# DRAFT 2020 URBAN WATER MANAGEMENT PLAN

CITY OF
ROSEVILLE
CALIFORNIA

# City of Roseville Draft 2020 Urban Water Management Plan

May 2021


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## Abbreviations

| | |
|---|---|
| Acre(s) | ac |
| Acre Feet | AF |
| Acre Feet Per Year | AF/yr |
| American Community Survey | ACS |
| American River Basin | Basin |
| American River Basin Study | ARBS or Study |
| Aquifer Storage Recovery | ASR |
| Average Dry Weather Flow | ADWF |
| Barton Road Water Treatment Plant | BRWTP |
| California Department of Finance | CDoF |
| California State Groundwater Elevation Monitoring Program | CASGEM |
| California Water Code | CWC |
| California-American Water Company | Cal-Am |
| Central Valley Project Municipal and Industrial Water Shortage Policy | CVP M&I WSP |
| Citrus Heights Water District | CHWD |
| City of Roseville | COR or Roseville |
| City of Roseville Water Utility | City |
| Compressed Natural Gas | CNG |
| Cubic Feet Per Second | cfs |
| Degrees Fahrenheit | °F |
| Department of Water Resources | DWR |
| Drought Risk Assessment | DRA |
| Dwelling Unit | DU |
| Environmental Impact Statement | EIS |
| Environmental Utilities | EU |
| Equivalent Dwelling Unit | EDU |
| Gallons Per Day per Dwelling Unit | Gpd/DU |
| Gallons Per Minute | gpm |
| Groundwater Management Plan | GWMP |
| Groundwater Sustainability Agency | GSA |
| Groundwater Sustainability Plan | GSP |
| Hot Scenarios | HD, HW |
| Maximum Contaminant Level | MCL |
| Middle Fork Project | MFP |
| Million Gallon(s) | MG |
| Million Gallons Per Day | MGD |
| Model Water Efficient Landscape Ordinance | MWELO |
| Municipal and Industrial | M&I |
| National Pollutant Discharge Elimination System | NPDES |
| Operations Criteria and Plan | OCAP |

| | |
|---|---|
| Parts Per Million | ppm |
| Potential Evapotranspiration | PET |
| Placer County Water Agency | PCWA |
| Pounds Per Square Inch | psi |
| Regional Drought Contingency Plan/ Regional Water Reliability Plan | RWRP |
| Sacramento Suburban Water District | SSWD |
| San Juan Water District | SJWD |
| Senate Bill X7-7 | SB X7-7 |
| South Placer Municipal Utilities District | SPMUD |
| South Placer Wastewater Authority | SPWA |
| State of California Legislature | Legislature |
| State Water Project | SWP |
| Sustainable Groundwater Management Act | SGMA |
| Thousand Acre-Feet | TAF |
| United States Bureau of Reclamation | USBR |
| United States Bureau of Reclamation | USBR |
| Urban Water Management Plan | UWMP |
| Urban Water Management Plan Guidebook 2020 | Guidebook |
| Urban Water Retail Supplier | Supplier |
| Warm Scenarios | WD, WW |
| Wastewater Treatment Plant | WWTP |
| Water Demand Tracking Tool | Tool |
| Water Forum Agreement | WFA |
| Water Shortage Contingency Plan | WSCP |
| Water Storage Investment Program | WSIP |
| Water Treatment Plant | WTP |
| Western Placer Groundwater Sustainability Agency | WPGSA |

# Executive Summary

## ES. 1 Introduction

An Urban Water Management Plan (UWMP) is the legal and technical water management foundation for suppliers throughout California. A UWMP combines information from various sources that inform water supply and demand such as projects pertaining to local land use planning, regional water supply, infrastructure, and demand management. The City of Roseville Water Utility (City) participates in UWMP updates every five years, as required by law. Each UWMP update addresses all requirements pertaining to urban retail water suppliers in accordance with the Urban Water Management Planning Act and the Water Conservation Act of 2009, also referred to as Senate Bill X7-7 (SB X7-7). Information contained in this 2020 UWMP includes the component listed in the following section.

## ES. 2 Plan Components

The plan consists of the following components:

- **Chapter 1:** The basis for preparing a plan and the new requirements.
- **Chapter 2:** Summary of how the plan is prepared and coordination with the public and other local and regional authorities.
- **Chapter 3:** A description of the City's treatment facilities and distribution infrastructure, as well as a description of the population and area served by the City.
- **Chapter 4:** Quantification of water use for the 5-years preceding the plan update and water use projections for a 20-year planning horizon.
- **Chapter 5:** Supporting data for compliance with SB X7-7.
- **Chapter 6:** Description of existing and planned water supplies and water supply management.
- **Chapter 7:** A drought risk assessment (DRA), which analyzes water supplies and demands in a single year or multiple years of a water shortage.
- **Chapter 8**: The Water Shortage Contingency Plan (WSCP), which outlines the process that the City will execute in the event of a water shortage.
- **Chapter 9:** Demand measures that the City integrates and plans to integrate into its regular operations to address increasing demands.
- **Chapter 10:** Record of the process by which the UWMP was adopted, submitted, and implemented with the intention of making the plan widely available to the City's customers and the public.

## ES. 3 Basis for Plan Preparation and Coordination

Urban water retail suppliers (suppliers) who either deliver 3,000-acre feet (AF) or more of water or have over 3,000 service connections are required to submit a UWMP. In 2020 the City had 46,112 service connections and supplied a total of 31,896 AF to its customers and therefore is required to prepare and submit an UWMP.

In preparation of the UWMP the City coordinated with the U.S. Bureau of Reclamation (USBR), Placer County Water Agency (PCWA), and San Juan Water District (SJWD), all of which supply water to the city on a wholesale basis. The City also actively sought involvement from the public and other local water agencies. Neighboring water retail suppliers and the community were informed of a public hearing to be held June 16, 2021. In this public hearing the plan will be presented, and attendees are encouraged to share questions and concerns prior to the presentation of the UWMP in the City Council meeting which will be held on June 16, 2021, during which the plan will be adopted.

### ES. 4 System and Supply Description

Raw water from Folsom Lake, the City's primary water source, is conveyed to the City's water treatment plant located in the Granite Bay area and is then distributed through the City's 600 miles of water mains to customers. Other water facilities that the City maintains include potable water storage tanks, pump stations, interties to exchange water with other water agencies, and groundwater wells.

The City receives its contract supplies purchased from USBR, PCWA, and SJWD through Folsom Reservoir. The City currently has 8 wells, 6 of which are in service, and is planning to expand their groundwater program as a means to having a more robust water supply available in the event of a water shortage condition. The City is also considering contract amendments with water agencies that would increase overall water supply resilience.

### ES. 5 Past and Projected Water Use

The City supplies water to customers for the following water use sectors:

- Commercial
- Industrial
- Institutional and Governmental
- Multi-Family Residential
- Single Family Residential
- Landscape

The UWMP characterizes water use by sector for the years preceding the plan update as well as projections of water use for the next 25 years. Projections in the 2020 UWMP differ significantly from 2015 projections as a result of the rapid development pace observed in Roseville since the last plan update. When the 2015 UWMP was prepared the City of Roseville's General Plan anticipated that buildout of planned development would be reached in 2065. The City of Roseville updated the General Plan in August 2020 and current estimations, reflecting the pace of development, now indicate buildout of planned development will be complete by 2035. The City has taken a long-term approach to its overall water strategy planning and has planned for a population of up to 198,000 for 2035. The actual volume of water used by each sector for 2020 and updated water use projections through the year 2045 are summarized in ES Table 1.

**ES Table 1** Actual 2020 Water Use and Projected Water Use through the Year 2045.

| Water Use Sector | 2020 | 2025 | 2030 | 2035 | 2040 | 2045 |
|---|---|---|---|---|---|---|
| Commercial | 2,630 | 6,135 | 6,508 | 7,017 | 7,017 | 7,017 |
| Industrial | 254 | 4,175 | 4,726 | 5,123 | 5,123 | 5,123 |
| Institutional/ Governmental | 412 | 8,904 | 9,494 | 10,321 | 10,321 | 10,321 |
| Multi-Family | 1,416 | 1,752 | 2,029 | 2,725 | 2,725 | 2,725 |
| Single Family | 17,115 | 22,564 | 24,508 | 26,281 | 26,281 | 26,281 |
| Landscape | 6,422 | 644 | 765 | 805 | 805 | 805 |
| Losses | 1,600 | 1,429 | 1,401 | 1,587 | 1,587 | 1,587 |
| Groundwater recharge | 597 | 1,560 | 2,720 | 3,350 | 3,350 | 3,350 |
| **Total** | **30,445** | **47,163** | **52,151** | **57,210** | **57,210** | **57,210** |
| NOTES: All values are in AF/yr. Values represent potable water use only. | | | | | | |

## ES. 6 SB X7-7

SB X7-7 called for a 20% reduction of water use from all retail water suppliers by the year 2020. In the 2015 UWMP the City calculated a 10-year and 5-year baseline period to determine an average baseline gallon per capita per day (GPCD) water use. This baseline demand was calculated to be 309 GPCD in accordance with the SB X7-7 standard methods. The 2020 target compliance water demand was 247 GPCD, a 20% reduction of the baseline. In 2020 the average demand for the City was 203 GPCD, which represents an approximately 34% reduction of the baseline demand. As such, the City is compliant with SB X7-7.

## ES. 7 Supply Reliability and Drought Risk Assessment and Water Shortage Contingency Plan

A supply reliability and drought risk assessment were performed. The assessments considered the supply available for a single-year and five-year consecutive drought period for both the near-term and long-term. The supply availability was compared to the total water use to determine if a deficit is projected for any of the conditions. The supply availability is subject to seasonal and climatic shortages and so in a dry or critically dry years increasing limitations are placed on the City for volume of water that they receive from Folsom Lake. The supply and drought risk assessment demonstrated that there may be minor deficits in supply versus demand conditions under certain drought related circumstances. These minor shortages may occur in the near-term extended drought scenario as well as over the longer term for both extended and single year drought conditions. The highest level of deficiency identified represents less than 8% of the annual demand and can be remedied by the simple application of basic conservation measures, estimated to achieve 13% savings. The results of the drought risk assessment are summarized in ES Table 2.

**ES Table 2** Near-Term and Long-Term Drought Risk Assessment Summary

| Drought Type Assessed | Deficit Range | Description of Anticipated Deficit |
|---|---|---|
| Near-Term 5 Consecutive Dry Years | 1,647 | Deficit Expected in fifth year only |
| Long-Term Single Dry Year | 1,647 – 1,824 | Deficit expected in 2025-2045 |
| Long-Term 5 Consecutive Dry Years | 7 – 4,904 | Deficit expected in fourth year for 2025-2045 |
| | 1,647 – 1,824 | Deficit expected in fifth year of drought for 2025-2045 |
| NOTES: All values are in AF/yr. | | |

To mitigate the projected deficits in a water shortage, a Water Shortage Contingency Plan (WSCP) was prepared. The WSCP outlines the procedures that the City will take annually to determine whether there will be a water deficit based on projected water demand and supply availability. If a deficit is anticipated the City will formally declare a water shortage emergency condition of varying levels dependent on the severity of the deficit. The declaration of the water shortage emergency condition will trigger a set of demand reduction actions that is to be carried out by the City and all water users. These demand reduction actions are set forth in the Roseville Municipal Code Chapter 14.09 Water Conservation and Drought Mitigation Ordinance. The legal authority of the City to enforce compliance with the demand reduction actions is granted by the Water Conservation and Drought Mitigation Ordinance.

## ES. 8 Demand Management Measures

Aside from the demand reduction actions of the Water Conservation and Drought Mitigation Ordinance, the City has taken a proactive approach to managing demand under normal conditions as well. Demand management measures include accurate metering through a meter retrofit program which was implemented from 2001 to 2011, public education and outreach, and regional rebate programs for efficient water use fixtures. System losses, typically losses due to leaks in the pipe network, can account for a significant portion of water demand. The City continues to be proactive in its approach to address leaks in the system and reduce the overall losses, including an active acoustic leak detection program to identify and repair leaks throughout the distribution system, working to reduce overall system losses.

## ES. 10 Plan Adoption and Submittal

The 2020 UWMP will be presented to City Council on June 16, 2021 for adoption. The 2020 UWMP will subsequently be submitted to the California Department of Water Resources for compliance with the Urban Water Management Planning Act. Copies of the plan have been made publicly available at the City's offices and an electronic version is also available for review and download on the City's website: www.roseville.ca.us/UWMP.

# Chapter 1 Urban Water Management Plan Purpose and Description

This chapter introduces the Urban Water Management (UWMP) including legislation requiring urban water retail suppliers to submit UWMPs, necessary information required to be reported in the 2020 UWMP, an overview of the changes to legislation since the 2015 City of Roseville UWMP, and a description of benefits to the supplier and its customers in completing a UWMP.

## 1.1 California Legislation

The Urban Water Management Planning Act was enacted in 1983 by the State of California Legislature (Legislature). The law established the requirement that an urban water supplier (supplier), providing municipal water to over 3,000 customers or 3,000 acre-feet (AF) annually, adopt an UWMP every five years. The aim of the Urban Water Management Planning Act was to address declarations and findings of the California Water Code (CWC):

*California Water Code Section 10610.2*

*(a) The Legislature finds and declares all of the following:*
*(1) The waters of the state are a limited and renewable resource subject to ever-increasing demands.*
*(2) The conservation and efficient use of urban water supplies are of statewide concern; however, the planning for that use and the implementation of those plans can best be accomplished at the local level.*
*(3) A long-term, reliable supply of water is essential to protect the productivity of California's businesses and economic climate, and increasing long-term water conservation among Californians, improving water use efficiency within the state's communities and agricultural production, and strengthening local and regional drought planning are critical to California's resilience to drought and climate change.*
*(4) As part of its long-range planning activities, every urban water supplier should make every effort to ensure the appropriate level of reliability in its water service sufficient to meet the needs of its various categories of customers during normal, dry, and multiple dry water years now and into the foreseeable future, and every urban water supplier should collaborate closely with local land-use authorities to ensure water demand forecasts are consistent with current land-use planning.*
*(5) Public health issues have been raised over a number of contaminants that have been identified in certain local and imported water supplies.*
*(6) Implementing effective water management strategies, including groundwater storage projects and recycled water projects, may require specific water quality and salinity targets for meeting groundwater basins water quality objectives and promoting beneficial use of recycled water.*
*(7) Water quality regulations are becoming an increasingly important factor in water agencies' selection of raw water sources, treatment alternatives, and modifications to existing treatment facilities.*
*(8) Changes in drinking water quality standards may also impact the usefulness of water supplies and may ultimately impact supply reliability.*
*(9) The quality of source supplies can have a significant impact on water management strategies and supply reliability.*

Additionally, efforts aimed at protecting California's water supply were expanded in 2009 with Senate Bill X7-7 (SB X7-7), where Governor Schwarzenegger called for a 20% reduction statewide in per capita water use by 2020.

## 1.2 Updates to 2020 UWMP

Since the reporting of the 2015 UWMP, there have been various requirements added by the Legislature to the CWC. Subsequent chapters of this report will provide necessary information to address requirements applicable to the City. The major new requirements are described in the following sections.

### 1.2.1 Lay Description

Pursuant to Section 10630.5, all plans are now required to include a lay description. This description shall include how much water the City has on a reliable basis, anticipated demands for the foreseeable future, the City's plan to meet those future demands, any challenges that the City will face in the future, and other information that will provide the public with an understanding of the City's 2020 UWMP.

The requirement for this lay description is met in the executive summary.

### 1.2.2 Water Loss Reporting

Pursuant to Section 10631(d)(3)(C), the 2020 UWMP shall include past water loss for the 5-years preceding the plan. The 2015 UWMP included water loss data from 2015 only.

### 1.2.3 Energy Use Information

Pursuant to 10631.2, the 2020 UWMP shall include any information related to the amount of energy consumed in various water processed to estimate the energy intensity.

### 1.2.4 Groundwater Supplies Coordination

Pursuant to 10631(b)(4)(A), if groundwater is identified as a source of water available to the supplier the 2020 UWMP shall coordinate with the current version of any groundwater sustainability plan adopted pursuant to 10720, Sustainable Groundwater Management Act, or any other authority for groundwater management for basins underlying the service area.

### 1.2.5 Five Consecutive Dry-Year Water Reliability Assessment

Pursuant to 10631(f), suppliers must now include a description of actions they will implement for a period of drought lasting five consecutive water years as opposed to the 2015 UWMP requirement, which was for multiple dry water years.

### 1.2.6 Drought Risk Assessment

Pursuant to 10635(b), all suppliers are required to include a drought risk assessment (DRA) in the UWMP. Interim updates to the DRA may be conducted by the supplier within the five-year cycle of the UWMP update.

### 1.2.7 Water Shortage Contingency Plan

Pursuant to Section 10632, every urban water supplier shall prepare and adopt a water shortage contingency plan (WSCP). The WSCP shall be included in the 2020 UWMP but is to be adopted separate from the UWMP with the intent that it be updated as needed independently of the UWMP.

### 1.2.8 Seismic Risk

Pursuant to 10632.5, suppliers shall include a seismic risk assessment and mitigation in the UWMP to assess vulnerabilities of the supplier's facilities. The seismic risk assessment and mitigation plan shall be updated when the UWMP is updated.

## 1.3 Benefits of UWMP Reporting

UWMP reporting for the City is required by the state and is a critical document for ensuring that the City remains compliant with various regulations. Additionally, completion of a UWMP demonstrating that the City addresses the requirements of the CWC is necessary to be eligible for any Department of Water Resources (DWR) administered grant or loan. Completion of the most recent UWMP may also be required for other state funding.

Beyond establishing grant or loan eligibility the UWMP is intended to be a useful tool for the supplier and the public. Thoughtful preparation of the plan provides the supplier an opportunity for forward thinking and planning, ensuring that their water supply remains robust in the future and continues to meet the dynamic needs of its customers. Throughout plan preparation the City, other suppliers, and local and regional authorities are encouraged to coordinate with one another creating a greater understanding of the region's water demands, ultimately promoting mindful utilization of the state's water resources.

## 1.4 Plan Organization

This UWMP was prepared in part by use of guidance issued by DWR via the *Urban Water Management Plan Guidebook 2020* (Guidebook). Organization of the plan chapters closely follows the suggested organization in the Guidebook. Where appropriate, submittal tables provided by DWR are used to report data; these tables are denoted by the suffix, "DWR Table". Additional data reporting is done in City of Roseville Tables denoted by the suffix, "COR Table".

# Chapter 2 Plan Preparation

This chapter provides an overview of the process by which the plan was prepared and the coordination that was carried out.

## 2.1 Basis for Preparing a Plan

The City of Roseville Water Utility (City) is a public water system (PWS), which is a system that provides drinking water for human consumption through pipes or other constructed conveyances. The City serves over 3,000 customers and delivers over 3,000 AF annually and as such is required to submit a UWMP. Metrics for total number of customers and volume of water supplied in the City's service area for 2020 are provided in DWR Table 2-1. The UWMP is required to be reviewed and updated every five years; preparation of this UWMP is an update to the most recent UWMP, adopted by the City of Roseville in 2016. As a water retail supplier, the City is also required to comply with the requirements of SB X7-7. This UWMP establishes the City's compliance with the Urban Water Management Planning Act and SB X7-7.

**DWR Table 2-1**

| Submittal Table 2-1 Retail Only: Public Water Systems | | | |
|---|---|---|---|
| Public Water System Number | Public Water System Name | Number of Municipal Connections 2020 | Volume of Water Supplied 2020 |
| 3110008 | City of Roseville | 46,112 | 30,445 |
| | **TOTAL** | 46,112 | 30,445 |
| NOTES: All volumes are in AF. Units of measure remain consistent throughout the UWMP as reported in DWR Table 2-3. | | | |

## 2.2 Individual or Regional Planning and Compliance

The CWC provides mechanisms for participating in area-wide regional, watershed or basin-wide urban water management planning. Per *Department of Water Resources Methodologies for Calculating Baseline and Compliance Urban Per Capita Water Use* (DWR Methodologies), water suppliers who receive water from a shared wholesale supplier may form a regional alliance. Although the City and its neighboring water suppliers practice regional water supply planning, the City has not formed a regional alliance with other water suppliers for compliance with SB X7-7. The City has prepared an individual UWMP, reporting solely on its own distribution service area and will not adopt a Regional Urban Water Management Plan (RUWMP), stated in DWR Table 2-2.

**DWR Table 2-2**

| Submittal Table 2-2: Plan Identification | | | |
|---|---|---|---|
| Select Only One | Type of Plan | | Name of RUWMP or Regional Alliance *if applicable* |
| ☑ | **Individual UWMP** | | |
| | ☐ | Water Supplier is also a member of a RUWMP | |
| | ☐ | Water Supplier is also a member of a Regional Alliance | |
| ☐ | **Regional Urban Water Management Plan (RUWMP)** | | |

## 2.3 Fiscal or Calendar Year and Units of Measure

General metrics for plan preparation are provided in DWR Table 2-3.

**DWR Table 2-3**

| Submittal Table 2-3: Supplier Identification | |
|---|---|
| Type of Supplier (select one or both) | |
| ☐ | Supplier is a wholesaler |
| ☑ | Supplier is a retailer |
| Fiscal or Calendar Year (select one) | |
| ☑ | UWMP Tables are in calendar years |
| ☐ | UWMP Tables are in fiscal years |
| If using fiscal years provide month and date that the fiscal year begins (mm/dd) | |
| Units of measure used in UWMP (select from drop down) | |
| Unit | AF |

## 2.4 Coordination and Outreach

This section discusses the City's coordination with other agencies and the public.

### 2.4.1 Wholesale and Retail Coordination

Pursuant to CWC Section 10631(j) the City is to coordinate with wholesale supply agencies that provide the City with water. The City has water supply contracts with Placer County Water Agency (PCWA), San Juan Water District (SJWD), and the U.S. Bureau of Reclamation (USBR). As a retail supplier the City has informed the three agencies of projected water use in five-year increments for the next 20 years. Documentation of this coordination is provided in Appendix A. DWR Table 2-4 lists those three agencies that the City has coordinated with.

**DWR Table 2-4**

| Submittal Table 2-4 Retail: Water Supplier Information Exchange |
|---|
| The retail Supplier has informed the following wholesale supplier(s) of projected water use in accordance with Water Code Section 10631. |
| Wholesale Water Supplier Name |
| U.S. Bureau of Reclamation |
| Placer County Water Agency |
| San Juan Water District |

### 2.4.2 Coordination with Other Agencies and the Community

The City has actively sought to coordinate preparation of the UWMP with local and regional agencies and the general public. The City recognizes that how it currently utilizes and plans to utilize its water supply affects not only its own customers, but customers served by neighboring water agencies and individuals or groups that rely on private wells. As the City is dedicated to the responsible and sustainable management of local and regional water resources it has invited participation from the agencies listed in COR Table 2-A. Documentation of this coordination is provided in Appendix B. On February 16, 2021, the City noticed the neighboring cities and counties that preparation of the 2020 UWMP update had begun. Additionally, the City will hold a public hearing on June 16, 2021 to introduce the 2020 UWMP to the public and solicit feedback and answer questions regarding the plan.

**COR Table 2-A** Outreach with Local and Regional Agencies

| Agency Name | Agency Type |
|---|---|
| U.S. Bureau of Reclamation | Wholesale Supplier |
| Placer County Water Agency | Water Supplier |
| San Juan Water District | Water Supplier |
| California American Water | Water Supplier |
| Citrus Heights Water District | Water Supplier |
| Sacramento Municipal utility District | Water Supplier |
| Sacramento Suburban Water District | Water Supplier |
| City of Roseville, City Manager | Local City |
| Placer County Public Works Department | Local County |
| Placer County Community Development Resource Agency | Local County |
| Regional Water Authority Sacramento | Regional Organization |

# Chapter 3 System Description

This chapter provides a description of the system including information on the distribution system; service area boundary; service area climate; service area population, demographics, and socioeconomics; and land uses within the service area.

## 3.1 General Description

The City of Roseville Water Utility (City) is a public utility owned and operated by the City of Roseville, which is on the interstate 80 corridor, approximately 15 miles northeast of downtown Sacramento California. The City obtains its surface water from Folsom Lake through wholesale purchase primarily from the United States Bureau of Reclamation (USBR) and additional water contracts with Placer County Water Agency (PCWA) and San Juan Water District (SJWD). The City also maintains and operates several production well sites that provide additional water supply reliability to the City with plans to construct more.

### 3.1.1 Transmission

The City has a diversion capacity of 150 cubic feet per second (cfs) or 96 million gallons per day (MGD) at Folsom Dam. From the pump station raw water is conveyed through parallel pipelines; the original 84-inch diameter pipeline constructed at the same time as the pump station and a 72-inch diameter pipeline completed in 2010 as a joint effort between the City and other water purveyors. The common facilities split at the “Hinkel Y”, and thereafter raw water is conveyed through parallel pipelines – a 60-inch diameter pipeline and a 48-inch diameter pipeline – to the City’s water treatment plant.

### 3.1.2 Water Treatment

The City’s single water treatment plant (WTP), located within the City but in the Granite Bay area, has a capacity of 100 MGD. There are no plans to expand the WTP as the WTP is sized just above the pumping capacity of the Folsom Dam pump station. The WTP is a conventional treatment plant. The treatment processes include flocculation and sedimentation, clarification, filtration, and disinfection. The treatment train, beginning with the intake at Folsom Lake, is shown in Figure 3-1.

Sedimentation takes place in three parallel clarifiers. The chemicals injected as part of the flocculation and sedimentation processes are caustic soda, alum, and a cationic polymer. Sedimentation takes place in three separate parallel clarifiers. There are 12 anthracite sand filters, which combined have a maximum filtration rate of about 83,000 gallons per minute (gpm). The clear wells have a total volume of 358,500 gallons. Disinfection is achieved using sodium hypochlorite. The City also adds fluoride to treated water at a concentration of 0.7 parts per million (ppm) prior to distribution.

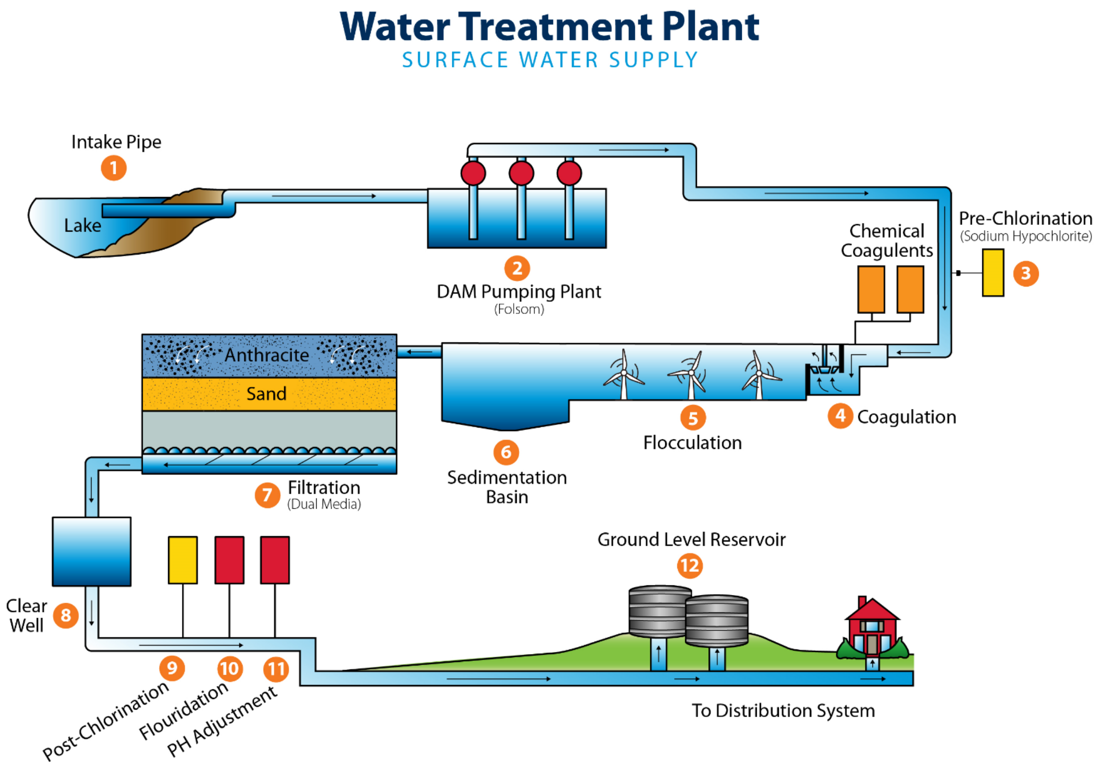



**Figure 3-1.** City of Roseville Water Treatment Plant Treatment Train

### 3.1.3 Storage

The City currently utilizes 6 potable water storage tanks, which are critical for maintaining water supply and system pressure during typical demand fluctuations, peak demand fluctuations, and emergency demands. The six water storage tanks have a total nominal capacity of 32 million gallons (MG). The City is also actively constructing two additional water storage tanks which will add a combined capacity of 12 MG, bringing the total storage capacity to 44 MG. The capacity of each tank is listed in COR Table 3-A.

**COR Table 3-A** Potable Water Storage Tanks

| Facility | Existing or Future | Year Constructed | Type | Pressure Zone Served | Capacity (MG) |
|---|---|---|---|---|---|
| WTP | Existing | 1971 | Steel | 1, 2, 4, 5 | 2 |
| WTP | Existing | 1990 | Pre-Stressed Concrete | 1, 2, 4, 5 | 4 |
| WTP | Existing | 2004 | Pre-Stressed Concrete | 1, 2, 4, 5 | 6 |
| Northeast | Existing | 1998 | Pre-Stressed Concrete | 1, 2, 4, 5 | 10 |
| Northeast | Existing | 2009 | Pre-Stressed Concrete | 1, 2, 4, 5 | 7.25 |
| Halverson | Existing | 2008 | Pre-Stressed Concrete | 2 | 2.9 |
| West Side | Future | 2022 | Pre-Stressed Concrete | 4 | 12 |

### 3.1.4 Distribution Network

The City maintains a distribution network consisting of approximately 600 miles of pressure pipe ranging from 1 inch to 72 inches in diameter. The network of pipe delivers potable water from the WTP to the City's customers to meet water demands during average day, maximum day, and peak hour conditions. The City aims to operate its system at a minimum pressure of 50 pounds per square inch (psi). Under existing conditions, the City mostly meets the minimum pressure criterion, with few instances where the minimum criteria are not met. These instances are not considered to be significant enough to impact the quality of customer's water service.

There are several specific plans for the City of Roseville which are in the process of being developed or will be developed in coming years. The City will serve these customers through new facilities which were designed during project development and that will be constructed by the developer and incorporated into the City's distribution network. The West Side Tank site will include a pump station with a pumping capacity of 20 MGD at the end of this construction phase, which is anticipated to be completed in 2022, but is designed to have a maximum capacity of 26.6 MGD at buildout. The existing and planned pump stations are summarized in COR Table 3-B.

**COR Table 3-B** Potable Water Pump Stations

| Facility | Existing or Future | Pressure Zone Served |
|---|---|---|
| Dual Purpose Pump Station | Existing | 1, 2 |
| Highland Reserve North Pump Station | Existing | 5 |
| Pleasant Grove Pump Station | Existing | 1 |
| Pacific Fruit Express (PFE) Pump Station | Existing | Emergency Intertie |
| West Side Pump Station | Future | 4 |

### 3.1.5 Groundwater Wells

The City currently operates 6 groundwater wells, which have a combined capacity of approximately 17,500-acre feet per year (AF/yr) or 15.6 MGD. Capacities of each operational well site are listed in COR Table 3-C. During the 2015 drought the water level in Folsom Lake was the lowest on record, which resulted in fluctuations in water supply. Consequently, the City sought to expand the existing ground water supply program to decrease reliability on Folsom Lake and to provide flexibility. To do so the City plans to utilize Aquifer Storage and Recovery (ASR) technology. ASR is the recharge of water in an aquifer through specially designed groundwater wells and recovery of water from that same well or others after time has passed. During times when there are excess surface water supplies, surface water can be injected using the ASR production wells and extracted during dry periods or when additional surface water is needed for the environment or other beneficial needs. Four of the existing operational wells have ASR capabilities, and the City plans to construct 6 additional wells with ASR capabilities by 2035.

**COR Table 3-C** Existing Operational Wells

| Facility | Install/Rehab Date | Well Depth (Feet) | Zone Served | Pumping Capacity (MGD) |
|---|---|---|---|---|
| Darling Way, No. 4 | 1958/ 1999 | 303 | 1 | 1.3 |
| Oakmont, No. 5 | 1978/ 1999 | 360 | 1 | 2.1 |
| Diamond Creek, No. 6 | 2002 | 460 | 4 | 4.0 |
| Woodcreek North, No. 7 | 2008 | 440 | 1 | 2.2 |
| Hayden Parkway, No. 8 | 2015 | 520 | 4 | 3.1 |
| Blue Oaks Boulevard, No. 12 | 2015 | 490 | 4 | 3.2 |

## 3.1.6 Interties

There are 17 interties with the surrounding jurisdictions of PCWA, SJWD, California-American Water Company (Cal-Am), Citrus Heights Water District (CHWD), and Sacramento Suburban Water District (SSWD). Each intertie is listed in COR Table 3-D.

**COR Table 3-D** Interties with Neighboring Water Suppliers

| Intertie Agency | Facility | Year Constructed | Operational Control Agency | Control Valve Size (Inches) | Agency Receiving Water | Avg. Days/ Yr. Utilized 2015-2020 | Days Utilized 2020 |
|---|---|---|---|---|---|---|---|
| SJWD | WTP | 1996 | Roseville | 16 | Roseville | >1 | 0 |
| | Eureka | 1999 | Roseville | 12 | Roseville | 0 | 0 |
| | Cavitt Stallman | 1999 | Roseville | 12 | Roseville | 0 | 0 |
| PCWA | Five Star | 1995 | PCWA | 12 | Roseville | 0 | 0 |
| | Stoneridge | 1998 | Roseville | 12 | PCWA | 274 | 274 |
| | Highland Park | 2000 | Roseville | 12 | PCWA | 0 | 0 |
| | Pleasant Grove | 2000 | PCWA | 12 | Roseville | 0 | 0 |
| | Industrial – Tinker | 1989 | Roseville | 16 | Roseville | 361 | 361 |
| | Bianchi Estates | 2000 | PCWA | 12 | | 365 | 365 |
| Cal-Am | Crowder | 2001 | Cal-Am | 12 | Cal-Am | 365 | 365 |
| | PFE | 2005 | Roseville | 16 | Cal-Am | 354 | 365 |
| | Vernon Oaks | 1988 | Roseville | 12 | Cal-Am | 0 | 0 |
| | Vineyard Rd | 1990 | Cal-Am | | Cal-Am | 365 | 365 |
| CHWD | Orlando | 1989 | Roseville | 6 | CHWD | 0 | 0 |
| | Blossom Hill | 1986 | Roseville | 10 | CHWD | 0 | 0 |
| | Fairway | 2017 | Roseville | 8 | CHWD | 0 | 0 |
| SSWD | PFE/ North Antelope | 2005 | Roseville | 20 | Both | 0 | 0 |

### *3.1.6.1 San Juan Water District Interties*

The three interties that exist between the City and SJWD under normal operations remain closed and are only intended for emergency use. The intertie at the WTP delivers water from SJWD to the City only. The Eureka and Cavitt Stallman interties deliver water to and from the City.

#### *3.1.6.2 Placer County Water Agency Interties*

All interties between the City and PCWA, except for the Bianchi estates intertie, can deliver water into the City. The Highland Park and Pleasant Grove interties cannot deliver water from the City to PCWA, but the other four remaining interties can. Through these interties a maximum of 11.5 MGD can be delivered to the City and 12.0 MGD can be delivered to PCWA. Three of the six PCWA interties under normal operations remain opened. The Stoneridge intertie regularly pumps water from the City to PCWA. The Bianchi Estates intertie is regularly kept open as it feeds PCWA's Bianchi Estates system and is the only source of supply for that area. The Industrial- Tinker intertie is normally open in order to deliver water from PCWA to Cal-Am through the Crowder and PFE interties.

#### *3.1.6.3 California American Water Company Intertie*

Only the PFE intertie can deliver water to the City and is intended for emergency use with a maximum capacity of 3.5 MGD. Both the Crowder intertie and Vineyard interties cannot deliver water to the city. All three interties can deliver water from the City to Cal-Am and are normally open with a total maximum capacity of 8.35 MGD. The water that is delivered to the Crowder and Vineyard Rd interties is from the PCWA Tinker intertie.

#### *3.1.6.4 Citrus Heights Water District*

The three interties between the City and CHWD can all be used to deliver water to and from the City. All three are intended for emergency use and under normal operating conditions remain closed.

#### *3.1.6.5 Sacramento Suburban Water District Intertie*

The intertie between the City and SSWD is part of regional development of conjunctive use programs. During an emergency or drought years, the PFE pump station will pump water from SSWD's service area into zone 1 of the City. Likewise, this intertie can be used to deliver water from the City to SSWD. A mutual aid agreement between the City and SSWD is currently being developed.

## 3.2 Service Area

The City's service area boundary lies within the limits of the City of Roseville. There are a few small areas within the city limits that are served by PCWA, SJWD, and CHWD. The service area is approximately 3,150 acres (ac). The service area and the facilities mentioned in section 3.1 are shown in Figure 3-2.

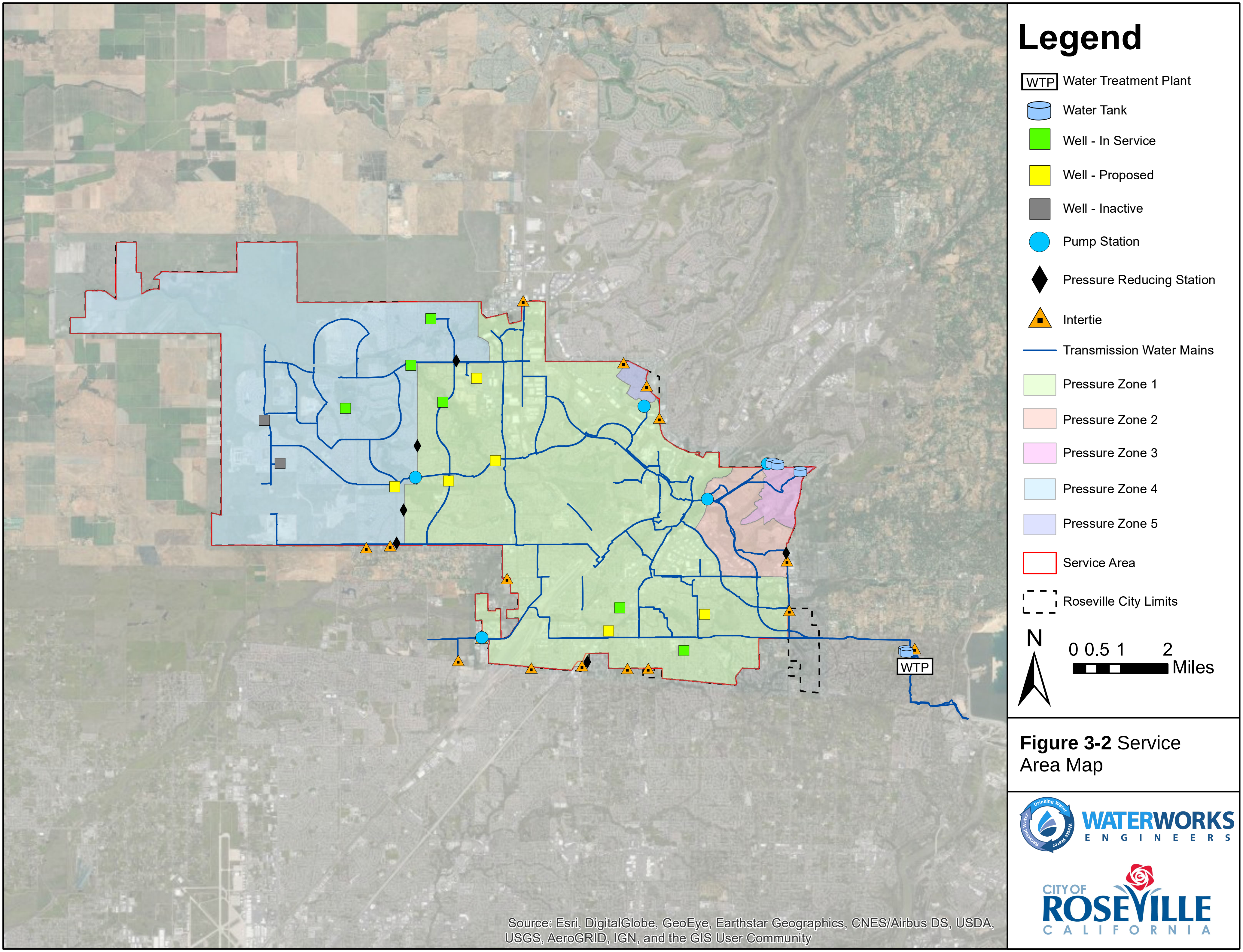



**Figure 3-2** Service Area Map

## 3.3 Service Area Climate

The service area experiences cool and humid winters and hot and dry summers. The City of Roseville's climate is similar to the City of Sacramento, which is in close proximity. Historical climate data was obtained from California Irrigation Management Information System (CIMIS) for station 155, which is located in Sacramento, for the reporting period of this UWMP and is summarized in COR Table 3-E. The average monthly temperature from 2016 to 2020 ranged from 39.8 degrees Fahrenheit (°F) to 95.1 °F. Typically the wet season begins in October and ends in May, with an average annual total precipitation of 13.3 inches.

**COR Table 3-E** Monthly Average Climate Data from 2016 through 2020

| Month | Average Minimum Temperature (°F) | Average Maximum Temperature (°F) | Average Temperature (°F) | Average Monthly Precipitation (inches) |
|---|---|---|---|---|
| January | 42.7 | 56.3 | 49.5 | 3.6 |
| February | 42.5 | 61.7 | 52.1 | 1.7 |
| March | 46.3 | 64.7 | 55.5 | 2.3 |
| April | 50.6 | 73.3 | 62.0 | 0.8 |
| May | 54.2 | 80.6 | 67.4 | 0.8 |
| June | 59.2 | 90.5 | 74.9 | 0.0 |
| July | 60.9 | 95.1 | 78.0 | 0.0 |
| August | 61.3 | 92.4 | 76.9 | 0.0 |
| September | 58.9 | 87.5 | 73.2 | 0.0 |
| October | 51.7 | 78.2 | 65.0 | 0.7 |
| November | 44.7 | 65.0 | 54.9 | 1.2 |
| December | 39.8 | 56.7 | 48.3 | 2.1 |
| Averages | 51.1 | 75.2 | 63.1 | 1.1 |

## 3.4 Service Area Population and Demographics

This section describes the population, demographic, and employment conditions of the City's water service area during the reporting period of the UWMP as well as future projections through 2045.

### 3.4.1 Service Area Population

Water use is directly tied to a service area's population and analyzing population growth and development trends is critical for the City's planning of water distribution facilities and infrastructure. Current and projected service area population estimates are provided in DWR Table 3-1. These projections differ from total population as a small number of City residents are served by adjacent water purveyors. The projections were estimated in coordination with the City of Roseville's General Plan, direct input from the City of Roseville's Planning Division, and previous studies performed by the City's Environmental Utilities Division. Methods for estimating population projections are further discussed in 5.2.

**DWR Table 3-1**

| Submittal Table 3-1 Retail: Population - Current and Projected | | | | | | |
|---|---|---|---|---|---|---|
| Population Served | 2020 | 2025 | 2030 | 2035 | 2040 | 2045 |
| | 140,187 | 151,742 | 170,526 | 193,190 | 193,190 | 193,190 |

### 3.4.2 Social, Economic, and Demographic Factors

The City of Roseville's population in 2019, according to the American Community Survey (ACS), was reported to be 68.2% White alone (not Hispanic or Latino), 14.5% Hispanic or Latino, 10.1% Asian alone, 2.8% Black alone, and all other race categories were less than 1%. A summary of all race categories surveyed is provided in COR Table 3-F. The United States Census Bureau reports that the median household income from 2015-2019 was $89,082. ACS reports that in 2019 8.4% of the population was in poverty and 16.5% of the population was 65 years of age and over. The social, economic, and demographic factors are not believed to affect water management and planning.

**COR Table 3-F** City of Roseville 2019 Population by Race

| Race Category | Percentage |
|---|---|
| American Indian and Alaska Native alone, not Hispanic or Latino | 0.3% |
| Asian alone, not Hispanic or Latino | 10.1% |
| Black alone, not Hispanic or Latino | 2.8% |
| Hispanic or Latino | 14.5% |
| Native Hawaiian and other Pacific Islander alone, not Hispanic or Latino | 0.1% |
| White alone, not Hispanic or Latino | 68.2% |
| Some other race alone, not Hispanic or Latino | 0.0% |
| Two or more races alone, not Hispanic or Latino | 3.9% |

## 3.5 Land Uses within the Service Area

A new requirement of the California Water Code, since the 2015 UWMP was published, requires that land use projections be coordinated with other local and regional land use authorities.

> *California Water Code 101631.*
>
> *(a) The description shall include the current and projected land uses within the existing or anticipates service area affecting the supplier's water management planning. Urban water suppliers shall coordinate with local or regional land use authorities to determine the most appropriate land use information, including, where appropriate, land use information obtained from local or regional land use authorities, as developed pursuant to Article 5 (commencing with section 65300) of Chapter 3 of Division 1 of Title 7 of the Government Code.*

In August 2020, the City of Roseville completed its update to the General Plan, with a planning horizon that extends into 2035. The General Plan includes the Land Use Element, which is provided in Appendix C. The Land

Use Element discusses existing and future land use conditions, with an intended purpose of setting guidelines for managing land use change. The City of Roseville has both residential and non-residential land uses; density and intensity guidelines for each land use type respectively are set forth in the Land Use Element. The land use categories as well as corresponding characteristics from the Land Use Element are summarized in COR Table 3-G and COR Table 3-H.

**COR Table 3-G** Residential Land Uses and Development Guidelines

| Land Use Category | Dwelling Units Per Acre | Estimated Population Per Gross Acre |
|---|---|---|
| Low-Density Residential (LDR) | 0.5 – 6.9 | 1.45 – 20.1 |
| Medium-Density Residential (MDR | 7.0 – 12.9 | 20.3 – 37.41 |
| High-Density Residential (HDR) | ≥ 13 | ≥ 27.3 |

**COR Table 3-H** Non-Residential Land Uses and Development Guidelines

| Land Use Category | Floor to Area Ratio |
|---|---|
| Neighborhood Commercial (NC) | 20% - 40% |
| Community Commercial | 20% - 40% |
| Regional Commercial | 20% - 40% |
| Business Commercial | 20% - 40% |
| Light Industrial | 20% - 50% |
| Tech/ Business Park | 20% - 50% |
| General Industrial | 20% - 50% |
| Transfer Station | Varies |
| Central Business District | ≤ 300% |
| Public/ Quasi-Public | Varies |

# Chapter 4 Water Use Characterization

This chapter provides a description and quantification of the City's past and current water use and future water use projections through the year 2045. Projections provided herein were coordinated with other local and regional planning documents in an effort to develop reliable water use projections.

## 4.1 Non-Potable Versus Potable Water Use

The City utilizes both potable and non-potable water to meet the diverse water needs of the customers within the service area. Potable water is water that is safe to drink and meets all California drinking water regulations per Title 22. The City's potable water supplies consist of surface water treated at the WTP, groundwater from various wells throughout the City that is chemically treated on site, finished water wheeled from other agencies through interties, and raw water received from other agencies through interties which is subsequently treated at the WTP.

Additionally, the City supplies recycled water, which is non-potable water for approved uses. Recycled water is wastewater that is treated to Title 22 disinfected tertiary standards. The City operates two wastewater treatment plants (WWTPs), Dry Creek and Pleasant Grove, both of which treat wastewater to the high standard required of recycled water. The recycled water produced at the WWTPs is distributed in a separate system from the potable water system and is utilized for landscape irrigation, environmental releases, cooling water, and construction uses.

Lastly, the City delivers raw water, which is also non-potable, to Linda Creek outside of the City's service area. Raw water is untreated water that is used in its natural state or with minimal treatment. The City is required to discharge 404 AF to Linda Creek as part of its instream flow commitment. The City does not deliver raw water to any of its customers within the service area.

## 4.2 Past, Current, and Projected Water Use by Sector

The following sections describe and quantify past, current, and projected water use. Water uses are delineated by various sectors. Additionally, the new requirement of the 2020 UWMP requiring quantification of system water losses for the five years preceding this plan are reported as follows.

### 4.2.1 Water Use Sectors Listed in Water Code

Water Code Section 10631(d) requires that water uses be identified for at least the ten following sectors; definitions for each of the sectors are adapted from those provided in the Guidebook.

- **Single-family residential** – A single family dwelling unit. A lot with a free-standing building containing one dwelling unit that may include a detached secondary dwelling. This is a retail demand.
- **Multifamily** – Multiple dwelling units contained within one building or several buildings within one complex. This is a retail demand.
- **Commercial** – A water user that provides or distributes a product or service. Water Code 10608.12(d). This is a retail demand.
- **Industrial** – Water user that is primarily a manufacturer or processor of materials as defined by the North American Industry Classification System (NAICS) code sectors 31 to 33, inclusive, of an entity that is a water user primarily engaged in research and development. Water Code Section 10608.12(h). This is a retail demand.

- **Institutional and governmental** – A water user dedicated to public service. This type of user includes, among other users, higher-education institutions, schools, courts, churches, hospitals, government facilities, and nonprofit research institutions per Water Code Section 10608.12(i). This is a retail demand.
- **Landscape** – Water connections supplying water solely for landscape irrigation. Such landscapes may be associated with multi-family, commercial, industrial, or institutional/governmental sites, but are considered a separate water use sector if the connection is solely for landscape irrigation. This is a retail demand.
- **Sales to other agencies** – These are water sales made to another agency. Projected sales may be based on projected demand provided by the receiving water supplier. This is a wholesale demand.
- **Saline Water Intrusion barriers, groundwater recharge, or conjunctive use, or any combination thereof** – *Conjunctive use* is a water management strategy where surface water and groundwater are managed together to increase the total water supply. For purposes of the UWMP, conjunctive use is seen as a management strategy rather than as a water use. This type of water use is best reported as groundwater recharge. *Groundwater recharge* can occur through both natural and artificial means. In the context of this UWMP, artificial groundwater recharge is the managed and intentional replenishment of natural groundwater supplies using techniques such as infiltration basins or injection wells. Water used for groundwater banking or storage may also be reported using this sector. If all, or a portion of, the groundwater recharge is subsequently pumped out of the basin in the same year, that water is reported as a supply from groundwater. *Saline water intrusion barrier* is the practice of injecting water into a freshwater aquifer to prevent the intrusion of saltwater. These may be either a wholesale or retail demand. The City currently does not have any demands under this water use sector.
- **Agricultural** – Water used for commercial agricultural irrigation. Water used for processing agricultural products (e.g., food, beverage, or textile manufacturing) may also be considered industrial process water. This may be either a wholesale or retail demand. The City currently does not have any demands under this water use sector.
- **Distribution system water losses** – Losses that were reported in accordance with the 12-month water loss for each of the prior five years.

### 4.2.2 Water Use Sectors in Addition to Those Listed in Water Code

Presently, the City has no additional water use sectors outside of the ten listed in CWC. Furthermore, the City expects that future water use will be restricted to the same sectors by which water is currently used based on land use projections from the Land Use Element.

### 4.2.3 Past Water Use

Past potable water use by sector was analyzed to estimate water use projections into the next 25 years, as required by the CWC. By examining past water use, trends can be understood such as, effects of temporary use restrictions during drought years, effects of long-term demand management measures, and the changing profile of service connections by water use sector. Past water uses from the last two UWMP years, 2010 and 2015, as well as the five years preceding this plan are summarized in COR Table 4-A.

**COR Table 4-A** Past Potable Water Use Volumes by Sector.

| Water Use Sector | 2010 | 2015 | 2016 | 2017 | 2018 | 2019 |
|---|---|---|---|---|---|---|
| Commercial | 2,042 | 1,930 | 2,101 | 2,218 | 2,565 | 3,021 |
| Industrial | 891 | 934 | 954 | 921 | 797 | 276 |
| Institutional and Governmental | 667 | 561 | 650 | 770 | 384 | 393 |
| Multi-Family | 2,196 | 1,464 | 1,556 | 1,569 | 1,376 | 1,358 |
| Single-Family | 15,836 | 11,680 | 13,215 | 14,674 | 15,303 | 15,387 |
| Landscape | 5,534 | 4,152 | 4,691 | 5,491 | 5,656 | 5,974 |
| Other (1) | 272 | – | – | – | – | – |
| Total | 27,438 | 20,721 | 23,176 | 25,643 | 26,081 | 26,409 |
| NOTES: (1) In 2015 and subsequent years thereafter, all water demands are characterized by water use sectors defined in the CWC. All Volumes are in AF. | | | | | | |

### 4.2.4 Current Water Use

The City's potable and non-potable water uses for 2020 by sector are reported in DWR Table 4-1. There are no existing potable or non-potable demands for the use types of saline barriers, conjunctive use, or agricultural.

**DWR Table 4-1**

| Submittal Table 4-1 Retail: Demands for Potable and Non-Potable Water - Actual | | | |
|---|---|---|---|
| Use Type | 2020 Actual | | |
| Water Use Sector | Additional Description | Level of Treatment | Volume |
| Commercial | Including non-metered | Drinking Water | 2,630 |
| Industrial | Including non-metered | Drinking Water | 254 |
| Institutional/Governmental | Including non-metered | Drinking Water | 412 |
| Multi-Family | Including non-metered | Drinking Water | 1,416 |
| Single Family | Including non-metered | Drinking Water | 17,115 |
| Landscape | Including non-metered | Drinking Water | 6,422 |
| Losses | Including non-metered | Drinking Water | 1,600 |
| Sales/Transfers/Exchanges to other Suppliers | Including non-metered | Drinking Water | 1,451 |
| Groundwater recharge | Excludes groundwater pumped and supplied to distribution system. | Drinking Water | 597 |
| Sales/Transfers/Exchanges to other Suppliers | Discharge to Linda Creek and water wheeled on behalf of SJWD | Raw Water | 404 |
| | | **TOTAL** | 32,300 |
| NOTES: All volumes are in AF. Losses are for potable water only. The 2020 Water Audit has not been validated at the time of plan preparation and final losses reported in the validated Water Audit may differ. | | | |

### 4.2.5 Projected Water Use

The City frequently completes studies aimed at understanding future water use demands to determine the reliability of system supplies and identify and plan for any vulnerabilities. As stated in 3.4.1, the service area population directly impacts water use demands. To estimate projected water use through 2045, the following approach and resources were utilized:

**Assumptions:**

- The Planning Division's population projection from the 2020 General Plan Land Use Element was utilized, which estimates a population of 198,000 at buildout of all planned development.
- Based on coordination with the City of Roseville's Planning Division, assumed that all planned development would be complete by 2035.
- Assumed that the population past 2035 would remain constant at 198,000 through 2045.
- An estimated 1,843 dwelling units in the City of Roseville are not served by the City. The number of dwelling units are estimated based on other utility accounts.

**Population Projection and Water Use Projection Steps**

1. Calculated the population not served by the City by multiplying the number of dwelling units and California Department of Finance (CDoF) household multiplier.
2. Subtracted the population not served by the City from the total CDoF City of Roseville population to obtain the service area population for 2016 through 2020.
3. Estimated the current percentage of development for each specific plan from aerial imagery.
4. Input current percentage of development into the City of Roseville's Environmental Utilities (EU) Department's Water Demand Tracking Tool, which calculates buildout water usage for each specific plan. Water use in the Tool is calculated by applying unit demand factors, specific to land use categories, to each of the dwelling units Demand factors and total water use for all specific plans are provided in COR Table 4-B and COR Table 4-C, respectively.
5. Plotted the service area population from 2016 through 2020 and the projected population for 2035 to approximate the population for 2025 and 2030 (Figure 4-1). The resultant population projections were previously summarized in DWR Table 3-1.
6. Updated the Water Demand Tracking Tool development percentage for 2025 and 2030 to reflect population projections and for 2035 to reflect 100% at buildout.

**COR Table 4-B** Unit Demand Factors for Land Use Type

| Residential Land Use Categories | Unit Demand Factor (gpd/DU) |
|---|---|
| Low Density Residential 1 – LDR1 (<3.5 DUs/Acre) | 728 |
| Low Density Residential 2 – LDR2 (3.5 to 5 DUs/Acre) | 600 |
| Low/Medium Density Residential 1 – LMDR1 (>5 to 6 DUs/Acre) | 521 |
| Low/Medium Density Residential 2 – LMDR2 (>6 to 8 DUs/Acre) | 430 |
| Medium Density Residential – MDR (>8 to 12 DUs/Acre) | 323 |
| High Density Residential – HDR1 (>12 to 16 DUs/Acre) | 288 |
| High Density Residential – HDR2 (>16 DUs/Acre) | 177 |
| **Non-Residential Land Use Categories** | **Unit Demand Factor** |
| Community Commercial/Retail | 2598 |
| Business Professional | 2598 |
| Light Industrial | 2598 |
| Industrial | 2562 |
| Railyard | 109 |
| Elementary School | 3454 |
| High School | 4069 |
| Public/Quasi Public | 1780 |
| Parks | 2988 |
| Open Space/Right of Way | 0 |

**COR Table 4-C** Specific Plan Water Demands at Buildout by Water Use Sector.

| Specific Plan | Commercial (AF/yr) | Industrial (AF/yr) | Institutional/ Governmental (AF/yr) | Multi-Family (AF/yr) | Single Family (AF/yr) | Landscape (AF/yr) | Total (AF/yr) |
|---|---|---|---|---|---|---|---|
| Infill | 2,232 | 2,625 | 6,070 | 552 | 8,898 | 0 | 20,377 |
| DTRSP | 780 | 7 | 124 | 15 | 92 | 0 | 1,018 |
| RSGW | 83 | 0 | 0 | 34 | 57 | 0 | 173 |
| SE | 530 | 0 | 441 | 393 | 1,270 | 0 | 2,633 |
| NE | 1,769 | 0 | 65 | 0 | 474 | 0 | 2,309 |
| STRSP | 115 | 0 | 335 | 148 | 1,481 | 0 | 2,079 |
| NCRSP | 1,457 | 226 | 546 | 444 | 1,610 | 0 | 4,283 |
| HRNSP | 470 | 0 | 312 | 180 | 701 | 0 | 1,663 |
| NWRSP | 378 | 0 | 1,596 | 338 | 4,847 | 0 | 7,159 |
| DWSP | 37 | 0 | 1,273 | 20 | 2,056 | 0 | 3,386 |
| NI | 220 | 3,718 | 195 | 99 | 826 | 0 | 5,057 |
| NRSP | 225 | 0 | 644 | 165 | 2,859 | 0 | 3,893 |
| WRSP | 231 | 255 | 1,465 | 615 | 5,648 | 1,074 | 9,289 |
| SVSP | 623 | 0 | 499 | 335 | 2,538 | 0 | 3,995 |
| CVSP | 56 | 0 | 88 | 108 | 745 | 0 | 997 |
| ARSP | 150 | 0 | 110 | 187 | 940 | 0 | 1,386 |

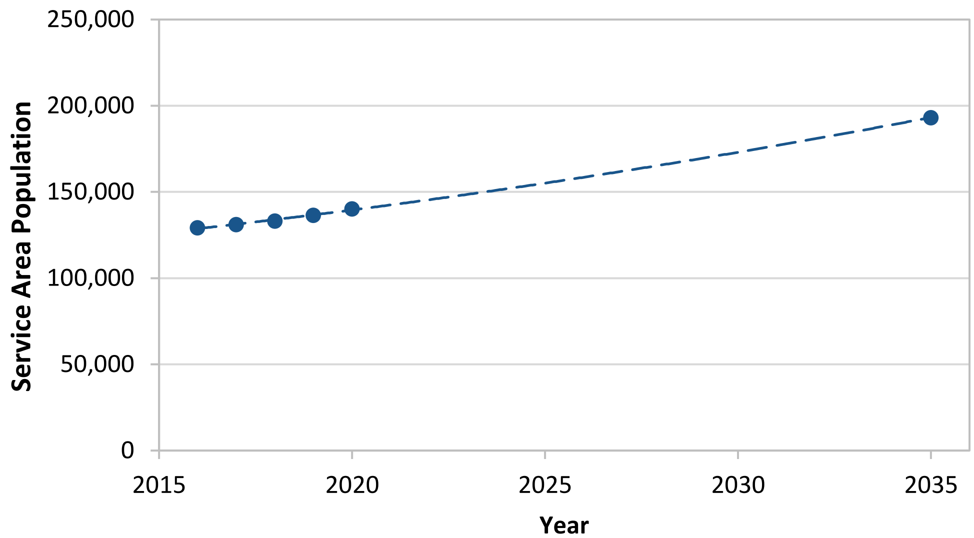



**Figure 4-1** Existing and Projected Service Area Population

**DWR Table 4-2**

| Submittal Table 4-2 Retail: Use for Potable and Non-Potable Water - Projected | | | | | | |
|---|---|---|---|---|---|---|
| Use Type | Additional Description (as needed) | Projected Water Use | | | | |
| | | 2025 | 2030 | 2035 | 2040 | 2045 |
| Commercial | Potable water, including non-metered | 6,135 | 6,508 | 7,017 | 7,017 | 7,017 |
| Industrial | Potable water, including non-metered | 4,175 | 4,726 | 5,123 | 5,123 | 5,123 |
| Institutional/Governmental | Potable water, including non-metered | 8,904 | 9,494 | 10,321 | 10,321 | 10,321 |
| Multi-Family | Potable water, including non-metered | 1,752 | 2,029 | 2,725 | 2,725 | 2,725 |
| Single Family | Potable water, including non-metered | 22,564 | 24,508 | 26,281 | 26,281 | 26,281 |
| Landscape | Potable water, including non-metered | 644 | 765 | 805 | 805 | 805 |
| Losses | Potable water | 1,429 | 1,401 | 1,587 | 1,587 | 1,587 |
| Sales/Transfers/Exchanges to other Suppliers | Potable water, including non-metered | 0 | 0 | 0 | 0 | 0 |
| Groundwater recharge | Potable water | 1,560 | 2,720 | 3,350 | 3,350 | 3,350 |
| Sales/Transfers/Exchanges to other Suppliers | Raw Water, Discharge to Linda Creek and water wheeled on behalf of SJWD | 404 | 404 | 404 | 404 | 404 |
| | **TOTAL** | 50,572 | 47,567 | 52,555 | 57,614 | 57,614 |
| NOTES: The city has no contracts for transfer for 2025 through 2045, as of yet. Projections are inclusive of lower income residential water demands. All values are in AF. | | | | | | |

Total Gross water use projections, inclusive of recycled water, are provided in DWR Table 4-3. Recycled water demand is further characterized in DWR Table 6-4 of Chapter 6

**DWR Table 4-3**

| Submittal Table 4-3 Retail: Total Gross Water Use (Potable and Non-Potable) | | | | | | |
|---|---|---|---|---|---|---|
| | 2020 | 2025 | 2030 | 2035 | 2040 | 2045 |
| Potable Water, Raw Water | 32,300 | 47,567 | 52,555 | 57,614 | 57,614 | 57,614 |
| Recycled Water Demand | 3,768 | 4,022 | 4,435 | 4,933 | 4,933 | 4,933 |
| **TOTAL WATER USE** | 36,068 | 51,589 | 56,990 | 62,547 | 62,547 | 62,547 |
| NOTES: All values are in AF. Values include potable and non-potable water use. | | | | | | |

### 4.2.6 Distribution System Water Losses

Distribution system water losses are the difference between the volume of water that is delivered into the potable drinking water distribution system and actual consumption. Losses are always present in a water system due to pipe leaks, unauthorized connections or use, faulty meters, and unmetered institutional and governmental water use. Each year the City characterizes its water loss in accordance with the American Water Works Association (AWWA) Water Audit Method. CWC requires urban retail water suppliers to conduct and submit validated water loss audit reports annually to DWR on October 1$^{st}$ following the reporting year. Final Water Audit and Validation Reports are available for 2016 through 2019 and provided in Appendix D. As the UWMP is required to be submitted prior to the due date of the Water Audit, values for 2020 stated herein are approximate and may be altered in the final submission of the 2020 Water Audit. Distribution system water losses for five years preceding the plan update from 2015-2019 are summarized in COR Table 4-D and estimated water loss for 2020 is given in DWR Table 4-4.

**COR Table 4-D** 12 Month Water Loss Audit Reporting for 2015-2019.

| Reporting Period Start Date (mm/yyyy) | Volume Water Loss (AF) |
|---|---|
| 01/2015 | 2,127.52 |
| 01/2016 | 2,330.47 |
| 01/2017 | 2,682.94 |
| 01/2018 | 2,140.95 |
| 01/2019 | 1,865.24 |

**DWR Table 4-4**

| Submittal Table 4-4 Retail: 12 Month Water Loss Audit Reporting | |
|---|---|
| Reporting Period Start Date | Volume of Water Loss* |
| 01/2020 | 1,599.23 |
| ** Taken from the field "Water Losses" (a combination of apparent losses and real losses) from the AWWA worksheet.* | |
| NOTES: All Volumes are in AF. The 2020 Water Audit has not been validated at the time of plan preparation and final water losses reported in the validated Water Audit may differ. | |

An update to the CWC requires that 2020 UWMPs and all UWMPs submitted thereafter include data showing whether the urban retail water supplier met the distribution loss standards enacted by the California State Water Resources Control Board (SWRCB) pursuant to Section 10608.34. At the time of plan preparation, the SWRCB has not adopted performance loss standards. Proposed water loss performance standards will set a maximum allowable water loss in gallons per connection per day for the City. The proposed baseline water loss is an average of the 2017 through 2019 water loss and is calculated to be 41.0 gallons per connection per day and the proposed performance standard to be met by 2028 is 22.3 gallons per connection per day Appendix E. Water loss in gallons per connection per day for 2017 through 2020 is shown in COR Table 4-E.

**COR Table 4-E** Loss Reported in AWWA Water Audit for 2017-2019.

| AWWA Loss Category | 2017 | 2018 | 2019 | 2020 (1) |
|---|---|---|---|---|
| Apparent Loss | 8.02 | 8.01 | 7.90 | 9.78 |
| Real Loss | 46.89 | 34.97 | 28.78 | 21.19 |
| Water Loss | 54.91 | 42.98 | 36.68 | 30.97 |
| NOTES: All values are gallons per connection per day.<br>(1) The 2020 Water Audit has not been validated at the time of plan preparation and final water loss reported in the validated Water Audit may differ. | | | | |

The data from 2017 through 2020 demonstrate that the City annually reduced water loss measured as gallons per connection per day. The City continues to prioritize and allocate resources to detecting and repairing leaks in the distribution to reduce water loss. Over the last five years the City has increased the accuracy of reported losses through a process of quantifying the City's authorized unmetered use of water for institutional and governmental operations, which had previously gone unquantified and were reported as water loss. These municipal functions include fire suppression, street sweeping, hydraulic utility excavation, and others. In dedicating resources to tracking and understanding these internal uses, consumption of water for these authorized uses has not been reduced or restricted and the services continue, as necessary. The City anticipates that it is on track to meet the performance standard by 2028.

Note that in DWR Table 4-2 the projected water loss in 2030 and thereafter was calculated by multiplying the performance standard by the estimated number of service connections and for 2025 an intermediate water loss multiplier of 27.09 gallons per connection per day was used. 2025 through 2045 number of service connections were estimated using the same ratio of 2020 total number of service connections to 2020 population.

### 4.2.7 Estimating Future Water Savings

As noted in DWR Table 4-2 and the following DWR Table 4-5, water use projections do consider future water savings and lower income residential demands.

**DWR Table 4-5**

| Submittal Table 4-5 Retail Only: Inclusion in Water Use Projections | |
|---|---|
| Are Future Water Savings Included in Projections? | Yes |
| Sections where citations of the codes, ordinances, utilized in demand projections are found. | 4.2.7.1<br>4.2.7.2<br>4.2.7.3 |
| Are Lower Income Residential Demands Included in Projections? | Yes |

The unit demand factors and resultant demands calculated by the EU department in COR Table 4-B and COR Table 4-C do not account for reduced demand from conservation measures. However, based on previous years' demand data, the City has observed that passive conservation measures have resulted in an approximate 25% reduced demand from what was projected. This 25% demand reduction is reflected in DWR Table 4-2 for the potable water use categories of Commercial, Industrial, Institutional/ Governmental, Multi-Family, Single Family, and Landscape. Conservation measures are described in the subsequent sections.

#### *4.2.7.1 Compliance with Water Efficient Landscape Requirements*

New development areas are required to reduce landscape area and calculated water demands as part of the process for land use approval, as required by the California Code of Regulations Title 23, Division 2 Chapter 2.7 Model Water Efficient Landscape Ordinance (MWELO). The City of Roseville's own standards have additional requirements for Water Efficient Landscaping, which can be found in Chapter 14.18 of the Roseville Municipal Code (available via the City's website).

#### *4.2.7.2 Increased Utilization of Recycled Water*

The City of Roseville requires recycled water to be used in most land use development areas currently being planned, and for construction water during drought years. Future required use includes landscaping associated with commercial, industrial, multi-family, parks, and transportation corridors. Guidelines for Recycled Water Service are outlined in Roseville Municipal Code Chapter 14.17 (available via City's website).

#### *4.2.7.3 Implementation of Low Water Use Fixtures*

Section 16.01.100 (A.) of the Roseville Municipal Code (available via City's website) states that: "The 2019 California Building Standards Code is hereby adopted by the City of Roseville Municipal Code."

Additionally, the mandatory CALGreen building standards code promotes conservation through the use of appliances and fixtures such as high-efficiency toilets, faucet aerators, and on-demand water heaters.

### 4.2.8 Characteristic Five-Year Water Use

The California Water Code Section 10635(a) requires that in addition to calculating water use projections over the next 20 years, in five-year increments, that suppliers perform a drought risk assessment lasting five consecutive years. The projected unconstrained demand for 2021-2025 is estimated in table COR Table 4-F. Unconstrained demand is demand absent any water supply or usage restrictions but does include the conservation practices for new construction, outlined in the previous section. This projection informs the drought risk assessment, which is detailed in Chapter 7 .

**COR Table 4-F** Five consecutive year unconstrained demand.

| Gross Water Use | 2021 | 2022 | 2023 | 2024 | 2025 |
|---|---|---|---|---|---|
| Potable Water, Raw, Other Non-Potable | 35,353 | 38,407 | 41,460 | 44,513 | 47,567 |
| Recycle Raw Water Demand | 3,819 | 3,870 | 3,920 | 3,971 | 4,022 |
| NOTES: All volumes are in AF. | | | | | |

## 4.3 Water Use for Lower Income Housing

Policy LU5.5, of the Land Use Element, strives to uphold the City of Roseville's Affordable Housing Goal by requiring that a minimum of 10% of all new housing units cost no more than 30% of the total monthly income of very low-, low-income, and moderate-income households. The City of Roseville EU Department annually coordinates with the Planning Division to gather data related to low-income housing metrics. The total number of affordable housing units in 2020 was 3,103, of which 633 were single family residences and 2,470 were multi-family residences. The water demands for low-income housing for 2020 were estimated by multiplying the number of single family and multi-family units by the average unit demand factor for low to medium density residential and high density residential, respectively, then reducing it by 20% to account for conservation efforts. These estimations are summarized in COR Table 4-G.

**COR Table 4-G** 2020 Affordable Housing Water Use

| Unit Demand Factors | |
|---|---|
| Average Low to Medium Density Residential Factor for Single Family Units | 520.4 (gpd/DU) |
| Average High Density Residential Factor for Multi-Family Units | 232.5 (gpd/DU) |
| 2020 Affordable Housing Water Use | |
| Single Family Residential | 295 (AF/yr) |
| Multi-Family Residential | 516 (AF/yr) |
| Total | 645 (AF/yr) |

As stated in DWR Table 4-5, the water use projections of DWR Table 4-2 are inclusive of water use for lower income households. The estimated water demand by sector for each specific plan, in COR Table 4-C, included affordable housing water use in the single family and multi-family water use calculations, which was used to derive the water use projections in DWR Table 4-2. The portion of water from those projections to be used by affordable housing units is shown in COR Table 4-H. As 10% of all new housing construction is required to be allocated to affordable housing, 10% of the difference between each of the five-year projections was added to the preceding period to estimate how much water would be used by low-income housing.

**COR Table 4-H** Affordable Housing Water Use Projections

| Housing Type | 2025 | 2030 | 2035 | 2040 | 2045 |
|---|---|---|---|---|---|
| Multi-Family Residential | 329 | 356 | 426 | 426 | 426 |
| Single-Family Residential | 1,061 | 1,255 | 1,433 | 1,433 | 1,433 |
| Total Affordable Housing Units | 1,390 | 1,612 | 1,859 | 1,859 | 1,859 |
| NOTES: All values are in AF/yr. | | | | | |

## 4.4 Climate Change Considerations

All projections included in Chapter 4 are representative of unconstrained demand except for passive conservation efforts described in 4.2.7. However, consideration of effects that climate change may have on demand projections and water supply and reliability is a critical aspect of ensuring that the City is well positioned to meet future demands. The City's primary water source is surface water from Folsom Lake and the City recognizes that the reliability of this source is reduced during dry years or a drought. A comprehensive study aimed at understanding how climate change will impact the American River Basin, from which the City receives its surface water supplies, was performed in 2020 and is included in Section 6.14.2. The effects of climate change on water supplies are considered in future plans for the groundwater program, a drought risk assessment, and a Water Shortage Contingency Plan**,** which are provided herein.

# Chapter 5 SBX7-7 Baselines, Targets, and 2020 Compliance

With the adoption of the Water Conservation Act of 2009, also known as Senate Bill X7-7 (SB X7-7), the State of California is required to achieve a 20% reduction in urban per capita water use by December 31, 2020. Additionally, incremental progress towards meeting the goal was required to be demonstrated in the 2015 UWMP. The 2015 UWMP calculated gallons per capita per day (GPCD) water use and confirmed that the 2015 interim target was met, and that progress was being made toward meeting the water use target for 2020. This chapter summarizes baselines and targets, which were quantified in previous UWMPs, and confirms that the City's 2020 water use is compliant with SB X7-7 legislation.

## 5.1 Baselines and Targets

The City first addressed SB X7-7 in the 2010 UWMP, where baseline per capita water use, the 2015 interim target, and 2020 target were established and adopted. For the 2015 UWMP update the Department of Water Resources issued guidance that there were significant discrepancies between the CDoF estimated 2010 population and the 2010 population as determined by the 2010 U.S Census, which could result in poor baseline population estimates. Consequently, the City and other water suppliers were required to recalculate baseline population that had been reported in the 2010 UWMP and to modify the 2015 and 2020 targets accordingly.

SB X7-7 requires each urban water retailer to determine their baseline daily per capita water use measured in GPCD, over a 10-year or 15-year baseline period. The 10-year baseline period is defined as a continuous 10-year period ending no earlier than December 31, 2004 and no later than December 31, 2010. SB X7-7 also defines that for suppliers which met a minimum of 10% of their 2008 water demand through recycled water that the baseline could be extended to a maximum of a 15-year baseline period. Only 8.76% of the City's demand was met with recycled water in 2008, consequently the City used a 10 consecutive year period for its baseline. Additionally, SB X7-7 requires that a 5-year baseline per capita water demand be calculated over a 5 consecutive year period ending no earlier than December 31, 2007 and no later than December 31, 2010. Given the requirements the City used the following baseline periods:

- 10-year Baseline Period: 1995-2004
- 5-year Baseline Period: 2003-2007

Since the 2015 UWMP was completed, the City has experienced no changes to the service area that would require recalculation of baseline or targets; there have been annexations for new construction, but these do not trigger recalculation requirements. Baselines and targets are summarized in DWR Table 5-1. The 2015 SB X7-7 Verification Form, which provides tables for detailed calculations of baselines and targets, is provided in Appendix F.

**DWR Table 5-1**

| Submittal Table 5-1 Baselines and Targets Summary from SB X7-7 Verification Form | | | | |
|---|---|---|---|---|
| Baseline Period | Start Year | End Year | Average Baseline GPCD | Confirmed 2020 Target |
| 10-15 year | 1995 | 2004 | 309 | 247 |
| 5 Year | 2003 | 2007 | 295 | |

## 5.2 Service Area Population

To correctly calculate compliance water use in GPCD, the population served by the City must be calculated. The method for 2020 service area population was briefly described in Section 4.2.5 and is further explained herein. The 2020 U.S. Census data were not available at the time of plan preparation and could not be used for population estimates, as such the City of Roseville population for 2020 was obtained from CDoF.

The CDoF population estimate for cities utilizes ACS data to distribute the 2010 U.S. census housing units into CDoF's standard housing types. Number of housing unit estimates are respective of new construction, annexations, demolition, and conversions. CDoF coordinates with both local jurisdictions and the U.S. Census Bureau to obtain housing unit change data. For 2020, CDoF estimated that the total population for the City of Roseville was 145,163. However, there are a few areas in the City of Roseville that are not served by the City. The population of the area not served was estimated by determining the total number of households in those areas and applying the household multiplier. The number of households was approximated based on utility information from other City of Roseville departments and the household multiplier was obtained from CDoF. The resulting population for the areas not served by the City is 4,976 and this was subtracted from the CDoF total population to obtain a 2020 service area population of 140,187.

## 5.3 Gross Water Use

Annual gross water use is defined by the CWC as the volume of water, treated or untreated, that enters the distribution system except for the following: recycled water, the net volume of water placed into long term storage, water conveyed by the retailer for use by another supplier, water delivered for agricultural use, and process water for industrial use if industrial water use is a significant percentage of overall water use. The volume of recycled water used within the City's service area is reported separate from potable water and is excluded from all gross water use volumes reported herein. No other exclusions or deductions were used in the calculation of the baseline gross water use and so are not included in the calculation of the 2020 gross water use.

## 5.4 2020 Compliance Daily Per-Capita Water Use

The 2020 compliance daily per capita water use (in GPCD) was calculated in accordance with Methodology 4 of DWR's *Methodologies for Calculating Baseline and Compliance Urban Per Capita Water Use* document. The SB X7-7 Compliance Form is a set of tables containing calculations demonstrating that the City met the 2020 target and achieved a 20% reduction from its baseline and is provided in Appendix G. 2020 GPCD and target compliance are also summarized in DWR Table 5-2.

**DWR Table 5-2**

| Submittal Table 5-2: 2020 Compliance from SB X7-7 2020 Compliance Form | | | | |
|---|---|---|---|---|
| 2020 GPCD | | | 2020 Confirmed Target GPCD | Did Supplier Achieve Targeted Reduction for 2020? Y/N |
| Actual 2020 GPCD | 2020 TOTAL Adjustments | Adjusted 2020 GPCD | | |
| 203 | 0 | 203 | 247 | Yes |
| NOTES: No allowable adjustments were applicable to the City. | | | | |

CWC Section 10608.24(d)(1) allows for adjustments to be made for factors outside of the supplier's control when determining compliance. Such factors include differences in evapotranspiration and rainfall, substantial changes to commercial or industrial water use due to increased business output and economic development, and substantial changes to institutional water use resulting from extraordinary events. No adjustments were made to the City's 2020 GPCD, as noted in DWR Table 5-2, and the City was able to demonstrate compliance without adjustments.

## 5.5 Regional Alliance

The City has complied with SB X7-7 and UWMP requirements as an individual supplier and has elected to not participate in a Regional Alliance.

# Chapter 6 Water Supply Characterization

This chapter catalogues and describes the various water resources and supplies available to the City of Roseville including contract supplies from other agencies, surface water, groundwater, storm water, wastewater, and recycled water, as well as water transfers. The supply source, origin, quality, quantity, and impacts of climate change on availability for each source are discussed within this section.

## 6.1 Surface Water

The City's primary water supply contracts are and have historically been comprised of high-quality surface water received through Folsom Reservoir according to the terms of the City's water supply contracts with the US Bureau of Reclamation (USBR), Placer County Water Agency (PCWA), and San Juan Water District (SJWD). Since these supplies are not considered self-supplied and are instead purchased through other agencies, they are described in Section 6.2 Purchased and Imported Water.

## 6.2 Purchased and Imported Water

The City has historically relied heavily on its water supply contracts with Placer County Water Agency, the US Bureau of Reclamation, and San Juan Water District. All four untreated surface water contract entitlements for American River water total 66,000 acre-feet per year (AF/yr). The City's current contract and supplies of are outlined in COR Table 6-A.

**COR Table 6-A** Surface Water Supply Summary

| Contract Supply | Supply Type | Quantity | Availability |
|---|---|---|---|
| USBR | Raw Surface Water | 32,000 AF | Subject to CVP M&I Usage Policy(1) |
| PCWA | Raw Surface Water | 30,000 AF | All Year Types |
| SJWD | Raw Surface Water | 800 AF | Normal or Wet Hydrologic Years |
| SJWD | Raw Surface Water | 3,200 AF | Normal or Wet Hydrologic Years |
| (1) The City's USBR Supply is subject in any year to determinations of allotments based on unimpaired inflow to Folsom Reservoir and downstream operations. | | | |

Water supplies from all three source agencies outlined above are received through the same point location at Folsom Dam. Folsom Lake has been the primary source of water supply for the City of Roseville since 1971. Surface water from the American River is collected and diverted at the Folsom Lake Pumping Plant located at Folsom Dam. The City receives supplies from all four of its raw water contract entitlements through the Folsom Lake Municipal and Industrial (M&I) Intake at this facility.

Untreated water supplies received at this point are conveyed by gravity or pumped by USBR depending on lake level through two parallel pipelines (84-inch and 72-inch) to the City's Barton Road Water Treatment Plant (BRWTP), with a capacity for treatment of volumes up to 100 MGD. The 72-inch pipeline was constructed in 2010 to increase redundancy and reliability of this critical supply route, in partnership with SJWD. Additionally, the City has 19 intertie facilities with neighboring agencies through which water supplies may be transferred under normal water year conditions as well as emergency or drought conditions. In the future, the City is exploring options with PCWA to facilitate receipt of treated water directly through existing and/or new intertie facilities.

### 6.2.1 Contract Supplies – Vulnerabilities and Restrictions

The City's contract supply with the USBR as part of the Central Valley Project is subject to yearly assignments based on each year's hydrologic conditions. Each year the City is informed in April of the determined percentage allotment of the full 32,000 AF allowed by the contract terms. This determination is made based on the unimpaired inflow of runoff into Folsom Reservoir. This supply is therefore highly vulnerable to climate change and its impacts on rainfall and snowpack conditions upstream of Folsom Reservoir in the Sierra Nevada Mountains. In recent years, this allotment has varied significantly on an annual basis and the City has undertaken dedicated efforts to examine alternatives for increasing water supply reliability in all year types.

The City's contract supply with PCWA is available in all hydrologic year types; it is also conveyed from the Middle Fork Project (MFP) through Folsom Reservoir and received as raw water at the same diversion point at Folsom Dam. The City is currently exploring potential future purchase of additional treated water supply received directly from PCWA to complement the raw water contract supply. PCWA's future Ophir Water Treatment Plant may provide up to 3,360 AF to the City in the future. The City is also currently engaged with PCWA to explore improvements to existing intertie facilities to expand and diversify opportunities for the transfer of supplies not dependent on the diversion facility at Folsom Dam.

The City has two water supply contracts with SJWD totaling 4,000 acre-feet. This supply is only available in Normal or Wet Year types and is received either through Folsom Reservoir or through interties with SJWD.

The City's surface water supplies are all dependent upon the operation of Folsom Reservoir by the US Bureau of Reclamation; the dam that creates the reservoir was originally constructed with a primary purpose of flood control, not water supply, and is still operated according to that primary function. The importance of this facility has led the City to examine options for redundancy, resilience, and or improvements with respect to the intake, and best practices in terms of management of its other water resources.

### 6.2.2 Water Forum Agreement

The City is a member of the Sacramento River Forum and a signatory to the Water Forum Agreement (WFA). Accordingly, the City has agreed to limit its diversions from the upper American River to 58,900 AF/yr during Normal and Wet water years, and to between 58,900 AF/yr and 43,800 AF/yr in Drier and Driest water years. The City is responsibly committed to the Water Forum Agreement but maintains the position that "By instituting programs to conserve water, it abandons no right, title or interest in or to any City water rights, contractual entitlements or any appurtenant rights necessary to exercise such water rights or entitlements," as described by Resolution No. 09-64, Declaring an Intent to Retain Control of Conserved Water (Appendix H).

### 6.2.3 Other Available Water Purchases

The City may choose to purchase Article 3F water from the Bureau of Reclamation when such supply is available. This supply source is typically only available in winter and spring months as it is generally considered "excess flow" released by the USBR above and beyond the entitlements of downstream users. In 2019 the City exercised this option and used approximately 950 AF of Article 3F water as part of their ASR program to inject and recharge the aquifer. This effort represented a continued commitment to provide not only water supply reliability for the City's residents but also to support Conjunctive Use to aid in regional water supply reliability.

## 6.3 Groundwater

In recent years, the City has taken significant steps to expand and strengthen their Groundwater Program to broaden the City's water supply portfolio. The City currently owns and maintains 6 operational groundwater wells, with 6 additional wells planned for development in the next 10 years, and one planned destruction. Four of the 6 operational wells are capable of Aquifer Storage and Recovery (ASR) whereby treated water is injected into the underlying aquifer for later extraction and use. Currently, the City plans to design all new wells with ASR capability, as the City moves toward a more evenly distributed reliance on diverse water resources and regional sustainability.

Groundwater is considered to be available for use as part of Roseville's water supply portfolio in all year types including Normal, Single-Dry, or Five Consecutive Year Drought scenarios. Importantly, groundwater will be a critical resource in future drought years as it supplements increasingly vulnerable surface water supplies.

### 6.3.1 Groundwater Basin Description

The City is located over the North American Subbasin of the Sacramento Valley Groundwater Basin. The North American Subbasin (DWR Groundwater Basin Number 5-21.64) is located in the eastern central portion of the Sacramento Groundwater Basin, encompassing portions of Sutter, Placer, and Sacramento Counties. As of 2020, the Basin is listed by DWR as high priority in large part due to the population in the basin and existing and projected future groundwater use, but the basin has neither been adjudicated nor is it considered in overdraft or critical overdraft conditions.

Groundwater elevations in the subbasin along the Placer/Sacramento County line declined at a rate of 1 to 1.5 feet per year for multiple decades until approximately the mid-1990s. Some of the largest decreases have occurred in the area of the former McClellan Air Force Base. From 1995, groundwater elevations were stabilized, and the declining elevation trend was dampened due to groundwater management activities stemming from the Water Forum Agreement restraining further increases in groundwater pumping and implementation of in-lieu banking in the region. Groundwater elevations in Sutter and northern Placer counties generally remain stable, although some wells in southern Sutter County have experienced declines.

In addition, the subbasin has historically been pumped by agricultural and urban users. Recently, in some areas of the subbasin, agricultural land has been and is being developed and converted to urban uses. At this time, the subbasin is operating within the current estimate of sustainable yield.

### 6.3.2 Groundwater Management

The City actively manages groundwater resources both internally in coordination with land use planning and growth projections as well as regionally in accordance with the provisions of the Sustainable Groundwater Management Act. These efforts are discussed in the following subsections.

### 6.3.2.1 Western Placer County Groundwater Management Plan

A Groundwater Management Plan (GMP) was completed in November of 2007 in accordance with Senate Bill (SB) 1938 and Assembly Bill (AB) 3030 in cooperation with PCWA, City of Lincoln, and California American Water. The GMP is available through the PCWA website: Western Placer Groundwater Management Plan.

### 6.3.2.2 Sustainable Groundwater Management Act (SGMA)

The Sustainable Groundwater Management Act of 2014, or SGMA, was a three-bill legislative package composed of AB 1739 (Dickinson), SB 1168 (Pavley), and SB 1319 (Pavley). The package was passed in September 2014 and contains a framework for sustainable management of groundwater supplies by local agencies, with a limited role for state intervention if local agencies fail to meet the requirements of SGMA. SGMA lays out a process and a timeline for local authorities to achieve sustainable management of high and medium priority groundwater basins throughout the state. It also provides tools, authorities, and deadlines to achieve statewide sustainable groundwater management. For local agencies involved in implementation, the requirements are significant and will take years to accomplish. DWR has the responsibility to evaluate local agency progress, while the SWRCB may intervene if DWR determines that local agencies fail to make progress and achieve the requirements of SGMA. Essentially, local agencies who volunteer to comply with SGMA must form as Groundwater Sustainability Agencies (GSAs) and prepare, adopt, and implement a Groundwater Strategic Plan (GSP) that meets the requirements of SGMA.

More specifically, critical required steps include the formation of GSAs within two years of when SGMA became effective; the adoption of GSPs within 5-7 years depending on the status of the basin in question (in critical overdraft condition or not); and preparation, adoption and implementation of a GSP(s) that achieves the sustainability goal within 20 years of plan adoption.

SGMA applies to basins or subbasins designated by DWR as high or medium-priority, based on a statewide prioritization that uses criteria including population, importance and amount of groundwater pumped, extent of irrigated agriculture dependent on groundwater, and other criteria. DWR's final Basin Prioritization findings indicate that there are 127 of California's 515 groundwater basins and subbasins which are high and/or medium-priority. These high and medium-priority basins account for 96% of California's annual groundwater pumping and include 88% of the state's population. The priority ranking for the North American sub-basin of the Sacramento Valley groundwater basin is 24 out of the state's 515 basins, with an overall ranking score of 22.5 and a designation of High Priority.

The City is well along the path of SGMA compliance, having joined the West Placer Groundwater Sustainability Agency (WPGSA) consisting of the City of Lincoln, Placer County Water Agency, Nevada Irrigation District, and the County of Placer. The WPGSA is one of a group of five GSAs formed within the North American Subbasin that consist of West Placer Groundwater Sustainability Authority, Sacramento Groundwater Authority, South Sutter Water District, Sutter County, and Recreation District 1001 GSAs. All five of these GSAs will prepare and submit one joint GSP for the entire Subbasin. This GSP will be submitted to DWR in advance of the January 31, 2022 deadline for high-priority basins not currently in critical overdraft.

### 6.3.3 Historical Groundwater Production

Until recently, groundwater had not been utilized by the City under normal year conditions. In the 2015 UWMP, the City's groundwater wells were identified for use only in drought or emergency conditions, with minimal pumping for the purpose of maintenance or demonstration of the City's ASR program. Over the last five years, the City has worked to advance and expand the groundwater infrastructure and groundwater program to provide additional water supply reliability.

Beginning in 2018, the City began to regularly operate existing groundwater infrastructure specifically by pumping small volumes of groundwater from the City's production wells and serving that water into the distribution system as part of the maintenance plan. In 2019 and 2020, the City was able to store excess surface water through the use of ASR production wells by injecting that water into the aquifer. As the City continues to develop this program and look to the future of sustainable supply, groundwater pumping patterns will continue to evolve. A summary of the amount of groundwater pumped by the City over the past five years is provided in DWR Table 6-1.

**DWR Table 6-1**

| Submittal Table 6-1 Retail: Groundwater Volume Pumped | | | | | | |
|---|---|---|---|---|---|---|
| ☐ | Supplier does not pump groundwater.<br>The supplier will not complete the table below. | | | | | |
| ☐ | All or part of the groundwater described below is desalinated. | | | | | |
| Groundwater Type | Location or Basin Name | 2016 | 2017 | 2018 | 2019 | 2020 |
| Alluvial Basin | North American Sub-basin of the Sacramento Valley Groundwater Basin 5-21.64 | 0 | 0 | 16.6 | 23.37 | 201.1 |
| | **TOTAL** | 0 | 0 | 17 | 23 | 201 |
| NOTES: Water pumped from Roseville groundwater wells does not need to be desalinated. | | | | | | |

### 6.3.4 Aquifer Storage and Recovery

The City considers development of a diverse and drought resistant water supply portfolio of primary importance. To this end, the City has invested in both planning and capital improvements develop their Aquifer Storage and Recovery (ASR) Program into a highly functional and critical component of the Water Utility's future. The ASR Program utilizes groundwater pumping infrastructure along with existing water supplies to increase reliability. ASR wells are capable of injecting treated surface water from the distribution system into the groundwater aquifer for later extraction and use. A schematic of wells equipped for ASR within an urban environment, accessing the underlying aquifer for groundwater, is provided in Figure 6-1.

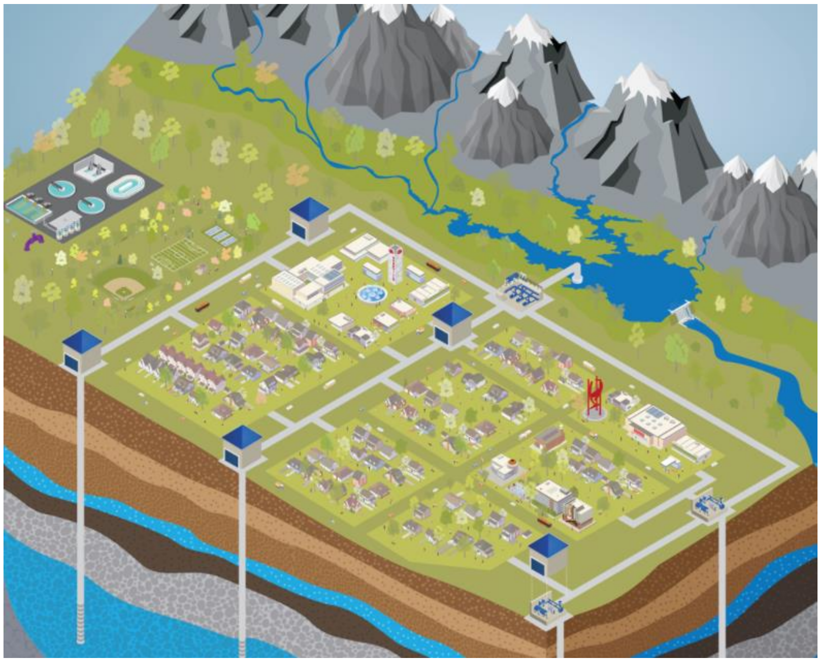


**Figure 6-1** Urban Groundwater Infrastructure Schematic

ASR production wells can be used seasonally (i.e. throughout the water year) or periodically over many years to create a "groundwater bank", storing surface water supplies within the aquifer in times of abundance (wet season or years) for use in times of scarcity (dry season or years). An important component of an ASR Program is to maintain consistent and detailed records of groundwater levels within the aquifer and extraction/injection volumes. This information is used to ensure the groundwater basin is managed sustainably providing water supply reliability benefits while avoiding impacts to the groundwater basin. The City is a committed leader in the region with respect to the development of potential future cooperative water banking and responsible regional resource management.

## 6.4 Stormwater

At this time, the City does not employ any active stormwater recovery measures. In recent years, the City has invested in studies to determine whether stormwater recapture represents a possible resource for future diversity in groundwater recharge projects. Considerations include water rights, timing and quantity of available runoff, property rights, and water quality, among others. Given the complexity of the issues pertaining to stormwater capture or surface spreading, the City continues to conduct analyses to determine the feasibility of this option in the future.

## 6.5 Wastewater and Recycled Water

The City currently owns and operates two regional wastewater treatment facilities that treat wastewater flows collected from the City, South Placer Municipal Utilities District (SPMUD), and some areas of unincorporated Placer County. This section provides information on wastewater management, as well as its current and potential reuse as a recycled water resource.

### 6.5.1 Wastewater Collection, Treatment, and Disposal

The South Placer Wastewater Authority (SPWA) was created under a Joint Powers Agreement in October 2000 and is comprised of the City of Roseville, South Placer Municipal Utilities District, and the County of Placer. The SPWA oversees policy for funding regional wastewater infrastructure. The City collaborates with the regional partners on forward planning and best practices for the management of these regional facilities.

The wastewater collection and treatment facilities within the City's service area are maintained and operated by City staff. The wastewater collection facilities outside of the City's service area are maintained by the other SPWA agencies (Placer County and SPMUD). Wastewater outside of the City's service area but within the SPWA Service Area Boundary is conveyed through trunk sewers to the City's wastewater treatment facilities located within the City limits. Metering stations are located at the City's service area boundaries to account for the wastewater entering the City's collection system originating from Placer County and SPMUD collection areas.

The City owns and operates on behalf of the SPWA the Dry Creek Wastewater Treatment Plant (Dry Creek WWTP) and the Pleasant Grove Wastewater Treatment Plant (Pleasant Grove WWTP). Both plants discharge tertiary treated wastewater to surface water. Dry Creek WWTP discharges to Dry Creek while the Pleasant Grove WWTP discharges to Pleasant Grove Creek. The two wastewater treatment plants serve an area that extends beyond the City boundaries.

The Dry Creek WWTP provides tertiary-level wastewater treatment. The treatment consists of screening, grit removal, primary clarification, aeration, nitrification and denitrification, secondary clarification, filtration, and ultraviolet disinfection. Disinfected tertiary-treated wastewater from the Dry Creek WWTP meets Title 22 regulations for full, unrestricted use. The current (2020) average dry weather flow (ADWF) is approximately 8.5 MGD, of which approximately 65%, or 5.5 MGD comes from the City of Roseville.

The plant is currently authorized to discharge up to 18 MGD ADWF into Dry Creek under the Municipal General Order. The Dry Creek WWTP discharge is assigned Municipal General Order enrollee number R5-2017-0085-004 and National Pollutant Discharge Elimination System (NPDES) permit No. CAG585001. Per the State Water Resources Control Board Division of Water Rights, the City is required to maintain an instream flow of four million gallons per day discharge to Dry Creek. Disinfected tertiary treated wastewater from the Dry Creek WWTP meets Title 22 regulations for full, unrestricted use. The Dry Creek WWTP currently (2020) produces 1,063 AF/yr of recycled water. A portion of recycled water from Dry Creek is discharged into a gravity line that supplies a school and Morgan Creek Golf Course, both of which are located in Placer County, outside the City's water service area. The remainder of recycled water from the Dry Creek WWTP is pumped into the recycled water distribution system and used within the City's water service area.

The Pleasant Grove WWTP currently (2020) treats approximately 8.1 MG ADWF with approximately 65% or 5.3 MGD coming from the City of Roseville. The Pleasant Grove WWTP provides disinfected tertiary-level treatment through the process of screening, grit removal, secondary aeration, secondary clarification, filtration, and ultraviolet disinfection. The Pleasant Grove WWTP discharge is assigned Municipal General Order enrollee number R5-2017-0085-005 and National Pollutant Discharge Elimination System Permit No. CAG585001. There are no instream flow requirements for Pleasant Grove Creek.

Disinfected tertiary-treated wastewater from Pleasant Grove WWTP meets Title 22 regulations for full, unrestricted use. The Pleasant Grove WWTP currently (2020) produces 2,434 AF/yr of recycled water that is pumped into the recycled water distribution system and used within the City's service area boundary.

Pleasant Grove WWTP is currently undergoing construction of a major capital improvement project which began in November 2019 and is expected to be complete in 2022. The project includes an increase in treatment capacity from 9.5 MGD up to 12 MGD. Improvements to the treatment process include the addition of primary clarification, waste activated sludge thickening, and anaerobic digestion. This project represents significant improvement to the capacity of the Pleasant Grove WWTP with important components of long-term resilience and improved efficiency of the City's utilities.

The project also includes important improvements which benefit the environmental and create renewable energy resources. Methane from anaerobic digestion will be converted to a renewable compressed natural gas (CNG) to fuel the City's growing solid waste fleet and fuel new microturbines that generate electricity for plant usage. The project includes a receiving facility for energy-dense wastes to enhance methane production.

As previously described, both treatment plants are regional wastewater facilities and as such, wastewater is generated both inside and outside of the City from a combination of residential and non-residential sources. A summary of the volume of wastewater processed at and discharged from each of the City's wastewater treatment plant in 2020 is provided in DWR Table 6-2 and DWR Table 6-3.

**DWR Table 6-2**

| Submittal Table 6-2 Retail: Wastewater Collected Within Service Area in 2020 | | | | | | |
|---|---|---|---|---|---|---|
| 100% | Percentage of 2020 service area covered by wastewater collection system | | | | | |
| 100% | Percentage of 2020 service area population covered by wastewater collection system | | | | | |
| Wastewater Collection | | | Recipient of Collected Wastewater | | | |
| Wastewater Collection Agency | Wastewater Volume Metered or Estimated? | Volume of Wastewater Collected from UWMP Service Area 2020 | Agency Receiving Collected Wastewater | Treatment Plant Name | Is WWTP Located Within UWMP Area? | Is WWTP Operation Contracted to a Third Party? |
| City of Roseville | Metered | 5,958 | City of Roseville | Pleasant Grove WWTP | Yes | No |
| City of Roseville | Metered | 6,501 | City of Roseville | Dry Creek WWTP | Yes | No |
| **Total Wastewater Collected from Service Area in 2020:** | | 12,459 | | | | |
| NOTES: All volumes are in AF.<br>Approximately 65% of the flow received at the Dry Creek WWTP and 65% of the flow received at the Pleasant Grove WWTP originates in the City's water service area. | | | | | | |

**DWR Table 6-3**

| Submittal Table 6-3 Retail: Wastewater Treatment and Discharge Within Service Area in 2020 | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Wastewater Treatment Plant Name | Discharge Location Name or Identifier | Discharge Location Description | Method of Disposal | Wastewater Generated Outside the Service Area Treated? | Treatment Level | 2020 volumes | | | | |
| | | | | | | Wastewater Treated | Discharged Treated Wastewater | Recycled Within Service Area | Recycled Outside of Service Area | Instream Flow Permit Requirement |
| Pleasant Grove WWTP | Pleasant Grove Creek | Creek | River or creek outfall | Yes | Tertiary | 9,166 | 6,491 | 2,434 | 0 | 0 |
| Dry Creek WWTP | Dry Creek | Creek | River or creek outfall | Yes | Tertiary | 10,001 | 7,902 | 956 | 378 | 4,481 |
| | | | | | **Total** | 19,167 | 14,393 | 3,119 | 378 | 4,481 |

NOTES: All volumes are in AF.
100% of influent flow received at both WWTPs is treated and discharged within the City’s service area boundary.

## 6.6 Recycled Water System

### 6.6.1 Recycled Water Coordination

The City regards recycled water as a valuable resource that is a key component of the City's overall water supply portfolio. The City operates its recycled water system and program in coordination with its regional wastewater partners, including South Placer Municipal Utilities District and Placer County. The City has been successfully irrigating landscaped areas throughout the City \and planning recycled water implementation as part of new development surrounding the City. The City prepared the 2016 Recycled Water Systems Evaluation to position the City for implementing the next phases of recycled water projects as new users within the City come online, and as the various UGA's plan for and install recycled water infrastructure.

The City operates the recycled water program though the requirements of Master Reclamation Permit Order 97-147 (Permit). The Permit implements the reclamation criteria of the City's Title 22 disinfected tertiary recycled water. Current uses of recycled water within the City include irrigation of landscapes and golf courses, industrial cooling for the Roseville Energy Park, and construction purposes such as dust control and soil compaction. Recycled water is also conveyed outside the City's water service area for golf course and landscape irrigation.

The City has prepared the South Placer Regional Wastewater 2020 Systems Evaluation Report (Appendix I), which delineates the current and projected service area boundary, including Urban Growth Areas expected to be added in the near future as development continues. The report provides baseline and projected characterizations of its regional wastewater and recycled water systems. The Systems Evaluation Report was updated to address recent annexations by the SPWA partner agencies, planning revisions, as well as changes in wastewater characteristics and flows. Recycled water supplies and availability are directly linked to the planning and operation of the wastewater treatment plants and must be managed and planned in coordination. The City and its SPWA partners continue utilizing recycled water supplies is to promote responsible water supply management. Beneficial use of available disinfected tertiary treated Title 22 recycled water allows surface water and groundwater supplies to be applied to potable uses.

All agency elements for a reuse program within the City boundary, including land planning, development, wastewater treatment, and water supply, are a part of the City of Roseville government organization.

## 6.7 Recycled Water Beneficial Uses

The City's recycled water program predominantly serves landscape irrigation customers. The City currently delivers recycled water to golf courses, parks, schools, and many miles of streetscape for landscape irrigation within the City's potable water service area. The City also provides recycled water to a school and a golf course outside of the City's potable water service area. The City delivers recycled water to the Roseville Energy Park, which is owned and operated by the City of Roseville Electric Utility, for industrial cooling purposes. Landscapes at both regional wastewater treatment plants also use recycled water for irrigation purposes. Recycled water can be used for construction purposes such as dust control and soil compaction.

The current and projected direct beneficial uses of recycled water in the City's water service area are shown in DWR Table 6-4.

**DWR Table 6-4**

| Submittal Table 6-4 Retail: Recycled Water Direct Beneficial Uses Within Service Area | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Name of Supplier Producing (Treating) the Recycled Water: | | City of Roseville | | | | | | | | |
| Name of Supplier Operating the Recycled Water Distribution System: | | City of Roseville | | | | | | | | |
| Beneficial Use Type | Potential Beneficial Uses of Recycled Water | Amount of Potential Uses of Recycled Water | General Description of 2020 Uses | Level of Treatment | 2020 | 2025 | 2030 | 2035 | 2040 | 2045 |
| Landscape irrigation (excludes golf courses) | Landscape irrigation of public areas and medians. | 3,164 | Landscape irrigation of public areas and medians. | Disinfected Tertiary | 1,336 | 1,446 | 1,625 | 1,841 | 1,841 | 1,841 |
| Golf course irrigation | Irrigation | 2,577 | Excludes golf course usage outside service area boundary. | Disinfected Tertiary | 1,744 | 1,888 | 2,121 | 2,403 | 2,403 | 2,403 |
| Industrial use | Industrial cooling | 310 | Roseville Energy Park (REP) cooling water use. | Disinfected Tertiary | 310 | 310 | 310 | 310 | 310 | 310 |
| Other | Morgan Creek Golf Course | 348 | Irrigation | Disinfected Tertiary | 378 | 378 | 378 | 378 | 378 | 378 |
| | | | | **Total:** | 3,768 | 4,022 | 4,435 | 4,933 | 4,933 | 4,933 |
| | | | | **2020 Internal Reuse** | yes | | | | | |
| NOTES: All values are reported in AF. | | | | | | | | | | |

The uses listed in DWR Table 6-4 include use of recycled water supply as well as required discharges. Recycled water uses represent demands within the City's service area boundary including all approved specific plans. The 4 million gallon per day required discharge to Dry Creek as an instream flow requirement totaling 4,480 AF/yr is not shown in DWR Table 6-4.

A comparison of the 2020 actual use of recycled water to what was projected for use in 2020 in the 2015 UWMP is provided in DWR Table 6-5.

**DWR Table 6-5**

| Submittal Table 6-5 Retail: 2015 UWMP Recycled Water Use Projection Compared to 2020 Actual | | |
|---|---|---|
| **Use Type** | **2015 Projection for 2020** | **2020 Actual Use** |
| Landscape irrigation (excludes golf courses) | 1,923 | 1,336 |
| Golf course irrigation | 1,378 | 1,744 |
| Industrial use | 1,120 | 310 |
| **Total** | 4,421 | 3,390 |
| NOTES: All values are in AF.<br>Golf course irrigation does not include golf course irrigation outside the City's service area (Morgan Creek Golf Course) | | |

## 6.8 Actions to Encourage and Optimize Future Recycled Water Use

As of 2020, the peak recycled water production in July is approximately equal to the peak recycled water demand in July. For the City to further expand recycled water usage during the irrigation season, additional recycled water must be made available. This will most likely be accomplished through expansion of operational storage, with the necessary storage volume dependent on actual demand requirements. Therefore, the City will continue to evaluate in-City and regional recycled water demands and consider its ability to provide recycled water for future projects.

It is the policy of the City that where the use of recycled water is feasible, appropriate, and acceptable to all applicable regulatory agencies, the City will require an owner or customer to use recycled water for approved uses. The City has other methods of encouraging recycled water use including a rate discount and public education. The recycled water rate for customers is currently 50 percent of the potable water rate. The City also implements an extensive public education campaign to educate its customers about the reliability and other benefits of recycled water. Another major benefit to customers of using recycled water is that it can be used reliably in times of drought. In the event the City imposes drought restrictions on uses, such as irrigation and construction, recycled water is exempt from these restrictions. Under certain drought stages, the City would mandate the use of recycled water for construction purposes.

One target of future recycled water use is new development, as stated in DWR Table 6-6. A major hindrance to expanding use of recycled water in existing developments is lack of infrastructure. Installing new infrastructure in existing areas is exceedingly expensive. The City requires use of recycled water for all commercial irrigation services in newly developing master planned areas. This is feasible because the recycled water infrastructure can be installed as part of the original project. Additionally, the City is considering expanding recycled water distribution to entities both within and outside the potable water service area.

**DWR Table 6-6**

| Submittal Table 6-6 Retail: Methods to Expand Future Recycled Water Use | | | |
|---|---|---|---|
| Page 6-12 | Page location of recycled water use narrative in UWMP | | |
| Name of Action | Description | Planned Implementation Year | Expected Increase in Recycled Water Use |
| Developer Agreements | Per City of Roseville development standards, recycled water must be incorporated into future construction. | 2020-2045 | 1,165 |
| | | **Total** | 1,165 |
| NOTES: All values are in AF. | | | |

## 6.9 Desalinated Water Opportunities

There are no opportunities for the development of desalinated water within the City's service area as a future supply source. The City is not located near any bodies of water that would allow for the option.

## 6.10 Exchanges or Transfers

The City maintains an on-demand treated water system that is used for municipal and industrial purposes. The City maintains direct treated water interties with five surrounding jurisdictions, as described in Section 2.2.3. The City can transfer water between jurisdictions through these interties or access water to supplement its distribution system. These facilities are designed to be used for wheeling water through the service area or for demand shortage assistance.

As a condition of the Water Forum Agreement, the City has entered into a re-operation agreement with PCWA for up to 20,000 AF to be used when Roseville's surface diversion is cut back. In general, the agreement calls for PCWA to release up to an additional 20,000 AF to the American River on an annual basis during time of reduced water availability in the system. This water is to maintain flows in the Lower American River (Nimbus Dam to Sacramento River), and therefore is not available for the City's use. This re-operation water is considered a transfer, although the ultimate user of the water, if any, has not been identified as part of the agreement - only that the water would be marketed when it was identified as available. It is possible there could be multiple users as the water will flow to the Delta and theoretically be available to all Delta water users.

Also, as a condition of the Water Forum Agreement, the City has committed to not take the entire amount of contracted water from the Upper American River. As a result of having 66,000 AF/yr of water available through various contracts and a commitment to take no more than 58,900 AF/yr from the American River Watershed, there is an opportunity to find a long-term transfer for the 7,100 AF/yr with a user downstream of the confluence of the American and Sacramento Rivers. The Water Code definition of short- and long-term conditions are that short-term is considered for a period of one year or less and long-term is for a period of more than one year.

## 6.11 Supply Management

The City has historically relied primarily on their suite of surface water contracts, supplying high quality water through the City-owned Barton Road Water Treatment Plant, and serving the City's population through gravity flow. In most year types, the City will continue to rely primarily on these supply sources for the bulk of potable water supply. Of these surface water contracts, the City employs supplies through the USBR contract as a first priority each year, pulling next from the PCWA contract as needed. Each year allocations from the USBR are subject to variation, resulting in potential differences in the duration and quantity of supply pulled from this contract annually.

City Water Utility staff plan to utilize groundwater infrastructure differently in Normal and Dry hydrologic years. In general, Roseville plans to use groundwater infrastructure in accordance with sustainable groundwater management goals and objectives. In a Normal year, this means that the City plans to extract up to the quantity of water banked in that year. In drought years, the City may find the need to operate its wells more significantly to meet demands when significant impacts are seen to surface water supplies. This is outlined further in Chapter 7. As the City continues to install more ASR wells into the coming decade, provisions of the municipal code will be updated to reflect their groundwater strategy.

## 6.12 Future Water Projects

The City has taken a proactive approach to ensuring resource diversity with a focus on surface water contracts, strong groundwater infrastructure, and highly collaborative regional presence in water planning and future conjunctive use. Future water supply project opportunities, including diversifying the purchasing or importing of water, expansion of the City's groundwater and ASR program, and regional cooperative conjunctive use are discussed in the following sections.

### 6.12.1 Purchased or Imported Water

In addition to the current contract with PCWA for 30,000 AF/yr of surface water, the City is evaluating and may enter an agreement with PCWA for additional treated surface water supplies available in all hydrologic year types. The treated PCWA water would be supplied by PCWA's future Ophir Water Treatment Plant (Ophir WTP) which will treat water from the Middle Fork Project. The Ophir WTP will be constructed in phases, with the first phase expected to be operational by 2035 and provide an estimated 10 MGD total supply to all customers. Additional phases will be evaluated as PCWA wholesale customers need new supply. The City may purchase up to 3 MGD of normal year capacity from the Ophir WTP, equivalent to 3,360 AF/yr of treated surface water supply.

The City is also exploring future opportunities for water transfers with regional partner agencies in an effort to diversify regional water management strategies in conjunction with responsible groundwater management practices. In 2019, the City executed an agreement for pilot water transfer program with Sacramento Municipal Utilities District (SMUD). This agreement allowed for an annual water transfer for up to 6,000 AF for three years. The transfer allows Roseville to use wet season higher flows to recharge the groundwater aquifer for later season extraction and use. The transfer was executed consistent with Water Forum Agreement policies and goals, as well as an excellent precedent for regional conjunctive use strategies. The City may look to renew this transfer or evaluate similar opportunities in coming years to provide drought resiliency and support the sustainable management of groundwater.

### 6.12.2 Groundwater and ASR Program

The City has historically relied upon groundwater resources only as a backup supply in times of shortage. Over the last few years and in response to lessons learned during the 2015 drought, changing climate conditions, and the overall need for further diversity and reliability of water supply, the City has invested in efforts to operationalize and expand its groundwater program as a regular part of its water supply portfolio in all year types. Along this vein, the City developed a Groundwater Strategic Plan in an effort to evaluate current infrastructure, potential new well sites, further understand the condition and accessibility of the aquifer within the City's service area boundary, and how groundwater planning would look moving forward. The result of these planning efforts has been the identification of 6 future well sites throughout the City's Pressure Zones 1 and 4, with a heavier emphasis on infrastructure on in Pressure Zone 1. Conceptual design and siting have been completed for these future well sites, with exploratory drilling. The City plans to install these wells and their topside improvements within the next 5-10 years, all with ASR capability to enhance flexibility of operations and expand the City's conjunctive use capabilities. For planning purposes, each well is assumed to extract a nominal 1,750 GPM, with a final production value to be determined upon production well drilling and development. These 6 future wells are expected to represent a total of 16,936 AF/yr of additional water supplies.

Four of the City's six existing wells have ASR injection capability, and at this time the City plans for future wells to also be ASR capable. The ASR Program will not only allow the City to change the pattern of water withdrawal from Folsom Reservoir from peak demand times in the summer to times when water is more available (i.e. the winter) but could also be used as a replacement for surface water in WFA dry/drier years. The expected future water supply programs are listed in DWR Table 6-7.

**DWR Table 6-7**

| Submittal Table 6-7 Retail: Expected Future Water Supply Projects or Programs | | | | | | |
|---|---|---|---|---|---|---|
| Name of Future Projects or Programs | Joint Project with other suppliers? | | Description | Planned Implementation Year | Planned for Use in Year Type | Expected Increase in Water Supply to Supplier |
| | Yes/ No | Agency Name (if applicable) | | | | |
| Regional Conjunctive Use | Yes | Various | Regional water banking and aquifer storage and recovery projects. | 2025 | All Year Types | Not Yet Determined |
| Production/ASR Well Program Expansion | No | | Development of up to 6 new production wells with ASR capability. | 2035 | Potentially, All Year Types | 14,431 |
| Ophir Water Treatment Plant | Yes | PCWA | Partnership with PCWA in the development of additional treated water capacity for purchase through existing interties. | 2035 | All Year Types | 3,360 |
| PCWA-Roseville Cooperative Water Reliability Project | Yes | PCWA | Partnership with PCWA to optimize and improve existing interties to increase supply transfer volumes and reliability. | 2025 | All Year Types | Not Yet Determined |
| NOTES: All values are in AF. | | | | | | |

## 6.13 Summary of Existing and Planned Sources of Water

The City's current planned sources of water can be summarized as such:

- The City is currently contracted to purchase 66,000 total AF/yr of American River water diverted from Folsom Lake with certain restrictions (see Chapter 7).
- The City intends to purchase an additional treated water supply from PCWA of 3,360 AF/yr as part of their Ophir Water Treatment Plant project.
- The City neither currently uses nor plans to use surface water that is not mentioned above.
- The City maintains groundwater wells for normal, drought year, and emergency supply. Four of the City's 6 existing active production wells possess ASR capability.
- The City does not currently use storm water as a potable water offset. The City is investigating future opportunities to use stormwater in other beneficial ways.
- The City currently utilizes and has future plans to expand recycled water usage.
- The City neither currently uses nor plans to use desalinated water.
- The City maintains direct treated water interties with four surrounding jurisdictions for use in emergency or water transfer situations.

The actual 2020 water supplies for the City are summarized in DWR Table 6-8 and the future projected water supplies for the City are summarized in DWR Table 6-9.

**DWR Table 6-8**

| Submittal Table 6-8 Retail: Water Supplies — Actual | | | |
|---|---|---|---|
| Water Supply | Additional Detail on Water Supply | 2020 | |
| | | Actual Volume | Water Quality |
| Purchased or Imported Water | US Bureau of Reclamation | 24,375 | Drinking Water |
| Purchased or Imported Water | Placer County Water Agency | 9,409 | Drinking Water |
| Purchased or Imported Water | San Juan Water District | 0 | Drinking Water |
| Groundwater (not desalinated) | City of Roseville owned production wells | 201 | Drinking Water |
| Recycled Water | Recycled water produced by City of Roseville WWTPs | 3,497 | Recycled Water |
| | **Total** | 37,482 | |
| NOTES: All values are in AF. | | | |

**DWR Table 6-9**

| Submittal Table 6-9 Retail: Water Supplies — Projected | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Water Supply | Additional Detail on Water Supply | Projected Water Supply | | | | | | | | | |
| Water Supply | | 2025 | | 2030 | | 2035 | | 2040 | | 2045 | |
| | | Reasonably Available Volume | Total Right or Safe Yield | Reasonably Available Volume | Total Right or Safe Yield | Reasonably Available Volume | Total Right or Safe Yield | Reasonably Available Volume | Total Right or Safe Yield | Reasonably Available Volume | Total Right or Safe Yield |
| Purchased or Imported Water | USBR - CVP Contract Supply | 32,000 | 32,000 | 32,000 | 32,000 | 32,000 | 32,000 | 32,000 | 32,000 | 32,000 | 32,000 |
| Purchased or Imported Water | PCWA - Middle Fork Project Supply | 30,000 | 30,000 | 30,000 | 30,000 | 30,000 | 30,000 | 30,000 | 30,000 | 30,000 | 30,000 |
| Purchased or Imported Water | SJWD | 4,000 | 4,000 | 4,000 | 4,000 | 4,000 | 4,000 | 4,000 | 4,000 | 4,000 | 4,000 |
| Other | Water Forum Limitation on American River Supply Diversion | -7,100 | | -7,100 | | -7,100 | | -7,100 | | -7,100 | |
| Purchased or Imported Water | PCWA - Potential Future Purchase (OPHIR WTP) | 0 | 0 | 0 | 0 | 3,360 | 3,360 | 3,360 | 3,360 | 3,360 | 3,360 |
| Groundwater (not desalinated) | Groundwater Wells | 1,560 | 7,920 | 2,720 | 12,570 | 3,350 | 14,430 | 3,350 | 14,430 | 3,350 | 14,430 |
| Recycled Water | South Placer Wastewater Authority | 4,791 | 4,791 | 5,269 | 5,269 | 5,643 | 5,643 | 5,958 | 5,958 | 6,383 | 6,383 |
| | **Total** | 65,311 | 77,991 | 66,869 | 82,309 | 69,283 | 86,103 | 69,598 | 86,418 | 70,023 | 86,843 |
| NOTES: Under normal year operations, the City intends to manage groundwater use sustainably through the active recharge of surface water through the ASR Program. Values shown above assume a 3-month injection window and an equal volume of extraction. New ASR well infrastructure is expected to be operational by 2030, with additional wells installed by 2035.<br>All values are in AFY. | | | | | | | | | | | |

## 6.14 Climate Change Impacts to Supply

### 6.14.1 Local Climate Change Outlook

The City has acknowledged and incorporated many recent lessons learned from the last 10 years of climate related impacts to the reliability of its water supply. Beginning with the extended drought early in the decade, culminating with the extreme shortages experienced in 2015, Roseville has seen unprecedented curtailments of water supply and how important diversity of sources, diversion locations, and other options become when regular supply is interrupted.

It is expected that regional reductions in Sierra Nevada snowpack will continue and worsen in the coming years, creating uncertainty of surface water supplies – specifically the contract Roseville holds with USBR for 32,000 AF annually which can be curtailed down to 0% depending on each year's hydrologic outcome. Further, in drought years a lack of inflow to Folsom Reservoir can reduce water surface elevations significantly and quickly, with the possibility of exposing the intake facility at the dam.

The City's surface water supplies will be more vulnerable to declining snowpack in coming years, with potential for severe limitations in single dry years as well as periods of persistent drought. Integrating cross-seasonal groundwater management (injecting in times of excess for extraction in times of scarcity) will provide much needed resilience in the face of shifting climate conditions.

With these things in mind, the City has taken steps to operationalize its groundwater infrastructure and work toward beneficial use (injection) of excess wet season supplies in preparation for seasonal shortages in surface supply. It is important to note that Roseville is not simply planning to draw from the aquifer to offset its surface water contracts, but rather that they are making concurrent plans to recharge this aquifer and bank supply before the need arises. It is this type of forward planning that Roseville brings to the regional stage in helping the group of agencies relying on these same supply sources to move toward a more sustainable outlook. Diversity of operations and supply sources allow a more flexible approach to each year's specific hydrologic conditions and water demand.

### 6.14.2 Regional Climate Studies

In 2020, the American River Basin (Basin) region conducted a climate change study in partnership with local water purveyors and the USBR. The purpose of the American River Basin Study (ARBS or Study) was to develop data, tools, analyses, identify supply-demand imbalances, and climate change adaptation strategies specific to the Basin. Under the "new normal" of a changing climate, the ARBS aims to improve the resolution of regional climate change data and to develop regionally specific mitigation and adaptation strategies. As a participant of the study, and service area contained within the Study Area, the following summarizes climate change findings pertinent for the region. More detail, along with the approved study can be found at www.pcwa.net/planning/arbs.

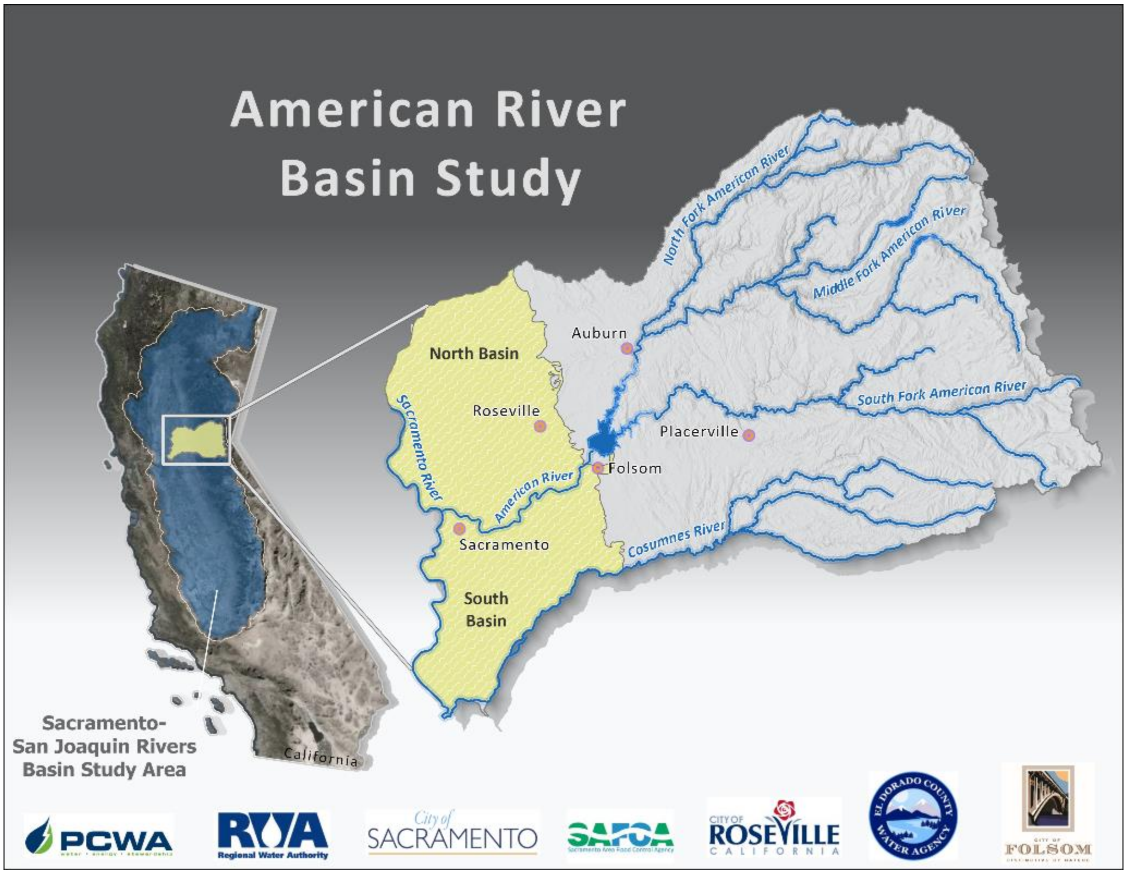



**Figure 6-2** American River Basin Study Area

The Study Area is bounded by the Sierra Nevada mountain range to the east, the Feather and Sacramento rivers to the west, the Bear River to the north, and the Cosumnes River to the south (see Figure 6-2). In addition to the American River Watershed, the Study Area encompasses the North and South American Groundwater Subbasins, and Non-Federal Partners' service areas outside of the American River Watershed.

### 6.14.3 Projected Future Conditions

Analysis of projected future climate conditions in the American River Basin and development of climate scenarios for the ARBS were based on an ensemble of bias-corrected and spatially downscaled climate projections[1]. This ensemble has been used by the California Water Commission and DWR as the primary source of climate projection information in several recent studies, including the Water Storage Investment Program (WSIP) and California's Fourth Climate Change Assessment (Pierce et.al., 2018). Projected future climate conditions were evaluated and characterized based on the ensemble of downscaled climate projections.

[1] Climate projections were developed using Global Climate Models from the Coupled Model Intercomparison Project Phase 5 (CMIP5) and downscaled using Localized Constructed Analogs (LOCA) method projected and coupled with two future emission scenarios (RCP 4.5 and RCP 8.5) available from Dr. David Pierce at the Scripps Institution of Oceanography.

Hydrology scenarios were used to develop streamflow inputs to CalSim 3.0, which was then used to evaluate changes in water supplies, demands, and management throughout the CVP and State Water Project (SWP), including the Study Area. Demands for each water purveyor largely relied upon water purveyor's information provided in Regional Drought Contingency Plan/Regional Water Reliability Plan (RWRP) (Regional Water Authority, 2017) and 2015 UWMPs.

### *6.14.3.1 Temperature*

Surface air temperatures are projected to increase steadily, with average summer temperatures increasing by approximately 7.2 degrees Fahrenheit (°F) by the end of the 21st century (see Figure 6-3), and winter temperatures increasing by 4.9°F. Projections of daily maximum and minimum temperatures suggest similar warming trends during all seasons, with maximum temperatures projected to increase as much as 7.3°F during the summer months.

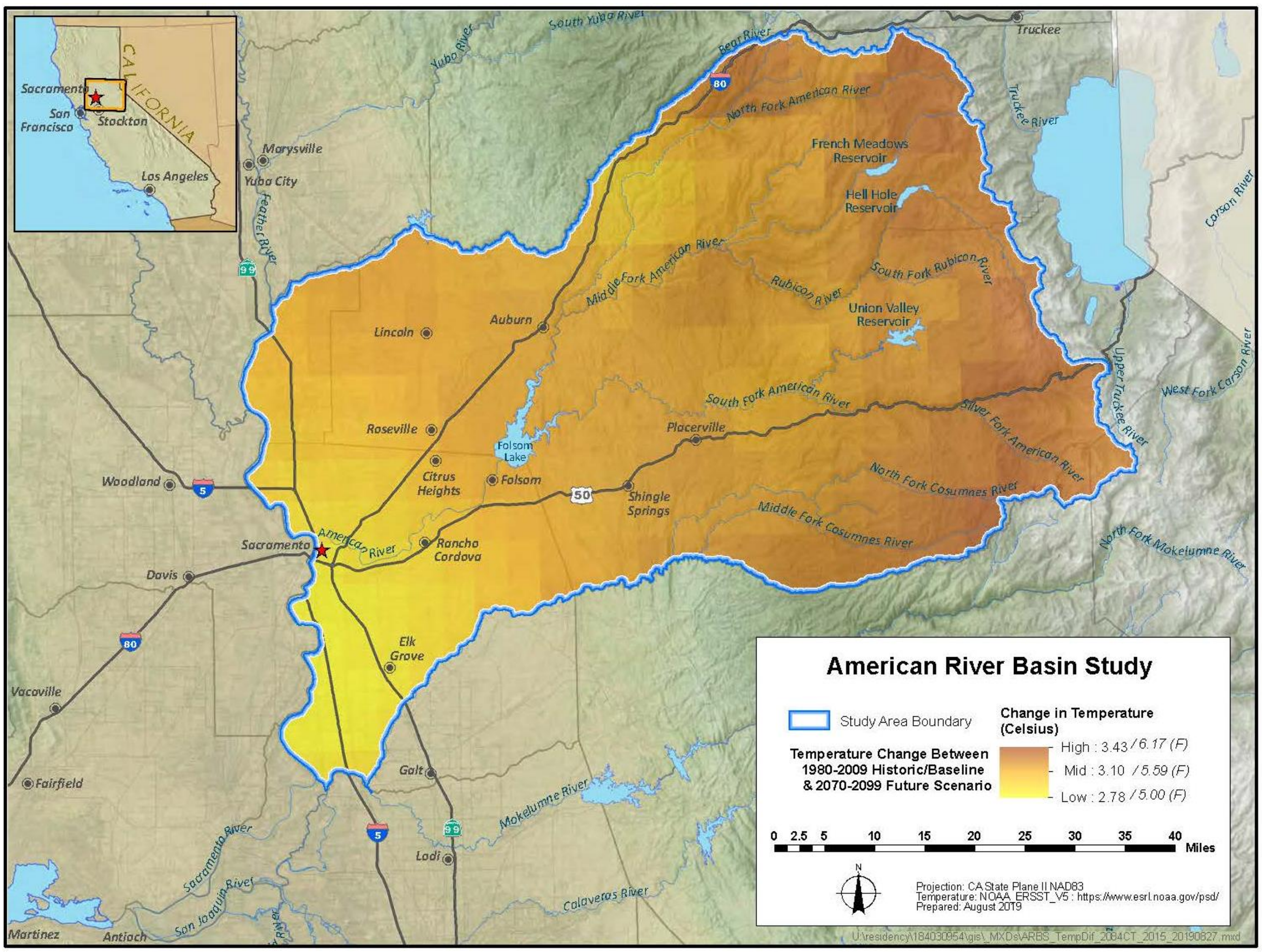



**Figure 6-3** Projected Changes in July Temperature between Historical (1980-2009) and End of Century Under Central Tendency Climate Change

### *6.14.3.2 Precipitation*

Annual precipitation projections show no significant trend in the median of change over the 21st century. Many of the available GCM projections show change in precipitation, but there is no consistency in the magnitude and direction of projected change between models. Approximately half of the projections indicate a minor increase in annual precipitation and half indicate a minor decrease, highlighting the large uncertainty in future precipitation over this region. Although lacking clear trend in projected annual precipitation, by the end of the 21st century the average fall and spring precipitation is expected to decrease, with winter and summer precipitation increasing. Increasing variability is also projected in winter and fall precipitation. A summary of these projections is provided in COR Table 6-B.

**COR Table 6-B** Projected Change in Precipitation and Temperature Over the American River Basin Study Area Between 1980-2009 and 2070-2099

| Season | Percent Change in Basin-Averaged Annual Mean Precipitation (%) | Change in Basin-Averaged Annual Mean Daily Air Temperature (°F) | Change in Annual Mean of Daily Maximum Air Temperature (°F) | Change in Annual Mean of Daily Minimum Air Temperature (°F) |
|---|---|---|---|---|
| Fall | -6.0 | 5.8 | 6.1 | 5.5 |
| Winter | 4.7 | 4.9 | 5.0 | 4.8 |
| Spring | -11.9 | 5.8 | 6.3 | 5.1 |
| Summer | 10.4 | 7.2 | 7.3 | 7.0 |

### *6.14.3.3 Snowpack*

Snow water equivalent (SWE) is a key indicator of water supplies in this region, where runoff is largely influenced by snowmelt. The increasing variability in precipitation combined with increases in surface air temperatures are key drivers in projections of a reduction in annual average SWE. Average SWE is forecasted to decrease by 50-85% across all climate scenarios and future time periods. In addition, areas that accumulate snow above Folsom Reservoir are also projected to have up to a 12-inch decrease in maximum snowpack by end of the century.

### *6.14.3.4 Evapotranspiration*

Potential evapotranspiration (PET) serves as a key indicator of landscape water demands, including consumptive use by evaporation and transpiration from bare soil, water surfaces, native vegetation, and crops. Average annual PET is expected to increase 1.2 to 6.2 inches across all climate scenarios and future time periods. PET is strongly correlated with air temperature and thus expected to increase more under the hot scenarios (HD, HW) than under the warm scenarios (WD, WW).

### *6.14.3.5 Runoff*

Watershed runoff is a direct indicator of local water supply available, as well as to statewide CVP-SWP system. Climate change projections indicate a pronounced shift in the distribution of runoff from May and June to earlier in the season (December to March), implying a transition in precipitation from snow to rainfall and/or earlier snowmelt and increasing the amount of runoff during the winter months. Peak runoff is expected to shift by more than a month earlier by mid to late century (Figure 6-4). Spring runoff will decrease due to reduced winter snowpack. Similar to the precipitation scenarios, there is large uncertainty in projected runoff where the ‘wet’ scenarios suggest an increase in annual runoff and the ‘dry’ scenarios suggest a decrease in annual runoff. The projected changes in basin wide runoff range from an increase of 486 thousand acre-feet (TAF) under the warm-wet scenario to a decrease of 203 TAF under the hot-dry scenario by the end of the century.

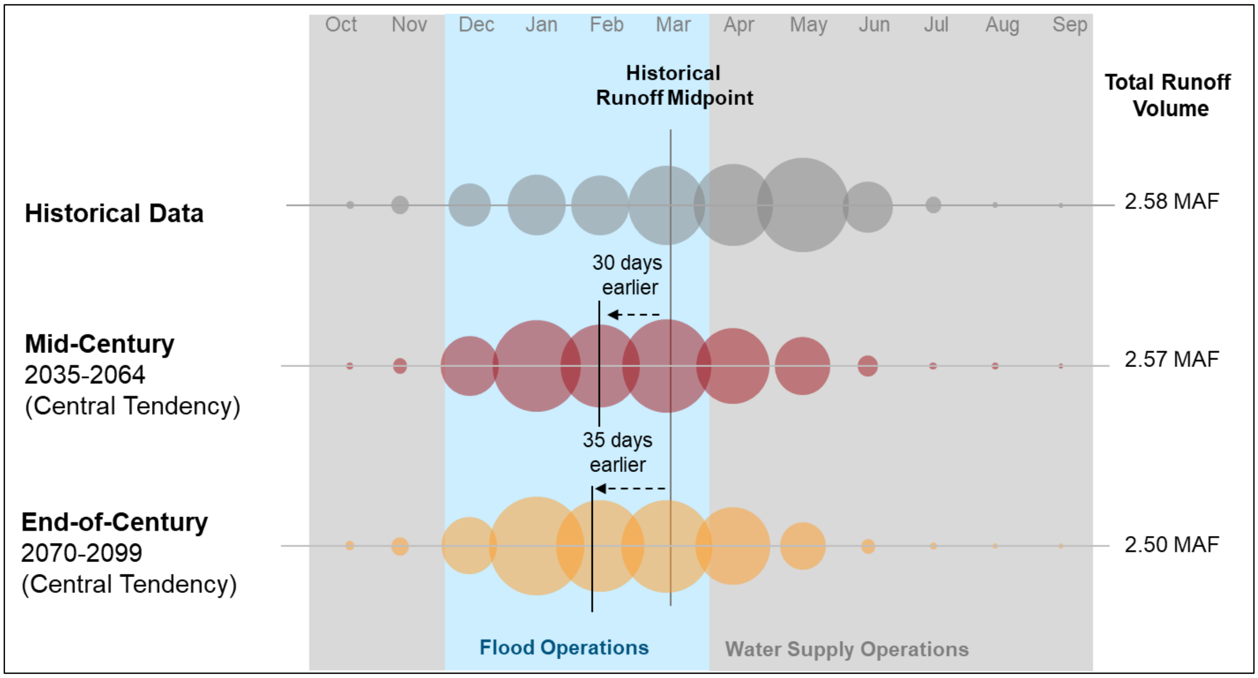



**Figure 6-4:** Distribution of Average Monthly Runoff for Historical Record (1922-2015) and Future Projections Under Central Tendency Climate Scenario

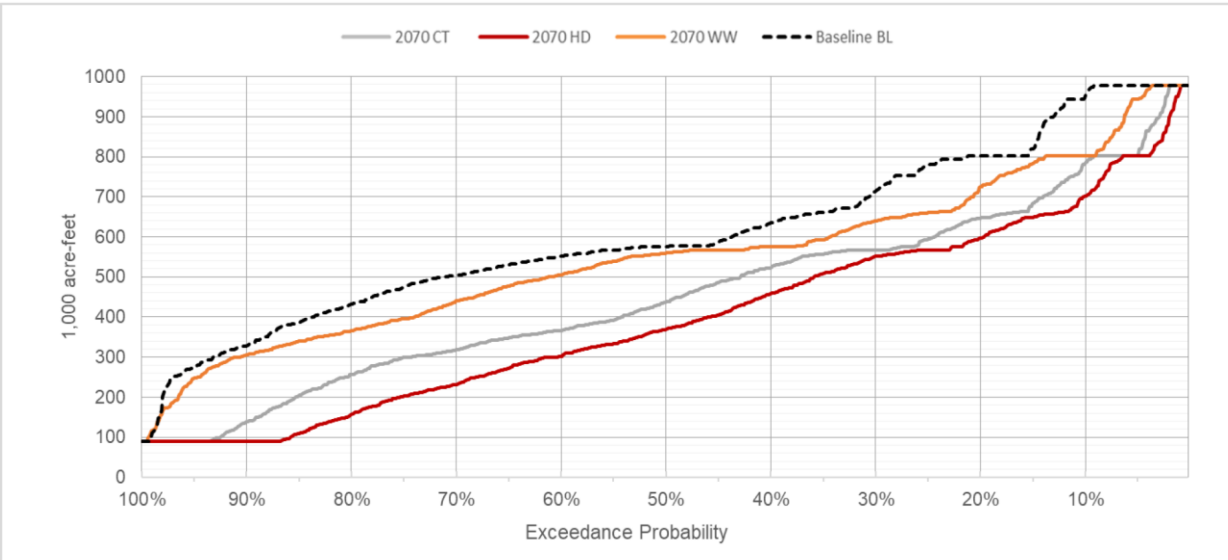
The change in annual climatic and hydrologic indicators between historical baseline observations (1915 to 2015) and projected future conditions for the ARBS area are listed in COR Table 6-C.

**COR Table 6-C** Change in Hydrologic Indicators Between Historical Observations and Projected Future Hydrology

| Time Period | Climate Scenario | Precip (in) | $T_{avg}$ (°F) | $T_{max}$ (°F) | $T_{min}$ (°F) | PET (in) | $SWE_{avg}$ (in) | $SWE_{max}$ (in) | Runoff (TAF) |
|---|---|---|---|---|---|---|---|---|---|
| 1915-2015 | Historical Observations | 38.2 | 54.8 | 67.8 | 35.6 | 42.8 | 1.5 | 5.7 | 1,458 |
| 2040-2069 | Warm-Wet | 1.9 | 4 | 6.2 | 1.6 | 1.6 | -0.7 | -2.3 | 701 |
| | Central Tendency | 0.1 | 5 | 8.1 | 2.1 | 2.7 | -0.9 | -2.8 | -2 |
| | Hot-Dry | -2.8 | 6.2 | 10.4 | 2.7 | 3.7 | -1.1 | -3.4 | -206 |
| 2055-2084 | Warm-Wet | 3.8 | 4.7 | 7.4 | 2 | 2 | -0.8 | -2.5 | 199 |
| | Central Tendency | -1.1 | 6.3 | 11.1 | 2.6 | 4.1 | -1.08 | -3.5 | -93 |
| | Hot-Dry | -3.4 | 7.9 | 13.3 | 3.7 | 5 | -1.2 | -3.8 | -185 |
| 2070-2099 | Warm-Wet | 7 | 5.4 | 8.3 | 2.5 | 1.8 | -0.9 | -2.9 | 486 |
| | Central Tendency | -0.6 | 6.5 | 11 | 2.8 | 3.9 | -1 | -3.3 | -54 |
| | Hot-Dry | -4.6 | 8.9 | 15.7 | 4.1 | 6.2 | -1.3 | -4.3 | -203 |

## Water Supply Reliability

Changing climate conditions in the Sierra Nevada Mountains threaten the volume of water stored in the snowpack and the timing of runoff entering Folsom Reservoir. Consequently, they can also affect the critical role of Folsom Reservoir in the CVP Operations. Reliance on Folsom Reservoir is expected to increase commensurate with the impact of sea level rise on salinity in the Delta. Modeling of these factors has illustrated that, without operational adjustments, Folsom Reservoir is projected to have lower end of conservation season (end of September) storage levels and approach "dead pool" more often under most future climate scenarios (see Figure 6-4). Similarly, increased early season runoff would increase flood risks along the Lower American River, leaving less water in the upper watershed available during water supply operations.




Key:
Baseline BL = Historic Conditions, 2070 CT = Central Tendency 2070 Climate Scenario, HD = Hot-Dry 2070 Climate Scenario, WW = Warm-Wet 2070 Climate Scenario

**Figure 6-5** Exceedance Plot of Folsom Reservoir Storage (end of September) Under Future Climate Change

Under the 2070 level of development, the ARBS projects a supply-demand imbalance of 63 to 78 TAF/year in the Upper Basin (or Foothills Area) without further conservation or management actions. In the Lower Basin, groundwater extraction is expected to increase by 62 to 155 TAF/year to offset the projected imbalance, which would affect groundwater sustainability.

Based on the water supply and demand imbalance results, the region's water supply reliability has vulnerabilities. The ARBS assessed several adaptation portfolios for addressing the range of vulnerabilities and future supply-demand imbalances for the Study Area for regional benefits. Portfolios analyzed were:

1. Foundational Institutions
2. No Assurances for Long-term CVP Water Contract
3. Alder Creek Storage and Conservation Project
4. Sacramento River Diversion Project
5. Federally Recognized Groundwater Bank (North and South Basin)
6. Folsom Dam Raise with Groundwater Banking (South Basin)
7. Modified Flow Management Standard

The seven formulated adaptation portfolios were quantitatively evaluated using CalSim 3 to alleviate supply-demand imbalances and benefits to the region. The Study's intent was not focused on individual water-supplier's portfolio, but rather how the region could plan to increase regional reliability. The precise composition, scale, operations, partnerships, funding, and governance to advance these project concepts will require further evaluations and coordination among Basin interests, including USBR, DWR, and SWRCB.

While climate change does have an impact on the basin, impacts are largely seen closer to the end of the century, and not within the timeline of the UWMP. Through proactive adaptation management actions, the Study highlights ways for the region to alleviate climate change impacts by the end of century. Therefore, in consideration of the timeline of the UWMP, the City of Roseville does not reflect any climate change impacts in supply and demand scenarios within this Plan.

## 6.15 Energy Intensity

A new requirement of the CWC, pursuant to 10631.2. (a), for 2020 UWMPs is that suppliers must include information that can be used to calculate energy intensity of their water service. Typically, a large portion of energy consumed in municipalities is dedicated to the conveyance, treatment, distribution, and storage of water. Maintaining water systems involves numerous pumps, motors, and other equipment which run for most or all hours of the day year-round. Because the water operations consume a significant amount of energy, these facilities can be a substantial contributor to greenhouse gas emissions in communities. Understanding how much energy is consumed at the City's various facilities is critical to ensure that the City is mindfully and efficiently utilizing energy resources.

An analysis of the energy intensity, which is the amount of energy consumed per the volume of potable water supplied, is provided in COR Table 6-D.

**COR Table 6-D** Energy Intensity Reporting

| Start Date for Reporting Period | 1/1/2020 | Sum of Water Management Processes |
|---|---|---|
| End Date | 12/31/2020 | |
| Volume of Water Entering Process (AF) | | 32,300 |
| Energy Consumed (kWh) | | 10,419,600 |
| Energy Intensity (kWh/AF) | | 322.60 |
| NOTES: Values include only water management processes that are under the City's operational control. | | |

The City treats and distributes the majority of its potable supply with the significant aid of gravity flow, from Folsom through the WTP and out into the distribution network throughout the City's service area. Data collected to support the analysis included in COR Table 6-D were primarily sourced from energy consumption billing data for the City's conveyance, treatment, distribution, and storage facilities for potable water. Where data was not available, estimates were made based upon similar facilities as well as calculations proportionate to the volume of water involved in the facility process. Some of the City's conveyance or distribution facilities do not have power sources or are owned by the adjacent utility and therefore do not represent consumption included in the calculation above.

# Chapter 7 Water Service Reliability and Drought Risk Assessment

This chapter describes the long-term reliability of the City's water supply portfolio in all hydrologic year types through the year 2045. The City's existing and planned water management strategies and options for increasing the reliability of water supplies are also addressed. Shorter term reliability planning that may require immediate action, such as drought or a catastrophic supply interruption, is addressed in the Water Shortage Contingency Plan.

## 7.1 Constraints on Water Sources

This section addresses potential legal, environmental, water quality, and climatic effects on the reliability of water supply sources through the year 2045.

### 7.1.1 Legal Constraints

The City does not anticipate legal factors to affect the reliability of recycled water or purchased water supply within the planning horizon of this UWMP.

There are no existing legal constraints that limit groundwater pumping and the groundwater basin is not currently adjudicated. However, as an updated sustainable yield for the subbasin has yet to be defined under SGMA, the legal authority to enforce the sustainable yield of the subbasin has not been created, and the basin is subject to the users' cooperation in managing the basin until a formal authority is created. The City actively participates in regional discussions regarding best practices and cooperative management of water resources. These issues and concerns are being discussed in forums like the Regional Water Authority and as part of the Western Placer County Groundwater Management Plan along with sustainable groundwater management objectives and activities. The collaborative group of City of Roseville, PCWA, City of Lincoln, and California American Water is responsible for and has been identified as the responsible entity for monitoring groundwater levels meeting requirements of the 2009 SB X7-6 California State Groundwater Elevation Monitoring Program (CASGEM) program. Information gathered as part of this program was included in the groundwater model that was developed to support the ASR application with the Regional Water Quality Control Board to determine impacts of proposed extractions and injections related to groundwater levels in the region.

### 7.1.2 Water Quality Constraints

The City's water supply portfolio consists of high-quality surface water, recycled water, and groundwater resources. In some areas of the City, iron and manganese can be found in native groundwater at concentrations both above and below the secondary taste and odor maximum contaminant level established for these constituents. The City monitors groundwater quality closely, to ensure water provided for potable use does not exceed these standards.

### 7.1.3 Physical Constraints

The physical constraints of recycled water, surface water, and groundwater are discussed in the following sections.

#### *7.1.3.1 Recycled Water*

Recycled water is physically constrained by flows into the City's wastewater treatment plants. It is therefore seasonally available in higher quantities when demands are lowest during the wet season. The distribution network of "purple pipe" is also a physical constraint for this supply source, as it only exists in the western portion of the City. Access to recycled water and its availability to offset potable needs are therefore, limited by physical access to this pipe network.

#### *7.1.3.2 Surface Water*

The City has identified its Folsom Lake intake as a likely physical constraint on current surface water supplies. All three surface water contract supplies are received through this point of diversion, making it a critical facility for the reliability of Roseville's surface water supply. If the water level of Folsom Lake were to drop close to or below the intake elevation as it nearly did in 2015, the City would not be able to divert water without additional infrastructure. The City is also able to receive supply through interties in emergency conditions; however, the WTP represents the primary diversion point. As a result of this vulnerability and lessons learned in the 2015 drought year, the City is actively exploring cooperative efforts with Folsom diversion and operation partners to duplicate or lower the intake facility to alleviate this concern. The City is likewise examining options for alternate diversion points or use of interties to increase reliability of physical water supply access.

The capacities of the Folsom Dam diversion, Roseville Water Treatment Plant, and distribution systems are sufficient to divert, treat, and convey the projected surface water demands. A 150 cubic feet per second (cfs) capacity limitations at the USBR pumping plant, which was agreed to based on recent pumping plant improvements, is sufficient to provide water to meet the City's needs.

#### *7.1.3.3 Groundwater*

The physical constraints on the current groundwater supply are the pumping capacities of existing wells. The total pumping capacities from all the six wells are about 11,050 GPM, approximately 15.9 MGD, per Chapter 3 . The City plans to install 6 additional wells by 2035 to provide additional groundwater supplies. Currently, the City plans to design all new wells with ASR capability to allow for greater groundwater banking and extraction capability throughout seasonal variations in surface water supply availability. Many of these planned well sites have been reassessed and relocated to areas of the City's surface are with more advantageous groundwater conditions as well as hydraulics with respect to the distribution network. Installation of wells higher in the hydraulic grade area of the system will allow for a greater downstream sphere of influence for this infrastructure and more flexible system operation in times of reliance on groundwater.

### 7.1.4 Other Constraints

Aside from legal and physical constraints, several other considerations affect the availability and reliability of Roseville's water supply portfolio. The City's purchased surface water supply is subject to reductions during dry years (seasonal and climatic shortages) pursuant to the Water Forum Agreement (WFA), the USBR Operations Criteria and Plan (OCAP), and the Central Valley Project Municipal and Industrial Water Shortage Policy (CVP M&I WSP). These agreements and programs are discussed in greater detail in the following subsections.

#### *7.1.4.1 Sacramento Water Forum Agreement*

The Sacramento Water Forum is a diverse group of business and agricultural leaders, citizen groups, and environmentalists, water managers, and local governments working together to balance two co-equal objectives:

1. **Provide a reliable and safe water supply for the Sacramento region's long-term growth and economic health.**
2. **Preserve the fishery, wildlife, recreational and aesthetic values of the Lower American River.**

The City, along with several other Sacramento-area water suppliers are signatory to the January 2000 Water Forum Agreement which includes Purveyor Specific Agreements, with the most recent revisions affected to these agreements in 2015. The Water Forum Agreement provides the framework for how water resources, including surface water and groundwater supplies would be used in the region, through the year 2030. The City's Purveyor Specific Agreement includes limitations on City surface water diversions from the American River under various hydrologic conditions. The Water Forum categorized water years into three types, all of which are defined in terms of the projected March through November unimpaired flow into Folsom Reservoir. These hydrologic year types are as follows in COR Table 7-A.

**COR Table 7-A** Water Forum Agreement Hydrologic Year Types

| Year Type | Unimpaired Flow into Folsom Reservoir |
|---|---|
| Normal/Average or Wet Year | Greater than or equal to 950,000 AF |
| Drier Year | Between 400,000 and 950,000 AF |
| Driest/Critically Dry Year | Less than 400,000 AF |

Although Roseville's water contract entitlements total 66,000 AF/yr, the City's diversions from the American River are limited by the WFA in normal/wet years, drier, and driest years. In normal/wet years, the City has agreed to limit surface water diversions from the American River to 58,900 AF/yr. In driest or critically dry years, the maximum diversion from the American River is limited to 43,800 AF/yr. In drier years, the City may divert an amount between 43,800 and 58,900 AF/yr from the American River, calculated linearly depending on the unimpaired flow into Folsom Reservoir, as shown in Figure 7-1.

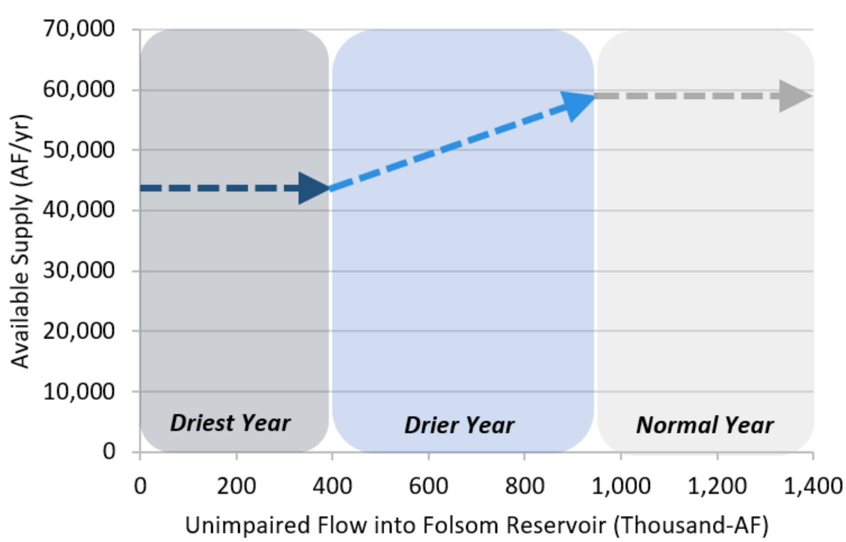



**Figure 7-1** Water Forum Agreement Supply Limitations

It is important to note that during the drier and driest years, the City has an agreement with PCWA to release an additional 20,000 AF/yr of water down the American River on the City's behalf through re-operation of PCWA's American River Middle Fork Project (MFP). This 20,000 AF/yr of water is not part of the City's contracted supply of 66,000 AF/yr. The intent of the MFP re-operational releases during drier and driest years is to mitigate environmental impacts resulting from increased diversions above 1995 baseline levels.

#### *7.1.4.2 USBR Operations Criteria and Plan*

In addition to the WFA, the City's USBR water is also subject to restrictions as detailed in the 2004 Long Term Central Valley Project Operations and Criteria Plan (location on USBR's website). Chapter 5 of the OCAP entitled "Operations Forecasting" states that CVP allocations can be affected by:

- Forecasted reservoir inflows and Central Valley hydrologic water supply;
- Current amounts of storage in upstream reservoirs and in San Luis Reservoir;
- Projected water demands in the Sacramento Valley;
- Instream and Delta regulatory requirements;
- Annual management of 3406(b)(2) resources (related to fish and wildlife); and/or
- Efficient use of CVP-SWP export capacity through Joint Point of Diversion flexibility.

The OCAP includes a requirement that contractors be informed by USBR no later than February 15 of any possible deficiency in supplies that year. Since 1992, increasing constraints placed on operations by legislative and ESA requirements have made water delivery to CVP contractors more difficult, with recent drought conditions further impacting deliveries. Additionally, it is important to note that the City's USBR water deliveries may be curtailed purely based on downstream Delta conditions, irrespective of available upstream supply.

#### *7.1.4.3 Central Valley and Industrial Water Shortage Policy*

Upon a condition of shortage as determined by the OCAP, the CVP M&I WSP details the "incremental steps" by which available M&I water supply is allocated to the CVP water service contractors. From the November 2015 USBR news release, elements of the CVP M&I WSP include:

- Define water shortage terms and conditions for applicable CVP water service contractors, as appropriate.
- Determine the quantity of water made available to CVP water service contractors that, together with the M&I water service contractors' drought water conservation measures and other non-CVP water supplies, would assist the M&I water service contractors in their efforts to protect public health and safety during severe or continuing drought.
- Provide information to CVP water service contractors for their use in water supply planning and development of drought contingency plans.

The Final Environmental Impact Statement (EIS) describes the existing setting, alternatives for future operations under the CVP M&I WSP, and potential environmental impacts of each alternative. USBR selected Alternative 4, the Preferred Alternative, which comprises the Updated CVP M&I Water Shortage Policy developed by USBR with stakeholder input received during preparation of the Final EIS.

The decision will allow USBR the greatest degree of flexibility to address CVP water service contractors' needs during a Condition of Shortage while recognizing that CVP deliveries are subject to the amount of CVP water available. The Updated CVP M&I WSP also provides clarity to the terms, conditions, and procedures of the CVP M&I WSP. A copy of the November 2015 Final Record of Decision is included in Appendix J.

## 7.2 Water Supply Reliability Assessment

This section addresses the reliability of the City's water supply in average, single dry, and multiple dry water years. The City uses the following water year definitions from the DWR 2020 Guidebook:

**COR Table 7-B** Reliability Assessment Year Type Characterization

| Year Type | Description |
|---|---|
| Average or Normal Year | A single year or averaged range of years that most closely represents the average water supply available to the Supplier. |
| Single Dry Year | The year that represents the lowest water supply available to the Supplier. |
| Five Consecutive Year Drought | The driest five-year historical sequence for the supplier. |

The reliability of the potable and recycled water supplies is discussed in the following sections and are compared to the projected potable and recycled water demand.

### 7.2.1 Potable Water Supply and Demand Assessment

This section provides an assessment of the City's expected water supply and demand for Normal Year, Single Dry Year, and Five Consecutive Year Drought scenarios, based on data available at the time of publication of this UWMP, and discusses the City plans to mitigate potential supply deficits.

The City has identified the following base water years to represent the Year Types:

- **Average or Normal Year**: 2017
- **Single Dry Year**: 2015
- **Five Consecutive Year Drought**: 2011 - 2015

This City has identified these base water years based heavily on lessons learned through the droughts experienced in the last 10 years. In 2017, 100% of the typical contract supply was available, making it a good candidate to represent an average or normal year. In 2015, the City experienced a 75% curtailment of their USBR contract value – a source which had been considered highly reliable until that time. With only a 25% allotment, this represents the lowest experienced water supply level in Roseville's history. The time period between 2011 and 2015 represented multiple years of drought conditions and the lowest average available water supply experienced by the City, and therefore has been identified to represent the five consecutive year drought condition. Supply volumes for base years are provided in DWR Table 7-1.

**DWR Table 7-1**

| Submittal Table 7-1 Retail: Basis of Water Year Data (Reliability Assessment) | | | |
|---|---|---|---|
| Year Type | Base Year | Available Supplies if Year Type Repeats | |
| | | ☐ Quantification of available supplies is not compatible with this table and is provided elsewhere in the UWMP. Location ______________________ | |
| | | ☑ Quantification of available supplies is provided in this table as either volume only, percent only, or both. | |
| | | **Volume Available** | **% of Average Supply** |
| Average Year | 2017 | 64,279 | 100% |
| Single-Dry Year | 2015 | 49,739 | 77% |
| Consecutive Dry Years 1st Year | 2011 | 64,279 | 100% |
| Consecutive Dry Years 2nd Year | 2012 | 59,430 | 92% |
| Consecutive Dry Years 3rd Year | 2013 | 59,480 | 93% |
| Consecutive Dry Years 4th Year | 2014 | 51,531 | 80% |
| Consecutive Dry Years 5th Year | 2015 | 49,942 | 78% |
| NOTES: Groundwater is not utilized as a significant source of supply until a Drought Stage 3 is declared by the City. Totals include recycled water which is assumed to be available in all year types. All volumes are in AF. | | | |

The City intends to use their groundwater supply differently in different year types. Under Normal Year conditions, the City intends to inject groundwater at an overall net benefit to the aquifer, or at most to extract groundwater up to the amount injected. In times of drought however, as in a Single Dry Year, or multi-year drought condition, the City can and will utilize their groundwater infrastructure as a larger percentage of overall supply. These assumptions and the resulting groundwater availability by year type are outlined in COR Table 7-C.

**COR Table 7-C** Groundwater Supply Availability by Year Type.

| Groundwater Supplies and Management by Year Type | | | | | |
|---|---|---|---|---|---|
| **Well Data** | Operational ASR Wells | 6 | 10 | 11 | 11 |
| | Total Annual Extraction Capacity | 17,600 | 28,000 | 32,100 | 32,100 |
| | Total Annual Injection Capacity | 7,000 | 12,100 | 14,900 | 14,900 |
| **Year Type** | **Assumptions** | **2020** | **2030** | **2035** | **Buildout** |
| **Normal** | In a Normal Year, the City would only typically extract less than or equal to the volume injected. The injection window is estimated at **3 months** for the wet season when additional volume might be available, and **90% capacity** would be assumed to account for 10% down time for maintenance. | 1,560 | 2,720 | 3,350 | 3,350 |
| **Single Dry** | In a Single Dry Year, the City would expect to pump for **6 months** of the year at 9**0% capacity** to allow for 10% down time for maintenance. | 7,920 | 12,570 | 14,430 | 14,430 |
| **Year 5 of a Multi-Year Drought** | In the 5th year of a 5 -Year Drought, the City would expect to pump for **6 months** of the year at 9**0% capacity** to allow for 10% down time for maintenance. | 7,920 | 12,570 | 14,430 | 14,430 |
| NOTES: All values are in AF. | | | | | |

The availability of total water supply from each source by hydrologic year type is outlined in COR Table 7-D.

**COR Table 7-D** Potable Supply Availability by Year Type

| Potable Water Supply Availability by Source and Hydrologic Year Type | | | | | | |
|---|---|---|---|---|---|---|
| **Supply Source** | **2020 (current)** | **2025** | **2030** | **2035** | **2040** | **2045** |
| **NORMAL WATER YEAR** | | | | | | |
| **USBR** | 32,000 | 32,000 | 32,000 | 32,000 | 32,000 | 32,000 |
| **PCWA** | 30,000 | 30,000 | 30,000 | 30,000 | 30,000 | 30,000 |
| **SJWD** | 4,000 | 4,000 | 4,000 | 4,000 | 4,000 | 4,000 |
| **Water Forum Limitation** | -7,100 | -7,100 | -7,100 | -7,100 | -7,100 | -7,100 |
| **PCWA (Future)** | 0 | 0 | 0 | 3,360 | 3,360 | 3,360 |
| **Groundwater** | 1,560 | 1,560 | 2,720 | 3,350 | 3,350 | 3,350 |
| **Total** | 60,460 | 60,460 | 61,620 | 65,610 | 65,610 | 65,610 |
| **SINGLE DRY YEAR** | | | | | | |
| **USBR** | 8,000 | 8,000 | 8,000 | 8,000 | 8,000 | 8,000 |
| **PCWA** | 30,000 | 30,000 | 30,000 | 30,000 | 30,000 | 30,000 |
| **SJWD** | 0 | 0 | 0 | 0 | 0 | 0 |
| **Water Forum Limitation** | 0 | 0 | 0 | 0 | 0 | 0 |
| **PCWA (Future)** | 0 | 0 | 0 | 3,360 | 3,360 | 3,360 |
| **Groundwater** | 7,920 | 7,920 | 12,570 | 14,431 | 14,431 | 14,431 |
| **Total** | 45,920 | 45,920 | 50,570 | 55,791 | 55,791 | 55,791 |
| **FIVE CONSECUTIVE YEAR DROUGHT - YEAR 1** | | | | | | |
| **USBR** | 32,000 | 32,000 | 32,000 | 32,000 | 32,000 | 32,000 |
| **PCWA** | 30,000 | 30,000 | 30,000 | 30,000 | 30,000 | 30,000 |
| **SJWD** | 4,000 | 4,000 | 4,000 | 4,000 | 4,000 | 4,000 |
| **Water Forum Limitation** | -7,100 | -7,100 | -7,100 | -7,100 | -7,100 | -7,100 |
| **PCWA (Future)** | 0 | 0 | 0 | 3,360 | 3,360 | 3,360 |
| **Groundwater** | 1,560 | 1,560 | 2,720 | 3,350 | 3,350 | 3,350 |
| **Total** | 60,460 | 60,460 | 61,620 | 65,610 | 65,610 | 65,610 |
| **FIVE CONSECUTIVE YEAR DROUGHT - YEAR 2** | | | | | | |
| **USBR** | 24,000 | 24,000 | 24,000 | 24,000 | 24,000 | 24,000 |
| **PCWA** | 30,000 | 30,000 | 30,000 | 30,000 | 30,000 | 30,000 |
| **SJWD** | 0 | 0 | 0 | 0 | 0 | 0 |
| **PCWA (Future)** | 0 | 0 | 0 | 3,360 | 3,360 | 3,360 |
| **Water Forum Limitation** | 0 | 0 | 0 | 0 | 0 | 0 |
| **Groundwater** | 1,560 | 1,560 | 2,720 | 3,350 | 3,350 | 3,350 |
| **Total** | 55,560 | 55,560 | 56,720 | 60,710 | 60,710 | 60,710 |

| | | | | | | |
|---|---|---|---|---|---|---|
| **FIVE CONSECUTIVE YEAR DROUGHT - YEAR 3** | | | | | | |
| **USBR** | 24,000 | 24,000 | 24,000 | 24,000 | 24,000 | 24,000 |
| **PCWA** | 30,000 | 30,000 | 30,000 | 30,000 | 30,000 | 30,000 |
| **SJWD** | 0 | 0 | 0 | 0 | 0 | 0 |
| **Water Forum Limitation** | 0 | 0 | 0 | 0 | 0 | 0 |
| **PCWA (Future)** | 0 | 0 | 0 | 3,360 | 3,360 | 3,360 |
| **Groundwater** | 1,560 | 1,560 | 2,720 | 3,350 | 3,350 | 3,350 |
| **Total** | 55,560 | 55,560 | 56,720 | 60,710 | 60,710 | 60,710 |
| **FIVE CONSECUTIVE YEAR DROUGHT - YEAR 4** | | | | | | |
| **USBR** | 16,000 | 16,000 | 16,000 | 16,000 | 16,000 | 16,000 |
| **PCWA** | 30,000 | 30,000 | 30,000 | 30,000 | 30,000 | 30,000 |
| **SJWD** | 0 | 0 | 0 | 0 | 0 | 0 |
| **Water Forum Limitation** | 0 | 0 | 0 | 0 | 0 | 0 |
| **PCWA (Future)** | 0 | 0 | 0 | 3,360 | 3,360 | 3,360 |
| **Groundwater** | 1,560 | 1,560 | 2,720 | 3,350 | 3,350 | 3,350 |
| **Total** | 47,560 | 47,560 | 48,720 | 52,710 | 52,710 | 52,710 |
| **FIVE CONSECUTIVE YEAR DROUGHT - YEAR 5** | | | | | | |
| **USBR** | 8,000 | 8,000 | 8,000 | 8,000 | 8,000 | 8,000 |
| **PCWA** | 30,000 | 30,000 | 30,000 | 30,000 | 30,000 | 30,000 |
| **SJWD** | 0 | 0 | 0 | 0 | 0 | 0 |
| **Water Forum Limitation** | 0 | 0 | 0 | 0 | 0 | 0 |
| **PCWA (future)** | 0 | 0 | 0 | 3,360 | 3,360 | 3,360 |
| **Groundwater** | 7,920 | 7,920 | 12,570 | 14,431 | 14,431 | 14,431 |
| **Total** | 45,920 | 45,920 | 50,570 | 55,791 | 55,791 | 55,791 |
| NOTES: Groundwater more significantly relied on in single dry years and year 5 of a five consecutive year drought condition.<br>All values are in AF. | | | | | | |

### 7.2.2 Comparison of Supply and Demand

A comparison of projected water supply and demand during Normal, Single Dry, and Five Consecutive Year Drought conditions are included in DWR Table 7-2, DWR Table 7-3, and DWR Table 7-4. It is important to note that in all scenarios shown in these tables, Normal Year demands are shown. As outlined in Chapter 4 , passive demand reduction savings are incorporated into the demand projections themselves; however, no specific conservation effort to reduce demands in a drought year have been shown in these tables in order to depict the most basic comparison of supply and demand in these year types. As shown, there is an adequate water supply in all normal years. In single dry years and in certain multiple dry years, water supply deficit may occur.

### 7.2.3 Recycled Water Supply and Demand Comparison

The City's recycled water supply is an important resource as it is considered to be 100% reliable in all water year types. Recycled water supply has been set equal to the projected recycled water demand in these analyses because showing a surplus recycled water supply would mask potential potable water shortages.

### 7.2.4 Total Water Supply and Demand Comparison

A comparison of projected total (potable and recycled) water supply and demand during a normal water year is included in DWR Table 7-2. As shown, there is an adequate water supply in normal years to meet demands through 2045.

**DWR Table 7-2**

| Submittal Table 7-2 Retail: Normal Year Supply and Demand Comparison | | | | | |
|---|---|---|---|---|---|
| | 2025 | 2030 | 2035 | 2040 | 2045 |
| Supply totals | 64,482 | 66,055 | 70,543 | 70,543 | 70,543 |
| Demand totals | 51,589 | 56,990 | 62,547 | 62,547 | 62,547 |
| Difference | 12,893 | 9,065 | 7,996 | 7,996 | 7,996 |
| NOTES: An additional 3,360 AF of supply from the PCWA Ophir WTP is assumed to become available in all year types as of 2035. The City plans to have 4 new wells operational by 2030 with an additional 2 following by 2035, as well as the destruction of 1 existing. Supply and demand include Recycled Water. All volumes are in AF. | | | | | |

A comparison of projected water supply and demand during a Single Dry Year is included in DWR Table 7-3.

**DWR Table 7-3**

| Submittal Table 7-3 Retail: Single Dry Year Supply and Demand Comparison | | | | | |
|---|---|---|---|---|---|
| | 2025 | 2030 | 2035 | 2040 | 2045 |
| Supply totals* | 49,942 | 55,005 | 60,723 | 60,723 | 60,723 |
| Demand totals* | 51,589 | 56,990 | 62,547 | 62,547 | 62,547 |
| Difference | (1,647) | (1,985) | (1,824) | (1,824) | (1,824) |
| NOTES: An additional 3,360 AF of supply from the PCWA Ophir WTP is assumed to become available in all year types as of 2035. The City plans to have 4 new wells operational by 2030 with an additional 2 following by 2035, as well as the destruction of 1 existing. Supply and demand include Recycled Water. All volumes are in AF. | | | | | |

A comparison of projected water supply and demand during a Five Consecutive Year Drought is included in DWR Table 7-4.

**DWR Table 7-4**

| Submittal Table 7-4 Retail: Multiple Dry Years Supply and Demand Comparison | | | | | | |
|---|---|---|---|---|---|---|
| | | 2025 | 2030 | 2035 | 2040 | 2045 |
| First year | Supply totals | 64,482 | 66,055 | 70,543 | 70,543 | 70,543 |
| | Demand totals | 51,589 | 56,990 | 62,547 | 62,547 | 62,547 |
| | Difference | 12,893 | 9,065 | 7,996 | 7,996 | 7,996 |
| Second year | Supply totals | 59,582 | 61,155 | 65,643 | 65,643 | 65,643 |
| | Demand totals | 51,589 | 56,990 | 62,547 | 62,547 | 62,547 |
| | Difference | 7,993 | 4,165 | 3,096 | 3,096 | 3,096 |
| Third year | Supply totals | 59,582 | 61,155 | 65,643 | 65,643 | 65,643 |
| | Demand totals | 51,589 | 56,990 | 62,547 | 62,547 | 62,547 |
| | Difference | 7,993 | 4,165 | 3,096 | 3,096 | 3,096 |
| Fourth year | Supply totals | 51,582 | 53,155 | 57,643 | 57,643 | 57,643 |
| | Demand totals | 51,589 | 56,990 | 62,547 | 62,547 | 62,547 |
| | Difference | (7) | (3,835) | (4,904) | (4,904) | (4,904) |
| Fifth year | Supply totals | 49,942 | 55,005 | 60,723 | 60,723 | 60,723 |
| | Demand totals | 51,589 | 56,990 | 62,547 | 62,547 | 62,547 |
| | Difference | (1,647) | (1,985) | (1,824) | (1,824) | (1,824) |
| NOTES: An additional 3,360 AF of supply from the PCWA Ophir WTP is assumed to become available in all year types as of 2035. The City plans to have 4 new wells operational by 2030 with an additional 2 following by 2035, as well as the destruction of 1 existing. Supply and demand include Recycled Water. All volumes in AF. | | | | | | |

As stated in DWR Table 7-4, there is sufficient supply to meet demands in Normal Years through 2045. In Single Dry Years and some extended drought years, shortages do occur. DWR Table 7-2, DWR Table 7-3, and DWR Table 7-4 include recycled water supply and demand. The remaining deficits shown will be mitigated by potable water conservation measures implemented as part of the Water Shortage Contingency Plan.

### 7.2.5 Deficit Mitigation

Depending on the raw water supply available from USBR, and in accordance with the WFA, deficits in potable water supply may occur in a single dry year or the latter stages of an extended drought condition. As shown in DWR Table 7-3 and DWR Table 7-4, the greatest potential deficit between available supply and demand would occur in Year 4 of a Five Consecutive Year Drought condition.

One potential strategy to alleviate deficiencies shown above is indicated in DWR Table 7-5. In DWR Table 7-5, the potential volume of water resulting from potable water demand reductions are shown.

**DWR Table 7-5**

| Submittal Table 7-5: Five-Year Drought Risk Assessment Tables to address Water Code Section 10635(b) | | | | | |
|---|---|---|---|---|---|
| | **2021** | **2022** | **2023** | **2024** | **2025** |
| Total Water Use | 39,172 | 42,276 | 45,380 | 48,484 | 51,589 |
| Total Supplies | 64,279 | 59,430 | 59,480 | 51,531 | 49,942 |
| Surplus/Shortfall w/o WSCP Action | 25,107 | 17,153 | 14,100 | 3,047 | (1,647) |
| **Planned WSCP Actions** (use reduction and supply augmentation) | | | | | |
| WSCP - supply augmentation benefit | 0 | 0 | 0 | 0 | 0 |
| WSCP - use reduction savings benefit | 0 | 0 | 0 | 0 | 6,659 |
| Revised Surplus/(shortfall) | 25,107 | 17,153 | 14,100 | 3,047 | 5,013 |
| Resulting % Use Reduction from WSCP action | 0% | 0% | 0% | 0% | 13% |
| NOTES: Supply and demand totals include Recycled Water. Demand reductions actions only apply to the portion of total water use that is potable and not to the recycled water. | | | | | |

The City will determine the needed balance between water conservation and groundwater pumping on a case-by-case basis consistent with the City's Municipal Code. The City also continues to plan for and analyze opportunities for water supply projects or exchanges that would increase the reliability of the raw water supplies diverted from the American River.

## 7.3 Regional Supply and Reliability

All water consumed by the City comes from local supply sources. No water is imported from other regions, nor does the City anticipate importing water from other regions throughout the UWMP planning period. However, the City is actively engaged in multiple planning projects and coordination intended to strengthen water supply reliability throughout the Sacramento area, in addition to investing in long-term water storage projects like the future Sites Reservoir. Projects like Sites will not provide direct benefit in terms of water supply to Roseville; however, as a regional project it promises to strengthen the Northern California water portfolio as a whole, providing benefit to all who operate within this sphere. The City is a committed regional partner in working to solve supply shortage issues before they become a critical reality, with climate change and increasingly limited supply sources at the crux of the issue. The City will continue these efforts into the future and work with its partner agencies to find the best path forward.

# Chapter 8 Water Shortage Contingency Plan

Following the severe drought of 2012-2016, the State of California Legislature sought to expand the water shortage contingency analysis under former law and mandated that a Water Shortage Contingency Plan (WSCP) be adopted by suppliers. A copy of the WSCP is provided in Appendix K.

# Chapter 9 Demand Management Measures

This chapter describes the City's historical and existing water conservation program, status of implementation of Demand Management Measures (DMMs), and projected future conservation implementation. The CWC requires that the UWMP include a comprehensive description of historical, current, and projected water conservation programs.

> *CWC 10631 (e) Provide a description of the supplier's water demand management measures. This description shall include all of the following:*
>
> *(1) (A) For an urban retail water supplier, as defined in Section 10608.12, a narrative description that addresses the nature and extent of each water demand management measure implemented over the past five years. The narrative shall describe the water demand management measures that the supplier plans to implement to achieve its water use targets pursuant to Section 10608.20.*
>
> *(B) The narrative pursuant to this paragraph shall include descriptions of the following water demand management measures:*
>
> *(i) Water waste prevention ordinances.*
>
> *(ii) Metering.*
>
> *(iii) Conservation pricing.*
>
> *(iv) Public education and outreach.*
>
> *(v) Programs to assess and manage distribution system real loss.*
>
> *(vi) Water conservation program coordination and staffing support.*
>
> *(vii) Other demand management measures that have a significant impact on water use as measured in gallons per capita per day, including innovative measures, if implemented.*

In previous UWMPs, a substantial amount of data was required to document a water supplier's progress in implementing fourteen specific DMMs. In 2014, Assembly Bill 2067 simplified, clarified, and updated reporting requirements for DMMs. Starting with the 2015 UWMP, focus has turned away from detailed descriptions of each of the fourteen DMMs and has turned to water conservation measures that are being implemented to achieve compliance with SB X7-7. For retail agencies, the number of DMMs has been reduced from fourteen to six (plus an "other" category). A narrative description of the status of the DMMs and how the DMMs will help the water supplier achieve its SBX7-7 water use targets is required. Detailed data are not required.

Members of the CUWCC may include their reporting in the UWMP, but a narrative is also required.

## 9.1 Demand Management Measures

The six DMMs required to be discussed in the 2020 include the following:

- Water waste prevention ordinances;
- Metering;
- Conservation pricing;
- Public Education and outreach;
- Programs to assess and manage distribution system real loss; and
- Water conservation program coordination and staffing support.

For each DMM, the current program is described, followed by a description of how the DMM was implemented over the previous five years and the planned implementation to achieve the water use targets required by SB X7-7, which is discussed in Chapter 5

### 9.1.1 Water Waste Prevention Ordinances

The City currently restricts water waste within its service area. Roseville Municipal Code Chapter 14.09, Water Conservation Ordinance (Appendix L), defines water waste and associated penalties of continued infractions. Per the ordinance, customers in violation are provided a series of notifications at one-week intervals: first a courtesy notice, second an administrative warning, and finally a formal citation. If the situation is not remedied by the time specified in the formal citation, additional measures can be taken to enforce compliance. These measures include fines, water restrictions, low flow devices, or discontinued service. In addition, the City may waive the courtesy notice and administrative warning in times of drought.

To enforce the Water Waste Ordinance, the City employs two 1,500 hour/year conservation workers to patrol within the service area limits. The City has also employed contract help at night to conduct water waste patrols. These patrol efforts are ramped up and down seasonally according to the intensity of landscape water usage. In addition, full-time City staff patrol for water waste as part of their normal job duties. In addition to patrols by City staff, the City has an online reporting mechanism that allows customers to report observed water waste anonymously. Customers can visit www.roseville.ca.us/waterwaste and submit an electronic form, which is then further investigated by City staff.

Implementation of this DMM is ongoing and expected to help the City achieve its water use targets by minimizing the nonessential uses of water so that the water is available to be used for human consumption, sanitation, and fire protection.

### 9.1.2 Metering

A meter retrofit program was developed and implemented from 2001 to 2011. Implementation of metered rates began immediately on all residential metered connections established after January 1, 2002, with the remaining retrofitted homes transitioned in large blocks as retrofits were completed. Customers were provided water use information for a period of one year before transition to volumetric billing began.

The metering DMM helps Roseville achieve its water use targets by providing accurate water use information to both the customer and the City. Higher than normal comparative usage triggers outreach to customers who may have leaks, as well as awareness of efficient water use practices. Overall, metering assists the City in managing customer water use and leak detection efforts.

### 9.1.3 Conservation Pricing

As a component of its meter retrofit program, the City adopted conservation pricing for water on all metered accounts from 2011 through 2015. Later, and to comply with Proposition 218 requirements, the City transitioned to a per-use, uniform billing rate structure in February 2016. A complete list of service charges, excess water use charges, and water rates are included in Roseville Municipal Code Sections 14.08.090 Service Charges for Metered Service through 14.08.100 Flat Water Rates. This information is included in Appendix M.

Implementation of this DMM is expected to help the City achieve its water use targets by ensuring water customers pay the true cost of water. The City regularly analyzes this cost of water production, capital improvement project needs, level of service requirements and other costs of operating the water system during regular rate studies. Where adjustments need be made, extensive public education efforts are undertaken to maintain transparency of utility operations and funding to support any required rate changes. Sufficient revenue will continue to be available to fund water system operations, maintenance, and water conservation programs.

### 9.1.4 Public Education and Outreach

The City promotes water conservation and other resource efficiencies in coordination with the Regional Water Authority (RWA), Roseville Electric, and Roseville's Public Information Department. The City distributes information through paid advertisements, television commercials, featured segments on the local government access channel, the internet (through the City's website and streaming video), the City's Utility Exploration Center, several water efficient workshops each year, movie theater ads, newsletters, bill inserts, mill messages, brochures, vehicle decals, community outreach events, community speaker bureaus, and yearly special events.

#### *9.1.4.1 Customer Water Usage Portal*

The City plans to implement a customer portal as part of the implementation of Advanced Metering Infrastructure (AMI) which is currently underway. This portal will provide residents with an ability to view their past usage and identify any changes in use patterns that may indicate leaks or opportunities for implementing cost savings by conserving water.

#### *9.1.4.2 Utility Exploration Center*

In 2008, the City's utilities jointly funded and created the Roseville Utility Exploration Center (UEC). In addition to serving as a "storefront" for the utilities, the Center is used by the City for community outreach and environmental education. Designed for an interactive experience, the UEC hosts multiple hands-on exhibits with a "learning lab" for demonstrations, presentations, and workshops. Topics include water conservation and watershed protection, energy efficiency, waste reduction, and wastewater management.

Since opening, the Utility Exploration Center has hosted over 640,000 program participants, with approximately 5,000 student (preschool through sixth grade) to the exhibit hall; partnered with cultural, recreational, and utility-related organizations to create a lively series of changing events, workshops, and activities; and connected with residents in a variety of off-site outreach activities.

The Center is housed within the Gold LEED (Leadership in Energy and Environmental Design) certified Martha Riley Library building, which was the first building in Placer County to be so honored. Future plans include the "Inspiration Garden," an outdoor learning space created in partnership with Roseville's Water Efficiency division, with a goal of encouraging more residents to adopt water-wise gardening practices. The garden is planned for completion by summer 2021. Plans are also underway to update the original visitor center exhibits. A larger outdoor project, originally called the IDEAscape, would further expand exhibits to include topics such as river-friendly landscaping and irrigation, utility systems, solar energy, and watershed protection. The project is currently on hold but is anticipated for completion by 2030.

### *9.1.4.3 Student Outreach*

In addition to Regional Water Authority (RWA) student outreach programs, the City independently provides presentations, conservation materials, and facility tours to local schools.

## 9.1.5 Regional Water Authority – Outreach and Education

In addition to local public education and outreach programs, the City also participates in a regional public education and outreach program through the Regional Water Authority (RWA). RWA is a joint powers authority formed in 2001 to promote collaboration on water management and water supply reliability programs in the greater Sacramento, Placer, El Dorado, Yolo, and Sutter counties. In collaboration with 19 water provider members and other wastewater, stormwater, and energy partners, RWA formed the Water Efficiency Program (WEP) in 2001 to bring cost effectiveness through economies of scale to public education and outreach activities.

The WEP operates on an average annual budget of $530,000 and is supplemented by grant funding. Grants are an important funding resource for the Program. Since 2003, the Program has been awarded $13.2 million in grant funding for public outreach and education as well as a variety of rebate programs, fixture direct install programs, system water loss, individualized customer usage reports, large landscape budgets and more. Of those funds, $3.8 million was awarded between 2016 and 2020.

The main function of the WEP is to develop and distribute public outreach messages to customers in the region by collaborating with its water provider members. The Program distributes these messages on a regional scale through regional media and advertising buys and was honored with the United States Environmental Protection Agency WaterSense Excellence in Education and Outreach Award in 2016. From 2016-2020, the WEP created a series of public outreach campaigns. A summary of each campaign and highlighted achievements is as follows.

Following the historic 2015 California drought, the WEP launched the “Rethink Your Yard” Campaign in 2016 with a focus on prioritizing landscape watering, putting trees first and transitioning thirsty lawn and landscaping to beautiful, low water use, River-Friendly landscapes. The Program advertised the campaign through online ads, social media, commercial radio, Raley Field (local baseball stadium) and local billboards. The campaign featured local homeowners with their newly redesigned yards on billboards throughout the region.

The campaign launched in 2017 focused on encouraging customers to understand and deliver the amount of water their landscape really needs and to make permanent equipment changes to improve efficiency such as installing weather-based irrigation controllers, more efficient sprinklers and drip irrigation. The Program partnered on this messaging with local nurseries through a “Get Growing this Fall” initiative to encourage residents to plant in the fall when days are cooler and plants don’t need as much water to establish roots.

From 2018 through 2020, the regional campaign focused on tackling the landscape overwatering problem with a “Check and Save” message encouraging residents to check the soil moisture with a moisture meter before turning on sprinklers. To support this message, the Program provided free froggy moisture meters via an online request form and at events. In 2019, WEP distributed 3,000 moisture meters to customers throughout the region.

These campaigns are implemented through both paid advertising buys and earned media from public service announcements (PSAs). Every year the campaigns can be heard on local radio stations such as Capital Public Radio and online through google, Facebook and YouTube advertisements. From 2016-2020, the WEP public outreach campaigns produced:

- Radio Advertising (2016-2020)
  3,443 radio advertisements ran
  17.2 million impressions

- Digital Advertising (Facebook, Google Display Network and Spotify) (2016-2020)
  24.3 million impressions
  262,900 clicks

- Additional advertising (billboards in 2016)
  1.8 million digital advertisements ran
  51.6 million impressions

- Public Service Announcements (Television and Radio) (2016-2020)
  20 million impressions
  $570,000 in value had they been purchased as advertising

The Program also continues messaging through its own Facebook page. From 2016-2020, the Program created about 60 Facebook posts a year featuring water saving tips and other relevant information. The WEP hosted several Facebook sweepstake contests including: Tree Hugger in 2016, where participates submitted pictures hugging a tree to raise awareness about the importance of healthy trees and the Under/Over Debate in 2020, where participates were asked to weigh in what is the proper way to hang toilet paper to raise awareness of toilet leaks. The winner of the Under/Over Debate sweepstakes received a case of toilet paper delivered via mail and gift card to a local hardware store.

The Program continues to utilize the public outreach website bewatersmart.info to reach customers throughout the region. The website contains regional and local water provider information on rebates and services, top ways to save, an interactive watering and water waste information map, a water-wise gardening database, recent press releases, the Sacramento Smart Irrigation Scheduler tool, and more. Educational information and customer services were modified to address the COVID pandemic in 2020 including online water efficiency lessons for kids, a list of nurseries that offered curbside pickup, virtual water wise house calls and numerous virtual educational customer workshops. Between 2016 and 2020, the website averaged 96,000 unique visitors per year.

For more targeted outreach, the Program distributed quarterly e-newsletters to participating residents. The e-newsletters are filled with water savings tips, upcoming events, and other interesting articles. They are usually timed around changes in the weather to help signal the need for residents to adjust their irrigation systems, such as day light savings coupled with a message to dial back sprinkler systems. The e-newsletter reaches 6,300 households.

Every year the WEP selects 3 public events to attend for the public to interact with local water efficiency staff. These events provide an opportunity for the region to communicate its messages in person. Events have included the Sacramento Home & Landscape Show at Cal Expo, Creek Week, Harvest Day, Farm-to-Fork Festival, and several Earth Day events. Additionally, RWA, in coordination with participating local water providers, hosts an annual

Mulch Mayhem event in which customers can pick up a truck load of free mulch from selected locations throughout the region. All in-person regional events were canceled in 2020 due to the COVID pandemic.

The Program is also very active in communicating to local media outlets such as the Sacramento Bee. Between 2016 and 2020, RWA issued 50 press releases on WEP activities and regionally significant news and participated in nearly 30 radio public affairs interviews. The RWA and the WEP were mentioned in dozens of news articles published by local and regional media outlets both within and outside of the Sacramento region during the same time frame.

To support public outreach messaging and water savings tips, the Program also coordinated several regional rebate programs, which were partially funded by state and federal grants. A variety of rebate options were provided including toilets, clothes washers, and irrigation efficiencies (full summary in COR Table 9-A). Collectively, these rebates and installations will produce an estimated lifetime (10 years) savings of 6 billion gallons of water and 6.4 million kilowatt hours of energy.

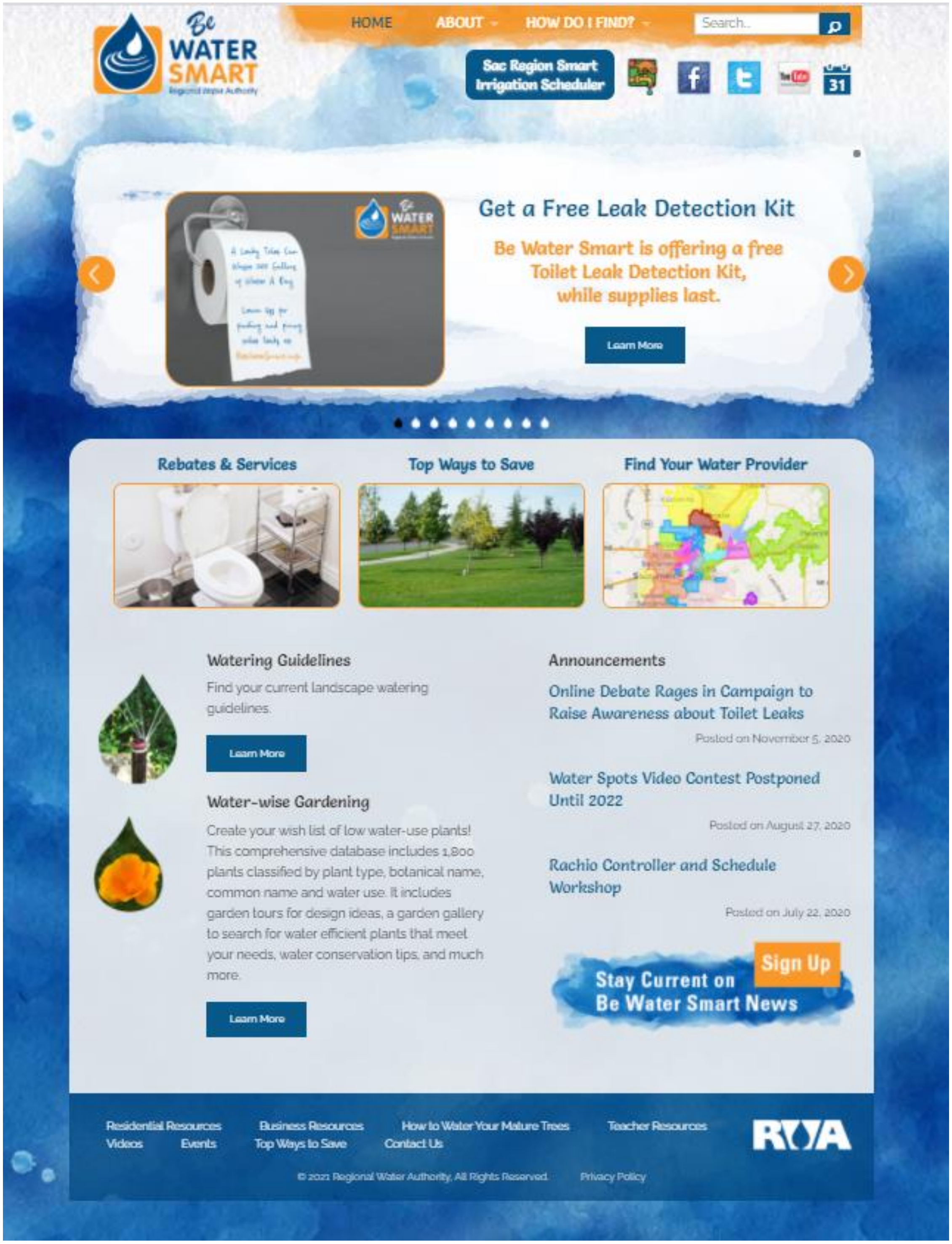
**COR Table 9-A** Regional Rebates and Installations from 2016 through 2020.

| Rebate/Installation Type | 2016 | 2017 | 2018 | 2019 | 2020 | Lifetime Water Savings per Type 2016-2020 (MG) | Lifetime Energy Savings per Type 2016-2020 (kWh)** |
|---|---|---|---|---|---|---|---|
| High Efficiency Clothes Washers Rebates | 491 | 480 | 453 | 366 | 518 | 111.2 | 118,094 |
| High Efficiency Toilets Rebates | 4,494 | 3,124 | 2,255 | 1,868 | 904 | 512.3 | 544,076 |
| Smart Irrigation Controllers Rebates | 245 | 358 | 801 | 556 | 1,298 | 667.9 | 709,299 |
| Irrigation Efficiencies Rebates* | 21,271 | 5,879 | 5,548 | 1,724 | NA | 3,786.4 | 4,021,178 |
| Turf Replacement Rebates (square feet) | 376,613 | 584,535 | 236,064 | 85,375 | NA | 474.6 | 503,980 |
| Toilet Direct Installation | 1,943 | 4,542 | 968 | NA | NA | 237.4 | 252,066 |
| Showerhead Direct Installation | 1,141 | 2,512 | 704 | NA | NA | 222.6 | 236,447 |
| Faucet Aerators Direct Installation | 1,162 | 4,314 | 317 | NA | NA | 18.5 | 19,648 |
| Urinal Direct Installation | NA | 403 | 73 | NA | NA | 10.2 | 10,878 |
| | | | | | | | |
| **Total Water Savings per year/Lifetime (MG)** | 285.9 | 138.2 | 104.4 | 42.9 | 32.8 | 6,041.1 | |
| **Total Energy Savings per year/Lifetime (kWh)**** | 303,626 | 146,717 | 110,915 | 45,509 | 34,799 | | 6,415,665 |

* Includes: pressure regulator equipment, pipe and pipe fittings, drip or low volume equipment, and sprinkler heads or nozzles.
**Regional average of 1,062 kilowatt hours per MG
kWh = kilowatt hours
MG = million gallons
NA = no funding available
Lifetime = 10 years

In addition to public outreach, the Program also coordinates school education activities. Since 2012, the Program has hosted the Water Spots Video Contest for high school and middle school students. The WEP provides a new contest theme each year and provides the region's teacher and students with relevant facts and images to help develop 30 second video PSAs. Students submit their videos to RWA who hosts a panel of local celebrities including Monica Woods from ABC 10 to decide on a first, second and third place winner. The top 10 scoring videos are then posted online for public voting to select a "people's choice" winner as well. Both teachers and student receive cash prizes and the winning videos are played at Raley Field during River Cats games and in select movie theaters throughout the region. The winning PSAs are incorporated into the WEP's media activities as well. Past themes include *WATER MYTHS BUSTED!, H2o Hero, and Show Off Your Water Smarts.* Between 2016 and

2019, 450 videos were submitted (average of 90 videos a year). The 2020 Water Spots Video Contest was canceled due to the COVID pandemic.



### 9.1.6 Programs to Assess and Manage Distribution System Real Loss

The City maintains a comprehensive water audit and leak-detection program to assess, identify, and repair potable distribution system losses.

In 2009, the City began using AWWA Water Loss software to develop an annual water loss audit. The City continues to employ this method in compliance with Senate Bill 555, validating the annual audit for accuracy prior to submission to DWR each year by the regulatory deadline of October 1. Results from the audit have helped the City identify where in the distribution process leaks are occurring. This information is coupled with detailed pipeline information stored in the City's asset management and GIS system. Audit information helps identify potentially leak prone areas of the City's distribution system for focused rehabilitation or repair projects. The City has recently implemented a proactive auditory leak detection program by City crew members in addition to the audit analyses to identify leaks. Additionally, an independent desktop analysis of potential areas of loss is planned for the coming year. Once these areas are isolated, responses include corrosion monitoring programs, service cathodic protection, relining and/or replacement. The City's asset management software is then updated with identified leaks, which in turn provides more information useful for prioritization of future rehabilitation programs. In 2020, the City began design of a project to rehabilitate 8 miles of water main in the downtown area to improve the function and longevity of the mains, reducing water loss through older pipes in this area of town.

The City also employs a third-party leak detection service on an annual basis to perform focused auditory surveys for leaks, in addition to in-house training and leak detection processes executed by City operations staff throughout their regular maintenance operations. In combination, these measures and projects employed to identify and reduce system leakage offer the City a comprehensive and proactive approach to the reduction of lost water supply.

### 9.1.7 Water Conservation Program Coordination Staffing Support

In addition to the employees mentioned in Section 9.1.1, the City employs other individuals as members of the City's internal water conservation program team. Member qualifications include: Certified Landscape Irrigation Auditor (CLIA) certification, Water Distribution Operator D-2 certification, and extensive irrigation system management experience.

In compliance with DWR's UWMP guidelines, the cull contact information for the City's Water Conservation Administrator is listed below:

Bobby Alvarez
Water Conservation Administrator
City of Roseville, Environmental Utilities Department
916-746-1710 (office)
BAlvarez@roseville.ca.us

## 9.2 Other Demand Management Measures

In addition to the six DMMs described above, the City also implements the following programs:

- Residential Water Wise House Calls

- Residential HET Replacement Program
- Residential Irrigation Rebates
- Residential Cash for Grass Rebates
- Commercial Irrigation Water “Budgets”
- Commercial Irrigation Audit
- Commercial Cash for Grass Rebates
- Commercial Custom Rebate
- Commercial Irrigation Improvements Rebates
- Commercial Food Service Water Efficiency Rebates
- Commercial Landscape Water Use Reviews
- Commercial Interior Water Use Audits
- Commercial Water Waste “Night Patrols”
- Commercial HET Replacement Program

These programs are described in Section 9.2.

### 9.2.1 Residential Conservation Programs

The City implements several programs to reduce the consumption of water to its residents. The activities of these various programs are described in the following subsections. Implementation of these programs is expected to help the City achieve its water use targets by reducing the amount of water consumed by its residential customers.

#### *9.2.1.1 Water Wise House Calls*

The City provides a free home water use inspection service known as the Water Wise House Call Program. Inspections are conducted by trained water conservation technicians and help identify potential water savings for the customer.

Single-family inspections are approximately one hour in length and consist of an indoor and outdoor evaluation. During the interior portion of the inspection, the technician measures flow rates of existing plumbing fixtures (offering high-efficiency alternatives if necessary), checks all fixtures and appliances for leaks, and provides information on the City’s currently available rebate programs (further described in Sections 9.1.2, 9.1.3, and 9.1.4).

Following the indoor evaluation, the technician then conducts an outdoor inspection. A typical outdoor inspection tests sprinkler system efficiency, distribution uniformity, pool equipment, as well as an evaluation for leaks via pressure test. Following the sprinkler test, soil moisture probes are utilized to optimize irrigation scheduling through adjustment of the residence’s irrigation controller.

Finally, water use information is reviewed, and the customer is provided with suggested corrective actions, information regarding the City’s rebate programs, and educational material on how to further water conservation.

In addition to local advertising, Water Wise House Calls are actively marketed to high water use customers by the City’s Water Efficiency Division. In 2020, modifications were made to this program to adhere to recommended safety procedures in consideration for the global health crisis caused by COVID-19. Adjusted Water Wise House Calls continue to be conducted in a safe manner for both residents and City employees.

#### 9.2.1.2 Residential High Efficiency Toilet Replacement Program

The City first established a HET rebate program in 2008. Residents can receive up to $100 for replacing an older (pre-1992), non-conserving toilet with a new 1.28 gallon per flush model. Rebates are offered on a first come/first service basis to customers on an annual basis, and the program is advertised regularly on Roseville's Channel 11, bill inserts, conservation articles, newsletters, and the City's website. Customers can also obtain an application by request through the mail or at special events and City office public counters.

The City continued this rebate until 2018 when market saturation caused the water savings realized by this program to diminish significantly. This program is currently under reevaluation to determine whether the current terms and conditions bear revision to reinstate the program. Each year new opportunities are explored, and existing rebate programs evaluated for effectiveness as the City works to offer a suite of available opportunities to residents.

#### 9.2.1.3 Residential Cash for Grass

In 2008, Roseville created a turf replacement program titled "Cash for Grass" that provides incentive for customers to replace their turf with water efficient landscaping. Turf is purchased at $1.00 per square foot up to $1,000 per residential site. To comply, participants must not only remove their turf but also install a low-volume irrigation system to irrigate their new water efficient landscape.

### 9.2.2 Commercial, Industrial, Institutional Conservation Programs

The City implements several programs to reduce the consumption of water to its commercial, industrial, and institutional customers. The activities of these various programs are described in the following subsections. Implementation of these programs is expected to help the City achieve its water use targets by reducing the amount of water consumed by its non-residential customers.

#### 9.2.2.1 Irrigation Water "Budgets"

The City has developed water "budgets" for the majority of its dedicated irrigation accounts (including those owned by the City). These budgets were created using the City's geographical information system (GIS) to determine irrigated landscape area and then field verified for accuracy. The budget reports, produced monthly, show the site's actual water use compared to the estimated water use based on site demographics. If a site's water usage is significantly greater than expected, City staff may request the site's owner complete a site water audit.

#### 9.2.2.2 Irrigation Audit

Similar to Water Wise House Calls, the City provides a free landscape audit service for irrigation customers upon request. Staff evaluates the irrigation system and makes recommendations for improvement. Rebates are available to further incentivize the customer to make improvements to their irrigation systems.

The City will continue to implement this program and will consider expansion based on the past years' participation.

#### *9.2.2.3 Commercial Cash for Grass*

Similar to the Residential Cash for Grass Program, the City offers rebates to commercial customers for replacing turf with water efficient landscaping. Commercial customers can receive $2.00 per square foot.

#### *9.2.2.4 Commercial Irrigation Improvement Rebates*

The City offers a suite of rebate opportunities for commercial irrigation customers including for conversion to drip irrigation, high efficiency nozzles, self-adjusting controllers, pressure regulators, as well as installation of irrigation submeters for a total potential rebate value of $15,000 for those who meet the established criteria for their projects. Applications for these rebates are easily accessed through the City's website with clear outlines of qualifying equipment and labor for ease of submission.

#### *9.2.2.5 Commercial Food Service Water Efficiency Rebates*

The City also offers a series of rebates available to commercial customers in the food service industry, with a "One-Stop Program" through which they can apply for applicable benefits on the purchase and replacement of cooking appliances (steamers and combination ovens), sanitation equipment (dishwashers), as well as refrigeration equipment (ice machines) with improved efficiency.

#### *9.2.2.6 Customized Rebate Program*

In addition to the above rebates, the Customized Rebate Program helps commercial, industrial, and institutional customers save money with financial incentives on capital expenditures for retrofit of existing equipment with more water-efficient technologies. This program applies to hardware upgrades including equipment and technology for space cooling, refrigeration, laundry, cleaning, and flushing. The customized rebate amount is derived by measuring current usage of the process compared to the water usage of the new retrofitted process. Water savings are estimated using the number of days operated per year and the expected life of the equipment (capped at 10 years). Total amount of saved water is rebated at $0.50 per 100 cubic feet. Rebates will be paid on a first-come, first served basis until program funds are depleted.

#### *9.2.2.7 Commercial Interior Water Use Audit*

The Commercial Interior Water Use Audit assists commercial properties in lowering water, wastewater, and energy costs. A facility review identifies equipment inefficiencies and provides a detailed report of all inefficiencies and corresponding recommendations.

#### *9.2.2.8 Night Patrols*

The City has implemented a Night Patrol program during peak water usage months that helps to identify commercial water waste after normal business hours. Patrols are typically conducted several nights per week.

#### *9.2.2.9 Commercial High Efficiency Toilet Replacement Program*

Similar to the Residential High Efficiency Toilet Replacement Program, commercial customers can receive up to $175 for replacing an older (pre-1992), non-conserving toilet with a new 1.28 gallon per flush model.

## 9.3 Planned Implementation to Achieve Water Use Targets

In most instances, helping customers understand the savings that can be achieved and methods available to achieve these savings is enough to motivate change. Through the above DMMs, the City can help customers identify these savings, which in turn helps the City to achieve its water use targets. Additionally, the City will continue to work with the Parks Department, area school districts, landscape contractors, and property managers to improve water use efficiency.

## 9.4 Members of the California Urban Water Conservation Council

In 1991 (amended September 16, 1999), an MOU regarding urban water conservation in California was made that formalizes an agreement between DWR, water utilities, environmental organizations, and other interested groups to implement Best Management Practices (BMPs) and make a cooperative effort to reduce the consumption of California's water resources. This MOU is administered by the California Water Efficiency Partnership (CalWEP).

In 1991, Roseville became a voluntary signatory of CalWEP's MOU (formerly the California Urban Water Conservation Council or CUWCC). Since becoming a signatory to the MOU, the City has implemented and promoted its water use efficiency programs to help customers reduce water demand. The City reports to CalWEP on its coverage of the recommended BMPs on a calendar year basis.

The Urban Water Management Planning Act (Water Code Section 10631 (j)) allows for an urban retail water agency that is a signatory member of CalWEP to meet the DMM requirements by documenting that CalWEP has determined the urban water agency is complying (coverage) with all of the provisions of the MOU. Documentation of the City's compliance is provided in Appendix N.

# Chapter 10 Plan Adoption and Submittal

This chapter provides information regarding the notification, public hearing, and adoption of the plan.

## 10.1 Inclusion of all 2020 Data

Because 2020 is the final compliance year for SB X7-7, the 2020 UWMPs must contain data through the end of 2020. If a water supplier bases its accounting on a fiscal year (July through June) the data must be through the end of the 2020 fiscal year (June 2020). If the water supplier bases its accounting on a calendar year, the data must be through the end of the 2020 calendar year (December 2020).

As indicated in Chapter 1, the City uses a calendar year for the water supply and demand accounting, and therefore this 2020 UWMP includes data through December 2020.

## 10.2 Notice of Public Hearing

The City provided 60-day notice of the preparation of its 2020 UWMP, and the notice of the 2020 UWMP Public Hearing to the cities and counties listed in DWR Table 10-1.

**DWR Table 10-1**

| Submittal Table 10-1 Retail: Notification to Cities and Counties | | |
|---|---|---|
| City Name | 60 Day Notice | Notice of Public Hearing |
| City of Roseville | ☑ | ☑ |
| County Name | 60 Day Notice | Notice of Public Hearing |
| Placer County | ☑ | ☑ |

Other agencies notified included the following:

- California American Water
- Citrus Heights Water District
- Placer County Water Agency
- Regional Water Authority
- San Juan Water District
- Sacramento Municipal Utilities District
- Sacramento Suburban Water District
- US Bureau of Reclamation

Public hearing notifications for adopting the Plan were published in the local newspaper (Roseville Press Tribune) and on the City's website. Copies of the published Notice of Public Hearing will be included in Appendix B.

## 10.3 Public Hearing and Adoption

The City has encouraged community and public interest involvement in the Plan update through the use of public meetings and web-based communication. Copies of the City's outreach efforts are included in Appendix B.

The public hearing will provide an opportunity for all City water users and the general public to become familiar with the Urban Water Management Plan as well as the Water Shortage Contingency Plan and ask questions about its contents. In addition, the hearing presents an opportunity for the public to learn about or comment on the City's continuing plans for providing a reliable, safe, high-quality water supply. Copies of the draft Urban Water Management Plan, including the Water Shortage Contingency Plan, are available for public inspection on the City's website. The public hearing will be held on June 16, 2021.

Copies of the adoption resolutions will be provided in Appendix O, in the final UWMP and WSCP.

## 10.4 Plan Submittal

A copy of the 2020 UWMP will be submitted to DWR within 30 days of adoption and by July 1, 2021. The adopted UWMP will be submitted electronically to DWR using the WUEdata submittal tool. A CD or hardcopy of the adopted 2020 UWMP will also be submitted to the California State Library.

No later than 30 days after adoption, a copy of the adopted 2020 UWMP, including the Water Shortage Contingency Plan, will be provided to the cities and counties to which the City provides water.

## 10.5 Public Availability

No later than 30 days after submittal to DWR, copies of this 2020 UWMP will be available for public review at the City's public offices. An electronic copy of this Plan will also be available for review and download on the City's website: www.roseville.ca.us/UWMP.

## 10.6 Public Implementation

This Plan will be the source document for any Senate Bill 610 Water Supply Assessment or Senate Bill 221 Water Supply Verifications required for any proposed projects between 2021 and 2025 that are subject to the California Environmental Quality Act (CEQA) and would demand an amount of water equivalent or greater than the amount of water by a 500-dwelling unit project. This Plan will also be the source document for water demand projections and water supply availability. Lastly, this Plan will provide guidance and direction on development of new local supplies and implementation of water conservation programs and recycled water expansion to meet the requirements of the Water Conservation Act.

## 10.7 Amending an Adopted UWMP

If the City amends its 2020 UWMP or the Water Shortage Contingency Plan contained therein, copies of amendments or changes to the plans will be submitted to DWR, the California State Library, and any city or county within which the supplier provides water supplies within 30 days after adoption.

## 10.8 California Water Code Requirements

Demonstration of compliance with all applicable requirements of the California Water Code pertaining to Urban Water Management Plan and Water Shortage Contingency Plan is provided in Appendix P. Appendix P was developed based on the UWMP Checklist provided in the Guidebook and is organized by subject.

# Appendix A – Notifications to Wholesale Suppliers

CITY OF ROSEVILLE CALIFORNIA
**Environmental Utilities**
**Water Division**
2005 Hilltop Circle
Roseville, California 95747

May 25, 2021

Mr. Jeremy Shepard, Director of Technical Services
Placer County Water Agency
PO Box 6570
Auburn, CA 95604-6570

RE: City of Roseville 2020 Urban Water Management Plan Demand Projections

Dear Mr. Shepard:

We sent notice earlier this year to inform you that the City of Roseville (City) Water Utility had begun preparation of the 2020 Urban Water Management Plan. In accordance with California Water Code Section 10631, as the City is a retail water supplier receiving water from your agency, we have provided you with projected water use through 2045 in the below table.

| Supply Source | 2025 | 2030 | 2035 | 2040 | 2045 |
|---|---|---|---|---|---|
| Placer County Water Agency Existing Contracts | 30,000 AF | 30,000 AF | 30,000 AF | 33,360 AF | 33,360 AF |
| Placer County Water Agency Future Ophir WTP | – | – | Up to 3.6 MGD | Up to 3.6 MGD | Up to 3.6 MGD |

A complete draft of the 2020 Urban Water Management Plan, which is inclusive of the newly required Water Shortage Contingency Plan, can be accessed at www.roseville.ca.us/UWMP. A public hearing of the Water Shortage Contingency Plan and Urban Water Management Plan will be held on June 16th at 6 pm. We encourage you to attend the public hearing which will be held through video conferencing. For information regarding broadcasting of the meeting and providing public comment please visit the City's website at https://www.roseville.ca.us/cms/One.aspx?portalId=7964922&pageId=16870417.

Should you wish to contact the City regarding either of the plans, you may do so by writing or emailing to the undersigned below. Thank you.

Sincerely,

Trevor Joseph, P.G., C.Hg.
Hydrogeologist
City of Roseville
Environmental Utilities Department
TJoseph@roseville.ca.us

CITY OF ROSEVILLE CALIFORNIA

**Environmental Utilities**
**Water Division**
2005 Hilltop Circle
Roseville, California 95747

May 25, 2021

Mr. Paul Helliker, General Manager
San Juan Water District
9935 Auburn-Folsom Road
Granite Bay, CA 95764

RE: City of Roseville 2020 Urban Water Management Plan Demand Projections

Dear Mr. Helliker:

We sent notice earlier this year to inform you that the City of Roseville (City) Water Utility had begun preparation of the 2020 Urban Water Management Plan. In accordance with California Water Code Section 10631, as the City is a retail water supplier receiving water from your agency, we have provided you with projected water use through 2045 in the below table.

| Supply Source | 2025 | 2030 | 2035 | 2040 | 2045 |
|---|---|---|---|---|---|
| San Juan Water District | 4,000 AF | 4,000 AF | 4,000 AF | 4,000 AF | 4,000 AF |

A complete draft of the 2020 Urban Water Management Plan, which is inclusive of the newly required Water Shortage Contingency Plan, can be accessed at www.roseville.ca.us/UWMP. A public hearing of the Water Shortage Contingency Plan and Urban Water Management Plan will be held on June 16th at 6 pm. We encourage you to attend the public hearing which will be held through video conferencing. For information regarding broadcasting of the meeting and providing public comment please visit the City's website at https://www.roseville.ca.us/cms/One.aspx?portalId=7964922&pageId=16870417.

Should you wish to contact the City regarding either of the plans, you may do so by writing or emailing to the undersigned below. Thank you.

Sincerely,

Trevor Joseph, P.G., C.Hg.
Hydrogeologist
City of Roseville
Environmental Utilities Department
TJoseph@roseville.ca.us

CITY OF ROSEVILLE CALIFORNIA
**Environmental Utilities**
**Water Division**
2005 Hilltop Circle
Roseville, California 95747

May 25, 2021

Mr. Drew Lessard, Area Manager
Central California Area Office
7794 Folsom Dam Road
Folsom, CA 95630

RE: City of Roseville 2020 Urban Water Management Plan Demand Projections

Dear Mr. Lessard:

We sent notice earlier this year to inform you that the City of Roseville (City) Water Utility had begun preparation of the 2020 Urban Water Management Plan. In accordance with California Water Code Section 10631, as the City is a retail water supplier receiving water from your agency, we have provided you with projected water use through 2045 in the below table. The City plans to make full beneficial use of each year's allotments.

| Supply Source | 2025 | 2030 | 2035 | 2040 | 2045 |
|---|---|---|---|---|---|
| US Bureau of Reclamation | 32,000 AF | 32,000 AF | 32,000 AF | 32,000 AF | 32,000 AF |

A complete draft of the 2020 Urban Water Management Plan, which is inclusive of the newly required Water Shortage Contingency Plan, can be accessed at www.roseville.ca.us/UWMP. A public hearing of the Water Shortage Contingency Plan and Urban Water Management Plan will be held on June 16th at 6 pm. We encourage you to attend the public hearing which will be held through video conferencing. For information regarding broadcasting of the meeting and providing public comment please visit the City's website at https://www.roseville.ca.us/cms/One.aspx?portalId=7964922&pageId=16870417.

Should you wish to contact the City regarding either of the plans, you may do so by writing or emailing to the undersigned below. Thank you.

Sincerely,

Trevor Joseph, P.G., C.Hg.
Hydrogeologist
City of Roseville
Environmental Utilities Department
tjoseph@roseville.ca.us

| | |
|---|---|
| **From:** | Joseph, Trevor |
| **To:** | Jeremy Shepard; Darin Reintjes |
| **Cc:** | York, Linda; Bigley, Sean |
| **Subject:** | City of Roseville 2020 Urban Water Management Plan Demand Projections |
| **Date:** | Tuesday, May 25, 2021 12:09:00 PM |
| **Attachments:** | PCWA_Technical Services Director ldy.pdf<br>image001.png |

Hi Jeremy and Darin –

Please see the attached letter as part of the Urban Water Management Plan requirements informing PCWA of our projected water use.

Regards,

**Trevor Joseph, P.G., C.Hg.**
Hydrogeologist
Environmental Utilities
**c:** (916) 517-2578

**Corporation Yard** | 2005 Hilltop Circle | Roseville, CA | 95747

| | |
|---|---|
| **From:** | Joseph, Trevor |
| **To:** | Helliker, Paul (San Juan Water District); Zlotnick, Greg (San Juan Water Distict) |
| **Cc:** | Bigley, Sean; York, Linda |
| **Subject:** | City of Roseville 2020 Urban Water Management Plan Demand Projections |
| **Date:** | Tuesday, May 25, 2021 12:10:41 PM |
| **Attachments:** | SJWD_General Manager ldy.pdf<br>image001.png |

Hi Paul and Greg –

Please see the attached letter as part of the Urban Water Management Plan requirements informing SJWD of our projected water use.

Regards,


**Trevor Joseph, P.G., C.Hg.**

Hydrogeologist
Environmental Utilities

**c:** (916) 517-2578

**Corporation Yard** | 2005 Hilltop Circle | Roseville, CA | 95747


CITY OF ROSEVILLE CALIFORNIA

| | |
|---|---|
| **From:** | Joseph, Trevor |
| **To:** | DLessard@usbr.gov |
| **Cc:** | Bigley, Sean; York, Linda |
| **Subject:** | City of Roseville 2020 Urban Water Management Plan Demand Projections |
| **Date:** | Tuesday, May 25, 2021 12:07:37 PM |
| **Attachments:** | image001.png<br>USBR Area Manager ldy.pdf |

Hi Drew –

Please see the attached letter as part of the Urban Water Management Plan requirements informing the USBR of our projected water use.

Regards,

**Trevor Joseph, P.G., C.Hg.**

Hydrogeologist
Environmental Utilities

**c:** (916) 517-2578

**Corporation Yard** | 2005 Hilltop Circle | Roseville, CA | 95747

# Appendix B – Public and Agency Outreach

CITY OF ROSEVILLE CALIFORNIA

**Environmental Utilities**
**Water Division**
2005 Hilltop Circle
Roseville, California 95747

February 12, 2021

S. Audie Foster, General Manager
California American Water
4701 Beloit Drive
Sacramento, CA 95838

RE: City of Roseville 2020 Urban Water Management Plan

Dear S. Audie Foster:

The City of Roseville (City) water utility has begun preparing the 2020 Urban Water Management Plan, which must be completed by July 1, 2021. In accordance with California Water Code Section 10642, we are writing to notify you that preparation is underway and to encourage your active input and involvement in the process.

Prior to Board adoption of the plan a public hearing will be held, and we will notify you of the date, time, and location of the meeting. We will also make a draft of the 2020 Urban Water Management Plan available to your agency in advance of the public hearing.

If you wish to contact the City about its review process, you may do so by writing to the undersigned or by email to jtmarks@roseville.ca.us. Thank you.

Sincerely,

Jason Marks

Jason Marks, P.E.
Senior Engineer
City of Roseville
Environmental Utilities Department

(916) 774-5750 • *Fax* • (916) 774-5690 • www.roseville.ca.us/eu

CITY OF ROSEVILLE CALIFORNIA

**Environmental Utilities**
**Water Division**
2005 Hilltop Circle
Roseville, California 95747

February 12, 2021

Mr. Hilary Straus, General Manager
Citrus Heights Water District
6230 Sylvan Road
Citrus Heights, CA 95610

RE: City of Roseville 2020 Urban Water Management Plan

Dear Mr. Straus:

The City of Roseville (City) water utility has begun preparing the 2020 Urban Water Management Plan, which must be completed by July 1, 2021. In accordance with California Water Code Section 10642, we are writing to notify you that preparation is underway and to encourage your active input and involvement in the process.

Prior to Board adoption of the plan a public hearing will be held, and we will notify you of the date, time, and location of the meeting. We will also make a draft of the 2020 Urban Water Management Plan available to your agency in advance of the public hearing.

If you wish to contact the City about its review process, you may do so by writing to the undersigned or by email to jtmarks@roseville.ca.us. Thank you.

Sincerely,

Jason Marks

Jason Marks, P.E.
Senior Engineer
City of Roseville
Environmental Utilities Department

(916) 774-5750 • *Fax* • (916) 774-5690 • www.roseville.ca.us/eu

CITY OF ROSEVILLE CALIFORNIA

**Environmental Utilities**
**Water Division**
2005 Hilltop Circle
Roseville, California 95747

February 12, 2021

Mr. Dominick Casey, City Manager
City of Roseville
311 Vernon Street
Roseville, CA 95678

RE: City of Roseville 2020 Urban Water Management Plan

Dear Mr. Casey:

The City of Roseville (City) water utility has begun preparing the 2020 Urban Water Management Plan, which must be completed by July 1, 2021. In accordance with California Water Code Section 10642, we are writing to notify you that preparation is underway and to encourage your active input and involvement in the process.

Prior to Board adoption of the plan a public hearing will be held, and we will notify you of the date, time, and location of the meeting. We will also make a draft of the 2020 Urban Water Management Plan available to your agency in advance of the public hearing.

If you wish to contact the City about its review process, you may do so by writing to the undersigned or by email to jtmarks@roseville.ca.us. Thank you.

Sincerely,

Jason Marks

Jason Marks, P.E.
Senior Engineer
City of Roseville
Environmental Utilities Department

CITY OF ROSEVILLE CALIFORNIA

**Environmental Utilities**
**Water Division**
2005 Hilltop Circle
Roseville, California 95747

February 12, 2021

Mr. Jeremy Shepard, Director of Technical Services
Placer County Water Agency
PO Box 6570
Auburn, CA 95604-6570

RE: City of Roseville 2020 Urban Water Management Plan (UWMP)

Dear Mr. Shepard:

We have received your letter dated November 19, 2020 and at this time have no known objection to the proposed summary for the 2020 UWMP. The City of Roseville (City) water utility has begun preparing the 2020 Urban Water Management Plan. In accordance with California Water Code Section 10642, we are writing to notify you that preparation is underway and to encourage your active input and involvement in the process.

Prior to Board adoption of the plan a public hearing will be held, and we will notify you of the date, time, and location of the meeting. We will also make a draft of the 2020 Urban Water Management Plan available to your agency in advance of the public hearing.

If you wish to contact the City about its review process, you may do so by writing to the undersigned or by email to jtmarks@roseville.ca.us. Thank you.

Sincerely,

Jason Marks

Jason Marks, P.E.
Senior Engineer
City of Roseville
Environmental Utilities Department

**Environmental Utilities**
**Water Division**
2005 Hilltop Circle
Roseville, California 95747

February 12, 2021

Peter Kraatz, Assistant Director
Placer County Public Works Department
3901 County Center Drive, Suite 220
Auburn, CA 95603

RE: City of Roseville 2020 Urban Water Management Plan

Dear Mr. Kraatz:

The City of Roseville (City) water utility has begun preparing the 2020 Urban Water Management Plan, which must be completed by July 1, 2021. In accordance with California Water Code Section 10642, we are writing to notify you that preparation is underway and to encourage your active input and involvement in the process.

Prior to Board adoption of the plan a public hearing will be held, and we will notify you of the date, time, and location of the meeting. We will also make a draft of the 2020 Urban Water Management Plan available to your agency in advance of the public hearing.

If you wish to contact the City about its review process, you may do so by writing to the undersigned or by email to jtmarks@roseville.ca.us. Thank you.

Sincerely,

Jason Marks

Jason Marks, P.E.
Senior Engineer
City of Roseville
Environmental Utilities Department

CITY OF ROSEVILLE CALIFORNIA
**Environmental Utilities**
**Water Division**
2005 Hilltop Circle
Roseville, California 95747

February 12, 2021

Lehigh Chavez, Environmental Coordinator
Placer County Community Development Resource Agency
3901 County Center Drive
Auburn, CA 95603

RE: City of Roseville 2020 Urban Water Management Plan

Dear Lehigh Chavez:

The City of Roseville (City) water utility has begun preparing the 2020 Urban Water Management Plan, which must be completed by July 1, 2021. In accordance with California Water Code Section 10642, we are writing to notify you that preparation is underway and to encourage your active input and involvement in the process.

Prior to Board adoption of the plan a public hearing will be held, and we will notify you of the date, time, and location of the meeting. We will also make a draft of the 2020 Urban Water Management Plan available to your agency in advance of the public hearing.

If you wish to contact the City about its review process, you may do so by writing to the undersigned or by email to jtmarks@roseville.ca.us. Thank you.

Sincerely,

Jason Marks

Jason Marks, P.E.
Senior Engineer
City of Roseville
Environmental Utilities Department

CITY OF ROSEVILLE CALIFORNIA

**Environmental Utilities**
**Water Division**
2005 Hilltop Circle
Roseville, California 95747

February 12, 2021

Regional Water Authority
5620 Birdcage Street, Suite 180
Citrus Heights, CA 95610

RE: City of Roseville 2020 Urban Water Management Plan

Dear RWA Members:

The City of Roseville (City) water utility has begun preparing the 2020 Urban Water Management Plan, which must be completed by July 1, 2021. In accordance with California Water Code Section 10642, we are writing to notify you that preparation is underway and to encourage your active input and involvement in the process.

Prior to Board adoption of the plan a public hearing will be held, and we will notify you of the date, time, and location of the meeting. We will also make a draft of the 2020 Urban Water Management Plan available to your agency in advance of the public hearing.

If you wish to contact the City about its review process, you may do so by writing to the undersigned or by email to jtmarks@roseville.ca.us. Thank you.

Sincerely,

Jason Marks

Jason Marks, P.E.
Senior Engineer
City of Roseville
Environmental Utilities Department

CITY OF ROSEVILLE CALIFORNIA
**Environmental Utilities**
**Water Division**
2005 Hilltop Circle
Roseville, California 95747

February 12, 2021

Mr. Paul Helliker, General Manager
San Juan Water District
9935 Auburn-Folsom Road
Granite Bay, CA 95764

RE: City of Roseville 2020 Urban Water Management Plan

Dear Mr. Helliker:

The City of Roseville (City) water utility has begun preparing the 2020 Urban Water Management Plan, which must be completed by July 1, 2021. In accordance with California Water Code Section 10642, we are writing to notify you that preparation is underway and to encourage your active input and involvement in the process. Additionally, in accordance with California Water Code Section 10631, as we are a retail water supplier receiving water from your agency, we will provide you with projected water use for the next 20 years (up to the year 2040).

Prior to Board adoption of the plan a public hearing will be held, and we will notify you of the date, time, and location of the meeting. We will also make a draft of the 2020 Urban Water Management Plan available to your agency in advance of the public hearing.

If you wish to contact the City about its review process, you may do so by writing to the undersigned or by email to jtmarks@roseville.ca.us. Thank you.

Sincerely,

Jason Marks

Jason Marks, P.E.
Senior Engineer
City of Roseville
Environmental Utilities Department

(916) 774-5750 • *Fax* • (916) 774-5690 • www.roseville.ca.us/eu

CITY OF ROSEVILLE CALIFORNIA

**Environmental Utilities**
**Water Division**
2005 Hilltop Circle
Roseville, California 95747

February 12, 2021

Ansel Lundberg, Water and Power Contract Specialist
Sacramento Municipal Utility District
6201 S Street
Sacramento, CA 95817

RE: City of Roseville 2020 Urban Water Management Plan

Dear Ansel Lundberg:

The City of Roseville (City) water utility has begun preparing the 2020 Urban Water Management Plan, which must be completed by July 1, 2021. In accordance with California Water Code Section 10642, we are writing to notify you that preparation is underway and to encourage your active input and involvement in the process.

Prior to Board adoption of the plan a public hearing will be held, and we will notify you of the date, time, and location of the meeting. We will also make a draft of the 2020 Urban Water Management Plan available to your agency in advance of the public hearing.

If you wish to contact the City about its review process, you may do so by writing to the undersigned or by email to jtmarks@roseville.ca.us. Thank you.

Sincerely,

Jason Marks

Jason Marks, P.E.
Senior Engineer
City of Roseville
Environmental Utilities Department

**Environmental Utilities**
**Water Division**
2005 Hilltop Circle
Roseville, California 95747

February 12, 2021

Mr. Daniel York, General Manager
Sacramento Suburban Water District
3701 Marconi Avenue, Suite 100
Sacramento, CA 95821

RE: City of Roseville 2020 Urban Water Management Plan

Dear Mr. York:

The City of Roseville (City) water utility has begun preparing the 2020 Urban Water Management Plan, which must be completed by July 1, 2021. In accordance with California Water Code Section 10642, we are writing to notify you that preparation is underway and to encourage your active input and involvement in the process.

Prior to Board adoption of the plan a public hearing will be held, and we will notify you of the date, time, and location of the meeting. We will also make a draft of the 2020 Urban Water Management Plan available to your agency in advance of the public hearing.

If you wish to contact the City about its review process, you may do so by writing to the undersigned or by email to jtmarks@roseville.ca.us. Thank you.

Sincerely,

Jason Marks

Jason Marks, P.E.
Senior Engineer
City of Roseville
Environmental Utilities Department

CITY OF ROSEVILLE CALIFORNIA

**Environmental Utilities**
**Water Division**
2005 Hilltop Circle
Roseville, California 95747

February 12, 2021

Mr. Drew Lessard, Area Manager
Central California Area Office
7794 Folsom Dam Road
Folsom, CA 95630

RE: City of Roseville 2020 Urban Water Management Plan

Dear Mr. Lessard:

The City of Roseville (City) water utility has begun preparing the 2020 Urban Water Management Plan, which must be completed by July 1, 2021. In accordance with California Water Code Section 10642, we are writing to notify you that preparation is underway and to encourage your active input and involvement in the process. Additionally, in accordance with California Water Code Section 10631, as we are a retail water supplier receiving water from your agency, we will provide you with projected water use for the next 20 years (up to the year 2040).

Prior to Board adoption of the plan a public hearing will be held, and we will notify you of the date, time, and location of the meeting. We will also make a draft of the 2020 Urban Water Management Plan available to your agency in advance of the public hearing.

If you wish to contact the City about its review process, you may do so by writing to the undersigned or by email to jtmarks@roseville.ca.us. Thank you.

Sincerely,

Jason Marks

Jason Marks, P.E.
Senior Engineer
City of Roseville
Environmental Utilities Department

CITY OF ROSEVILLE CALIFORNIA

**Environmental Utilities**
**Water Division**
2005 Hilltop Circle
Roseville, California 95747

May 25, 2021

Mr. Dominick Casey, City Manager
City of Roseville
311 Vernon Street
Roseville, CA 95678

RE: City of Roseville 2020 Urban Water Management Plan Public Hearing

Dear Mr. Casey:

We sent notice earlier this year to inform you that the City of Roseville Water Utility (Water Utility) had begun preparation of the 2020 Urban Water Management Plan (UWMP). A draft of the UWMP, which is inclusive of the newly required Water Shortage Contingency Plan (WSCP), has been completed and can be accessed at www.roseville.ca.us/UWMP.

Prior to Board adoption, a public hearing of the UWMP and WSCP will be held on June 16th at 6pm. We encourage you to attend the public hearing which will be held through video conferencing. For information regarding broadcasting of the meeting and providing public comment please visit the City's website at https://www.roseville.ca.us/cms/One.aspx?portalId=7964922&pageId=16870417.

If you wish to contact the Water Utility regarding either of the plans, you may do so by writing to the undersigned or by email to TJoseph@roseville.ca.us. Thank you.

Sincerely,

Trevor Joseph, P.G., C.Hg.
Hydrogeologist
City of Roseville
Environmental Utilities Department

CITY OF ROSEVILLE CALIFORNIA
**Environmental Utilities**
**Water Division**
2005 Hilltop Circle
Roseville, California 95747

May 25, 2021

S. Audie Foster, General Manager
California American Water
4701 Beloit Drive
Sacramento, CA 95838

RE: City of Roseville 2020 Urban Water Management Plan Public Hearing

Dear S. Audie Foster:

We sent notice earlier this year to inform you that the City of Roseville Water Utility (Water Utility) had begun preparation of the 2020 Urban Water Management Plan (UWMP). A draft of the UWMP, which is inclusive of the newly required Water Shortage Contingency Plan (WSCP), has been completed and can be accessed at www.roseville.ca.us/UWMP.

Prior to Board adoption, a public hearing of the UWMP and WSCP will be held on June 16th at 6pm. We encourage you to attend the public hearing which will be held through video conferencing. For information regarding broadcasting of the meeting and providing public comment please visit the City's website at https://www.roseville.ca.us/cms/One.aspx?portalId=7964922&pageId=16870417.

If you wish to contact the Water Utility regarding either of the plans, you may do so by writing to the undersigned or by email to TJoseph@roseville.ca.us. Thank you.

Sincerely,

Trevor Joseph, P.G., C.Hg.
Hydrogeologist
City of Roseville
Environmental Utilities Department

CITY OF ROSEVILLE CALIFORNIA

**Environmental Utilities**
**Water Division**
2005 Hilltop Circle
Roseville, California 95747

May 25, 2021

Mr. Hilary Straus, General Manager
Citrus Heights Water District
6230 Sylvan Road
Citrus Heights, CA 95610

RE: City of Roseville 2020 Urban Water Management Plan Public Hearing

Dear Mr. Straus:

We sent notice earlier this year to inform you that the City of Roseville Water Utility (Water Utility) had begun preparation of the 2020 Urban Water Management Plan (UWMP). A draft of the UWMP, which is inclusive of the newly required Water Shortage Contingency Plan (WSCP), has been completed and can be accessed at www.roseville.ca.us/UWMP.

Prior to Board adoption, a public hearing of the UWMP and WSCP will be held on June 16th at 6pm. We encourage you to attend the public hearing which will be held through video conferencing. For information regarding broadcasting of the meeting and providing public comment please visit the City's website at https://www.roseville.ca.us/cms/One.aspx?portalId=7964922&pageId=16870417.

If you wish to contact the Water Utility regarding either of the plans, you may do so by writing to the undersigned or by email to TJoseph@roseville.ca.us. Thank you.

Sincerely,

Trevor Joseph, P.G., C.Hg.
Hydrogeologist
City of Roseville
Environmental Utilities Department

(916) 774-5750 • *Fax* • (916) 774-5690 • www.roseville.ca.us/eu

CITY OF ROSEVILLE CALIFORNIA
**Environmental Utilities**
**Water Division**
2005 Hilltop Circle
Roseville, California 95747

May 25, 2021

Peter Kraatz, Assistant Director
Placer County Public Works Department
3901 County Center Drive, Suite 220
Auburn, CA 95603

RE: City of Roseville 2020 Urban Water Management Plan Public Hearing

Dear Mr. Kraatz:

We sent notice earlier this year to inform you that the City of Roseville Water Utility (Water Utility) had begun preparation of the 2020 Urban Water Management Plan (UWMP). A draft of the UWMP, which is inclusive of the newly required Water Shortage Contingency Plan (WSCP), has been completed and can be accessed at www.roseville.ca.us/UWMP.

Prior to Board adoption, a public hearing of the UWMP and WSCP will be held on June 16th at 6pm. We encourage you to attend the public hearing which will be held through video conferencing. For information regarding broadcasting of the meeting and providing public comment please visit the City's website at https://www.roseville.ca.us/cms/One.aspx?portalId=7964922&pageId=16870417.

If you wish to contact the Water Utility regarding either of the plans, you may do so by writing to the undersigned or by email to TJoseph@roseville.ca.us. Thank you.

Sincerely,

Trevor Joseph, P.G., C.Hg.
Hydrogeologist
City of Roseville
Environmental Utilities Department

CITY OF ROSEVILLE CALIFORNIA

**Environmental Utilities**
**Water Division**
2005 Hilltop Circle
Roseville, California 95747

May 25, 2021

Lehigh Chavez, Environmental Coordinator
Placer County Community Development Resource Agency
3901 County Center Drive
Auburn, CA 95603

RE: City of Roseville 2020 Urban Water Management Plan Public Hearing

Dear Lehigh Chavez:

We sent notice earlier this year to inform you that the City of Roseville Water Utility (Water Utility) had begun preparation of the 2020 Urban Water Management Plan (UWMP). A draft of the UWMP, which is inclusive of the newly required Water Shortage Contingency Plan (WSCP), has been completed and can be accessed at www.roseville.ca.us/UWMP.

Prior to Board adoption, a public hearing of the UWMP and WSCP will be held on June 16th at 6pm. We encourage you to attend the public hearing which will be held through video conferencing. For information regarding broadcasting of the meeting and providing public comment please visit the City's website at https://www.roseville.ca.us/cms/One.aspx?portalId=7964922&pageId=16870417.

If you wish to contact the Water Utility regarding either of the plans, you may do so by writing to the undersigned or by email to TJoseph@roseville.ca.us. Thank you.

Sincerely,

Trevor Joseph, P.G., C.Hg.
Hydrogeologist
City of Roseville
Environmental Utilities Department

**Environmental Utilities**
**Water Division**
2005 Hilltop Circle
Roseville, California 95747

May 25, 2021

Regional Water Authority
5620 Birdcage Street, Suite 180
Citrus Heights, CA 95610

RE: City of Roseville 2020 Urban Water Management Plan Public Hearing

Dear RWA Members:

We sent notice earlier this year to inform you that the City of Roseville Water Utility (Water Utility) had begun preparation of the 2020 Urban Water Management Plan (UWMP). A draft of the UWMP, which is inclusive of the newly required Water Shortage Contingency Plan (WSCP), has been completed and can be accessed at www.roseville.ca.us/UWMP.

Prior to Board adoption, a public hearing of the UWMP and WSCP will be held on June 16th at 6pm. We encourage you to attend the public hearing which will be held through video conferencing. For information regarding broadcasting of the meeting and providing public comment please visit the City's website at https://www.roseville.ca.us/cms/One.aspx?portalId=7964922&pageId=16870417.

If you wish to contact the Water Utility regarding either of the plans, you may do so by writing to the undersigned or by email to TJoseph@roseville.ca.us. Thank you.

Sincerely,

Trevor Joseph, P.G., C.Hg.
Hydrogeologist
City of Roseville
Environmental Utilities Department

CITY OF ROSEVILLE CALIFORNIA

**Environmental Utilities**
**Water Division**
2005 Hilltop Circle
Roseville, California 95747

May 25, 2021

Ansel Lundberg, Water and Power Contract Specialist
Sacramento Municipal Utility District
6201 S Street
Sacramento, CA 95817

RE: City of Roseville 2020 Urban Water Management Plan Public Hearing

Dear Ansel Lundberg:

We sent notice earlier this year to inform you that the City of Roseville Water Utility (Water Utility) had begun preparation of the 2020 Urban Water Management Plan (UWMP). A draft of the UWMP, which is inclusive of the newly required Water Shortage Contingency Plan (WSCP), has been completed and can be accessed at www.roseville.ca.us/UWMP.

Prior to Board adoption, a public hearing of the UWMP and WSCP will be held on June 16th at 6pm. We encourage you to attend the public hearing which will be held through video conferencing. For information regarding broadcasting of the meeting and providing public comment please visit the City's website at https://www.roseville.ca.us/cms/One.aspx?portalId=7964922&pageId=16870417.

If you wish to contact the Water Utility regarding either of the plans, you may do so by writing to the undersigned or by email to TJoseph@roseville.ca.us. Thank you.

Sincerely,

Trevor Joseph, P.G., C.Hg.
Hydrogeologist
City of Roseville
Environmental Utilities Department

CITY OF ROSEVILLE CALIFORNIA
**Environmental Utilities**
**Water Division**
2005 Hilltop Circle
Roseville, California 95747

May 25, 2021

Mr. Daniel York, General Manager
Sacramento Suburban Water District
3701 Marconi Avenue, Suite 100
Sacramento, CA 95821

RE: City of Roseville 2020 Urban Water Management Plan Public Hearing

Dear Mr. York:

We sent notice earlier this year to inform you that the City of Roseville Water Utility (Water Utility) had begun preparation of the 2020 Urban Water Management Plan (UWMP). A draft of the UWMP, which is inclusive of the newly required Water Shortage Contingency Plan (WSCP), has been completed and can be accessed at www.roseville.ca.us/UWMP.

Prior to Board adoption, a public hearing of the UWMP and WSCP will be held on June 16th at 6pm. We encourage you to attend the public hearing which will be held through video conferencing. For information regarding broadcasting of the meeting and providing public comment please visit the City's website at https://www.roseville.ca.us/cms/One.aspx?portalId=7964922&pageId=16870417.

If you wish to contact the Water Utility regarding either of the plans, you may do so by writing to the undersigned or by email to TJoseph@roseville.ca.us. Thank you.

Sincerely,

Trevor Joseph, P.G., C.Hg.
Hydrogeologist
City of Roseville
Environmental Utilities Department

| | |
|---|---|
| **From:** | Joseph, Trevor |
| **To:** | Foster, Stephen (American Water) |
| **Cc:** | Bigley, Sean; York, Linda |
| **Subject:** | City of Roseville 2020 Urban Water Management Plan Public Hearing |
| **Date:** | Tuesday, May 25, 2021 12:35:03 PM |
| **Attachments:** | Cal Am_General Manager ldy.pdf<br>image001.png |

Hello Stephen

Please see the attached letter as part of the Urban Water Management Plan requirements informing Cal Am of a pending public hearing. They City's UWMP will be made available on our website shortly.

Regards,

**Trevor Joseph, P.G., C.Hg.**
Hydrogeologist
Environmental Utilities
**c:** (916) 517-2578

**Corporation Yard** | 2005 Hilltop Circle | Roseville, CA | 95747

**From:** Joseph, Trevor
**To:** York, Linda
**Subject:** FW: City of Roseville 2020 Urban Water Management Plan Public Hearing
**Date:** Tuesday, May 25, 2021 12:41:00 PM
**Attachments:** CHWD_General Manager ldy.pdf
image001.png

---

**From:** Joseph, Trevor
**Sent:** Tuesday, May 25, 2021 12:37 PM
**To:** Hilary Straus <hstraus@chwd.org>
**Subject:** City of Roseville 2020 Urban Water Management Plan Public Hearing

Hello Hilary

Please see the attached letter as part of the Urban Water Management Plan requirements informing CHWD of a pending public hearing. They City's UWMP will be made available on our website shortly.

Regards,

**Trevor Joseph, P.G., C.Hg.**
Hydrogeologist
Environmental Utilities
**c:** (916) 517-2578

**Corporation Yard** | 2005 Hilltop Circle | Roseville, CA | 95747

| | |
|---|---|
| **From:** | Joseph, Trevor |
| **To:** | pkraatz@placer.ca.gov |
| **Cc:** | Bigley, Sean; York, Linda; Hanson, Christina (Placer County) |
| **Subject:** | City of Roseville 2020 Urban Water Management Plan Public Hearing |
| **Date:** | Tuesday, May 25, 2021 12:40:09 PM |
| **Attachments:** | Placer County Public Works Assistant Director ldy.pdf<br>image001.png |

Hello Peter

Please see the attached letter as part of the Urban Water Management Plan requirements informing Placer County Public Works of a pending public hearing.   They City's UWMP will be made available on our website shortly.

Regards,


**Trevor Joseph, P.G., C.Hg.**

Hydrogeologist
Environmental Utilities

**c:** (916) 517-2578

**Corporation Yard** | 2005 Hilltop Circle | Roseville, CA | 95747

| | |
|---|---|
| **From:** | Joseph, Trevor |
| **To:** | cdraecs@placer.ca.gov |
| **Cc:** | Bigley, Sean; York, Linda; Hanson, Christina (Placer County) |
| **Subject:** | City of Roseville 2020 Urban Water Management Plan Public Hearing |
| **Date:** | Tuesday, May 25, 2021 12:43:10 PM |
| **Attachments:** | Placer County, Environmental Coordinator ldy.pdf<br>image001.png |

Hello Leigh

Please see the attached letter as part of the Urban Water Management Plan requirements informing Placer County Environmental Coordinator of a pending public hearing.   They City's UWMP will be made available on our website shortly.

Regards,

**Trevor Joseph, P.G., C.Hg.**
Hydrogeologist
Environmental Utilities
**c:** (916) 517-2578

**Corporation Yard** | 2005 Hilltop Circle | Roseville, CA | 95747

**From:** Cecilia Partridge
**Subject:** City of Roseville 2020 Urban Water Management Plan Public Hearing Notification
**Date:** Tuesday, May 25, 2021 2:54:37 PM
**Attachments:** RWA_Membership ldy.pdf

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**EXTERNAL:** This email originated from outside of the organization. Do not click on any links or open attachments unless you recognize the sender and know the content is safe.

Good afternoon RWA members,

Attached is a notice from the City of Roseville regarding an upcoming Public Hearing for their 2020 Urban Water Management Plan.

Any questions please feel free to contact me.

*Cecilia Partridge*
cpartridge@rwah2o.org
**Executive Assistant**
**Regional Water Authority**
**5620 Birdcage Street, Suite 180**
**Citrus Heights, CA 95610**
**916-213-4631 cell**

| | |
|---|---|
| **From:** | Joseph, Trevor |
| **To:** | "Ansel Lundberg" |
| **Cc:** | Bigley, Sean; York, Linda |
| **Subject:** | City of Roseville 2020 Urban Water Management Plan Public Hearing |
| **Date:** | Tuesday, May 25, 2021 12:46:14 PM |
| **Attachments:** | SMUD Water and Power Contract Specialist ldy.pdf<br>image001.png |

Hello Ansel

Please see the attached letter as part of the Urban Water Management Plan requirements informing SMUD of a pending public hearing.   They City's UWMP will be made available on our website shortly.

Regards,


**Trevor Joseph, P.G., C.Hg.**

Hydrogeologist
Environmental Utilities

**c:** (916) 517-2578

**Corporation Yard** | 2005 Hilltop Circle | Roseville, CA | 95747

| | |
|---|---|
| **From:** | Joseph, Trevor |
| **To:** | Dan York |
| **Cc:** | Bigley, Sean; York, Linda |
| **Subject:** | City of Roseville 2020 Urban Water Management Plan Public Hearing |
| **Date:** | Tuesday, May 25, 2021 12:45:17 PM |
| **Attachments:** | SSWD General Manager ldy.pdf<br>image001.png |

Hello Dan

Please see the attached letter as part of the Urban Water Management Plan requirements informing Sacramento Suburban Water District of a pending public hearing.   They City's UWMP will be made available on our website shortly.

Regards,

**Trevor Joseph, P.G., C.Hg.**
Hydrogeologist
Environmental Utilities
**c:** (916) 517-2578

**Corporation Yard** | 2005 Hilltop Circle | Roseville, CA | 95747

## York, Linda

**Subject:** FW: Urban Water Management Plan and Water Shortage Contingency Update to Publish in the Press Tribune on May 28, 2021 and June 4, 2021 City of Roseville #1050
**Attachments:** NOTICE OF PUBLIC HEARING UWMP AND WSCP.docx

**From:** Rachel White <rachelw@goldcountrymedia.com> on behalf of legals@goldcountrymedia.com <legals@goldcountrymedia.com>
**Sent:** Friday, May 21, 2021 4:01:49 PM
**To:** Six, Katrina <KMSix@roseville.ca.us>
**Subject:** RE: Urban Water Management Plan and Water Shortage Contingency Update to Publish in the Press Tribune on May 28, 2021 and June 4, 2021 City of Roseville #1050

**EXTERNAL:** This email originated from outside of the organization. Do not click on any links or open attachments unless you recognize the sender and know the content is safe.

Hi, Katrina,

This order has been completed and scheduled as requested for The Roseville Press Tribune on May 28, June 4, 2021. The order is #77551.

**If you have any questions on this order, please include the order number in your email to legals@goldcountrymedia.com.**

Thank you for your business,

Rachel White
Legals Clerk
Gold Country Media
Direct: (916) 774-7911
Email: legals@goldcountrymedia.com

AUBURN Journal | THE PLACER HERALD Rocklin | The Loomis News | THE ROSEVILLE PRESS TRIBUNE | LINCOLN NEWS MESSENGER | THE FOLSOM Telegraph | granite bay VIEW | foothill MAGAZINE | FOLSOM LAKE ENTERTAINER | south placer MAGAZINE

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**From:** Six, Katrina via Legals [mailto:legals@goldcountrymedia.com]
**Sent:** Wednesday, May 19, 2021 12:28 PM
**To:** legals@goldcountrymedia.com
**Subject:** Urban Water Management Plan and Water Shortage Contingency Update to Publish in the Press Tribune on May 28, 2021 and June 4, 2021 City of Roseville #1050

Urban Water Management Plan and Water Shortage Contingency Update to Publish in the Press Tribune on May 28, 2021 and June 4, 2021 City of Roseville #1050

**Katrina Six**
*Deputy City Clerk*
City Clerk Department
**o:** (916) 774-5267
f: (916) 786-9175

**Civic Center |** 311 Vernon Street **|** Roseville, CA **|** 95678

NOTICE OF PUBLIC HEARING
2020 URBAN WATER MANAGEMENT PLAN
AND 2020 WATER SHORTAGE CONTINGENCY UPDATE
CITY OF ROSEVILLE, PLACER COUNTY, CALIFORNIA

**NOTICE IS HEREBY GIVEN that the City of Roseville will hold a public hearing on Wednesday, June 16, 2021 at 6:00 p.m. in the City Council Chambers at 311 Vernon Street, Roseville, California, to consider adoption of the City of Roseville 2020 Urban Water Management Plan. The public hearing will also include consideration for adoption of the 2020 Water Shortage Contingency Plan. The Water Shortage Contingency Plan is included as Chapter 8 of the 2020 Urban Water Management Plan.**

**The Public Review Draft of these documents is available on the City's website at http://roseville.ca.us/UWMP .**

# Appendix C – Land Use Element

CITY OF ROSEVILLE CALIFORNIA

# II. LAND USE

# Table of Contents

# Figures



# Tables


# LAND USE

## PURPOSE

The purpose of the Land Use Element is to set guidelines for managing land use change. Land use designations define allowable density and land uses. The Land Use Map illustrates the location of each of these uses. Goals and policies in this Element guide land use change to achieve many goals: maintaining and enhancing quality of life in neighborhoods; promoting revitalization and economic development; enhancing fiscal sustainability; and ensuring orderly and efficient long-term growth.

A community's ultimate land use distribution and development pattern are influenced by economic development and opportunities, the capacity and location of infrastructure and services, natural and environmental constraints, the periods of time when the community was founded and experienced growth, market opportunities and constraints, and social factors. The implementation of land policies interacts with these and other factors to improve social, economic, and environmental outcomes. Land use patterns have complex relationships with other key planning considerations. For example, infrastructure capacity and placement can influence the distribution of land uses and the community's overall character. At the same time, the desired community character speaks to the distribution of land uses and the infrastructure necessary to serve these land uses.

It is the overall goal of the Land Use Element to promote a balanced land use pattern that supports innovative land use approaches and retains and enhances the distinct character and identity of Roseville.

# GUIDING PRINCIPLES

The City has received input from residents and business owners through surveys, task forces, committee meetings, and other mechanisms. This input was used to develop guiding principles that create the foundation for the goals and policies of the Land Use Element. These guiding principles include:

- Promote and enhance Roseville's unique character and identity.
- Distinguish Roseville from adjacent communities through the quality of development and design and the level of public services and facilities provided.
- Protect and enhance Downtown and the City's established neighborhoods.
- Promote new development and ensure that development is an integrated and connected part of the City's land use pattern.
- Provide a variety of housing types and opportunities to serve the needs and incomes of all households.
- Create a balanced land use pattern with an appropriate mix of uses to accommodate residential, employment, service, and social needs within the community.
- Preserve open space in areas with sensitive environmental resources and provide high-quality, accessible recreational amenities.
- Ensure fiscal responsibility.
- Create a land use mix and development pattern that accommodates and promotes alternative transportation modes for ease of access and improved air quality and public health.
- Proactively manage and plan for growth.

# ORGANIZATION

The Land Use Element consists of the Land Use Map and land use goals and policies. The Land Use Map visually illustrates the City's existing and planned land use mix and pattern.[1] Land use decision-making is guided by the goals and policies contained in the text of the Land Use Element, as well as the land use implementation measures outlined in the appendix to the General Plan. While the Land Use Map is an illustration of policy, it only reflects those policies that can be graphically shown. The Land Use Map and land use policies must be used in combination with each other, along with the policies from the other Elements.

[1] A copy of the Land Use Map is available through the Development Services Department - Planning Division at 311 Vernon Street or online at www.roseville.ca.us.

The Land Use Element is organized into the following six components:

1 ***Planning Area*** provides a description of the Planning Area, the Sphere of Influence, and planning subareas.

2 ***Land Use Designations*** identifies and defines the City's land use categories, incorporating general use, development, intensity, and siting and compatibility guidelines.

3 ***Development Forecast*** presents estimates of future development potential within the Planning Area.

4 ***Community Form*** provides goals and policies to define and direct the future form and development pattern of the City.

5 ***Community Design*** includes goals and policies that address aesthetics, integration of the built and natural environments, and community character.

6 ***Growth Management*** focuses on the proactive management of growth in the community, including performance standards to regulate growth and development, as well as policies addressing annexations and expansion of the City's Sphere of Influence.

*It is the overall goal of the Land Use Element to promote a balanced land use pattern that supports innovative land use approaches and retains and enhances the distinct character and identity of Roseville.*

# PLANNING AREA

The focus of the General Plan's land use policy is on the City's "Planning Area" (see Figure II-1), which includes all planning subareas within the City limits, Sphere of Influence, and the City/County Memorandum of Understanding area, as described below.

## Sphere of Influence

The City's Planning Area includes 796 acres of land that is within the City's Sphere of Influence, but outside the current City limits. The City does not have jurisdiction over projects proposed within the Sphere of Influence, but will monitor, receive notices, and provide official comments on such projects. The City will use policies of the Growth Management component of this Element to evaluate annexations to the City and expansions of the Sphere of Influence, which would be subject to approval by the Placer County Local Agency Formation Commission (LAFCO).

## City/County Memorandum of Understanding Area

The City has an expanded cooperation agreement in place with Placer County, commonly referred to as the City/County Memorandum of Understanding (MOU), which provides guidelines for the City or County to follow to ensure that development within the MOU area is cooperatively planned with input from both agencies.

## Planning Subareas

Within the City limits, there are 16 subareas that have been defined for planning purposes. These include the Infill Area, the North Industrial Area, and the City's 14 Specific Plan Areas:

- **Infill Area** – This area has vacant and underutilized properties where the City will encourage infill development, but overall, it is mostly built out. The Infill Area includes the historic core of the community but excludes the Downtown and Riverside Gateway Specific Plan Areas.

- **North Industrial Area** – While not subject to a specific plan, this is a recognized planning subarea of the City that provides a major opportunity for industrial and employment development serving the south Placer region. The North Industrial Area has adopted design guidelines, the North Roseville Design Guidelines, which applies to the majority of the planning area. Other portions of the North Industrial Area are regulated by the Hewlett Packard Master Plan or Campus Oaks Master Plan.

- **Southeast Roseville Specific Plan (1985)** – This mixed-use Specific Plan represents the City's first effort to use the specific plan process to master plan a new development area.

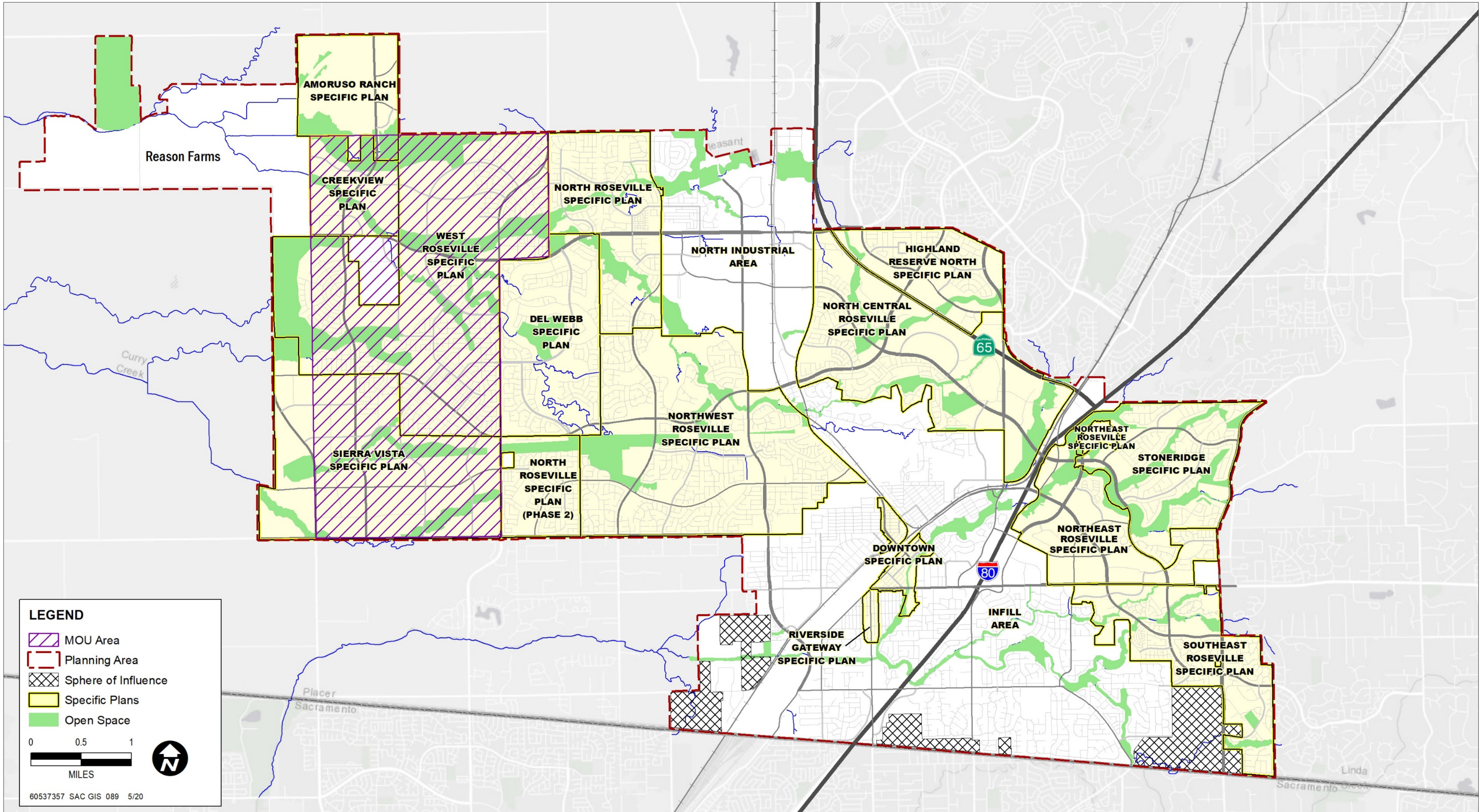
- **Northeast Roseville Specific Plan (1987)** – This Specific Plan is primarily intended for commercial and employment-generating uses but also has significant residential and open space components.

- **Northwest Roseville Specific Plan Area (1989)** – The predominant land uses in this Specific Plan Area are single- and multi-family development, but the Specific Plan also provides for commercial, office, open space, and public uses.

- **North Central Roseville Specific Plan (1990)** – This Specific Plan Area includes residential, commercial, and office uses, along with a large area for wetland preservation and creation.

- **Del Webb Specific Plan (1993)** – This Specific Plan Area is planned as an age-restricted community consisting of single-family homes focused around recreational facilities with supportive private and public uses.

Figure II-1 | Planning Areas



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- **Highland Reserve North Specific Plan (1997)** – This Specific Plan accommodates single- and multi-family residential development, along with commercial and other supportive uses.
- **North Roseville Specific Plan (1997)** – This multi-phase Specific Plan includes single- and multi-family dwelling units, commercial uses, parks and other public facilities, and open space.
- **Stoneridge Specific Plan (1998)** – This Specific Plan accommodates single- and multi-family residential development, commercial and office uses, parks and other public facilities, and open space.
- **West Roseville Specific Plan (2004)** – This Specific Plan accommodates single- and multi-family dwelling units, including age-restricted units, commercial uses, industrial development, parks and other public facilities, and open space.
- **Riverside Gateway Specific Plan (2006)** – The Riverside Gateway Specific Plan is intended to guide public improvements and facilitate commercial and residential infill development between Douglas Boulevard and Darling Way.
- **Downtown Specific Plan (2009)** – This Specific Plan encourages mixed-use infill development throughout the Historic Old Town and the Vernon Street District. The associated Downtown Code implements the Plan, physically applying the Plan's guidance to properties within the Plan Area.
- **Sierra Vista Specific Plan (2010)** – This Specific Plan accommodates single- and multi-family units, including age-restricted units, commercial development, parks and other public facilities, and open space.
- **Creekview Specific Plan (2012)** – This Specific Plan accommodates single- and multi-family dwelling units, commercial and office development, parks and other public facilities, and open space.
- **Amoruso Ranch Specific Plan (2016)** – This Specific Plan accommodates single- and multi-family dwelling units, commercial development, parks and other public facilities, and open space.

Roseville's Specific Plans play an important role in guiding development and conservation. In many areas of the City, the Specific Plans are the primary mechanism for implementing the goals and policies of the General Plan. It is the City's policy to plan for new development and/or reinvestment efforts through the Specific Plan process.

The Specific Plans establish detailed policies and implementation programs for portions of the City, consistent with the goals and policies established in the General Plan. Specific Plan land use designations are reflected on the General Plan Land Use Map, although Specific Plans may also use new land use categories that are more specific or tailored to a particular situation. The City's Specific Plans are consistent with, and are hereby incorporated by this reference, as a component of the Land Use Element of the General Plan. Copies of all of the City's Specific Plans may be obtained through the Development Services Department in the Civic Center at 311 Vernon Street or online at: www.roseville.ca.us.

## LAND USE DESIGNATIONS

The City's land use designations define allowable land use, and serve as a guide for zoning, Specific Plans, and other land use regulations. Each land use designation has density and intensity guidelines (Table II-3 and II-4), which are used for planning of facilities (e.g. roadway, utilities, schools, parks, etc.) that support the various land uses, as directed by goals and policies in other Elements. The Land Use Map (Figure II-2) illustrates the location of the City's land use designations. The City's land use designations include:

## Residential

- Low-Density Residential (0.5 – 6.9 Dwelling Units/Acre)
- Medium-Density Residential (7.0 – 12.9 Dwelling Units/Acre)
- High-Density Residential (13.0 Dwelling Units/Acre or greater)

## Commercial

- Neighborhood Commercial
- Community Commercial
- Regional Commercial

## Office

- Business Professional

## Industrial

- Light Industrial
- Tech/Business Park
- General Industrial
- Transfer Station

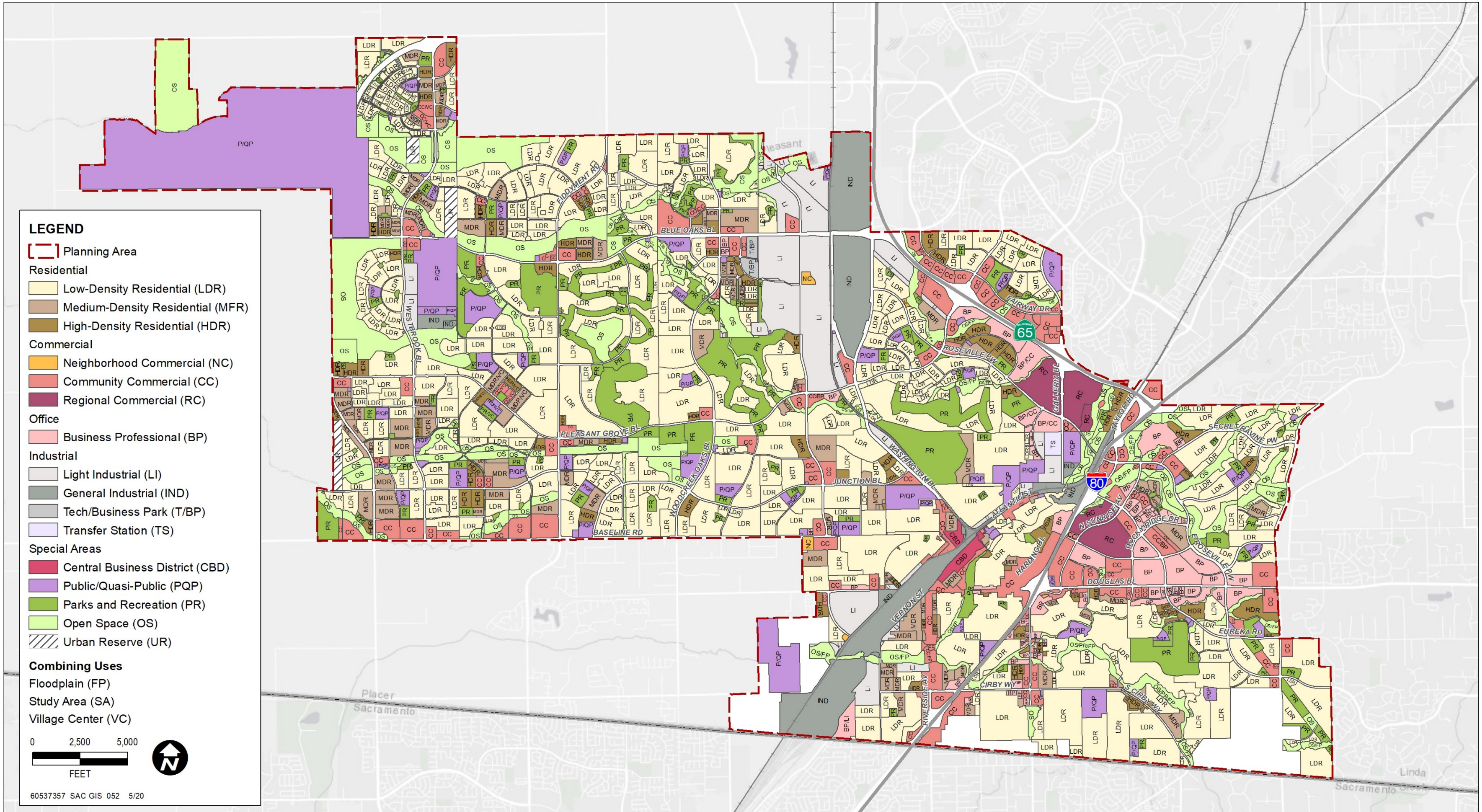
## Special Areas

- Central Business District
- Public/Quasi-Public
- Parks and Recreation
- Open Space
- Urban Reserve

## Combining Designations

- Floodplain
- Study Area
- Village Center

**Figure II-2 | Land Use Map**



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Compared to zoning, the City's land use designations define allowable land use broadly, in part to provide the flexibility necessary to achieve the General Plan's policies related to pedestrian orientation and convenience and facilitate mixed-use, infill development. For example, in addition to primary uses, there are permitted secondary uses associated with each land use designation that allow for a more diverse land use mix. The Zoning Ordinance, Specific Plans, and Community Design Guidelines provide more specific standards to ensure compatibility among adjacent land uses. The extent of the secondary uses permitted and conditions related to their use will be as specified in the overlying zoning, Specific Plan, and/or other master plan.

Typically, a single land use designation is applied to a given area. However, to promote mixed-use development, the City may use two or more designations for certain areas that include complementary land uses. Because the Land Use Map provides a guide for future development, it is possible that more than one zoning district may be consistent with any one land use designation.

*The City's land use designations define allowable land use broadly, in part to provide the flexibility necessary to achieve the General Plan's policies related to pedestrian orientation and convenience and facilitate mixed-use, infill development.*

## Use Types, Density, Intensity, and Compatibility

Land use designations contain development guidelines to be applied to each use. These include density guidelines for residential uses, intensity guidelines for non-residential uses, and, where appropriate, land use compatibility guidelines. Tables II-1 and II-2 summarize density and intensity guidelines. Tables II-3 through II-8 describe the purpose, allowable uses, and development guidelines for land use designations. Table II-9 is a compatibility matrix for all land use designations. Table II-10 illustrates the relationship between land use designations and implementing zoning districts.

## Table II-1 | Residential Land Use Characteristics

| Land Use Category | Dwelling Units Per Acre | Estimated Population Per Gross Acre[1] |
|---|---|---|
| Low-Density Residential | 0.5 TO 6.9 | 1.45-20.01 |
| Medium-Density Residential | 7.0 TO 12.9 | 20.3-37.41 |
| High-Density Residential | 13.0 + | 27.3+ |

[1] Assumes 2.1 persons per multi-family unit and 2.9 persons per single-family unit based on the American Community Survey (2013 - 2017). The estimated population per gross acre is only an estimate and does not represent City policy.

## Table II-2 | Non-Residential Land Use Characteristics

| Land Use Category | Floor Area Ratio* | Typical Acreage | Typical Square Footage |
|---|---|---|---|
| Neighborhood Commercial | 20% TO 40% | Less than 5 | < 50,000 |
| Community Commercial | 20% TO 40% | 5 to 25 | 50,000 TO 250,000 |
| Regional Commercial | 20% TO 40% | >25 | >250,000 |
| Business Professional | 20% TO 40% | Varies | Varies |
| Light Industrial | 20% TO 50% | Varies | Varies |
| Tech/Business Park | 20% TO 50% | Varies | Varies |
| General Industrial | 20% TO 50% | Varies | Varies |
| Transfer Station | Varies | Varies | Varies |
| Central Business District | Up to 300% | Varies | Varies |
| Public/Quasi-Public | Varies | Varies | Varies |

* Floor Area Ratios (FARs) are intended as guidelines and not as absolute restriction

## RESIDENTIAL LAND USES

The residential designations include areas designated for a broad array of housing types with different densities. Each residential designation includes a purpose statement, primary and secondary uses, and development guidelines for each designation.

The Low-, Medium-, and High-Density land use designations are based on the number of allowable dwelling units per gross developable acre. A gross developable acre is defined as the land designated as residential use excluding overhead power lines and their easements, areas within the designated 100-year floodplain, and for the Low- and Medium-Density land use designations, any right-of-way and landscape corridors associated with collector and arterial roadways.

Each residential land use designation is indicated on the Land Use Map as an abbreviation (e.g., LDR) and will be followed by a number, indicating the number of dwelling units per gross developable area (e.g., LDR-6.0). Roseville generally uses the Specific Plan or master planning process to establish land use designations. Minimum and maximum densities for each residential land use designation are included within the development guidelines listed for each designation.

Each residential designation includes both primary and secondary land uses. As expected, the primary land uses are residential in each of these designations, but also include public parks, resource preservation and open space areas, and landscape corridors and other public utility easements. Secondary uses include those uses such as schools, places of worship, private recreation, limited office, and childcare facilities – uses that are normally associated with residential areas and are of such a limited size that a separate or distinct land use designation (e.g., public facility or commercial) is not always warranted.

Table II-3 outlines the purpose, allowable uses, and development guidelines for the residential land designations.

## NON-RESIDENTIAL LAND USES

The non-residential designations include areas designated for commercial, office, industrial uses, special areas, and combining districts. Like the residential designations, each non-residential designation includes a purpose statement, primary and secondary uses, and development guidelines for each designation.

Intensity development guidelines for non-residential development are expressed as floor area ratios (FARs). This is a ratio of the total floor area (including all floors and not just the "footprint" of a building) divided by the total lot or parcel area. The City expresses this ratio as a percentage. Typical commercial FARs range from 20 to 50 percent, but may be as high as 300 percent (i.e. a three-story building covering 100 percent of the lot area) in locations such as downtown Roseville.

Intensity and compatibility guidelines for the commercial, office, and industrial land use designations are guidelines and not absolute restrictions. Factors such as General Plan policies, intensity of use, anticipated traffic levels, and availability of public facilities and infrastructure will be assessed as part of the development review or Specific Plan process to determine the appropriate level of floor area to land area ratio.

Unlike the specific secondary uses listed in the residential designations, which are intended to be subordinate and may be permitted only to support neighborhood convenience, the relationship of secondary uses in non-residential areas differ. It is the intention of the non-residential land use designations to permit secondary land uses that support and complement primary uses. These secondary land uses do not need to be subordinate. The size of these areas would typically be limited and would, therefore, not warrant a separate land use designation for the secondary land use. Tables II-4, II-5, and II-6 outline the purpose, allowable uses, and development guidelines for the non-residential land designations.

## SPECIAL LAND USE DESIGNATIONS

In addition to the residential, commercial, office, and industrial land use designations, the City has also established Special Land Use Designations for Central Business Districts, Parks and Recreation, Open Space, public uses, and Urban Reserve Areas. Table II-7 outlines the purpose, allowable uses, and development guidelines for the Special Land Use Designations.

## COMBINING DESIGNATIONS

These designations are only applied in combination with another land use designation and modify the uses and development guidelines of that designation. Table II-8 outlines the purpose, allowable uses, and development guidelines for the Special Land Use Designations.

## Table II-3 | Residential Land Use Designations

| Designation | Purpose | Primary Uses | Secondary Uses | Development Guidelines |
|---|---|---|---|---|
| **Low-Density Residential (LDR)** | Applies to lands where single-family dwelling units, which comprise the majority of Roseville's housing supply, are located. Assigned to lands with the flexibility to accommodate development constraints (e.g., slopes, trees, etc.). Typically, low-density residential lands should require minimal grading or disturbance of natural features. Avoidance of land use limitations (topography, vegetation, easements, etc.) can be achieved by designing larger or smaller lots or by clustering and attaching units. | Attached and detached single-family residences, public parks, resource preservation and open space areas, landscape corridors, and other public utility easements. | Secondary uses include accessory dwelling units, public and private schools, religious assembly, private recreation, and limited office, commercial childcare facilities, and neighborhood retail and services. | 0.5 to 6.9 dwelling units per gross developable acre.<br><br>Lot sizes average 6,000 to 7,500 square feet but may be larger or smaller. |
| **Medium-Density Residential (MDR)** | Applies to lands characterized by small-lot single-family detached dwelling units and attached patio homes, halfplexes, duplexes, townhouses, condominiums, and mobile home parks. Should accommodate a variety of housing types and designs. Often located as a transition between higher-intensity land uses and low-density residential uses. | Attached and detached single-family, halfplexes, duplexes and multi-family residences; and public parks, resource preservation and open space areas, landscape corridors and other public utility easements. | Secondary uses include accessory dwelling units, public and private schools, religious assembly, private recreation, and limited office, commercial childcare facilities, and neighborhood retail and services. | 7.0 to 12.9 dwelling units per gross developable acre. |
| **High-Density Residential (HDR)** | Provides for apartments or condominiums with multiple-story structures containing multiple attached dwelling units. The broad range of densities in this category will yield a variety of design options. May be combined with commercial uses to form a mixed-use development where higher densities could be desirable and beneficial. | Multiple-family dwellings in attached units and public parks, resource preservation and open space areas, landscape corridors, and other public utility easements. | Secondary uses include public and private schools, religious assembly, private recreation, and limited office, commercial childcare facilities, and neighborhood retail and services. | 13.0 and above dwelling units per gross developable acre.<br><br>Should be applied to lands adjacent to bicycle and transit corridors, and in close proximity to services. |

## Table II-4 | Non-Residential Land Use Designations: Commercial

| Designation | Purpose | Primary Uses | Secondary Uses | Development Guidelines |
|---|---|---|---|---|
| **Neighborhood Commercial (NC)** | Provides basic commercial retail and services for the convenience of surrounding neighborhoods within walking distance of major residential areas. | A limited range of goods and services intended for the convenience of the residents in the immediate neighborhood and compatible with adjacent land uses. | Medical offices, veterinary clinics, other professional offices and commercial child care facilities. | Goods and services may be provided in stand-alone buildings or in small centers, typically on parcels less than five (5) acres in size with a floor area ratio between 20% and 40%. Developments will have a pedestrian scale and orientation and provide convenient pedestrian and bicycle access to reduce the need for an automobile trip. Should be adjacent to collector and/or arterial streets, and residential neighborhoods. |
| **Community Commercial (CC)** | Provides a broader range of goods and services to an expanded service area. | Retail stores and businesses selling a full range of goods and services including auto sales and repair, and commercial child care facilities. | Professional offices uses, including medical offices and clinics. | Due to the larger service area, the acreages are larger than in the neighborhood commercial land use category. Typically, the acreages range from 5 to 25 acres, the square footage ranges from 50,000 to 250,000 square feet, and the floor area ratio ranges from 20% to 40%. Should be located at intersections of, or adjacent to arterials. |
| **Regional Commercial (RC)** | Accommodates the larger shopping centers and commercial activities where uses provide goods and services to a citywide and regional service area. | Major department and discount stores, auto malls, hotels and motels, and commercial recreation or entertainment. | Office and financial institutions. | Typically, Regional Commercial developments would encompass more than 25 acres. Should be located adjacent to and with immediate access to major transit linkages, arterials, regional roadways, and highways. Sites should possess good automobile and truck access. Shopping centers in the regional commercial land use would typically exceed 250,000 square feet with a floor area ratio between 20% and 40%. |

## Table II-5 | Non-Residential Land Use Designations: Office

| Designation | Purpose | Primary Uses | Secondary Uses | Development Guidelines |
|---|---|---|---|---|
| **Business Professional (BP)** | Provides areas for small and large office uses, including uses supportive of offices. | Administrative, professional, government, and medical offices, and research and development (not including any manufacturing or assembly). Hospitals, clinics, and general medical may also be permitted. | Limited service commercial uses (e.g., banks, restaurants, commercial day care centers, travel agencies, florists, etc.) are encouraged where they would minimize the need for vehicle travel for convenience trips but only as secondary uses in proximity to large office parks and complexes. In association with clinics and hospitals, general medical, pharmacies and other medical related retail may be permitted. | Offices developed in stand-alone buildings or in a business park or campus setting. The business professional land use designation may be applied to lands that are adjacent to regional and community commercial designated lands. May also be used as a buffer between residential areas and arterials, community commercial, and light industrial. Floor area ratios should range between 20% and 40%. |

## Table II-6 | Non-Residential Land Use Designations: Industrial

| Designation | Purpose | Primary Uses | Secondary Uses | Development Guidelines |
|---|---|---|---|---|
| **Light Industrial (LI)** | Applies to lands reserved for office, industrial, and research and development uses that generate very limited noise, vibration, odor, dust, smoke, light, or other pollutants, and are either integrated or compatible with surrounding uses. | Research and development (which may include manufacturing and assembly), electronics assembly, warehousing, intensive commercial uses (e.g., auto body repair, landscaping material sales, retail and wholesale lumberyards), and associated administrative offices. | Limited service commercial uses (e.g., banks, restaurants, commercial day care centers, travel agencies, florist, etc.) are encouraged where they would minimize the need for vehicle travel for convenience trips, but only as secondary uses. Service uses with large space requirements, such as health clubs, religious assembly, dance and gymnastic studios, and off-peak public assembly uses may also be permitted. | Floor area ratios range from 20% to 50%.<br>Should be located adjacent to major roadways with convenient truck access to accommodate the needs of the businesses that require this land use. |

Table II-6 | Non-Residential Land Use Designations: Industrial (Cont.)

| Designation | Purpose | Primary Uses | Secondary Uses | Development Guidelines |
|---|---|---|---|---|
| **Tech/Business Park (T/BP)** | A variant of the LI designation and is envisioned as more of a campus type use. The land use designation provides for a mix of uses that are compatible with and act as a transition between the light industrial use types and commercial and residential uses. | Allowed use types include professional offices, light manufacturing, research services, and light wholesale and distribution. | Limited service commercial uses (e.g., banks, restaurants, commercial day care centers, travel agencies, florist, etc.) are encouraged where they would minimize the need for vehicle travel for convenience trips but only as secondary uses. Service uses with large space requirements such as health clubs, religious assembly, dance and gymnastic studios, and off-peak public assembly uses may also be permitted. | Floor area ratios range from 20% to 50%. |
| **General Industrial (IND)** | Provides areas for industrial uses that tend to generate noise, vibration, odor, dust, smoke, light, and an aesthetic appearance not compatible with residential and other sensitive receptors. The intent of this category is to provide a place for industrial uses within the City that is properly buffered from other uses. | A wide range of activities, including manufacturing, wholesale distribution, large storage areas and other industrial uses, are permitted. | Incidental retail and service commercial uses associated with large employment areas and industrial parks. | Areas developed under this designation should be located with direct access to a major or minor arterial or both, freeways, or rail lines. Floor area ratios range from 20% to 50%. |

Table II-6 | Non-Residential Land Use Designations: Industrial (Cont.)

| Designation | Purpose | Primary Uses | Secondary Uses | Development Guidelines |
|---|---|---|---|---|
| **Transfer Station (TS)** | Reserves and protects industrial areas that may be suitable for a solid waste transfer station. | Intermediate waste handling facilities where solid waste is transferred from hauling vehicles to a transfer vehicle where the waste or portion thereof undergoes processing, recycling, or further handling before transport to a disposal site, waste processing facility, or other facility. | None. | Only be applied where all of the following is satisfied:<br>• All adjacent land use designations are General Industrial or Light Industrial;<br>• All areas within 200 feet of the transfer station facility property shall be zoned such that the transfer station facility use is protected from incompatible adjacent uses;<br>• The area has access from major arterials capable of providing access for transfer vehicles and the public; and<br>• The use of the area as a transfer station facility is consistent with the existing or planned character of the area.<br>Transfer stations shall be designed and maintained to, at a minimum, include enclosed processing areas, paved access, fenced and screened storage areas for recycled goods, dust mitigation, and be in compliance with other City, county, state, and federal standards. |

Table II-7 | Special Land Use Designations

| Designation | Purpose | Primary Uses | Secondary Uses | Development Guidelines |
|---|---|---|---|---|
| **Central Business District (CBD)** | Accommodates significantly greater intensities and traditional mixed retail, office, and apartment uses. Limited in its application to Downtown Roseville but may be applied to areas of greater urban intensity. | A mix of retail and office uses, including municipal offices, public assembly, theaters, and restaurants. | Medium-density and high-density residential uses. | Floor area ratios may be as high as 300% (three times the site area). |
| **Park and Recreation (P/R)** | Accommodates public parks and public and private recreation facilities. | Public park and recreation facilities, including ball diamonds and fields, golf courses, pools, bike trails and community buildings; and private recreation uses when they include outdoor facilities, such as golf course, tennis courts, and similar uses. | Libraries, child/elder care facilities, resource mitigation, and drainage detention. | For public recreation, the Parks and Recreation Element contains policies and standards that establish locational criteria, acreage requirements, and the types of improvements planned for each of the City parks. |
| **Open Space (OS)** | Preserves and protects public and private lands that are significant due to wildlife habitat, natural features, or flood hazard. Within new development areas, the 100-year floodplain will be designated as Open Space. Sensitive or unique natural features, including, but not limited to, wetlands, vernal pools, and oak woodlands are also to be designated as Open Space as part of specific plans and other major development review processes. | Preserved natural lands, passive recreation and minor recreation facilities (picnic tables, restrooms), walking and bike trails, and resource interpretive facilities. | Resource mitigation and drainage detention. | All permitted uses shall be compatible with the preservation and protection of open space values (habitat and visual) and shall comply with the policies and standards contained in the Open Space and Conservation Element. |
| **Public/Quasi-Public (P/QP)** | Establishes areas for education, religious assembly, governmental offices, municipal corporation yards, and water treatment plants. | Municipal, governmental or public facilities, places of worship, and related uses. | None. | This land use designation shall apply to all municipal facilities and may also be applied to quasi-public facilities where the size of such facilities warrants an individual land use designation. |

## Table II-7 | Special Land Use Designations (Cont.)

| Designation | Purpose | Primary Uses | Secondary Uses | Development Guidelines |
|---|---|---|---|---|
| **Urban Reserve (UR)** | Applies to those lands that are anticipated to receive urban land entitlements, but at the present time, are constrained by growth management policies, availability of services or other limitations. | Agriculture, open space, passive recreation and resource protection. | Caretakers' residence. | A caretaker's residence may be established at a density of 1 unit per 300 acres. Prior to the allocation of any urban land use entitlements, the applicable constraints must be resolved, consistent with the policies contained in the Growth Management component of this Element. |

## Table II-8 | Combining Designations

| Designation | Purpose | Permitted Uses and Guidelines |
|---|---|---|
| **Floodplain (FP)** | Identifies lands that are within the regulatory floodplain boundaries as defined in the Safety Element. Development is strictly regulated by the City. In areas with existing development, the floodplain designation is an overlay or a combining land use. As part of a specific plan, the land use designation may be combined with an open space or parks designation, if found consistent with the policies of the Safety Element. | Uses are limited to those that minimize flooding impacts on upstream and downstream areas and are consistent with both the policies of the Safety Element and the underlying land use designation. |
| **Study Area (SA)** | Identifies future General Plan or neighborhood study areas. This combining designation may be applied to any area, in which the City believes that additional land use analysis and amendment of the General Plan may be desirable to resolve specific neighborhood or land use issues. | Concurrent with a Land Use Map amendment to apply this combining designation, the City shall also adopt an ordinance regulating interim land use development. Such regulations shall relate to the land use issue that requires such regulations and shall include an expiration date. |
| **Village Center (VC)** | Allows for a mix and density of land uses common to a traditional downtown, urban setting. Allows for flexibility and deviation from the development guidelines and permitted uses contained in the primary land use designation for which it is combined. | Use of this combining designation requires comprehensive land use planning through approval of a Specific Plan. The permitted uses, development guidelines, and extent of deviation are to be defined in the Specific Plan. |

## Table II-9 | Compatibility of Adjacent Land Use Designations as Applied on the General Plan Land Use Map

| | LDR | MDR | HDR | NC | CC | RC | BP | LI | IND | T/BP | CBD | P/QP | P/R | OS | UR | VC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LDR | ■ | ■ | ▒ | ▒ | ▒ | □ | ▒ | ▒ | □ | □ | ▒ | ▒ | ■ | ■ | ▒ | ▒ |
| MDR | ■ | ■ | ■ | ▒ | ▒ | □ | ▒ | ▒ | □ | ▒ | ▒ | ▒ | ■ | ■ | ▒ | ▒ |
| HDR | ▒ | ■ | ■ | ▒ | ▒ | ▒ | ▒ | ▒ | □ | ■ | ■ | ▒ | ■ | ■ | ▒ | ▒ |
| NC | ▒ | ▒ | ▒ | ■ | ■ | ▒ | ■ | ■ | ▒ | ■ | ■ | ■ | ▒ | ▒ | ▒ | ▒ |
| CC | ▒ | ▒ | ▒ | ■ | ■ | ■ | ■ | ■ | ▒ | ■ | ■ | ■ | ▒ | ▒ | ▒ | ▒ |
| RC | □ | □ | ▒ | ▒ | ■ | ■ | ■ | ■ | ▒ | ■ | ▒ | ▒ | ▒ | ▒ | ▒ | ▒ |
| BP | ▒ | ▒ | ▒ | ■ | ■ | ■ | ■ | ■ | ▒ | ■ | ■ | ▒ | ■ | ■ | ▒ | ▒ |
| LI | ▒ | ▒ | ▒ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ▒ | ▒ | ▒ | ▒ | ▒ | ▒ |
| IND | □ | □ | □ | ▒ | ▒ | ▒ | ▒ | ■ | ■ | ▒ | □ | ▒ | □ | ▒ | ▒ | ▒ |
| T/BP | ▒ | ▒ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ▒ | ▒ | ■ | □ |
| CBD | ▒ | ▒ | ■ | ■ | ■ | ▒ | ■ | ▒ | □ | ■ | ■ | ■ | ■ | ■ | ▒ | ▒ |
| P/QP | ▒ | ▒ | ▒ | ■ | ■ | ▒ | ▒ | ▒ | ▒ | ■ | ■ | ▒ | ■ | ■ | ▒ | ▒ |
| P/R | ■ | ■ | ■ | ▒ | ▒ | ▒ | ■ | ▒ | □ | ■ | ■ | ▒ | ■ | ■ | ▒ | ▒ |
| OS | ■ | ■ | ■ | ▒ | ▒ | ▒ | ■ | ▒ | ▒ | ▒ | ▒ | ■ | ▒ | ■ | ▒ | ▒ |
| UR | ▒ | ▒ | ▒ | ▒ | ▒ | ▒ | ▒ | ▒ | ▒ | ■ | ▒ | ▒ | ▒ | ▒ | ■ | ■ |
| VC | ▒ | ▒ | ▒ | ▒ | ▒ | ▒ | ▒ | ▒ | ▒ | ■ | ▒ | ▒ | ▒ | ▒ | ■ | ■ |

■ Compatible
▒ Conditionally Compatible
□ Not Compatible

BP = Business Professional
CBD = Central Business District
CC = Community Commercial
HDR = High Density Residential
IND = General Industrial
LDR = Low Density Residential
LI = Light Industrial
MDR = Medium Density Residential
NC = Neighborhood Commercial
OS = Open Space
P/QP = Public/Quasi Public
P/R = Park and Recreation
RC = Regional Commercial
T/BP = Tech/Business Park
UR = Urban Reserve
VC = Village Center

Note: or purposes of this table, “adjacent” includes land uses separated by collectors and local streets but does not include land uses separated by major arterials or highways or by a buffer greater than 50 feet defined as open space, parks, paseos, or landscape setbacks, provided the adjacent use is not heavy industrial or manufacturing.

## Table II-10 | Land Use Designations, Special Areas, and Combining Designations and Implementing Zones

| LAND USE DESIGNATION | IMPLEMENTING ZONES |
|---|---|
| Low-Density Residential (LDR) | R1, R2, RS, RMU, PD |
| Medium-Density Residential (MDR) | R2, R3, RS, RMU, PD |
| High-Density Residential (HDR) | R3, RM, PD |
| Neighborhood Commercial (NC) | NC, PD |
| Community Commercial (CC) | NC, CC, PD, GC, HC, CMU |
| Regional Commercial (RC) | CC, RC, GC, PD |
| Business Professional (BP) | BP, PD |
| Light Industrial (LI) | M1, MP, MMU, PD, CMU |
| General Industrial (IND) | M1, M2, MMU, MP, PD, CMU |
| Central Business District (CBD) | HD, CBD, R3, RMU, P/QP, CMU, BP, NC, PR, OS, PD |
| Public/Quasi-Public (P/QP) | P/QP, PR, OS, UR, PD |
| Parks and Recreation (P/R) | PR, P/QP, OS, UR |
| Open Space (OS) | OS, P/QP, PR, UR |
| Urban Reserve (UR) | OS, P/QP, PD, UR, PR |
| Tech/Business Park (T/BP) | BP, MMU, CMU, MP, M1 |
| Village Center (VC) | R1, R2, R3, RS, CC, CMU, PD, NC |

Note: Land use designation implementation is not necessarily limited to these zones, especially when combined with an RS or PD zone. Additional zones may be consistent for transitional or interim land uses consistent with General Plan policies. Mixed land use designations may require a variety of land use designations, overlay and/or a PD zone.

Implementing Zones Legend

BP = Business Professional; CBD = Central Business District; CC = Community Commercial; CMU = Commercial Mixed Use; GC = General Commercial; HC = Highway Commercial; HD = Old Town Historic District; M1 = Light Industrial; M2 = General Industrial; MMU = Industrial Mixed Use; MP = Industrial/Business Park; NC = Neighborhood Commercial; OS = Open Space; P/QP = Public/Quasi-Public; PD = Planned Development; PR = Park and Recreation; R1 = Single-Family Residential; R2 = Two-Family Residential; R3 = Multi-Family Housing; RC = Regional Commercial; RMU = Residential Mixed Use; RS = Small Lot Residential; UR = Urban Reserve.

# DEVELOPMENT FORECAST

The City can influence the pace of development and the number of dwelling units, building square footage, jobs, population, and other characteristics of development through General Plan policy and implementing actions. The pace and nature of buildout of the General Plan is also dependent on factors outside of the City's control, including, but not limited to:

- Global, national, state, and regional economic conditions
- Federal budget and regulatory actions
- State budget allocations, relevant policy direction, and regulatory actions
- Perceptions about the quality of life in the region
- Housing costs, demographic trends, and community character
- Job and educational opportunities
- Infrastructure, resource, and land availability and cost

While it is difficult to accurately predict the amount and pace of long-term development, it is important for long-range plans to provide such estimates. The location, timing, and financing for infrastructure and public facilities depend on these forecasts. They also allow communities to assess land availability for different housing types and inform updates to plans that are needed as demand and capacity for different housing types change over time. Estimates of development capacity also allow the City to assess whether it can accommodate existing and future needs for non-residential development.[2] Development forecasts are used in the City's environmental impact analysis and inform mitigation measures that are needed to reduce or avoid such impacts.

With buildout of the General Plan, the City is estimated to have a total population of approximately 198,000, with approximately 75,200 dwelling units, 60 million square feet of non-residential building square footage, and between 120,000 and 150,000 local jobs (Table II-11).

The estimates of future population, housing units, local jobs, and square footage of development are not City policy. These assumptions are derived strictly for the purposes of analysis. The General Plan does not specify a maximum growth rate. Certain areas designated for urban use may or may not be developed between the present and 2035. Some areas may be developed at the upper end of the density ranges, while other areas may develop at the lower end. It is likely that, over time, the underlying factors driving these development forecasts will change. The City may update land use change assumptions from time to time, either in the context of a General Plan amendment or update, or as a separate exercise for planning purposes.

The City may also update the General Plan, Specific Plans, or implementing documents for policy purposes based, in part, on development forecasts and changes to these development forecasts in the future. For example, the Land Use Element contains policies that are intended to promote a beneficial jobs/housing balance. The right balance is related to the number of residents that commute, the transportation mode used for that commute, and the commute distance and time required. The relationship between jobs and housing affects and is affected by local employment opportunities, household incomes, housing prices, and non-residential lease rates and land costs. The City could

[2] This includes an assessment of the capacity for both "basic" and "non-basic" activities and services. While there is some overlap, in general, basic activities serve an export market, and are the driver of economic growth, while non-basic activities serve the local market.

consider plan amendments to the General Plan or Specific Plans to ensure an adequate supply of land for housing and economic development purposes.

## Table II-11 | Existing and Future Development

| Development Factor | 2016 | 2035 |
|---|---|---|
| **Dwelling Units** | 52,900 | 75,200 |
| **Population** | 135,800 | 198,000 |
| **Non-Residential Square Footage** | 33,000,000 | 60,000,000 |
| **Jobs** | 82,000 | 120,000 to 150,000 |
| **Jobs to Dwelling Units** | 1.55 | 1.6 to 2 |

Notes: The population estimate assumes 2.1 persons per multi-family unit and 2.9 persons per single-family unit based on the American Community Survey (2013 - 2017), 1.8 persons per household for age-restricted dwelling units based on the 2010 Census, and 350 square feet for each resident for congregate care/assisted living facilities. The 2016 jobs estimate is from the Sacramento Area Council of Governments (SACOG) 2020 Metropolitan Transportation Plan/Sustainable Communities Strategy Appendix C – Land Use Forecast. The future non-residential square footage was estimated by the City of Roseville in 2019 and does not include square footage devoted to fairgrounds, schools, or structures within golf courses, parks, or cemeteries. The estimate for local jobs in 2035 is derived using existing jobs-to-housing, jobs-to-population, and employment per square footage ratios applied to 2035 estimates for dwelling units, population, and non-residential square footage.

Achieving the City's planning objectives requires more than the right ratio between housing and local jobs. This is not just a mathematical exercise, but rather, requires both a quantitative and qualitative analysis of commute behavior, employment opportunities by occupation and wage, housing need and income type, and the rate of both job and housing growth in a regional context. Similarly, while the relationship between jobs and housing is important to monitor, Roseville also strives to be a complete community with neighborhoods and districts that offer a diverse array of housing, commercial and public services, recreational and cultural opportunities, and multiple transportation options to reach daily destinations.

# COMMUNITY FORM

The Community Form component is intended to go a step beyond the identification of land uses and the rules and regulations for their development. Goals and policies related to community form address the physical characteristics that lend shape, appearance, and identity to a community. A community's character is tied to expressions of familiar physical characteristics - landmarks, streets, buildings, parks, and natural features that create a unique identity. Roseville's policies are intended to influence the shape, form, and appearance of both new development and reinvestment in existing districts and neighborhoods, so that development appropriately reflects the vision and goals of residents and decision makers.

Community form has been the focus of regional long-range planning efforts, particularly since the adoption of the Sacramento Region Blueprint by the Sacramento Area Council of Governments (SACOG) Board of Directors in 2004. The Blueprint Principles focus on high-quality design for compact development that provides walkable communities; compact development that helps preserve open space, allow multi-modal transportation access, and facilitate more efficient infrastructure provision; reinvestment to allow better use of existing infrastructure; mixed-use development that provides for more vibrant neighborhoods; and open space that is incorporated into development and conserved on the fringes of the developed region for agriculture and habitat. These Blueprint Principles are broad and are expected to be applied differently in different parts of the Sacramento region. In 2005, the City went through a process to identify how these Principles, including the following Roseville Blueprint Implementation Strategies, which are embodied in the Community Form and Community Design components of this Element, should be applied locally.[3]

- **Transportation Choices:** Provide a variety of transportation choices. Development should be designed to encourage people to walk, ride bicycles, ride the bus, ride transit and heavy rail, or carpool. Land use concepts are intended to encourage the use of these modes of travel and reduce congestion.

- **Mixed Land Use:** Provide a variety of services in proximity to residential uses to reduce the reliance on automobile travel and give residents transit options… A mix of land uses can be provided within the same building and/or project. There are many examples of this type of development: housing near employment centers; a building with ground-floor retail with housing such as apartments or condominiums above; etc.

- **Compact Development:** Take advantage of compact building design. Creating environments that are more compactly built and that use space in an efficient but aesthetic manner can encourage more walking, biking, and public transit use, and shorten auto trips.

- **Housing Choices:** Create a range of housing opportunities and choices. Providing a variety of places where people can live such as apartments, condominiums, townhouses, and single-family detached homes on varying lot sizes is important in serving all aspects of the community including families, singles, seniors, and people with special needs. This issue is of special concern for residents with very low-, low-, and moderate-incomes (often our teachers, entry-level public safety personnel, and other public employees and professionals) as well as retail employees, service workers, and others for whom finding housing close to work is challenging, especially as land values increase. By providing a mix of housing options, residents will have more choices.

- **Use Existing Assets:** Use of existing assets to strengthen and direct development toward existing development areas. Ongoing public and private investment in the Downtown and historic core is critical to maintaining and enhancing the economic vitality of Roseville. Development of infill or vacant lands, intensification of underutilized parcels, or redevelopment can make better use of existing public

[3] Please see *Smart Choices for Roseville's Future: Implementation Strategies to Achieve Blueprint Project Objectives* (May 2005) for more details.

infrastructure. This can include rehabilitation and reuse of buildings, introduction of mixed-use opportunities, and joint use of existing public facilities, such as parking garages.

- **Natural Resource Conservation:** Natural resource conservation of open space and agricultural land. Encourage the incorporation of public-use open space (such as parks, town squares, trails, greenbelts, paseos, and preserves) within development projects and protect wildlife and plant habitat through open space preservation, agricultural preservation, and promotion of environment-friendly practices, such as energy efficient design, water conservation, and stormwater management. In addition to conserving resources and protecting species, natural resource conservation improves the overall quality of life by providing places for everyone to enjoy the outdoors with family outings and by creating a sense of open space throughout the community.

- **Quality Design:** Foster distinctive, attractive communities with a strong sense of place and use land efficiently. The design details of any land use development, such as the relationship to the street, setbacks, placement of garages, sidewalks, landscaping, the aesthetics of building design, and the design of the public right-of-way (sidewalks, connected streets and paths, bike lanes, and the width of streets), are all factors that can influence the attractiveness of living in a compact development. Design also facilitates the ease of walking and biking to work or neighborhood services. Good site and architectural design are important factors in creating a sense of community and a sense of place.

The Community Form component addresses the following topics:

- ***General*** policies that identify the desired quality of design and public services, along with the connectedness of all neighborhoods and commercial districts of the City.

- ***Development Patterns, Transportation, and Air Quality/Greenhouse Gas Emissions*** provide guidance for land use patterns that allow residents a range of viable transportation options, including walking, bicycling, transit, and vehicular travel.

- ***Downtown and Neighborhoods*** indicates the City's priority in retaining, enhancing, and preserving its historic business district and existing neighborhoods and the development of new areas that provide neighborhood services.

- ***Relationship of New Development*** emphasizes the importance of ensuring that the forms of new development cohere with those of the existing community, and that all portions of the City are linked and compatible with one another.

- ***Jobs/Housing and Economic Development*** establishes policies that support the fiscal viability of the City, focusing on jobs and housing for residents and a prosperous business climate.

- ***Community Involvement and Inter-jurisdictional Cooperation*** addresses the need for community and regional involvement on major development applications, City studies, and regional issues such as air quality, solid waste and transportation. Community involvement will be broad and inclusive and continue to engage the Roseville Coalition of Neighborhood Associations.

## GOALS AND POLICIES

### COMMUNITY FORM: GENERAL

**Goal LU1** **Define Roseville's overall identity and character by the following attributes:**

**a. Distinction from other communities through the quality of development and the high level of services provided to citizens.**

b. **A commitment to preserving its small-town attributes and cultural heritage and a dedication to promoting a strong sense of community, while preserving individual neighborhoods and promoting a prosperous business community.**

c. **Continuing to be a family-oriented community that offers opportunities to pursue various lifestyles.**

d. **Residential development that includes clusters of high to low densities balanced with large expanses of open space.**

e. **Ensuring high standards of public safety.**

***Policy LU1.1*** *Ensure high-quality development in new and existing development areas, as defined through specific plans, the development review process, and the Community Design Guidelines.*

***Policy LU1.2*** *Through both public and private efforts, develop clearly defined entries at major entrances into the City through the use of open space, landscaping, signage, and other distinctive elements as a way of defining the City's boundaries and identity.*

***Policy LU1.3*** *Continue to provide a full range of public services and maintain high levels of service for public facilities, services, transportation, open space, and parks and recreation.*

***Policy LU1.4*** *Promote a diversity of residential living options (e.g. density ranges, housing types, affordability ranges), while ensuring community compatibility and well-designed residential development.*

***Policy LU1.5*** *Promote land use patterns that result in the efficient use of urban lands and preservation of open space, as specified in the Open Space and Conservation Element.*

***Policy LU1.6*** *Through development approvals and City programs (e.g., revitalization, Capital Improvement Program, parks and recreation programs, etc.), ensure that all portions of the community are linked and integrated.*

***Policy LU1.7*** *Promote land use patterns that result in the dispersion of secondary or satellite services including libraries, schools, parks, public meeting places, and commercial uses throughout the community through the establishment of neighborhood centers.*

## COMMUNITY FORM: DEVELOPMENT PATTERNS, TRANSPORTATION, AND AIR QUALITY/GREENHOUSE GAS EMISSIONS

### Goal LU2 Achieve a community form that supports convenient and safe pedestrian, bicycle, and transit access.

***Policy LU2.1*** *Promote development patterns that support a variety of transportation modes and accommodate pedestrian mobility.*

***Policy LU2.2*** *Allow mixed-use development that integrates residential and non-residential land uses, so that residents may easily walk or bike to shopping, services, employment, and leisure activities.*

***Policy LU2.3*** *Concentrate higher-intensity uses and appropriate support uses in Pedestrian Districts and within close proximity of transit and bikeway corridors, as identified in the Transit Master Plans and Bicycle Master Plan. Public uses, such as parks, plazas, public buildings, community centers, schools, and/or libraries, should be easily accessible to the public.*

***Policy LU2.4*** *Promote and encourage the location of employee services, such as child care, restaurants, banking facilities, convenience markets, and other daily needs within major employment centers for the purpose of reducing mid-day vehicle trips.*

***Policy LU2.5*** *Where feasible, improve existing developed areas to create better pedestrian, bicycle, and transit accessibility.*

***Policy LU2.6*** *Require proposed neighborhood-serving uses (e.g. neighborhood commercial uses, day care, parks, schools, and other community facilities and services) to be physically linked with adjacent residential neighborhoods through multi-modal transportation connections.*

## COMMUNITY FORM: DOWNTOWN AND REVITALIZATION

**Goal LU3.1 In partnership with private interests, the City of Roseville will continue to promote a vibrant town center offering government services, social and cultural activities, and commercial opportunities in Downtown Roseville. Roseville will also encourage the creation of additional social, cultural and commercial satellite opportunities throughout the community.**

**Goal LU3.2 Through the designation of special study areas and revitalization efforts, the City of Roseville will preserve, revitalize, and enhance its business districts, existing neighborhoods, and mixed-use corridors.**

***Policy LU3.1*** *Create and maintain a strong and identifiable Downtown that offers the surrounding community a cluster of municipal offices and services, commercial, retail, and office uses, higher education opportunities, and higher-density residential uses, consistent with the Downtown Specific Plan.*

***Policy LU3.2*** *Facilitate population and economic growth in areas having the potential for revitalization*

***Policy LU3.3*** *Direct resources to facilitate revitalization of Downtown, neighborhoods in the Infill Area, and mixed-use corridors.*

***Policy LU3.4*** *Encourage infill development and reinvestment that:*

- *Upgrades the quality and enhances the character of existing areas;*
- *Enhances the mix of land uses in proximity to one another so that more households can access services, recreation, and jobs without the use of a car;*
- *Facilitates pedestrian activity and public transit use;*
- *Efficiently utilizes and does not overburden existing services and infrastructure; and*

- *Results in land use patterns and densities that provide the opportunity for the construction of a variety of housing types that are affordable to all income groups.*

***Policy LU3.5*** *Promote active citizen involvement in defining, maintaining, and improving the character and identity of existing neighborhoods, including consideration of cultural and artistic enhancements.*

***Policy LU3.6*** *Support the maintenance and rehabilitation of existing residential units within established neighborhoods.*

***Policy LU3.7*** *Identify locations where special study is necessary to develop strategies for preserving, enhancing, and revitalizing existing developed areas.*

### COMMUNITY FORM: NEW DEVELOPMENT

**Goal LU4 Design new development to be integrated, connected, and related to existing development areas within the City.**

***Policy LU4.1*** *Require new development areas and associated community-wide facilities (open space resources, parks, libraries, etc.) to be linked and oriented to existing developed areas of the community through road networks, public transit systems, open space systems, bikeway and pedestrian systems, and other physical connections.*

***Policy LU4.2*** *Encourage a development pattern that is contiguous with existing developed areas of the City.*

### COMMUNITY FORM: JOBS/HOUSING AND ECONOMIC DEVELOPMENT

**Goal LU5.1 Roseville will strive to be a complete community with a mix of land uses, housing types, and job opportunities that meet the diverse needs of its existing and future residents and businesses.**

**Goal LU5.2 Roseville will promote and encourage the availability of a variety of goods and services and retain a positive business climate in the City.**

***Policy LU5.1*** *Implement a land use mix and pattern of development that provides linkages between residents' jobs and local employment-generating uses, facilitates a match between the number and type of local jobs and the local labor force, and maintains the fiscal viability of the City.*

***Policy LU5.2*** *Support density bonuses in the construction of affordable housing, in accordance with the Density Bonus Ordinance and the Housing Element, to promote affordable housing options in areas particularly in areas where with few such housing opportunities and where employment centers exist or are planned.*

***Policy LU5.3*** *Consider the fiscal impacts to the City from projects proposing a General Plan land use change.*

***Policy LU5.4*** *The City may approve a project that is identified as having a negative fiscal impact on the City if overriding findings are made that the project benefits outweigh its impacts. Such benefits may relate to the provision of affordable housing, significant open space or recreation facilities, job creation, infill development near transit service, or other public benefits.*

***Policy LU5.5*** *Uphold the City's Affordable Housing Goal by requiring an affordable housing target for projects seeking a General Plan Amendment, Specific Plan Amendment, and/or rezoning to a residential designation proposing 25 or more new dwelling units. For these projects, the target is for a minimum of 10% of all new housing units to cost no more than 30% of the total monthly income of very low-, low-income, and moderate-income households (the City also uses the term "middle" in certain Specific Plans to refer to moderate-income households earning no more than 100% of the Area Median Income- AMI). The breakdown of the affordable units will be, at a minimum, 40% for rental to very low- and 40% for rental to low-income households. The remaining 20% may be reserved for moderate-income purchase (which will be priced to be affordable to households earning 95% of the Area Median Income) or may be distributed equally among the rental obligations, as approved by the City. Variations in affordable housing ratios may be approved through a Development Agreement where the following criteria are met:*

- *A need has been identified for a specific affordable housing type (very low-, low- or moderate-income) and the project meets this need;*
- *The project does not rely on or obtain City subsidies; and*
- *Units proposed within these criteria would allow for individuals to stay within their units as their future income grows.*

***Policy LU5.6*** *Maintain land use patterns, intensities, and densities that ensure an adequate supply of land for office, commercial, industrial, and other employment-generating development.*

***Policy LU5.7*** *Support activities that attract employment uses to the City, as identified in the Economic Development Strategy.*

## COMMUNITY FORM: COMMUNITY INVOLVEMENT AND INTER-JURISDICTIONAL COOPERATION

### Goal LU6.1 Roseville recognizes its role within the Sacramento and Placer County region and is dedicated to exploring regional solutions to regional issues.

### Goal LU6.2 Provide inclusive community engagement opportunities for individuals and community groups to produce timely and meaningful input leading to proactive, consensus-driven actions by the City and its partners.

***Policy LU6.1*** *Encourage active involvement by individuals and citizens in the planning process through ongoing public participation opportunities and informational programs.*

***Policy LU6.2*** *For major development proposals (e.g. major General Plan amendments, adoption of specific plans and amendments), encourage and provide public participation opportunities at early stages in the process.*

***Policy LU6.3*** *Coordinate and take a lead role, where feasible, with local, state, federal, and other agencies on regional issues of importance, including but not limited to air quality, climate change mitigation and resiliency, transportation, water supply, sewage treatment, solid waste disposal and recycling, flood control, hazardous waste management, resource protection, and transit.*

***Policy LU6.4*** *To the extent feasible, coordinate land use planning and public improvements with neighboring jurisdictions.*

***Policy LU6.5*** *Encourage early consultation with adjacent jurisdictions and refer development proposals that may have an impact to these jurisdictions to the respective agencies for their review and comment. Respond and comment on development proposals in other jurisdictions that may have an impact on Roseville to minimize such impacts and ensure consistency and compatibility with existing and planned development in the City.*

# COMMUNITY DESIGN

Design influences the aesthetics, character, desirability, and function of a community. Roseville, through its development review process, promotes high-quality design that balances aesthetic and functional considerations; integrates the natural and built environments; and creates inviting, convenient, safe, and comfortable human-scale connections between different land uses.

The emphasis of the Community Design component of this Element is on presenting a design framework that reflects the City's goal of high-quality, community-wide design. To assist in achieving this goal, the City has developed policies that address aesthetics and function, the integration of the built and the natural environments, art in public places, and community character. The application of these design principles will help to establish an aesthetically pleasing city and a distinct community identity.

The goals and policies in this Element will be implemented through the application of the City's Community Design Guidelines. The Guidelines provide detailed standards that establish common design elements and concepts to be used in the design and review of new development proposals in Roseville. The intent of the Guidelines is to ensure consistent quality, while supporting flexibility and the ability to provide unique solutions that fulfill the intent of the Guidelines through alternative means. The City anticipates that the Community Design Guidelines will need to be updated periodically to implement the General Plan's direction in a dynamic regulatory and economic environment. The design concepts contained in this Element, and further refined by the Community Design Guidelines, indicate Roseville's desire to create a City that has a distinct character notable for its high-quality design.

## GOALS AND POLICIES

### COMMUNITY DESIGN

**Goal LU7.1** **Achieve a consistent level of high-quality aesthetic and functional design through the development of, and adherence to superior design concepts and principles, as defined in the Community Design Guidelines.**

**Goal LU7.2** **Encourage, promote, and support the maintenance and expansion of a wide range of programs that serve to increase public understanding, appreciation, and enjoyment of cultural and artistic forms, and the display of artistic expression in public spaces to contribute to the cultural experience and the sense of place and community.**

**Goal LU7.3** **Encourage the planning and building of a city that sensitively integrates open space and natural resources, and promotes compatibility within and between the natural and the urban environments.**

**Goal LU7.4 Emphasize the preservation and enhancement of historically and culturally significant buildings, native oak trees, woodlands, and other significant features, as a primary element in defining Roseville's community character.**

***Policy LU7.1*** *Through the design review process, apply design standards that promote the use of high-quality building materials, architectural and site designs, landscaping signage, and amenities.*

***Policy LU7.2*** *Continue to develop and apply design standards that result in efficient site and building designs, pedestrian-friendly projects that stimulate the use of alternative modes of transportation, and compatibility between adjacent developments.*

***Policy LU7.3*** *Encourage designs that strike a balance between the incorporation of aesthetic and development requirements, and the economic considerations associated with development.*

***Policy LU7.4*** *Promote flexibility in the design review process to achieve design objectives, and encourage projects with innovative, unique, and creative architectural style and design.*

***Policy LU7.5*** *Encourage, promote, and support art in public spaces and programs to enhance the design of the City.*

***Policy LU7.6*** *Encourage project designs that place a high priority and value on open space, and the preservation, enhancement and incorporation of natural resources and other features including consideration of topography, vegetation, wetlands, and water courses.*

***Policy LU7.7*** *Encourage and promote the preservation of historic and/or unique, culturally and architecturally significant buildings, features, and important visual resources.*

***Policy LU7.8**.* *The location and preservation of native oak trees and oak woodlands shall be a primary factor in determining site design, building location, grading, construction and landscaping, and in establishing the character of projects through their use as a unifying element in both new and existing development.*

***Policy LU7.9*** *Control artificial lighting to avoid spill-over lighting onto adjacent properties. Use anti-reflective architectural materials and coatings to prevent glare.*

# GROWTH MANAGEMENT

In general, growth management can be defined as certain actions taken by local government to influence the location, composition, rate, or total amount of development in a community. The City manages growth to help coordinate development opportunities and constraints, as dictated by the physical, social, and economic characteristics of the areas planned for development, for the City as a whole.

The City recognizes two primary candidates for growth potential. The first is within existing developed parts of the City's corporate boundaries through reinvestment in the community. The second is either inside or outside City limits through new development of "greenfield" areas (non-urbanized or vacant land). "Greenfield" development has been the focus of the City's growth management efforts, but as the City matures and approaches buildout, infill development and reinvestment have an increasing role in meeting the City's needs for housing and economic development.

Inherent in the term "growth management" is the assumption that there will be growth. With growth, there are many potential tangible and intangible benefits, as well as impacts. The right type of growth can be beneficial to the community's economy and quality of life through additional employment opportunities, housing availability, improved delivery and variety of services, opportunity for greater access to destinations without the use of a car, enhanced efficiency of public service provision and fiscal sustainability, and increased commercial, social and cultural opportunities. At the same time, if growth is not well planned and managed, it can have negative impacts on the community. These may include increased reliance on the automobile for reaching destinations, public health effects related to air pollutant emissions, increased costs of construction and maintenance for public infrastructure, impacts to environmental resources, loss of community character, loss of the sense of safety and security, and other adverse effects.

## Growth Management Principles

The challenge is to accommodate and manage growth that balances the positive and negative impacts in a fashion that results in an overall benefit to the community. This is best accomplished proactively. To this end, the overarching principles that guide the City's approach to managing growth include:

- Maintain quality of life through a balance of land uses;
- Maintain the City's fiscal health in the long term;
- Continue to add and enhance the value of the built environment;
- Maintain and further define the City's physical form through creation of an open space transition area along the western interface with County lands.

In the recent past, the City has used the Specific Plan process, with appropriate updates to the General Plan, to manage and direct growth in a way that is relatively more comprehensive, compared to a project-by-project approach. This approach allows the City to plan for and finance necessary infrastructure and facilities, address area-wide development opportunities and constraints, and identify key growth management issues that may not be apparent in the context of individual project analysis.

## Growth Management Visioning Committee

In 2004, the City Council appointed a 20-member Growth Management Visioning Committee. The Committee was charged with reviewing growth management policies and developing a vision and policy recommendations to guide the City's long-range physical development. The Committee's Vision includes 11 characteristics that define the preferred future:

- A Distinct Community Identity;
- Well-Planned Neighborhoods and Communities;
- A Vibrant Downtown;
- A Balance Between New Growth and Revitalization;
- Abundant Parks and Open Space;
- A Diverse Range of Housing Types;
- Mobility and Transportation Choices;
- Economic Vitality;
- Convenient Access to Higher Education;
- Sustainable Environmental Resources and Infrastructure;
- Innovative Design and Land Use Planning; and,
- On-going Partnerships with Neighboring Communities.

The Committee recommended three additional policy concepts: Maintain Roseville's Identity and Character; Promote Stakeholder Involvement and Ensure Accountability; and Work Aggressively to Address Traffic Generated Outside of Roseville. Further, the Committee recommended that the following Policy Concepts be used to evaluate and influence potential growth that could affect the City within its current boundaries, within its Sphere of Influence, and in unincorporated land where the development will impact the City:

- Maintain an Open Space Transition Buffer;
- Ensure Fiscal Sustainability;
- Encourage High-Quality Infrastructure, Programs, and Services;
- Promote Comprehensive Large-Scale Planning;
- Use Performance-Based Standards to Manage Growth;
- Ensure Community Benefit;
- Maintain Roseville's Identify and Character;
- Promote Stakeholder Involvement and Ensure Accountability; and,
- Work Aggressively to Address Traffic Impacts Generated Outside of Roseville.

## Guiding Principles for Growth

The City Council adopted a set of 13 Guiding Principles for new development areas in May of 2001. The intent of the Guiding Principles is to supplement General Plan policies by creating guidelines for new development proposals for areas located outside of City limits. They are intended to articulate the City's expectations relating to any potential development proposals and are to be applied as performance measures for annexation proposals. These principles are contained as policies of this Growth Management component.

The Growth Management component focuses on the development of performance standards rather than artificial timelines or growth rates for future development. This approach has resulted in goals and policies that emphasize performance (e.g., maintaining levels of service, providing adequate park acreage, financing needed school facilities, etc.) rather than on specific dates, growth rates, or build-out of existing plans. The performance standards provide the criteria for planning and managing growth by requiring the mitigation of growth impacts and the provision of both tangible and intangible benefits to the community.

## GOALS AND POLICIES

### GROWTH MANAGEMENT - GENERAL

**Goal LU8.1** **Proactively manage and plan for growth.**

**Goal LU8.2** **Encourage a pattern of development that promotes the efficient and timely provision of urban infrastructure and services, and that preserves valuable natural and environmental resources.**

**Goal LU8.3** **Growth shall mitigate its impacts through consistency with the General Plan goals and policies and shall provide a positive benefit to the community.**

**Goal LU8.4** **Continue a comprehensive, logical planning process, rather than an incremental, piecemeal approach.**

**Goal LU8.5** **Encourage public participation in the development and monitoring of growth management policies and programs.**

**Goal LU8.6** **Manage and evaluate growth in a regional context, not in isolation.**

**Goal LU8.7** **Potential population growth in Roseville must be based on the long-term carrying capacities and limits of the roadway system, sewer and water treatment facilities, and electrical utility service, as defined in the Circulation Element and the Public Facilities Element.**

**Goal LU8.8** **Growth and development must occur at a rate corresponding to the availability of desired facilities' capacity.**

**Goal LU8.9** **Growth should be managed to minimize negative impacts to existing businesses and residents within the City.**

**Goal LU8.12** **Use growth management as a tool to maintain the City's identity, community form, reputation in the region, to maintain high levels of service for residents, and to influence projects outside the City's boundaries that have the potential to affect the quality of life and/or services that are provided to residents.**

***Policy LU8.1*** *Growth must provide a strong diversified economic base and a balance between employment and affordable housing.*

**Policy LU8.2** *Growth should occur on the basis that projected revenue should be sufficient to meet public costs.*

**Policy LU8.3** *Growth shall be managed to ensure that adequate public facilities and services, as defined in the Public Facilities Element, are planned and provided, and public health, safety, and welfare is protected.*

**Policy LU8.4** *The City shall accommodate projected population and employment growth in areas where the appropriate level of public infrastructure and services are planned or will be made available concurrent with development.*

**Policy LU8.5** *The City shall use the specific plan process to ensure a comprehensive, logical growth process for new development areas (e.g., annexations) or any areas where significant land use changes are considered.*

**Policy LU8.6** *The City shall oppose urban density residential, commercial, or industrial development in unincorporated areas unless adequate public facilities and services can be provided and mechanisms to ensure their availability and provision are secured during the land use entitlement process. It is the City's preference that urban development occur within incorporated areas.*

**Policy LU8.7** *The City will manage growth in such a way to ensure that significant open space areas will be preserved.*

**Policy LU8.8** *Retain and enhance Roseville's identity and character to ensure that Roseville, even as it grows, remains consistent with the Growth Management Visioning Committee's Vision Statement.*

**Policy LU8.9** *Work aggressively to address traffic generated outside of Roseville by working in collaboration with neighboring jurisdictions, regional, state, and federal entities to ensure that traffic through Roseville is mitigated by regional solutions. The City will encourage changes in land use mix and community design that promote walking, biking, and transit.*

**Policy LU8.10** *In addition to being consistent with the other goals and policies of the General Plan, Specific Plans shall comply with the following:*

a. *Provide a public focal point, community, and/or theme feature. These features shall be specific to each area and be designed to promote and enhance community character. A special feature may include, but is not limited to, a community plaza, central park, or some other type of gathering area; outdoor amphitheater; community garden; regional park with special facilities; sports complex; or cultural facilities.*

b. *Provide entryways at entrances to the City in accordance with the Community Design Guidelines. Where possible, the entryways shall take advantage of and incorporate existing natural resources into the entry treatment. The Specific Plans shall identify the location and treatment of the entryways, and shall consider the use of open space, oak regeneration areas, signage, and/or special landscaping to create a visual edge or buffer that provides a strong definition to entryways into the City.*

c. *The Specific Plan areas shall be planned and oriented to be an integral part of the City consistent with the policies of the Community Form component of this Element.*

d. *Develop design guidelines, specifying screening and a transition between public utilities (e.g. substations, pump stations) and other uses, in conjunction with the public utility departments and agencies. In addition, development along power line and* *pipeline easements shall incorporate design treatment to ensure compatibility and safety. Design guidelines and treatment may include minimum setbacks, building and landscape design standards, and possible limitations on certain types of uses and activities.*

*e. Preserve natural resource areas where they exist, and where feasible, along new roadways. Such roadways may create a public boundary between the resource area and other uses. The Specific Plans shall identify locations and standards for the preservation of natural resources along roadways, and shall identify sources of financing for such road segments.*

## GROWTH MANAGEMENT – NEW GROWTH AREAS

**Goal LU9.10 Growth should be planned in a way that addresses the appropriate interface between City and County lands.**

**Goal LU9.11 New growth should be designed to meet the Guiding Principles for Growth.**

**Goal LU9.13 New development shall be consistent with the City's desire to establish an edge along the western boundary of the City that fosters: a physical separation from County lands through a system of connected open space; a well-defined sense of entry to City from the west; opportunities for habitat preservation and recreation; and view preservation corridors that provide an aesthetic and recreational resource for residents.**

***Policy LU9.1*** *The City may consider modification to the General Plan for new growth where adequate public services and facilities and preservation and conservation of natural resources can be provided in conjunction with the following:*

*a. Additional land to accommodate demand for housing or employment uses*

*b. Projects that will provide community benefits, including, but not limited to the provision of public transit services*

*c. Ensure that growth provides benefits to the community as a whole and weigh community benefits against public costs*

***Policy LU9.2*** *Prior to the consideration of any General Plan amendment to modify land use designations or expand the City's boundaries or Sphere of Influence, the City shall complete or cause to be completed the following City-wide studies/plans:*

*a. Long-range transit plan*

*b. Fiscal studies*

*c. Public facilities and services capacity study*

*d. Transportation system capacity study*

*e. Utility capacity and supply (i.e., water, sewer, drainage, and electric)*

*The studies shall define <u>overall holding capacities</u> and identify additional performance standards that will need to be met to ensure the achievement of the goals and policies of the General Plan.*

**Policy LU9.3** *The City shall require the submittal of a specific plan for the consideration of new development areas or any areas where a significant modification to the General Plan land use allocation is proposed. The specific plan process shall, at a minimum, include the following:*

*a. General Plan Amendment*

*b. Development Agreement*

*c. Zoning Entitlements*

*d. Environmental Impact Report*

*e. Phasing, Financing, Capital Improvements Plan*

*f. Fiscal Impact Analysis*

**Policy LU9.4** *Specific plans will be evaluated based on the following minimum criteria:*

*a. Government Code requirements for specific plans*

*b. Demonstrated consistency with General Plan goals and policies*

*c. Demonstrated consistency with the identified City-wide studies and holding capacity analyses*

*d. Justification for proposed specific plan boundaries*

*e. Community benefit (e.g., affordable housing, significant open space or recreation facilities, job creation, infill development near transit service).*

*f. Ability to substantially mitigate impacts*

*g. Impact on the City's growth pattern*

*Each specific plan proposal shall include, with its initial submittal, a full analysis of how the plan complies with, and relates to the above factors.*

**Policy LU9.5** *Apply the City's adopted Guiding Principles for Growth to any new development proposed in and out of City's corporate boundaries that is not already part of an adopted Specific Plan or within the Infill Area:*

1. *Any new development proposal shall, on a stand-alone basis, have an overall net neutral or positive fiscal impact on the City's General Fund Services.*

2. *Any new development proposal shall include logical growth/plan boundaries.*

3. *Any new development proposal shall not create a direct or indirect conflict with the ongoing operations of the Pleasant Grove or Dry Creek Wastewater Treatment Plant operations or any City-owned power generation facilities.*

4. *Any new development proposal shall maintain the integrity of existing neighborhoods and create a sense of place in new neighborhoods.*

5. *Any new development proposal shall include a plan to ensure full funding and maintenance of improvements and services at no cost to existing residents (including increased utility rates). A proposal shall not burden, increase the cost of, or diminish the supply or reliability of public services.*

6. *Any new development proposal shall aid in regional transportation solutions and in right-of-way preservation.*

7. *Any new development proposal that does not have a sufficient supply of surface water shall secure additional supplies above what the City currently has available. New development proposals shall also provide the funding necessary to incorporate the new source of supply into the City's water supply portfolio (surface water, groundwater and recycled water); and new development proposals shall include measures to reduce water demand by implementing the use of conservation best management practices, recycled water, and other off-sets.*

8. *Any new development proposal shall consider development potential within the entire City/County Memorandum of Understanding Area in the design and sizing of infrastructure improvements.*

9. *Any new development proposal shall aid in resolution of regional storm water retention.*

10. *Any new development proposal shall incorporate mechanisms to ensure schools, and, if necessary, new schools, are available to serve residents anticipated for new development and that new development does not adversely affect existing schools.*

11. *Any new development proposal shall include a significant interconnected public open space component/conservation plan consistent with the City of Roseville/U.S. Fish and Wildlife Service Memorandum of Understanding.*

12. *Any new development proposal shall include a public participation component to keep the public informed and solicit feedback throughout the specific plan process.*

13. *Any new development proposal shall provide a community benefit to the City and residents.*

***Policy LU9.6*** *As new development is proposed in or outside the City's Sphere of Influence, project proponents shall provide a transitional area between City and County lands, through a system of managed interconnecting open space or other buffers, such as separation by arterial roadways.*

***Policy LU9.7*** *Monitor and participate in development proposals and/or General Plan updates in Placer County to ensure that potential impacts to City residents are minimized, with respect to traffic, service levels, and other quality of life matters.*

***Policy LU9.8*** *New development proposals to the north and west of the City limits shall meet the objectives and terms of the Memorandum of Understanding between the City of Roseville and the County of Placer.*

***Policy LU9.9*** *Development proposed on the western edge of the City shall provide a distinctive open space transition to create a physical and visual buffer between the City and County that ensures that the identity and uniqueness of the City and County will be maintained.*

***Policy LU9.10*** *Consistent with the County/City Memorandum of Understanding, the City shall continue to support and endorse the maintenance of the one-mile buffer zone around landfill operations, as set forth in Policy No. 4.G.11 of the Placer County General Plan. The buffer zone should, consistent with relevant performance criteria, be sufficient to maintain the long-term viability of the landfill, while at the same time protecting City residences from nuisances.*

***Policy LU9.11*** *Promote stakeholder involvement and ensure accountability between property owners, Placer County, and surrounding jurisdictions on defining and shaping the vision for growth to the west and north of the City.*

## GROWTH MANAGEMENT - ANNEXATIONS AND SPHERE OF INFLUENCE

### Goal LU10 Evaluate Sphere of Influence amendments and annexations that promote efficient use of land and public service provision and advance General Plan goals.

***Policy LU10.1*** *The City may initiate studies to investigate the potential of (1) annexing areas within its Sphere of Influence; and (2) expanding its Sphere of Influence boundaries. The studies should be focused on those areas that may affect General Plan goals and policies and would be logically served and planned by the City. The studies shall include the identification, availability, and funding of public services, as well as the costs and impacts to the City and other service providers. Issues to be analyzed include, but are not limited to present and planned land uses, water, sewer, electric, library, parks, schools, circulation, and affordable housing. Based on these studies and resident and property owner input, the City may take steps to annex or expand its Sphere of Influence.*

***Policy LU10.2*** *The City may consider annexations that:*

- *Are contiguous with City boundaries and provide for a logical expansion of the City;*
- *Create clear and reasonable boundaries;*
- *Are beneficial from a fiscal standpoint to the City and its residents;*
- *Are consistent with state law and Placer County Local Agency Formation Commission (LAFCO) standards and criteria;*
- *Ensure the preservation of open space and agriculture lands; and,*
- *Are consistent with the General Plan.*

***Policy LU10.3*** *The City may consider expanding its Sphere of Influence to incorporate areas that, in the future, should be logically planned and serviced by Roseville. The City shall consider the following factors, as identified by LAFCO, when making determinations involving Sphere of Influence boundaries:*

- *Present and planned land uses in the area;*
- *Present and probable need for public facilities and services in the area;*
- *Present capacity of public facilities and adequacy of public services;*
- *Existence of any social or economic communities of interest in the area; and,*
- *Open space and agricultural lands.*

# Appendix D – AWWA Water Loss Audits

# AWWA Free Water Audit Software: Reporting Worksheet



? Click to access definition
\+ Click to add a comment

**Water Audit Report for:** City of Roseville (3110008)
**Reporting Year:** 2019 | 1/2019 - 12/2019

Please enter data in the white cells below. Where available, metered values should be used; if metered values are unavailable please estimate a value. Indicate your confidence in the accuracy of the input data by grading each component (n/a or 1-10) using the drop-down list to the left of the input cell. Hover the mouse over the cell to obtain a description of the grades

**All volumes to be entered as: ACRE-FEET PER YEAR**

To select the correct data grading for each input, determine the highest grade where the utility meets or exceeds all criteria for that grade and all grades below it.

<----------- Enter grading in column 'E' and 'J' ---------->

### WATER SUPPLIED

| | Grade | Value | Unit | Master Meter and Supply Error Adjustments: Grade | Pcnt | Value | Unit |
|---|---|---|---|---|---|---|---|
| Volume from own sources: | 7 | 28,372.970 | acre-ft/yr | 7 | | 3.744 | acre-ft/yr |
| Water imported: | 5 | 1,264.500 | acre-ft/yr | 2 | | | acre-ft/yr |
| Water exported: | 3 | 1,336.300 | acre-ft/yr | 1 | | | acre-ft/yr |
| **WATER SUPPLIED:** | | **28,297.426** | acre-ft/yr | | | | |

Enter negative % or value for under-registration
Enter positive % or value for over-registration

### AUTHORIZED CONSUMPTION

Click here: ? for help using option buttons below

| | Grade | Value | Unit | Pcnt | Value | Unit |
|---|---|---|---|---|---|---|
| Billed metered: | 6 | 26,276.770 | acre-ft/yr | | | |
| Billed unmetered: | 10 | 132.020 | acre-ft/yr | | | |
| Unbilled metered: | 8 | 0.080 | acre-ft/yr | | | |
| Unbilled unmetered: | 8 | 23.320 | acre-ft/yr | | 23.320 | acre-ft/yr |
| **AUTHORIZED CONSUMPTION:** | | **26,432.190** | acre-ft/yr | | | |

Use buttons to select percentage of water supplied **OR** value

### WATER LOSSES (Water Supplied - Authorized Consumption)

**1,865.236** acre-ft/yr

**Apparent Losses**

| | Grade | Value | Unit | Pcnt | Value | Unit |
|---|---|---|---|---|---|---|
| Unauthorized consumption: | | 70.744 | acre-ft/yr | 0.25% | | acre-ft/yr |
| Customer metering inaccuracies: | 4 | 265.423 | acre-ft/yr | 1.00% | | acre-ft/yr |
| Systematic data handling errors: | 5 | 65.692 | acre-ft/yr | 0.25% | | acre-ft/yr |
| **Apparent Losses:** | | **401.858** | acre-ft/yr | | | |

Default option selected for unauthorized consumption - a grading of 5 is applied but not displayed

Default option selected for Systematic data handling errors - a grading of 5 is applied but not displayed

**Real Losses (Current Annual Real Losses or CARL)**

| | | |
|---|---|---|
| **Real Losses = Water Losses - Apparent Losses:** | **1,463.378** | acre-ft/yr |
| **WATER LOSSES:** | **1,865.236** | acre-ft/yr |

### NON-REVENUE WATER

**NON-REVENUE WATER:** **1,888.636** acre-ft/yr

= Water Losses + Unbilled Metered + Unbilled Unmetered

### SYSTEM DATA

| | Grade | Value | Unit |
|---|---|---|---|
| Length of mains: | 9 | 633.4 | miles |
| Number of active AND inactive service connections: | 9 | 45,395 | |
| Service connection density: | | 72 | conn./mile main |
| Are customer meters typically located at the curbstop or property line? | | Yes | |
| Average length of customer service line: | | | (length of service line, beyond the property boundary, that is the responsibility of the utility) |
| Average operating pressure: | 6 | 83.2 | psi |

Average length of customer service line has been set to zero and a data grading score of 10 has been applied

### COST DATA

| | Grade | Value | Unit |
|---|---|---|---|
| Total annual cost of operating water system: | 10 | $14,408,821 | $/Year |
| Customer retail unit cost (applied to Apparent Losses): | 9 | $1.30 | $/100 cubic feet (ccf) |
| Variable production cost (applied to Real Losses): | 5 | $208.00 | $/acre-ft |

☐ Use Customer Retail Unit Cost to value real losses

**WATER AUDIT DATA VALIDITY SCORE:**

***** YOUR SCORE IS: 70 out of 100 *****

A weighted scale for the components of consumption and water loss is included in the calculation of the Water Audit Data Validity Score

**PRIORITY AREAS FOR ATTENTION:**

Based on the information provided, audit accuracy can be improved by addressing the following components:

1: Volume from own sources
2: Customer metering inaccuracies
3: Billed metered

## AWWA Free Water Audit Software: Reporting Worksheet



? Click to access definition
\+ Click to add a comment

**Water Audit Report for:** City of Roseville (3110008)
**Reporting Year:** 2018 | 1/2018 - 12/2018

Please enter data in the white cells below. Where available, metered values should be used; if metered values are unavailable please estimate a value. Indicate your confidence in the accuracy of the input data by grading each component (n/a or 1-10) using the drop-down list to the left of the input cell. Hover the mouse over the cell to obtain a description of the grades

**All volumes to be entered as: ACRE-FEET PER YEAR**

To select the correct data grading for each input, determine the highest grade where the utility meets or exceeds all criteria for that grade and all grades below it.

### WATER SUPPLIED

<----------- Enter grading in column 'E' and 'J' ---------->

Master Meter and Supply Error Adjustments

| Item | Grade | Value | Units | Grade | Pcnt | Value | Units |
|---|---|---|---|---|---|---|---|
| Volume from own sources: | 7 | 28,312.300 | acre-ft/yr | 8 | | 1.810 | acre-ft/yr |
| Water imported: | 5 | 1,106.030 | acre-ft/yr | 1 | | | acre-ft/yr |
| Water exported: | 3 | 1,123.700 | acre-ft/yr | 1 | | | acre-ft/yr |
| **WATER SUPPLIED:** | | **28,292.820** | acre-ft/yr | | | | |

Enter negative % or value for under-registration
Enter positive % or value for over-registration

### AUTHORIZED CONSUMPTION

Click here: ? for help using option buttons below

| Item | Grade | Value | Units | Pcnt | Value | Units |
|---|---|---|---|---|---|---|
| Billed metered: | 5 | 26,007.220 | acre-ft/yr | | | |
| Billed unmetered: | 10 | 74.700 | acre-ft/yr | | | |
| Unbilled metered: | 8 | 47.560 | acre-ft/yr | | | |
| Unbilled unmetered: | 8 | 22.394 | acre-ft/yr | | 22.394 | acre-ft/yr |
| **AUTHORIZED CONSUMPTION:** | | **26,151.874** | acre-ft/yr | | | |

Use buttons to select percentage of water supplied **OR** value

### WATER LOSSES (Water Supplied - Authorized Consumption)

**2,140.946** acre-ft/yr

**Apparent Losses**

| Item | Grade | Value | Units | Pcnt | Value | Units |
|---|---|---|---|---|---|---|
| Unauthorized consumption: | | 70.732 | acre-ft/yr | 0.25% | | acre-ft/yr |

Default option selected for unauthorized consumption - a grading of 5 is applied but not displayed

| Item | Grade | Value | Units | Pcnt | Value | Units |
|---|---|---|---|---|---|---|
| Customer metering inaccuracies: | 3 | 263.180 | acre-ft/yr | 1.00% | | acre-ft/yr |
| Systematic data handling errors: | 5 | 65.018 | acre-ft/yr | 0.25% | | acre-ft/yr |

Default option selected for Systematic data handling errors - a grading of 5 is applied but not displayed

**Apparent Losses:** **398.930** acre-ft/yr

**Real Losses (Current Annual Real Losses or CARL)**

**Real Losses = Water Losses - Apparent Losses:** **1,742.016** acre-ft/yr

**WATER LOSSES:** **2,140.946** acre-ft/yr

### NON-REVENUE WATER

**NON-REVENUE WATER:** **2,210.900** acre-ft/yr

= Water Losses + Unbilled Metered + Unbilled Unmetered

### SYSTEM DATA

| Item | Grade | Value | Units |
|---|---|---|---|
| Length of mains: | 9 | 627.5 | miles |
| Number of active AND inactive service connections: | 9 | 44,467 | |
| Service connection density: | | 71 | conn./mile main |

Are customer meters typically located at the curbstop or property line? Yes

Average length of customer service line: (length of service line, beyond the property boundary, that is the responsibility of the utility)

Average length of customer service line has been set to zero and a data grading score of 10 has been applied

| Item | Grade | Value | Units |
|---|---|---|---|
| Average operating pressure: | 6 | 82.1 | psi |

### COST DATA

| Item | Grade | Value | Units |
|---|---|---|---|
| Total annual cost of operating water system: | 10 | $14,859,449 | $/Year |
| Customer retail unit cost (applied to Apparent Losses): | 9 | $1.17 | $/100 cubic feet (ccf) |
| Variable production cost (applied to Real Losses): | 5 | $179.67 | $/acre-ft |

☐ Use Customer Retail Unit Cost to value real losses

### WATER AUDIT DATA VALIDITY SCORE:

***** YOUR SCORE IS: 68 out of 100 *****

A weighted scale for the components of consumption and water loss is included in the calculation of the Water Audit Data Validity Score

### PRIORITY AREAS FOR ATTENTION:

Based on the information provided, audit accuracy can be improved by addressing the following components:

1: Volume from own sources
2: Customer metering inaccuracies
3: Billed metered

# AWWA Free Water Audit Software: Reporting Worksheet

WAS v5.0


? Click to access definition
\+ Click to add a comment

**Water Audit Report for:** City of Roseville (3110008)
**Reporting Year:** 2017 1/2017 - 12/2017

Please enter data in the white cells below. Where available, metered values should be used; if metered values are unavailable please estimate a value. Indicate your confidence in the accuracy of the input data by grading each component (n/a or 1-10) using the drop-down list to the left of the input cell. Hover the mouse over the cell to obtain a description of the grades

**All volumes to be entered as: ACRE-FEET PER YEAR**

To select the correct data grading for each input, determine the highest grade where the utility meets or exceeds all criteria for that grade and all grades below it.

<----------- Enter grading in column 'E' and 'J' ---------->

**WATER SUPPLIED**

| | Grade | Volume | Units | Master Meter and Supply Error Adjustments: Grade | Pcnt | Value | Units |
|---|---|---|---|---|---|---|---|
| Volume from own sources: | 7 | 28,449.624 | acre-ft/yr | 8 | | -143.610 | acre-ft/yr |
| Water imported: | 5 | 964.400 | acre-ft/yr | 1 | | | acre-ft/yr |
| Water exported: | 3 | 1,207.900 | acre-ft/yr | 1 | | | acre-ft/yr |
| **WATER SUPPLIED:** | | **28,349.734** | acre-ft/yr | | | | |

Enter negative % or value for under-registration
Enter positive % or value for over-registration

**AUTHORIZED CONSUMPTION**

Click here: ? for help using option buttons below

| | Grade | Volume | Units | Pcnt | Value | Units |
|---|---|---|---|---|---|---|
| Billed metered: | 5 | 25,483.030 | acre-ft/yr | | | |
| Billed unmetered: | 10 | 159.840 | acre-ft/yr | | | |
| Unbilled metered: | n/a | | acre-ft/yr | | | |
| Unbilled unmetered: | 8 | 23.920 | acre-ft/yr | | 23.920 | acre-ft/yr |
| **AUTHORIZED CONSUMPTION:** | | **25,666.790** | acre-ft/yr | | | |

Use buttons to select percentage of water supplied
**OR**
value

**WATER LOSSES (Water Supplied - Authorized Consumption)** **2,682.944** acre-ft/yr

**Apparent Losses**

| | Grade | Volume | Units | Pcnt | Value | Units |
|---|---|---|---|---|---|---|
| Unauthorized consumption: | | 70.874 | acre-ft/yr | 0.25% | | acre-ft/yr |

**Default option selected for unauthorized consumption - a grading of 5 is applied but not displayed**

| | Grade | Volume | Units | Pcnt | Value | Units |
|---|---|---|---|---|---|---|
| Customer metering inaccuracies: | 3 | 257.404 | acre-ft/yr | 1.00% | | acre-ft/yr |
| Systematic data handling errors: | 5 | 63.708 | acre-ft/yr | 0.25% | | acre-ft/yr |

**Default option selected for Systematic data handling errors - a grading of 5 is applied but not displayed**

**Apparent Losses:** **391.986** acre-ft/yr

**Real Losses (Current Annual Real Losses or CARL)**

**Real Losses = Water Losses - Apparent Losses:** **2,290.957** acre-ft/yr

**WATER LOSSES:** **2,682.944** acre-ft/yr

**NON-REVENUE WATER**

**NON-REVENUE WATER:** **2,706.864** acre-ft/yr

= Water Losses + Unbilled Metered + Unbilled Unmetered

**SYSTEM DATA**

| | Grade | Value | Units |
|---|---|---|---|
| Length of mains: | 9 | 615.0 | miles |
| Number of active AND inactive service connections: | 9 | 43,618 | |
| Service connection density: | | 71 | conn./mile main |
| Are customer meters typically located at the curbstop or property line? | | Yes | |
| Average length of customer service line: | | | |

(length of service line, beyond the property boundary, that is the responsibility of the utility)

**Average length of customer service line has been set to zero and a data grading score of 10 has been applied**

| | Grade | Value | Units |
|---|---|---|---|
| Average operating pressure: | 5 | 83.6 | psi |

**COST DATA**

| | Grade | Value | Units |
|---|---|---|---|
| Total annual cost of operating water system: | 10 | $14,825,646 | $/Year |
| Customer retail unit cost (applied to Apparent Losses): | 9 | $1.18 | $/100 cubic feet (ccf) |
| Variable production cost (applied to Real Losses): | 5 | $112.40 | $/acre-ft |

☐ Use Customer Retail Unit Cost to value real losses

**WATER AUDIT DATA VALIDITY SCORE:**

***** YOUR SCORE IS: 67 out of 100 *****

A weighted scale for the components of consumption and water loss is included in the calculation of the Water Audit Data Validity Score

**PRIORITY AREAS FOR ATTENTION:**

Based on the information provided, audit accuracy can be improved by addressing the following components:

1: Volume from own sources
2: Customer metering inaccuracies
3: Billed metered

# AWWA Free Water Audit Software: Reporting Worksheet

WAS v5.0


? Click to access definition
\+ Click to add a comment

Water Audit Report for: City of Roseville
Reporting Year: 2016 | 1/2016 - 12/2016

Please enter data in the white cells below. Where available, metered values should be used; if metered values are unavailable please estimate a value. Indicate your confidence in the accuracy of the input data by grading each component (n/a or 1-10) using the drop-down list to the left of the input cell. Hover the mouse over the cell to obtain a description of the grades

**All volumes to be entered as: ACRE-FEET PER YEAR**

To select the correct data grading for each input, determine the highest grade where the utility meets or exceeds all criteria for that grade and all grades below it.

<----------- Enter grading in column 'E' and 'J' ---------->

**WATER SUPPLIED**

Master Meter and Supply Error Adjustments

| | Grade | Value | Units | Adj. Grade | Pcnt | Value | Units |
|---|---|---|---|---|---|---|---|
| Volume from own sources: | 7 | 25,813.000 | acre-ft/yr | 3 | | | acre-ft/yr |
| Water imported: | 3 | 915.250 | acre-ft/yr | 1 | | | acre-ft/yr |
| Water exported: | 3 | 911.700 | acre-ft/yr | 1 | | | acre-ft/yr |
| **WATER SUPPLIED:** | | **25,816.550** | acre-ft/yr | | | | |

Enter negative % or value for under-registration
Enter positive % or value for over-registration

**AUTHORIZED CONSUMPTION**

Click here: ? for help using option buttons below

| | Grade | Value | Units | Pcnt | Value | Units |
|---|---|---|---|---|---|---|
| Billed metered: | 5 | 22,956.000 | acre-ft/yr | | | |
| Billed unmetered: | 9 | 212.000 | acre-ft/yr | | | |
| Unbilled metered: | 8 | 296.200 | acre-ft/yr | | | |
| Unbilled unmetered: | 7 | 21.880 | acre-ft/yr | | 21.880 | acre-ft/yr |
| **AUTHORIZED CONSUMPTION:** | | **23,486.080** | acre-ft/yr | | | |

Use buttons to select percentage of water supplied **OR** value

**WATER LOSSES (Water Supplied - Authorized Consumption)** **2,330.470** acre-ft/yr

**Apparent Losses**

| | Grade | Value | Units | Pcnt | Value | Units |
|---|---|---|---|---|---|---|
| Unauthorized consumption: | | 64.541 | acre-ft/yr | 0.25% | | acre-ft/yr |

**Default option selected for unauthorized consumption - a grading of 5 is applied but not displayed**

| | Grade | Value | Units | Pcnt | Value | Units |
|---|---|---|---|---|---|---|
| Customer metering inaccuracies: | 3 | 234.871 | acre-ft/yr | 1.00% | | acre-ft/yr |
| Systematic data handling errors: | 5 | 57.390 | acre-ft/yr | 0.25% | | acre-ft/yr |

**Default option selected for Systematic data handling errors - a grading of 5 is applied but not displayed**

**Apparent Losses:** **356.802** acre-ft/yr

**Real Losses (Current Annual Real Losses or CARL)**

**Real Losses = Water Losses - Apparent Losses:** **1,973.668** acre-ft/yr

**WATER LOSSES:** **2,330.470** acre-ft/yr

**NON-REVENUE WATER**

**NON-REVENUE WATER:** **2,648.550** acre-ft/yr

= Water Losses + Unbilled Metered + Unbilled Unmetered

**SYSTEM DATA**

| | Grade | Value | Units |
|---|---|---|---|
| Length of mains: | 10 | 600.0 | miles |
| Number of active AND inactive service connections: | 8 | 42,655 | |
| Service connection density: | | 71 | conn./mile main |

Are customer meters typically located at the curbstop or property line? Yes

Average length of customer service line: (length of service line, beyond the property boundary, that is the responsibility of the utility)

**Average length of customer service line has been set to zero and a data grading score of 10 has been applied**

Average operating pressure: 6 | 86.2 psi

**COST DATA**

| | Grade | Value | Units |
|---|---|---|---|
| Total annual cost of operating water system: | 10 | $9,313,891 | $/Year |
| Customer retail unit cost (applied to Apparent Losses): | 8 | $1.54 | $/100 cubic feet (ccf) |
| Variable production cost (applied to Real Losses): | 5 | $109.00 | $/acre-ft |

☐ Use Customer Retail Unit Cost to value real losses

**WATER AUDIT DATA VALIDITY SCORE:**

***** YOUR SCORE IS: 67 out of 100 *****

A weighted scale for the components of consumption and water loss is included in the calculation of the Water Audit Data Validity Score

**PRIORITY AREAS FOR ATTENTION:**

Based on the information provided, audit accuracy can be improved by addressing the following components:

1: Volume from own sources
2: Customer metering inaccuracies
3: Billed metered

# AWWA Free Water Audit Software: Reporting Worksheet

WAS v5.0


? Click to access definition
\+ Click to add a comment

**Water Audit Report for:** City of Roseville
**Reporting Year:** 2015 | 1/2015 - 12/2015

Please enter data in the white cells below. Where available, metered values should be used; if metered values are unavailable please estimate a value. Indicate your confidence in the accuracy of the input data by grading each component (n/a or 1-10) using the drop-down list to the left of the input cell. Hover the mouse over the cell to obtain a description of the grades

**All volumes to be entered as: ACRE-FEET PER YEAR**

To select the correct data grading for each input, determine the highest grade where the utility meets or exceeds all criteria for that grade and all grades below it.

<-----------  Enter grading in column 'E' and 'J' ---------->

**WATER SUPPLIED**

| | Grade | Value | Unit | Master Meter and Supply Error Adjustments: Pcnt | Value | Unit |
|---|---|---|---|---|---|---|
| Volume from own sources: | 7 | 22,991.000 | acre-ft/yr | | | acre-ft/yr |
| Water imported: | 9 | 853.500 | acre-ft/yr | | | acre-ft/yr |
| Water exported: | 9 | 781.900 | acre-ft/yr | | | acre-ft/yr |

Enter negative % or value for under-registration
Enter positive % or value for over-registration

**WATER SUPPLIED:** 23,062.600 acre-ft/yr

**AUTHORIZED CONSUMPTION**

Click here: ? for help using option buttons below

| | Grade | Value | Unit | Pcnt | Value | Unit |
|---|---|---|---|---|---|---|
| Billed metered: | 7 | 20,499.000 | acre-ft/yr | | | |
| Billed unmetered: | 9 | 222.000 | acre-ft/yr | | | |
| Unbilled metered: | 8 | 182.000 | acre-ft/yr | | | |
| Unbilled unmetered: | 7 | 32.080 | acre-ft/yr | | 32.080 | acre-ft/yr |

Use buttons to select percentage of water supplied **OR** value

**AUTHORIZED CONSUMPTION:** 20,935.080 acre-ft/yr

**WATER LOSSES (Water Supplied - Authorized Consumption)** 2,127.520 acre-ft/yr

**Apparent Losses**

| | Grade | Value | Unit | Pcnt | Value | Unit |
|---|---|---|---|---|---|---|
| Unauthorized consumption: | | 57.657 | acre-ft/yr | 0.25% | | acre-ft/yr |

**Default option selected for unauthorized consumption - a grading of 5 is applied but not displayed**

| | Grade | Value | Unit | Pcnt | Value | Unit |
|---|---|---|---|---|---|---|
| Customer metering inaccuracies: | 5 | 208.899 | acre-ft/yr | 1.00% | | acre-ft/yr |
| Systematic data handling errors: | 5 | 51.248 | acre-ft/yr | 0.25% | | acre-ft/yr |

**Default option selected for Systematic data handling errors - a grading of 5 is applied but not displayed**

**Apparent Losses:** 317.803 acre-ft/yr

**Real Losses (Current Annual Real Losses or CARL)**
**Real Losses = Water Losses - Apparent Losses:** 1,809.717 acre-ft/yr

**WATER LOSSES:** 2,127.520 acre-ft/yr

**NON-REVENUE WATER**
**NON-REVENUE WATER:** 2,341.600 acre-ft/yr
= Water Losses + Unbilled Metered + Unbilled Unmetered

**SYSTEM DATA**

| | Grade | Value | Unit |
|---|---|---|---|
| Length of mains: | 10 | 583.0 | miles |
| Number of active AND inactive service connections: | 8 | 41,832 | |
| Service connection density: | | 72 | conn./mile main |
| Are customer meters typically located at the curbstop or property line? | | No | |
| Average length of customer service line: | 10 | 1.5 | ft |
| Average operating pressure: | 8 | 78.0 | psi |

(length of service line, beyond the property boundary, that is the responsibility of the utility)

**COST DATA**

| | Grade | Value | Unit |
|---|---|---|---|
| Total annual cost of operating water system: | 8 | $5,579,612 | $/Year |
| Customer retail unit cost (applied to Apparent Losses): | 8 | $0.72 | $/100 cubic feet (ccf) |
| Variable production cost (applied to Real Losses): | 8 | $242.69 | $/acre-ft |

☐ Use Customer Retail Unit Cost to value real losses

**WATER AUDIT DATA VALIDITY SCORE:**

***** YOUR SCORE IS: 72 out of 100 *****

A weighted scale for the components of consumption and water loss is included in the calculation of the Water Audit Data Validity Score

**PRIORITY AREAS FOR ATTENTION:**

Based on the information provided, audit accuracy can be improved by addressing the following components:

1: Volume from own sources
2: Customer metering inaccuracies
3: Billed metered

# Appendix E – Proposed Water Loss Standards

# Proposed Water Loss Performance Standards

**Note:** The State Water Board has proposed combined standards for water districts that generally report per other water use efficiency requirements in a combined manner for certain water systems.

## Sample combination of standards for water systems reporting in different metrics:

**Suppliers with all water systems reporting in gallons per connection per day: Standard in in gallons per connection per day**

$$\frac{\text{Standard for system 1} \times \text{Number of connections for system 1} + \text{Standard for system 2} \times \text{Number of connections for system 2}}{\text{Sum total of number of connections for system 1 and system 2}}$$

**Suppliers with all water systems reporting in gallons per mile per day: Standard in gallons per mile per day**

$$\frac{\text{Standard for system 1} \times \text{Length of mains for system 1} + \text{Standard for system 2} \times \text{Length of mains for system 2}}{\text{Sum total of length of mains for system 1 and system 2}}$$

**Suppliers with water systems reporting in a combination of gallons per mile per day and gallons per connection per day:**

**Standard in gallons per connection per day**

$$\frac{\text{Standard for system 1} \times \text{Number of connections for system 1} + \text{Standard for system 2} \times \text{Length of mains for system 2}}{\text{Sum total of number of connections for system 1 and system 2}}$$

## Calculated baseline and proposed water loss performance standards

Note: The standards that are combined for certain water districts are in orange text, while the individual system data informing the respective combined standard is in *italics* and grey text in the rows above the standard.

| Urban water supplier (naming per water loss audit) | Baseline water loss (Averaged over 2017-2019) Gallons per connection per day | Baseline water loss (Averaged over 2017-2019) Gallons per mile per day | Water loss performance standards Gallons per connection per day | Water loss performance standards Gallons per mile per day |
|---|---|---|---|---|
| Adelanto City Of | 49.1 | N/A | 18.5 | N/A |
| Alameda County Water District | 21.5 | N/A | 17.7 | N/A |
| Alco Water Service | 15.1 | N/A | 15.1 | N/A |
| Alhambra City Of | 8.6 | N/A | 8.6 | N/A |
| Amador Water Agency | 66.3 | N/A | 21.0 | N/A |
| American Canyon City Of | 30.8 | N/A | 17.7 | N/A |
| Anaheim City Of | 23.5 | N/A | 19.5 | N/A |
| Anderson City Of | 53.4 | N/A | 16.5 | N/A |
| Antioch City Of | 11.9 | N/A | 11.9 | N/A |
| Apple Valley Ranchos Water Company | 23.3 | N/A | 23.3 | N/A |
| Arcadia City Of | 32.1 | N/A | 18.2 | N/A |
| Arcata City Of | 48.7 | N/A | 20.1 | N/A |
| Arroyo Grande City Of | 7.7 | N/A | 7.7 | N/A |
| Arvin Community Service District | 67.9 | N/A | 14.4 | N/A |
| Atascadero Mutual Water Company | 35.9 | N/A | 35.9 | N/A |
| Atwater City Of | 308.8 | N/A | 11.4 | N/A |
| Azusa Lightand Water | 78.5 | N/A | 13.8 | N/A |
| Bakersfield City Of | 19.3 | N/A | 19.3 | N/A |
| Bakman Water Company | 85.3 | N/A | 15.1 | N/A |
| Banning City Of | 63.1 | N/A | 31.4 | N/A |
| Bear Valley Community Services District | N/A | 191.7 | N/A | 191.7 |
| Beaumont-Cherry Valley Water District | 41.0 | N/A | 20.9 | N/A |
| Bella Vista Water District | N/A | 1710.6 | N/A | 670.4 |
| Bellflower-Somerset Mutual Water Company | 12.4 | N/A | 12.4 | N/A |
| Benicia City Of | 46.1 | N/A | 19.4 | N/A |

| Urban water supplier (naming per water loss audit) | Baseline water loss (Averaged over 2017-2019) Gallons per connection per day | Baseline water loss (Averaged over 2017-2019) Gallons per mile per day | Water loss performance standards Gallons per connection per day | Water loss performance standards Gallons per mile per day |
|---|---|---|---|---|
| Beverly Hills City Of | 30.0 | N/A | 16.9 | N/A |
| Big Bear Community Services District | 12.8 | N/A | 12.8 | N/A |
| Big Bear Lake City Of | 9.5 | N/A | 9.5 | N/A |
| Blythe City Of | 80.3 | N/A | 15.0 | N/A |
| Brawley City Of | 54.8 | N/A | 12.7 | N/A |
| Brea City Of | 15.2 | N/A | 15.2 | N/A |
| Brentwood City Of | 30.5 | N/A | 14.7 | N/A |
| Buena Park City Of | 35.8 | N/A | 16.4 | N/A |
| Burbank City Of | 13.4 | N/A | 13.4 | N/A |
| Burlingame City Of | 19.5 | N/A | 19.5 | N/A |
| *Calaveras County Water District-Ebbetts Pass* | *84.8* | *N/A* | *20.9* | *N/A* |
| *Calaveras County Water District-Jenny Lind* | *155.9* | *N/A* | *21.3* | *N/A* |
| Calaveras County Water District | 112.6 | N/A | 21.1 | N/A |
| Calexico City Of | 4.2 | N/A | 4.2 | N/A |
| *California American Water Company-Los Angeles Division-Baldwin Hills* | *24.6* | *N/A* | *17.5* | *N/A* |
| *California American Water Company-Los Angeles Division-Duarte* | *85.9* | *N/A* | *18.5* | *N/A* |
| *California American Water Company-Los Angeles Division-San Marino* | *27.4* | *N/A* | *18.1* | *N/A* |
| California American Water Company-Los Angeles Division | 42.3 | | 18.1 | |
| California American Water Company-Monterey District | 6.4 | N/A | 6.4 | N/A |
| *California American Water Company-Sacramento District-Antelope* | *19.4* | *N/A* | *14.9* | *N/A* |
| *California American Water Company-Sacramento District-Lincoln Oaks* | *5.6* | *N/A* | *5.6* | *N/A* |

| Urban water supplier (naming per water loss audit) | Baseline water loss (Averaged over 2017-2019) Gallons per connection per day | Baseline water loss (Averaged over 2017-2019) Gallons per mile per day | Water loss performance standards Gallons per connection per day | Water loss performance standards Gallons per mile per day |
|---|---|---|---|---|
| *California American Water Company-Sacramento District-Parkway* | *25.3* | *N/A* | *14.2* | *N/A* |
| *California American Water Company-Sacramento District-Rosemont* | *29.4* | *N/A* | *17.8* | *N/A* |
| California American Water Company-Sacramento District | 20.4 | | 13.2 | |
| California American Water Company-San Diego District | 25.6 | N/A | 15.6 | N/A |
| California American Water Company-Ventura District | 33.5 | N/A | 24.5 | N/A |
| California City | N/A | 1641.2 | N/A | 460.4 |
| *California Water Service Company Bakersfield-Bakersfield* | *74.6* | *N/A* | *17.2* | *N/A* |
| *California Water Service Company Bakersfield-North Garden* | *65.7* | *N/A* | *18.5* | *N/A* |
| California Water Service Company Bakersfield | 73.7 | | 17.3 | |
| California Water Service Company Bear Gulch | 13.9 | N/A | 13.9 | N/A |
| California Water Service Company Chico District | 28.6 | N/A | 18.7 | N/A |
| California Water Service Company Dominguez | 23.8 | N/A | 18.4 | N/A |
| California Water Service Company East Los Angeles | 4.0 | N/A | 4.0 | N/A |
| California Water Service Company Hermosa-Redondo | 12.4 | N/A | 12.4 | N/A |
| California Water Service Company Livermore | 17.2 | N/A | 17.2 | N/A |
| California Water Service Company Los Altos-Suburban | 24.5 | N/A | 17.8 | N/A |
| California Water Service Company Marysville | 40.6 | N/A | 15.2 | N/A |
| *California Water Service Company Mid Peninsula-San Carlos* | *6.2* | *N/A* | *6.2* | *N/A* |
| *California Water Service Company Mid Peninsula-San Mateo* | *20.6* | *N/A* | *16.1* | *N/A* |
| California Water Service Company Mid Peninsula | 16.6 | | 13.4 | |

| Urban water supplier (naming per water loss audit) | Baseline water loss (Averaged over 2017-2019) Gallons per connection per day | Baseline water loss (Averaged over 2017-2019) Gallons per mile per day | Water loss performance standards Gallons per connection per day | Water loss performance standards Gallons per mile per day |
|---|---|---|---|---|
| California Water Service Company Oroville | 27.4 | N/A | 18.4 | N/A |
| California Water Service Company Palos Verdes | 32.6 | N/A | 24.0 | N/A |
| California Water Service Company Salinas District | 9.2 | N/A | 9.2 | N/A |
| California Water Service Company Selma | 35.1 | N/A | 14.0 | N/A |
| California Water Service Company South San Francisco | 0.6 | N/A | 0.6 | N/A |
| California Water Service Company Stockton | 20.6 | N/A | 13.5 | N/A |
| California Water Service Company Visalia | 10.1 | N/A | 10.1 | N/A |
| California Water Service Company Westlake | 31.7 | N/A | 24.6 | N/A |
| Camarillo City Of | 3.4 | N/A | 3.4 | N/A |
| Cambria Community Service District | 15.5 | N/A | 15.5 | N/A |
| Camrosa Water District | 35.9 | N/A | 18.8 | N/A |
| Carlsbad Municipal Water District | 21.5 | N/A | 21.5 | N/A |
| Carmichael Water District | 36.3 | N/A | 15.5 | N/A |
| Carpinteria Valley Water District | 23.0 | N/A | 23.0 | N/A |
| Castaic Lake Water Agency Santa Clarita Water Division | 47.0 | N/A | 25.5 | N/A |
| Ceres City Of | 14.6 | N/A | 11.3 | N/A |
| Cerritos City Of | 19.9 | N/A | 19.9 | N/A |
| Chino City Of | 37.3 | N/A | 17.8 | N/A |
| Chino Hills City Of | 6.2 | N/A | 6.2 | N/A |
| Citrus Heights Water District | 15.3 | N/A | 15.3 | N/A |
| Cloverdale City of | 30.9 | N/A | 12.6 | N/A |
| Clovis City Of | 7.4 | N/A | 7.4 | N/A |
| Coachella City Of | 31.9 | N/A | 18.7 | N/A |
| Coachella Valley Water District | 43.3 | N/A | 24.1 | N/A |

| Urban water supplier (naming per water loss audit) | Baseline water loss (Averaged over 2017-2019) Gallons per connection per day | Baseline water loss (Averaged over 2017-2019) Gallons per mile per day | Water loss performance standards Gallons per connection per day | Water loss performance standards Gallons per mile per day |
|---|---|---|---|---|
| Coalinga City Of | 41.0 | N/A | 20.6 | N/A |
| Coastside County Water District | 18.5 | N/A | 18.5 | N/A |
| Colton City Of | 65.5 | N/A | 16.7 | N/A |
| Contra Costa Water District | 21.8 | N/A | 18.5 | N/A |
| Corcoran City Of | N/A | 2415.1 | N/A | 444.7 |
| Corona City Of | 16.1 | N/A | 16.1 | N/A |
| Covina City Of | 30.2 | N/A | 22.3 | N/A |
| Covina Irrigating Company | 37.7 | N/A | 22.2 | N/A |
| Crescent City | 80.2 | N/A | 21.6 | N/A |
| Crescenta Valley Community Water District | 22.4 | N/A | 22.4 | N/A |
| Crestline Village Water District | 4.3 | N/A | 4.3 | N/A |
| Cucamonga Valley Water District | 28.6 | N/A | 21.2 | N/A |
| Cupertino City Of | 25.6 | N/A | 25.6 | N/A |
| Daly City | 12.3 | N/A | 12.3 | N/A |
| Davis City Of | 37.3 | N/A | 11.1 | N/A |
| Del Oro Water Company | 22.0 | N/A | 22.0 | N/A |
| Delano City Of | 56.6 | N/A | 14.1 | N/A |
| Desert Water Agency | 87.1 | N/A | 21.2 | N/A |
| Diablo Water District | 15.5 | N/A | 15.5 | N/A |
| Dinuba City Of | 32.9 | N/A | 11.6 | N/A |
| Discovery Bay Community Services District | 14.0 | N/A | 14.0 | N/A |
| Downey City Of | 27.4 | N/A | 14.9 | N/A |
| Dublin San Ramon Services District | 7.3 | N/A | 7.3 | N/A |
| East Bay Municipal Utility District | 45.6 | N/A | 21.7 | N/A |
| East Niles Community Services District | 47.1 | N/A | 14.6 | N/A |

| Urban water supplier (naming per water loss audit) | Baseline water loss (Averaged over 2017-2019) Gallons per connection per day | Baseline water loss (Averaged over 2017-2019) Gallons per mile per day | Water loss performance standards Gallons per connection per day | Water loss performance standards Gallons per mile per day |
|---|---|---|---|---|
| East Orange County Water District | 25.8 | N/A | 25.8 | N/A |
| East Palo Alto City Of | 25.1 | N/A | 14.2 | N/A |
| East Valley Water District | 37.3 | N/A | 19.8 | N/A |
| Eastern Municipal Water District | 28.1 | N/A | 20.7 | N/A |
| El Centro City Of | 128.0 | N/A | 13.7 | N/A |
| El Dorado Irrigation District | 83.2 | N/A | 42.2 | N/A |
| El Monte City Of | 49.9 | N/A | 13.5 | N/A |
| El Segundo City Of | 37.6 | N/A | 15.4 | N/A |
| El Toro Water District | 24.2 | N/A | 24.2 | N/A |
| Elk Grove Water District | 15.9 | N/A | 15.9 | N/A |
| Elsinore Valley Municipal Water District | 20.1 | N/A | 20.1 | N/A |
| Escondido City Of | 22.2 | N/A | 22.2 | N/A |
| Estero Municipal Improvement District | 31.4 | N/A | 14.1 | N/A |
| Eureka City Of | 23.2 | N/A | 15.0 | N/A |
| Exeter City Of | 41.0 | N/A | 12.6 | N/A |
| Fair Oaks Water District | 23.3 | N/A | 19.6 | N/A |
| Fairfield City Of | 73.7 | N/A | 15.0 | N/A |
| Fallbrook Public Utilities District | 62.5 | N/A | 44.8 | N/A |
| Folsom City Of | 133.3 | N/A | 16.9 | N/A |
| Fortuna City Of | 45.4 | N/A | 26.1 | N/A |
| Fountain Valley City Of | 11.9 | N/A | 11.9 | N/A |
| Fresno City Of | 47.7 | N/A | 13.6 | N/A |
| Fruitridge Vista Water Company | 71.4 | N/A | 10.8 | N/A |
| Fullerton City Of | 18.4 | N/A | 18.4 | N/A |
| Galt City Of | 24.4 | N/A | 11.5 | N/A |

| Urban water supplier (naming per water loss audit) | Baseline water loss (Averaged over 2017-2019) Gallons per connection per day | Baseline water loss (Averaged over 2017-2019) Gallons per mile per day | Water loss performance standards Gallons per connection per day | Water loss performance standards Gallons per mile per day |
|---|---|---|---|---|
| Garden Grove City Of | 22.9 | N/A | 11.9 | N/A |
| Georgetown Divide Public Utility District | N/A | 787.5 | N/A | 787.5 |
| Gilroy City Of | 33.4 | N/A | 17.0 | N/A |
| Glendale City Of | 18.2 | N/A | 18.2 | N/A |
| Glendora City Of | 68.5 | N/A | 19.8 | N/A |
| Golden State Water Company-Artesia | 23.3 | N/A | 13.3 | N/A |
| Golden State Water Company-Barstow | 51.0 | N/A | 26.0 | N/A |
| Golden State Water Company-Bay Point | 24.2 | N/A | 17.8 | N/A |
| Golden State Water Company-Bell-Bell Gardens | 21.7 | N/A | 13.5 | N/A |
| Golden State Water Company-Claremont | 46.9 | N/A | 23.5 | N/A |
| Golden State Water Company-Cordova | 67.3 | N/A | 12.1 | N/A |
| Golden State Water Company-Culver City | 15.2 | N/A | 15.2 | N/A |
| Golden State Water Company-Florence Graham | 25.2 | N/A | 13.1 | N/A |
| Golden State Water Company-Norwalk | 16.3 | N/A | 13.7 | N/A |
| Golden State Water Company-Orcutt | 49.5 | N/A | 16.7 | N/A |
| Golden State Water Company-Placentia | 27.3 | N/A | 22.5 | N/A |
| Golden State Water Company-San Dimas | 16.7 | N/A | 16.7 | N/A |
| Golden State Water Company-Simi Valley | 12.2 | N/A | 12.2 | N/A |
| Golden State Water Company-South Arcadia | 15.2 | N/A | 15.2 | N/A |
| Golden State Water Company-South San Gabriel | 41.7 | N/A | 13.3 | N/A |
| Golden State Water Company-Southwest | 14.7 | N/A | 14.7 | N/A |
| Golden State Water Company-West Orange | 19.5 | N/A | 19.5 | N/A |
| Goleta Water District | 24.3 | N/A | 24.3 | N/A |
| Great Oaks Water Company Incorporated | 22.5 | N/A | 14.4 | N/A |
| Greenfield City Of | 37.3 | N/A | 13.8 | N/A |

| Urban water supplier (naming per water loss audit) | Baseline water loss (Averaged over 2017-2019) Gallons per connection per day | Baseline water loss (Averaged over 2017-2019) Gallons per mile per day | Water loss performance standards Gallons per connection per day | Water loss performance standards Gallons per mile per day |
|---|---|---|---|---|
| Groveland Community Services District | 14.5 | N/A | 14.5 | N/A |
| Hawthorne City Of | 14.1 | N/A | 14.1 | N/A |
| Hayward City Of | 20.5 | N/A | 20.5 | N/A |
| Healdsburg City Of | 10.4 | N/A | 10.4 | N/A |
| Helix Water District | 18.4 | N/A | 18.4 | N/A |
| Hemet City Of | 5.8 | N/A | 5.8 | N/A |
| Hesperia Water District | 19.2 | N/A | 19.2 | N/A |
| Hi Desert Water District | 23.5 | N/A | 23.5 | N/A |
| Hillsborough Town Of | 26.6 | N/A | 26.6 | N/A |
| Hollister City Of | 30.4 | N/A | 15.6 | N/A |
| Humboldt Community Services District | 59.1 | N/A | 14.0 | N/A |
| Huntington Beach City Of | 14.8 | N/A | 14.8 | N/A |
| Huntington Park City Of | 18.8 | N/A | 12.4 | N/A |
| Imperial City Of | 45.6 | N/A | 14.8 | N/A |
| Indian Wells Valley Water District | 38.7 | N/A | 16.5 | N/A |
| Indio City Of | 30.5 | N/A | 17.6 | N/A |
| Inglewood City Of | 12.6 | N/A | 12.6 | N/A |
| Irvine Ranch Water District | 14.9 | N/A | 14.9 | N/A |
| Joshua Basin Water District | N/A | 507.0 | N/A | 507.0 |
| Jurupa Community Service District | 33.0 | N/A | 24.8 | N/A |
| Kerman City Of | 32.4 | N/A | 11.2 | N/A |
| Kingsburg City Of | 505.3 | N/A | 12.1 | N/A |
| La Habra City Of | 28.0 | N/A | 20.1 | N/A |
| La Palma City Of | 37.2 | N/A | 15.0 | N/A |
| La Verne City Of | 34.2 | N/A | 18.9 | N/A |

| Urban water supplier (naming per water loss audit) | Baseline water loss (Averaged over 2017-2019) Gallons per connection per day | Baseline water loss (Averaged over 2017-2019) Gallons per mile per day | Water loss performance standards Gallons per connection per day | Water loss performance standards Gallons per mile per day |
|---|---|---|---|---|
| Laguna Beach County Water District | 24.4 | N/A | 17.5 | N/A |
| Lake Arrowhead Community Services District | 20.7 | N/A | 20.7 | N/A |
| Lake Hemet Municipal Water District | 32.2 | N/A | 19.9 | N/A |
| Lakeside Water District | 19.8 | N/A | 19.8 | N/A |
| Lakewood City Of | 12.9 | N/A | 12.9 | N/A |
| Lamont Public Utility District | 79.7 | N/A | 12.9 | N/A |
| Las Virgenes Municipal Water District | 25.1 | N/A | 25.1 | N/A |
| Lathrop City Of | 18.6 | N/A | 13.3 | N/A |
| *Liberty Utilities(Park Water)Corp-Bell Norwalk* | *5.8* | *N/A* | *5.8* | *N/A* |
| *Liberty Utilities(Park Water)Corp-Compton Willow* | *11.2* | *N/A* | *11.2* | *N/A* |
| *Liberty Utilities(Park Water)Corp-Lynwood* | *N/A* | *50.2* | *N/A* | *50.2* |
| Liberty Utilities (Park Water) Corp | | | 6.5 | |
| Lincoln Avenue Water Company | 21.4 | N/A | 21.4 | N/A |
| Lincoln City Of | 35.2 | N/A | 23.6 | N/A |
| Linda County Water District | 88.1 | N/A | 14.0 | N/A |
| Livermore City Of | 27.8 | N/A | 16.8 | N/A |
| Livingston City Of | 67.4 | N/A | 11.4 | N/A |
| Lodi City Of | 10.6 | N/A | 10.6 | N/A |
| Loma Linda City Of | 62.3 | N/A | 16.8 | N/A |
| Lomita City Of | 17.7 | N/A | 12.8 | N/A |
| Lompoc City Of | 15.9 | N/A | 15.9 | N/A |
| Long Beach City Of | 7.0 | N/A | 7.0 | N/A |
| Los Angeles City Department Of Water And Power | 36.9 | N/A | 33.0 | N/A |
| Los Angeles County Waterworks District29-Malibu&Marina Del Rey | 26.7 | N/A | 26.7 | N/A |

| Urban water supplier (naming per water loss audit) | Baseline water loss (Averaged over 2017-2019) Gallons per connection per day | Baseline water loss (Averaged over 2017-2019) Gallons per mile per day | Water loss performance standards Gallons per connection per day | Water loss performance standards Gallons per mile per day |
|---|---|---|---|---|
| Los Angeles County Waterworks District40-Antelope Valley | 23.3 | N/A | 20.5 | N/A |
| Los Banos City Of | 83.6 | N/A | 11.5 | N/A |
| Lynwood City Of | 22.3 | N/A | 12.3 | N/A |
| Madera City Of | 3.5 | N/A | 3.5 | N/A |
| Mammoth Community Water District | 26.6 | N/A | 26.6 | N/A |
| Manhattan Beach City Of | 3.6 | N/A | 3.6 | N/A |
| Manteca City Of | 22.3 | N/A | 12.6 | N/A |
| Marin Municipal Water District | 24.5 | N/A | 24.5 | N/A |
| Marina Coast Water District | 30.6 | N/A | 17.4 | N/A |
| Martinez City Of | 57.5 | N/A | 20.3 | N/A |
| Mc Kinleyville Community Services District | 19.5 | N/A | 15.5 | N/A |
| Menlo Park City Of | 59.2 | N/A | 19.3 | N/A |
| Merced City Of | 41.9 | N/A | 11.4 | N/A |
| Mesa Water District | 18.0 | N/A | 18.0 | N/A |
| Mid-Peninsula Water District | 14.8 | N/A | 14.8 | N/A |
| Millbrae City Of | 28.4 | N/A | 17.8 | N/A |
| Milpitas City Of | 35.0 | N/A | 23.5 | N/A |
| Mission Springs Water District | 48.1 | N/A | 19.2 | N/A |
| Modesto City Of | 80.9 | N/A | 14.7 | N/A |
| Monrovia City Of | 17.9 | N/A | 17.9 | N/A |
| Monte Vista Water District | 67.3 | N/A | 21.1 | N/A |
| Montebello Land And Water Company | 38.9 | N/A | 15.3 | N/A |
| Montecito Water District | 33.7 | N/A | 33.7 | N/A |
| Monterey Park City Of | 23.6 | N/A | 18.4 | N/A |
| Morgan Hill City Of | 30.4 | N/A | 17.7 | N/A |

| **Urban water supplier (naming per water loss audit)** | **Baseline water loss (Averaged over 2017-2019) Gallons per connection per day** | **Baseline water loss (Averaged over 2017-2019) Gallons per mile per day** | **Water loss performance standards Gallons per connection per day** | **Water loss performance standards Gallons per mile per day** |
|---|---|---|---|---|
| Morro Bay City Of | 2.1 | N/A | 2.1 | N/A |
| Moulton Niguel Water District | 24.7 | N/A | 24.7 | N/A |
| Mountain House Community Services District | 44.9 | N/A | 14.8 | N/A |
| Mountain View City Of | 18.9 | N/A | 16.4 | N/A |
| Myoma Dunes Mutual Water Company | 47.6 | N/A | 19.8 | N/A |
| Napa City Of | 24.9 | N/A | 16.2 | N/A |
| *Nevada Irrigation District-E George* | *58.7* | *N/A* | *28.4* | *N/A* |
| *Nevada Irrigation District-Lake Wildwood* | *13.5* | *N/A* | *13.5* | *N/A* |
| *Nevada Irrigation District-Loma Rica* | *28.1* | *N/A* | *28.1* | *N/A* |
| Nevada Irrigation District | 37.8 | N/A | 24.9 | N/A |
| Newhall County Water District | 36.2 | N/A | 27.5 | N/A |
| Newman Cityof | 61.7 | N/A | 11.0 | N/A |
| Newport Beach City Of | 26.2 | N/A | 18.4 | N/A |
| Nipomo Community Service District | N/A | 755.7 | N/A | 755.7 |
| Norco City Of | 29.3 | N/A | 24.9 | N/A |
| North Coast County Water District | 13.0 | N/A | 13.0 | N/A |
| North Marin Water District | 8.5 | N/A | 8.5 | N/A |
| North Tahoe Public Utilities District | 64.5 | N/A | 26.9 | N/A |
| Norwalk City Of | 0.4 | N/A | 0.4 | N/A |
| Oakdale City Of | 34.6 | N/A | 11.0 | N/A |
| Oceanside City Of | 15.8 | N/A | 15.8 | N/A |
| Oildale Mutual Water Company | 12.2 | N/A | 12.2 | N/A |
| *Olivehurst Public Utilities District* | *48.2* | *N/A* | *13.8* | *N/A* |
| *Olivehurst Public Utilities District-Plumas Lake* | *51.7* | *N/A* | *13.5* | *N/A* |
| Olivehurst Public Utilities District | 49.4 | N/A | 13.7 | N/A |

| Urban water supplier (naming per water loss audit) | Baseline water loss (Averaged over 2017-2019) Gallons per connection per day | Baseline water loss (Averaged over 2017-2019) Gallons per mile per day | Water loss performance standards Gallons per connection per day | Water loss performance standards Gallons per mile per day |
|---|---|---|---|---|
| Olivenhain Municipal Water District | 36.2 | N/A | 36.2 | N/A |
| Ontario City Of | 23.0 | N/A | 23.0 | N/A |
| Orange City Of | 31.1 | N/A | 21.6 | N/A |
| Orangevale Water Company | 29.6 | N/A | 16.4 | N/A |
| Orchard Dale Water District | 32.3 | N/A | 13.7 | N/A |
| Otay Water District | 15.9 | N/A | 15.9 | N/A |
| Oxnard City Of | 31.3 | N/A | 17.0 | N/A |
| Padre Dam Municipal Water District | 6.6 | N/A | 6.6 | N/A |
| Palmdale Water District | 44.7 | N/A | 19.8 | N/A |
| Palo Alto City Of | 13.4 | N/A | 13.4 | N/A |
| Paradise Irrigation District | 20.9 | N/A | 20.9 | N/A |
| Paramount City Of | 68.5 | N/A | 18.9 | N/A |
| Pasadena City Of | 31.8 | N/A | 19.0 | N/A |
| Paso Robles City Of | 11.0 | N/A | 11.0 | N/A |
| Patterson City Of | 69.4 | N/A | 12.6 | N/A |
| Petaluma City Of | 23.7 | N/A | 13.4 | N/A |
| Phelan Pinon Hills Community Services District | N/A | 819.7 | N/A | 819.7 |
| Pico Rivera City Of | 10.0 | N/A | 10.0 | N/A |
| Pico Water District | 10.3 | N/A | 10.3 | N/A |
| Pismo Beach City Of | 11.8 | N/A | 11.8 | N/A |
| Pittsburg City Of | 24.9 | N/A | 15.4 | N/A |
| *Placer County Water Agency-Auburn Bowman* | *56.9* | *N/A* | *19.9* | *N/A* |
| *Placer County Water Agency-Foothill* | *47.0* | *N/A* | *20.2* | *N/A* |
| Placer County Water Agency | 49.5 | N/A | 20.1 | N/A |
| Pleasanton City Of | 49.2 | N/A | 18.9 | N/A |

| Urban water supplier (naming per water loss audit) | Baseline water loss (Averaged over 2017-2019) Gallons per connection per day | Baseline water loss (Averaged over 2017-2019) Gallons per mile per day | Water loss performance standards Gallons per connection per day | Water loss performance standards Gallons per mile per day |
|---|---|---|---|---|
| Pomona City Of | 25.6 | N/A | 21.2 | N/A |
| Port Hueneme City Of | 8.6 | N/A | 8.6 | N/A |
| Porterville City Of | 47.2 | N/A | 14.6 | N/A |
| Poway City Of | 37.4 | N/A | 31.8 | N/A |
| Quartz Hill Water District | 19.3 | N/A | 19.3 | N/A |
| Rainbow Municipal Water District | N/A | 718.5 | N/A | 718.5 |
| Ramona Municipal Water District | 18.4 | N/A | 18.4 | N/A |
| Rancho California Water District | 41.1 | N/A | 36.6 | N/A |
| Red Bluff City Of | 14.3 | N/A | 14.3 | N/A |
| Redding City Of | 57.1 | N/A | 23.0 | N/A |
| Redlands City Of | 46.8 | N/A | 24.7 | N/A |
| Redwood City | 23.6 | N/A | 14.5 | N/A |
| Reedley City Of | 155.1 | N/A | 11.9 | N/A |
| Rialto City Of | 21.2 | N/A | 21.2 | N/A |
| Rincon Del Diablo Municipal Water District | 31.7 | N/A | 31.7 | N/A |
| Rio Linda-Elverta Community Water District | 37.6 | N/A | 12.3 | N/A |
| Rio Vista City Of | 22.3 | N/A | 15.0 | N/A |
| Riverbank City Of | 19.3 | N/A | 12.9 | N/A |
| Riverside City Of | 54.8 | N/A | 24.0 | N/A |
| Riverside Highland Water Company | 10.5 | N/A | 10.5 | N/A |
| Rohnert Park City Of | 27.0 | N/A | 13.3 | N/A |
| Rosamond Community Service District | 27.2 | N/A | 22.1 | N/A |
| Roseville City Of | 41.0 | N/A | 22.3 | N/A |
| Rowland Water District | 18.6 | N/A | 18.6 | N/A |
| Rubidoux Community Service District | 55.8 | N/A | 20.5 | N/A |

| Urban water supplier (naming per water loss audit) | Baseline water loss (Averaged over 2017-2019) Gallons per connection per day | Baseline water loss (Averaged over 2017-2019) Gallons per mile per day | Water loss performance standards Gallons per connection per day | Water loss performance standards Gallons per mile per day |
|---|---|---|---|---|
| Rubio Canyon Land And Water Association | 22.4 | N/A | 18.6 | N/A |
| Sacramento City Of | 38.2 | N/A | 12.0 | N/A |
| Sacramento County Water Agency | 54.2 | N/A | 15.6 | N/A |
| Sacramento Suburban Water District | 22.1 | N/A | 15.1 | N/A |
| San Bernardino City Of | 47.6 | N/A | 21.8 | N/A |
| San Bernardino County Service Area64Spring Valley Lake | 69.9 | N/A | 17.1 | N/A |
| San Bernardino County Service Area70J Oak Hills | N/A | 1040.5 | N/A | 767.2 |
| San Bruno City Of | 17.7 | N/A | 17.7 | N/A |
| San Buenaventura City Of(Ventura) | 19.9 | N/A | 19.9 | N/A |
| San Clemente City Of | 36.4 | N/A | 17.9 | N/A |
| San Diego City Of | 31.7 | N/A | 25.1 | N/A |
| San Dieguito Water District | 23.5 | N/A | 21.0 | N/A |
| San Fernando City Of | 28.7 | N/A | 17.2 | N/A |
| San Francisco Public Utilities Commision | 24.9 | N/A | 18.3 | N/A |
| San Gabriel County Water District | 24.5 | N/A | 18.0 | N/A |
| San Gabriel Valley Water Company | 21.2 | N/A | 18.5 | N/A |
| San Gabriel Valley Water Company Fontana Division | 40.4 | N/A | 21.1 | N/A |
| San Jacinto City Of | 39.7 | N/A | 20.1 | N/A |
| San Jose City Of | 38.0 | N/A | 23.0 | N/A |
| San Jose Water Company | 24.0 | N/A | 18.8 | N/A |
| San Juan Capistrano City Of | 13.1 | N/A | 13.1 | N/A |
| San Juan Water District | 77.1 | N/A | 19.4 | N/A |
| San Lorenzo Valley Water District | 49.2 | N/A | 23.6 | N/A |
| San Luis Obispo City Of | 27.3 | N/A | 17.6 | N/A |
| Santa Ana City Of | 13.8 | N/A | 13.8 | N/A |

| Urban water supplier (naming per water loss audit) | Baseline water loss (Averaged over 2017-2019) Gallons per connection per day | Baseline water loss (Averaged over 2017-2019) Gallons per mile per day | Water loss performance standards Gallons per connection per day | Water loss performance standards Gallons per mile per day |
|---|---|---|---|---|
| Santa Barbara City Of | 27.4 | N/A | 27.4 | N/A |
| Santa Clara City Of | 25.6 | N/A | 15.4 | N/A |
| Santa Cruz City Of | 18.5 | N/A | 18.5 | N/A |
| Santa Fe Irrigation District | 53.2 | N/A | 22.9 | N/A |
| Santa Fe Springs City Of | 31.0 | N/A | 17.8 | N/A |
| Santa Margarita Water District | 16.2 | N/A | 16.2 | N/A |
| Santa Maria City Of | 11.2 | N/A | 11.2 | N/A |
| Santa Monica City Of | 2.2 | N/A | 2.2 | N/A |
| Santa Paula City Of | 10.8 | N/A | 10.8 | N/A |
| Santa Rosa City Of | 16.3 | N/A | 16.3 | N/A |
| Scotts Valley Water District | 19.9 | N/A | 19.9 | N/A |
| Seal Beach City Of | 26.3 | N/A | 15.4 | N/A |
| Shafter City Of | 62.2 | N/A | 14.8 | N/A |
| Shasta Lake City Of | 24.0 | N/A | 24.0 | N/A |
| Sierra Madre City Of | 76.3 | N/A | 27.2 | N/A |
| Signal Hill City Of | 18.6 | N/A | 18.6 | N/A |
| Soledad City Of | 17.6 | N/A | 10.7 | N/A |
| Sonoma City Of | 22.8 | N/A | 16.6 | N/A |
| Soquel Creek Water District | 13.3 | N/A | 13.3 | N/A |
| South Coast Water District | 8.1 | N/A | 8.1 | N/A |
| South Feather Waterand Power | 57.0 | N/A | 30.4 | N/A |
| South Gate City Of | 11.2 | N/A | 11.2 | N/A |
| South Pasadena City Of | 30.1 | N/A | 18.6 | N/A |
| South Tahoe Public Utility District | 71.5 | N/A | 23.0 | N/A |
| Stockton City Of | 35.5 | N/A | 14.7 | N/A |

| Urban water supplier (naming per water loss audit) | Baseline water loss (Averaged over 2017-2019) Gallons per connection per day | Baseline water loss (Averaged over 2017-2019) Gallons per mile per day | Water loss performance standards Gallons per connection per day | Water loss performance standards Gallons per mile per day |
|---|---|---|---|---|
| Suburban Water Systems-San Jose Hills | 16.8 | N/A | 16.8 | N/A |
| Suburban Water Systems-Whittier-La Mirada | 22.7 | N/A | 18.4 | N/A |
| Suisun-Solano Water Authority | 47.1 | N/A | 12.3 | N/A |
| Sunny Slope Water Company | 27.2 | N/A | 16.2 | N/A |
| Sunnyslope Community Water District | 14.8 | N/A | 14.8 | N/A |
| Sunnyvale City Of | 20.6 | N/A | 17.1 | N/A |
| Susanville City Of | 59.5 | N/A | 19.5 | N/A |
| Sweetwater Authority | 15.4 | N/A | 15.4 | N/A |
| Sweetwater Springs Water District | 29.4 | N/A | 19.6 | N/A |
| Tehachapi City Of | 46.1 | N/A | 19.5 | N/A |
| Thousand Oaks City Of | 14.1 | N/A | 14.1 | N/A |
| Torrance City Of | 6.7 | N/A | 6.7 | N/A |
| Trabuco Canyon Water District | 20.2 | N/A | 20.2 | N/A |
| Tracy City Of | 39.3 | N/A | 15.4 | N/A |
| Triunfo Sanitation District-Oak Park Water Service | 1.6 | N/A | 1.6 | N/A |
| Truckee-Donner Public Utilities District | 63.1 | N/A | 23.1 | N/A |
| Tulare City Of | 18.8 | N/A | 11.2 | N/A |
| *Tuolumne Utilities District-Sonora Jamestown* | *75.7* | *N/A* | *25.6* | *N/A* |
| *Tuolumne Utilities District-Upper Basin* | *31.6* | *N/A* | *21.7* | *N/A* |
| Tuolumne Utilties District | 56.1 | N/A | 23.8 | N/A |
| Turlock City Of | 58.0 | N/A | 13.2 | N/A |
| Tustin City Of | 37.4 | N/A | 11.3 | N/A |
| Twentynine Palms Water District | 31.3 | N/A | 27.0 | N/A |
| Ukiah City Of | 38.3 | N/A | 21.2 | N/A |
| Upland City Of | 25.2 | N/A | 25.2 | N/A |

| Urban water supplier (naming per water loss audit) | Baseline water loss (Averaged over 2017-2019) Gallons per connection per day | Baseline water loss (Averaged over 2017-2019) Gallons per mile per day | Water loss performance standards Gallons per connection per day | Water loss performance standards Gallons per mile per day |
|---|---|---|---|---|
| Vacaville City Of | 28.3 | N/A | 19.5 | N/A |
| Valencia Water Company | 30.2 | N/A | 26.6 | N/A |
| Vallecitos Water District | 35.1 | N/A | 35.1 | N/A |
| Vallejo City Of | 57.9 | N/A | 14.9 | N/A |
| Valley Center Municipal Water District | N/A | 834.6 | N/A | 834.6 |
| Valley County Water District | 12.8 | N/A | 12.8 | N/A |
| Valley Of The Moon Water District | 29.0 | N/A | 15.2 | N/A |
| Valley Water Company | 13.4 | N/A | 13.4 | N/A |
| Vaughn Water Company | 31.2 | N/A | 12.8 | N/A |
| Ventura County Waterworks District No01-Moorpark | 35.5 | N/A | 21.7 | N/A |
| Ventura County Waterworks District No08-Simi Valley | 13.4 | N/A | 13.4 | N/A |
| Vernon City Of | N/A | 5234.6 | N/A | 630.2 |
| Victorville Water District | 53.6 | N/A | 26.5 | N/A |
| Vista Irrigation District | 23.8 | N/A | 23.8 | N/A |
| Walnut Valley Water District | 28.3 | N/A | 28.3 | N/A |
| Wasco City Of | 15.3 | N/A | 12.4 | N/A |
| Watsonville City Of | 20.2 | N/A | 15.0 | N/A |
| West Kern Water District | N/A | 5110.3 | N/A | 506.2 |
| West Sacramento City Of | 236.0 | N/A | 12.8 | N/A |
| West Valley Water District | 62.5 | N/A | 18.1 | N/A |
| Westborough Water District | 8.1 | N/A | 8.1 | N/A |
| Western Municipal Water District Of Riverside | 64.6 | N/A | 32.5 | N/A |
| Westminster City Of | 14.5 | N/A | 14.5 | N/A |
| Whittier City Of | 20.0 | N/A | 15.1 | N/A |
| Windsor Town Of | 28.2 | N/A | 23.9 | N/A |

| Urban water supplier (naming per water loss audit) | Baseline water loss (Averaged over 2017-2019) Gallons per connection per day | Baseline water loss (Averaged over 2017-2019) Gallons per mile per day | Water loss performance standards Gallons per connection per day | Water loss performance standards Gallons per mile per day |
|---|---|---|---|---|
| Woodland City Of | 25.7 | N/A | 13.5 | N/A |
| Yorba Linda Water District | 40.5 | N/A | 20.9 | N/A |
| Yreka City Of | 68.6 | N/A | 28.3 | N/A |
| Yuba City | 35.8 | N/A | 13.6 | N/A |
| Yucaipa Valley Water District | 46.3 | N/A | 12.0 | N/A |

## Baseline inputs from water loss audits to draft economic model

**Note:** The data for water systems that are combined into one standard are identified in *italics.*

| Urban water supplier (naming per water loss audit) | Average real loss (acre-feet per year) | Length of mains (miles) | Number of service connections | Variable production cost (dollars per acre-foot) | Average operational pressure (psi) |
|---|---|---|---|---|---|
| Adelanto City Of | 450.3 | 130.6 | 8194.3 | 903.9 | 73.0 |
| Alameda County Water District | 2046.7 | 920.8 | 85131.3 | 606.2 | 72.8 |
| Alco Water Service | 146.2 | 89.2 | 8638.3 | 219.8 | 67.4 |
| Alhambra City Of | 179.5 | 167.5 | 18588.0 | 478.9 | 60.0 |
| Amador Water Agency | 142.2 | 51.3 | 1914.0 | 108.7 | 70.0 |
| American Canyon City Of | 192.7 | 103.4 | 5584.0 | 705.7 | 68.0 |
| Anaheim City Of | 1677.7 | 799.1 | 63805.3 | 643.1 | 77.0 |
| Anderson City Of | 203.1 | 40.0 | 3396.0 | 66.1 | 70.9 |
| Antioch City Of | 431.5 | 370.7 | 32401.0 | 777.2 | 68.2 |
| Apple Valley Ranchos Water Company | 550.3 | 476.2 | 21051.0 | 112.9 | 93.4 |
| Arcadia City Of | 502.4 | 164.6 | 13978.7 | 104.3 | 77.0 |
| Arcata City Of | 349.6 | 90.6 | 6414.7 | 274.2 | 80.0 |

| **Urban water supplier (naming per water loss audit)** | **Average real loss (acre-feet per year)** | **Length of mains (miles)** | **Number of service connections** | **Variable production cost (dollars per acre-foot)** | **Average operational pressure (psi)** |
|---|---|---|---|---|---|
| Arroyo Grande City Of | 55.8 | 88.7 | 6453.3 | 1501.9 | 65.0 |
| Arvin Community Service District | 307.9 | 61.3 | 4046.3 | 393.5 | 60.0 |
| Atascadero Mutual Water Company | 430.8 | 246.0 | 10700.0 | 175.0 | 103.0 |
| Atwater City Of | 2592.7 | 97.6 | 7495.0 | 112.4 | 50.0 |
| Azusa Lightand Water | 2068.7 | 305.2 | 23526.0 | 301.8 | 59.7 |
| Bakersfield City Of | 1005.4 | 569.3 | 46460.7 | 176.6 | 70.0 |
| Bakman Water Company | 246.5 | 73.2 | 2578.5 | 318.2 | 52.5 |
| Banning City Of | 760.6 | 168.2 | 10756.0 | 190.8 | 109.3 |
| Bear Valley Community Services District | 38.6 | 180.0 | 3602.0 | 524.0 | 90.0 |
| Beaumont-Cherry Valley Water District | 828.9 | 376.7 | 18042.0 | 462.3 | 75.0 |
| Bella Vista Water District | 463.7 | 242.0 | 6328.7 | 176.3 | 72.0 |
| Bellflower-Somerset Mutual Water Company | 98.4 | 66.0 | 7053.0 | 56.1 | 56.7 |
| Benicia City Of | 504.6 | 114.6 | 9763.0 | 230.9 | 81.0 |
| Beverly Hills City Of | 374.5 | 171.0 | 11141.0 | 1205.8 | 68.2 |
| Big Bear Community Services District | 87.5 | 82.1 | 6102.0 | 377.4 | 85.0 |
| Big Bear Lake City Of | 160.7 | 165.4 | 15029.7 | 257.4 | 86.3 |
| Blythe City Of | 305.8 | 51.4 | 3400.0 | 91.6 | 62.0 |
| Brawley City Of | 459.7 | 100.0 | 7487.0 | 50.9 | 55.0 |
| Brea City Of | 231.7 | 222.1 | 13573.0 | 937.8 | 75.0 |
| Brentwood City Of | 810.2 | 326.7 | 23700.7 | 1130.7 | 62.2 |
| Buena Park City Of | 765.6 | 236.2 | 19107.0 | 619.8 | 70.0 |
| Burbank City Of | 401.2 | 286.0 | 26661.0 | 738.5 | 115.0 |
| Burlingame City Of | 201.0 | 115.8 | 9200.7 | 1745.8 | 85.0 |
| *Calaveras County Water District-Ebbetts Pass* | *557.4* | *155.6* | *5869.0* | *238.8* | *70.0* |
| *Calaveras County Water District-Jenny Lind* | *656.6* | *103.6* | *3759.0* | *209.4* | *70.0* |
| Calexico City Of | 39.9 | 55.2 | 8550.0 | 244.4 | 50.0 |

| Urban water supplier (naming per water loss audit) | Average real loss (acre-feet per year) | Length of mains (miles) | Number of service connections | Variable production cost (dollars per acre-foot) | Average operational pressure (psi) |
|---|---|---|---|---|---|
| *California American Water Company-Los Angeles Division-Baldwin Hills* | *180.3* | *69.8* | *6556.3* | *806.3* | *75.8* |
| *California American Water Company-Los Angeles Division-Duarte* | *753.7* | *98.8* | *7832.0* | *315.6* | *76.8* |
| *California American Water Company-Los Angeles Division-San Marino* | *462.3* | *181.0* | *15085.3* | *366.8* | *76.2* |
| California American Water Company-Monterey District | 279.8 | 561.4 | 39097.7 | 435.1 | 89.3 |
| *California American Water Company-Sacramento District-Antelope* | *228.5* | *95.8* | *10496.5* | *277.0* | *68.0* |
| *California American Water Company-Sacramento District-Lincoln Oaks* | *91.3* | *143.5* | *14606.0* | *240.2* | *64.5* |
| *California American Water Company-Sacramento District-Parkway* | *423.3* | *167.3* | *14912.0* | *167.0* | *63.0* |
| *California American Water Company-Sacramento District-Rosemont* | *550.4* | *187.9* | *16725.0* | *169.9* | *76.3* |
| California American Water Company-San Diego District | 629.0 | 180.8 | 21939.7 | 1810.3 | 71.8 |
| California American Water Company-Ventura District | 776.7 | 256.5 | 20706.3 | 1491.7 | 95.9 |
| California City | 576.9 | 313.8 | 4858.0 | 1387.4 | 65.0 |
| *California Water Service Company Bakersfield-Bakersfield* | *5510.4* | *856.8* | *65962.7* | *288.6* | *68.3* |
| *California Water Service Company Bakersfield-North Garden* | *505.2* | *122.2* | *6859.7* | *288.6* | *71.0* |
| California Water Service Company Bear Gulch | 300.7 | 347.2 | 19263.3 | 1683.7 | 81.0 |
| California Water Service Company Chico District | 934.9 | 406.0 | 29204.3 | 98.9 | 76.0 |
| California Water Service Company Dominguez | 918.6 | 389.6 | 34439.7 | 1380.6 | 78.0 |
| California Water Service Company East Los Angeles | 121.6 | 277.8 | 27131.0 | 574.2 | 79.0 |
| California Water Service Company Hermosa-Redondo | 377.1 | 217.7 | 27242.7 | 1234.7 | 68.0 |
| California Water Service Company Livermore | 365.2 | 230.4 | 18935.7 | 963.9 | 66.3 |

| **Urban water supplier (naming per water loss audit)** | **Average real loss (acre-feet per year)** | **Length of mains (miles)** | **Number of service connections** | **Variable production cost (dollars per acre-foot)** | **Average operational pressure (psi)** |
|---|---|---|---|---|---|
| California Water Service Company Los Altos-Suburban | 527.7 | 300.8 | 19236.3 | 1142.6 | 71.0 |
| California Water Service Company Marysville | 178.7 | 55.9 | 3929.3 | 77.2 | 63.7 |
| *California Water Service Company Mid Peninsula-San Carlos* | *70.7* | *115.5* | *10139.0* | *1961.3* | *80.0* |
| *California Water Service Company Mid Peninsula-San Mateo* | *611.6* | *259.1* | *26497.7* | *1961.3* | *72.0* |
| California Water Service Company Oroville | 117.6 | 62.4 | 3834.7 | 193.6 | 72.3 |
| California Water Service Company Palos Verdes | 887.3 | 347.3 | 24292.3 | 1404.7 | 91.7 |
| California Water Service Company Salinas District | 257.8 | 279.2 | 25083.7 | 138.2 | 76.0 |
| California Water Service Company Selma | 258.8 | 91.8 | 6591.3 | 115.4 | 59.4 |
| California Water Service Company South San Francisco | 11.0 | 169.0 | 17224.3 | 1608.5 | 76.0 |
| California Water Service Company Stockton | 1043.7 | 562.1 | 45194.3 | 684.0 | 55.0 |
| California Water Service Company Visalia | 500.9 | 588.9 | 44466.7 | 66.9 | 62.7 |
| California Water Service Company Westlake | 253.5 | 118.3 | 7141.0 | 1488.2 | 90.0 |
| Camarillo City Of | 51.8 | 203.0 | 13706.0 | 915.8 | 76.0 |
| Cambria Community Service District | 70.1 | 66.7 | 4032.0 | 583.8 | 85.0 |
| Camrosa Water District | 329.7 | 211.1 | 8204.7 | 898.0 | 65.0 |
| Carlsbad Municipal Water District | 777.3 | 453.7 | 32204.7 | 1214.4 | 81.0 |
| Carmichael Water District | 479.5 | 154.0 | 11789.7 | 257.1 | 66.0 |
| Carpinteria Valley Water District | 116.3 | 88.4 | 4504.7 | 386.7 | 89.0 |
| Castaic Lake Water Agency Santa Clarita Water Division | 1633.9 | 355.0 | 31054.3 | 553.3 | 100.6 |
| Ceres City Of | 202.0 | 154.0 | 12360.0 | 66.3 | 50.0 |
| Cerritos City Of | 349.2 | 186.4 | 15638.0 | 439.5 | 82.5 |
| Chino City Of | 843.9 | 267.0 | 20204.7 | 623.0 | 73.8 |
| Chino Hills City Of | 151.4 | 280.5 | 21946.3 | 913.9 | 80.0 |

| Urban water supplier (naming per water loss audit) | Average real loss (acre-feet per year) | Length of mains (miles) | Number of service connections | Variable production cost (dollars per acre-foot) | Average operational pressure (psi) |
|---|---|---|---|---|---|
| Citrus Heights Water District | 346.0 | 271.0 | 20232.3 | 250.4 | 88.3 |
| Cloverdale Cityof | 114.6 | 32.3 | 3314.3 | 218.0 | 57.8 |
| Clovis City Of | 289.5 | 518.0 | 34901.7 | 313.4 | 63.5 |
| Coachella City Of | 297.0 | 121.6 | 8319.0 | 117.4 | 75.0 |
| Coachella Valley Water District | 5049.6 | 1716.7 | 104047.7 | 234.8 | 83.3 |
| Coalinga City Of | 177.5 | 98.5 | 3861.7 | 416.0 | 70.0 |
| Coastside County Water District | 158.2 | 88.9 | 7624.7 | 1486.6 | 78.1 |
| Colton City Of | 748.2 | 165.9 | 10202.0 | 160.6 | 66.7 |
| Contra Costa Water District | 1526.0 | 818.1 | 62501.3 | 215.7 | 73.0 |
| Corcoran City Of | 351.7 | 130.0 | 3772.0 | 198.6 | 50.0 |
| Corona City Of | 795.4 | 802.6 | 44012.0 | 609.8 | 93.6 |
| Covina City Of | 292.7 | 112.7 | 8650.3 | 786.0 | 88.5 |
| Covina Irrigating Company | 365.6 | 111.0 | 8647.0 | 794.0 | 88.4 |
| Crescent City | 397.1 | 104.2 | 4420.3 | 89.3 | 74.2 |
| Crescenta Valley Community Water District | 210.7 | 170.9 | 8386.3 | 687.7 | 93.4 |
| Crestline Village Water District | 24.5 | 72.8 | 5076.0 | 1150.0 | 99.8 |
| Cucamonga Valley Water District | 1562.0 | 710.0 | 48694.7 | 487.7 | 80.0 |
| Cupertino City Of | 122.6 | 59.9 | 4279.3 | 1357.8 | 104.1 |
| Daly City | 319.8 | 198.0 | 23122.7 | 1675.7 | 70.7 |
| Davis City Of | 714.0 | 192.0 | 17101.7 | 248.4 | 50.0 |
| Del Oro Water Company | 118.7 | 64.8 | 4820.7 | 470.5 | 84.2 |
| Delano City Of | 595.0 | 131.0 | 9390.0 | 159.9 | 59.7 |
| Desert Water Agency | 2388.3 | 416.6 | 24469.0 | 235.9 | 79.9 |
| Diablo Water District | 207.2 | 190.0 | 11903.3 | 657.4 | 70.0 |
| Dinuba City Of | 221.5 | 72.5 | 6016.3 | 145.9 | 51.7 |
| Discovery Bay Community Services District | 93.4 | 48.0 | 5944.3 | 150.4 | 60.0 |

| Urban water supplier (naming per water loss audit) | Average real loss (acre-feet per year) | Length of mains (miles) | Number of service connections | Variable production cost (dollars per acre-foot) | Average operational pressure (psi) |
|---|---|---|---|---|---|
| Downey City Of | 717.1 | 276.0 | 23325.0 | 366.6 | 65.0 |
| Dublin San Ramon Services District | 195.3 | 319.0 | 23724.0 | 1420.3 | 80.9 |
| East Bay Municipal Utility District | 19584.5 | 4205.9 | 383229.0 | 78.2 | 82.6 |
| East Niles Community Services District | 423.5 | 127.6 | 8020.3 | 475.7 | 60.0 |
| East Orange County Water District | 35.2 | 23.7 | 1215.0 | 620.5 | 101.0 |
| East Palo Alto City Of | 115.3 | 38.6 | 4102.0 | 1786.1 | 65.0 |
| East Valley Water District | 974.7 | 316.6 | 23319.7 | 145.9 | 80.0 |
| Eastern Municipal Water District | 5037.5 | 2390.4 | 160146.7 | 871.1 | 74.7 |
| El Centro City Of | 1419.3 | 120.0 | 9899.0 | 76.5 | 60.0 |
| El Dorado Irrigation District | 3863.1 | 1185.2 | 41445.3 | 92.1 | 109.3 |
| El Monte City Of | 209.1 | 43.0 | 3738.3 | 168.9 | 60.0 |
| El Segundo City Of | 217.0 | 57.5 | 5152.0 | 1318.0 | 67.5 |
| El Toro Water District | 272.5 | 180.2 | 10044.3 | 946.0 | 86.9 |
| Elk Grove Water District | 141.9 | 102.9 | 7957.0 | 186.2 | 61.3 |
| Elsinore Valley Municipal Water District | 1019.4 | 722.7 | 45313.3 | 1048.0 | 84.0 |
| Escondido City Of | 665.1 | 430.7 | 26710.3 | 1288.3 | 96.1 |
| Estero Municipal Improvement District | 263.9 | 120.6 | 7512.7 | 1860.5 | 58.0 |
| Eureka City Of | 261.1 | 160.9 | 10028.7 | 1072.5 | 61.2 |
| Exeter City Of | 153.1 | 43.0 | 3331.0 | 537.6 | 55.0 |
| Fair Oaks Water District | 363.1 | 181.0 | 13938.7 | 234.4 | 80.0 |
| Fairfield City Of | 2549.9 | 370.7 | 30901.3 | 113.4 | 65.0 |
| Fallbrook Public Utilities District | 648.0 | 271.8 | 9251.3 | 1139.7 | 116.6 |
| Folsom City Of | 3155.1 | 335.2 | 21138.5 | 112.1 | 68.0 |
| Fortuna City Of | 231.2 | 65.4 | 4544.7 | 216.8 | 97.3 |
| Fountain Valley City Of | 228.0 | 217.0 | 17178.0 | 605.7 | 70.0 |
| Fresno City Of | 7775.7 | 1839.8 | 145578.7 | 168.5 | 51.1 |

| Urban water supplier (naming per water loss audit) | Average real loss (acre-feet per year) | Length of mains (miles) | Number of service connections | Variable production cost (dollars per acre-foot) | Average operational pressure (psi) |
|---|---|---|---|---|---|
| Fruitridge Vista Water Company | 386.4 | 52.0 | 4830.0 | 100.6 | 49.0 |
| Fullerton City Of | 656.5 | 431.3 | 31894.0 | 791.6 | 76.9 |
| Galt City Of | 206.6 | 100.7 | 7565.0 | 116.8 | 50.0 |
| Garden Grove City Of | 863.0 | 440.0 | 33702.0 | 656.3 | 52.0 |
| Georgetown Divide Public Utility District | 145.7 | 165.2 | 3883.7 | 93.3 | 93.0 |
| Gilroy City Of | 552.7 | 209.3 | 14768.7 | 626.8 | 70.0 |
| Glendale City Of | 696.4 | 400.0 | 34101.0 | 1212.2 | 94.3 |
| Glendora City Of | 1034.0 | 225.7 | 13485.0 | 383.6 | 76.0 |
| Golden State Water Company-Artesia | 282.4 | 101.2 | 10824.7 | 486.9 | 61.4 |
| Golden State Water Company-Barstow | 527.4 | 187.3 | 9232.3 | 124.0 | 89.0 |
| Golden State Water Company-Bay Point | 138.1 | 52.1 | 5105.7 | 1217.7 | 77.7 |
| Golden State Water Company-Bell-Bell Gardens | 181.3 | 75.0 | 7449.7 | 490.1 | 61.5 |
| Golden State Water Company-Claremont | 595.0 | 162.8 | 11328.7 | 868.6 | 89.9 |
| Golden State Water Company-Cordova | 1144.9 | 202.7 | 15185.7 | 98.4 | 52.4 |
| Golden State Water Company-Culver City | 165.0 | 109.9 | 9719.7 | 1363.8 | 76.1 |
| Golden State Water Company-Florence Graham | 275.7 | 94.1 | 9774.7 | 462.3 | 60.0 |
| Golden State Water Company-Norwalk | 174.0 | 91.0 | 9507.3 | 642.0 | 62.8 |
| Golden State Water Company-Orcutt | 639.7 | 145.3 | 11544.0 | 211.0 | 70.7 |
| Golden State Water Company-Placentia | 400.3 | 144.3 | 13075.7 | 689.2 | 92.0 |
| Golden State Water Company-San Dimas | 302.8 | 204.7 | 16219.7 | 866.5 | 82.0 |
| Golden State Water Company-Simi Valley | 184.7 | 146.1 | 13543.0 | 1289.8 | 74.6 |
| Golden State Water Company-South Arcadia | 127.7 | 66.3 | 7493.0 | 457.8 | 65.4 |
| Golden State Water Company-South San Gabriel | 232.8 | 40.0 | 4979.7 | 364.7 | 62.8 |
| Golden State Water Company-Southwest | 874.7 | 519.0 | 52959.0 | 1119.7 | 74.3 |
| Golden State Water Company-West Orange | 611.0 | 260.4 | 27917.3 | 585.1 | 79.0 |
| Goleta Water District | 457.9 | 254.7 | 16842.0 | 1078.3 | 83.1 |

| Urban water supplier (naming per water loss audit) | Average real loss (acre-feet per year) | Length of mains (miles) | Number of service connections | Variable production cost (dollars per acre-foot) | Average operational pressure (psi) |
|---|---|---|---|---|---|
| Great Oaks Water Company Incorporated | 537.1 | 211.4 | 21345.7 | 851.5 | 65.0 |
| Greenfield City Of | 155.8 | 35.3 | 3729.7 | 136.0 | 63.0 |
| Groveland Community Services District | 52.9 | 71.0 | 3262.0 | 887.3 | 110.0 |
| Hawthorne City Of | 102.2 | 60.8 | 6477.0 | 1046.2 | 58.3 |
| Hayward City Of | 838.8 | 387.0 | 36459.7 | 1823.2 | 94.1 |
| Healdsburg City Of | 54.6 | 59.5 | 4706.0 | 152.3 | 65.0 |
| Helix Water District | 1208.9 | 744.5 | 58661.3 | 1046.5 | 90.0 |
| Hemet City Of | 60.5 | 132.3 | 9304.0 | 240.9 | 80.0 |
| Hesperia Water District | 576.8 | 589.0 | 26813.0 | 645.6 | 85.0 |
| Hi Desert Water District | 280.1 | 308.9 | 10635.7 | 172.3 | 82.0 |
| Hillsborough Town Of | 127.8 | 100.1 | 4294.0 | 3069.4 | 85.0 |
| Hollister City Of | 223.8 | 93.5 | 6572.5 | 363.5 | 65.0 |
| Humboldt Community Services District | 525.5 | 105.6 | 7932.0 | 684.3 | 60.0 |
| Huntington Beach City Of | 902.1 | 607.2 | 54440.0 | 665.2 | 63.3 |
| Huntington Park City Of | 118.7 | 59.8 | 5649.7 | 791.1 | 56.0 |
| Imperial City Of | 282.5 | 63.0 | 5532.0 | 388.7 | 65.0 |
| Indian Wells Valley Water District | 534.8 | 263.9 | 12351.3 | 85.8 | 61.7 |
| Indio City Of | 790.0 | 344.7 | 23130.0 | 175.4 | 71.3 |
| Inglewood City Of | 223.9 | 156.0 | 15869.3 | 1441.9 | 85.0 |
| Irvine Ranch Water District | 1976.2 | 1886.1 | 118025.0 | 1330.3 | 84.1 |
| Joshua Basin Water District | 148.7 | 261.8 | 5831.0 | 1039.7 | 84.0 |
| Jurupa Community Service District | 1164.4 | 481.6 | 31509.3 | 838.5 | 92.5 |
| Kerman City Of | 134.8 | 59.6 | 3711.0 | 104.0 | 47.0 |
| Kingsburg City Of | 2082.3 | 61.0 | 3679.0 | 63.5 | 50.0 |
| La Habra City Of | 411.3 | 165.0 | 13121.0 | 676.1 | 82.0 |
| La Palma City Of | 183.6 | 39.4 | 4408.0 | 506.9 | 68.7 |

| Urban water supplier (naming per water loss audit) | Average real loss (acre-feet per year) | Length of mains (miles) | Number of service connections | Variable production cost (dollars per acre-foot) | Average operational pressure (psi) |
|---|---|---|---|---|---|
| La Verne City Of | 339.2 | 178.0 | 8854.5 | 1021.2 | 70.0 |
| Laguna Beach County Water District | 237.3 | 135.0 | 8670.0 | 984.7 | 70.0 |
| Lake Arrowhead Community Services District | 194.2 | 127.7 | 8356.7 | 501.5 | 88.0 |
| Lake Hemet Municipal Water District | 516.2 | 250.0 | 14332.0 | 991.5 | 75.7 |
| Lakeside Water District | 157.0 | 127.0 | 7080.7 | 1461.0 | 90.0 |
| Lakewood City Of | 290.1 | 180.0 | 20137.0 | 291.3 | 57.0 |
| Lamont Public Utility District | 281.3 | 28.5 | 3152.0 | 81.5 | 60.0 |
| Las Virgenes Municipal Water District | 599.0 | 402.9 | 21318.3 | 1001.2 | 121.8 |
| Lathrop City Of | 136.1 | 112.6 | 6524.0 | 95.0 | 54.0 |
| *Liberty Utilities(Park Water)Corp-Bell Norwalk* | *109.8* | *205.2* | *16895.0* | *785.8* | *75.8* |
| *Liberty Utilities(Park Water)Corp-Compton Willow* | *87.6* | *148.8* | *6959.0* | *785.8* | *87.5* |
| *Liberty Utilities(Park Water)Corp-Lynwood* | *9.1* | *162.3* | *4520.0* | *785.8* | *68.4* |
| Lincoln Avenue Water Company | 107.6 | 58.0 | 4483.3 | 439.3 | 92.0 |
| Lincoln City Of | 724.9 | 244.3 | 18384.0 | 904.3 | 92.0 |
| Linda County Water District | 454.2 | 61.3 | 4603.7 | 93.8 | 60.0 |
| Livermore City Of | 320.1 | 160.3 | 10285.3 | 1166.0 | 67.9 |
| Livingston City Of | 248.6 | 36.0 | 3293.3 | 128.2 | 51.7 |
| Lodi City Of | 277.5 | 243.0 | 23262.7 | 179.8 | 57.5 |
| Loma Linda City Of | 379.1 | 77.4 | 5435.3 | 642.3 | 69.3 |
| Lomita City Of | 85.5 | 43.2 | 4323.0 | 1129.8 | 58.3 |
| Lompoc City Of | 178.8 | 140.0 | 10016.7 | 369.6 | 110.0 |
| Long Beach City Of | 737.3 | 923.0 | 93928.3 | 1014.7 | 67.0 |
| Los Angeles City Department Of Water And Power | 30602.8 | 7384.8 | 740490.7 | 936.3 | 109.0 |
| Los Angeles County Waterworks District29-Malibu&Marina Del Rey | 229.0 | 218.1 | 7646.0 | 1401.8 | 79.3 |
| Los Angeles County Waterworks District40-Antelope Valley | 1498.7 | 1008.0 | 57449.4 | 385.5 | 71.3 |

| Urban water supplier (naming per water loss audit) | Average real loss (acre-feet per year) | Length of mains (miles) | Number of service connections | Variable production cost (dollars per acre-foot) | Average operational pressure (psi) |
|---|---|---|---|---|---|
| Los Banos City Of | 1137.8 | 175.0 | 12149.0 | 93.8 | 49.4 |
| Lynwood City Of | 227.7 | 95.0 | 9097.3 | 1222.2 | 56.0 |
| Madera City Of | 55.8 | 204.0 | 14232.0 | | 54.0 |
| Mammoth Community Water District | 111.0 | 66.0 | 3730.0 | 129.2 | 110.0 |
| Manhattan Beach City Of | 55.4 | 106.1 | 13631.0 | 1432.6 | 65.0 |
| Manteca City Of | 553.5 | 285.5 | 22156.3 | 156.2 | 55.0 |
| Marin Municipal Water District | 1726.2 | 869.9 | 62958.3 | 335.5 | 109.3 |
| Marina Coast Water District | 255.9 | 203.0 | 7474.3 | 158.1 | 60.0 |
| Martinez City Of | 653.4 | 139.1 | 10139.7 | 195.8 | 81.2 |
| Mc Kinleyville Community Services District | 137.3 | 87.8 | 6300.3 | 710.4 | 65.0 |
| Menlo Park City Of | 299.7 | 57.7 | 4520.3 | 2069.3 | 79.3 |
| Merced City Of | 1011.8 | 280.0 | 21545.0 | 90.6 | 50.0 |
| Mesa Water District | 501.5 | 328.4 | 24919.0 | 728.2 | 80.0 |
| Mid-Peninsula Water District | 132.6 | 102.3 | 7988.3 | 1583.5 | 102.0 |
| Millbrae City Of | 208.8 | 76.0 | 6552.7 | 1970.6 | 75.8 |
| Milpitas City Of | 646.6 | 194.7 | 16511.3 | 695.3 | 93.8 |
| Mission Springs Water District | 708.1 | 354.1 | 13138.0 | 488.3 | 65.0 |
| Modesto City Of | 6525.6 | 868.0 | 72015.0 | 280.4 | 60.0 |
| Monrovia City Of | 194.2 | 108.6 | 9678.7 | 214.9 | 99.3 |
| Monte Vista Water District | 939.9 | 201.9 | 12476.3 | 878.6 | 80.8 |
| Montebello Land And Water Company | 173.8 | 46.0 | 3988.3 | 558.7 | 66.9 |
| Montecito Water District | 175.2 | 116.5 | 4643.7 | 814.9 | 111.2 |
| Monterey Park City Of | 357.2 | 134.0 | 13491.0 | 50.2 | 80.0 |
| Morgan Hill City Of | 478.9 | 197.2 | 14060.7 | 531.5 | 72.4 |
| Morro Bay City Of | 12.7 | 73.7 | 5486.0 | 2573.6 | 65.0 |
| Moulton Niguel Water District | 1483.5 | 676.3 | 53674.0 | 929.5 | 98.0 |

| **Urban water supplier (naming per water loss audit)** | **Average real loss (acre-feet per year)** | **Length of mains (miles)** | **Number of service connections** | **Variable production cost (dollars per acre-foot)** | **Average operational pressure (psi)** |
|---|---|---|---|---|---|
| Mountain House Community Services District | 256.2 | 57.2 | 5094.0 | 228.7 | 65.3 |
| Mountain View City Of | 390.3 | 185.3 | 18390.0 | 641.8 | 72.7 |
| Myoma Dunes Mutual Water Company | 134.8 | 33.8 | 2525.5 | 111.4 | 80.0 |
| Napa City Of | 717.4 | 360.2 | 25723.0 | 488.8 | 67.3 |
| *Nevada Irrigation District-E George* | *411.8* | *150.7* | *6261.3* | *74.7* | *90.4* |
| *Nevada Irrigation District-Lake Wildwood* | *50.3* | *44.8* | *3327.7* | *79.5* | *84.9* |
| *Nevada Irrigation District-Loma Rica* | *164.6* | *118.8* | *5224.7* | *87.6* | *88.3* |
| Newhall County Water District | 156.7 | 65.9 | 3866.0 | 273.7 | 97.1 |
| Newman Cityof | 242.6 | 28.0 | 3513.0 | 124.9 | 52.3 |
| Newport Beach City Of | 782.2 | 302.2 | 26638.7 | 1176.7 | 78.0 |
| Nipomo Community Service District | 156.6 | 185.0 | 4685.7 | 173.0 | 68.0 |
| Norco City Of | 249.4 | 104.7 | 7586.0 | 787.7 | 95.0 |
| North Coast County Water District | 175.5 | 132.6 | 12091.0 | 1739.3 | 83.0 |
| North Marin Water District | 196.9 | 316.6 | 20768.7 | 878.5 | 62.5 |
| North Tahoe Public Utilities District | 236.3 | 46.0 | 3270.3 | 157.6 | 100.0 |
| Norwalk City Of | 2.5 | 57.6 | 5371.5 | 955.0 | 67.5 |
| Oakdale City Of | 314.9 | 75.0 | 8114.3 | 123.4 | 51.0 |
| Oceanside City Of | 787.6 | 591.0 | 44425.0 | 1543.7 | 72.3 |
| Oildale Mutual Water Company | 154.3 | 148.4 | 11308.3 | 132.5 | 60.0 |
| *Olivehurst Public Utilities District* | *242.8* | *56.5* | *4498.0* | *214.1* | *60.0* |
| *Olivehurst Public Utilities District-Plumas Lake* | *129.7* | *25.1* | *2238.5* | *164.9* | *60.0* |
| Olivenhain Municipal Water District | 916.4 | 466.2 | 22617.3 | 1128.4 | 115.0 |
| Ontario City Of | 912.6 | 595.3 | 35480.7 | 346.3 | 85.0 |
| Orange City Of | 1266.2 | 462.0 | 36402.0 | 780.8 | 86.8 |
| Orangevale Water Company | 188.9 | 82.5 | 5705.0 | 167.5 | 67.5 |
| Orchard Dale Water District | 153.8 | 43.0 | 4257.0 | 603.4 | 62.0 |

| **Urban water supplier (naming per water loss audit)** | **Average real loss (acre-feet per year)** | **Length of mains (miles)** | **Number of service connections** | **Variable production cost (dollars per acre-foot)** | **Average operational pressure (psi)** |
|---|---|---|---|---|---|
| Otay Water District | 893.5 | 733.0 | 50287.7 | 1756.0 | 116.6 |
| Oxnard City Of | 1481.3 | 581.4 | 42312.0 | 1112.5 | 67.0 |
| Padre Dam Municipal Water District | 177.1 | 410.0 | 24072.7 | 1871.4 | 107.7 |
| Palmdale Water District | 1373.7 | 433.0 | 27439.0 | 278.6 | 77.2 |
| Palo Alto City Of | 395.3 | 238.5 | 26404.0 | 1810.8 | 71.0 |
| Paradise Irrigation District | 201.9 | 177.9 | 8640.5 | 53.1 | 91.0 |
| Paramount City Of | 567.1 | 161.7 | 7391.3 | 441.0 | 68.3 |
| Pasadena City Of | 1357.3 | 531.5 | 38048.3 | 1041.0 | 73.4 |
| Paso Robles City Of | 137.8 | 228.8 | 11174.0 | 569.4 | 74.2 |
| Patterson City Of | 506.2 | 49.0 | 6507.7 | 78.3 | 60.0 |
| Petaluma City Of | 536.6 | 245.5 | 20172.7 | 1056.9 | 59.0 |
| Phelan Pinon Hills Community Services District | 317.7 | 346.0 | 7010.0 | 647.6 | 100.4 |
| Pico Rivera City Of | 107.6 | 98.0 | 9562.5 | 292.7 | 70.0 |
| Pico Water District | 62.5 | 68.0 | 5428.7 | 339.9 | 66.0 |
| Pismo Beach City Of | 62.9 | 50.0 | 4759.7 | 1550.0 | 72.9 |
| Pittsburg City Of | 527.9 | 254.3 | 18891.0 | 806.3 | 65.0 |
| *Placer County Water Agency-Auburn Bowman* | *598.1* | *156.1* | *9390.0* | *265.0* | *76.7* |
| *Placer County Water Agency-Foothill* | *1481.7* | *413.4* | *28147.0* | *265.0* | *79.7* |
| Pleasanton City Of | 1220.4 | 329.0 | 22126.3 | 858.9 | 75.3 |
| Pomona City Of | 919.8 | 488.0 | 32110.0 | 986.7 | 82.2 |
| Port Hueneme City Of | 56.6 | 47.3 | 5838.7 | 783.2 | 45.0 |
| Porterville City Of | 862.9 | 260.8 | 16326.0 | 182.0 | 60.0 |
| Poway City Of | 584.1 | 285.5 | 13949.0 | 1482.0 | 102.7 |
| Quartz Hill Water District | 126.2 | 96.9 | 5824.3 | 410.3 | 73.8 |
| Rainbow Municipal Water District | 257.5 | 320.0 | 8040.0 | 1312.7 | 158.0 |
| Ramona Municipal Water District | 198.4 | 226.3 | 9612.3 | 1300.0 | 155.0 |

| Urban water supplier (naming per water loss audit) | Average real loss (acre-feet per year) | Length of mains (miles) | Number of service connections | Variable production cost (dollars per acre-foot) | Average operational pressure (psi) |
|---|---|---|---|---|---|
| Rancho California Water District | 2057.3 | 940.8 | 44734.7 | 1271.7 | 110.5 |
| Red Bluff City Of | 77.9 | 81.0 | 4865.0 | | 63.0 |
| Redding City Of | 1872.8 | 558.5 | 29263.5 | 261.7 | 80.0 |
| Redlands City Of | 1100.8 | 406.2 | 21017.0 | 235.3 | 87.0 |
| Redwood City | 650.1 | 264.6 | 24605.7 | 1948.9 | 64.7 |
| Reedley City Of | 1099.4 | 92.2 | 6329.0 | 132.1 | 50.7 |
| Rialto City Of | 280.7 | 197.3 | 11833.3 | 141.1 | 71.7 |
| Rincon Del Diablo Municipal Water District | 255.9 | 119.0 | 7218.0 | 1870.9 | 106.7 |
| Rio Linda-Elverta Community Water District | 195.0 | 61.9 | 4631.7 | 122.7 | 53.3 |
| Rio Vista City Of | 117.6 | 46.0 | 4706.0 | 161.7 | 67.5 |
| Riverbank City Of | 158.6 | 66.0 | 7323.3 | 82.8 | 60.0 |
| Riverside City Of | 4327.2 | 985.9 | 70478.3 | 98.7 | 89.0 |
| Riverside Highland Water Company | 54.1 | 77.7 | 4584.3 | 112.2 | 72.0 |
| Rohnert Park City Of | 280.3 | 116.1 | 9283.7 | 458.2 | 58.0 |
| Rosamond Community Service District | 153.0 | 97.3 | 5030.0 | 958.2 | 80.0 |
| Roseville City Of | 2002.2 | 614.2 | 43580.0 | 133.7 | 84.0 |
| Rowland Water District | 287.6 | 207.0 | 13771.7 | 1037.3 | 85.5 |
| Rubidoux Community Service District | 393.1 | 71.6 | 6284.0 | 91.9 | 85.0 |
| Rubio Canyon Land And Water Association | 78.6 | 60.0 | 3129.3 | 378.1 | 70.0 |
| Sacramento City Of | 6465.0 | 1708.3 | 150898.0 | 100.7 | 45.0 |
| Sacramento County Water Agency | 2202.3 | 544.7 | 36264.3 | 176.5 | 60.7 |
| Sacramento Suburban Water District | 1168.4 | 706.9 | 47238.7 | 156.7 | 58.9 |
| San Bernardino City Of | 2556.1 | 755.8 | 47915.3 | 158.5 | 80.3 |
| San Bernardino County Service Area64Spring Valley Lake | 305.5 | 40.4 | 3901.3 | 156.7 | 75.0 |
| San Bernardino County Service Area70J Oak Hills | 181.8 | 156.0 | 3285.3 | 637.1 | 85.0 |

| Urban water supplier (naming per water loss audit) | Average real loss (acre-feet per year) | Length of mains (miles) | Number of service connections | Variable production cost (dollars per acre-foot) | Average operational pressure (psi) |
|---|---|---|---|---|---|
| San Bruno City Of | 231.8 | 120.3 | 11699.0 | 622.7 | 81.3 |
| San Buenaventura City Of(Ventura) | 671.0 | 394.5 | 30104.0 | 465.8 | 93.0 |
| San Clemente City Of | 709.5 | 212.6 | 17403.3 | 1063.1 | 75.3 |
| San Diego City Of | 10519.5 | 3370.2 | 296100.3 | 1289.7 | 93.4 |
| San Dieguito Water District | 314.4 | 176.4 | 11966.0 | 1323.6 | 82.0 |
| San Fernando City Of | 165.0 | 67.1 | 5132.7 | 164.3 | 72.0 |
| San Francisco Public Utilities Commision | 4970.3 | 1257.6 | 178166.0 | 90.3 | 76.1 |
| San Gabriel County Water District | 253.2 | 82.0 | 9215.7 | 84.9 | 80.0 |
| San Gabriel Valley Water Company | 1169.1 | 566.2 | 49312.3 | 880.8 | 75.0 |
| San Gabriel Valley Water Company Fontana Division | 2189.7 | 692.1 | 48373.3 | 812.5 | 80.0 |
| San Jacinto City Of | 186.6 | 126.7 | 4197.3 | 518.0 | 65.0 |
| San Jose City Of | 1157.9 | 343.0 | 27182.0 | 1579.6 | 91.0 |
| San Jose Water Company | 6292.5 | 2477.7 | 234386.3 | 1226.1 | 73.6 |
| San Juan Capistrano City Of | 172.6 | 207.3 | 11734.3 | 884.7 | 60.0 |
| San Juan Water District | 922.4 | 209.9 | 10687.3 | 266.6 | 72.0 |
| San Lorenzo Valley Water District | 441.6 | 185.0 | 8014.0 | 224.1 | 80.0 |
| San Luis Obispo City Of | 338.2 | 177.6 | 11043.0 | 270.4 | 70.0 |
| Santa Ana City Of | 670.9 | 505.3 | 43250.0 | 617.5 | 73.9 |
| Santa Barbara City Of | 832.4 | 323.0 | 27121.0 | 482.5 | 120.8 |
| Santa Clara City Of | 755.9 | 312.9 | 26406.0 | 1301.4 | 66.9 |
| Santa Cruz City Of | 507.5 | 271.2 | 24524.0 | 183.8 | 91.1 |
| Santa Fe Irrigation District | 447.5 | 160.0 | 7509.0 | 1223.9 | 80.0 |
| Santa Fe Springs City Of | 218.4 | 108.0 | 6283.5 | 812.5 | 69.5 |
| Santa Margarita Water District | 1012.1 | 625.1 | 55648.3 | 952.1 | 90.0 |
| Santa Maria City Of | 284.2 | 337.5 | 22709.3 | 232.5 | 79.3 |
| Santa Monica City Of | 43.6 | 206.8 | 18109.3 | 994.1 | 74.5 |

| Urban water supplier (naming per water loss audit) | Average real loss (acre-feet per year) | Length of mains (miles) | Number of service connections | Variable production cost (dollars per acre-foot) | Average operational pressure (psi) |
|---|---|---|---|---|---|
| Santa Paula City Of | 91.7 | 97.8 | 7572.3 | 216.4 | 66.4 |
| Santa Rosa City Of | 992.2 | 644.3 | 54388.3 | 851.6 | 69.0 |
| Scotts Valley Water District | 92.0 | 65.1 | 4132.0 | 426.2 | 100.0 |
| Seal Beach City Of | 162.4 | 74.8 | 5513.3 | 513.5 | 65.0 |
| Shafter City Of | 327.3 | 108.6 | 4699.3 | 136.9 | 55.0 |
| Shasta Lake City Of | 100.5 | 79.4 | 3740.3 | 158.8 | 83.0 |
| Sierra Madre City Of | 317.5 | 47.6 | 3715.5 | 160.0 | 103.0 |
| Signal Hill City Of | 69.6 | 50.0 | 3331.0 | 921.0 | 78.5 |
| Soledad City Of | 76.5 | 14.6 | 3884.0 | 155.5 | 55.3 |
| Sonoma City Of | 112.3 | 54.3 | 4404.7 | 866.6 | 70.7 |
| Soquel Creek Water District | 235.8 | 172.4 | 15863.7 | 176.6 | 76.4 |
| South Coast Water District | 119.4 | 163.3 | 13114.0 | 1012.9 | 87.5 |
| South Feather Waterand Power | 446.6 | 200.0 | 7000.0 | | 90.0 |
| South Gate City Of | 180.9 | 169.0 | 14408.5 | 418.5 | 65.0 |
| South Pasadena City Of | 210.5 | 67.8 | 6239.0 | 1044.0 | 79.3 |
| South Tahoe Public Utility District | 1134.6 | 253.0 | 14173.7 | 164.2 | 84.0 |
| Stockton City Of | 1938.8 | 601.5 | 48791.3 | 564.5 | 60.0 |
| Suburban Water Systems-San Jose Hills | 805.4 | 483.9 | 42870.3 | 566.5 | 77.9 |
| Suburban Water Systems-Whittier-La Mirada | 861.9 | 376.7 | 33874.7 | 471.3 | 78.5 |
| Suisun-Solano Water Authority | 447.3 | 95.8 | 8475.0 | 108.2 | 55.0 |
| Sunny Slope Water Company | 192.1 | 60.2 | 6300.0 | 165.5 | 72.5 |
| Sunnyslope Community Water District | 98.2 | 80.2 | 5921.3 | 95.6 | 72.0 |
| Sunnyvale City Of | 667.0 | 347.7 | 28926.7 | 1560.4 | 72.7 |
| Susanville City Of | 253.8 | 43.5 | 3808.3 | 70.2 | 81.8 |
| Sweetwater Authority | 592.3 | 408.0 | 34363.0 | 1554.9 | 74.3 |
| Sweetwater Springs Water District | 125.2 | 65.0 | 3800.0 | 272.9 | 75.0 |

| **Urban water supplier (naming per water loss audit)** | **Average real loss (acre-feet per year)** | **Length of mains (miles)** | **Number of service connections** | **Variable production cost (dollars per acre-foot)** | **Average operational pressure (psi)** |
|---|---|---|---|---|---|
| Tehachapi City Of | 170.8 | 55.5 | 3307.0 | 142.5 | 75.2 |
| Thousand Oaks City Of | 269.2 | 229.9 | 17050.3 | 1525.8 | 80.5 |
| Torrance City Of | 201.6 | 320.0 | 27041.7 | 993.3 | 75.0 |
| Trabuco Canyon Water District | 90.5 | 66.5 | 3989.7 | 885.1 | 90.0 |
| Tracy City Of | 1062.6 | 458.3 | 24121.7 | 485.0 | 60.0 |
| Triunfo Sanitation District-Oak Park Water Service | 8.5 | 46.0 | 4700.0 | 1646.8 | 80.0 |
| Truckee-Donner Public Utilities District | 909.6 | 231.7 | 12871.0 | 294.4 | 84.3 |
| Tulare City Of | 417.1 | 227.0 | 19839.0 | 87.0 | 50.0 |
| *Tuolumne Utilities District-Sonora Jamestown* | *422.7* | *102.4* | *4984.7* | *155.2* | *87.7* |
| *Tuolumne Utilities District-Upper Basin* | *141.4* | *105.6* | *3995.0* | *155.2* | *72.0* |
| Turlock City Of | 1241.8 | 305.0 | 19100.3 | 57.2 | 54.7 |
| Tustin City Of | 593.1 | 172.0 | 14165.0 | 633.9 | 50.0 |
| Twentynine Palms Water District | 283.6 | 211.0 | 8087.3 | 185.7 | 85.0 |
| Ukiah City Of | 205.2 | 62.0 | 4779.0 | 108.5 | 85.0 |
| Upland City Of | 584.8 | 255.6 | 20733.0 | 805.0 | 100.0 |
| Vacaville City Of | 896.7 | 359.4 | 28254.7 | 644.0 | 80.0 |
| Valencia Water Company | 1101.2 | 367.2 | 32598.7 | 535.2 | 103.9 |
| Vallecitos Water District | 882.2 | 376.6 | 22469.7 | 2030.6 | 117.4 |
| Vallejo City Of | 2638.3 | 483.3 | 40646.0 | 227.0 | 65.0 |
| Valley Center Municipal Water District | 320.4 | 342.7 | 10066.7 | 1444.2 | 120.0 |
| Valley County Water District | 180.8 | 126.0 | 12649.3 | 492.0 | 63.0 |
| Valley Of The Moon Water District | 230.9 | 92.5 | 7108.0 | 1609.6 | 65.0 |
| Valley Water Company | 54.9 | 55.0 | 3657.0 | 1578.0 | 70.0 |
| Vaughn Water Company | 375.0 | 220.4 | 10727.7 | 0.5 | 50.0 |
| Ventura County Waterworks District No01-Moorpark | 434.1 | 171.0 | 10912.7 | 1289.3 | 83.0 |

| Urban water supplier (naming per water loss audit) | Average real loss (acre-feet per year) | Length of mains (miles) | Number of service connections | Variable production cost (dollars per acre-foot) | Average operational pressure (psi) |
|---|---|---|---|---|---|
| Ventura County Waterworks District No08-Simi Valley | 387.4 | 350.3 | 25762.0 | 1081.0 | 100.0 |
| Vernon City Of | 295.6 | 50.4 | 1022.0 | 589.4 | 75.0 |
| Victorville Water District | 2135.2 | 752.0 | 35561.0 | 424.0 | 86.8 |
| Vista Irrigation District | 765.4 | 467.4 | 28706.7 | 994.2 | 97.7 |
| Walnut Valley Water District | 869.4 | 482.0 | 27471.0 | 1032.0 | 103.0 |
| Wasco City Of | 86.0 | 79.0 | 5009.3 | 208.0 | 51.8 |
| Watsonville City Of | 335.0 | 178.0 | 14806.3 | 116.6 | 65.0 |
| West Kern Water District | 1820.3 | 318.0 | 7733.3 | 156.1 | 60.0 |
| West Sacramento City Of | 3797.5 | 200.0 | 14367.3 | 89.5 | 55.0 |
| West Valley Water District | 1502.0 | 375.1 | 21441.3 | 291.9 | 70.0 |
| Westborough Water District | 35.7 | 24.5 | 3928.7 | 1904.1 | 77.7 |
| Western Municipal Water District Of Riverside | 1507.1 | 493.4 | 20839.3 | 1048.8 | 100.0 |
| Westminster City Of | 335.8 | 251.0 | 20638.0 | 317.0 | 63.7 |
| Whittier City Of | 258.2 | 143.0 | 11516.0 | 433.6 | 65.0 |
| Windsor Town Of | 174.6 | 139.1 | 5524.0 | 428.3 | 78.6 |
| Woodland City Of | 462.6 | 277.1 | 16049.7 | 820.4 | 55.0 |
| Yorba Linda Water District | 1134.0 | 366.3 | 25013.0 | 725.8 | 82.0 |
| Yreka City Of | 234.3 | 90.8 | 3047.3 | 137.6 | 84.3 |
| Yuba City | 754.4 | 299.3 | 18813.7 | 86.2 | 56.1 |
| Yucaipa Valley Water District | 668.2 | 209.0 | 12893.0 | 202.7 | 50.0 |

# Appendix F – 2015 SBX7-7 Verification Form

| SB X7-7 Table 0: Units of Measure Used in UWMP* *(select one from the drop down list)* |
|---|
| Acre Feet |
| **The unit of measure must be consistent with Table 2-3* |
| NOTES: |

| SB X7-7 Table-1: Baseline Period Ranges | | | |
|---|---|---|---|
| **Baseline** | **Parameter** | **Value** | **Units** |
| 10- to 15-year baseline period | 2008 total water deliveries | 34,052 | Acre Feet |
| | 2008 total volume of delivered recycled water | 2,985 | Acre Feet |
| | 2008 recycled water as a percent of total deliveries | 8.77% | Percent |
| | Number of years in baseline period[1, 2] | 10 | Years |
| | Year beginning baseline period range | 1995 | |
| | Year ending baseline period range[3] | 2004 | |
| 5-year baseline period | Number of years in baseline period | 5 | Years |
| | Year beginning baseline period range | 2003 | |
| | Year ending baseline period range[4] | 2007 | |

*[1] If the 2008 recycled water percent is less than 10 percent, then the first baseline period is a continuous 10-year period. If the amount of recycled water delivered in 2008 is 10 percent or greater, the first baseline period is a continuous 10- to 15-year period.* *[2] The Water Code requires that the baseline period is between 10 and 15 years. However, DWR recognizes that some water suppliers may not have the minimum 10 years of baseline data.*

*[3] The ending year must be between December 31, 2004 and December 31, 2010.*

*[4] The ending year must be between December 31, 2007 and December 31, 2010.*

NOTES:

| SB X7-7 Table 2: Method for Population Estimates | |
|---|---|
| Method Used to Determine Population (may check more than one) | |
| ☑ | **1. Department of Finance** (DOF)<br>DOF Table E-8 (1990 - 2000) and (2000-2010) and<br>DOF Table E-5 (2011 - 2015) when available |
| ☐ | **2. Persons-per-Connection Method** |
| ☐ | **3. DWR Population Tool** |
| ☐ | **4. Other**<br>DWR recommends pre-review |
| NOTES: | |

| SB X7-7 Table 3: Service Area Population | | |
|---|---|---|
| Year | | Population |
| 10 to 15 Year Baseline Population | | |
| Year 1 | 1995 | 54,602 |
| Year 2 | 1996 | 58,424 |
| Year 3 | 1997 | 62,619 |
| Year 4 | 1998 | 66,761 |
| Year 5 | 1999 | 71,824 |
| Year 6 | 2000 | 74,562 |
| Year 7 | 2001 | 78,420 |
| Year 8 | 2002 | 83,167 |
| Year 9 | 2003 | 89,289 |
| Year 10 | 2004 | 94,561 |
| 5 Year Baseline Population | | |
| Year 1 | 2003 | 89,289 |
| Year 2 | 2004 | 94,561 |
| Year 3 | 2005 | 99,295 |
| Year 4 | 2006 | 101,641 |
| Year 5 | 2007 | 103,693 |
| 2015 Compliance Year Population | | |
| **2015** | | 123,572 |
| NOTES: Does not include approximately 4,810 person living within City limits, but outside the water service area. | | |

## SB X7-7 Table 4-A: Volume Entering the Distribution System(s)

Complete one table for each source.

| Name of Source | All Sources | | | |
|---|---|---|---|---|
| **This water source is:** | | | | |
| ☑ | The supplier's own water source | | | |
| ☑ | A purchased or imported source | | | |
| **Baseline Year** *Fm SB X7-7 Table 3* | | Volume Entering Distribution System | Meter Error Adjustment* *Optional* *(+/-)* | Corrected Volume Entering Distribution System |
| 10 to 15 Year Baseline - Water into Distribution System | | | | |
| Year 1 | 1995 | 18,841 | | 18,841 |
| Year 2 | 1996 | 21,254 | | 21,254 |
| Year 3 | 1997 | 23,001 | | 23,001 |
| Year 4 | 1998 | 20,462 | | 20,462 |
| Year 5 | 1999 | 24,179 | | 24,179 |
| Year 6 | 2000 | 25,646 | | 25,646 |
| Year 7 | 2001 | 28,100 | | 28,100 |
| Year 8 | 2002 | 29,853 | | 29,853 |
| Year 9 | 2003 | 29,714 | | 29,714 |
| Year 10 | 2004 | 32,468 | | 32,468 |
| 5 Year Baseline - Water into Distribution System | | | | |
| Year 1 | 2003 | 29,714 | | 29,714 |
| Year 2 | 2004 | 32,468 | | 32,468 |
| Year 3 | 2005 | 31,481 | | 31,481 |
| Year 4 | 2006 | 33,637 | | 33,637 |
| Year 5 | 2007 | 33,864 | | 33,864 |
| 2015 Compliance Year - Water into Distribution System | | | | |
| **2015** | | 22,881 | | 22,881 |

** Meter Error Adjustment - See guidance in Methodology 1, Step 3 of Methodologies Document*

NOTES:

| SB X7-7 Table 4: Annual Gross Water Use * | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Baseline Year *Fm SB X7-7 Table 3* | | Volume Into Distribution System *This column will remain blank until SB X7-7 Table 4-A is completed.* | Deductions | | | | | Annual Gross Water Use |
| | | | Exported Water | Change in Dist. System Storage (+/-) | Indirect Recycled Water *This column will remain blank until SB X7-7 Table 4-B is completed.* | Water Delivered for Agricultural Use | Process Water *This column will remain blank until SB X7-7 Table 4-D is completed.* | |
| 10 to 15 Year Baseline - Gross Water Use | | | | | | | | |
| Year 1 | 1995 | 18,841 | | | - | | - | 18,841 |
| Year 2 | 1996 | 21,254 | | | - | | - | 21,254 |
| Year 3 | 1997 | 23,001 | | | - | | - | 23,001 |
| Year 4 | 1998 | 20,462 | | | - | | - | 20,462 |
| Year 5 | 1999 | 24,179 | | | - | | - | 24,179 |
| Year 6 | 2000 | 25,646 | | | - | | - | 25,646 |
| Year 7 | 2001 | 28,100 | | | - | | - | 28,100 |
| Year 8 | 2002 | 29,853 | | | - | | - | 29,853 |
| Year 9 | 2003 | 29,714 | | | - | | - | 29,714 |
| Year 10 | 2004 | 32,468 | | | - | | - | 32,468 |
| **10 - 15 year baseline average gross water use** | | | | | | | | **25,352** |
| 5 Year Baseline - Gross Water Use | | | | | | | | |
| Year 1 | 2003 | 29,714 | | | - | | - | 29,714 |
| Year 2 | 2004 | 32,468 | | | - | | - | 32,468 |
| Year 3 | 2005 | 31,481 | | | - | | - | 31,481 |
| Year 4 | 2006 | 33,637 | | | - | | - | 33,637 |
| Year 5 | 2007 | 33,864 | | | - | | - | 33,864 |
| **5 year baseline average gross water use** | | | | | | | | **32,233** |
| 2015 Compliance Year - Gross Water Use | | | | | | | | |
| **2015** | | 22,881 | - | | - | | - | **22,881** |
| * NOTE that the units of measure must remain consistent throughout the UWMP, as reported in Table 2-3 | | | | | | | | |
| NOTES: | | | | | | | | |

| SB X7-7 Table 5: Gallons Per Capita Per Day (GPCD) | | | | |
|---|---|---|---|---|
| **Baseline Year** *Fm SB X7-7 Table 3* | | Service Area Population *Fm SB X7-7 Table 3* | Annual Gross Water Use *Fm SB X7-7 Table 4* | Daily Per Capita Water Use (GPCD) |
| 10 to 15 Year Baseline GPCD | | | | |
| Year 1 | 1995 | 54,602 | 18,841 | 308 |
| Year 2 | 1996 | 58,424 | 21,254 | 325 |
| Year 3 | 1997 | 62,619 | 23,001 | 328 |
| Year 4 | 1998 | 66,761 | 20,462 | 274 |
| Year 5 | 1999 | 71,824 | 24,179 | 301 |
| Year 6 | 2000 | 74,562 | 25,646 | 307 |
| Year 7 | 2001 | 78,420 | 28,100 | 320 |
| Year 8 | 2002 | 83,167 | 29,853 | 320 |
| Year 9 | 2003 | 89,289 | 29,714 | 297 |
| Year 10 | 2004 | 94,561 | 32,468 | 307 |
| **10-15 Year Average Baseline GPCD** | | | | **309** |
| 5 Year Baseline GPCD | | | | |
| **Baseline Year** *Fm SB X7-7 Table 3* | | Service Area Population *Fm SB X7-7 Table 3* | Gross Water Use *Fm SB X7-7 Table 4* | Daily Per Capita Water Use |
| Year 1 | 2003 | 89,289 | 29,714 | 297 |
| Year 2 | 2004 | 94,561 | 32,468 | 307 |
| Year 3 | 2005 | 99,295 | 31,481 | 283 |
| Year 4 | 2006 | 101,641 | 33,637 | 295 |
| Year 5 | 2007 | 103,693 | 33,864 | 292 |
| **5 Year Average Baseline GPCD** | | | | **295** |
| 2015 Compliance Year GPCD | | | | |
| **2015** | | 123,572 | 22,881 | **165** |
| NOTES: | | | | |

| **SB X7-7 Table 6**: Gallons per Capita per Day<br>*Summary From Table SB X7-7 Table 5* | |
|---|---|
| 10-15 Year Baseline GPCD | 309 |
| 5 Year Baseline GPCD | 295 |
| 2015 Compliance Year GPCD | 165 |
| NOTES: | |

| **SB X7-7 Table 7: 2020 Target Method**<br>*Select Only One* | | |
|---|---|---|
| Target Method | | Supporting Documentation |
| ☑ | Method 1 | SB X7-7 Table 7A |
| ☐ | Method 2 | SB X7-7 Tables 7B, 7C, and 7D<br>*Contact DWR for these tables* |
| ☐ | Method 3 | SB X7-7 Table 7-E |
| ☐ | Method 4 | Method 4 Calculator |
| NOTES: | | |

| **SB X7-7 Table 7-A: Target Method 1**<br>20% Reduction | |
|---|---|
| 10-15 Year Baseline GPCD | **2020 Target GPCD** |
| 309 | **247** |
| NOTES: | |

| SB X7-7 Table 7-F: Confirm Minimum Reduction for 2020 Target | | | |
|---|---|---|---|
| 5 Year Baseline GPCD *From SB X7-7 Table 5* | Maximum 2020 Target[1] | Calculated 2020 Target[2] | **Confirmed 2020 Target** |
| 295 | 280 | 247 | **247** |

*[1] Maximum 2020 Target is 95% of the 5 Year Baseline GPCD* *[2] 2020 Target is calculated based on the selected Target Method, see SB X7-7 Table 7 and corresponding tables for agency's calculated target.*

NOTES:

| SB X7-7 Table 8: 2015 Interim Target GPCD | | |
|---|---|---|
| Confirmed 2020 Target *Fm SB X7-7 Table 7-F* | 10-15 year Baseline GPCD *Fm SB X7-7 Table 5* | **2015 Interim Target GPCD** |
| 247 | 309 | **278** |

NOTES:

| SB X7-7 Table 9: 2015 Compliance | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Actual 2015 GPCD | 2015 Interim Target GPCD | Optional Adjustments *(in GPCD)* Enter "0" if Adjustment Not Used | | | | | 2015 GPCD *(Adjusted if applicable)* | **Did Supplier Achieve Targeted Reduction for 2015?** |
| | | Extraordinary Events | Weather Normalization | Economic Adjustment | TOTAL Adjustments | Adjusted 2015 GPCD | | |
| 165 | 278 | *From Methodology 8 (Optional)* | *From Methodology 8 (Optional)* | *From Methodology 8 (Optional)* | - | 165 | 165 | **YES** |

NOTES:

# Appendix G – 2020 SBX7-7 Compliance Form

| SB X7-7 Table 0: Units of Measure Used in 2020 UWMP* *(select one from the drop down list)* |
|---|
| Acre Feet |
| **The unit of measure must be consistent throughout the UWMP, as reported in Submittal Table 2-3.* |
| NOTES: |

| SB X7-7 Table 2: Method for 2020 Population Estimate | |
|---|---|
| **Method Used to Determine 2020 Population** (may check more than one) | |
| ☑ | **1. Department of Finance** (DOF) or **American Community Survey** (ACS) |
| ☐ | **2. Persons-per-Connection Method** |
| ☐ | **3. DWR Population Tool** |
| ☑ | **4. Other** DWR recommends pre-review |
| NOTES: The population for areas in the City of Roseville boundary not served by the City of Roseville Water Utility was subtracted from the total 2020 DOF population. | |

| SB X7-7 Table 3: 2020 Service Area Population | |
|---|---|
| **2020 Compliance Year Population** | |
| **2020** | 140,187 |
| NOTES: | |

## SB X7-7 Table 4: 2020 Gross Water Use

| Compliance Year 2020 | 2020 Volume Into Distribution System *This column will remain blank until SB X7-7 Table 4-A is completed.* | 2020 Deductions: Exported Water * | 2020 Deductions: Change in Dist. System Storage* (+/-) | 2020 Deductions: Indirect Recycled Water *This column will remain blank until SB X7-7 Table 4-B is completed.* | 2020 Deductions: Water Delivered for Agricultural Use* | 2020 Deductions: Process Water *This column will remain blank until SB X7-7 Table 4-D is completed.* | 2020 Gross Water Use |
|---|---|---|---|---|---|---|---|
| | 33,263 | 1,451 | - | - | - | - | **31,813** |

*** Units of measure (AF, MG , or CCF)** must remain consistent throughout the UWMP, as reported in SB X7-7 Table 0 and Submittal Table 2-3.

NOTES:

## SB X7-7 Table 4-A: 2020 Volume Entering the Distribution System(s), Meter Error Adjustment

Complete one table for each source.

| | |
|---|---|
| **Name of Source** | Folsom Lake |
| **This water source is** *(check one)* **:** | |
| ☑ | The supplier's own water source |
| ☐ | A purchased or imported source |

| Compliance Year 2020 | Volume Entering Distribution System [1] | Meter Error Adjustment [2] *Optional* *(+/-)* | Corrected Volume Entering Distribution System |
|---|---|---|---|
| | 31,711 | - | 31,711 |

*[1] **Units of measure (AF, MG , or CCF)** must remain consistent throughout the UWMP, as reported in SB X7-7 Table 0 and Submittal Table 2-3.*

*[2] **Meter Error Adjustment** - See guidance in Methodology 1, Step 3 of Methodologies Document*

NOTES: Total volume excludes raw water delivered to Linda Creek.

## SB X7-7 Table 4-A: 2020 Volume Entering the Distribution System(s) Meter Error Adjustment

Complete one table for each source.

| | | | |
|---|---|---|---|
| **Name of Source** | Ground Water | | |
| **This water source is** *(check one)* **:** | | | |
| ☑ | The supplier's own water source | | |
| ☐ | A purchased or imported source | | |
| **Compliance Year 2020** | Volume Entering Distribution System [1] | Meter Error Adjustment [2] *Optional* *(+/-)* | Corrected Volume Entering Distribution System |
| | 201 | 0 | 201 |

[1] ***Units of measure (AF, MG , or CCF)*** *must remain consistent throughout the UWMP, as reported in SB X7-7 Table 0 and Submittal Table 2-3.*

[2] ***Meter Error Adjustment -*** *See guidance in Methodology 1, Step 3 of Methodologies Document*

NOTES:

## SB X7-7 Table 4-A: 2020 Volume Entering the Distribution System(s), Meter Error Adjustment

Complete one table for each source.

| | | | |
|---|---|---|---|
| **Name of Source** | Total water delivered from other suppliers to Roseville | | |
| **This water source is** *(check one)* **:** | | | |
| ☐ | The supplier's own water source | | |
| ☑ | A purchased or imported source | | |
| **Compliance Year 2020** | Volume Entering Distribution System [1] | Meter Error Adjustment [2] *Optional* *(+/-)* | Corrected Volume Entering Distribution System |
| | 1,352 | 0 | 1,352 |

[1] ***Units of measure (AF, MG , or CCF)*** *must remain consistent throughout the UWMP, as reported in SB X7-7 Table 0 and Submittal Table 2-3.*

[2] ***Meter Error Adjustment*** *- See guidance in Methodology 1, Step 3 of Methodologies Document*

NOTES:

| SB X7-7 Table 5: 2020 Gallons Per Capita Per Day (GPCD) | | |
|---|---|---|
| **2020 Gross Water** ***Fm SB X7-7 Table 4*** | **2020 Population** ***Fm SB X7-7 Table 3*** | **2020 GPCD** |
| 31,813 | 140,187 | **203** |
| NOTES: | | |

| SB X7-7 Table 9: 2020 Compliance | | | | | | | |
|---|---|---|---|---|---|---|---|
| Actual 2020 GPCD[1] | Optional Adjustments to 2020 GPCD<br>Enter "0" if Adjustment Not Used | | | | | 2020 Confirmed Target GPCD [1, 2] | **Did Supplier Achieve Targeted Reduction for 2020?** |
| | Extraordinary Events[1] | Weather Normalization[1] | Economic Adjustment[1] | TOTAL Adjustments[1] | Adjusted 2020 GPCD [1] *(Adjusted if applicable)* | | |
| 203 | - | - | - | - | 203 | 247 | **YES** |

[1] *All values are reported in GPCD*

[2] ***2020 Confirmed Target GPCD*** *is taken from the Supplier's SB X7-7 Verification Form Table SB X7-7, 7-F.*

NOTES:

# Appendix H – Intent to Retain Control of Conserved Water

RESOLUTION NO. 09-64

DECLARING AN INTENT TO RETAIN CONTROL OF CONSERVED WATER

WHEREAS, the City has contractual entitlements to divert water from Folsom Reservoir, under which the City diverts and treats water for distribution to its residents and water users; and

WHEREAS, the City plans to implement a series of water conservation projects and programs for the purpose of eliminating losses of water within its water transmission and distribution system and for reducing consumption of water by its customers through on-site efficiency improvements and curtailment of water waste; and

WHEREAS, Water Code section 1011 provides that water is deemed conserved when less water is used to accomplish the same purposes of use allowed under a water right and that such cessation or reduction in use is deemed a beneficial use of a water right to the extent of such cessation or reduction in use; and

WHEREAS, Water Code section 1011 and the City's CVP water service contract authorizes the City to make water conserved as a result of such water conservation projects and programs available for use, sale, lease, exchange or short- or long-term transfers inside and outside of the City; and

NOW, THEREFORE, BE IT RESOLVED by the Council of the City of Roseville as follows:

1. The foregoing recitals are true and are incorporated into this Resolution by this reference.

2. The City Council finds and determines that: (a) making significant investments in infrastructure and administrative resources protects the City's water supplies for the benefit of all residents and water users in the City; (b) protecting all of the City's water supplies is of paramount importance to the health and welfare of the City's residents and water users; (c) conserving water through reductions in use is intended to promote statewide policies mandating and encouraging beneficial use of water; and (d) preserving conserved water supplies and making those supplies available for use, sale or transfer is in the best interests of the City and its residents and water users.

3. The City Council declares that, by instituting programs to conserve water, it abandons no right, title or interest in or to any City water rights, contractual entitlements or any appurtenant rights necessary to exercise such water rights or entitlements.

4. In accordance with Water Code section 1011 and any contractual rights, the City reserves the right to sell, lease, exchange, or otherwise transfer for use within or outside of the City's boundaries all water that has been conserved as a result of its water conservation projects and programs.

5. The Environmental Utilities Director and staff are directed to take all actions necessary to implement this Resolution, including the filing of annual reports of reductions in water use resulting from any water conservation projects and programs carried out under this Resolution with the State Water Resources Control Board.

PASSED AND ADOPTED by the City Council of the City of Roseville on the 18th day of February 2009, by the following vote:

AYES COUNCILMEMBERS: Allard, Gray, Garcia, Roccucci, Garbolino

NOES COUNCILMEMBERS: None

ABSENT COUNCILMEMBERS: None

MAYOR

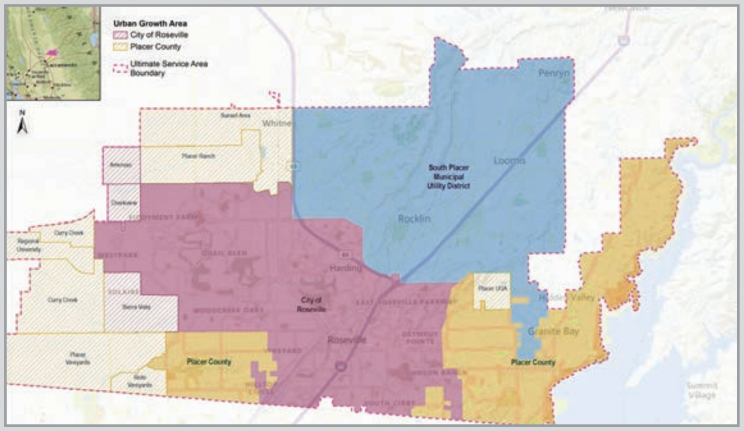
Attest:

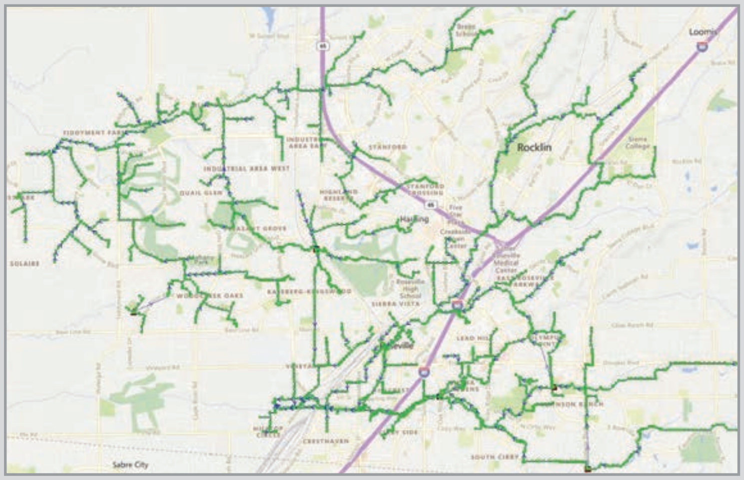
City Clerk

# Appendix I – Regional 2020 Wastewater Systems Evaluation Report

**SOUTH PLACER WASTEWATER AUTHORITY**
Partners: City of Roseville, Placer County, South Placer Municipal Utility District

# South Placer Regional Wastewater 2020 Systems Evaluation Report





**December 2020**

*Prepared by*
WOODARD & CURRAN

# SOUTH PLACER REGIONAL WASTEWATER 2020 SYSTEMS EVALUATION REPORT

REGISTERED PROFESSIONAL ENGINEER
CHRISTOPHER C. VANLIENDEN
No. 75034
Exp. 12-31-21
CIVIL
STATE OF CALIFORNIA


WOODARD & CURRAN
2175 North California Blvd., Suite 315
Walnut Creek, CA 94596
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woodardcurran.com
COMMITMENT & INTEGRITY DRIVE RESULTS


0011183.00
South Placer Wastewater Authority
December 2020

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## TABLES

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## Acknowledgements


This report represents a collaborative effort between Woodard & Curran, V&A Consulting Engineers, the South Placer Wastewater Authority, the City of Roseville, the South Placer Municipal Utility District, and Placer County. We would like to take an opportunity to thank the following key individuals:

| | |
|---|---|
| Ken Glotzbach | City of Roseville |
| Todd Jordan | City of Roseville |
| Chris Bracco | City of Roseville |
| Kevin Bell | Placer County |
| Robin Mahoney | Placer County |
| Jared Deck | Placer County |
| Eric Nielsen | South Placer Municipal Utility District |
| Carie Huff | South Placer Municipal Utility District |
| Herb Niederberger | South Placer Municipal Utility District |
| Dave Richardson | Woodard & Curran |
| Chris van Lienden | Woodard & Curran |
| Jim Graydon | Woodard & Curran |
| Gisa Ju | Woodard & Curran |
| Ian Jaffe | Woodard & Curran |
| Athena Pervissian | Woodard & Curran |
| James Kohne | Woodard & Curran |
| Kevin Krajewski | V&A Consulting Engineers |

## List of Abbreviations

| | |
|---|---|
| AA | average annual |
| ac | acres |
| ADWF | average dry weather flow |
| AFY | acre feet per year |
| APN | assessor parcel number |
| BOD | biochemical oxygen demand |
| BSF | base sanitary flow |
| CIP | Capital Improvement Program |
| DC | Dry Creek |
| DCWWTP | Dry Creek Wastewater Treatment Plant |
| du, DU | dwelling unit |
| DWF | dry weather flow |
| ea | each |
| EDU | Equivalent Dwelling Unit |
| ENR-CCI | Engineering News Record Construction Cost Index |
| ft | feet |
| FY | fiscal year |
| GIS | Geographical Information System |
| gpd | gallons per day |
| gpm | gallons per minute |
| GWI | groundwater infiltration |
| I/I | inflow and infiltration |
| in | inches |
| lb/day | pounds per day |
| MCRT | mean cell residence time |
| MG | million gallons |
| mgd | million gallons per day |
| MM | maximum month |
| NPDES | National Pollutant Discharge Elimination System |
| PDWWF | peak day wet weather flow |
| PG | Pleasant Grove |
| PGWWTP | Pleasant Grove Wastewater Treatment Plant |
| PHWWF | peak hour wet weather flow |
| PMF | peak month flow |
| PS | pump station |
| PWWF | peak wet weather flow |
| RAS | return activated sludge |
| RDI/I | rainfall dependent infiltration/inflow |

| | |
|---|---|
| RWQCB | Regional Water Quality Control Board |
| SMD-2 | Placer County Sewer Maintenance District 2 |
| SMD-3 | Placer County Sewer Maintenance District 3 |
| SPMUD | South Placer Municipal Utility District |
| SPWA | South Placer Wastewater Authority |
| SWRCB | State Water Resources Control Board |
| Systems Evaluation | Regional Wastewater and Recycled Water Systems Evaluation |
| TM | technical memorandum |
| TSS | total suspended solids |
| UGA | Urban Growth Area |
| UV | ultraviolet |
| WAS | waste activated sludge |
| WWF | wet weather flow |
| WWTP | wastewater treatment plant |

# EXECUTIVE SUMMARY

This report summarizes the results and recommendations of the Systems Evaluation prepared for the South Placer Wastewater Authority (SPWA), which is a Joint Powers Authority comprised of the City of Roseville (City), South Placer Municipal Utility District (SPMUD), and the County of Placer (Placer County). The Systems Evaluation was prepared by Woodard & Curran in close coordination with City, County and District staff. The Systems Evaluation will be used to guide improvements to the regional wastewater collection system and wastewater treatment plants to accommodate current and future development and ensure that SPWA's customers continue to receive a high level of service.

## Background and Purpose of the Systems Evaluation

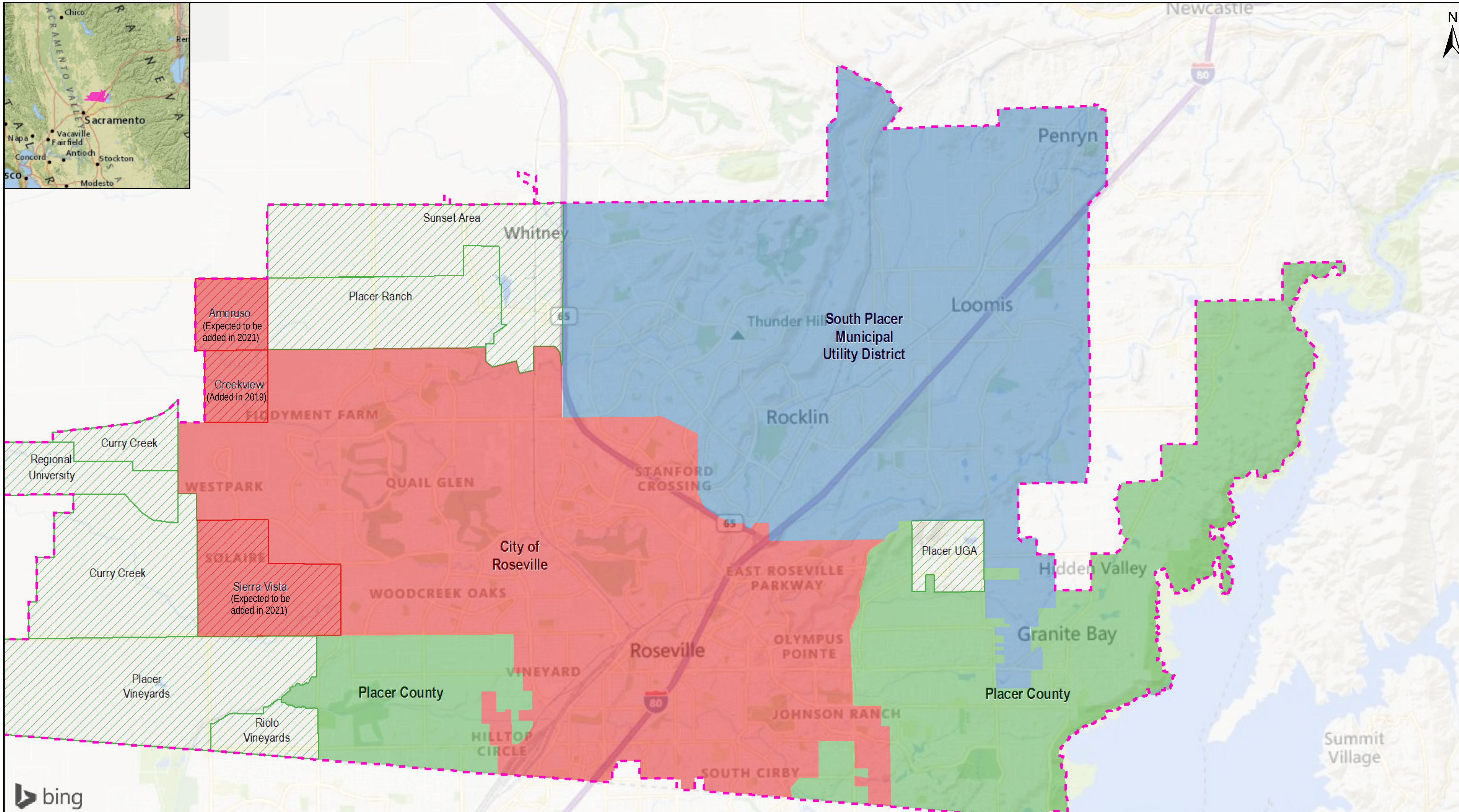
The South Placer Wastewater Authority (SPWA) was created under a Joint Powers Agreement in October 2000 and comprises the City of Roseville (City), South Placer Municipal Utility District (SPMUD), and the County of Placer (Placer County). Flow from SPMUD and portions of Placer County discharge into the City's sewer collection system. The City of Roseville, on behalf of the regional partners, owns and operates two regional wastewater treatment facilities: the Pleasant Grove Wastewater Treatment Plant (PGWWTP), and the older Dry Creek Wastewater Treatment Plant (DCWWTP). Additionally, the City of Roseville owns and operates the network of gravity sewers, pump stations, and force mains that serve customers within the City's limits, including the joint (regional) facilities that convey flow from the SPWA partners. SPMUD owns and operates gravity sewers, pump stations, and force mains in Rocklin, Loomis, and portions of southern Placer County. Placer County owns and operates gravity sewers, pump stations, and force mains in unincorporated areas of Placer County that are not served by other agencies.

The South Placer Regional Wastewater and Recycled Water Systems Evaluation prepared in 2009 (2009 Systems Evaluation), defined the SPWA service area boundary; evaluated the wastewater collection, wastewater treatment, and recycled water distribution systems; and identified existing and potential future improvement needs. Since that study was completed, the recycled water distribution system has been "removed" from the SPWA system (reallocated as an asset) and is now wholly managed by the City of Roseville. SPWA is now updating the Systems Evaluation to better evaluate future wastewater collection and treatment capacity needs that may have changed since 2009. This report documents the evaluation of the wastewater collection system capacity and the capacity of the wastewater treatment plants versus projected flows and loads.

This South Placer Regional Wastewater Systems Evaluation (Systems Evaluation) has been conducted to accomplish the following:

- Document the existing (2020) capacity and the flows and loadings on regional trunk sewer and wastewater treatment infrastructure and facilities present in 2020;
- Project buildout conditions based upon regional planning documents and planned regional developments in southwestern Placer County; and,
- Present a Regional Systems evaluation, with system deficiencies identified, and capital projects forecasted, which will inform the SPWA partners in identifying their ability to provide service for planned and proposed development both presently and for buildout conditions.

The service area is shown in Figure 1-1, and the regional collection system is shown in Figure ES-2. Figure 1-1 also indicates the location of the Urban Growth Areas (UGAs) within the service area, which are included in this study. Note that Creekview has been incorporated into the City of Roseville service area as of January 2019, while Amoruso and Sierra Vista are anticipated to be incorporated into the City's service area in early 2021.




# Figure ES-1

## 2021 Service Area Boundary

South Placer Wastewater Authority
2020 Systems Evaluation

0 ½ 1 2 Miles

**2021 Partner Agency Service Area**

- City of Roseville
- Placer County
- SPMUD

**Urban Growth Area**

- City of Roseville UGA
- Placer County UGA
- Ultimate Service Area Boundary

Project #: 0011183.00
Map Created: December 2020

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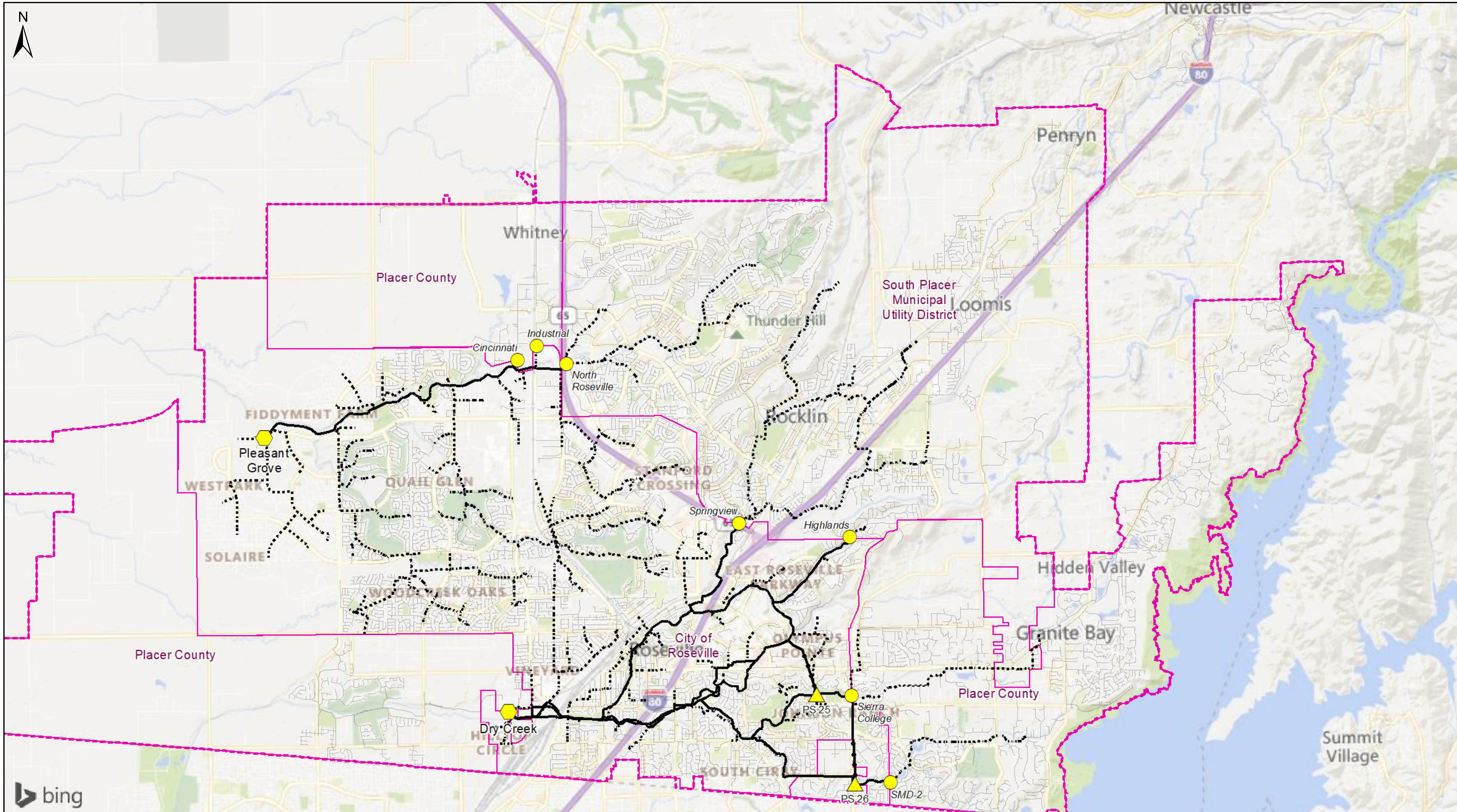


# Figure ES-2
# Modeled Trunk System

South Placer Wastewater Authority
2020 Systems Evaluation

0 ½ 1 2 Miles

- Regional Gravity Sewer
- Regional Force Main
- Non-Regional Modeled Sewer
- Non-Modeled Sewer
- Wastewater Treatment Plant
- Pump Station
- Permanent Flow Meters
- Partner Agency Boundary
- Ultimate Service Area Boundary

Project #: 0011183.00
Map Created: December 2020

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Placer | CITY OF ROSEVILLE CALIFORNIA | SMUD | WOODARD & CURRAN

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## Modeled Flow Projections

The flow projections developed for this Systems Evaluation were based on the information collected for the system's hydraulic model updates, including the updates performed for the current study. In 2007, a hydraulic model of the City's sewer collection system was developed using the H2OMap Sewer modeling platform (2007 Model Development Project), in parallel with a trunk sewer model for the combined Roseville, SPMUD, and Placer County systems. The models were later updated as part of the 2009 Systems Evaluation. Subsequently, the City's sewer model was updated in 2017 to reflect existing and future demands within the City, and to upgrade the modeling platform to the fully dynamic InfoWorks ICM software. For the current Systems Evaluation Update, the City's model was updated to reflect existing and future projected flows from Placer County and SPMUD.

Existing base wastewater flows were developed based on the assumptions summarized below; currently connected parcels are indicated in Figure ES-3. Note that flow projections (referred herein as loads) are intended to represent the level of development present during the flow monitoring periods used to calibrate the hydraulic model. Buildout loads were based on projected development within the service area. Two buildout scenarios were developed: (1) Buildout scenario representing the currently anticipated development density, and (2) Buildout-Sensitivity scenario, representing higher density development and some potential redevelopment areas.

For the City of Roseville, existing loads were developed based on water consumption data, and calibrated during the 2017 model update. A 15% rebound to reflect drought conditions was assumed for existing sewer loads. A buildout scenario was developed based on infill of currently vacant parcels using land use information from the City's General Plan or provided by the City's planning department, and development of UGAs within the City. The Buildout-Sensitivity scenario considers potential intensification and redevelopment in the downtown Roseville area.

Placer County provided spreadsheets summarizing existing equivalent dwelling units (EDUs) for each APN[1], which formed the basis of the existing model loads. (Note: an EDU is defined as the flow equivalent of one single-family residence.) For the Buildout scenario, flows were based on a spreadsheet provided by Placer County that summarized the anticipated EDUs for all entitled projects in Placer County[2], development of other currently vacant parcels (based on general plan data[2]), and development of the Placer County UGAs. For the Buildout scenario, an average development density for vacant parcels was assumed within the General Plan limits. For the Buildout-Sensitivity scenario, the development density was assumed to be at the maximum range allowed by the General Plan. A Base Wastewater Flowrate (BWF) of 180 gpd per EDU was assumed for Placer County and SPMUD.

SPMUD provided a shapefile[3] which provided EDUs for the year 2020 (which was identified as "existing" land use by SPMUD staff), and 2060 (which was identified as "Buildout" by SPMUD staff). This shapefile formed the basis of the Existing and Buildout scenarios.

For the UGAs, land use and flow projections were based on the most recent wastewater master plans for each UGA.

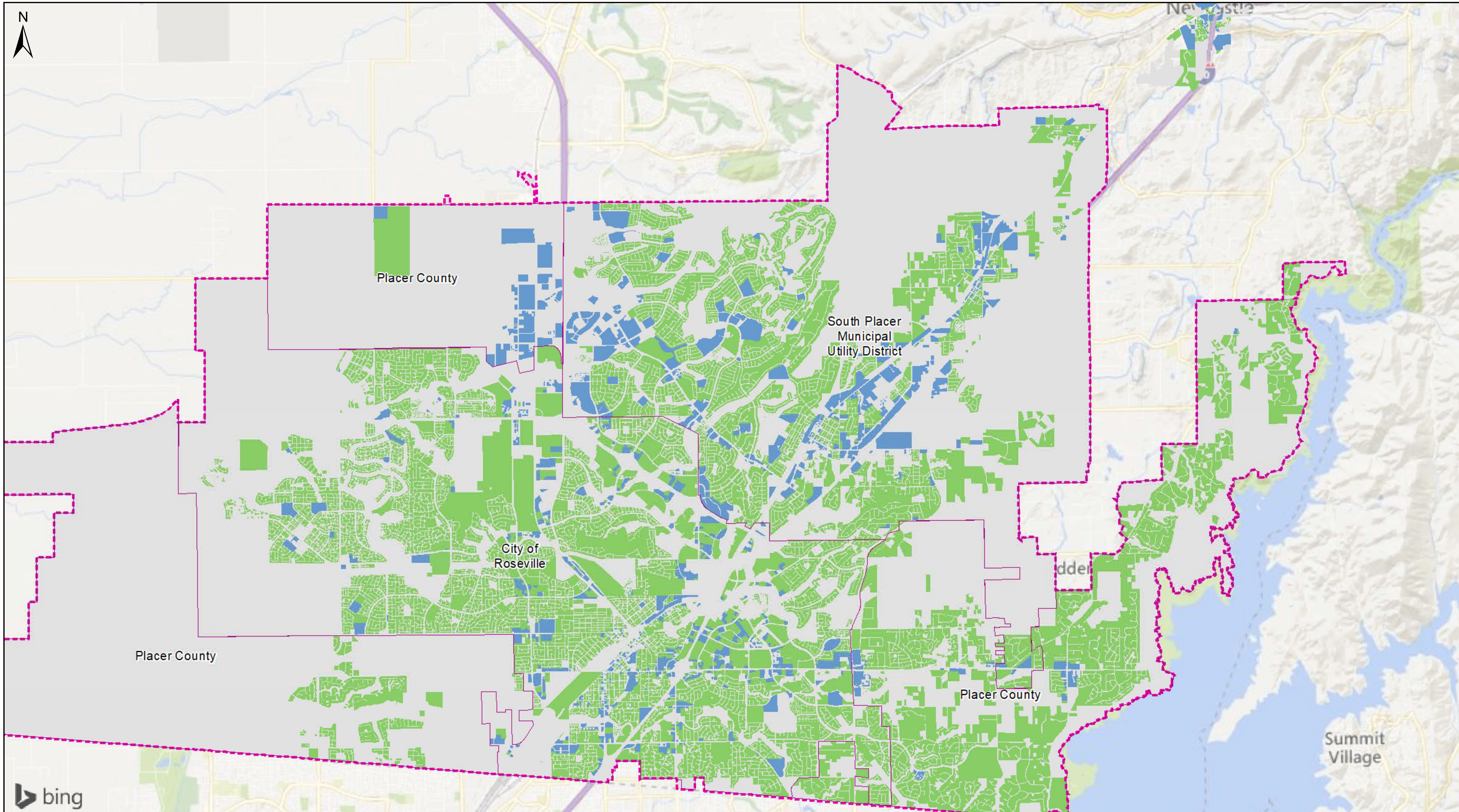
The locations of future developments, including urban growth areas, are indicated in Figure ES-4.

---

[1] Spreadsheets included: Existing dry creek EDU-7-24-19.xls, Existing SMD 2- EDU-2018-12-12.xlsx, Existing SMD 3- EDU-2018-12-12.xlsx, Existing Sunset EDU-7-24-19.xls

[2] 2018-12-18-Entitled-Planned Project.xlsx (provided December, 2018) and GeneralPlans_CommPlans.shp (downloaded from Placer County website, dated October 20, 2019)

[3] SPMUD_SewerLoading_AddressPoints, provided August 7, 2019.




# Figure ES-3

## Existing Connected Parcels

South Placer Wastewater Authority
2020 Systems Evaluation

0 ½ 1 2 Miles

**Parcel Land Use**

- Commercial/Industrial
- Residential
- Unconnected

- Service Area Boundary
- Partner Agency Boundary

Project #: 0011183.00
Map Created: December 2020

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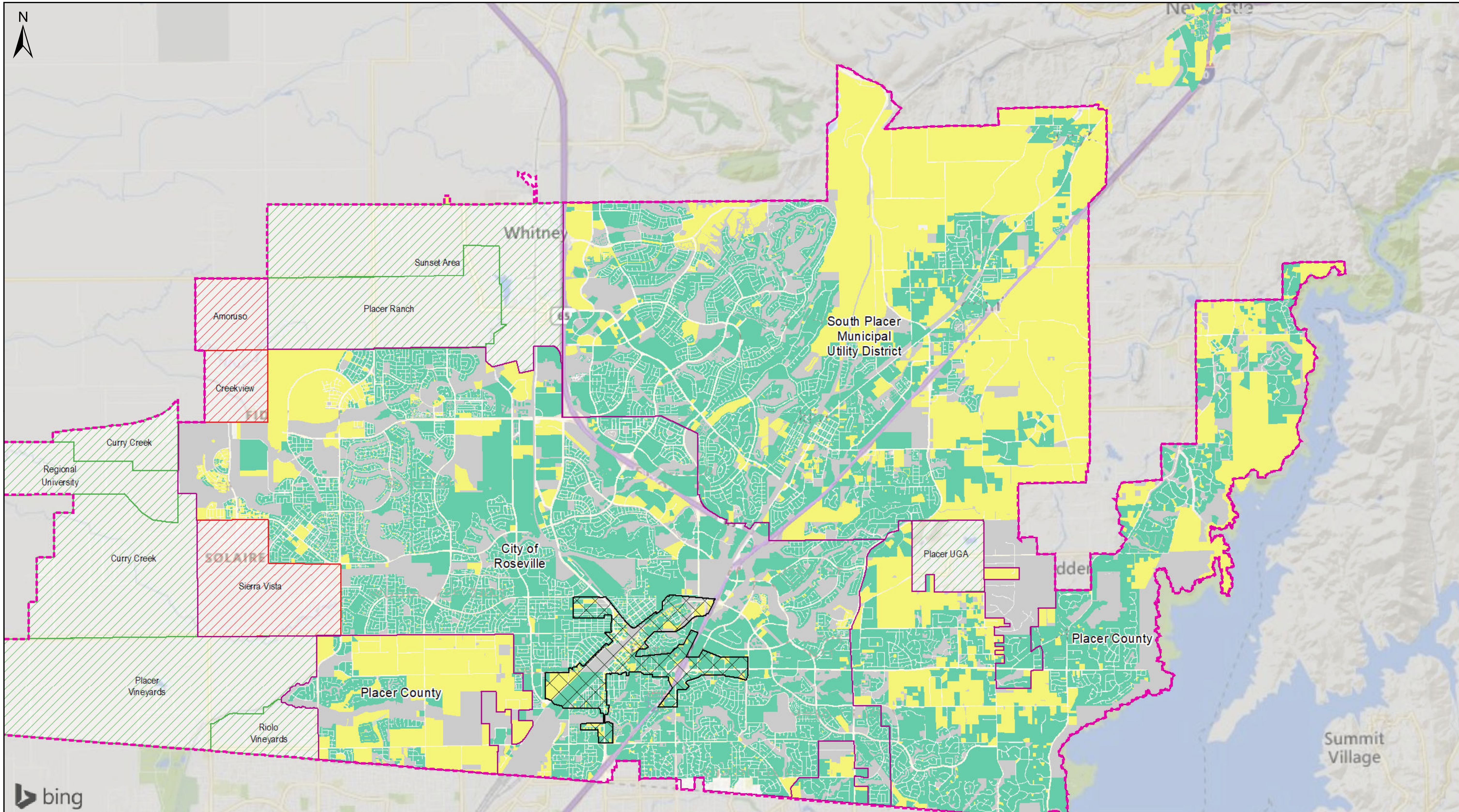


# Figure ES-4

Future Development and Urban Growth Areas

South Placer Wastewater Authority
2020 Systems Evaluation

0 ½ 1 2 Miles

**Buildout Status**

- Existing
- Future Connection
- Unconnected
- Redevelopment Area

**Urban Growth Area**

- City of Roseville UGA
- Placer County UGA
- Partner Agency Boundary

- Service Area Boundary

Project #: 0011183.00
Map Created: December 2020

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Model loads were calibrated based on temporary monitoring programs for the 2015/2016 wet weather season (30 meters for the City's 2017 Model Update) and 12 meters during the 2018/2019 wet weather season (for SPMUD and Placer County). V&A Consulting Engineers, under subcontract to Woodard & Curran, conducted the monitoring. As part of the calibration process, rates of wet season groundwater infiltration (GWI, observed as a constant additional flow throughout the monitoring period), and rainfall-dependent inflow and infiltration (RDI/I) were calculated. Existing and projected flows predicted by the model are summarized in Table ES-1 and Table ES-2.

Table ES-1: Estimated Dry Weather Flows[a] by Agency

| WWTP | Agency | Existing Calibration ADWF (mgd) | Existing ADWF with Drought Rebound | Buildout ADWF (mgd) | Buildout-Sensitivity[b] ADWF (mgd) |
|---|---|---|---|---|---|
| Pleasant Grove | Roseville | 5.87 | 6.70 | 13.01 | 13.04 |
| | Placer County | 0.18 | 0.20 | 9.85 | 9.85 |
| | SPMUD | 2.25 | 2.97 | 3.63 | 3.63 |
| | Total | 8.30 | 9.87 | 26.49 | 26.52 |
| Dry Creek | Roseville | 5.60 | 6.27 | 6.89 | 8.23 |
| | Placer County | 2.57 | 2.81 | 7.19 | 7.42 |
| | SPMUD | 2.90 | 3.64 | 5.16 | 5.16 |
| | Total | 11.06 | 12.72 | 19.24 | 20.81 |

Notes:

a. Includes wet season GWI.
b. For the Buildout-Sensitivity scenario, the development density was assumed to be at the maximum range allowed by the General Plan. A Base Wastewater Flowrate (BWF) of 180 gpd per EDU was assumed for Placer County and SPMUD

Table ES-2: Modeled ADWF And Peak WW Flow Summary

| | Existing (Rebound) | | | Buildout | | | Buildout-Sensitivity | | |
|---|---|---|---|---|---|---|---|---|---|
| WWTP | BWF[a] (mgd) | ADWF (mgd) | PWWF[b] (mgd) | BWF[a] (mgd) | ADWF (mgd) | PWWF[b] (mgd) | BWF[a] | ADWF (mgd) | PWWF[b] (mgd) |
| Pleasant Grove | 9.5 | 9.9 | 27.4 | 26.1 | 26.5 | 55.8 | 26.2 | 26.5 | 56.0 |
| Dry Creek | 10.1 | 12.7 | 41.9 | 16.7 | 19.2 | 59.2 | 18.2 | 20.8 | 60.6 |

Notes:

a. Does not include wet season groundwater infiltration (GWI).
b. Modeled PWWF assumes improvements have been implemented to eliminate overflows and significant surcharging.

## Trunk Sewer Evaluation

The calibrated model was run for Existing, Buildout, and Buildout-Sensitive land use scenarios under the design event described above. Several deficiencies were identified in non-regional facilities which resulted in model-predicted overflows for one or more of the scenarios; to ensure flows were conveyed to regional sewers, pipes were upsized in this analysis to eliminate any overflows. As the current model is a calibrated fully-dynamic model, the design condition represents a relatively infrequent storm event, and many of SPWA's sewers are relatively deep, surcharging up to within 5 feet of the manhole rims (ground surface) was considered acceptable under 10-year design storm PWWF, as long as the surcharge (flow height in the manhole) does not exceed 4 feet from the top of pipe up the manhole.

Model results under Existing and Buildout conditions are summarized in Table ES-3 and results for the Buildout scenario are shown in Figure ES-5. Within the regional system, seven deficiency areas have been identified as indicated in Figure ES-5. There was no significant difference in modeled surcharge between the Buildout and Buildout-Sensitivity scenarios.

Table ES-3: Sewer Capacity Results under Existing and Buildout Land Use Scenarios[a]

| Area | Existing (with Rebound) | | | Buildout and Buildout-Sensitivity | | |
|---|---|---|---|---|---|---|
| | Length of Throttle Surcharge (ft) | Maximum Surcharge Depth (ft) | Minimum Freeboard (ft) | Length of Throttle Surcharge (ft) | Maximum Surcharge Depth (ft) | Minimum Freeboard (ft) |
| A | 5,530 | 7.3 | 0.0 | 5,530 | 7.8 | 0.0 |
| B | 3,369 | 1.9 | 2.0 | 3,948 | 7.7 | 0.0 |
| C | 522 | 1.0 | 7.4 | 6,009 | 6.4 | 2.8 |
| D | 700 | 1.1 | 8.6 | 4,220 | 3.3 | 6.4 |
| E | -- | -- | -- | 2,223 | 3.1 | 5.6 |
| F | -- | 0.9 | 12.2 | 1,716 | 7.3 | 2.2 |
| G | -- | -- | -- | 0 | 2.3 | 6.3 |

Notes:

a. Areas that exceed the hydraulic capacity criteria but do not have modeled overflows are highlighted yellow, while areas with modeled overflows are highlighted orange.

Based on these model results, improvement projects have been identified to relieve the capacity deficiencies. Improvement Project 1 would relieve existing deficiencies, while Improvement Project 2 and 3 would relieve deficiencies identified in the Buildout system. Improvement Project 2 and 3 would largely be triggered by additional growth in Placer County's SMD2 and SMD3 service areas. Subsequent model runs were performed to estimate the number of EDUs that would trigger the need for these additional projects; based on this analysis, the projects would be needed after approximately 1,800 additional EDUs (compared to 2018 development). Based on the EDU projections provided by Placer County, this additional growth is not anticipated until after Fiscal Year (FY) 2059/2060. Note that this estimate is based on dry weather flows and rainfall response estimated as part of the model update; changes in these projected flows may occur (in the future with additional flow monitoring and model updates) which would trigger the need for the projects earlier, or delay or eliminate the need for the projects.

The proposed capacity improvement projects are summarized in Table ES-4 and the locations are shown in Figure ES-6.

Table ES-4: Proposed Capacity Improvement Projects

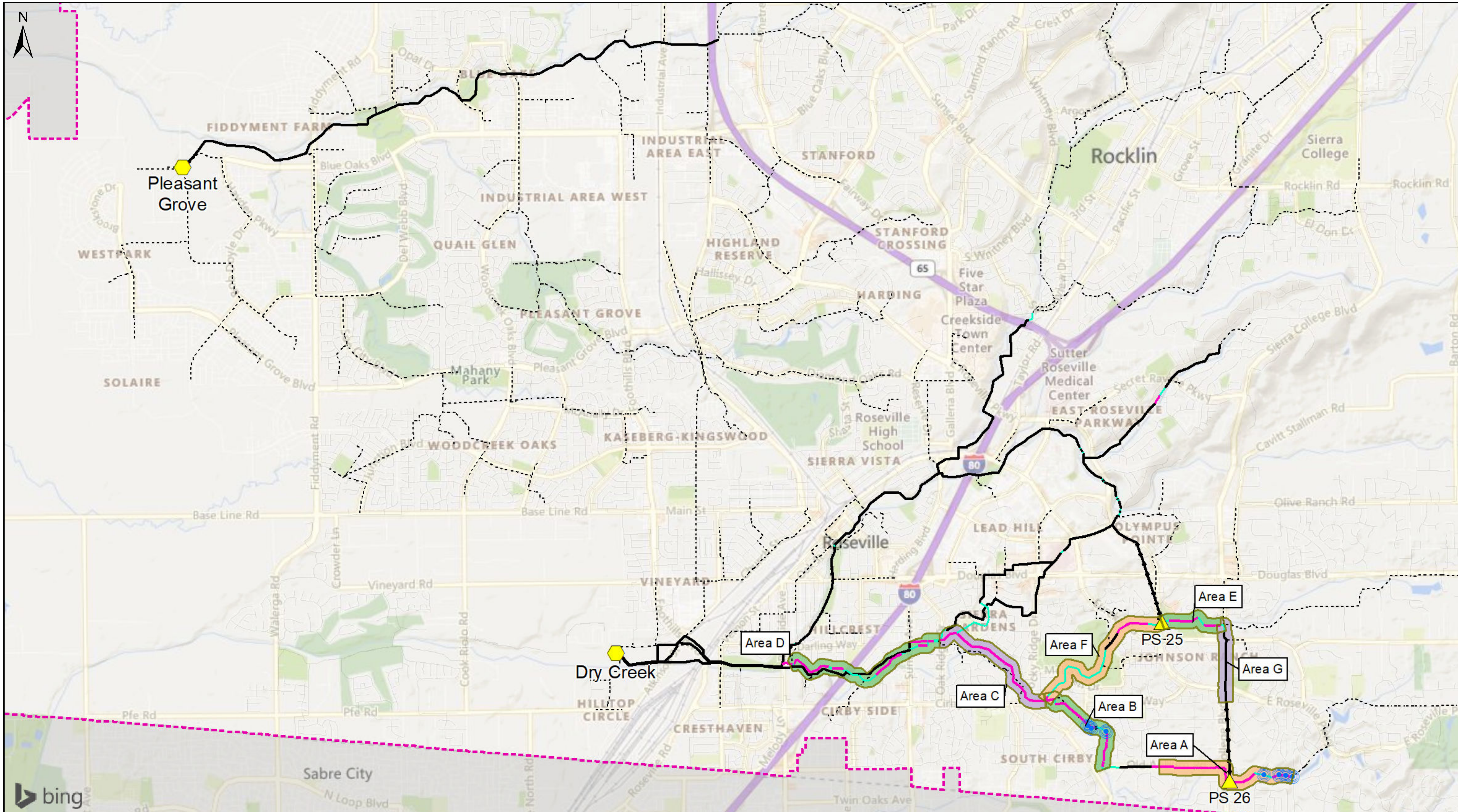
| Project | Description | Estimated Capital Improvement Cost | Approximate Additional EDUs in SMD2/SMD3 to Trigger Project[a] |
|---|---|---|---|
| 1 | Increased Capacity of PS 26 and sewers on Sierra College Blvd directly downstream of PS 26 to relieve Old Auburn Trunk sewer (Area A) | $1,606,000 | Existing |
| 2 | Redirect flows from PS 26 and Sierra College Blvd down Eureka Road to relieve Area E. | $1,831,000 | ~1,800[b] |
| 3 | Increased Firm capacity of PS 25 to meet Buildout PWWF.<br>New weir structure or adjustments to existing structure at PS 25 to convey the maximum potential flow through PS 25 without any dry weather flows. | $758,000 | ~1,800[c] |

Notes:

a. Based on a percentage of buildout factor applied to future model loads. Represents approximately 60% of buildout.

b. There are approximately 8,400 Existing EDUs upstream of the deficiency triggering Improvement Project 2, and approximately 10,200 EDUs would trigger the need for improvement. Represents approximately 60% of buildout.

c. There are approximately 11,900 Existing EDUs upstream of the deficiency triggering Improvement Project 3, including 7,600 in Placer County, 4,200 in Roseville, and less than 100 in SPMUD. Approximately 13,700 EDUs would trigger the need for the improvement.




# Figure ES-5

Model Results (Buildout and Buildout Sensitivity PWWF)

South Placer Wastewater Authority
2020 Systems Evaluation

0 ¼ ½ 1 Miles

- Regional Gravity Sewer
- Force Main
- Non-Regional Modeled Sewer
- Backwater Surcharge
- Throttle Surcharge
- Modeled Sewer Overflow
- Deficiency Area
- Ultimate Service Area Boundary

Project #: 0011183.00
Map Created: December 2020

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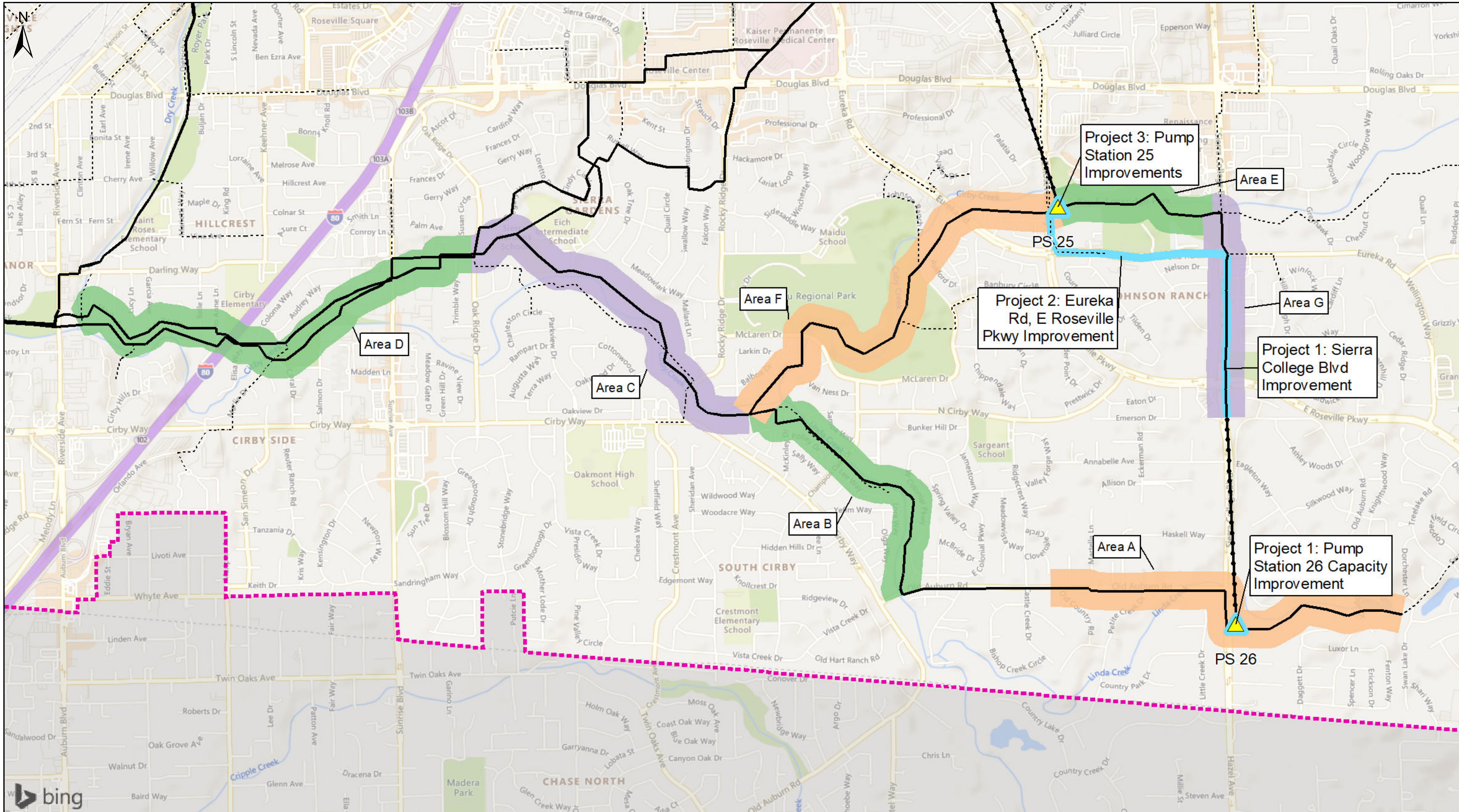


# Figure ES-6
## Proposed Improvement Locations

South Placer Wastewater Authority
2020 Systems Evaluation

0 0.125 0.25 0.5 Miles

- Regional Gravity Sewer
- Force Main
- Non-Regional Modeled Sewer
- Pump Station
- Preliminary Capacity Improvement Area
- Deficiency Area
- Service Area Boundary

Project #: 0011183.00
Map Created: December 2020
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## Wastewater Treatment Plant Expansion Evaluation

Based on the updated growth projections provided by the SPWA partners, wastewater flow and loading (organic loading as measured by Biochemical Oxygen Demand, or BOD, and solids loading as measured by Total Suspended Solids, or TSS) projections were developed for the Dry Creek Wastewater Treatment Plant (DCWWTP) and Pleasant Grove Wastewater Treatment Plant (PGWWTP). The flow and loading projections were compared to the most recent evaluations of treatment plant capacity from 2009 for DCWWTP and from 2016 for PGWWTP. Projected shortfalls in hydraulic capacity or biological treatment capacity were identified and preliminary recommendations for expansion and upgrade projects were proposed. The recommendations address phasing, timing, and preliminary conceptual costs of the expansions required through buildout to address both flows and loads, as well as identifying next steps for confirming current plant capacity and refining expansion and upgrade projects.

## Wastewater Flow and Loading Evaluation

Current influent flows and loadings for both plants were established by analyzing daily plant influent data provided by the City of Roseville for the period from January 1, 2016 through September 19, 2019 for influent flow and from January 1, 2013 through September 19, 2019 for wastewater loadings. Notably, the waste loadings for biochemical oxygen demand (BOD) over the past 6 years have been significantly higher than documented for prior studies and design projects. In previous studies, average BOD concentrations of 248 mg/L at DCWWTP and 285 mg/L at PGWWTP were documented. The 2013-2019 data set shows an average influent BOD concentration of 425 mg/L at DCWWTP and 358 mg/L at PGWWTP. These higher concentrations may be a result of water conservation efforts over the past decade combined with the drought conditions that were experienced throughout California from 2011-2016, but should be confirmed through additional testing. While TSS and nutrient loadings were also calculated, now that the Roseville WWTPs are addressing nutrient removal in their water quality strategies, the focus herein is on organic loading, as measured by BOD, because that is where the capacity constraints present themselves.

Projected flows were calculated based on population and non-residential growth, normalized to account for diversity in land uses by establishing equivalent dwelling units (EDUs). EDU projection data were provided by each of the SPWA partners. Flow projections were developed by multiplying the projected EDUs by an ADWF contribution of 190 gallons per day (gpd) per EDU, in accordance with the estimate developed in the 2009 Systems Evaluation (a conservative value used for regional treatment capacity planning).

The plant data show that current BOD loadings are higher than the BOD treatment capacities estimated in the prior reference documents for both plants. However, according to City staff, the plants have consistently been in compliance with their NPDES discharge permits. This suggests that the actual plant capacities are beyond their nominal design capacity with respect to BOD. Additionally, it is unclear to what extent interim improvements such as the Nitrate Reduction Improvements project at DCWWTP have affected the plant capacity. For the purposes of this Systems Evaluation, it is assumed that the annual average BOD removal capacity at each plant is, at minimum, the same as the current BOD loadings. It is recommended that process-specific sampling, process modeling, and, if needed, stress testing be performed to determine the actual plant capacity, the limiting processes, and corresponding process improvements needed at each plant. While this evaluation will be immediately helpful at Pleasant Grove, it is immediately essential at Dry Creek because of the large discrepancy between current loading and nominal capacity.

The current and projected flows and loadings to the treatment plants are summarized in Table ES-5 along with the treatment capacities based on current operating conditions. This comparison of current plant capacity and projected future flows and loads accounts for only hydraulic and carbonaceous BOD treatment capacity because these parameters have driven capacity expansion timing in the past (vs. TSS and nutrient treatment capacity). Potential nutrient removal requirements have not been considered in expansion timing and phasing. Evaluation of plant capacity with respect to TSS and nutrient removal should be incorporated into the subsequent analysis of plant capacity.

Table ES-5: Current and Projected Flows and Organic (BOD) Loadings

| Parameter | Condition | Unit | Capacity | Current | FY59/60 | Buildout |
|---|---|---|---|---|---|---|
| Dry Creek Wastewater Treatment Plant | | | | | | |
| EDU | | # | | 57,747 | 87,772 | 96,000 |
| Flow | Average Dry Weather Flow | mgd | 18 | 8.6 | 16.7 | 18.2 |
| BOD | Annual Average Loading | lbs/day | 33,900[1] | 33,900 | 52,000 | 56,000 |
| Pleasant Grove Wastewater Treatment Plant | | | | | | |
| EDU | | # | | 54,907 | 92,864 | 145,000 |
| Flow | Average Dry Weather Flow | mgd | 12[2] | 7.6 | 17.6 | 27.6 |
| BOD | Annual Average Loading | lbs/day | 22,400[1] | 22,400 | 38,000 | 60,000 |

Notes:

1. Current BOD loadings based on plant data from January 2013 through September 2019.
2. Plant improvements that expand treatment capacity at PGWWTP are currently under construction and are expected to be in service by FY 22-23.

Recommended Expansion Phasing

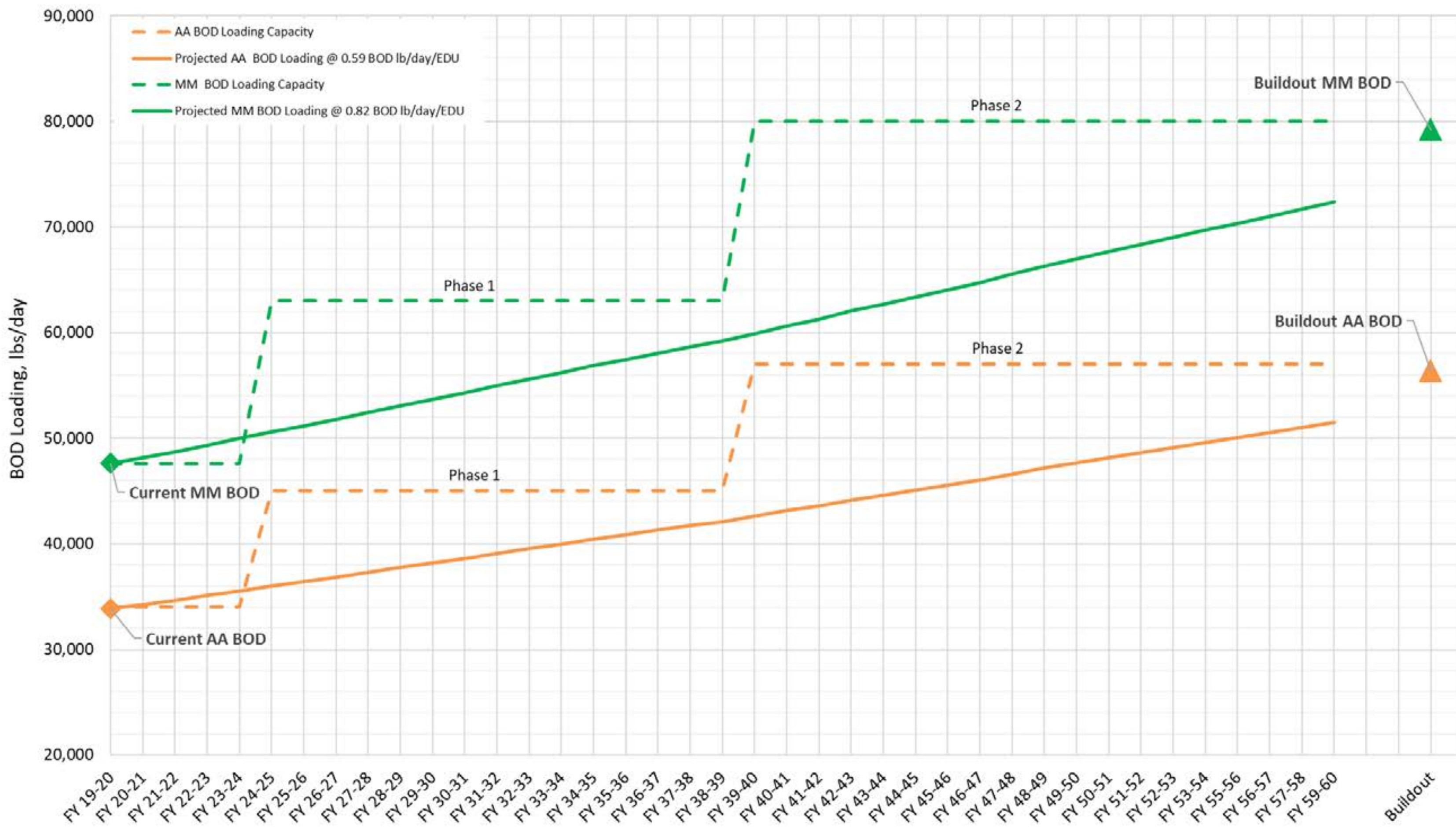
Prior to implementing any further improvements, it is recommended that process-specific sampling, process modeling, and if needed, stress testing be performed to determine the actual plant capacity, the limiting process, and corresponding process improvements needed at each plant.

***Dry Creek Wastewater Treatment Plant.*** Based on the projected ADWF of 16.7 for FY 59/60 and 18.2 mgd for buildout, the current ADWF hydraulic capacity of 18 mgd is effectively sufficient through buildout. As shown in Table ES-5, DCWWTP appears to be currently running at or beyond its nominal design capacity with respect to BOD loading. Figure ES-7 shows annual average (AA) and maximum monthly (MM) biological treatment capacities plotted against the loadings projected over the planning period and the anticipated expansion phasing. Depending on the results of the capacity testing, a Phase 1 expansion project may be necessary in approximately FY 24/25, which is the earliest practical time frame considering planning, design, and construction duration. The plant will reach 94% of the expanded Phase 1 AA and MM BOD loading capacity in FY 39/40. Therefore, it is recommended to implement Phase 2 biological improvements at this time. Phase 2 improvements in FY 39/40 are recommended to bring the plant BOD loading capacity to its buildout AA and MM projections of 56,000 and 79,000 lbs/day, respectively. The timing and magnitude of the recommended projects should be refined after additional capacity analysis and facility planning is completed, as described in the 3rd paragraph in the Wastewater Flow and Loading Evaluation section above.

Pleasant Grove Wastewater Treatment Plant. The improvements currently under construction will expand PGWWTP's treatment capacity to 12 mgd by FY 22-23. Based on the ADWF projections, this capacity expansion should be sufficient to handle flows through FY 28-29, though timing would depend on whether any rebound in sewer flows occurs.. Based on current estimates of capacity, Phase 1 hydraulic expansion at PGWWTP may be needed by approximately FY 28-29 to expand the plant ADWF to 15 mgd. Phase 1 expansion would carry the PGWWTP through FY 40-41. At that point, Phase 2 improvements may be needed to increase the plant ADWF capacity to the FY 59/60 flow projections of 17.6 mgd. Figure ES-8 shows ADWF plotted against the flow projected over the planning period and the anticipated phasing for improvements.

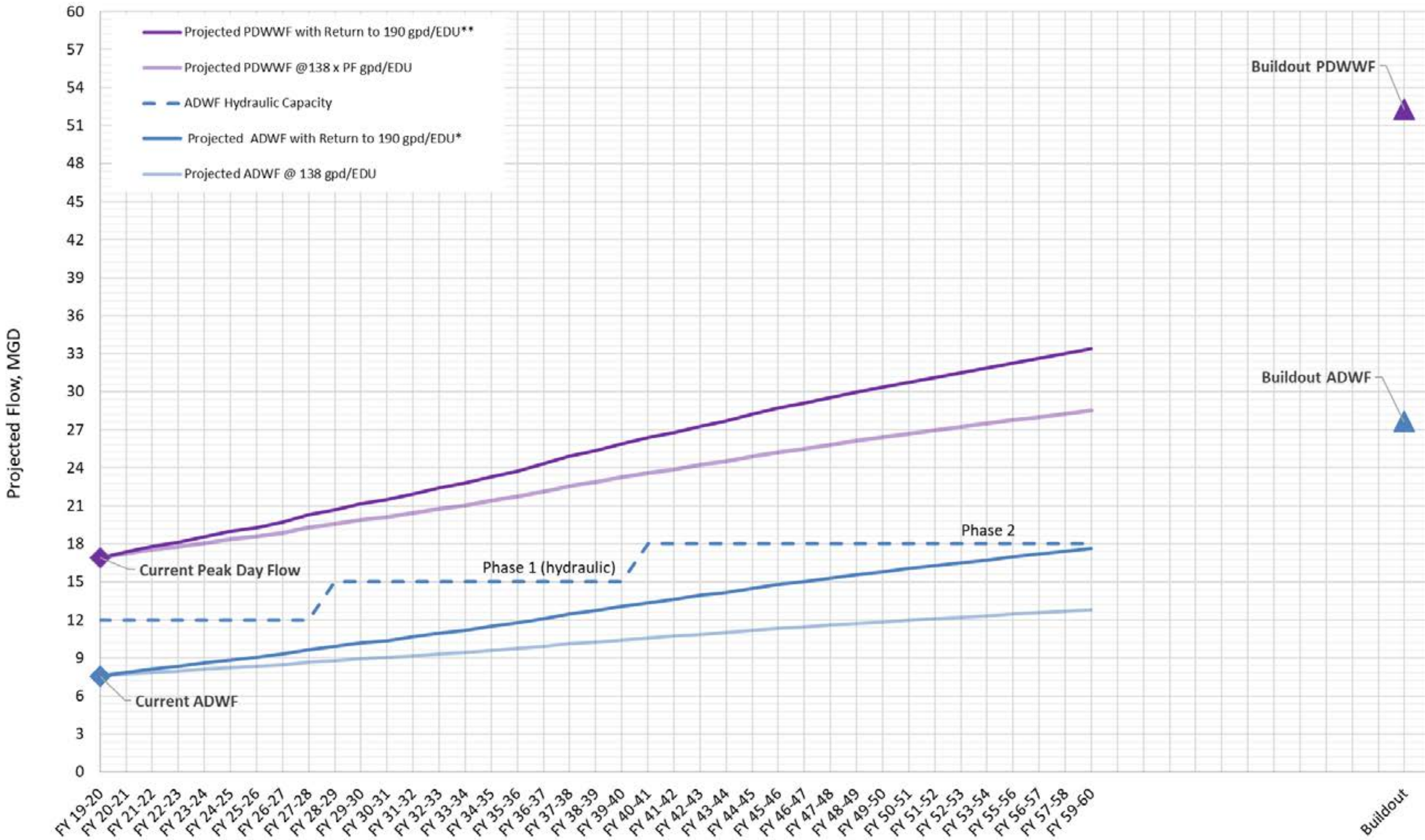
As shown in Table ES-5, PGWWTP is currently running at or beyond its nominal design capacity with respect to BOD loading. Figure ES-9 shows AA and MM biological treatment capacities plotted against the loadings projected over the planning period and the anticipated expansion phasing. The improvements currently under construction will expand the plant's AA and MM BOD loading capacities to 34,500 lbs/day and 40,100 lbs/day, respectively. These improvements should be sufficient to meet projected BOD loadings through FY 40/41 when Phase 2 hydraulic capacity improvements are recommended at PGWWTP. During Phase 2 expansion, it is recommended that plant capacity be increased to accommodate projected FY59/60 AA and MM BOD loadings of 38,000 lbs/day and 48,000 lbs/day, respectively. The timing and magnitude of the recommended projects should be refined after additional capacity analysis and facility planning is completed, as described in the Wastewater Flow and Loading Evaluation section above.

Figure ES-7: DCWWTP Biological Capacity Comparison



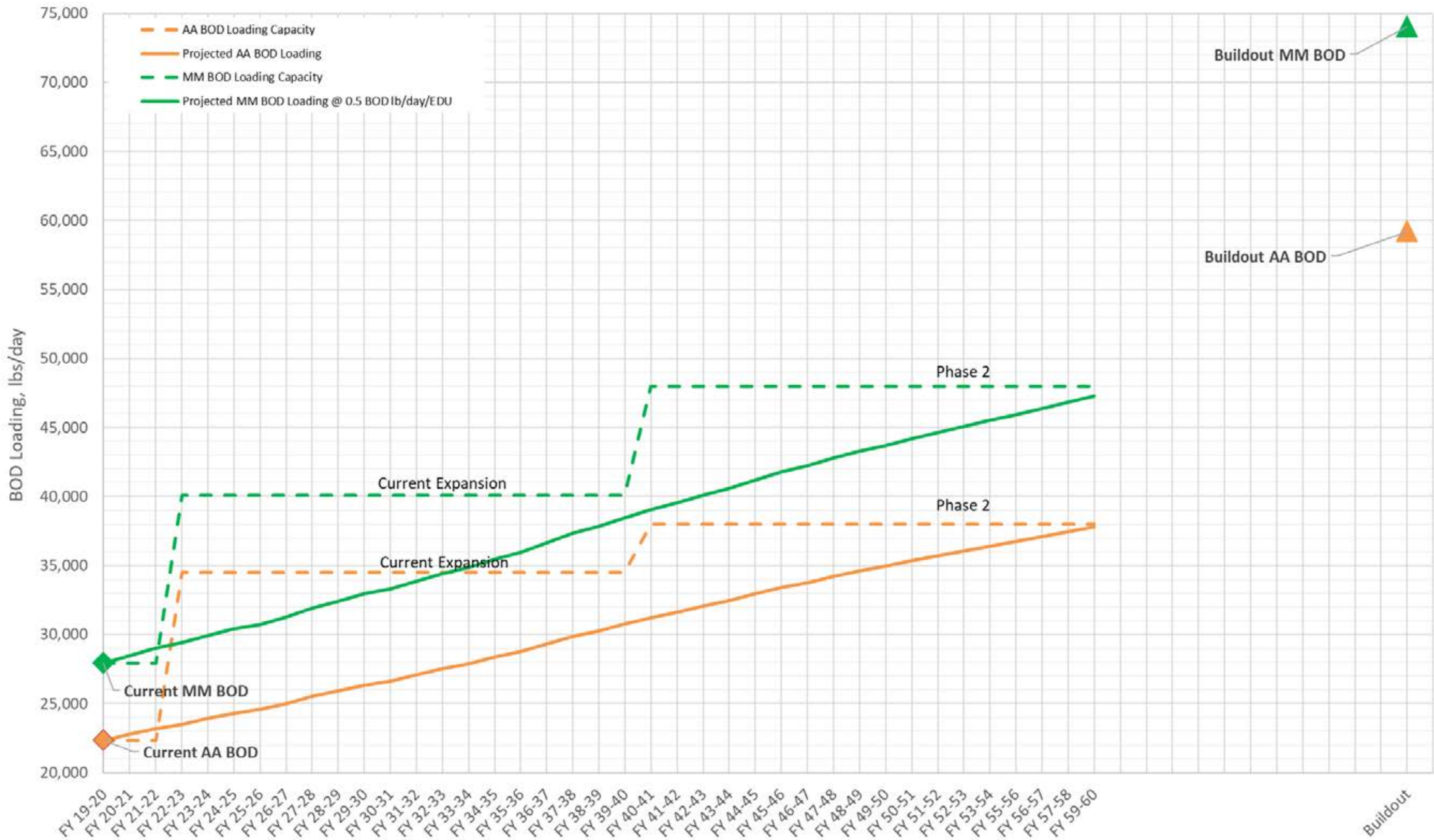

* Buildout date is currently unknown and is shown for graphical purposes only.

Figure ES-8: PGWWTP Hydraulic Capacity Comparison




* ADWF GPD/EDU factor is assumed to reach 190 gpd/EDU by FY 59/60, with a linear increase from 138 gpd/EDU at FY 19/20
**PDWWF is assumed to be ADWF flow plus 170 gpd/EDU of wet weather flow, based on current wet weather flowrates
*** Buildout date is currently unknown and is shown for graphical purposes only.

Figure ES-9: PGWWTP Biological Capacity Comparison




* Buildout date is currently unknown and is shown for graphical purposes only.

### Conceptual Level Capital Cost Estimates

Preliminary opinions of probable cost at the conceptual level were developed for the recommended expansion phases. Estimates were developed by extrapolating from process unit cost estimates found in prior plant studies and applying appropriate escalation factors, allowances, and contingencies. Improvements that may be required after the FY 59/60 planning horizon have not been estimated.

*Dry Creek Wastewater Treatment Plant.* The preliminary phased improvements on a process basis are provided in Table ES-6. The listed improvements in Phase 1 (FY 24/25) will increase the AA BOD treatment capacity from 34,000 to 45,000 lbs/day (an equivalent increase in plant ADWF capacity from 11.5 mgd to 14.5 mgd). In Phase 2 (FY 39/40), the improvements will increase the AA BOD treatment capacity from 45,000 to 57,000 lbs/day (an equivalent increase in plant ADWF capacity from 14.5 mgd to 18 mgd). It should be emphasized that the cost estimates provided below are conceptual level costs for capacity expansion projects and do not include rehabilitation and replacement projects or discretionary projects. More detailed cost estimating should be developed when the plant capacity is determined and phased improvement projects are updated accordingly.

*Pleasant Grove Wastewater Treatment Plant.* The preliminary phased improvements on a process basis are provided in Table ES-7. The recommended phased improvements in Phase 1 (FY 28-29) increase the plant ADWF capacity from 12 mgd to 15 mgd. Phase 2 improvements will increase the ADWF capacity from 15 mgd to 18 mgd and the AA BOD treatment capacity from 35,000 to 38,000 lbs per day. It should be emphasized that the cost estimates provided below are conceptual level costs for capacity expansion projects and do not include rehabilitation and replacement projects or discretionary projects. More detailed cost estimating should be developed when the plant capacity is determined, and phased improvement projects are updated accordingly.

Table ES-6: DCWWTP Phase 1 and Phase 2 Capital Cost Estimates (ENR CCI: 12115)[a]

| Process | Process Unit Cost | Phase 1<br>FY 24/25<br># of units | Phase 2<br>FY 39/40<br># of units |
|---|---|---|---|
| Coarse Screens | $280,000 | - | 1 |
| Influent Pump Station | $2,000,000 | - | 1 |
| Fine Screens | $170,000 | 2 | 1 |
| Odor Control | $210,000 | 1 | 1 |
| Grit Basins | $290,000 | - | 1 |
| Primary Sedimentation | $3,400,000 | - | 2 |
| Aeration Basins | $2,600,000 | 4 | 6 |
| Blowers | $290,000 | 1 | - |
| Mixed Liquor Return Pumps | $150,000 | 4 | 6 |
| Rehab Existing Anoxic Zones | $290,000 | 1 | |
| Secondary Clarifiers | $4,100,000 | 4 | 2 |
| RAS/WAS Pump Station | $860,000 | 1 | 1 |
| Tertiary Filtration | $730,000 | | 2 |
| Waste Backwash Pumps | $100,000 | | 1 |
| UV Disinfection | $2,100,000 | | 1 |
| Anaerobic Digesters | $3,300,000 | 1 | 1 |
| Centrifuges | $650,000 | 2 | |
| Cooling Units | $290,000 | | 2 |
| Total Unit Process Costs | | $34,000,000 | $43,000,000 |
| Site Yard Piping & Mechanical (5%) | | $1,700,000 | $2,200,000 |
| Site Electrical / I&C/SCADA (15%) | | $5,100,000 | $6,500,000 |
| Site Civil (5%) | | $1,700,000 | $2,200,000 |
| Subtotal of Direct Construction Costs | | $43,000,000 | $54,000,000 |
| Mobilization/Demobilization (5%) | | $2,200,000 | $2,700,000 |
| Contractor Overhead & Profit (20%) | | $8,600,000 | $10,800,000 |
| Subtotal of Direct and Indirect Costs | | $54,000,000 | $68,000,000 |
| Contingency (30%) | | $16,000,000 | $20,000,000 |
| Total Estimated Construction Cost | | $70,000,000 | $88,000,000 |
| Engineering, Permitting, CM, ESDC (25%) | | $18,000,000 | $22,000,000 |
| Total Estimated Capital Cost | | $88,000,000 | $110,000,000 |

Notes:

a. Costs based on Average of SF and “20 Cities” ENR for April 2020: 12115

Table ES-7: PGWWTP Phase 1 and Phase 2 Capital Cost Estimates (ENR CCI: 12115)[a]

| Process | Process Unit Cost | Phase 1 FY 24/25 # of units | Phase 2 FY 39/40 # of units |
|---|---|---|---|
| Influent Pumps | $120,000 | 1 | - |
| Grit Basins | $290,000 | 1 | - |
| Fine Screens | $170,000 | 2 | - |
| Primary Sedimentation | $3,400,000 | - | 1 |
| Oxidation Ditches | $7,100,000 | - | 1 |
| Secondary Clarifiers | $4,100,000 | 1 | 1 |
| RAS/WAS Pump Station | $860,000 | 1 | - |
| Tertiary Filtration | $730,000 | 2 | 1 |
| UV Disinfection | $2,100,000 | 3 | - |
| Thickeners Building Modification | $490,000 | - | 1 |
| Digesters Building Modification | $490,000 | - | 1 |
| Total | | $13,000,000 | $16,000,000 |
| Site Yard Piping & Mechanical (5%) | | $650,000 | $800,000 |
| Site Electrical / I&C/SCADA (15%) | | $2,000,000 | $2,400,000 |
| Site Civil (5%) | | $650,000 | $800,000 |
| Subtotal of Direct Costs | | $16,000,000 | $20,000,000 |
| Mobilization/Demobilization (5%) | | $800,000 | $1,000,000 |
| Contractor Overhead & Profit (20%) | | $3,200,000 | $4,000,000 |
| Subtotal of Direct and Indirect Costs | | $20,000,000 | $25,000,000 |
| Contingency (30%) | | $6,000,000 | $7,500,000 |
| Total Estimated Construction Cost | | $26,000,000 | $33,000,000 |
| Engineering, Permitting, CM, ESDC (25%) | | $6,500,000 | $8,300,000 |
| Total Estimated Capital Cost | | $33,000,000 | $41,000,000 |

Notes:

a. Costs based on Average of SF and "20 Cities" ENR for April 2020: 12115

## Capacity Improvement Project Summary

Table ES-8 summarizes the capacity improvements identified in this systems evaluation. Note that the improvement needs projected for Dry Creek and Pleasant Grove WWTPs are significantly larger and more expensive than the improvement projects projected for the collection system, but are based on limited available data. The estimated costs for Dry Creek WWTP are especially high because of the size and age of that plant; when it was designed, the organic loading in Roseville was far lower than when Pleasant Grove was designed; since the mid 2000's organic loading to both plants has continued to increase. Further studies, as described in the Wastewater Flow and Loadings Section should be undertaken for both treatment plants, and the capacity improvement projects should be refined based on those findings.

Table ES-8: Proposed Capacity Improvement Projects

| | | Existing | FY 24/25 or FY 28/29 | FY 39/40 | After FY 59/60 |
|---|---|---|---|---|---|
| Collection System | Description | Improvement Project 1 (Increased Capacity of PS 26 and sewers on Sierra College Blvd) | None | None | Improvement Project 2 (Redirect flows from PS 26 and Sierra College Blvd down Eureka Road)<br><br>Improvement Project 3 (Increased Firm capacity of PS 25 with diversion structure improvements) |
| | Estimated Capital Cost | $1,610,000 | - | - | $2,590,000 |
| Dry Creek WWTP | Description | Plant Capacity, Condition Assessment, and Facilities Plan | Phase 1 (Increase AA BOD Capacity to ~45,000 lbs/day) | Phase 2 (Increase AA BOD Capacity to ~57,000 lbs/day) | Phase 3: Increase BOD Capacity and Hydraulic Capacity (not estimated) |
| | Estimated Capital Cost | $550,000 | $88,000,000 | $110,000,000 | Not Estimated |
| Pleasant Grove WWTP | Description | Plant Capacity, Condition Assessment, and Facilities Plan | Increase ADWF hydraulic capacity to 15 mgd | Increase ADWF hydraulic capacity to 18 mgd. Increase AA BOD Loading Capacity to 38,000 lbs/day | Phase 3: Increase BOD Capacity and Hydraulic Capacity (not estimated) |
| | Estimated Capital Cost | $450,000 | $33,000,000 | $41,000,000 | Not Estimated |

## Next Steps

Based on the findings of this preliminary evaluation, and discussions with the project team the following next steps are recommended for consideration by SPWA:

- Conduct an analysis of process performance and current biological treatment and hydraulic capacity at both DCWWTP and PGWWTP. This will likely require process-specific sampling and development of calibrated process models. Biological treatment capacity should consider both BOD and nitrate plus nitrite permit limitations set forth within each plant's respective NPDES permit. Results of this study should determine a capacity rating for each unit process at the plant and the limiting processes. This analysis will provide a sound basis for the planning of new facilities and is integral to determining required future capital improvement projects during phased expansions. It is recommended that DCWWTP capacity analysis take precedence over PGWWTP considering DCWWTP appears to be currently operating beyond its nominal BOD removal capacity.

- Review previous condition assessment work conducted on the plant assets and perform additional assessment needed to identify and prioritize repair and replacement (R&R) projects. This effort would include a risk assessment to identify likelihood of failure and criticality of each asset. Results of this study would identify R&R projects which may need to be implemented prior to or concurrent with phased expansions.

- Based on the capacity analysis and R&R project planning, develop Facilities Plans for DCWWTP and PGWWTP. Considering both plants could be running at or above their nominal design capacities, it is recommended that facilities planning begin immediately after the capacity analysis. This effort would evaluate various process optimization steps and upgrade alternatives and provide recommended improvements for phased expansions. The Facilities Plans would include review of the 190 gpd/EDU flow factor that is critical to the timing and magnitude of any hydraulic capacity improvements.

- Develop Class 4 cost estimates for recommended improvements at the WWTPs under each expansion phase and for R&R projects to assist SPWA partners in assessing capital needs in the future.

- For the collection system, periodically update the model network based on any configuration changes, perform re-calibration to confirm the actual and anticipated flows, and to update future loads into the model network. An update frequency of every 5-10 years is recommended, depending on changes in development planning and/or system configuration.

We also recommend that SPWA evaluate funding and financing options to support implementation of the recommended capital improvements, especially Phase 1 at Dry Creek given its size and relative immediacy. With the implementation of the steps above, and the ongoing high level performance of the SPWA Regional System, SPWA will be able to continue its excellent level of service to the Regional Partners.

# 1. INTRODUCTION

The South Placer Wastewater Authority (SPWA) was created under a Joint Powers Agreement in October 2000 and comprises the City of Roseville (City), South Placer Municipal Utility District (SPMUD), and the County of Placer (Placer County). Flow from SPMUD and portions of Placer County discharge into the City's sewer collection system. The City of Roseville, on behalf of the regional partners, owns and operates two regional wastewater treatment facilities: the Pleasant Grove Wastewater Treatment Plant (PGWWTP), and the older Dry Creek Wastewater Treatment Plant (DCWWTP). Additionally, the City of Roseville owns and operates the network of gravity sewers, pump stations, and force mains that serve customers within the City's limits, including the joint (regional) facilities that convey flow from the SPWA partners. SPMUD owns and operates gravity sewers, pump stations, and force mains in Rocklin, Loomis, and portions of southern Placer County. Placer County owns and operates gravity sewers, pump stations, and force mains in unincorporated areas of Placer County that are not served by other agencies.

Figure 1-1 shows the service area boundaries of the SPWA partner agencies and the overall SPWA service area. Figure 1-1 also indicates the location of several Urban Growth Areas (UGAs), both inside and outside the City, which have significant development plans under varying stages of progress.

The South Placer Regional Wastewater and Recycled Water Systems Evaluation prepared in 2009 (2009 Systems Evaluation), defined the SPWA service area boundary; evaluated the wastewater collection, wastewater treatment, and recycled water distribution systems; and identified existing and potential future improvement needs. Since that study was completed, the recycled water distribution system has been removed from the SPWA system (reallocated as an asset) and is now wholly managed by the City of Roseville. SPWA is now updating the Systems Evaluation to better evaluate future wastewater collection and treatment capacity needs that may have changed since 2009. This report documents the evaluation of the regional wastewater collection system capacity and the capacity of the wastewater treatment plants versus projected flows and loads.

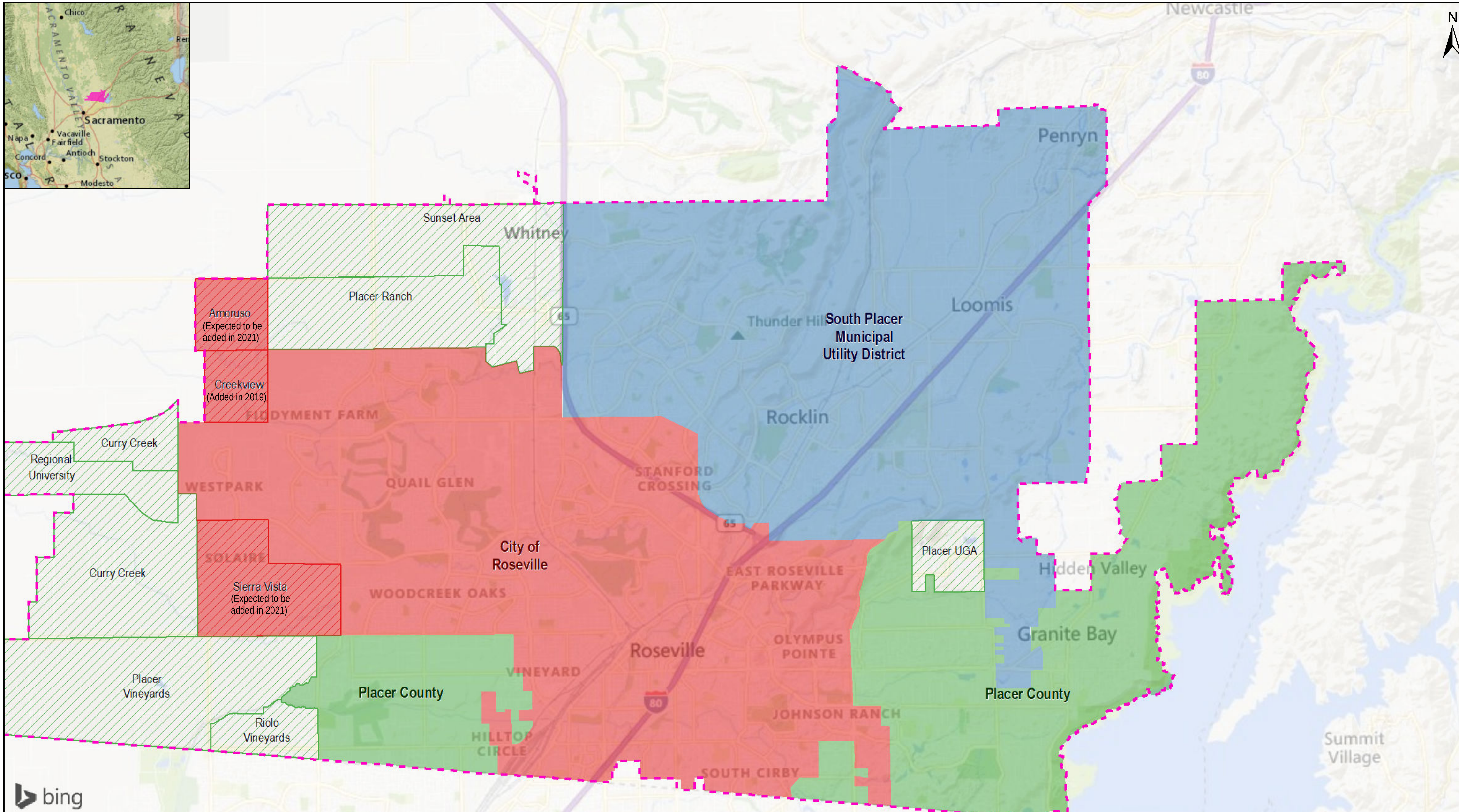
## 1.1 Objectives of the Systems Evaluation

The specific need for this Systems Evaluation was precipitated by several factors, including:

- Recent annexations of land by SPWA partner agencies;
- Changes in water consumption rates and associated dry weather flow rates;
- Planned development and redevelopment within the 2005 SPWA service area;
- Revisions in the planning for proposed Urban Growth Areas (UGAs) in the vicinity of the 2005 SPWA service area;
- Wastewater characteristics (i.e., flow and strength) that have changed since the 2009 Systems Evaluation.

This South Placer Regional Wastewater Systems Evaluation (Systems Evaluation) has been conducted to accomplish the following:

- Document the existing (2020) capacity and the flows and loadings on regional trunk sewer and wastewater treatment infrastructure and facilities present in 2020;
- Project buildout conditions based upon regional planning documents and planned regional developments in southwestern Placer County; and,
- Present a Regional Systems evaluation, with system deficiencies identified, and capital projects forecasted, which will inform the SPWA partners in identifying their ability to provide service for planned and proposed development, both presently and for buildout conditions.




# Figure 1-1
## 2021 Service Area Boundary

South Placer Wastewater Authority
2020 Systems Evaluation

0 ½ 1 2 Miles

**2021 Partner Agency Service Area**
- City of Roseville
- Placer County
- SPMUD

**Urban Growth Area**
- City of Roseville UGA
- Placer County UGA
- Ultimate Service Area Boundary

Project #: 0011183.00
Map Created: December 2020

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## 1.2 Project Scope

The scope of the Systems Evaluation, as well as a brief discussion of work conducted under each task, is described below.

- Task 1 – Project Management.

  Periodic progress meetings were held with City staff to review project status and discuss project issues, and monthly status reports were prepared to document the work completed.

- Task 2 – Data Collection and Review.

  This task involved assembling, organizing, and reviewing information and data related to the sewer system, including previous reports; maps and drawings of sewer system facilities and recent sewer improvement projects; water use and customer account data; the City's General Plan and other relevant planning information; and sewer design standards and specifications. This task also included meetings with City Planning staff, Placer County and SPMUD to confirm growth and future land use assumptions within the City of Roseville as well as from the SPWA partners outside the City.

- Task 3 – Flow Monitoring.

  A plan for flow and rainfall monitoring in the collection system during the 2015/16 wet weather season was developed. The program included 30 temporary flow meters (including 5 meters authorized by Task 5) and two rain gauges installed for a period of approximately two months (mid-January through mid-March). Gauge adjusted radar rainfall (GARR) data was also obtained for the rainfall periods. The monitoring was conducted by Woodard & Curran's subconsultant, V&A Consulting Engineers, and the GARR data was provided by OneRain, Inc.

- Task 4 – Model Update and Calibration.

  A hydraulic model of the City's trunk sewer system was developed using InfoWorks™ ICM software. The model network was developed using as-builts, the City's GIS data, and information from the 2005 Model Development Project. Flow loads to the model were compiled using water use and land use data and flow factors representing unit base wastewater flow (BWF) rates, diurnal BWF patterns, and infiltration/inflow (I/I). The model was calibrated for dry and wet weather conditions using the flow monitoring data collected under Task 2.

- Task 5 – Update Flow Projections.

  Based on data collected under Task 2 and discussions with SPWA and partner agencies' staff, existing and projected flows were developed. As part of this task, the best available planning information was collected and documented, including plans for Urban Growth Areas and parcel based data within the agencies' current service areas. A database of parcel-based projections within the SPMUD and Placer County Service areas was also prepared in this task. This information was used to estimate future flows and potential capacity needs.

- Task 6 – Trunk Sewer Evaluation

  In this task, the existing trunk sewers were evaluated against hydraulic performance criteria under the design storm conditions identified for the 2009 System Evaluation. Using the calibrated model and the selected design storm, existing and future model runs were performed to identify capacity deficiencies in the trunk sewer system. For those deficiencies, capacity improvement projects were developed.

- Task 7 – Wastewater Treatment Plant Expansion Evaluations

Based on the flow projections developed in Task 5 and buildout timeline information provided by City of Roseville, Placer County, and SPMUD, design flows and biological loading for both the Dry Creek and Pleasant Grove Wastewater Treatment Plants were developed. Based on these design flows and work completed by the City of Roseville, phased WWTP capacity expansions were identified considering current and future changes in regulatory requirements, and preliminary cost estimates were developed.

- Task 8 – Prepare Systems Evaluation

  This report was prepared to summarize and present the results and recommendations of the study.

## 1.3 Report Organization

This report includes five chapters, which are described below

- Chapter 1, Introduction, presents the background, objectives, and scope of the System Evaluation.
- Chapter 2, Modeled Flow Projections, discusses the service area land use projections, the basis for developing estimates for each component of wastewater flows, and the base wastewater flow projections for the service area.
- Chapter 3, Trunk Sewer Evaluation, describes the modeled trunk sewer system, development of the model network and model loads, flow monitoring program, and model calibration. This chapter also identifies the results of the capacity analysis, including preliminary solutions for the identified capacity deficiencies.
- Chapter 4, Wastewater Treatment System Evaluation, summarizes the wastewater treatment upgrade and expansion analyses performed for the Systems Evaluation, including the development of flow and loading peaking factors, facility expansion recommendations to handle projected flows and loadings at buildout, and a timeline for phasing the construction of the improvements.
- Chapter 5, Capacity Improvement Summary, summarizes the recommended capacity improvements, including project costs, phasing, and implementation recommendations.

# 2. BASIS OF FLOW PROJECTIONS

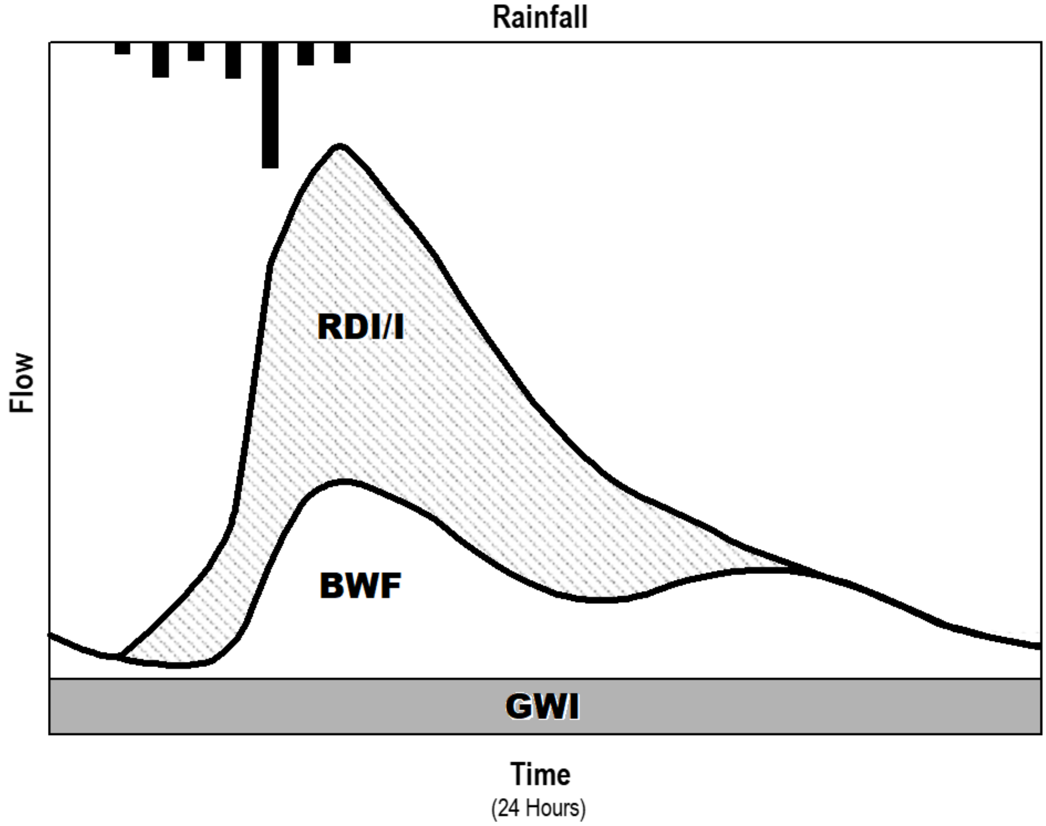
## 2.1 Introduction

The flow projections developed for this Systems Evaluation were based on the information collected for the system's hydraulic model updates, including the updates performed for the current study. In 2007, a hydraulic model of the City's sewer collection system was developed using the H2OMap Sewer modeling platform (2007 Model Development Project), in parallel with a trunk sewer model for the combined Roseville, SPMUD, and Placer County systems. The models were later updated as part of the 2009 Systems Evaluation. Subsequently, the City's sewer model was updated in 2017 to reflect existing and future demands within the City, and to upgrade the modeling platform to the fully dynamic InfoWorks ICM software. For the current Systems Evaluation Update, the City's model was updated to reflect existing and future projected flows from Placer County and SPMUD.

This section describes the flow components used in the hydraulic model and the existing and projected future land uses for the service area, which form the basis for generating base wastewater flows, in the current hydraulic model. Note that flow projections (referred herein as loads) are intended to represent the level of development present during the flow monitoring periods used to calibrate the hydraulic model. Design flow estimates were developed based on criteria developed for each component of wastewater flows: base wastewater flow (BWF), groundwater infiltration (GWI), and rainfall-dependent infiltration and inflow (RDI/I), and confirmed through model calibration, as described in Chapter 3. Average dry weather flow (ADWF) projections for each treatment plant area discussed in the Wastewater Treatment Plant Expansion Evaluations TM.

The three components of wastewater flows are illustrated conceptually in Figure 2-1. BWF represents the sanitary and process flow contributions from residential, commercial, institutional, and industrial users of the system. GWI is groundwater that infiltrates into defects in sewer pipes and manholes, particularly in winter and springtime in low-lying areas. GWI is typically seasonal in nature and remains relatively constant during specific periods of the year. ADWF represents the average flows at each WWTP from July to September. The source of these flows is a combination of BWF and GWI. RDI/I is storm water inflow and infiltration that enter the system in direct response to rainfall events, through direct connections such as holes in manhole covers or illegally connected roof leaders or area drains, or, more commonly, through defects in sewer pipes, manholes, and service laterals. RDI/I typically results in short term peak flows that recede quickly after the rainfall ends.

Figure 2-1: Wastewater Flow Components
(Not to scale)




## 2.2 Average Dry Weather Flow

ADWF has been estimated for four development scenarios: (1) Existing loads for model calibration; (2) Existing loads for capacity analysis; (3) Buildout; and (4) Buildout Sensitivity, which includes some additional densification and redevelopment assumptions based on feedback from the SPWA partners. As part of this Systems Evaluation, a database of existing and future loads for each parcel in Placer County and SPMUD service areas has been developed and provided to the City. As noted above, ADWF includes two components: GWI and BWF.

In 2007, a hydraulic model of the City's sewer collection system was developed using the H2OMap Sewer modeling platform (2007 Model Development Project), in parallel with a trunk sewer model for the combined Roseville, SPMUD, and Placer County systems. The models were later updated as part of the 2009 Systems Evaluation. Subsequently, the City's sewer model was updated in 2017 to reflect existing and future demands within the City, and to upgrade the modeling platform to the fully dynamic InfoWorks ICM software. For the current Systems Evaluation Update, the City's model was updated to reflect existing and future projected flows from Placer County and SPMUD.

This section describes the flow projections and model development process used to evaluate the SPWA collection system (sewers conveying flows from more than one partner agency), as well as findings from that effort.

### 2.2.1 Diurnal Base Wastewater Flow Curves

BWF varies throughout the day in a typical way, generally peaking early in the morning in upstream sewers and later and less sharply in larger downstream sewers. Typical hourly peak flows from small residential areas tend to be about twice the average flow (or even higher for very small areas), whereas peak flows further downstream may be less than 1.5 times average flows due to flow attenuation in the collection system. Higher peaks can occur on atypical days of the year (e.g., on major holidays such as Thanksgiving or at halftime on Super Bowl Sunday).

For the current Systems Evaluation Update, typical diurnal profiles were developed for residential and commercial/industrial (non-residential) wastewater flow, for both weekend and weekday conditions. These hydraulic profiles are shown in Figure 2-2 and Figure 2-3. The residential profiles were developed based on monitored flows for smaller, primarily residential meter areas and refined during calibration. Two non-residential profiles were developed to represent flow patterns from two different types of uses: commercial/retail pattern, and an industrial/professional pattern. For parcels inside the City, each non-residential parcel was assigned a non-residential diurnal profile according to the land use code in the parcel database; a summary of the diurnal profile assigned to each land use code is provided in Appendix A. For non-residential parcels in Placer County and SPMUD, the commercial/retail pattern was used.

For UGAs, the residential profile was used for all residential uses, and the retail/commercial diurnal profile was used for all non-residential and mixed use land uses.

Figure 2-2: Residential Diurnal Curves

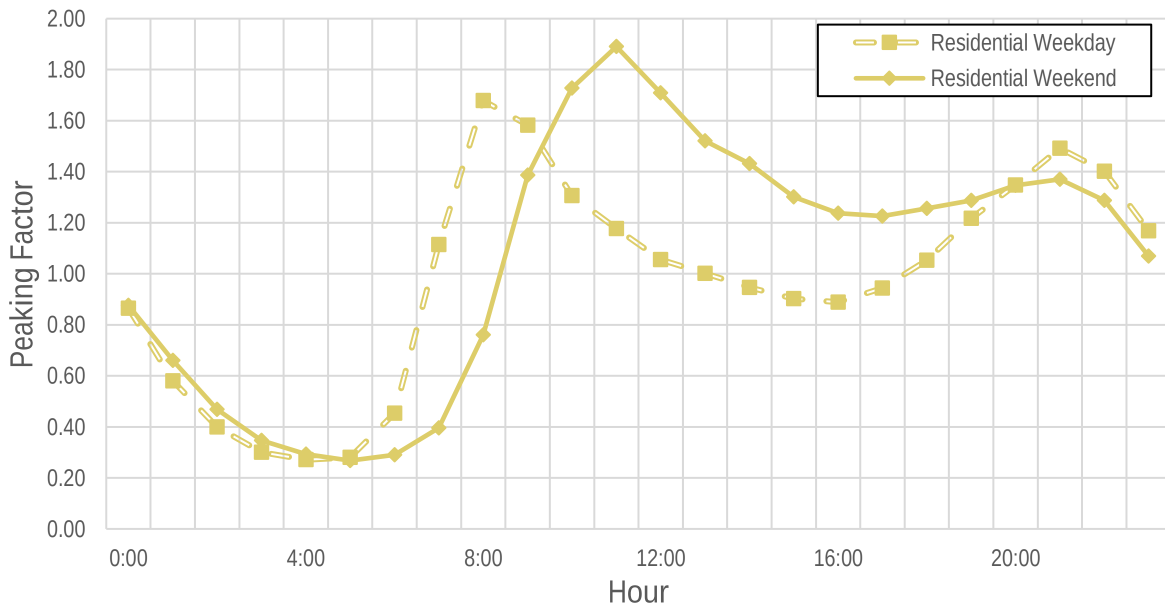
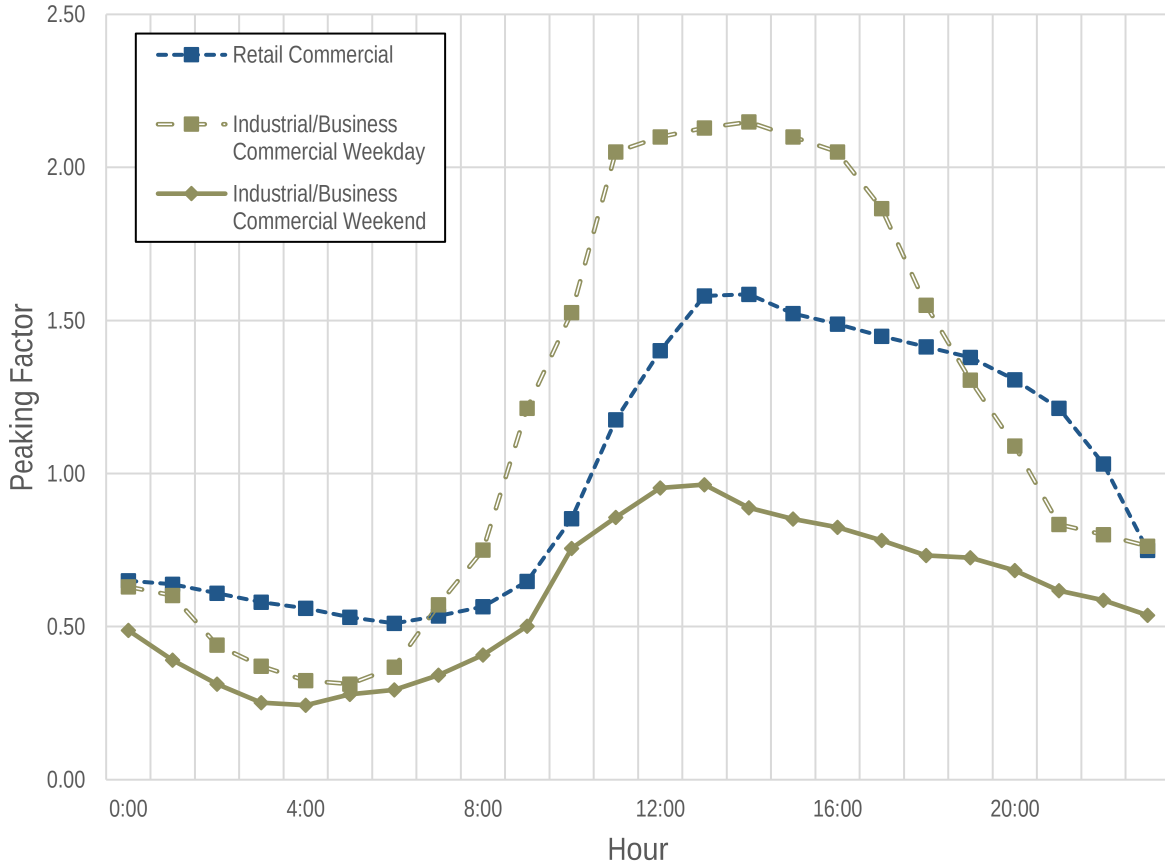


Figure 2-3: Non-Residential Diurnal Curves




### 2.2.2 Groundwater Infiltration

Groundwater infiltration is generally quantified based on actual flow monitoring data, since it is difficult to predict GWI rates based on physical system data alone. In the context of design flow criteria, GWI represents the incremental groundwater infiltration that occurs during the wet weather season above the "baseline" infiltration level during the driest months of the year.

GWI can be estimated based on minimum flows during non-rainfall periods within a wet weather flow monitoring period. Minimum flows typical occur during the nighttime or early morning hours when base wastewater flows are at a low. Alternatively, GWI can be estimated as the difference between average metered flow during non-rainfall periods and computed average BWF. In either case, the resulting GWI, is expressed on a unit basis (gpd/acre or gpad) by dividing by the sewered acreage of the monitored area. Typical GWI rates may range from 100 to over 1,000 gpad.

GWI flows for existing connected parcels were estimated through the model calibration process (see Chapter 3) by comparing model-simulated BWF to actual flow measurements from the temporary flow monitoring program. Cases where model-predicted BWF was noticeably lower than monitored flow indicated the possible occurrence of GWI.

### 2.2.3 Existing Base Wastewater Flows

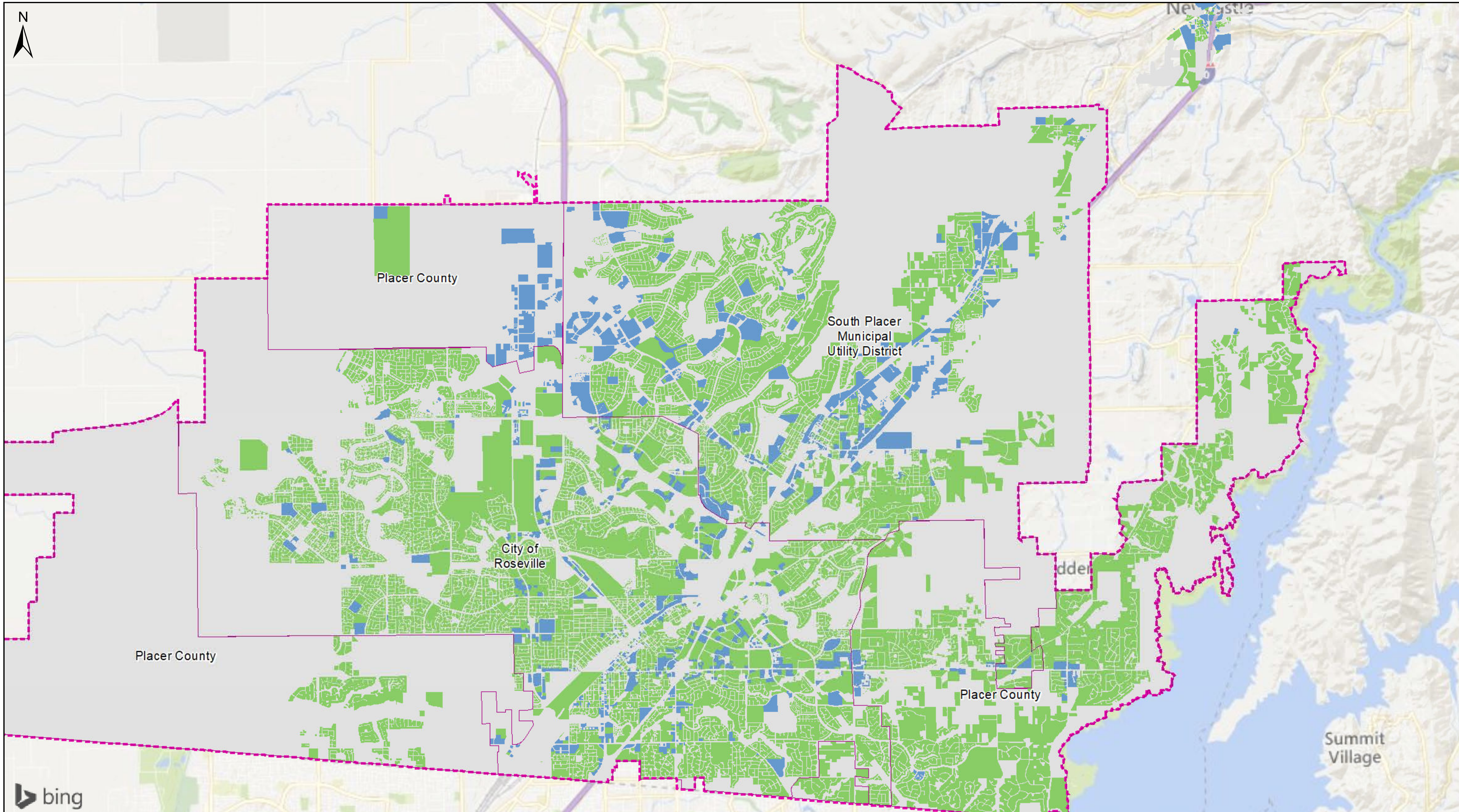
Existing base wastewater flows were developed based on the assumptions summarized below; currently connected parcels are indicated in Figure 2-4. Note that loads are intended to represent the level of development present during the flow monitoring periods used to calibrate the hydraulic model.

#### 2.2.3.1 City of Roseville

As noted previously, flows within City limits were estimated as part of the 2017 Sewer Model Update. As part of that study, existing residential and non-residential BWF within the City was determined based on water billing data provided by the City. The City has relatively complete water use records for all parcels within the City; billing data from December 2013 through April 2016 was provided for use in developing BWF estimates for the model. Metered water use during the winter months is assumed to most closely approximate wastewater generation, since outdoor water use is at a minimum. As data for the City of Roseville came from work done in 2016, existing BWF estimates for the City of Roseville represents 2016 land use.

December 2015 through March 2016 data was selected to represent winter water use, as it was generally wetter than prior years and therefore less irrigation was employed. This data also coincides with the flow monitoring period for the 2017 Sewer Model Update and should therefore correlate better with the recorded data during model calibration. It was assumed that all water use during these months was returned to the sewer; this assumption was validated during calibration. Note that the 2015/2016 wet season occurred after several years of drought. Therefore, water use levels may be lower than non-drought years due to conservation.

Where water use data was not available (limited portions of the City), sewer generation rates were estimated based on existing dwelling units indicated in the parcel database. For purposes of calibration, a single family rate of 160 gpd per DU and a multi-family rate of 120 gpd per DU were assumed, based on average rates from the December 2015 through March 2016 billing data. Using GIS processes, BWF loads from each parcel were then allocated to the nearest City sewer.




# Figure 2-4

## Existing[1] Connected Parcels

South Placer Wastewater Authority
2020 Systems Evaluation

0 ½ 1 2 Miles

**Parcel Land Use**

- Commercial/Industrial
- Residential
- Unconnected

- Service Area Boundary
- Partner Agency Boundary

1. "Existing" represents 2015/2016 connections within the City of Roseville and 2019 connections for Placer County and SPMUD.

Project #: 0011183.00
Map Created: December 2020

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Figure Exported: 12/21/2020 By: cvanlienden Using: \\woodardcurran.net\shared\Projects\RMC\WCR\0091 Roseville, City of\0011183.00 SPWA Systems Evaluation\G. GIS\3 MXDs\Report Figures\2-4_Existing_Connected_Parcels.mxd

### 2.2.3.2 Placer County and SPMUD

Placer County provided spreadsheets summarizing equivalent dwelling units (EDUs) for each APN[1]. (Note: an EDU is defined as the flow equivalent of one single-family residence.) This dataset was then joined to a parcel dataset downloaded from the County website (downloaded March 20th, 2019), and then allocated to the nearest Placer County sewer. Since not all Placer County sewers are included in the model, GIS processes were used to identify the modeled manhole downstream of the parcel. All of the EDUs included in the spreadsheets were assigned to parcels and allocated to modeled manholes in this way. Each parcel was assigned either a residential or commercial loading pattern based on its general plan category as summarized in Appendix A.

SPMUD provided a shapefile[2] which provided EDUs for the year 2020 (which was identified as “existing” land use by SPMUD staff), an associated SPMUD manhole, and a type of use (residential or commercial) for each parcel. As for Placer County, GIS processes were used to identify the modeled manhole downstream of the parcel.

During calibration, a base wastewater flowrate of 160 gpd per EDU was typically applied, but this factor was adjusted down in some cases by 15 or 20 percent based on data from wastewater flow meters in the collection system.

### 2.2.3.3 Drought Rebound

The calibration period occurred during the third year of an ongoing drought. Billing data and flow records indicate a general decline in water use, likely due to the drought-induced conservation primarily limiting irrigation water use but also reducing indoor water use. Analysis of billing data indicates that on a per dwelling unit basis, water use was reduced by approximately 15 percent between 2014 and 2016. Therefore, for capacity analysis purposes of the existing system and for all future scenarios, it has been assumed that base wastewater flows within the City would increase by 15 percent.

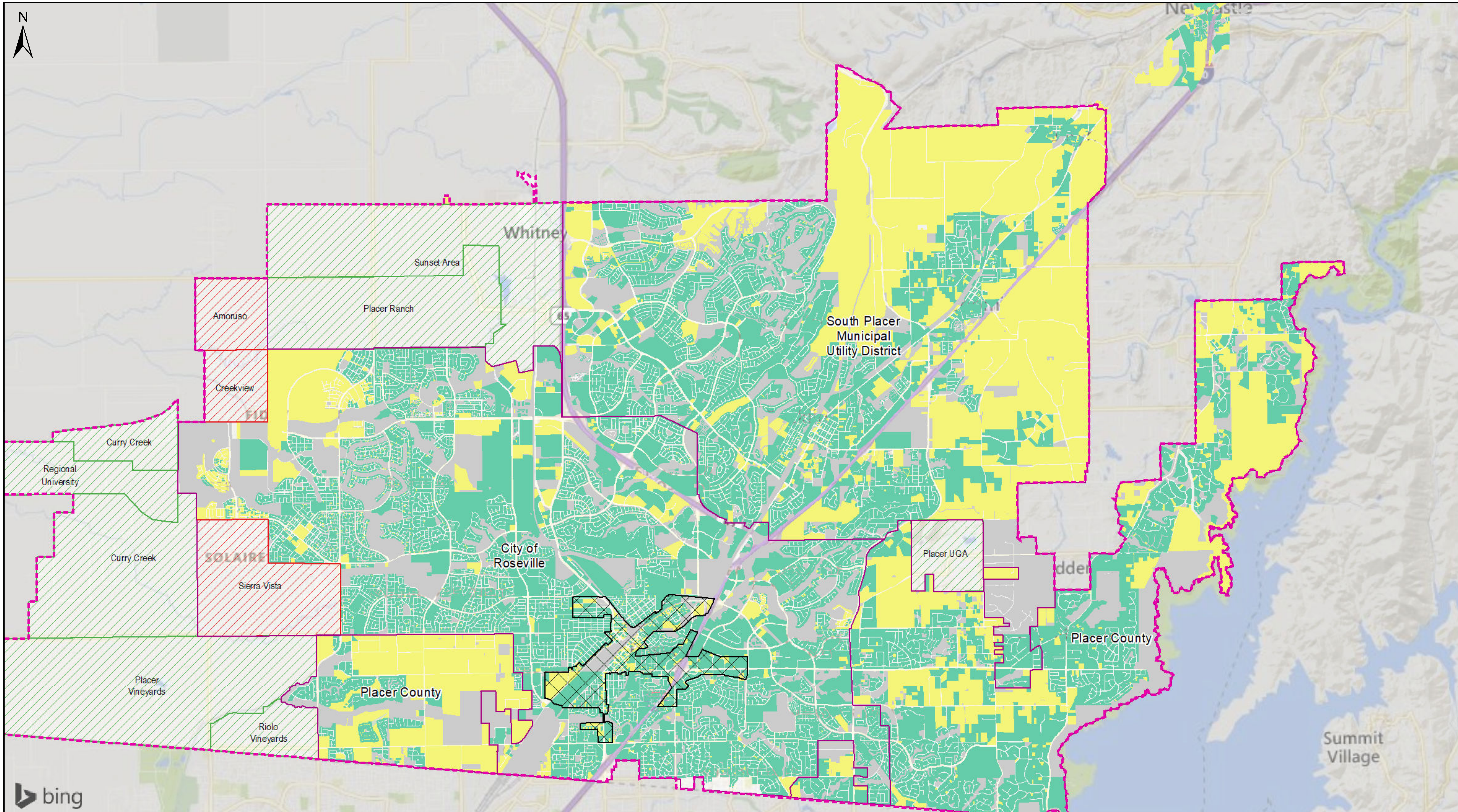
For Placer County and SPMUD, BWF was increased to 180 gpd per EDU, which is consistent with the BWF assumptions used in the 2009 Systems Evaluation and is approximately a 15 percent increase compared to calibrated flow factors overall, though specific flow meter basins assume a higher rebound percentage (wherever the flowrate per EDU was decreased during calibration).

## 2.2.4 Future Average Dry Weather Flow

Future BWF from the City, SPMUD, and Placer County have been estimated for a Buildout scenario (representing likely future land use based on current data) as well as a Buildout-Sensitivity scenario (representing higher potential growth) using the factors summarized in Table 2-1. For consistency with WWTP flow projections, ADWF flow factors are used, which includes some dry season GWI.

The locations of future developments, including urban growth areas, are indicated in Figure 2-5, and discussed further in the next sections.

[1] Spreadsheets included: Existing dry creek EDU-7-24-19.xls, Existing SMD 2- EDU-2018-12-12.xlsx, Existing SMD 3- EDU-2018-12-12.xlsx, Existing Sunset EDU-7-24-19.xls
[2] SPMUD_SewerLoading_AddressPoints, provided August 7, 2019.




# Figure 2-5

Future Development and Urban Growth Areas

South Placer Wastewater Authority
2020 Systems Evaluation

0 ½ 1 2 Miles

**Buildout Status**
- Existing
- Future Connection
- Unconnected
- Redevelopment Area

**Urban Growth Area**
- City of Roseville UGA
- Placer County UGA
- Partner Agency Boundary

- Service Area Boundary

Project #: 0011183.00
Map Created: December 2020

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Table 2-1: Average Dry Weather Flow Factors

| Land Use Designation | Units | Unit Flow Factors [a] |
|---|---|---|
| Commercial | gpd per acre | 850 |
| Heavy Industrial | gpd per acre | 850 |
| Light Industrial | gpd per acre | 850 |
| Mixed Use | gpd per acre | 2,300 |
| Public/Quasi-Public | gpd per acre | 660 |
| Schools | gpd per acre | 170 |
| Residential Single DU (or EDU) | gpd per du | 190 |
| Residential Mult. DU [b] | gpd per acre | 2,040 |
| Parks > 10 Acres | gpd per acre | 10 |
| Vacant/Open Space | gpd per acre | 0 |

Notes:

a. Includes allowance for GWI.

b. The Residential Multiple DU unit flow factor can also be represented as 130 gpd per du

#### 2.2.4.1 City of Roseville

For the City of Roseville, the Buildout scenario is based on infill of currently vacant parcels, using land use information from the City's General Plan or provided by the City's planning department, and development of the Sierra Vista, Creekview, and Amoruso UGAs. Sources of data included the following:

- Parcel data downloaded from the City's website (download dated 8/25/2016). The parcel data has the following fields that were used for to estimate future demands:
    - PotUnits: The total number of units allocated to the parcel, prior to any development. Once development beings, potential units is reduced to zero.
    - Undevunits: Once development commences, undeveloped units are the number of vacant lots in the subdivision that do not have a single family unit
    - PotArea: the total developable square footage of the parcel upon its creation. Once development begins, the area is reduced to zero.
    - UndevArea: Once development commences, if the parcel is not fully developed, the number refers to the remaining available square footage of land available to be developed
- The West Roseville Specific Plan (*West Roseville Specific Plan*, EIP Associates, dated February 4, 2004) was used to confirm future units within the West Roseville Specific Plan area.
- Land use data for several specific developments was provided by City Planning, where that data was likely to be more current and more detailed than available in the current GIS.

Infill locations are indicated in Figure 2-5.

##### 2.2.4.1.1 Redevelopment (Buildout-Sensitivity Scenario)

The Buildout-Sensitivity scenario includes redevelopment of a portion of the City, as indicated in Figure 2-5. Redevelopment occurs where existing land uses are removed and replaced with new, typically more intensive land uses (and associated sewer flows). Redevelopment land uses are based on parcel-based classifications developed for the 2009 Systems Evaluation. It was assumed that existing land uses for the parcels in the redevelopment area would be replaced by the land uses in the redevelopment plan. Overall, redevelopment results in an increase in ADWF of about 1.5 mgd from the Buildout Scenario. More detailed information on the redevelopment land uses inside the City is included in TM 9C of the 2009 Systems Evaluation.

#### 2.2.4.2 Placer County and SPMUD

Placer County provided a spreadsheet that summarized the anticipated EDUs for all entitled projects in Placer County[1]. EDUs for other currently vacant parcels were estimated using general plan data[1]. Specifically, the general plan shapefile indicated a minimum and maximum density for each category; the categories used for this study, and the associated density and diurnal curve used are summarized in Appendix A. For the Buildout-Sensitivity scenario, Placer County staff suggested an assumption that 60 percent of parcels zoned for residential development would densify to 30 percent higher than the maximum density allowed in the general plan. GIS processes were used to allocate each parcel to the nearest Placer County sewer, and then associated with the modeled manhole downstream of the parcel.

The shapefile provided by SPMUD specified the EDUs in 2060 for each parcel, as well as an associated SPMUD manhole. As for assignment of existing loads, GIS processes were used to identify the modeled manhole downstream of the parcel.

Locations of future development in Placer County and SPMUD are indicated on Figure 2-5.

#### 2.2.4.3 Urban Growth Areas

Several UGAs were identified in the 2009 Systems Evaluation and have been included in this evaluation. Locations of the UGAs are shown in Figure 2-5. Placer County UGAs include Placer Ranch, Sunset Area, Placer Vineyards, Regional University, Riolo Vineyards, and Curry Creek; the SMD-3 UGA has been incorporated into the current Service Area Boundary. UGAs within the City identified for included Sierra Vista, Creekview, and Amoruso; these UGAs either have already been added to the current Service Area Boundary or are expected to be added in early 2021 (as shown in Figure 1-1) but are included here for consistency with the City's 2017 Model Update. Land use and flow projections were based on the most recent wastewater master plans for each UGA, as indicated below. Flows associated with each UGA are summarized in Table 2-2. A more detailed summary of land uses for each UGA broken out by sewershed is included in Appendix B.

- Sierra Vista (*Sierra Vista Specific Plan Sanitary Sewer Master Plan*, Mackay & Somps Civil Engineers, July 2009)
- Creekview (*Creekview Specific Plan Sanitary Sewer Master Plan*, Mackay & Somps Civil Engineers, November 2010)
- Amoruso (*Amoruso Ranch Specific Plan Area Wastewater Master Plan*, Kimley Horn, September 2015)
- Placer Ranch (*Placer Ranch Sewer Master Plan,* Mackay & Somps, July 2017)

[1] 2018-12-18-Entitled-Planned Project.xlsx (provided December, 2018) and GeneralPlans_CommPlans.shp (downloaded from Placer County website, dated October 20, 2019)

- Sunset Area (*Sunset Area Water, Wastewater, and Recycled Water Technical Report,* Psomas, October 2017)
- Placer Vineyards (*Placer Vineyards Specific Plan; Sanitary Sewer Master Plan Addendum 1,* Mackay & Somps, May 2019)
- Regional University (*Regional University Specific Plan, Sanitary Sewer Demand*, Mackay & Somps, September 1, 2017)
- Riolo Vineyards (*Riolo Vineyards Sanitary Sewer Master Plan Update*, Unico Engineering, April 2016)
- Curry Creek (*2009 SPWA Systems Evaluation*, RMC Water & Environment, 2009). No current planning information is available for Curry Creek. Preliminary land use estimates were developed for the 2009 Systems Evaluation and used again for this evaluation.
- Placer UGA (*Hawk Homestead Sewer Analysis – Supplementary Information Requested by Placer County Environmental Engineering,* Derrick Whitehead, Municipal Consulting Group, January 29, 2016)

Table 2-2: ADWF from UGAs

| UGA | Agency | WWTP | Total Area (ac) | Buildout ADWF (mgd) |
|---|---|---|---|---|
| Sierra Vista | Roseville | Pleasant Grove | 2,064 | 1.83 |
| Creekview | Roseville | Pleasant Grove | 501 | 0.43 |
| Amoruso[a] | Roseville | Pleasant Grove | 694 | 0.61 |
| Placer Ranch | Placer County | Pleasant Grove | 2,213 | 2.15 |
| Sunset Area[b] | Placer County | Pleasant Grove | 2,888 | 3.80 |
| Placer Vineyards | Placer County | Dry Creek | 5,230 | 2.89 |
| Regional University | Placer County | Pleasant Grove | 1,159 | 1.17 |
| Riolo Vineyards | Placer County | Pleasant Grove | 879 | 0.23 |
| Curry Creek | Placer County | Pleasant Grove | 3,212 | 2.74 |
| Placer UGA | Placer County | Pleasant Grove | 617 | 0.04 |

Notes:

a. Includes 274 units north of Amoruso that would contribute flow through sewers in Amoruso (Toad Hill)

b. Does not include the Placer Ranch subset of the Sunset Area Plan

### 2.2.5 Dry Weather Flow Summary

Existing and Projected Future Dry Weather Flows are summarized in Table 2-3. Note that these estimates include wet season GWI, which may be higher than dry season GWI.

Table 2-3: Estimated Dry Weather Flows[a] by Agency

| WWTP | Agency | Existing Calibration ADWF (mgd) | Existing ADWF with Drought Rebound | Buildout ADWF (mgd) | Buildout-Sensitivity[b] ADWF (mgd) |
|---|---|---|---|---|---|
| Pleasant Grove | Roseville | 5.87 | 6.70 | 13.01 | 13.04 |
| | Placer County | 0.18 | 0.20 | 9.85 | 9.85 |
| | SPMUD | 2.25 | 2.97 | 3.63 | 3.63 |
| | Total | 8.30 | 9.87 | 26.49 | 26.52 |
| Dry Creek | Roseville | 5.60 | 6.27 | 6.89 | 8.23 |
| | Placer County | 2.57 | 2.81 | 7.19 | 7.42 |
| | SPMUD | 2.90 | 3.64 | 5.16 | 5.16 |
| | Total | 11.06 | 12.72 | 19.24 | 20.81 |

Notes:

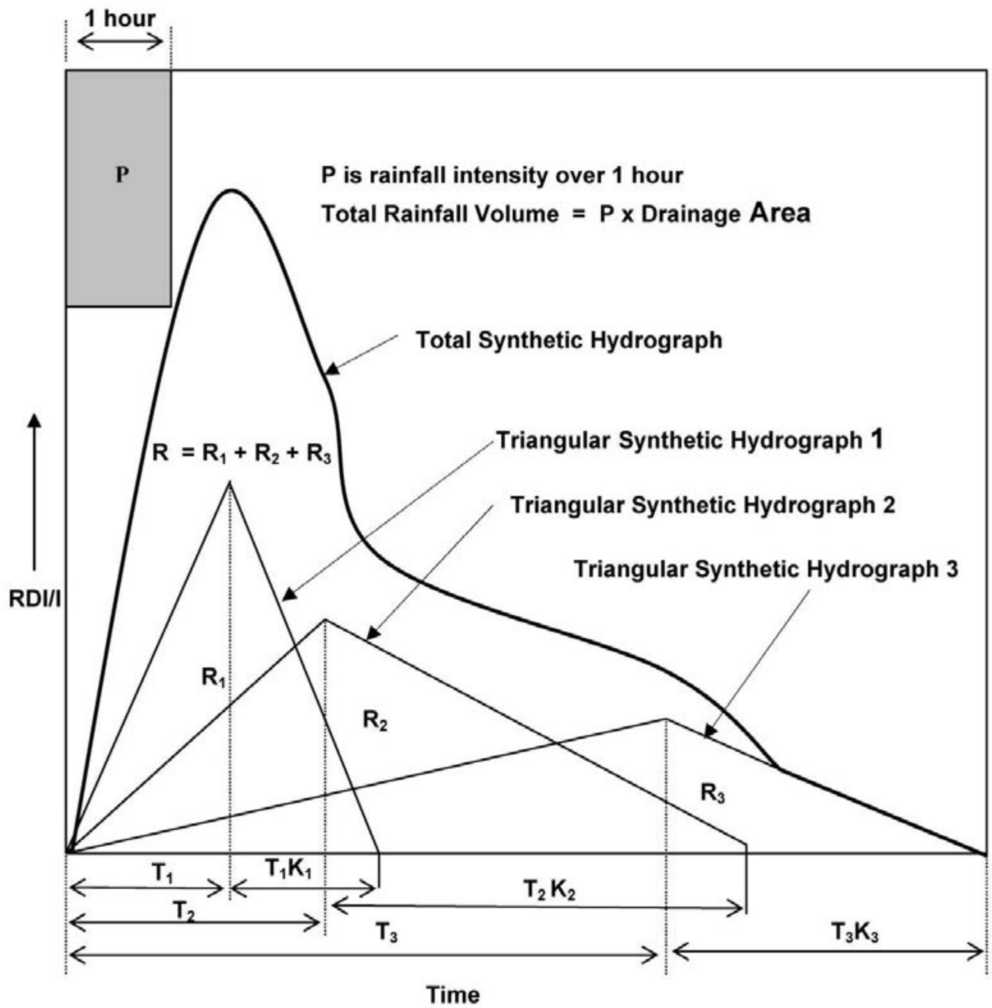
a. Includes wet season GWI.

b. For the Buildout-Sensitivity scenario, the development density was assumed to be at the maximum range allowed by the General Plan. A Base Wastewater Flowrate (BWF) of 180 gpd per EDU was assumed for Placer County and SPMUD.

## 2.3 Rainfall-Dependent Infiltration and Inflow

RDI/I flows result from rainfall events that produce infiltration and inflow of storm water runoff into the sewer system. RDI/I flows are defined by the magnitude, shape, and timing of the RDI/I response. RDI/I varies depending on many factors, including the magnitude and intensity of the storm event, area topography, type of soil, and the condition of the sewers, manholes, and sewer service laterals. In a dynamic model, RDI/I is typically computed as a percentage of the rainfall (sometimes referred to as the “R value”) falling on the contributing area of a subcatchment for each of three or more hydrograph components, representing different response times to rainfall, e.g., fast, medium, and slow, as illustrated in Figure 2-6. The contributing area is assumed to be the sum of the area of all developed parcels, except for large open areas such as parks and parking lots. Summing all of the component hydrographs for the entire duration of the rainfall event results in the total RDI/I hydrograph for the event for that subcatchment. Note that although the “slow” RDI/I component can contribute significantly to the total RDI/I volume, the “fast” component has the biggest impact on the magnitude of the peak wet weather flow.

Figure 2-6: RDI/I Hydrograph Components



# 3. TRUNK SEWER EVALUATION

## 3.1 Introduction

This section describes the hydraulic analysis and design criteria used to evaluate system performance and size capacity relief projects in the trunk sewer system and identifies the capacity deficiencies based on the results of model runs.

## 3.2 Model Network Development

This section describes the development of the hydraulic model used for the capacity assessment of the SPWA trunk sewers. The modeling software used for this study was InfoWorks ICM by Innovyze, a fully dynamic hydraulic modeling program that has been used for many other collection systems in California, including Sacramento Area Sewer District, Regional San, and the City of Folsom. This section provides an overview of the model development process, including description of the modeled sewer network, the flow monitoring program, and the calibration of the model.

### 3.2.1 Modeling Terminology

Key modeling terms are defined below.

- Network refers to the representation of the physical facilities being modeled. Modeled network components include pipes, manholes, and pump stations.
- Nodes are primarily manholes, but also include pump station wet wells and outfalls (discharge points from the modeled system). Key data associated with nodes include manhole ground elevations and pump station wet well elevations and cross-sectional areas.
- Pipes or conduits are connections (links) between nodes, and include both gravity sewers, force mains and conduits. Key data associated with pipes are upstream and downstream node IDs, pipe length, diameter, roughness factor, and upstream and downstream invert elevations.
- Pumps, gates, and overflow weirs are represented in the model as links between nodes. Data associated with these facilities depend on the structure type. For example, data for weirs include width, elevation, and weir discharge coefficient.
- Subcatchments are areas that contribute flow to the modeled sewer network. They may represent parcels, or an area comprised of multiple parcels that are collected by unmodeled sewers in the collection system (sewershed). Data associated with subcatchments include BWF (computed based on population, water use, or other available data), type of diurnal BWF profile (which is a function of land use), I/I parameters, and the node at which the flow from the subcatchment enters the modeled system.
- Model loads are the flows entering the modeled sewer system from each subcatchment. Model loads include residential and commercial sanitary or BWF, GWI, and RDI/I. As a sum, they represent the total wastewater flow applied to the model.
- Models are the combination of a modeled network, its associated subcatchments and loads, and other data (e.g., rainfall, diurnal profiles, inflows from other areas, etc.) that comprise a specific model scenario.

### 3.2.2 Modeled System

The model network for this Systems Evaluation included trunk sewers from the City's model, as well as selected pipe reaches in SPMUD and Placer County. The extent of the modeled sewers in SPMUD and Placer County is consistent with the extent used in the 2009 Systems Evaluation, and generally includes 15-inch and larger trunk sewers. The existing modeled network is shown in Figure 3-1. Figure 3-1 also highlights the trunk sewers within Roseville that convey flow from multiple SPWA partners and are the focus of the capacity analysis.

As noted previously, the model network was based on the model developed for the City's 2017 Sewer Model Update. For the trunk sewers in that model update, the City's GIS data was updated with rim and invert elevation data extracted from record drawings or, in some cases, ground elevation data from other datasets. In a few cases (e.g. at all flow splits) additional data was collected through survey or field inspection by City staff.

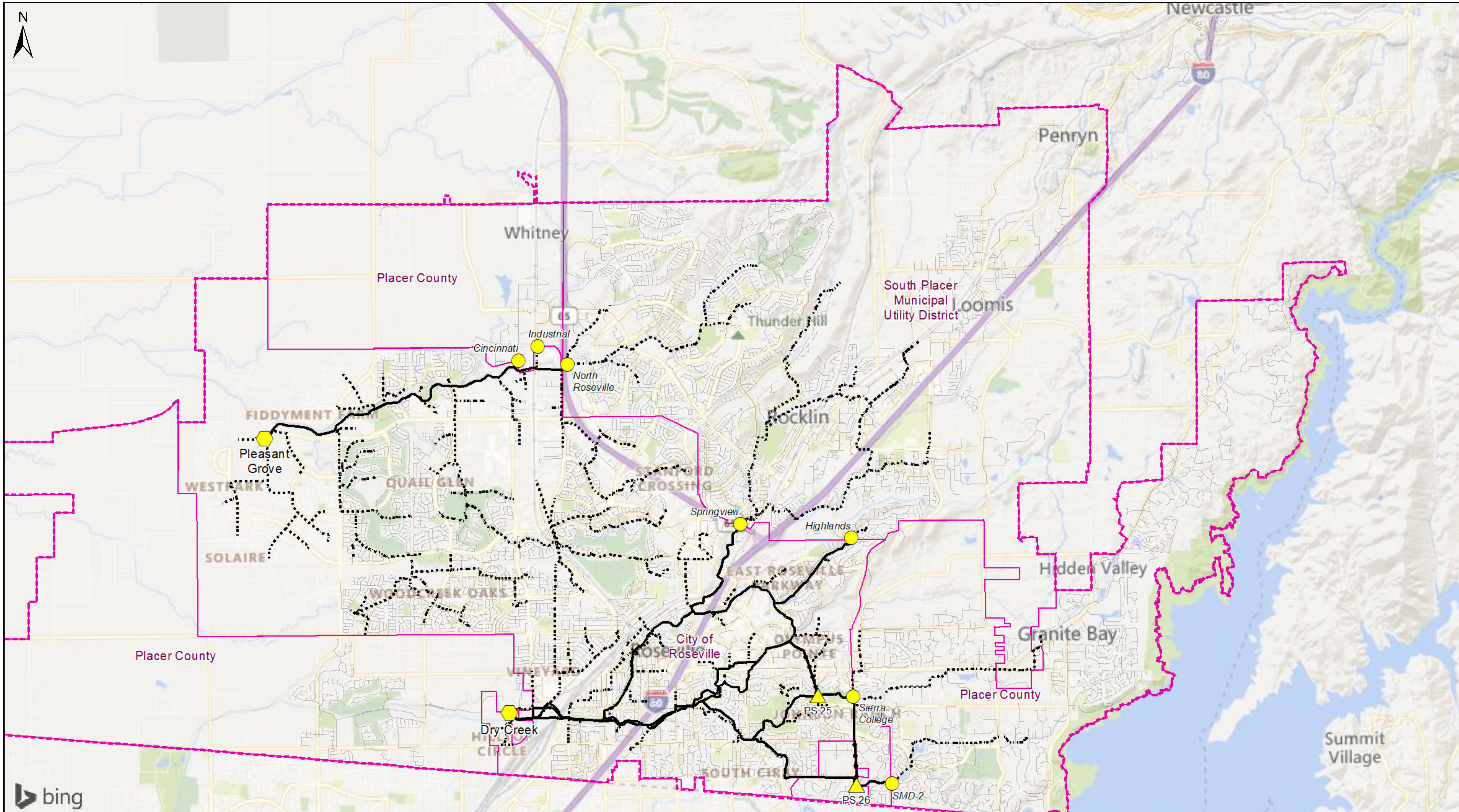
For the current Systems Evaluation Update, that model was extended into Placer County and SPMUD service areas to provide a more complete analysis of the regional trunk sewer system. GIS data provided by Placer County and SPMUD was used as the basis for extending the network into their respective systems. The model extent was limited to the extent used for the 2009 Systems Evaluation, but generally includes most 15-inch and larger sewers, as well as selected smaller diameter sewers. A model validation process was undertaken, similar to the process used in the City's 2017 Sewer Model Update.

Model validation generally includes the following:

- Connectivity checks. The modeled networks were checked for connectivity, which includes verifying that correct upstream/downstream manholes were identified for each pipe, with no missing links or nodes in the network. A connected network means that all pipes and manholes will be selected when the network is traced upstream from the model outfalls.
- Missing data checks. Key data required for modeling were reviewed to identify missing values. Missing data were inferred where reasonable (e.g., where one or two invert elevations were missing between populated values, the data could be interpolated), or populated based on data from the 2009 Systems Evaluation.
- Profile review. Profiles were plotted for each series of pipe segments in the modeled network to visually check for suspect data. Examples of suspect data include negative pipe slopes, abrupt steps up or down in pipe inverts, and pipe diameters that conflict with surrounding pipes. Where appropriate, corrections to suspect data were inferred. Otherwise, verification in the form of as-built drawings or field investigations were requested.
- Special structures. Flow splits (manholes with more than one outlet pipe) were identified for further verification of outlet pipe elevations and/or the existence of weir overflows or other control structures. Field verification and/or as-built drawings were requested as needed.

In all, the model includes approximately 83 miles of gravity trunk sewers, of which about 32 miles are considered SPWA facilities. All gravity pipelines are modeled assuming a Manning's n of 0.013.

The modeled system includes two pump stations that can convey regional flows as summarized in Table 3-1. PS 25 and PS 26 were designed to operate during high wet weather conditions by transferring flow between trunk sewers, thereby alleviating downstream capacity issues. Flow enters the pump station wet well when surcharge conditions in the adjacent gravity sewer overtops an associated weir. PS 25 is designed to limit surcharging in the trunk sewer on Old Auburn Road and conveys flows (mostly originating in Placer County) north towards the 21-inch trunk sewer downstream of Placer County's Sierra College Meter. PS 26 is designed to limit surcharging in that 21-inch easement sewer by conveying flows further north on East Roseville Parkway. City operations staff note that PS 26 is used regularly during wet weather conditions, but PS 25 has not been used in a number of years.




# Figure 3-1
# Modeled Trunk System

South Placer Wastewater Authority
2020 Systems Evaluation

0 ½ 1 2 Miles

- Regional Gravity Sewer
- Regional Force Main
- Non-Regional Modeled Sewer
- Non-Modeled Sewer
- Wastewater Treatment Plant
- Pump Station
- Permanent Flow Meters
- Partner Agency Boundary
- Ultimate Service Area Boundary

Project #: 0011183.00
Map Created: December 2020

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Table 3-1: Regional Pump Station Facilities

| Pump Station | No. of Pumps | Firm Capacity[a] (mgd) | Total Capacity (mgd) | Force Main Dia. (in.) |
|---|---|---|---|---|
| PS 25[b] (Johnson Ranch) | 2 | 2.02 | 3.20 | 12 |
| PS 26 (Old Auburn) | 2 | 0.43 | 0.68 | 8 |

Notes:

a. Capacity with one pump out of service.

b. Capacity of PS 25 is based on information collected as part of the 2009 Systems Evaluation. Capacity has not been evaluated for this study. Based on reports from City operations, PS 26 has not been used in several years.

### 3.2.3 Flow Monitoring Program

To support the development of the hydraulic model and flow projections for the Systems Evaluation Update, a temporary flow monitoring program was conducted as part of this study, including 30 meters during the 2015/2016 wet weather season (for the City's 2017 Model Update) and 12 meters during the 2018/2019 wet weather season (for SPMUD and Placer County). V&A Consulting Engineers, under subcontract to Woodard & Curran, conducted the monitoring. The meters and rain gauges were installed for a 2-month period from early January through early March for each wet weather season to capture the flow from the tributary areas. In addition, two recording rain gauges were also installed during both seasons and used for calibration of gauge-adjusted radar rainfall data. The locations of the flow monitoring sites are shown in Figure 3-2. The figure also shows the associated tributary area (basin) for each flow meter.

The locations of the flow meters relative to each other and to flow splits within the collection system are shown schematically in Figure 3-3. Note that many of the meters were located downstream of other meters; therefore, the tributary areas shown for each of these meters in Figure 3-2 are the "incremental" areas between the flow meter and tributary basins of the upstream flow meters. Flow meter locations, pipe diameters, and upstream meters are listed in Table 3-2 and Table 3-3 for the permanent meters and temporary meters, respectively. Data for all meters during both flow monitoring periods are included in Appendix C.

The purpose of the flow monitoring program was to quantify the flows in the system to provide data with which to calibrate the hydraulic model (discussed later in this section), and to quantify the I/I response to storm events in various areas of the system.

Table 3-2: Permanent Flow Meters

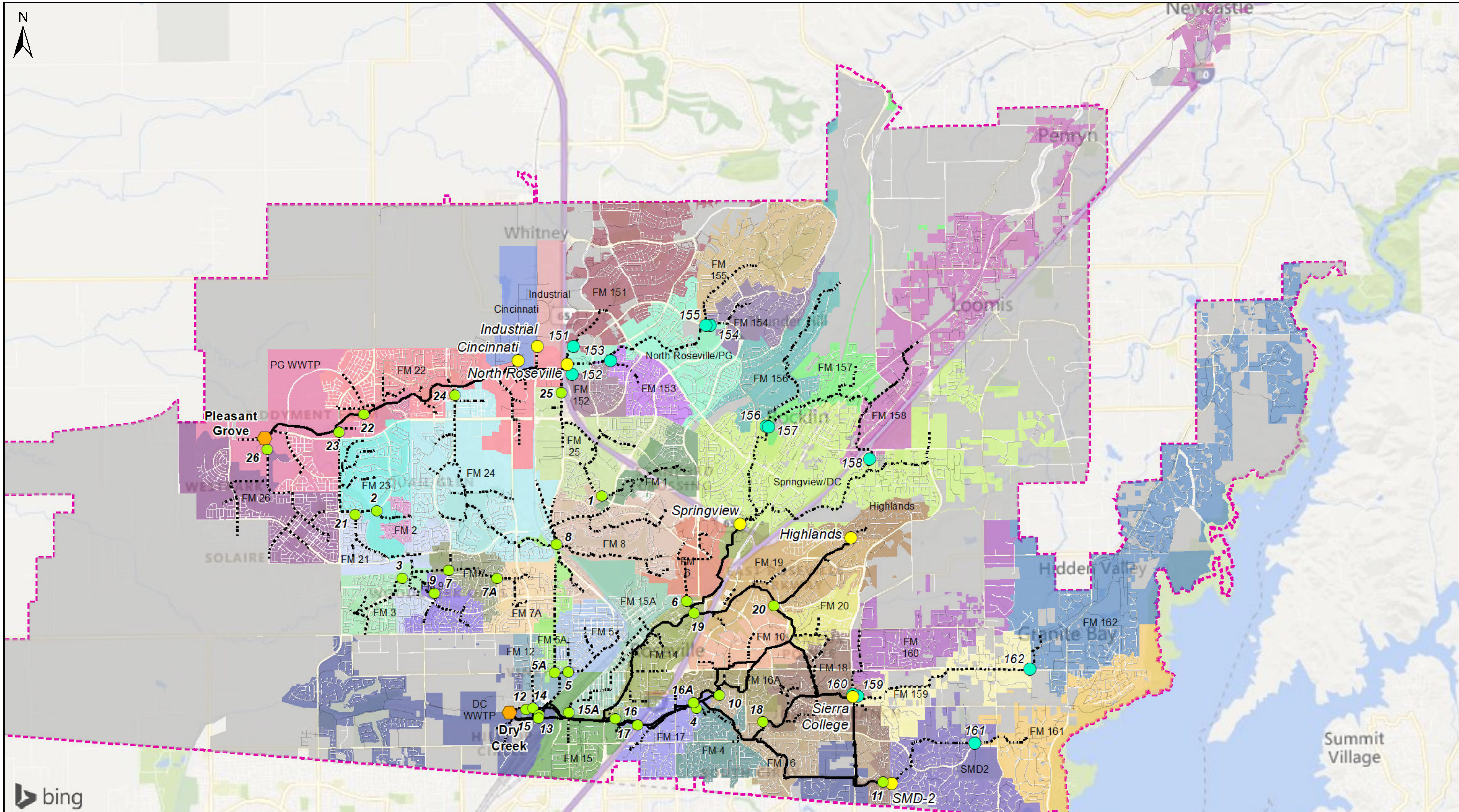
| Flow Meter ID (FM ID) | Agency | Downstream Meters | Upstream Meters |
|---|---|---|---|
| Cincinnati | Placer County | 22 | |
| Industrial | Placer County | 22 | |
| SMD-2 | Placer County | 11 | 161 |
| Sierra College | Placer County | 18 | 159, 160 |
| Highlands | SPMUD | 19 | |
| North Roseville | SPMUD | 22 | 151, 152, 153, 154, 155 |
| Springview | SPMUD | 14 | 156, 157, 158 |

## Table 3-3: Temporary Flow Meter Locations

| Flow Meter ID (FM ID) | Manhole ID | Diameter (in)[a] | Downstream Meters | Upstream Meters |
|---|---|---|---|---|
| 1 | E04-042 | 18 | 25 | |
| 2 | E01-180 | 15 | 23 | |
| 3 | D02-280 | 15 | 21 | |
| 4 | B06-195 | 15 | 16, 17 | |
| 5 | B04-003 | 12 | 15 | |
| 5A | B04-225 | 21 | 15 | |
| 6 | C06-161 | 18 | 14 | |
| 7 | D02-354 | 23.5 | 21 | 7A |
| 7A | D03-115 | 12 | 7 | |
| 8 | D04-201 | 24 | 24 | |
| 9 | D02-068 | 18 | 21 | |
| 10 | B06-341 | 18 | 16 | |
| 11[b] | A08-034 | 14.5 | PS 26, 16, 17 | SMD-2 |
| 12 | B03-029 | 21 | DC WWTP | |
| 13[c] | B03-042 | 42 | DC WWTP | 16 |
| 14 | B03-024 | 66 | DC WWTP | 6, 19, Springview |
| 15 | B03-053 | 36 | DC WWTP | 5, 5A, 15A, 17 |
| 15A | B04-082 | 12 | 15 | |
| 16 | B04-151 | 30 | 13 | 4, 10, 11, 16A, 18 |
| 16A | B06-161 | 15 | 16, 17 | |
| 17 | B05-258 | 21 | 15 | 4,1 6A, 11 |
| 18 | B07-242 | 22.5 | 16 | 11, Sierra College |
| 19 | C06-024 | 35.5 | 14 | 20, Highlands |
| 20 | C07-003 | 24 | 19 | |
| 21 | E01-149 | 33 | 23 | 3, 7, 9 |
| 22 | F01-136 | 72 | PG WWTP | 24, 25, Cincinnati, Industrial, North Roseville |
| 23 | F01-147 | 36 | PG WWTP | 2, 21 |
| 24 | F02-074 | 41.5 | 22 | 8 |
| 25 | G04-041 | 21 | 22 | 1 |
| 26 | F99-035 | 42 | PG WWTP | |
| 151 | L02-001 | 24 | North Roseville | |
| 152 | K02-005 | 18 | North Roseville | |
| 153 | L03-014 | 18 | North Roseville | |
| 154 | M06-004 | 18 | North Roseville | |
| 155 | M06-003 | 21 | North Roseville | |
| 156 | J07-058 | 15 | Springview | |
| 157 | J07-060 | 18 | Springview | |
| 158 | I10-037 | 18 | Springview | |
| 159 | C9-02 | 17.4 | Sierra College | 161 |
| 160 | C9-04 | 14.4 | Sierra College | |
| 161 | B12-03 | 14.4 | SMD-2 | |
| 162 | D14-03 | 14.4 | 159 | |

Notes:

a. Actual measured diameter used for meter flow calculations (may be slightly different than pipe nominal diameter).
b. Meter located directly downstream of SMD-2 meter to confirm SMD-2 flows and for consistency with 2005 Flow Monitoring Program. Meter confirmed accuracy of flows at SMD-2 meter.
c. Meter placed for consistency with 2005 Flow Monitoring Program and to confirm measured flows to DC WWTP.




# Figure 3-2

## Flow Monitoring Locations

South Placer Wastewater Authority
2020 Systems Evaluation

0 ½ 1 2 Miles

- Regional Gravity Sewer
- Regional Force Main
- Non-Regional Modeled Sewer
- Non-Modeled Sewer
- Permanent Flow Meters
- 152 2018/2019 Temporary Flow Meter
- 5 2015/2016 Temporary Flow Meter
- Wastewater Treatment Plant
- FM 152 Flow Meter Basin
- Ultimate Service Area Boundary

Project #: 0011183.00
Map Created: December 2020

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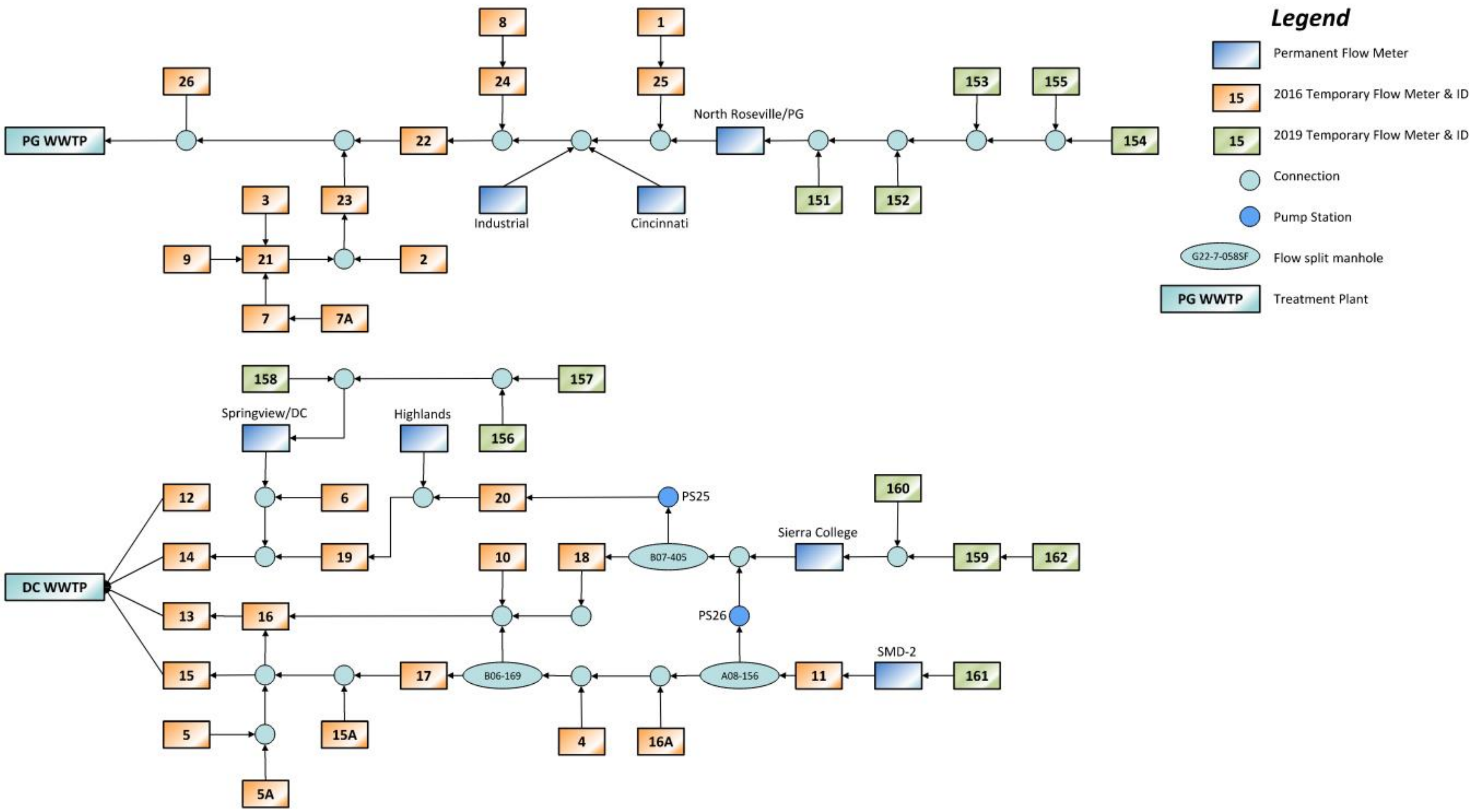
Figure 3-3: Flow Meter Schematic



#### 3.2.3.1 Radar Rainfall Data

To obtain the most accurate spatial rainfall data for use in model calibration, gauge-adjusted radar rainfall (GARR) data was obtained for the rainfall events that occurred during both monitoring periods. GARR data combines the use of spatial rainfall estimates from radar data with point rainfall measurements from rain gauges located on the ground. The radar measures the reflected signals from falling raindrops in the atmosphere, which can then be translated into estimates of rainfall rates using mathematical and empirical relationships. However, the conversion of the reflected signals to rainfall rates is not sufficiently accurate to consistently estimate actual rainfall amounts at a given location, but does provide good information about the relative rainfall amounts at different locations (i.e., the spatial variation of rainfall). Therefore, the radar rainfall estimates are calibrated to (i.e., adjusted to match) more accurate rainfall measurements from rain gauges located on the ground in the area of study.

The process of converting radar images to GARR estimates is complex and must be conducted by trained and experienced radar rainfall specialists. There are several providers of GARR data throughout U.S. Each uses its own data processing techniques and proprietary algorithms to generate the gauge-adjusted radar rainfall estimates. For this study, Woodard & Curran contracted with OneRain, Inc. to provide the GARR data. The rainfall collected by the two V&A temporary rain gauges was provided to OneRain for use in their GARR calibration to supplement data available from permanent rain gauges owned by the City for its Flood Alert System.

OneRain developed the GARR data for the flow monitoring period in 5-minute time increments for 1 kilometer by 1 kilometer pixels (each approximately 250 acres in size) covering the entire SPWA service area (including SPMUD and Placer County). Approximately 200 pixels cover the sewered portions of the service area. The data was aggregated to 15-minute intervals for use in the model. The pixel containing the centroid of each model subcatchment defines the rainfall for that subcatchment for each rainfall event.

### 3.2.4 Model Loading

Section 4.4 described how BWF model loads were developed from water use and land use and growth projections. GWI and RDI/I flows were also loaded to the model by parcel by associating each parcel with a flow meter area. For each parcel, a sewershed ("contributing") area (i.e., area that potentially contributes I/I) was determined based on land use. Contributing areas for non-open space land uses, including residential, commercial, industrial, and institutional uses, were based on the full parcel area. Contributing areas for parks and other land uses that may contribute sewer flows but are likely to have significant open space were limited to 1 acre. Parcels comprised of open space, drainage channels, and large roadways such as freeways not likely to contribute sewer flows were assigned zero contributing area. I/I flows for each parcel were computed in the model by applying the appropriate meter area GWI and RDI/I parameters (determined during the model calibration process described below) to the contributing area of the parcel.

Parcels loading to the same modeled manhole are grouped into subcatchments. All BWF loads associated with each parcel in the subcatchment are then summed to calculate the overall BWF loading from the subcatchment. The contributing areas are also summed, and the appropriate meter area GWI and RDI/I parameters are assigned to calculate I/I flows for each subcatchment.

### 3.2.5 Model Calibration

Model calibration is the process of comparing model-computed flows to observed (monitored) flows to verify that the model is accurately simulating flows in the sewer system. The model is calibrated for both dry and wet weather conditions.

As described above, temporary flow monitoring programs were conducted during the late January through mid-March 2016 and 2018 wet weather periods. The data collected during these flow monitoring programs, as well as data from the permanent meters, were used for model calibration.

### 3.2.6 Dry Weather Calibration

The dry period in early to mid-February 2016 (for flow meters in the City) and late January 2019 (for flow meters in SPMUD and Placer County) were used as the dry weather calibration periods for the model. The dry weather calibration process was used to verify BWF loads and diurnal curves, and to quantify GWI (as indicated by monitored flows that were higher than estimated BWF). The dry period immediately prior to the wet weather calibration period in early March was also used to confirm the calibration.

Figure 3-4 shows an example plot of model vs. metered flow for one meter location (Site 155). In this graph, the green line represents the monitored (observed) flow, and the red line is the model-simulated flow. Calibration graphs for all meters throughout the monitoring program are included in Appendix D. Note that the Sierra College permanent meter was not operational during much of the 2019 season; however, nearly all tributary flows to this meter were measured as part of the temporary metering program. While most meters calibrated well for both 2016 and 2019 data, there were a few meters with discrepancies. The discrepancies are mostly due to differences in GWI observed in the temporary meters upstream of the Springview and Sierra College meters during the 2019 flow monitoring program versus the 2016 program. As 2016 had significantly less rainfall preceding the flow monitoring program, this GWI was likely not present during the 2016 flow monitoring program.

Table 3-4 summarizes the dry weather loading parameters determined for each flowmeter area during calibration. Calibrated unit flow factors are indicated on Figure 3-5, while estimated GWI rates for each flowmeter area are indicated on Figure 3-6.

The model calibration resulted in a reasonably good match of modeled to metered flow at most locations, but some differences at others. These differences may be due to inaccuracies in the meter data, inaccuracies in the water consumption data, or in the configuration of the system (e.g., upstream flow splits). The calibration process also resulted in further investigation and adjustments at the major flow split locations in the model (manholes SMH B06-169, SMH A08-156, SMH B07-405 and SMH D04-442). To ensure accuracy during calibration, sewers in the City's trunk model were updated based on survey, field investigation and City drawings to capture the physical structures of the flow splits and then adjusted as needed to better calibrate to the flow meter data.

For a few of the meters (FM 6, 10, and 16A), the water consumption data was not sufficient to account for all of the apparent flow observed by the flowmeter. This could be due to water use not in the water consumption database (e.g. water from another source, or error in the water consumption database), or an error in the flow meter data. To be conservative, some residential flow (less than 0.1 mgd) was distributed in each of the meter areas across all parcels to improve calibration.

# Table 3-4: Dry Weather Flow Loading Parameters

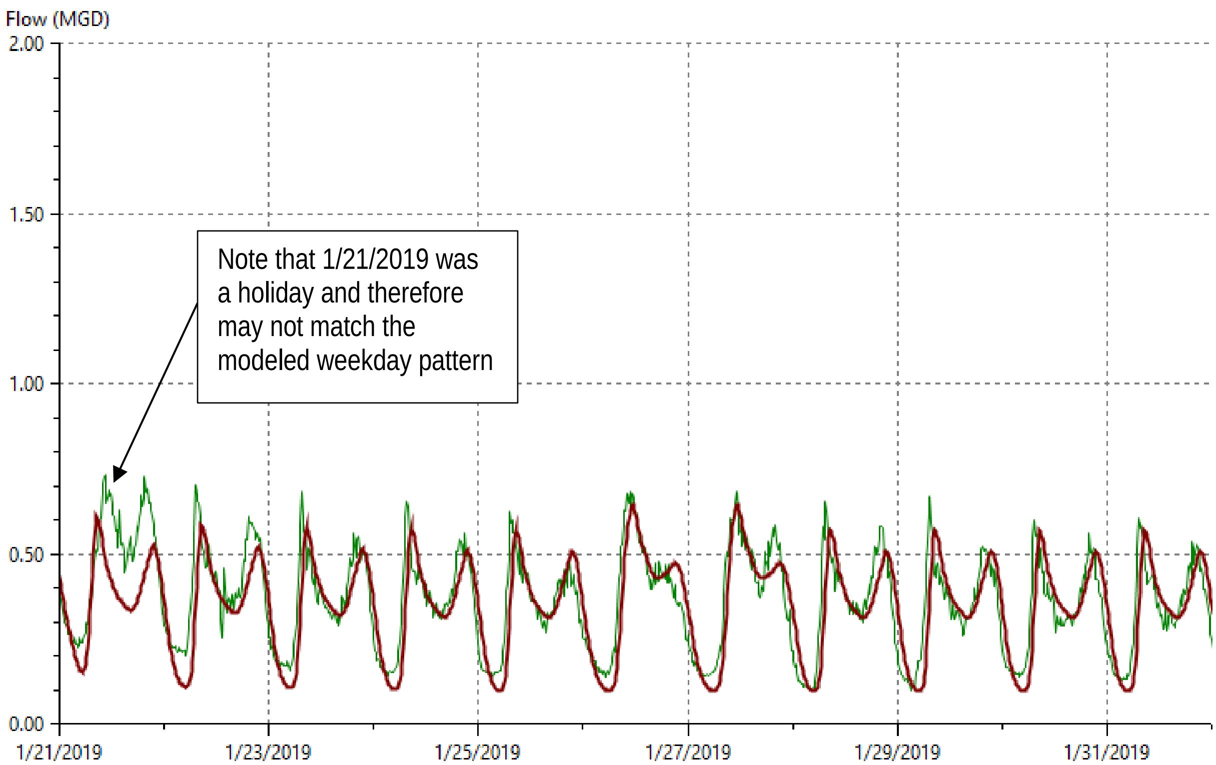
| Flow Meter ID (FM ID) | Contributing Area[a] (acres) | Incremental Calibrated ABWF[a] (mgd) | Calibration ABWF Reduction Factor[b] | GWI (gpd/ac.) | GWI[a] (mgd) | Incremental Calibrated ADWF[a] (mgd) |
|---|---|---|---|---|---|---|
| 1 | 297 | 0.28 | 0% | -- | -- | 0.28 |
| 2 | 174 | 0.14 | 0% | -- | -- | 0.14 |
| 3 | 270 | 0.29 | 0% | -- | -- | 0.29 |
| 4 | 397 | 0.30 | 0% | -- | -- | 0.30 |
| 5 | 241 | 0.30 | 0% | 373 | 0.09 | 0.39 |
| 5A | 181 | 0.14 | 0% | 441 | 0.08 | 0.22 |
| 6 | 209 | 0.23 | 0% | 192 | 0.04 | 0.27 |
| 7 | 181 | 0.19 | 0% | -- | -- | 0.19 |
| 7A | 349 | 0.42 | 0% | -- | -- | 0.42 |
| 8 | 588 | 0.51 | 0% | 425 | 0.25 | 0.76 |
| 9 | 209 | 0.22 | 0% | -- | -- | 0.22 |
| 10 | 363 | 0.32 | 0% | -- | -- | 0.32 |
| 11 | 0[b] | 0.00 | 0% | -- | -- | 0.00 |
| 12 | 157 | 0.15 | 0% | -- | -- | 0.15 |
| 13 | 0[c] | 0.00 | 0% | -- | -- | 0.00 |
| 14 | 428 | 0.43 | 0% | -- | -- | 0.43 |
| 15 | 328 | 0.31 | 0% | -- | -- | 0.31 |
| 15A | 326 | 0.30 | 0% | -- | -- | 0.30 |
| 16 | 470 | 0.41 | 0% | 1064 | 0.50 | 0.91 |
| 16A | 219 | 0.27 | 0% | 593 | 0.13 | 0.40 |
| 17 | 352 | 0.31 | 0% | -- | -- | 0.31 |
| 18 | 364 | 0.34 | 0% | 302 | 0.11 | 0.45 |
| 19 | 374 | 0.51 | 0% | 561 | 0.21 | 0.72 |
| 20 | 172 | 0.18 | 0% | -- | -- | 0.18 |
| 21 | 327 | 0.26 | 0% | -- | -- | 0.26 |
| 22 | 857 | 0.58 | 0% | -- | -- | 0.58 |
| 23 | 283 | 0.20 | 0% | -- | -- | 0.20 |
| 24 | 932 | 1.38 | 0% | -- | -- | 1.38 |
| 25 | 589 | 0.53 | 0% | 170 | 0.10 | 0.53 |
| 26 | 423 | 0.34 | 0% | -- | -- | 0.34 |
| 151 | 757 | 0.64 | 15% | -- | -- | 0.64 |
| 152 | 218 | 0.25 | 0% | -- | -- | 0.25 |
| 153 | 280 | 0.23 | 20% | -- | -- | 0.23 |
| 154 | 384 | 0.23 | 20% | -- | -- | 0.23 |
| 155 | 521 | 0.35 | 15% | -- | -- | 0.35 |
| 156 | 562 | 0.21 | 15% | 302 | 0.17 | 0.38 |
| 157 | 314 | 0.16 | 0% | 96 | 0.03 | 0.19 |
| 158 | 1766 | 0.74 | 15% | 130 | 0.23 | 0.97 |
| 159 | 497 | 0.11 | 0% | 80 | 0.04 | 0.15 |
| 160 | 570 | 0.17 | 20% | 175 | 0.1 | 0.27 |
| 161 | 818 | 0.21 | 0% | 342 | 0.28 | 0.49 |
| 162 | 2124 | 0.44 | 0% | 311 | 0.66 | 1.10 |
| Cincinnati[d] | 204 | 0.09 | 0% | -- | -- | 0.09 |
| Industrial[d] | 121 | 0.06 | 0% | -- | -- | 0.06 |
| SMD-2 | 783 | 0.28 | 0% | -- | -- | 0.28 |
| Sierra College | 14 | 0.01 | 0% | -- | -- | 0.01 |
| Highlands | 344 | 0.11 | 0% | -- | -- | 0.11 |

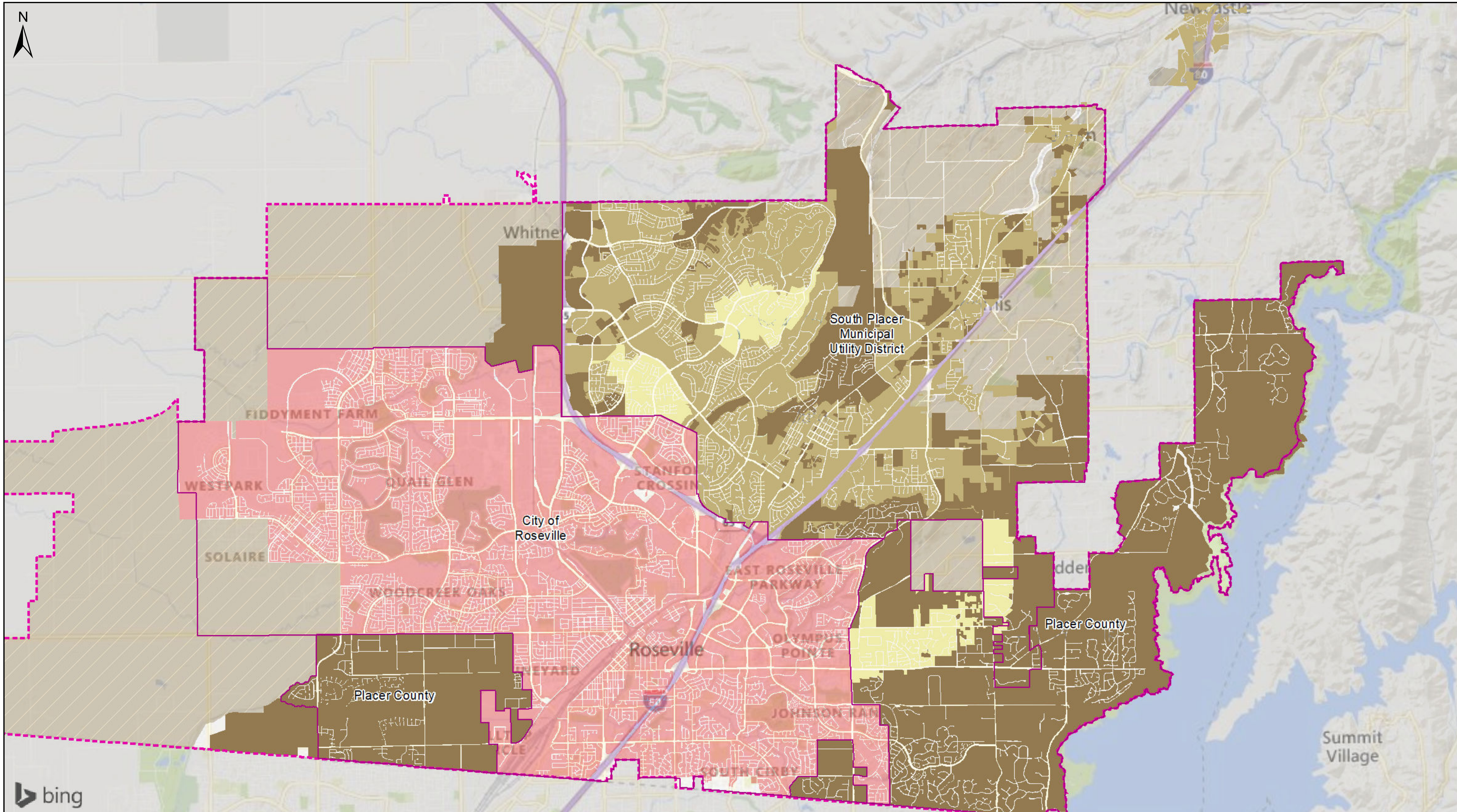
| Flow Meter ID (FM ID) | Contributing Area[a] (acres) | Incremental Calibrated ABWF[a] (mgd) | Calibration ABWF Reduction Factor[b] | GWI (gpd/ac.) | GWI[a] (mgd) | Incremental Calibrated ADWF[a] (mgd) |
|---|---|---|---|---|---|---|
| North Roseville (Pleasant Grove) | 1997 | 1.25 | 15% | -- | -- | 1.25 |
| Springview (Dry Creek) | 605 | 0.55 | 15% | -- | -- | 0.55 |

Notes:

a. For meters with upstream basins, represents the incremental meter basin area or flow, as shown on Figure 3-2.
b. Meter located directly downstream of SMD-2 meter to confirm SMD-2 flows and for consistency with 2005 Flow Monitoring Program
c. Meter placed for consistency with 2005 Flow Monitoring Program and to confirm measured flows to DC WWTP.
d. Due to highly variable and relatively small industrial flows, calibration of Cincinnati and Industrial meters was limited.

Figure 3-4: Example DWF Model Calibration Graph (Site 155)






# Figure 3-5

## Calibrated Unit Flow Factors

South Placer Wastewater Authority
2020 Systems Evaluation

0 ½ 1 2
Miles

**Flow Factor (gpd/EDU)**

- 128
- 136
- 160

City of Roseville (Water Billing Data)

Future Connection

Ultimate Service Area Boundary

Partner Agency Boundary

Project #: 0011183.00
Map Created: December 2020

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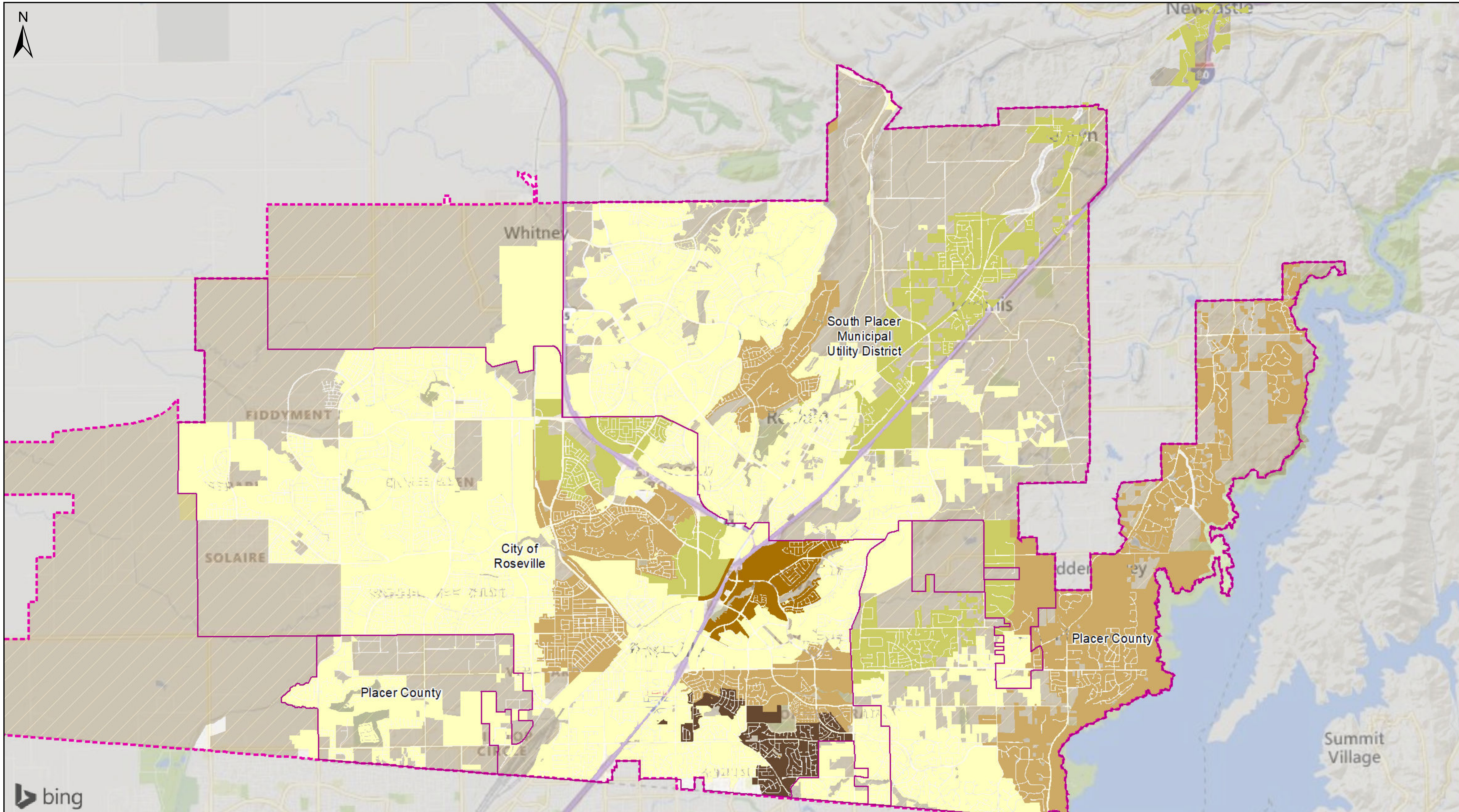


# Figure 3-6

## Calibrated GWI Rates

South Placer Wastewater Authority
2020 Systems Evaluation

0 ½ 1 2 Miles

Partner Agency Boundary

Ultimate Service Area Boundary

**GWI (gpd/acre)**

- < 100
- 100 - 200
- 200 - 500
- 500 - 1,000
- > 1,000
- Unconnected

Project #: 0011183.00
Map Created: December 2020

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Placer | CITY OF ROSEVILLE CALIFORNIA | SPMUD | WOODARD & CURRAN

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## 3.3 Wet Weather Flow Projections

### 3.3.1 Wet Weather Calibration

During wet weather calibration, parameters are adjusted to simulate the volume and timing of RDI/I for monitored storm events. Rainfall was assigned to each parcel or subcatchment using data from the GARR pixel at the centroid of the parcel or subcatchment. Through the wet weather calibration process, RDI/I hydrograph parameters were developed for each metered area. For calibration of the City's meters, the rainfall period from March 4th through March 15th, 2016 was used to determine RDI/I parameters. This period had two storms: the first storm occurring around March 5th-6th generally had the highest rainfall totals; the second storm on March 12th-13th generally had the highest peak flows. The soils for the second storm were more saturated, and generated a larger response. For a conservative calibration, RDI/I parameters were selected to best match the response to the March 12th-13th storm. These conservative calibration conditions should be considered when using this model to evaluate capacity.

For meters in Placer County and SPMUD, two storms were used for wet weather calibration: one event occurring January 15th through January 17th, and another event February 25th through 27th, 2019. The January event was generally higher peak intensity but lower total volume, while the February event was less intense but had more total rain. Both events had similar (generally wet) antecedent conditions. Some meters had higher peak flows during the January event, while others had higher peak flows during the February event; in general, an attempt was made to calibrate for both events. Storm information for the calibration events are summarized in Table 3-5.

Table 3-5: Calibration Rainfall Events

| Start Date/Time | Storm Duration (hours) | Total Storm Rainfall (in.) | | | Peak Hour (in.) | | |
|---|---|---|---|---|---|---|---|
| | | DC WWTP | Rocklin (Site 157) | Granite Bay (Site 162) | DC WWTP | Rocklin (Site 157) | Granite Bay (Site 162) |
| 2016 Calibration Events | | | | | | | |
| 3/5/2016 13:00 | 69 | 2.68 | 3.16 | 2.84 | 0.15 | 0.21 | 0.22 |
| 3/12/2016 14:00 | 86 | 2.29 | 2.52 | 2.70 | 0.21 | 0.22 | 0.25 |
| 2019 Calibration Events | | | | | | | |
| 1/16/2019 12:00 | 12 | 1.55 | 1.71 | 1.83 | 0.36 | 0.34 | 0.44 |
| 2/24/2019 17:00 | 44 | 3.59 | 3.78 | 3.49 | 0.23 | 0.19 | 0.19 |

Table 3-6 summarizes the results of the wet weather calibration in terms of the R values assigned to each flow meter basin. An example wet weather calibration graph is presented in Figure 3-7. Calibration graphs for all meters are included in Appendix D.

Overall, most meters had relatively low R values, indicative of a tight system with newer pipes (see Figure 3-8). The FM 5 and FM 7 areas exhibited more significant peak flow response. Further investigations, such as smoke tests or CCTV, may be appropriate in these area or others with higher R factors to identify potential sources of I/I (such as unauthorized stormwater discharge or leaking pipes or manholes) and any capacity concerns.

A few areas did not exhibit enough response to rainfall to develop calibration parameters; a minimum R volume response of 0.6 percent was assumed, distributed evenly between the fast, medium, and slow response R factors. For future growth areas, a minimum R volume response of 0.6 percent was also assumed, which results in a peak RDI/I under the design storm of approximately 700 gallons per acre per day (consistent with criteria for new development documented in TM 3A of the 2009 Systems Evaluation).

Table 3-6: Wet Weather Calibration Parameters

| Flow Meter ID (FM ID) | R1 RDI/I Vol (%) | R2 RDI/I Vol (%) | R3 RDI/I Vol (%) | Rtot RDI/I Vol (%) |
|---|---|---|---|---|
| 1 | 0.2 | 0.4 | 4.0 | 4.6 |
| 2 | 1.2 | 1.0 | 3.0 | 5.2 |
| 3 | 0.2 | 0.2 | 2.0 | 2.4 |
| 4 | 0.8 | 0.5 | 2.0 | 3.3 |
| 5 | 3.0 | 6.0 | 8.0 | 17.0 |
| 5A | 0.2 | 2.0 | 3.5 | 5.7 |
| 6 | 0.5 | 1.5 | 1.0 | 3.0 |
| 7 | 2.5 | 2.0 | 12.0 | 16.5 |
| 7A | 1.0 | 0.7 | 3.0 | 4.7 |
| 8 | 0.2 | 2.0 | 6.0 | 8.2 |
| 9 | 0.5 | 3.0 | 5.0 | 8.5 |
| 10 | 0.2 | 0.4 | 0.5 | 1.1 |
| 11 | 0.8 | 2.0 | 2.2 | 5.0 |
| 12 | 0.2 | 0.2 | 4.0 | 4.4 |
| 13 | 0.5 | 1.0 | 3.0 | 4.5 |
| 14 | 0.3 | 1.3 | 3.8 | 5.4 |
| 15 | 3.0 | 2.5 | 0.3 | 5.8 |
| 15A | 0.8 | 0.3 | 0.3 | 1.4 |
| 16 | 0.5 | 1.0 | 3.0 | 4.5 |
| 16A | 1.5 | 1.0 | 6.0 | 8.5 |
| 17[a] | 0.2 | 0.2 | 0.2 | 0.8 |
| 18 | 0.3 | 2.0 | 5.0 | 7.3 |
| 19 | 0.3 | 1.3 | 3.8 | 5.4 |
| 20 | 0.2 | 0.6 | 3.0 | 3.8 |
| 21 | 0.2 | 2.0 | 2.0 | 4.2 |
| 22 | 0.2 | 0.4 | 4.0 | 4.6 |
| 23[a] | 0.2 | 0.2 | 0.2 | 0.6 |
| 24 | 0.2 | 1.0 | 0.5 | 1.7 |
| 25 | 0.2 | 1.5 | 6.0 | 7.7 |
| 26[a] | 0.2 | 0.2 | 0.2 | 0.6 |
| 151 | 0.6 | 0.7 | 0.2 | 1.5 |
| 152 | 0.7 | 0.3 | 0.1 | 1.1 |
| 153 | 1.0 | 0.5 | 0.2 | 1.7 |
| 154 | 0.4 | 0.5 | 0.1 | 1.0 |
| 155 | 1.3 | 1.0 | 1.0 | 3.3 |
| 156 | 1.0 | 1.3 | 2.0 | 4.3 |
| 157 | 0.7 | 0.4 | 0.4 | 1.5 |

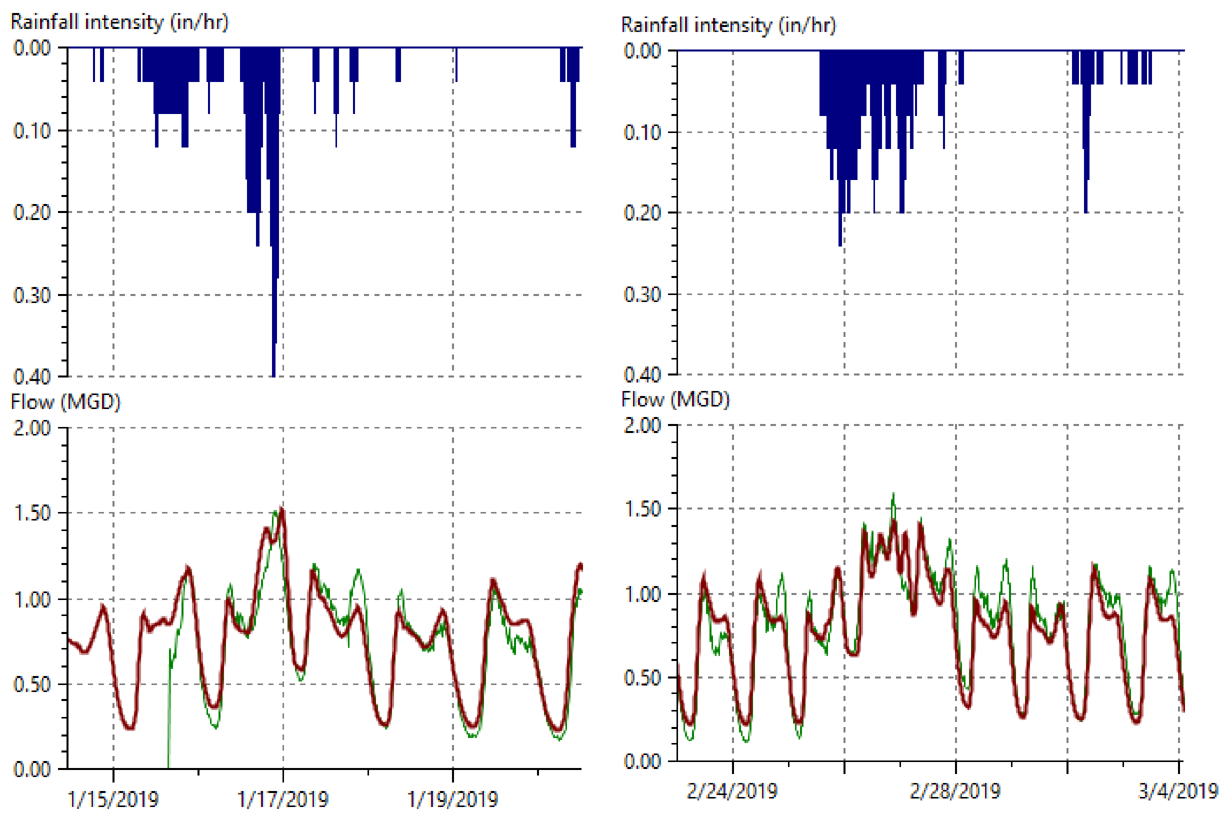
| Flow Meter ID (FM ID) | R1 RDI/I Vol (%) | R2 RDI/I Vol (%) | R3 RDI/I Vol (%) | Rtot RDI/I Vol (%) |
|---|---|---|---|---|
| 158 | 0.3 | 1.1 | 3.0 | 4.4 |
| 159 | 0.2 | 0.5 | 1.3 | 2.0 |
| 160 | 0.9 | 1.3 | 2.5 | 4.7 |
| 161 | 0.6 | 1.0 | 2.0 | 3.6 |
| 162 | 0.2 | 0.5 | 1.3 | 2.0 |
| Cincinnati[b] | 0.1 | 0.1 | 1.3 | 1.5 |
| Industrial[b] | 0.1 | 0.1 | 0.3 | 0.5 |
| SMD-2 | 0.6 | 1.0 | 2.0 | 3.6 |
| Sierra College | 0.5 | 0.9 | 1.9 | 3.3 |
| Highlands | 0.7 | 1.0 | 0.4 | 2.1 |
| North Roseville (Pleasant Grove) | 1.3 | 1.3 | 0.3 | 2.9 |
| Springview (Dry Creek) | 0.7 | 2.0 | 10.0 | 12.7 |

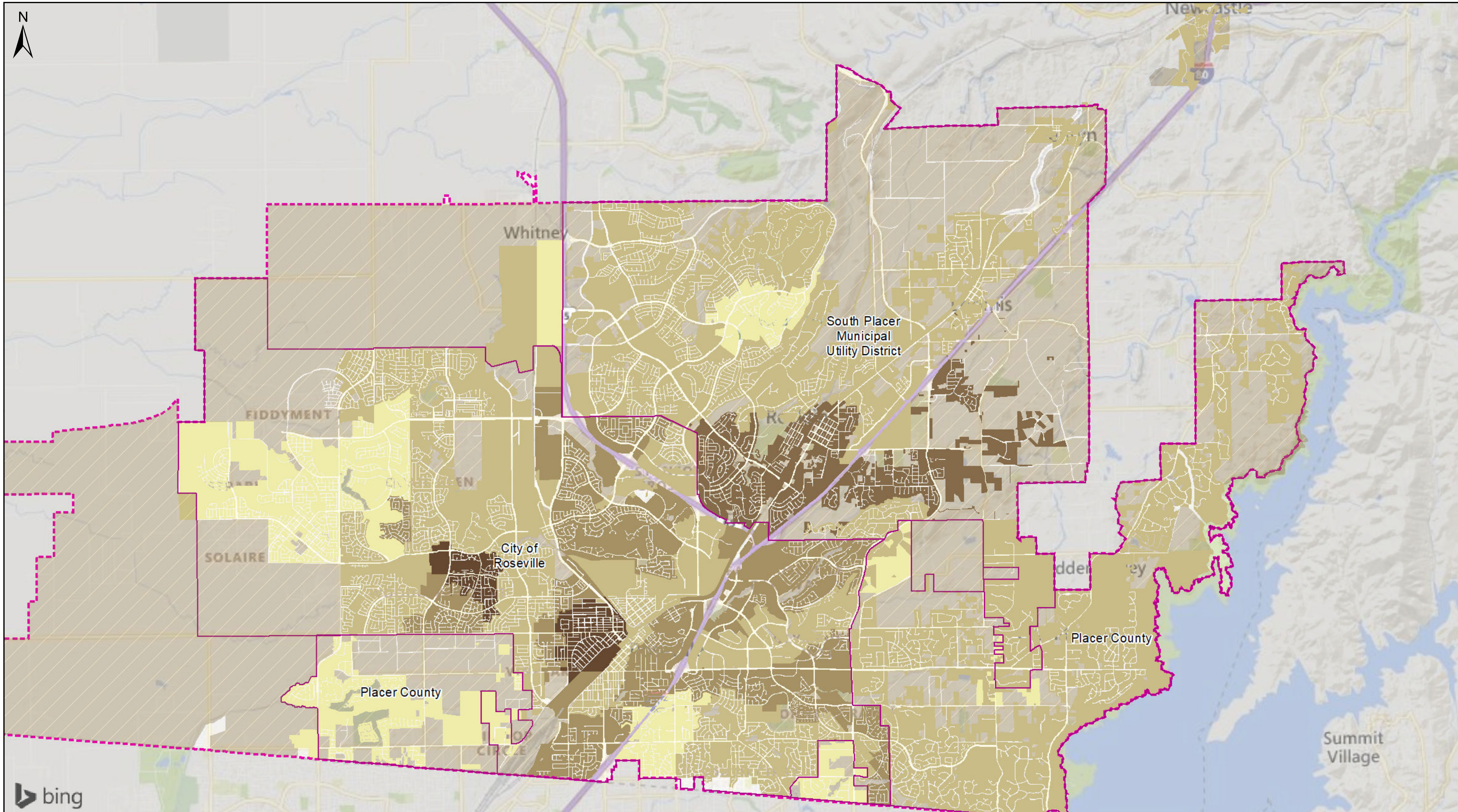
Notes:

a. Where flowmeters did not indicate a significant response to rainfall, a minimum response of 0.6% was assumed, disbributed evenly between R1, R2, and R3. A minimum response of 0.6% was also assumed for areas of future growth.

b. Due to highly variable and relatively low industrial flows, calibration of Cincinnati and Industrial meters was limited.

Figure 3-7: Example WWF Model Calibration Graph (Site 155)






# Figure 3-8

Calibrated R Values

South Placer Wastewater Authority
2020 Systems Evaluation

0 ½ 1 2 Miles

Unconnected

Partner Agency Boundary

Ultimate Service Area Boundary

**Total R**

- 0.3% - 1%
- 1% - 5%
- 5% - 10%
- 11% - 15%
- > 15%

Project #: 0011183.00
Map Created: December 2020

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## 3.4 Capacity Analysis

This section describes the hydraulic analysis and capacity criteria used to evaluate system performance and size capacity relief projects in the trunk sewer system, and identifies the capacity deficiencies based on the results of model runs.

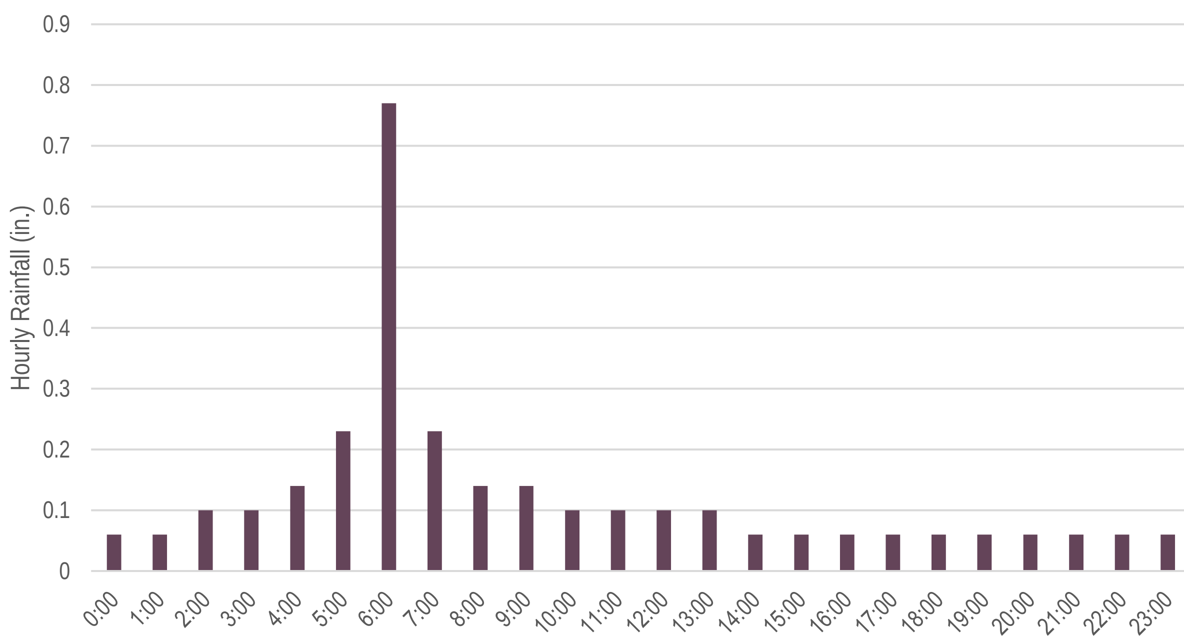
### 3.4.1 Design Flow Criteria

Design flows for sewer systems consist of BWF, GWI, and RDI/I. Criteria for computing existing BWF, GWI, and RDI/I (developed as part of model calibration), and flow assumptions for future development were discussed in the previous chapters. Note that for capacity analysis purposes, base wastewater flows assume rebound of approximately 15 percent from current flows.

For this Systems Evaluation Update, design RDI/I is based on a 10-year 24-hour synthetic rainfall pattern that occurs uniformly across the entire service area. The event used is the same event as used for the previous 2009 Systems Evaluation. The design storm hyetograph was developed utilizing Table 5-A-1 (elevation (h) = 150 feet) from the 1990 Placer County Flood Control and Water Conservation District Stormwater Management Manual (1990 Placer County Stormwater Management Manual). This event has a 1 hour peak intensity of 0.77 inches and a 24-hour rainfall depth of 2.97 inches. The peak rainfall hour was set at 6 a.m. so that the peak RDI/I response (which would normally occur about 1-2 hours after the rainfall for a typical basin) roughly coincides with the peak hour of the dry weather profiles to give a conservative flow response in the collection system. The intensity and timing of the design storm is presented in Figure 3-9.

It should be noted that current NOAA statistics (NOAA Atlas 14, updated in 2014) have a somewhat lower peak hour rainfall intensity, though slightly higher 24-hour rainfall depth (1 hour peak intensity of 0.65 and 24-hour depth of 3.35 inches). As the design event developed from the 1990 Placer County Stormwater Management Manual was likely to result in higher peak flows, and therefore more conservative estimate of system capacity, that design event was selected for this evaluation. NOAA Atlas 14 data confirms that design rainfall intensity does not vary significantly across the SPWA service area.

Figure 3-9: SPWA 10-year Design Storm Event



### 3.4.1.1 Summary of Flows Under Design Storm

A summary of modeled flows based on the design flow criteria is included in Table 3-7.

Table 3-7: Modeled ADWF and Peak Wet Weather Flow Summary

| | Existing (Rebound) | | | Buildout | | | Buildout-Sensitivity | | |
|---|---|---|---|---|---|---|---|---|---|
| WWTP | BWF[a] (mgd) | ADWF (mgd) | PWWF[b] (mgd) | BWF[a] (mgd) | ADWF (mgd) | PWWF[b] (mgd) | BWF[a] | ADWF (mgd) | PWWF[b] (mgd) |
| Pleasant Grove | 9.5 | 9.9 | 27.4 | 26.1 | 26.5 | 55.8 | 26.2 | 26.5 | 56.0 |
| Dry Creek | 10.1 | 12.7 | 41.9 | 16.7 | 19.2 | 59.2 | 18.2 | 20.8 | 60.6 |

Notes:

a. Does not include wet season groundwater infiltration (GWI).
b. Modeled PWWF assumes improvements have been implemented to eliminate overflows and significant surcharging.

## 3.4.2 Hydraulic Capacity Criteria

Capacity deficiency or performance criteria are used to determine when the capacity of a sewer pipeline is exceeded to the extent that a capacity improvement project (e.g., a relief sewer or larger replacement sewer) is required. Capacity deficiency criteria are sometimes called “trigger” criteria in that they trigger the need for a capacity improvement project. These criteria may differ from “design criteria” that are applied to determine the size of a new facility, which may be more conservative than the performance criteria. The 2009 Systems Evaluation identified several hydraulic capacity criteria:

- No surcharging in SPWA sewers, though exceptions were made where limited surcharging may occur in relatively deep pipes. Note that surcharging due to downstream conditions (i.e. backwater conditions) may not be considered a deficiency.

- Pump stations are considered capacity deficient if the design storm PWWF exceeds the pump station capacity with the largest pumping unit out of service (i.e. firm capacity).

- Force mains with velocities exceeding 7 feet per second under PWWF may require further investigation, though would not trigger a project unless the pump station required additional capacity.

As the current model is a calibrated fully-dynamic model, the design condition represents a relatively infrequent storm event, and many of SPWA’s sewers are relatively deep, a less conservative surcharge criteria was applied, with surcharging up to within 5 feet of the manhole rims (ground surface) considered acceptable under 10-year design storm PWWF, as long as the surcharge (flow height in the manhole) does not exceed 4 feet from the top of pipe up the manhole. The pump station and force main criteria from the 2009 Systems Evaluation were unchanged.

## 3.4.3 Capacity Analysis Results

The calibrated model was run for Existing, Buildout, and Buildout-Sensitive land use scenarios under the design event described above. Several deficiencies were identified in non-regional facilities which resulted in model-predicted overflows for one or more of the scenarios; to ensure flows were conveyed to regional sewers, pipes were upsized in this analysis to eliminate any overflows.

Within the regional system, seven areas have been identified that either have deficiencies or could be impacted when upstream deficiencies are relieved. Note that not all areas have been identified as having capacity deficiencies.

- Area A includes the sewers on Old Auburn Road immediately downstream and upstream of PS 26. This area is designed to divert flows above the springline of the sewer into PS 26. However, since PS 26 has insufficient firm capacity during peak wet weather flows, the sewers back up into the upstream sewers and results in a modeled overflow. This is an area of known capacity concerns. If flows through PS 26 were increased, the capacity issues in this area would be relieved.

- Area B includes the trunk sewer downstream of Area A from Old Auburn Road to SMH A06-257, which is where flow from PS 26 rejoins this trunk sewer. Note that there are two shallow manholes in this area that have less than 5 feet of cover (SMH A07-234 and SMH A07-091). Sewer depths should be investigated, and, if depths are confirmed, bolting manhole covers should be considered.

- Area C includes the trunk sewer downstream of Area B (from SMH A06-257) to the junction structure at Oak Ridge Drive. The junction structure at Oak Ridge Drive connects a 15-inch trunk (modeled, but not part of the regional system) to the main 33-inch trunk, but allows high flows to overtop a weir into a parallel 15-inch trunk sewer.

- Area D includes the 30-inch and 33-inch trunk sewer downstream of the Area C (from Oak Ridge Drive), to the 42-inch sewer near Riverside Age.

- Area E includes the 15 and 21-inch sewers from the Sierra College permanent meter to the weir structure adjacent to PS 25.

- Area F includes the area downstream of Area E, extending from PS 25 to the upstream manhole of Area C (SMH A06-257).

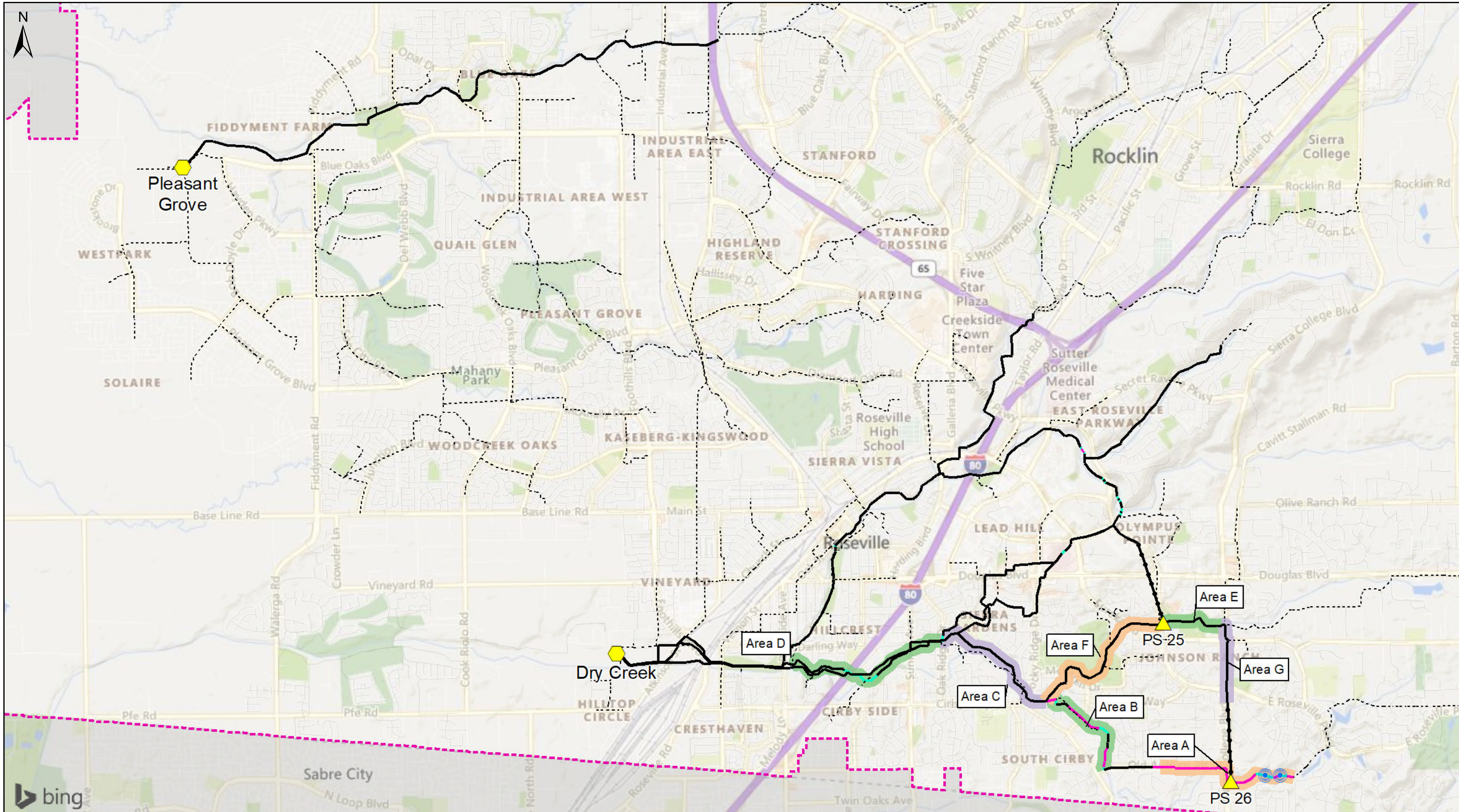
- Area G includes the gravity sewer downstream of PS 26, extending to the intersection with Area E.

Model results under Existing and Buildout conditions are summarized in Table 3-8 and shown in Figure 3-10 and Figure 3-11, respectively. The figures indicate existing trunk sewers that were predicted by the model to be surcharged (water levels in manholes above the crowns of the pipes) due to "throttle" conditions (peak flow exceeding full pipe capacity) or due to backwater from a downstream throttle condition, and locations of model-predicted overflows. Note that Figure 3-11 shows the results for both the Buildout and Buildout-Sensitivity scenarios (i.e. there is no difference in surcharge locations between the scenarios). In Table 3-8, areas that exceed the hydraulic capacity criteria but do not have modeled overflows are highlighted yellow, while areas with modeled overflows are highlighted orange. Hydraulic profiles for each area under existing and Buildout land use conditions are included in Appendix E.

Table 3-8: Capacity Results under Existing and Buildout Land Use Scenarios[a]

| Area | Existing (with Rebound) | | | Buildout and Buildout-Sensitivity | | |
|---|---|---|---|---|---|---|
| | Length of Throttle Surcharge (ft) | Maximum Surcharge Depth (ft) | Minimum Freeboard (ft) | Length of Throttle Surcharge (ft) | Maximum Surcharge Depth (ft) | Minimum Freeboard (ft) |
| A | 5,530 | 7.3 | 0.0 | 5,530 | 7.8 | 0.0 |
| B | 3,369 | 1.9 | 2.0 | 3,948 | 7.7 | 0.0 |
| C | 522 | 1.0 | 7.4 | 6,009 | 6.4 | 2.8 |
| D | 700 | 1.1 | 8.6 | 4,220 | 3.3 | 6.4 |
| E | -- | -- | -- | 2,223 | 3.1 | 5.6 |
| F | -- | 0.9 | 12.2 | 1,716 | 7.3 | 2.2 |
| G | -- | -- | -- | 0 | 2.3 | 3.3 |

a. Areas that exceed the hydraulic capacity criteria but do not have modeled overflows are highlighted yellow, while areas with modeled overflows are highlighted orange.




# Figure 3-10
## Model Results (Existing PWWF)

South Placer Wastewater Authority
2020 Systems Evaluation

0 ¼ ½ 1 Miles

- Regional Gravity Sewer
- Force Main
- Non-Regional Modeled Sewer
- Backwater Surcharge
- Throttle Surcharge
- Modeled Sewer Overflow
- Deficiency Area
- Ultimate Service Area Boundary

Project #: 0011183.00
Map Created: December 2020

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Placer | City of Roseville California | SMUD | Woodard & Curran

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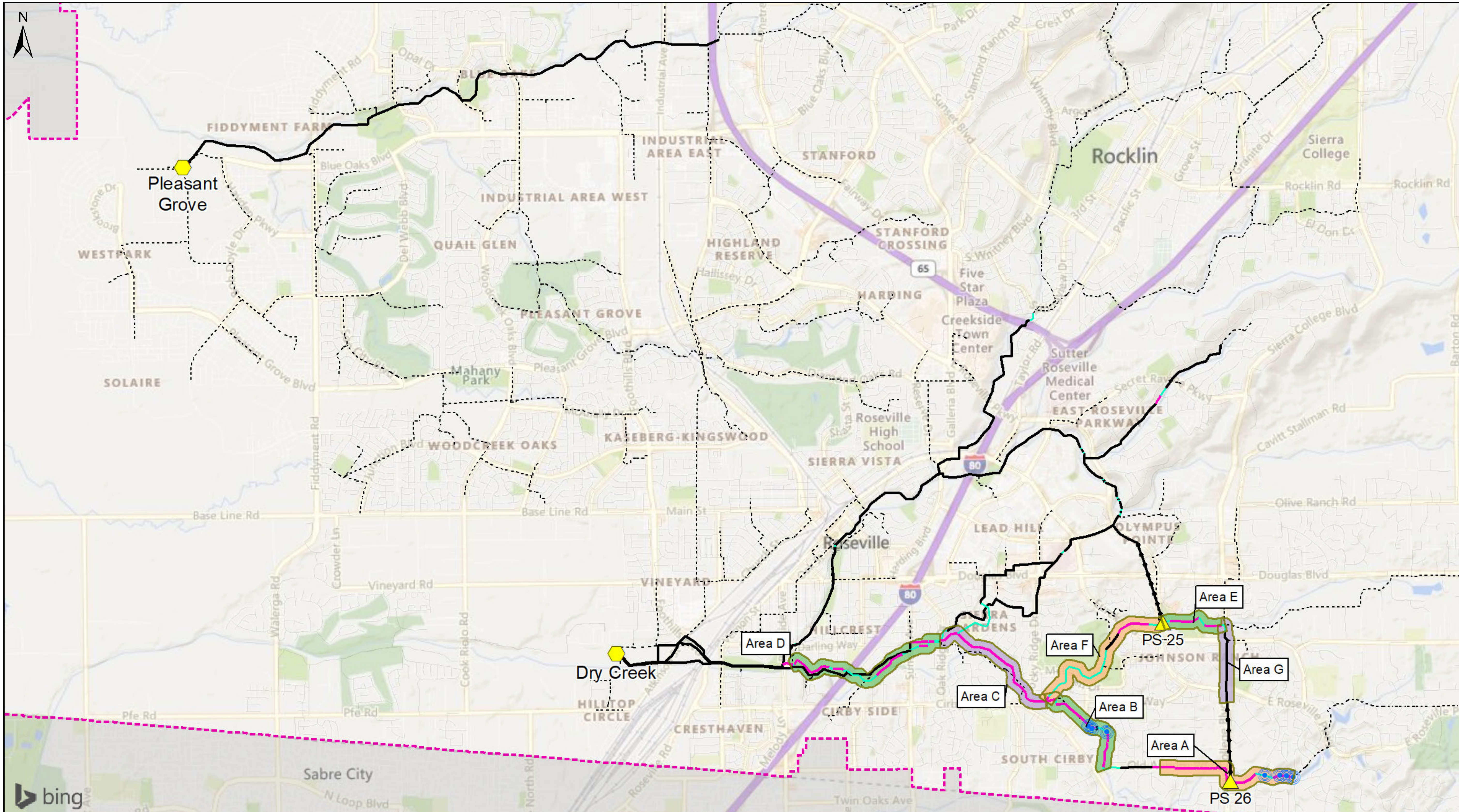


# Figure 3-11

Model Results (Buildout and Buildout Sensitivity PWWF)

South Placer Wastewater Authority
2020 Systems Evaluation

0 ¼ ½ 1 Miles

Regional Gravity Sewer

Force Main

Non-Regional Modeled Sewer

Backwater Surcharge

Throttle Surcharge

Modeled Sewer Overflow

Deficiency Area

Ultimate Service Area Boundary

Project #: 0011183.00
Map Created: December 2020

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## 3.5 Proposed Improvements

Proposed improvement projects have been developed, and verified using the hydraulic model, to alleviate surcharge in the areas described in the previous section. Each proposed project was reviewed on aerial mapping to identify potential design and constructability issues. Preliminary estimates of probable construction costs were prepared.

This section discusses these proposed improvements as well as the criteria used to develop them and estimate costs. The projects are considered planning level, and further pre-design of each project is recommended prior to implementation.

### 3.5.1 Design Criteria for New Sewer Facilities

Section 9 of the City of Roseville Design Standards (January 2019) details criteria for Sanitary Sewer Design. These criteria are used during the development of new standards and applied to any new infrastructure.

#### 3.5.1.1 Gravity Sewers

Below is a list of select City design standards for gravity sewers. See Section 9 of the Design Standards for a full listing of criteria.

- Minimum slopes and flow capacities summarized below

| Pipe Diameter (in) | Slope (ft/ft) | Capacity (at 0.7 Depth) | Capacity Flowing Full |
|---|---|---|---|
| 6 | 0.0050 | 0.22 MGD | |
| 8 | 0.0035 | 0.38 MGD | |
| 10 | 0.0025 | 0.58 MGD | |
| 12 | 0.0020 | 0.85 MGD | 1.00 MGD |
| 15 | 0.0015 | 1.32 MGD | 1.60 MGD |
| 18 | 0.0012 | 1.95 MGD | 2.35 MGD |

- Maximum allowable depth-to-diameter ratio (d/D) of 0.7 at design flow for laterals 10 inches or less. Pipes 12" or greater may be designed to flow full unless connections are planned, in which case the 0.7 depth-to-diameter ratio governs.
- Flow velocities must be between 2 feet per second and 10 feet per second.
- Maximum bury depth of main with lateral connection shall be 15 feet. Minimum slope of lateral connection shall be ¼ inch per foot with a minimum bury depth of 12 inches at any buildable location within the properties to be served.
- Maximum spacing of manholes shall be 500 feet for all straight lines of 10 inches in diameter or less. Manhole spacing for mains 12 inches and larger shall be considered on a case by case basis.
- The invert elevation for pipe of the same diameter entering a manhole shall have a 0.10-foot drop between the entering and exiting pipe and invert elevations for pipe of different diameters shall match crown of exiting pipe. The crown of the entering pipe shall be at the same elevation or higher than the exit pipe.
- Drop connections shall be permitted under special conditions and with the approval of the Environmental Utilities Director

#### 3.5.1.2 Pump Stations and Force Mains

Below is a list of select City design standards for pump stations and force mains. See Section 9 of the Design Standards for a full listing of criteria.

- A sufficient number of centrifugal pumping units shall be installed such that station capacity can be maintained with any one unit out of service.
- Provisions for 4 hour storage capacity shall be provided.
- Planning level criteria as follows:

| | |
|---|---|
| Pump Stations | |
| Capacity | PWWF (hydraulic modeling required for pipes 18 inches and larger) |
| Storage | 4 hours |
| Operation | Lead/lag for duty pump(s), plus 1 standby pump |
| Maximum Pump Cycles | 6 cycles/hour (3 cycles per pump) |
| Force Mains | |
| Headloss | Hazen-Williams roughness coefficient (C-factor) of 120 |
| Maximum Velocity | 7-10 feet per second |
| Minimum Velocity | 3.0 feet per second |

### 3.5.2 Cost Criteria

Opinions of probable costs for proposed capacity improvement projects were developed based on Woodard & Curran's experience with similar projects and discussions with product vendors. The estimated construction costs are based on a Class 4 estimate as defined by the Association for the Advancement of Cost Engineering (AACE) International cost estimate classification system. Table 3-9 provides a summary of the estimate classes and expected accuracy range. For Class 4 estimates, the expected accuracy range is -15% to -30% on the low end and +20% to +50% on the high end.

Table 3-9: Cost Estimate Classification Matrix (AACE International)

| Estimate Class | Level of Project Definition | Purpose of Estimate | Methodology | Expected Accuracy Range |
|---|---|---|---|---|
| Class 5 | 0% to 2% | Concept screening | Capacity factored, parametric models, judgement, or analogy | Low: -20% to -50%<br>High: +30% to +100% |
| Class 4 | 1% to 15% | Study or feasibility | Equipment factored or parametric models | Low: -15% to -30%<br>High: +20% to +50% |
| Class 3 | 10% to 40% | Budget authorization or control | Semi-detailed unit costs with assembly level line items | Low: -10% to -20%<br>High: +10% to +30% |
| Class 2 | 30% to 75% | Control or bid/tender | Detailed unit cost with forced detailed take-off | Low: -5% to -15%<br>High: +5% to +20% |
| Class 1 | 65% to 100% | Check estimate or bid/tender | Detailed unit cost with detailed take-cost | Low: -3% to -10%<br>High: +3% to +15% |

Source: AACE International Recommended Practice No. 18R-97

These estimates are suitable for use for budget forecasting, CIP development, and project evaluations, with the understanding that refinements to the project details and costs would be necessary as projects proceed into the design and construction phases. All costs have been adjusted to an Engineering News Record Construction Cost Index (ENR CCI) of approximately 12,115, which represents the average of the April 2020 ENR CCI for “20 Cities Average” and “San Francisco” indices.

Cost criteria include baseline unit construction costs for gravity sewers using open-cut methods. Pipe bursting is sometimes a more cost-effective option for projects that involve upsizing existing sewers to 15-inch diameter or smaller; this construction method could be considered during design. Costs for gravity trunk sewers vary with pipe diameter and depth (in the case of open-cut construction). Allowances added to the baseline construction cost include mobilization/demobilization and project-specific for remove and replace construction and traffic control for work in roadways. A 30 percent allowance for contingencies for unknown conditions was also included for all projects, as well as an allowance of 25 percent of construction cost for engineering, administration, and legal costs. For pump stations, costs include site work, mechanical and electrical equipment specific to each station.

### 3.5.3 Proposed Capacity Improvement Project Descriptions

Improvement projects were developed as a series of improvements that sequentially decrease surcharging in downstream sewers. These improvement projects, including estimated capital improvement costs, are discussed below and summarized in Table 3-10 and shown in Figure 3-12. Individual improvement project cost estimate details as well as detailed project figures are provided in Appendix F.

#### 3.5.3.1 Improvement Project 1

Improvement Project 1 would increase the capacity of PS 26 (Sierra College Boulevard PS) as needed to limit surcharging in the Old Auburn Trunk sewer (Area A and Area B). The weir leading to PS 26 would be unchanged and would divert flows when depth in the sewer exceeds half the sewer diameter. Because this project would substantially increase flows through the sewer on Sierra College Boulevard (Area G), this project also includes upsizing those pipelines to 10, 12, and 15-inch sewers to eliminate surcharging in that line.

PS 26 will need to be modified to meet the increased firm capacity, from 0.43 mgd to 1.6mgd. If the existing wet well is large enough, it could be retrofitted with new, higher flow pumps. The existing wet well at PS 26 is 8 feet in internal diameter. Updated design criteria were provided to a Flygt pump representative and, based on the minimum wet well sizing for their recommended pump selection, the existing wet well is sufficiently large to be reused with a larger pump.

The pump selection provided should be considered preliminary. Given the high total pump station head and large motor of the resulting pump selection, an evaluation of alternatives to reduce the pump size, via upsizing the discharge force main for example, should be considered during pre-design. A life cycle cost analysis may be appropriate to compare the difference between the additional headloss and resulting pumping costs versus the cost to upsize the force main.

#### 3.5.3.2 Improvement Project 2

Improvement Project 2 would re-route the sewer on Sierra College Boulevard east on Eureka and reconnect to the regional trunk at East Roseville Parkway (Area F). This would relieve surcharge in Area E. Excess flows resulting in surcharge in Area F would be diverted through PS 25 to the northern sewershed, which does not have capacity concerns. The preliminary project would upsize existing 8 and 10-inch sewer on Eureka Road and E Roseville Parkway. Since the connection is about 100 feet downstream of the PS 25 diversion structure, this improvement project may increase flows (and associated surcharge) in Area F (unless adjustments are made to the PS 25 diversion structure, as discussed in Improvement Project 3).

#### 3.5.3.3 Improvement Project 3

Improvement Project 3 would alter the piping and diversion structure in the vicinity of PS 25 (Rollingwood PS) to convey additional flow away from Area C, Area D, and Area F, and increase the capacity of PS 25 as needed to accommodate the additional flow. For this improvement project, the diversion structure would be converted to divert any flows exceeding peak dry weather flow (up to approximately 2.6 mgd with buildout land uses under peak wet weather conditions),. It should be noted that the 2009 Systems Evaluation assumed diversion of 3.2 mgd through PS 25 with buildout land uses under peak wet weather conditions.

A new junction structure would need to be installed at E Roseville Parkway (or the existing junction structure would need to be relocated) in order to capture the additional flows.

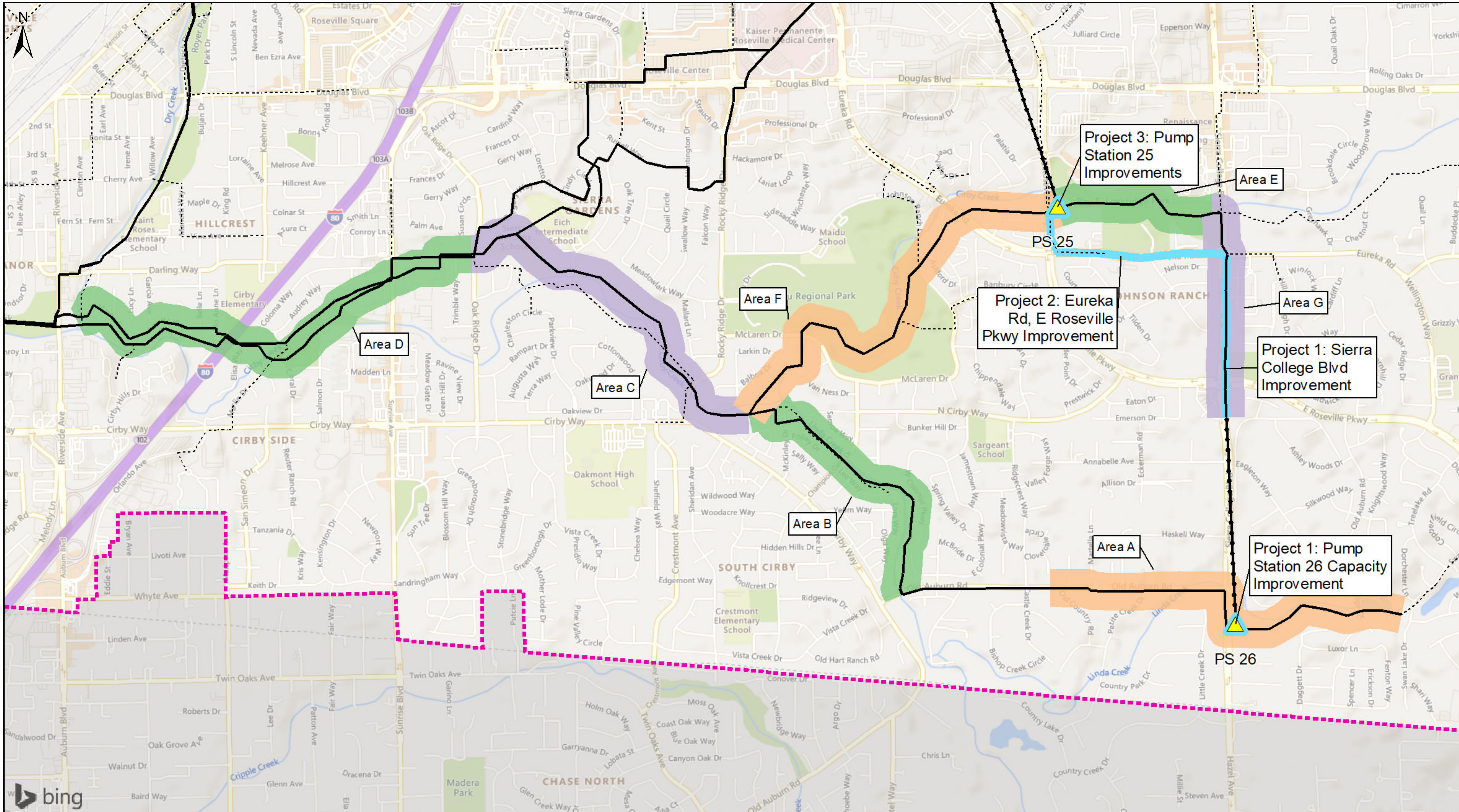
PS 25 would need to be modified to meet the increased firm capacity. If the existing wet well is large enough, it could be retrofitted with new, higher flow pumps. The existing wet well at PS 25 is 10 feet in internal diameter. Updated design criteria were provided to a Flygt pump representative and, based on the minimum wet well sizing for their recommended pump selection, the existing wet well could be reused.

Table 3-10: Proposed Capacity Improvement Projects

| Project | Location | Existing Sizes | Improved Sizes[a] | Description | Estimated Capital Improvement Cost |
|---|---|---|---|---|---|
| 1 | PS 26 | 0.43 mgd firm capacity | 1.6 mgd PWWF at Buildout | Increased Capacity of PS 26 and sewers on Sierra College Blvd directly downstream of PS 26 to relieve Old Auburn Trunk sewer (Area A) | $1,606,000 |
| | Sierra College Blvd (Area G) | 500 ft of 8-inch<br>1,900 ft of 10-inch | 500 ft of 10-inch (upsized from 8-inch)<br>900 ft of 12-inch (upsized from 10-inch)<br>1,000 ft of 15-inch (upsized from 10-inch) | | |
| 2 | Eureka Road and E. Roseville Parkway | 800 ft of 8-inch<br>1,400 ft of 10-inch | 2,200 of 15-inch (upsized from 8 or 10-inch)<br>1,200 ft of new 15-inch. | Redirect flows from PS 26 and Sierra College Blvd down Eureka Road to relieve Area E. | $1,831,000 |
| 3 | PS 25 (pumps) | 2.02 mgd firm capacity | 2.6 mgd PWWF at Buildout | Increased Firm capacity of PS 25 to meet Buildout PWWF (depends on alternative).<br><br>New weir structure or adjustments to existing structure at PS 25 to convey the maximum potential flow through PS 25 without any dry weather flows. | $758,000 |
| | PS 25 diversion structure | N/A | New diversion structure and related piping | | |

Notes:

a. Note that pipeline capacity increases could be accomplished through parallel pipes, rather than upsizes.




# Figure 3-12
## Proposed Improvement Locations

South Placer Wastewater Authority
2020 Systems Evaluation

0 0.125 0.25 0.5 Miles

- Regional Gravity Sewer
- Force Main
- Non-Regional Modeled Sewer
- Pump Station
- Preliminary Capacity Improvement Area
- Deficiency Area
- Service Area Boundary

Project #: 0011183.00
Map Created: December 2020

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### 3.5.4 Timing of Proposed Improvement Projects

While Project 1 is needed for current demands, Project 2 and Project 3 are expected to be triggered by future development. For the purpose of this Systems Evaluation, an approximate number of equivalent dwelling units upstream of the capacity deficiency that would trigger the need for a project has been estimated by applying a reduction factor to future flows to represent percentage of buildout. Nearly all of the future growth that would trigger the projects would occur in SMD-2 and SMD-3 (with less than 100 EDUs of future growth anticipated for SPMUD and Roseville). Based on the SMD2 and SMD3 growth projections provided by Placer County, this would occur beyond the 2060 planning horizon provided.

The timing estimated here is subject to change, and could be impacted by the following assumptions:

- Inflow and Infiltration rates for existing sewers are assumed to remain approximately the same. These rates could change based on pipe condition and maintenance activities (such as rehabilitation and repair) in the collection system.
- Inflow and Infiltration rates for new sewers are assumed based on typical values. Actual I/I rates could be higher or lower than assumed.
- The estimates are based on an assumed rebound of dry weather flows to 190 gpd per EDU. If dry weather flows do not rebound, the timing for Project 2 and Project 3 could be somewhat delayed.

Future studies should monitor the I/I rates and update these estimates as needed. The number of EDUs in SMD2/SMD3 that would trigger the proposed project are summarized in Table 3-11.

Table 3-11: Timing of Proposed Capacity Improvement Projects

| Project | Description | Estimated Capital Improvement Cost | Approximate Additional EDUs in SMD2/SMD3 to Trigger Project[a] |
|---|---|---|---|
| 1 | Increased Capacity of PS 26 and sewers on Sierra College Blvd directly downstream of PS 26 to relieve Old Auburn Trunk sewer (Area A) | $1,606,000 | Existing |
| 2 | Redirect flows from PS 26 and Sierra College Blvd down Eureka Road to relieve Area E. | $1,831,000 | ~1,800[b] |
| 3 | Increased Firm capacity of PS 25 to meet Buildout PWWF (depends on alternative).<br><br>New weir structure or adjustments to existing structure at PS 25 to convey the maximum potential flow through PS 25 without any dry weather flows. | $758,000 | ~1,800[c] |

Notes:

a. Based on a percentage of buildout factor applied to future model loads.

b. Represents approximately 60% of buildout. There are approximately 8,400 Existing EDUs upstream of the deficiency triggering Improvement Project 2, and approximately 10,200 EDUs would trigger the need for improvement.

c. Represents approximately 60% of buildout. There are approximately 11,900 Existing EDUs upstream of the deficiency triggering Improvement Project 3, including 7,600 in Placer County, 4,200 in Roseville, and less than 100 in SPMUD. Approximately 13,700 EDUs would trigger the need for the improvement.

# 4. WASTEWATER TREATMENT PLANT EXPANSION EVALUATION

## 4.1 Introduction

Based on the updated growth projections provided by the SPWA partners through fiscal year 2059-2060 and at buildout, this section provides facility expansion recommendations for Dry Creek Wastewater Treatment Plant (DCWWTP) and Pleasant Grove Wastewater Treatment Plant (PGWWTP), which treat the entirety of flows from the SPWA service area. The recommendations address timing, phasing, and preliminary conceptual costs of the expansions required through buildout to address both flows and loads, as well as identifying next steps for confirming current plant capacity to accurately reflect recent and ongoing capital improvements.

The analysis provides updates to the following flow and loading parameters for DCWWTP and PGWWTP:

- Flows: existing and projected influent flow through buildout:
    - Average Dry Weather Flow (ADWF)
    - Average Annual flow (AA)
    - Peak Month Flow (PMF)
    - Peak Day Wet Weather Flow (PDWWF)
    - Peak Hour Wet Weather Flow (PHWWF)
- Loads: existing and projected influent loads through buildout:
    - Biochemical Oxygen Demand (BOD), Annual Average (AA) and Maximum Month (MM)
    - Total Suspended Solids (TSS), AA and MM
    - Ammonia ($NH_3$), AA and MM

### 4.1.1 Dry Creek Wastewater Treatment Plant

Much of the DCWWTP was constructed in 1974 and was expanded in 1991 to treat an ADWF of 18 mgd. In June of 2004, a portion of the influent flow was diverted to the newly constructed PGWWTP, freeing up some treatment capacity at the time. Recently, nutrient removal upgrades were completed at DCWWTP to ensure reliable compliance with the NPDES permit limits (including the 10 mg/L average monthly limit for nitrate plus nitrite).[1] Currently, the flow meter on the discharge of the Influent Pump Station is being modified to increase the PHWWF hydraulic capacity to 36 mgd.

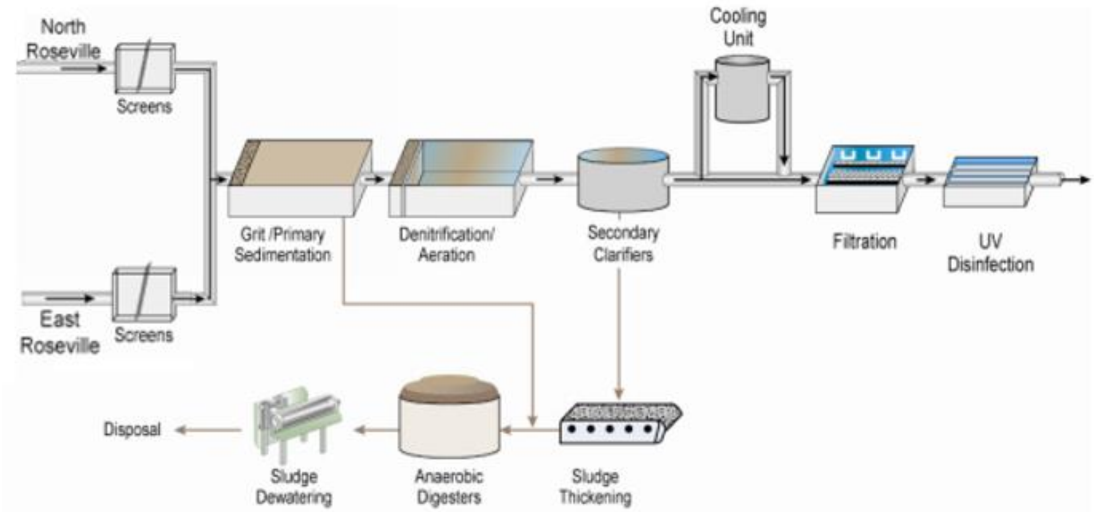
Population in the SPWA service area has continued to grow steadily, with loadings increasing substantially while ADWF decreased. The ADWF at DWWTP has decreased from 10.5 mgd in 2009to approximately 8.6 mgd as of 2019.

Equally as important as the hydraulic capacity of a plant is its biological treatment capacity. Design of the 1991 expansion of the plant was based on an influent BOD concentration of 160 mg/L, and the corresponding AA and MM loadings of 24,000 lbs/day and 36,000 lbs/day. Since 1991, the influent BOD concentration has increased to 425 mg/L, resulting in much higher BOD loadings than in previous projections. The impact of higher influent BOD concentration and loadings is discussed in Section 4.3.1.

A schematic of the DCWWTP liquid and solids treatment train is shown in Figure 4-1.

[1] Source: City of Roseville, DCWWTP Nitrate Reduction Improvements Project, Basis of Design Report (May 2017).

Figure 4-1: DCWWTP Treatment Schematic



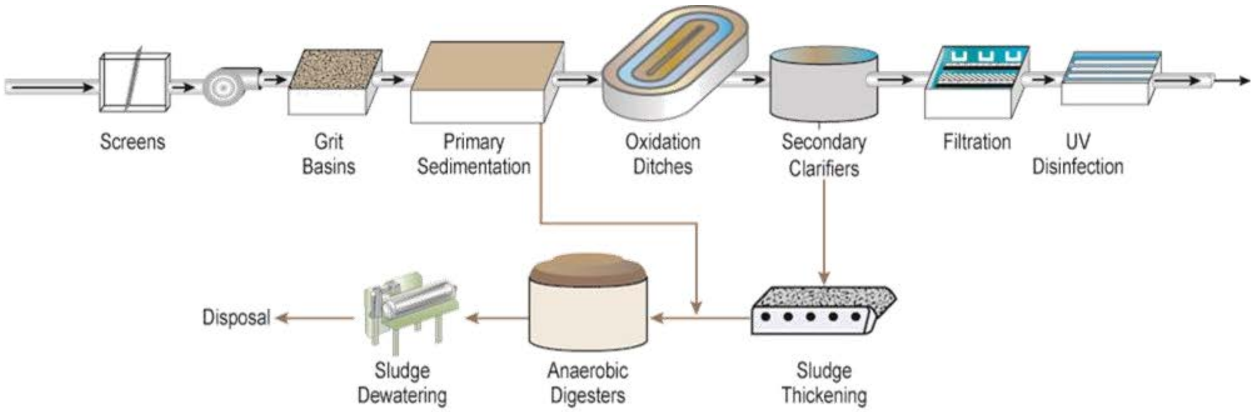

### 4.1.2 Pleasant Grove Wastewater Treatment Plant

Construction of the PGWWTP was completed in 2004. It was designed for an ADWF of 12 mgd, assuming historical domestic strength wastewater, similar to the Dry Creek Plant. Subsequent study of the plant's treatment processes and influent loading resulted in PGWWTP's capacity being lowered to an equivalent flow of 9.5 mgd. Like the DCWWTP, this was partially a result of influent BOD concentrations trending much higher over time than anticipated in the initial design. Current ADWF is approximately 7.6 mgd with an average influent BOD concentration of 358 mg/L.

To ensure the plant can reliably treat 12 mgd ADWF at the current higher loadings, an expansion project is currently underway, with anticipated completion/commissioning by fiscal year (FY) 22/23.[1] The expansion will add a primary sedimentation process to the liquid treatment train, which currently includes influent screening and grit removal, secondary treatment/denitrification in oxidation ditches, secondary clarification, filtration, and disinfection. The solids treatment process is being upgraded with sludge thickening using rotary drum thickeners and anaerobic digestion of the combined thickened secondary sludge and primary sludge, upstream of the existing dewatering centrifuges (which currently dewater only the secondary sludge). These upgrades will provide additional solids treatment capacity as well as biological treatment capacity. Figure 4-2 shows a schematic of the PGWWTP treatment train reflecting the upgrades currently under construction.

[1] Source: City of Roseville, PGWWTP Expansion Basis of Design Report (March 2016).

Figure 4-2: PGWWTP Treatment Schematic




## 4.2 Flows and Loadings

Influent flows and loading (organic loading as measured by BOD and solids loading as measured by TSS) for both the DCWWTP and PGWWTP were established by analyzing daily plant influent data provided by the City of Roseville for the period from January 1, 2016 through September 19, 2019 for influent flow and from January 1, 2013 through September 19, 2019 for loadings. In addition, hourly flow data from December 1, 2016 to September 17, 2019 (which incorporated high winter flow periods) was used to establish peak hour flows.

Projected flows for both the DCWWTP and PGWWTP were calculated based on population and non-residential growth, normalized to account for diversity in land uses by establishing equivalent dwelling units (EDUs). EDU projection data were provided by each of the SPWA JPA Partners (City of Roseville, Placer County, and South Placer Municipal Utility District)[1]. Flow projections were developed by multiplying the projected EDUs by an ADWF contribution of 190 gallons per day (gpd) per EDU, in accordance with the estimate developed in the 2009 Systems Evaluation.

### 4.2.1 Current Flows and Peaking Factors

Current ADWF was established by averaging flows observed at each plant for the period of July through September. While the ADWF is usually thought of as the rated capacity of a treatment plant, the design of treatment systems must also accommodate significant seasonal and diurnal variations in influent flow. A treatment plant must be designed to prevent hydraulic overloads and wash out of solids during peak day and peak hour events. Generally, preliminary and primary treatment systems are sized for peak day or peak hour flow, while secondary treatment systems must meet maximum month organic loading peaks. Sizing treatment processes appropriately aids treatment plants in meeting discharge limits during the higher flows and loading periods that can otherwise stress or overwhelm the plant processes.

Current flow conditions and the associated peaking factors for both plants are summarized in Table 4-1.

[1] Data provided on July 2019 for Placer County, August 2019 for SPMUD, and November 2016 for the City of Roseville

Table 4-1: Current Flows and Peaking Factors

| Flow Condition | DCWWTP | | PGWWTP | |
|---|---|---|---|---|
| | Current Flow, mgd | Peaking Factor | Current Flow, mgd | Peaking Factor |
| ADWF | 8.6 | 1.0 | 7.6 | 1.0 |
| AA | 10.8 | 1.2 | 8.1 | 1.07 |
| PMF | 18.4 | 2.12 | 10.3 | 1.36 |
| PDWWF | 27.9 | 3.22 | 16.9 | 2.23 |
| PHWWF | 36.0 | 4.19 | 20.4 | 2.69 |

It should be noted that the current plant data reflect a significantly lower flow contribution per EDU than the previously established unit flow factor of 190 gpd/EDU. Approximately 57,747 EDUs are tributary to DCWWTP for FY 19/20. Based on the current ADWF, the equivalent unit flow contribution is approximately 150 gpd/EDU. At PGWWTP, there are approximately 54,907 EDU tributary to the plant for FY19/20, which reflects a flow contribution of 138 gpd/EDU. This is likely the result of several factors, including water conservation efforts over the past decade, drought conditions that were experienced throughout California from 2011-2016, and lower levels of development than previously anticipated prior to the impacts of the recession in 2008-2009.

These flow contributions per EDU may rebound back to historical levels and, to provide a safety factor, the 190 gpd/EDU will continue to be used for this analysis. This unit flow factor should be tracked closely and, if warranted, the per EDU value adjusted accordingly over time.

### 4.2.2 Projected Plant Influent Flows

Future plant flows were projected over the planning horizon to fiscal year 2059-2060 (FY 59/60)[1] and to ultimate buildout conditions, based on the information provided in Chapter 2. ADWF projections at FY 59/60 and buildout are calculated by multiplying the EDU projection by the flow contribution per EDU. Peaking factors from Table 4-1 were then applied to established ADWF per EDU based on current flows (138 gpd/EDU at PGWWTP and 150 gpd/EDU at DCWWTP) and added to ADWFs difference calculated from 190 gpd/EDU and current ADWF/EDU to project the additional flow conditions. This approach avoids using peaking factors on projected ADWF calculated from 190 gpd/EDU for a more realistic flow estimate. These flows are summarized in Table 4-2 and Table 4-3.

Table 4-2: Projected FY 59/60 and Buildout EDUs and Flows at DCWWTP

| Condition | DCWWTP | | | |
|---|---|---|---|---|
| | FY 59/60 EDU | FY 59/60 Flow, mgd | Buildout EDU | Buildout Flow, mgd |
| ADWF | 87,772 | 16.7 | 96,000 | 18.2 |
| AA | --- | 19.9 | --- | 21.8 |
| PMF | --- | 31.5 | --- | 34.4 |
| PDWWF | --- | 45.9 | --- | 50.2 |
| PHWWF | --- | 58.6 | --- | 64.1 |

[1]SPWA's fiscal year runs from July 1 to June 30.

Table 4-3: Projected FY 59/60 and Buildout EDUs and Flows at PGWWTP

| Condition | PGWWTP | | | |
|---|---|---|---|---|
| | FY 59/60 EDU | FY 59/60 Flow, mgd | Buildout EDU | Buildout Flow, mgd |
| ADWF | 92,864 | 17.6 | 145,000 | 27.6 |
| AA | --- | 18.6 | --- | 29.0 |
| PMF | --- | 22.2 | --- | 34.8 |
| PDWWF | --- | 33.4 | --- | 52.3 |
| PHWWF | --- | 39.3 | --- | 61.5 |

### 4.2.3 Current BOD Loadings

In previous studies, design parameters were established based on much lower influent BOD concentrations, ranging from 248 mg/L at DCWWTP to 285 mg/L at PGWWTP. The plant data set provided for this TM (which is an extended data set from 2013-2019) indicates an average influent BOD concentration of 425 mg/L at DCWWTP, and 358 mg/L at PGWWTP. The range in influent BOD concentrations at both plants are shown in Figure 4-3 and Figure 4-4.

Figure 4-3: Influent BOD Concentrations at DCWWTP

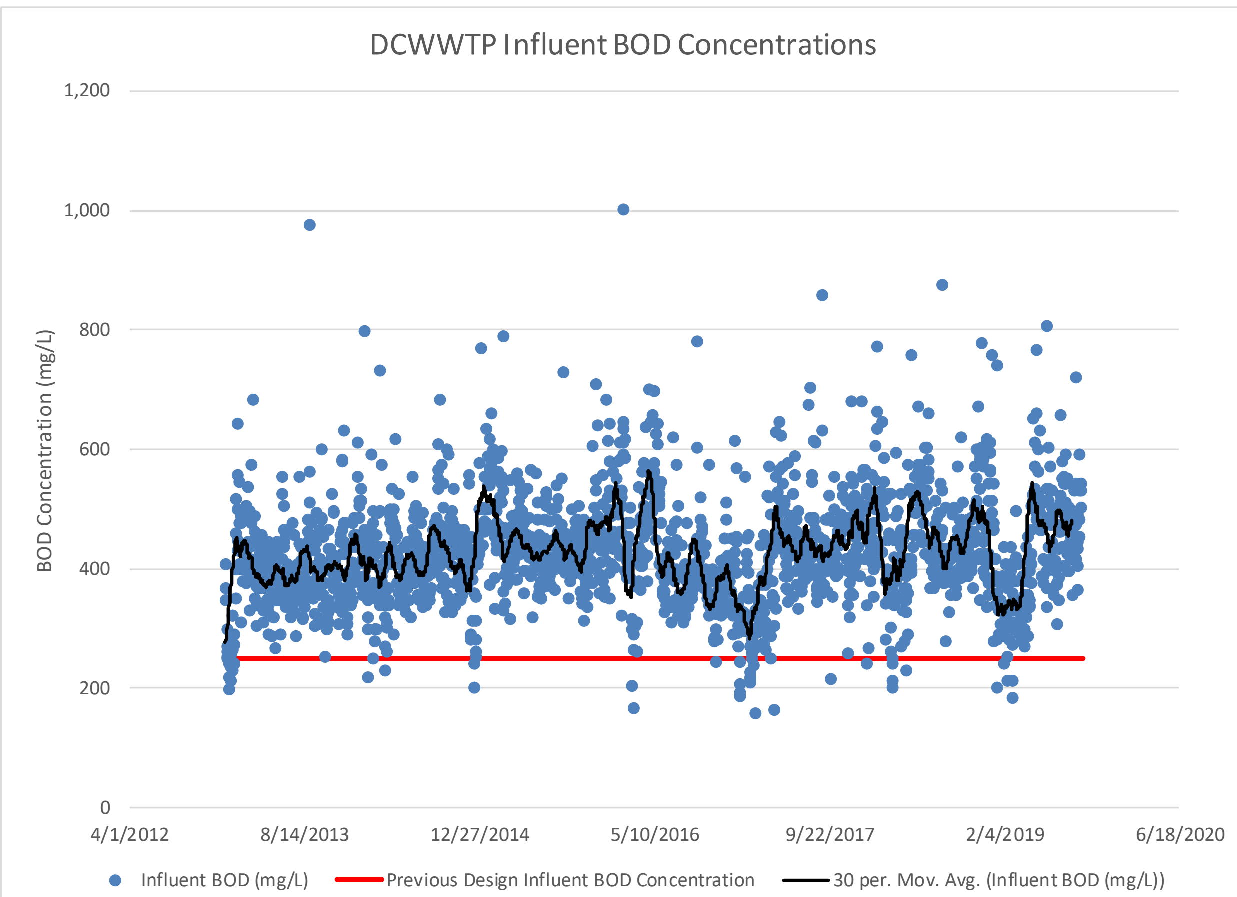
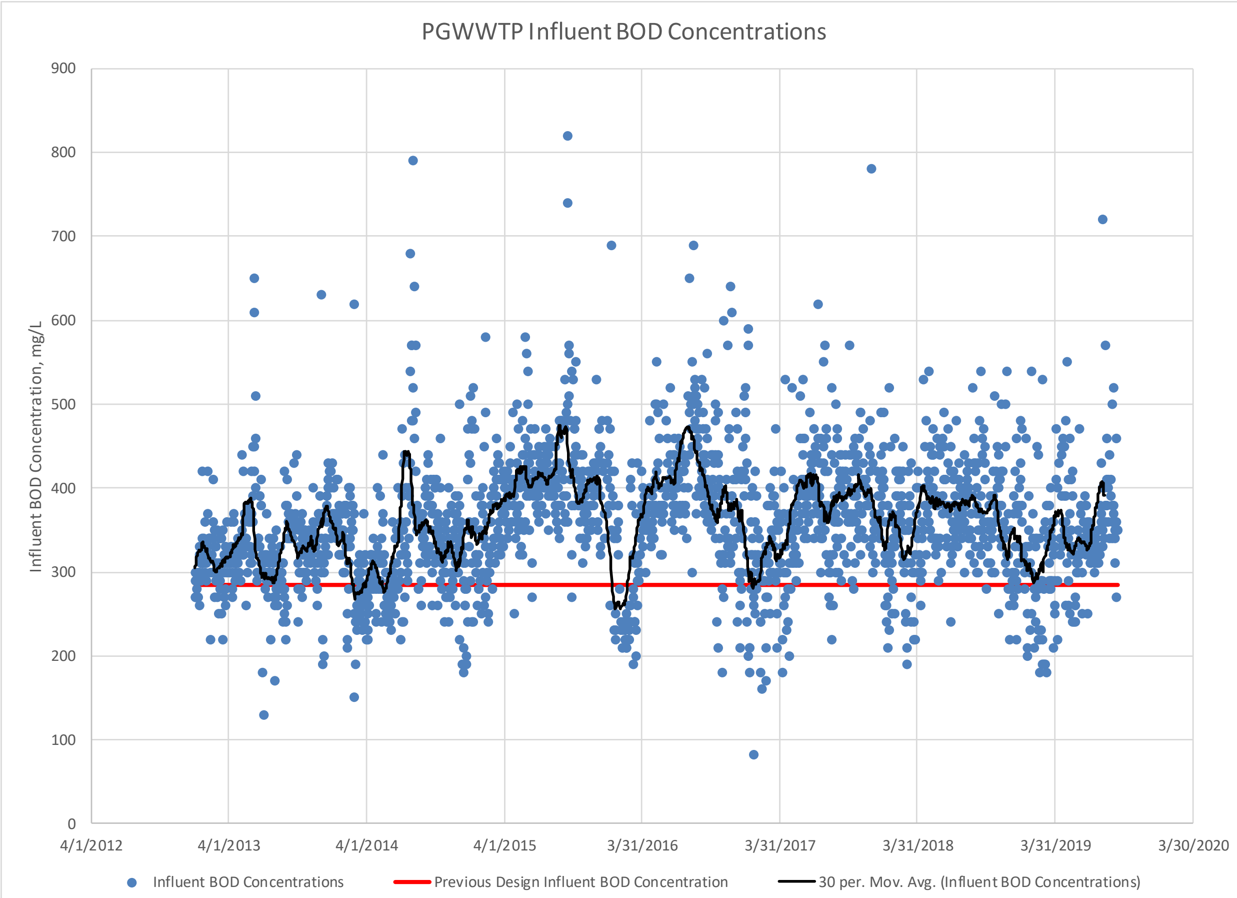


Figure 4-4: Influent BOD Concentrations at PGWWTP




These higher concentrations are likely a result of water conservation efforts over the past decade, combined with the drought conditions that were experienced throughout California from 2011-2016, though the relatively high concentrations at DCWWTP should be confirmed. The effect of conservation is on top of the demographic changes in the SPWA service area since the treatment plants were designed that brought much more commercial flows and loadings along with changing development patterns, such that the strength of the wastewater at both plants evolved from low strength domestic wastewater to moderate strength commercial wastewater, influenced by more food service, restaurant, brewery and other contributions.

A 30-day moving average of influent BOD concentrations is also shown on these figures. This moving average shows that current influent concentrations are now holding relatively constant, though they are higher than previous designs accounted for. This is an indication that influent BOD concentrations have now leveled off, however we recommend the SPWA monitor this parameter in the long term. When the State experiences another drought or there are changes to land use within the service area such as densification, influent loading concentrations may increase further.

### 4.2.4 Current and Projected Plant Influent Loadings

The January 1, 2013 through September 19, 2019 data set also included daily influent plant loadings for BOD, TSS, and $NH_3$. These data were analyzed to establish current annual average (AA) and maximum month (MM) pollutant loadings. Current MM loadings were established by taking the maximum value of a 30-day running average of the daily influent data provided. The peaking factors for each parameter were established by dividing the MM loading by the AA loading.

Projected loads, shown in Table 4-4 and Table 4-5, were calculated by using the average loadings from the data set provided and establishing AA loading per EDU. Peaking factors were then applied to establish the FY 59/60 and buildout MM loads.

Table 4-4: Current and Projected Influent Loading at DCWWTP

| Parameter | Condition | Unit | DCWWTP | | | |
|---|---|---|---|---|---|---|
| | | | Current | FY59/60 | Buildout | Peaking Factor |
| BOD | Average Concentration | mg/L | 425 | --- | --- | --- |
| | AA Loading | lbs/day | 33,900 | 52,000 | 56,000 | --- |
| | MM Loading | lbs/day | 47,600 | 73,000 | 79,000 | 1.41 |
| TSS | Average Concentration | mg/L | 540 | --- | --- | --- |
| | AA Loading | lbs/day | 42,800 | 65,000 | 71,000 | --- |
| | MM Loading | lbs/day | 60,800 | 92,000 | 101,000 | 1.42 |
| $NH_3$ | Average Concentration | mg/L | 23 | --- | --- | --- |
| | AA Loading | lbs/day | 1,800 | 2,800 | 3,100 | --- |
| | MM Loading | lbs/day | 2,500 | 4,000 | 4,200 | 1.35 |

Table 4-5: Current and Projected Influent Loading at PGWWTP

| Parameter | Condition | Unit | PGWWTP | | | |
|---|---|---|---|---|---|---|
| | | | Current | FY59/60 | Buildout | Peaking Factor |
| BOD | Average Concentration | mg/L | 358 | --- | --- | --- |
| | AA Loading | lbs/day | 22,400 | 38,000 | 60,000 | --- |
| | MM Loading | lbs/day | 28,000 | 48,000 | 75,000 | 1.25 |
| TSS | Average Concentration | mg/L | 291 | --- | --- | --- |
| | AA Loading | lbs/day | 18,100 | 31,000 | 48,000 | --- |
| | MM Loading | lbs/day | 26,400 | 45,000 | 70,000 | 1.46 |
| $NH_3$ | Average Concentration | mg/L | 40 | --- | --- | --- |
| | AA Loading | lbs/day | 2,400 | 4,100 | 6,400 | --- |
| | MM Loading | lbs/day | 2,700 | 4,600 | 7,100 | 1.11 |

## 4.3 Plant Capacity Comparison and Expansion Phasing

This comparison of current plant capacity and projected future flows and loads accounts for only hydraulic and carbonaceous BOD treatment capacity because these parameters have driven capacity expansion timing in the past. Potential nutrient removal requirements have not been considered in expansion timing and phasing. Evaluation of plant capacity with respect to TSS and ammonia removal should be incorporated into a subsequent analysis of plant capacity. Existing plant capacity was provided in the following documents:

- South Placer Regional Wastewater and Recycled Water Systems Evaluation, RMC Water and Environment, December, 2009
- Technical Memorandum 4b: Wastewater Treatment Plants Expansion Requirements (TM 4b), RMC Water and Environment, March 28, 2006
- DCWWTP Initial Assessment Final Report, CH2M Hill, Inc, August 2008
- Final Pleasant Grove Wastewater Treatment Expansion Basis of Design Report, Kennedy/Jenks Consultants, March 2016
    - Executive Summary
    - Technical Memorandum No. 1: Influent Flow and Load Characteristics and Projections, Pleasant Grove Wastewater Treatment Plant

- City of Roseville, Dry Creek Wastewater Treatment Plant, Influent Pump Station Hydraulic Analysis, Waterworks Engineers, March 2018.

Current loading capacities at each plant based on these documents are summarized in Table 4-6.

Table 4-6: Current Hydraulic and Organic (BOD) Capacities at DCWWTP and PGWWTP

| Plant | DCWWTP Existing | PGWWTP Existing | PGWWTP FY 22-23[a] |
|---|---|---|---|
| ADWF Hydraulic Treatment Capacity, mgd | 18[b] | 12[b] | 12[a,c] |
| Biological Treatment Capacity, AA BOD Loading, lbs/day | 26,200[d] | 22,000[b] | 34,500[c] |
| Biological Treatment Capacity, MM BOD loading, lbs/day | 32,500[d] | N/A | 40,100[c] |

Notes:

a. Plant improvements that expand treatment capacity at PGWWTP are currently under construction and are expected to be in service by FY 22-23. Capacity comparisons in this TM take this into consideration.
b. Permitted plant capacity and capacity documented in the South Placer Regional Wastewater and Recycled Water Systems Evaluation, RMC Water and Environment, December 2009.
c. Source: Table 1.1, Technical Memorandum No. 1: Influent Flow and Load Characteristics and Projections. Final Pleasant Grove Wastewater Treatment Expansion Basis of Design Report, Kennedy/Jenks Consultants, March 2016
d. Source: Table 5-1, DCWWTP Initial Assessment Final Report, CH2M Hill, Inc, August 2008

The plant data show that current BOD loadings are higher than the BOD treatment capacities estimated in the reference documents at both plants (marginally higher at Pleasant Grove). However, according to City staff, the plants have consistently been in compliance with their NPDES discharge permits. This suggests that the actual plant capacities are beyond their nominal design capacity with respect to BOD. Additionally, it is unclear to what extent interim improvements such as the Nitrate Reduction Improvements project at DCWWTP have affected the plant capacity. For the purposes of this TM, it is assumed that the AA and MM BOD removal capacity at each plant are, at minimum, the same as their current BOD loadings. Table 4-7 shows the revised treatment capacities based on current AA and MM BOD loadings. It is recommended that process-specific sampling, process modeling, and, if needed, stress testing be performed to determine the actual plant capacity, the limiting processes, and corresponding process improvements needed at each plant. While this evaluation will be immediately helpful at Pleasant Grove, it is essential at Dry Creek because of the large discrepancy between current loading and nominal capacity.

Table 4-7: Revised Current Hydraulic and Organic (BOD) Capacities at DCWWTP and PGWWTP

| Plant | DCWWTP | PGWWTP Existing | PGWWTP FY 22-23[a] |
|---|---|---|---|
| ADWF Hydraulic Treatment Capacity, mgd | 18[b] | 12[b] | 12[a,c] |
| Biological Treatment Capacity AA BOD Loading, lbs/day | 33,900[d] | 22,400[d] | 34,500[c] |
| Biological Treatment Capacity, MM BOD Loading, lbs/day | 48,000[d] | 28,000[d] | 40,100[c] |

Notes:

a. Plant improvements that expand treatment capacity at PGWWTP are currently under construction and are expected to be in service by FY 22-23. Capacity comparisons in this TM take this into consideration.
b. Permitted plant capacity and capacity documented in the South Placer Regional Wastewater and Recycled Water Systems Evaluation, RMC Water and Environment, December, 2009.
c. Source: Table 1.1, Technical Memorandum No. 1: Influent Flow and Load Characteristics and Projections. Final Pleasant Grove Wastewater Treatment Expansion Basis of Design Report, Kennedy/Jenks Consultants, March 2016
d. Current BOD loadings based on plant data from January 2013 through September 2019.

### 4.3.1 Dry Creek Wastewater Treatment Plant

This section discusses the hydraulic and biological capacity of the DCWWTP and preliminary phasing of future improvements. Based on the estimated plant capacity and projected flow and loading requirements, two phases of improvements are recommended.

#### 4.3.1.1 Hydraulic Capacity and Phasing

Based on the projected ADWF of 16.7 for FY 59/60 and 18.2 mgd for buildout, the current DCWWTP ADWF hydraulic capacity of 18 mgd is effectively sufficient through buildout. Figure 4-5 shows ADWF capacity plotted against the flow projected over the planning period. Figure 4-5 also presents graphs for ADWF and PDWWF rebound based on a linear interpolation from 150 gpd/EDU calculated based on current flows in FY 19/20 to a potential flow factor of 190 gpd/EDU in FY 59/60. This is not to say that all unit processes are sufficient to handle future peak flows associated with wet weather; assuming peaking factors hold steady over time, or increase, unit processes based upon flow criteria (as opposed to loading) will need to be expanded as presented below.

#### 4.3.1.2 Biological Capacity and Phasing

Preliminary biological capacity improvements for DCWWTP have been identified, which should be confirmed and refined when additional capacity testing has been completed. Based on Table 4-7, DCWWTP is currently running at or beyond its nominal design capacity with respect to BOD loading. It is recommended that SPWA implement Phase 1 expansion in approximately FY 24/25 which is the earliest practical time frame it could be implemented considering planning, design, and construction duration. The plant will reach 94% of the expanded Phase 1 AA and MM BOD loading capacity in FY 39/40. Therefore, it is recommended to implement Phase 2 biological improvements at this time concurrent with necessary wet weather hydraulic improvements. Phase 2 improvements in FY 39/40 are recommended to bring the plant BOD loading capacity to its buildout AA and MM projections of 56,000 and 79,000 lbs/day, respectively. Figure 4-6 shows AA and MM biological treatment capacities plotted against the loadings projected over the planning period and the anticipated phasing. As discussed in Chapter 5, the timing and size of the recommended projects should be reviewed after additional capacity analysis and facility planning is completed.

### 4.3.2 Pleasant Grove Wastewater Treatment Plant

This section discusses the hydraulic and biological capacity of the PGWWTP and the recommended phasing of future improvements. This phasing includes improvements that are currently under design and are expected to be in service by FY 22-23. Based on the estimated plant capacity and projected flow and loading requirements, two phases of improvements beyond the FY 22-23 project are recommended.

#### 4.3.2.1 Hydraulic Capacity and Phasing

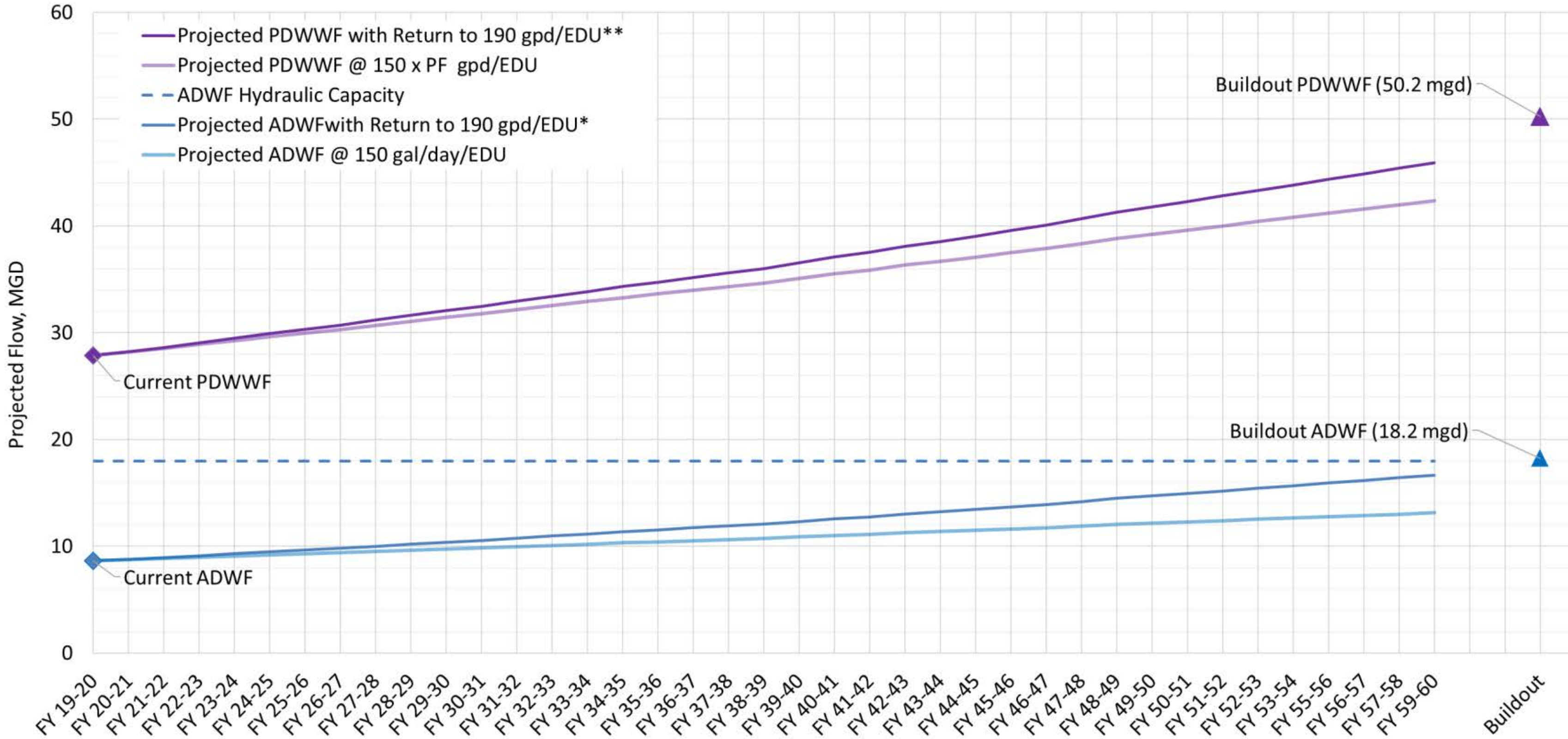
Although the PGWWTP hydraulic capacity is 12 mgd, based on the references above, the current ADWF treatment capacity at the PGWWTP is rated at 9.5 mgd. The improvements currently under construction will expand PGWWTP's treatment capacity to its hydraulic capacity rating of 12 mgd. Based on the ADWF projections calculated from a linear interpolation between current flow of 138 gpd/EDU and historic 190 gpd/EDU flow contribution, this capacity expansion should be sufficient to handle flows through approximately FY 28-29, though timing would depend on the rate of any rebound in sewer flows. It is currently recommended that Phase 1 hydraulic expansion be implemented in FY 28-29 to expand the plant ADWF to 15 mgd. Phase 1 expansion would carry the PGWWTP through FY 40-41. At that point, Phase 2 improvements may be needed to increase the plant ADWF capacity to FY 59/60 flow projections of 18 mgd. Figure 4-7 shows ADWF plotted against the flow projected over the planning period and the anticipated phasing for improvements. Figure 4-7 presents graphs for ADWF and PDWWF rebound based on linear interpolation from 138 gpd/EDU calculated based on current flows in FY 19/20 to a potential flow factor of 190 gpd/EDU in FY 59/60. As discussed in Chapter 5, the timing and size of the recommended projects should be reviewed after additional facility planning is completed and the gpd/EDU assumption is confirmed.

#### 4.3.2.2 Biological Capacity and Phasing

Based on Table 4-7, PGWWTP is currently running at or beyond its nominal design capacity with respect to BOD loading. The improvements currently under design will expand the plant's AA and MM BOD loading capacities to 34,500 lbs/day and 40,100 lbs/day. These improvements should be sufficient to meet projected BOD loadings through FY 40/41 when Phase 2 hydraulic capacity improvements are recommended. During Phase 2 expansion, it is recommended that plant capacity be increased to accommodate projected FY59/60 AA and MM BOD loadings of 38,000 lbs/day and 48,000 lbs/day, respectively. The timing and magnitude of additional expansion to accommodate buildout will be determined in subsequent planning documents.

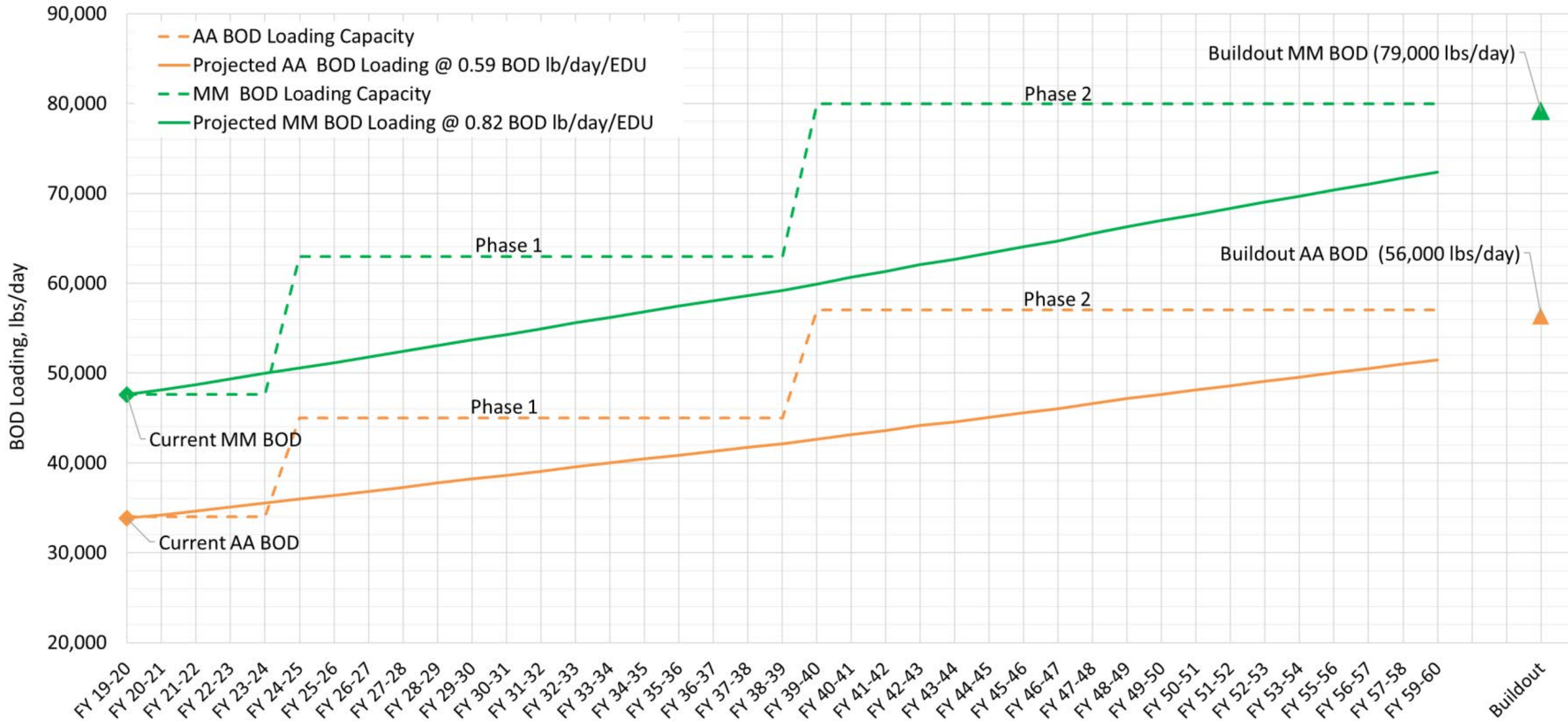
Figure 4-8 shows AA and MM biological treatment capacities plotted against the loadings projected over the planning period and the anticipated phasing.

Figure 4-5: DCWWTP Hydraulic Capacity Comparison



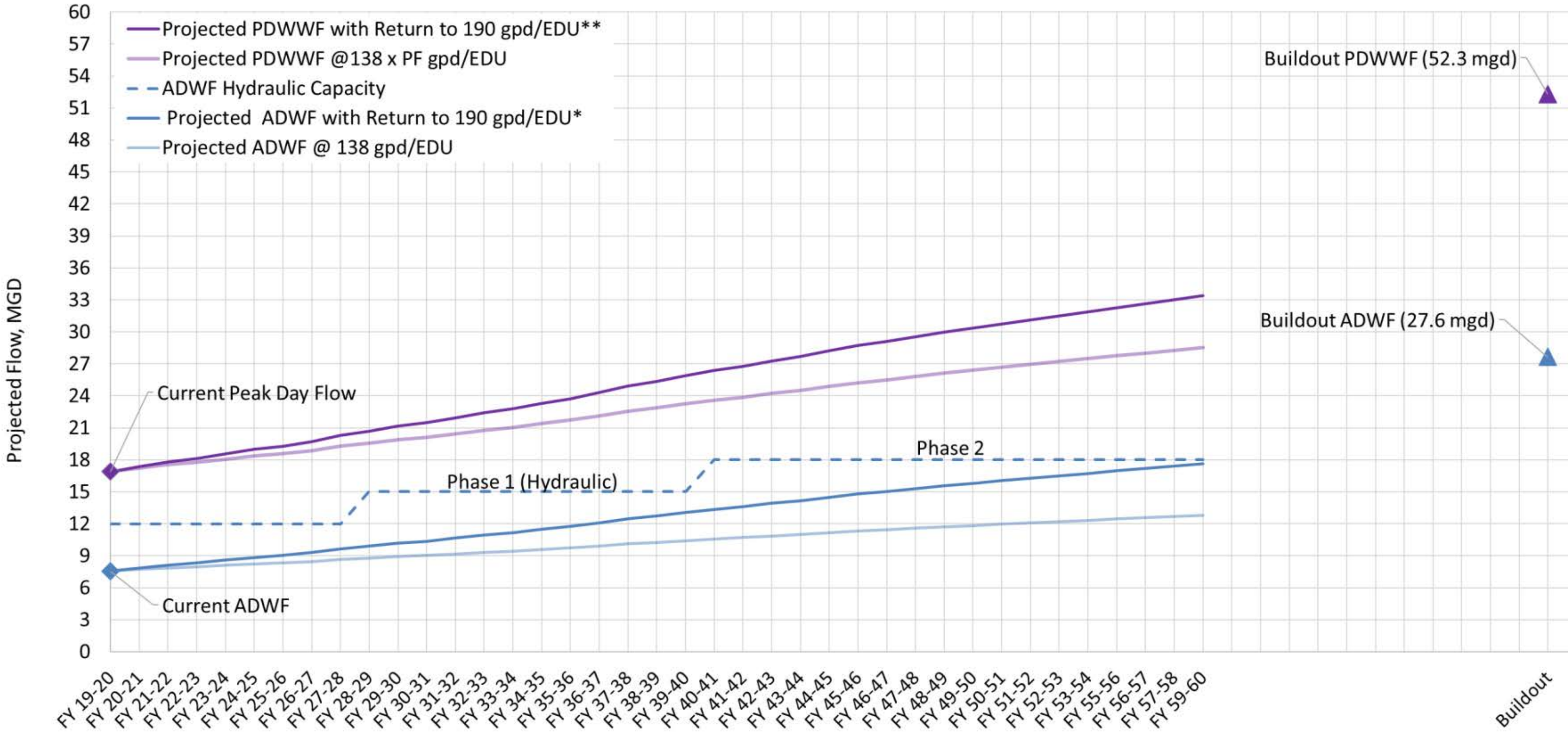

* ADWF gpd/EDU flow factor is assumed to reach 190 gpd/EDU by FY 59/60, with a linear increase from 150 gpd/EDU at FY 19/20
**PDWWF is assumed to be ADWF flow plus 330 gpd/EDU of wet weather flow, based on current wet weather flowrates
*** Buildout date is currently unknown and is shown for graphical purposes only.

Figure 4-6: DCWWTP Biological Capacity Comparison



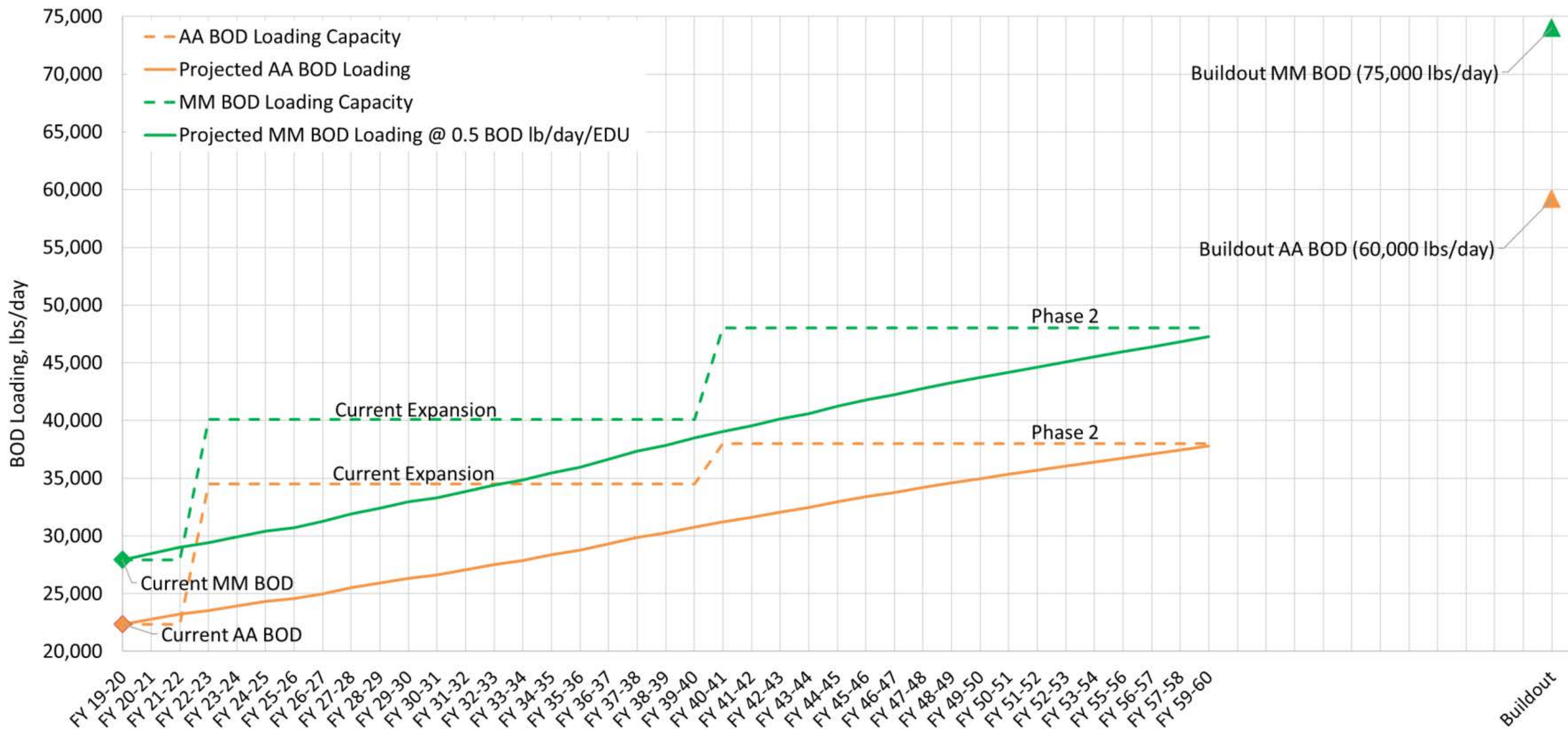

* Buildout date is currently unknown and is shown for graphical purposes only.

Figure 4-7: PGWWTP Hydraulic Capacity Comparison




* ADWF GPD/EDU factor is assumed to reach 190 gpd/EDU by FY 59/60, with a linear increase from 138 gpd/EDU at FY 19/20
**PDWWF is assumed to be ADWF flow plus 170 gpd/EDU of wet weather flow, based on current wet weather flowrates
*** Buildout date is currently unknown and is shown for graphical purposes only.

Figure 4-8: PGWWTP Biological Capacity Comparison




* Buildout date is currently unknown and is shown for graphical purposes only.

## 4.4 Conceptual Capital Cost Estimates

Opinions of probable cost were developed for the recommendations of this TM and are presented in this section. This section also provides the procedures and methodology used for developing planning-level capital cost estimates for PGWWTP and DCWWTP phased improvement projects. Note that improvements that would be required after the FY 59/60 planning horizon have not been estimated.

### 4.4.1 Cost Estimation Approach

This section describes the assumptions and procedures used to develop cost estimates for phased improvements at PGWWTP and DCWWTP. The cost estimates provided in this TM include improvements that would increase the plant capacity to treat the projected flows and loadings but does not include repair and replacement (R&R) projects or discretionary projects such as resource recovery improvements.

The estimated construction costs are based on a Class 5 estimate as defined by the Association for the Advancement of Cost Engineering (AACE) International cost estimate classification system. Table 4-8 provides a summary of the estimate classes and expected accuracy range. For Class 5 estimates, the expected accuracy range is -20% to -50% on the low end and +30% to +100% on the high end.

Table 4-8: Cost Estimate Classification Matrix (AACE International)

| Estimate Class | Level of Project Definition | Purpose of Estimate | Methodology | Expected Accuracy Range |
|---|---|---|---|---|
| Class 5 | 0% to 2% | Concept screening | Capacity factored, parametric models, judgement, or analogy | Low: -20% to -50%<br>High: +30% to +100% |
| Class 4 | 1% to 15% | Study or feasibility | Equipment factored or parametric models | Low: -15% to -30%<br>High: +20% to +50% |
| Class 3 | 10% to 40% | Budget authorization or control | Semi-detailed unit costs with assembly level line items | Low: -10% to -20%<br>High: +10% to +30% |
| Class 2 | 30% to 75% | Control or bid/tender | Detailed unit cost with forced detailed take-off | Low: -5% to -15%<br>High: +5% to +20% |
| Class 1 | 65% to 100% | Check estimate or bid/tender | Detailed unit cost with detailed take-cost | Low: -3% to -10%<br>High: +3% to +15% |

Source: AACE International Recommended Practice No. 18R-97

Construction costs were developed based on the improvements and unit costs provided in the prior planning documents listed below:

- Technical Memorandum 4b: Wastewater Treatment Plants Expansion Requirements, RMC Water and Environment, March 28, 2006 (TM 4b).
- DCWWTP Initial Assessment Final Report, CH2M Hill, Inc, August 2008 (CH2M Hill, 2008)
- Final Pleasant Grove Wastewater Treatment Expansion Basis of Design Report, Kennedy/Jenks Consultants, March 2016

Raw construction costs are estimated for each component based on estimated unit costs multiplied by quantity.

Construction cost factors were used to develop and escalate unit costs to reflect the current bid environment, industry trends, and project location as well as plant capacity increase. These factors are incorporated into the unit costs and are represented in two categories:

- **Engineering News Record's (ENR) Construction Cost Index (CCI) –** All project construction cost estimates are indexed to an ENR CCI of 12115 which represents the average of the April 2020 indices for San Francisco (SF) ENR and the "20-Cities" ENR, to account for the greater Sacramento area construction market.
- Capacity Adjustment Factor – The number of units listed in TM 4b were associated with different capacity increases than required in proposed improvement phasing in this Systems Evaluation. Proportional adjustment factors were used to account for these capacity increase differences. Further discussion is provided below.

Based on the level of detail available for Class 5 estimates, allowances are used for some of the direct construction elements including the site electrical, and instrumentation and control (I&C), site yard piping and mechanical, and site civil work estimates (i.e. direct construction costs). Allowance estimates are made using the percentages listed in Table 4-9.

Table 4-9: Direct Construction Cost Allowances

| Construction Cost Allowance Types | Percent |
|---|---|
| Site Yard Piping & Mechanical | 5% |
| Site Electrical / I&C/SCADA | 15% |
| Site Civil | 5% |

From the direct construction cost subtotal, indirect construction cost factors are applied to develop an estimated total construction cost. These construction cost markups include the following:

- Overhead and Profit – Contractor overhead and profit (O&P) represents the general contractor's operating costs and estimated profit levels. The O&P factor typically varies between 10% and 25% of the direct construction cost subtotal, depending on the size of the project and market conditions, with larger projects typically having lower O&P factors. For this Systems Evaluation, an O&P factor of 20% was used.
- Estimating Contingency – The estimating contingency is defined as unknown costs due to lack of detailed engineering during the planning phase that are estimated as a percentage of defined project costs (i.e. direct and indirect construction cost subtotal). For this Systems Evaluation, a contingency factor of 30% was used since the projects are at conceptual planning level.

The estimated total construction cost is then multiplied by an allowance of 25% for Engineering, Permitting, Construction Management, and Engineering Services during Construction.

### 4.4.2 Dry Creek WWTP Cost Estimates

The proposed Phase 1 and 2 improvements and process unit cost estimates in TM 4b were used as the basis of the cost estimate. Several revisions and updates were made to the TM 4b improvements to develop the new phased improvements list and cost estimates in this Systems Evaluation, including the following:

- Influent Pump Station –Several improvements have been completed at East Roseville influent pump station including installation of new pumps and emergency generator, demolition of the old East Roseville Pump Station and Pump Station Annex, and replacement of PLCs. Therefore, TM 4b Phase 1 improvements were updated to remove the influent pump installation.
- Influent Coarse Screen – The existing two coarse screens have a PHWWF capacity of 30 mgd each. The existing screens provide sufficient capacity through buildout with project PHWWF of 54.7 mgd with two screens in service and using the existing bypass channel in the event that one of the screens is out of service. Therefore, it is recommended that a third screen be installed in Phase 2.
- Aeration Tanks – TM 4b proposed installation of ten new aeration tanks including replacement of four of the exiting smaller size aeration tanks constructed in 1974 with larger tanks (same size as tanks constructed in 1991) in Phase 1. The CH2M Hill, 2008 report evaluation indicated existing aeration basin volumes were sufficient for Phase 1 improvements which assumed a projected AA BOD loading capacity about the same as the current plant loading and recommended providing additional aeration and mixed liquor recycle (MLR) pumping capacity. New MLR pumps were installed at the plant per the Nitrate Removal Project Basis of Design Report (B&C, 2017). A rough evaluation of the aeration tank sizes indicated that replacement of two aeration tanks and construction of two new ones (total of four) in Phase 1 and replacement of the remaining 2 aeration tanks and construction of 4 new ones in Phase 2 (total of six) would provide sufficient capacity at each of the 2 phases.
- Capacity Increase Adjustment Factor – Biological treatment capacity increases for AA BOD loading were used to calculate the DCWWTP adjustment factor. The Adjustment Factor was obtained from the ratio between incremental capacity increases proposed in TM 4b and in this TM.

  BOD loading increase in Phase 1 based on TM 4b was 10,500 lb/day and the required capacity increase per this TM is 11,100. An adjustment factor of 1.06 was calculated and applied to the number of units.

  BOD loading increase in Phase 2 based on TM 4b was 13,700 lb/day and the required capacity increase per this TM is 12,000 lb/day. An adjustment factor of 0.88 was calculated and applied to the number of units.

The preliminary phased improvements are provided in Table 4-10. The listed improvements increase the plant ADWF capacity based on AA BOD loading from 11.5 mgd to 14.5 mgd in Phase 1 and to 18 mgd in Phase 2. It should be emphasized that the cost estimates provided below are conceptual level costs for capacity expansion projects and do not include rehabilitation and replacement projects or discretionary projects. More detailed cost estimating should be developed when the plant capacity is determined, and phased improvement projects are updated accordingly.

Table 4-10: DCWWTP Phase 1 and Phase 2 Capital Cost Estimates ( ENR CCI: 12115)[a]

| Process | Process Unit Cost | Phase 1 FY 24/25 | Phase 2 FY 39/40 |
|---|---|---|---|
| | | # of units | # of units |
| Coarse Screens | $280,000 | - | 1 |
| Influent Pump Station | $2,000,000 | - | 1 |
| Fine Screens | $170,000 | 2 | 1 |
| Odor Control | $210,000 | 1 | 1 |
| Grit Basins | $290,000 | - | 1 |
| Primary Sedimentation | $3,400,000 | - | 2 |
| Aeration Basins | $2,600,000 | 4 | 6 |
| Blower | $290,000 | 1 | - |
| Mixed Liquor Return Pumps | $150,000 | 4 | 6 |
| Rehab Existing Anoxic Zones | $290,000 | 1 | |
| Secondary Clarifiers | $4,100,000 | 4 | 2 |
| RAS/WAS Pump Station | $860,000 | 1 | 1 |
| Tertiary Filtration | $730,000 | | 2 |
| Waste Backwash Pumps | $100,000 | | 1 |
| UV Disinfection | $2,100,000 | | 1 |
| Anaerobic Digesters | $3,300,000 | 1 | 1 |
| Centrifuges | $650,000 | 2 | |
| Cooling Units | $290,000 | | 2 |
| Total Unit Process Costs | | $34,000,000 | $43,000,000 |
| Site Yard Piping & Mechanical (5%) | | $1,700,000 | $2,200,000 |
| Site Electrical / I&C/SCADA (15%) | | $5,100,000 | $6,500,000 |
| Site Civil (5%) | | $1,700,000 | $2,200,000 |
| Subtotal of Direct Construction Costs | | $43,000,000 | $54,000,000 |
| Mobilization/Demobilization (5%) | | $2,200,000 | $2,700,000 |
| Contractor Overhead & Profit (20%) | | $8,600,000 | $10,800,000 |
| Subtotal of Direct and Indirect Costs | | $54,000,000 | $68,000,000 |
| Contingency (30%) | | $16,000,000 | $20,000,000 |
| Total Estimated Construction Cost | | $70,000,000 | $88,000,000 |
| Engineering, Permitting, CM, ESDC (25%) | | $18,000,000 | $22,000,000 |
| Total Estimated Capital Cost | | $88,000,000 | $110,000,000 |

Notes:

a. Costs based on Average of SF and "20 Cities" ENR for April 2020: 12115

### 4.4.3 PGWWTP Cost Estimates

The proposed Phase 1 and 2 improvements and cost estimates in TM 4b were used as the basis of the cost estimate. Several revisions and updates were implemented on these proposed improvements for Phase 1 and Phase 2 to develop the new phased improvements cost estimates, including the following:

- Current Expansion – As described in 1.2, several improvements are currently being constructed at PGWWTP per the Pleasant Grove Wastewater Treatment Plant Expansion BODR (Kennedy/Jenks, 2016). Therefore, TM 4b Phase 1 improvements were updated by removing the current expansion projects from Phase 1 scope, including the following:
    - Installation of four new primary sedimentation basins
    - Installation of 1 odor control system
    - Installation of 2 new solid thickening systems and building
    - Installation of 2 new digesters and building
    - Installation of 1 new co-generation system
- Hydraulic Capacity Increase – Proposed Phase 1 improvements in this TM are to increase PGWWTP peak day hydraulic capacity. Therefore, proposed projects in Phase 1 improvements in TM 4b were revised to include only improvements to unit process that increase the plant hydraulic capacity and the remaining projects associated with BOD removal capacity including installation of one digester and one oxidation ditch, and construction of associated buildings were moved to Phase 2 improvements .
- Capacity Increase Adjustment Factor – For Phase 1, since only hydraulic capacity increase is required, an Adjustment Factor was obtained from the ratio between the hydraulic capacity increase in TM 4b and in this TM. Both TMs propose 3 mgd hydraulic capacity increases in Phase 1, therefore the adjustment factor of 1 was multiplied by the number of units proposed in TM 4b.

  For Phase 2, biological treatment capacity increases for AA BOD loading were used. The Phase 2 BOD loading capacity increase in TM 4b was 21,000 lb/day and the proposed capacity increase in this TM is 3,500 lb/day. An adjustment Factor of 0.17 was calculated from TM 4b and proposed capacity increase ratio and was multiplied by the number of units proposed in TM 4b.

  An adjustment factor was not applied to building modifications.

The updated opinion of probable cost for the phased improvements is provided in Table 4-11. The recommended phased improvements increase the plant ADWF capacity from 12 mgd to 15 mgd in Phase 1 and from 15 mgd to 18 mgd in Phase 2. It should be emphasized that the cost estimates provided below are conceptual level costs for capacity expansion projects and do not include rehabilitation and replacement projects or discretionary projects. More detailed cost estimating should be developed when the plant capacity is determined, and phased improvement projects are updated accordingly.

Table 4-11: PGWWTP Phase 1 and Phase 2 Capital Cost Estimates (ENR CCI: 12115)[a]

| Process | Process Unit Cost | Phase 1 FY 28/29 | Phase 2 FY 39/40 |
|---|---|---|---|
| | | # of units | # of units |
| Influent Pumps | $120,000 | 1 | - |
| Grit Basins | $290,000 | 1 | - |
| Fine Screens | $170,000 | 2 | - |
| Primary Sedimentation | $3,400,000 | - | 1 |
| Oxidation Ditches | $7,100,000 | - | 1 |
| Secondary Clarifiers | $4,100,000 | 1 | 1 |
| RAS/WAS Pump Station | $860,000 | 1 | - |
| Tertiary Filtration | $730,000 | 2 | 1 |
| UV Disinfection | $2,100,000 | 3 | - |
| Thickeners Building Modification | $490,000 | - | 1 |
| Digesters Building Modification | $490,000 | - | 1 |
| Total | | $13,000,000 | $16,000,000 |
| Site Yard Piping & Mechanical (5%) | | $650,000 | $800,000 |
| Site Electrical / I&C/SCADA (15%) | | $2,000,000 | $2,400,000 |
| Site Civil (5%) | | $650,000 | $800,000 |
| Subtotal of Direct Costs | | $16,000,000 | $20,000,000 |
| Mobilization/Demobilization (5%) | | $800,000 | $1,000,000 |
| Contractor Overhead & Profit (20%) | | $3,200,000 | $4,000,000 |
| Subtotal of Direct and Indirect Costs | | $20,000,000 | $25,000,000 |
| Contingency (30%) | | $6,000,000 | $7,500,000 |
| Total Estimated Construction Cost | | $26,000,000 | $33,000,000 |
| Engineering, Permitting, CM, ESDC (25%) | | $6,500,000 | $8,300,000 |
| Total Estimated Capital Cost | | $33,000,000 | $41,000,000 |

Notes:

a. Costs based on Average of SF and “20 Cities” ENR for April 2020: 12115

# 5. CAPACITY IMPROVEMENT PROJECT SUMMARY & NEXT STEPS

Table 5-1 summarizes the capacity improvements identified in this systems evaluation. Note that the improvement needs projected for Dry Creek and Pleasant Grove WWTPs are significantly larger and more expensive than the improvement projects projected for the collection system, but are based on limited available data. The estimated costs for Dry Creek WWTP are especially high because of the size and age of that plant; when it was designed, the organic loading in Roseville was far lower than when Pleasant Grove was designed; since the mid 2000's organic loading to both plants has continued to increase. Further studies, as described in Chapter 4, should be undertaken for both treatment plants, and the capacity improvement projects should be refined based on those findings.

Note that only capacity improvement projects have been identified; condition and reliability related improvement needs have not been evaluated in this study.

Table 5-1: Proposed Capacity Improvement Projects

| | | Existing | FY 24/25 | FY 39/40 | After FY 59/60 |
|---|---|---|---|---|---|
| Collection System | Description | Improvement Project 1 (Increased Capacity of PS 26 and sewers on Sierra College Blvd) | None | None | Improvement Project 2 (Redirect flows from PS 26 and Sierra College Blvd down Eureka Road)<br><br>Improvement Project 3 (Increased Firm capacity of PS 25 with diversion structure improvements) |
| | Estimated Capital Cost | $1,610,000 | - | - | $2,590,000 |
| Dry Creek WWTP | Description | Plant Capacity Analysis, Condition Assessment, and Facilities Plan | Phase 1 (Increase AA BOD Capacity to ~45,000 lbs/day) | Phase 2 (Increase AA BOD Capacity to ~57,000 lbs/day) | Phase 3: Increase BOD Capacity and Hydraulic Capacity (not estimated) |
| | Estimated Capital Cost | $550,000 | $88,000,000 | $110,000,000 | Not Estimated |
| Pleasant Grove WWTP | Description | Plant Capacity Analysis, Condition Assessment, and Facilities Plan | Increase ADWF hydraulic capacity to 15 mgd | Increase ADWF hydraulic capacity to 18 mgd. Increase AA BOD Loading Capacity to 38,000 lbs/day | Phase 3: Increase BOD Capacity and Hydraulic Capacity (not estimated) |
| | Estimated Capital Cost | $450,000 | $33,000,000 | $41,000,000 | Not Estimated |

## 5.1 Next Steps

Based on the findings of this preliminary evaluation, and discussions with the project team, the following next steps are recommended for consideration by SPWA:

- Conduct an analysis of process performance and current biological treatment and hydraulic capacity at both DCWWTP and PGWWTP. This will likely require process-specific sampling and development of calibrated process models. Biological treatment capacity should consider both BOD and nitrate plus nitrite permit limitations set forth within each plant's respective NPDES permit. Results of this study should determine a capacity rating for each unit process at the plant and the limiting processes. This analysis will provide a sound basis for the planning of new facilities and is integral to determining required future capital improvement projects during phased expansions. It is recommended that DCWWTP capacity analysis take precedence over PGWWTP considering DCWWTP is currently operating well beyond its nominal BOD removal capacity.

- Review previous condition assessment work conducted on the plant assets and perform additional assessment needed to identify and prioritize repair and replacement (R&R) projects. This effort would include a risk assessment to identify likelihood of failure and criticality of each asset. Results of this study would identify R&R projects which may need to be implemented prior to or concurrent with phased expansions.

- Based on the capacity analysis and R&R project planning, develop Facilities Plans for DCWWTP and PGWWTP. Considering both plants are running at or above their nominal design capacities, it is recommended that facilities planning begin immediately after the capacity analysis. This effort would evaluate various process optimization steps and upgrade alternatives and provide recommended improvements for phased expansions. The Facilities Plans would include review of the 190 gpd/EDU flow factor that is critical to the timing and magnitude of any hydraulic capacity improvements.

- Develop Class 4 cost estimates for recommended improvements at the WWTPs under each expansion phase and for R&R projects to assist SPWA partners in assessing capital needs in the future.

- For the collection system, periodically update the model network based on any configuration changes, perform re-calibration to confirm the actual and anticipated flows, and to update future loads into the model network. An update frequency of every 5-10 years is recommended, depending on changes in development planning and/or system configuration.

We also recommend that SPWA evaluate funding and financing options to support implementation of the recommended capital improvements, especially Phase 1 at Dry Creek, given its size and relative immediacy. With the implementation of the steps above, and the ongoing high level performance of the SPWA Regional System, SPWA will be able to continue its excellent level of service to the Regional Partners.

# APPENDIX A – PLACER COUNTY GENERAL PLAN DENSITIES

| General Plan Designation | Maximum Density (EDU/Acre) | Diurnal Profile |
|---|---|---|
| Commercial | 21 | Commercial |
| Greenbelt & Open Space | 0 | Residential |
| High Density Residential 4 - 10 DU/Ac. | 10 | Residential |
| Industrial | 4.356 | Commercial |
| Low Density Residential 0.4 - 0.9 Ac. M | 2.5 | Residential |
| Low Density Residential 1 - 2 DU./Ac. | 2 | Residential |
| Low Density Residential Density Transf | 2.5 | Residential |
| Low Density Residential Development | 2 | Residential |
| Medium Density Residential 2 - 4 DU/A | 4 | Residential |
| Open Space | 0 | Residential |
| Professional Office | 4.356 | Commercial |
| Public Facility | 0 | Commercial |
| Rural Estate 4.6 - 20 Ac. Min. | 0.21739 | Residential |
| Rural Low Density Residential 0.9 - 2.3 | 1.11 | Residential |
| Rural Low Density Residential 0.9 - 2.3 | 1.11 | Residential |
| Rural Low Density Residential 0.9 - 2.3 | 1.11 | Residential |
| Rural Low Density Residential 0.9 - 2.3 | 1.39 | Residential |
| Rural Low Density Residential 1 - 2.3 A | 1 | Residential |
| Rural Residential 2.3 - 4.6 Ac. Min. | 0.43478 | Residential |
| Public Facility/Agricultural 80 Ac. Min. | 0 | Residential |
| Low Density Residential 0.4 - 2.3 Ac. M | 1.11 | Residential |
| Riparian Drainage | 0 | Residential |
| Agriculture/Timberland - 20 Ac. Min. | 0 | Residential |
| Rural Residential 1 - 10 Ac. Min. | 1 | Residential |

# APPENDIX B – URBAN GROWTH AREA LAND USE SUMMARIES

# PLACER COUNTY URBAN GROWTH AREAS

Placer Ranch UGA[a]

| Land Use | Flow Factor | Land Use Quantities | | |
|---|---|---|---|---|
| | | Western Shed | Central Shed | Eastern Shed |
| Single Family Residential (Units) | 190 gpd/DU | 2,244 | 1,254 | 320 |
| Multi Family Residential (Units) | 130 gpd/DU | 397 | 782 | 831 |
| Mixed Use (acres) | 2,300 gpd/ac | - | 33.8 | 15.1 |
| Commercial (acres) | 850 gpd/ac | 73.2 | 309.9 | 38.0 |
| Parks > 10 acres (acres) | 10 gpd/ac | 37.8 | 17.1 | - |
| Public/Quasi-Public (acres) | 660 gpd/ac | 0.8 | 0.8 | 3.9 |
| Schools (acres) | 170 gpd/ac | 32.0 | - | - |
| **Total ADWF (mgd)** | | **0.55** | **1.95** | **0.24** |

Footnotes:

a. See Exhibit D of the Placer Ranch Sewer Master Plan (Mackay & Somps, 2017). Approximately 1,300 acres in the Sunset Industrial Area outside of Placer Ranch are anticipated to drain through Placer Ranch sewers, when fully developed.

Sunset Industrial Area[a]

| Land Use | Flow Factor | Land Use Quantities | | | |
|---|---|---|---|---|---|
| | | PR-POC 1 | PR-POC 2 | Existing POC 1 | Existing POC 2 |
| Single Family Residential (Units) | 190 gpd/DU | 2,361 | 297 | 0 | 0 |
| Multi Family Residential (Units) | 130 gpd/DU | 0 | 0 | 0 | 0 |
| Mixed Use (acres) | 2,300 gpd/ac | 257 | 161 | 0 | 0 |
| Commercial/ Industrial (acres) | 850 gpd/ac | 1,287 | 85 | 531 | 277 |
| Parks > 10 acres (acres) | 10 gpd/ac | 0 | 0 | 0 | 0 |
| Public/Quasi-Public (acres) | 660 gpd/ac | 0 | 0 | 0 | 0 |
| Schools (acres) | 170 gpd/ac | 0 | 0 | 0 | 0 |
| Point Sources[d] | gpd | 480,000 | 0 | 0 | 0 |
| **Total ADWF (mgd)** | | **2.61** | **0.50** | **0.45** | **0.24** |

Footnotes:

a. Sunset Area Water, Wastewater, and Recycled Water Technical Report (Psomas, October 2017)
b. Includes low density residential and medium density residential units.
c. Approximately 1,300 acres in the Sunset Industrial Area outside of Placer Ranch are anticipated to drain through Placer Ranch sewers, when fully developed.
d. Includes Thunder Valley Casino and Area L270 (County area east of the Sunset Area proposed to drain through the Sunset Area)

Placer Vineyards[a]

| Land Use | Flow Factor | Land Use Quantities | | |
|---|---|---|---|---|
| | | Shed A1 | Shed A2 | Shed B |
| Single Family Residential (Units) | 190 gpd/DU | 1,723 | 7,051 | 1,951 |
| Multi Family Residential (Units) | 130 gpd/DU | 0 | 2,822 | 270 |
| Mixed Use (acres) | 2,300 gpd/ac | 0 | 50.5 | 0 |
| Commercial/ Industrial (acres) | 850 gpd/ac | 0 | 234.2 | 25.0 |
| Parks > 10 acres (acres) | 10 gpd/ac | 0 | 30 | 12.0 |
| Public/Quasi-Public (acres) | 660 gpd/ac | 0 | 113 | 27.2 |
| Schools (acres) | 170 gpd/ac | 12 | 155 | 0 |
| | **Total ADWF (mgd)** | **0.33** | **2.12** | **0.45** |

Footnotes:

a. Placer Vineyards Specific Plan; Sanitary Sewer Master Plan Addendum 1 (Mackay & Somps, May 20, 2019)

Table 0-1: Regional University[a]

| Land Use | Flow Factor | Land Use Quantities |
|---|---|---|
| Single Family Residential (Units) | 190 gpd/DU | 1,845 |
| Multi Family Residential (Units) | 130 gpd/DU | 349 |
| Mixed Use (acres) | 2,300 gpd/ac | 10.98 |
| Commercial/ Industrial (acres) | 850 gpd/ac | 25 |
| Parks > 10 acres (acres) | 10 gpd/ac | 27.3 |
| Public/Quasi-Public (acres) | 660 gpd/ac | 5.0 |
| Schools (acres) | 170 gpd/ac | 32.6 |
| University | mgd | 0.725 |
| | **Total ADWF (mgd)** | **1.18** |

Footnotes:

a. Regional University Specific Plan, Sanitary Sewer Demand (Mackay & Somps, September 1, 2017)

Riolo Vineyards[a]

| Land Use | Flow Factor | Land Use Quantities | | |
|---|---|---|---|---|
| | | Lift Station Shed | Gravity Shed 1 | Gravity Shed 2 |
| Single Family Residential (Units) | 190 gpd/DU | 673[b] | 172 | 153 |
| Multi Family Residential (Units) | 130 gpd/DU | 0 | 0 | 0 |
| Mixed Use (acres) | 2,300 gpd/ac | 0 | 0 | 0 |
| Commercial/ Industrial (acres) | 850 gpd/ac | 26.5[b] | 0 | 10 |
| Parks > 10 acres (acres) | 10 gpd/ac | 0 | 0 | 0 |
| Public/Quasi-Public (acres) | 660 gpd/ac | 0 | 0 | 11 |
| Schools (acres) | 170 gpd/ac | 0 | 16 | 0 |
| **Total ADWF (mgd)** | | **0.15** | **0.035** | **0.045** |

Footnotes:

a. Riolo Vineyards Sanitary Sewer Master Plan Update (Unico Engineering, April 2016)

b. Includes flows from offsite draining through these sheds

Placer UGA[a]

| Land Use | Flow Factor | Land Use Quantities | |
|---|---|---|---|
| | | North Shed | South Shed |
| Single Family Residential (Units) | 190 gpd/DU | 147 | 41.7 |
| Multi Family Residential (Units) | 130 gpd/DU | 0 | 0 |
| Mixed Use (acres) | 2,300 gpd/ac | 0 | 0 |
| Commercial/ Industrial (acres) | 850 gpd/ac | 0 | 0 |
| Parks > 10 acres (acres) | 10 gpd/ac | 0 | 0 |
| Public/Quasi-Public (acres) | 660 gpd/ac | 0 | 0 |
| Schools (acres) | 170 gpd/ac | 0 | 0 |
| **Total ADWF (mgd)** | | **0.028** | **0.008** |

Footnotes:

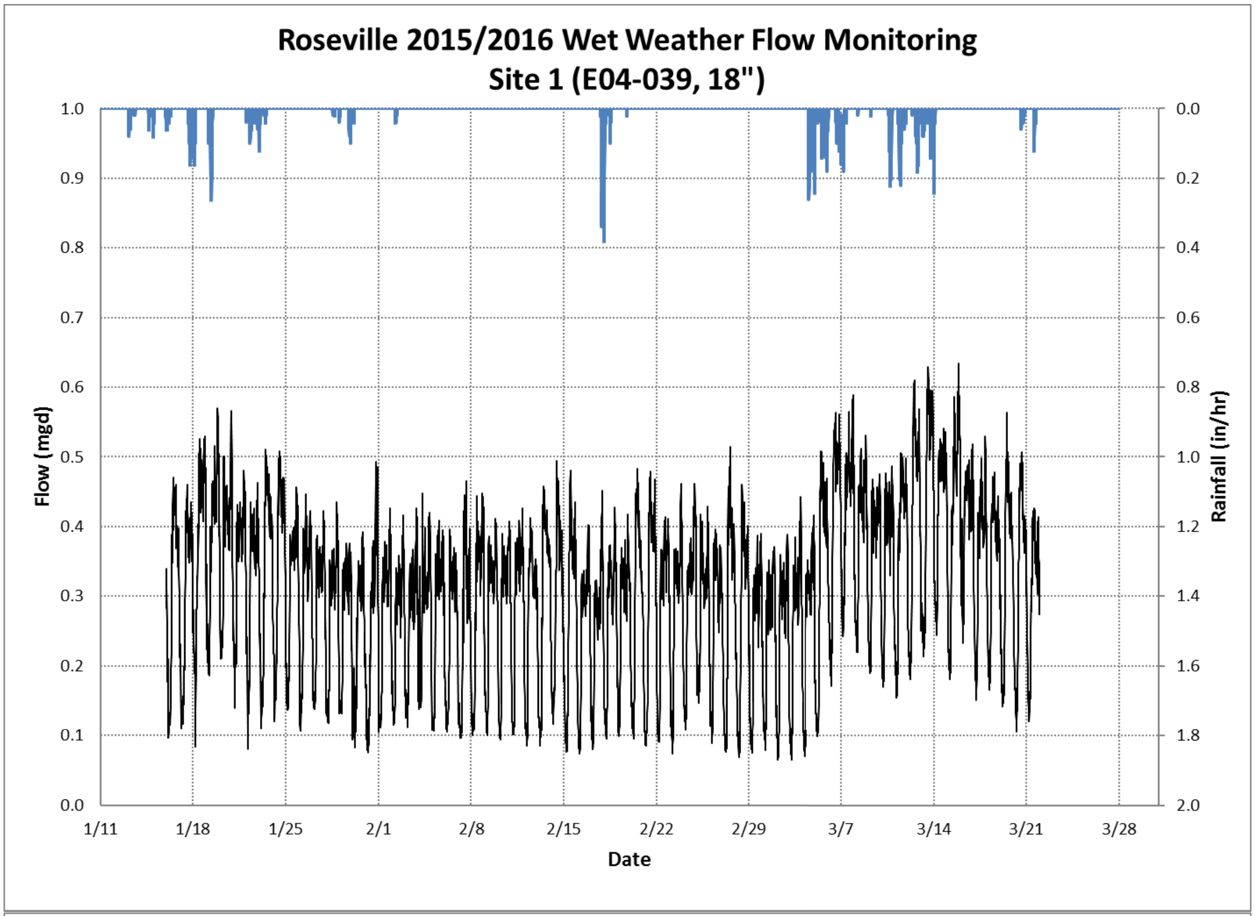
a. *Hawk Homestead Sewer Analysis – Supplementary Information Requested by Placer County Environmental Engineering*, Derrick Whitehead, Municipal Consulting Group, January 29, 2016

| Land Use | Flow Factor | Creekview[a] | Amoruso[b] | Sierra Vista[c] | |
|---|---|---|---|---|---|
| | | | | North Shed[d] | South Shed |
| Single Family Residential (Units) | 190 gpd/DU | 2,019 | 4,239[e] | 1,658 | 2,118 |
| Multi Family Residential (Units) | 130 gpd/DU | 758 | 873 | 1,058 | 1,478 |
| Mixed Use (acres) | 2,300 gpd/ac | 0.0 | 27.3 | 13.3 | 34.9 |
| Commercial (acres) | 850 gpd/ac | 15.5 | 23.9 | 37.7 | 181.0 |
| Parks > 10 acres (acres) | 10 gpd/ac | 0.0 | 0.0 | 10.0 | 39.9 |
| Public/Quasi-Public (acres) | 660 gpd/ac | 2.6 | 7.6 | 10.1 | 6.6 |
| Schools (acres) | 170 gpd/ac | 7.0 | 9.6 | 10.0 | 45.6 |
| **Total ADWF (mgd)** | | **0.43** | **0.61** | **0.59** | **1.24** |

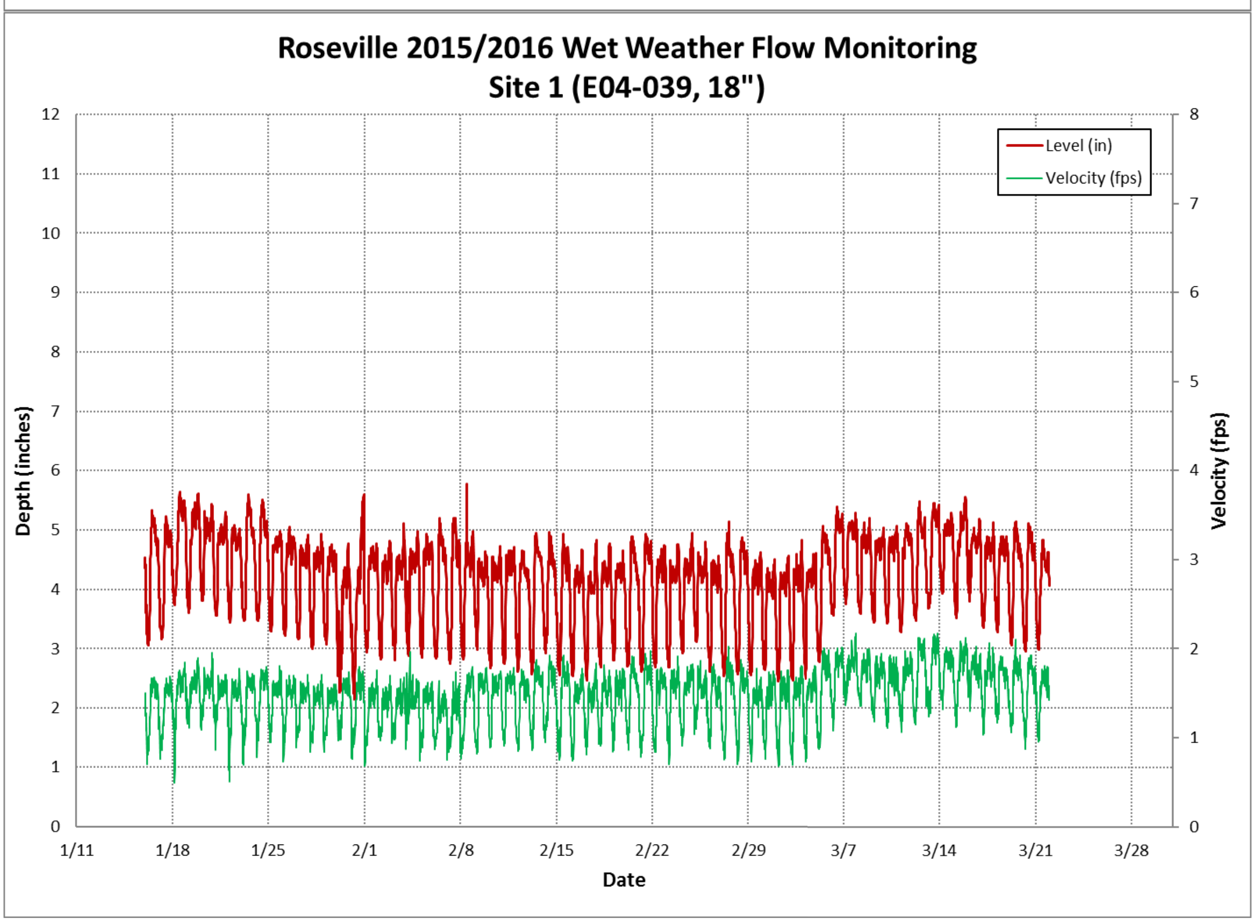
Footnotes:

a. *Creekview Specific Plan Sanitary Sewer Master Plan*, Mackay & Somps Civil Engineers, November 2010
b. *Amoruso Ranch Specific Plan Area Wastewater Master Plan*, Kimley Horn, September 2015
c. *Sierra Vista Specific Plan Sanitary Sewer Master Plan*, Mackay & Somps Civil Engineers, July 2009
d. Includes the Westbrook portion of Sierra Vista
e. Includes 274 units north of Amoruso that would contribute flow through sewers in Amoruso (Toad Hill)

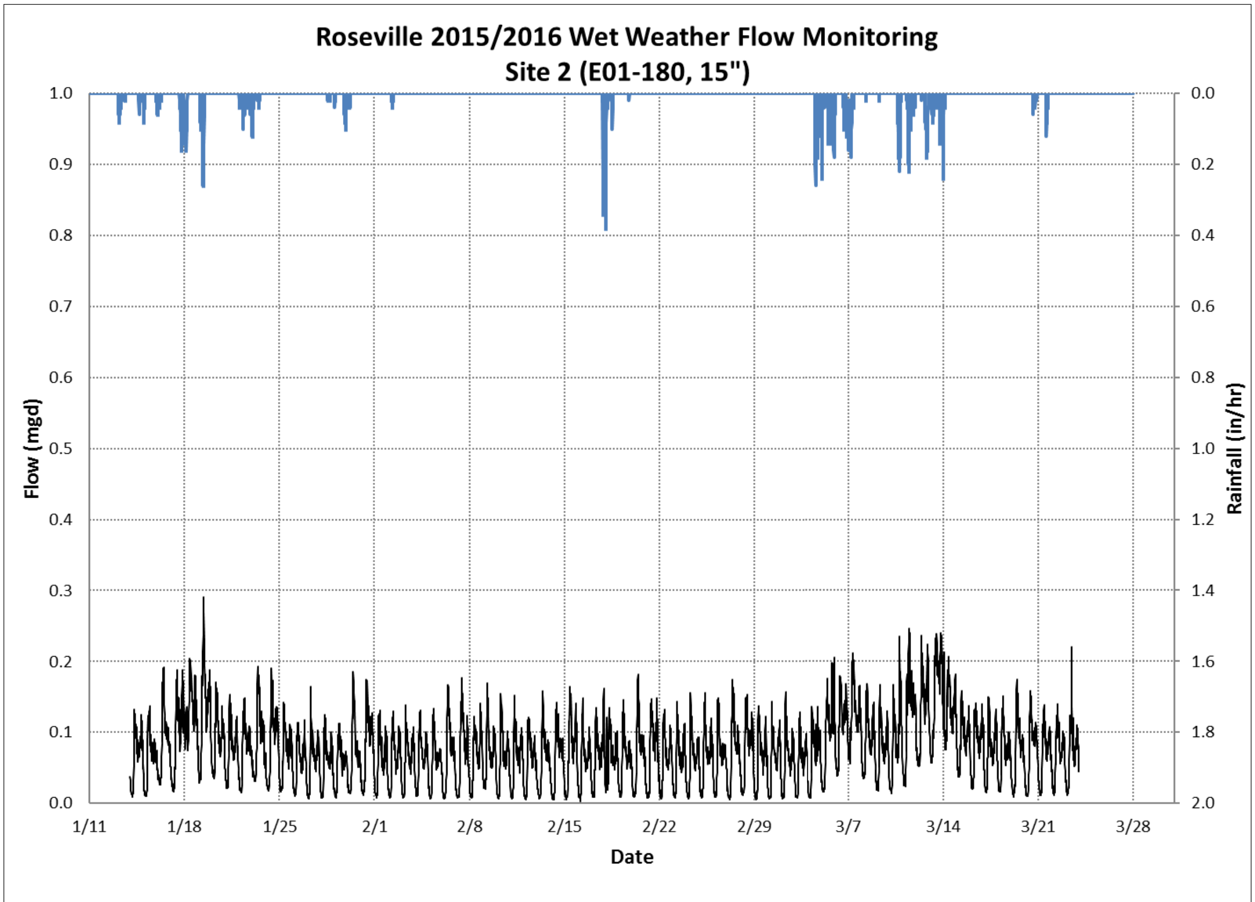
# APPENDIX C – FLOW MONITORING DATA



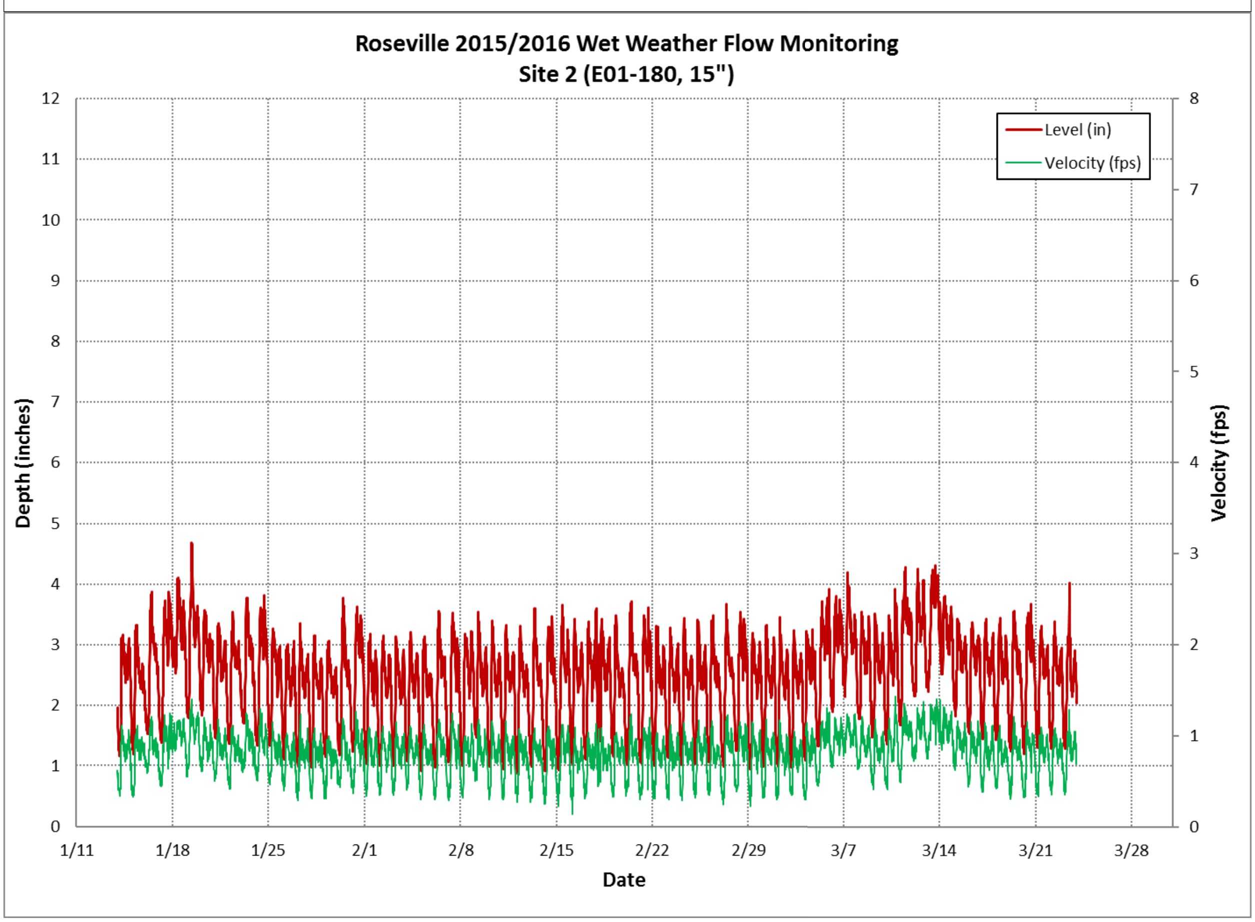
Roseville 2015/2016 Wet Weather Flow Monitoring
Site 1 (E04-039, 18")
Flow (mgd)
Rainfall (in/hr)
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
1.6
1.8
2.0
1/11
1/18
1/25
2/1
2/8
2/15
2/22
2/29
3/7
3/14
3/21
3/28
Date

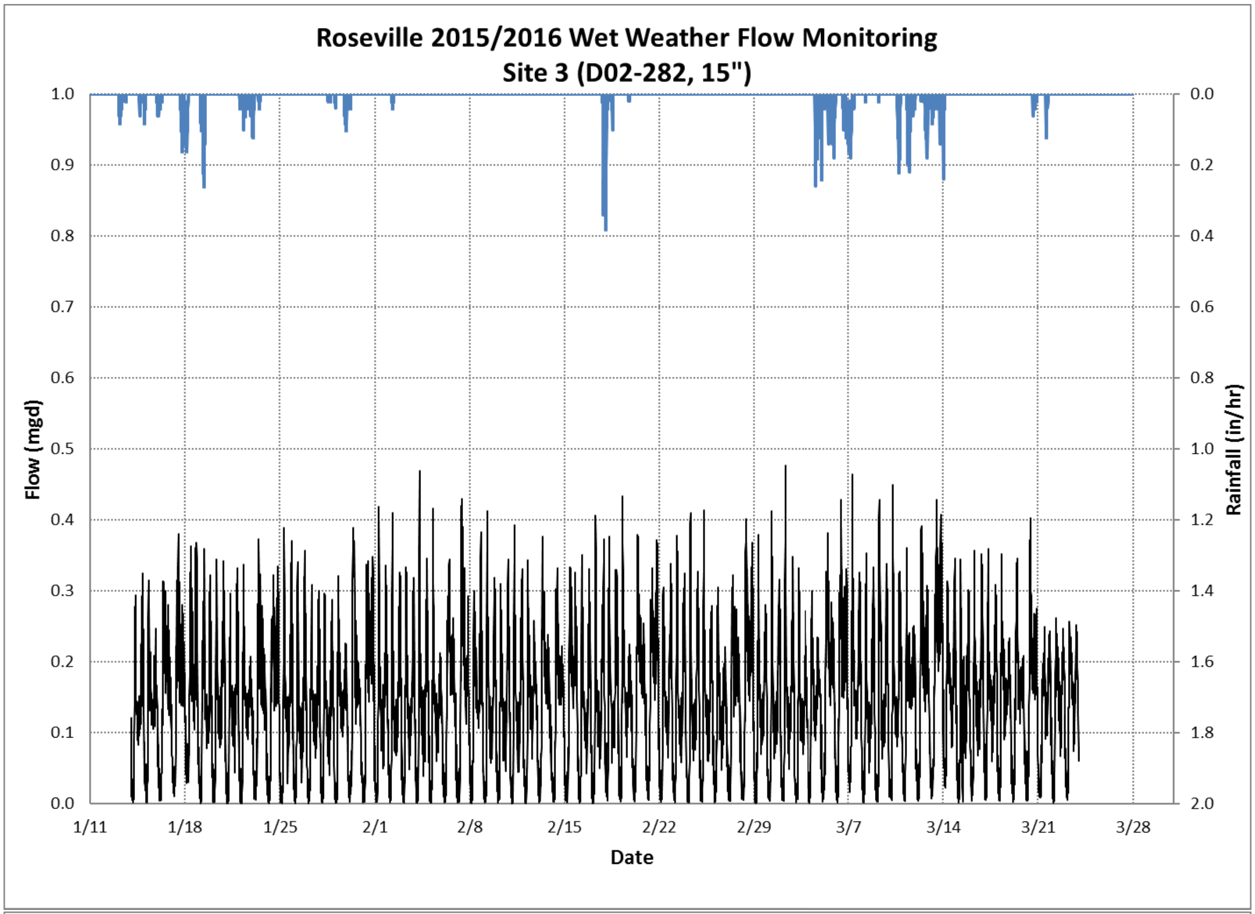
Roseville 2015/2016 Wet Weather Flow Monitoring
Site 1 (E04-039, 18")
Level (in)
Velocity (fps)
Depth (inches)
Velocity (fps)
12
11
10
9
8
7
6
5
4
3
2
1
0
8
7
6
5
4
3
2
1
0
1/11
1/18
1/25
2/1
2/8
2/15
2/22
2/29
3/7
3/14
3/21
3/28
Date

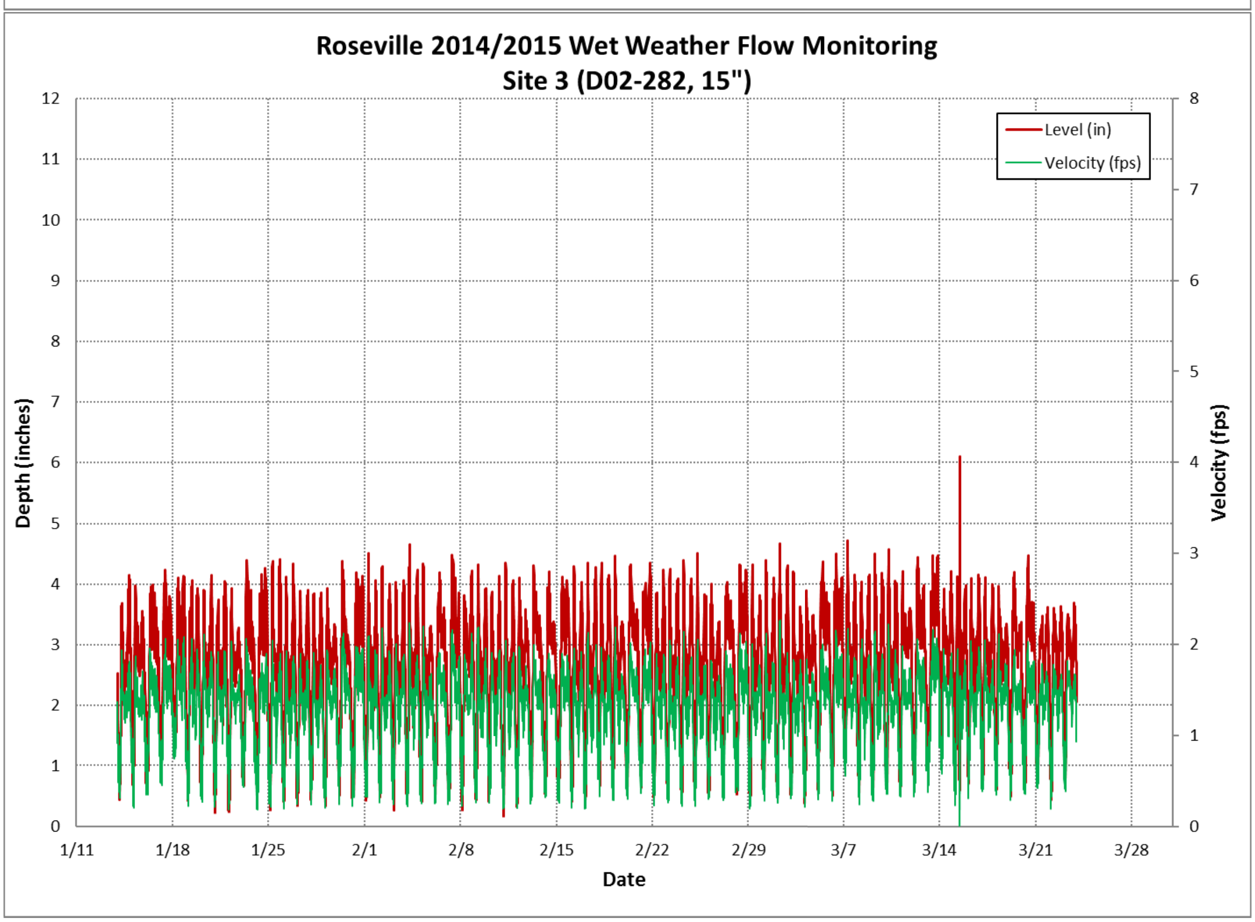


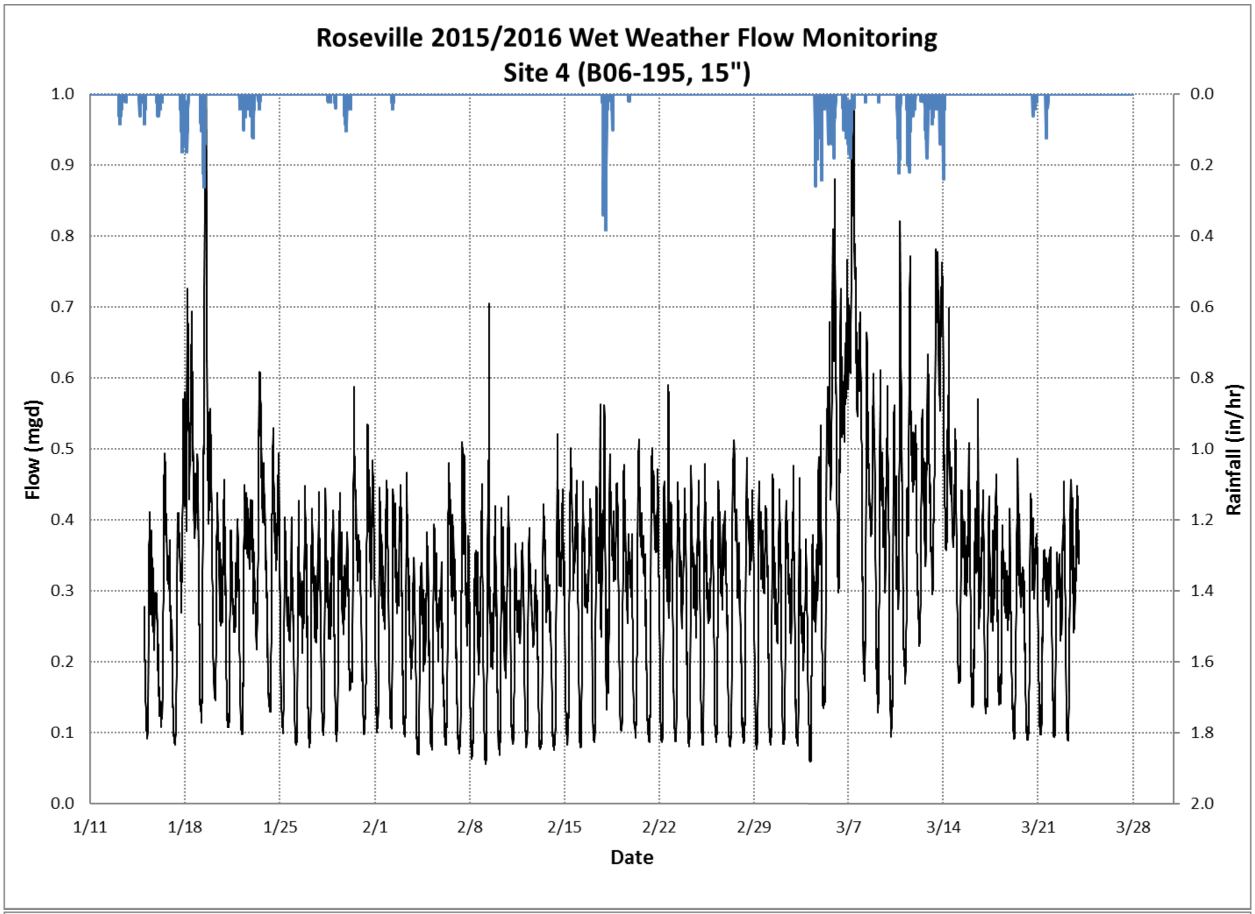
Roseville 2015/2016 Wet Weather Flow Monitoring
Site 2 (E01-180, 15")
Flow (mgd)
Rainfall (in/hr)
Date
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
1.6
1.8
2.0
1/11
1/18
1/25
2/1
2/8
2/15
2/22
2/29
3/7
3/14
3/21
3/28

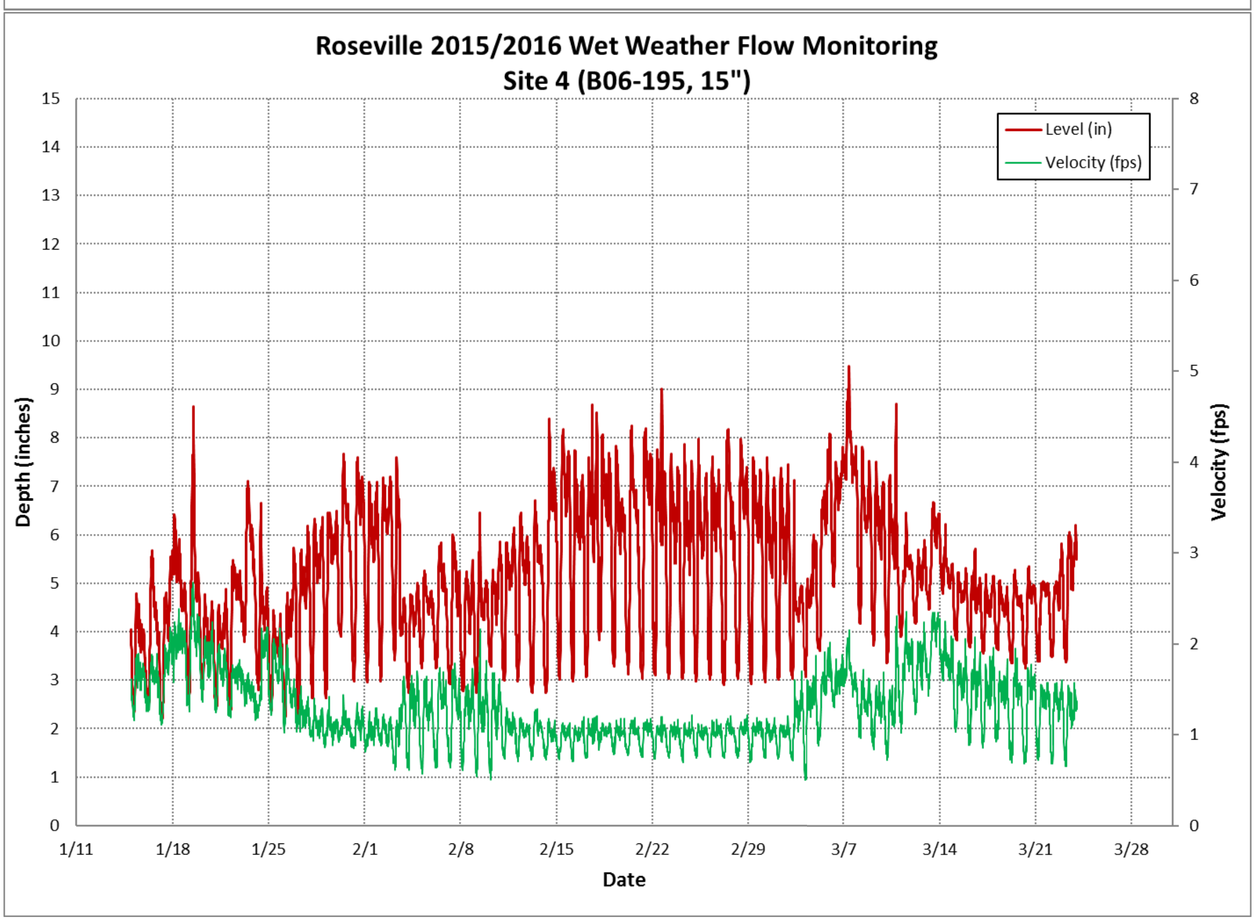



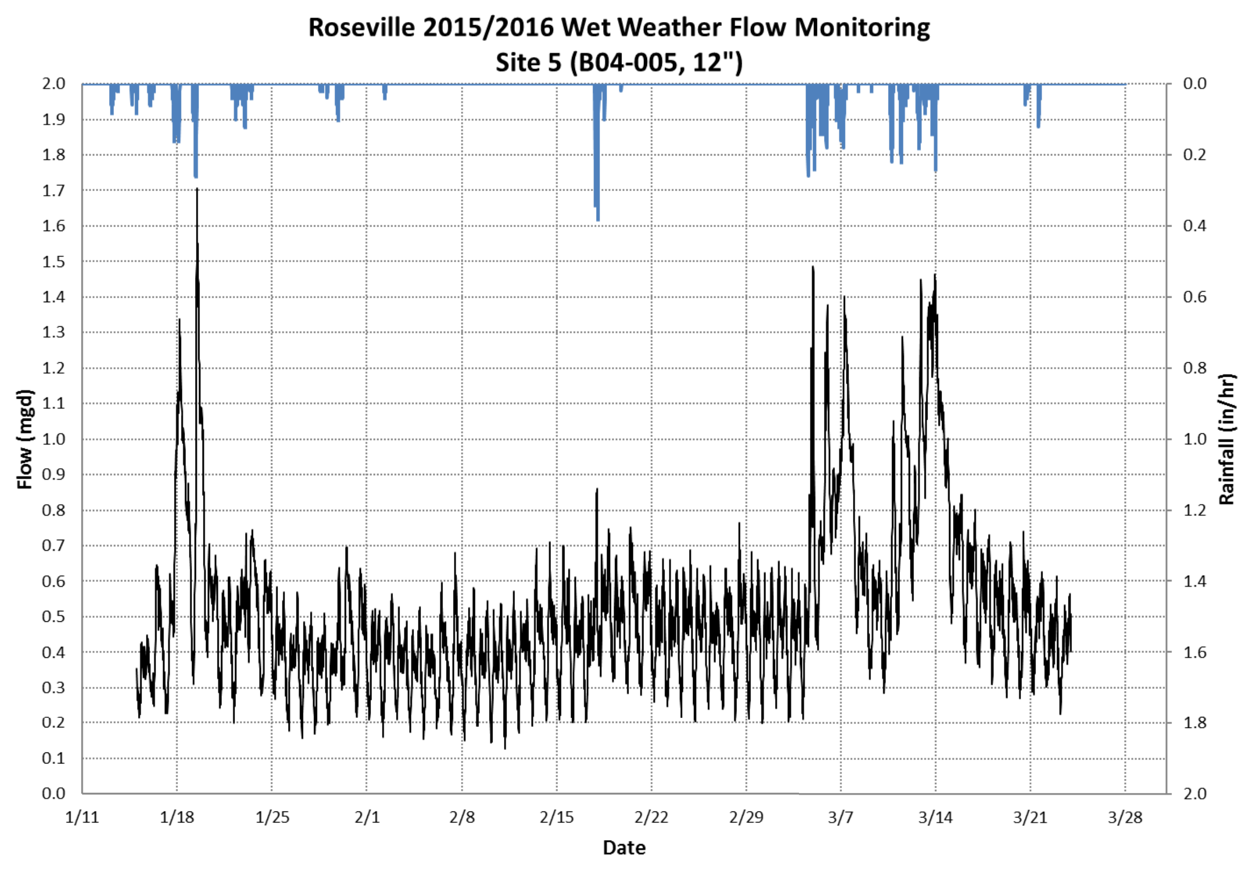
Roseville 2015/2016 Wet Weather Flow Monitoring
Site 2 (E01-180, 15")
Level (in)
Velocity (fps)
Depth (inches)
Velocity (fps)
Date
12
11
10
9
8
7
6
5
4
3
2
1
0
8
7
6
5
4
3
2
1
0
1/11
1/18
1/25
2/1
2/8
2/15
2/22
2/29
3/7
3/14
3/21
3/28


Roseville 2015/2016 Wet Weather Flow Monitoring
Site 3 (D02-282, 15")
Flow (mgd)
Rainfall (in/hr)
Date
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
1.6
1.8
2.0
1/11
1/18
1/25
2/1
2/8
2/15
2/22
2/29
3/7
3/14
3/21
3/28

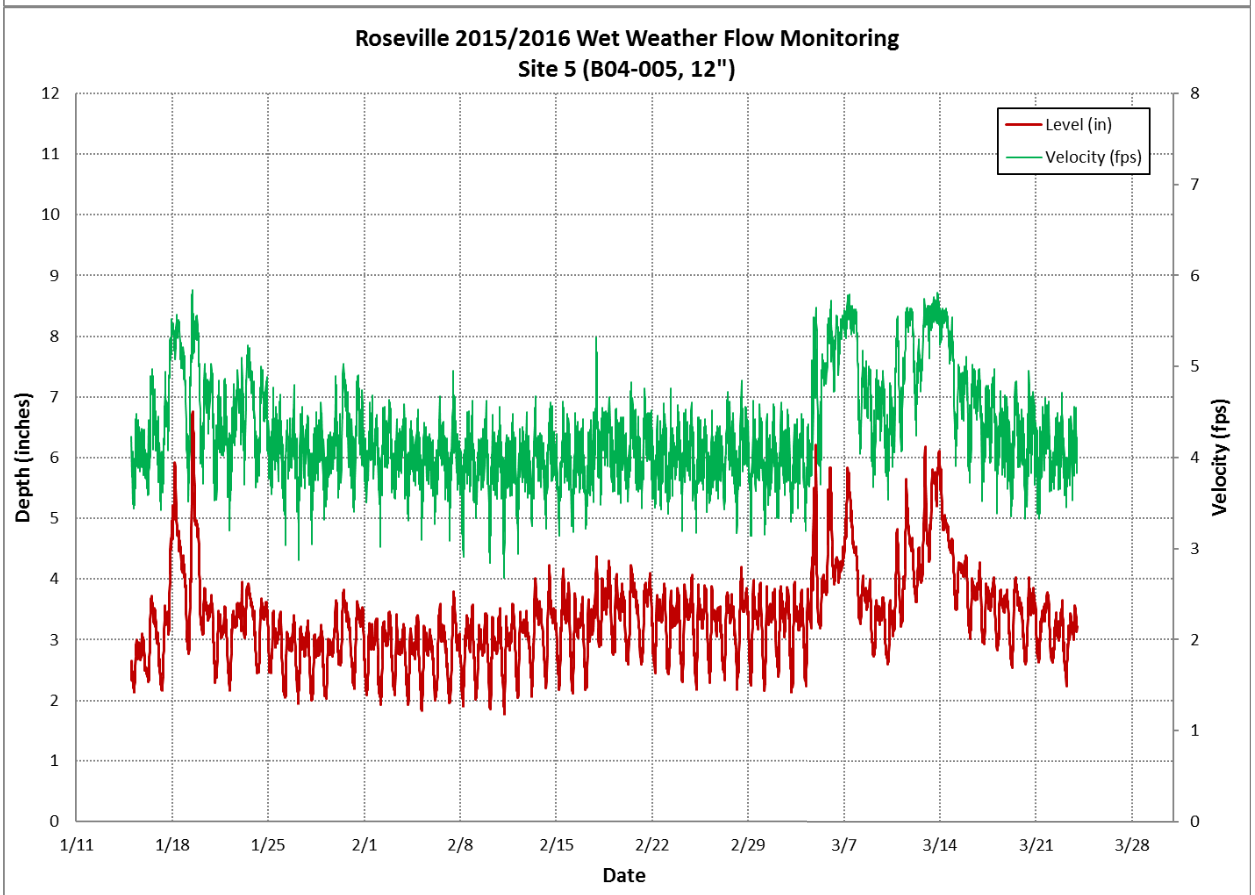

Roseville 2014/2015 Wet Weather Flow Monitoring
Site 3 (D02-282, 15")
Level (in)
Velocity (fps)
Depth (inches)
Velocity (fps)
Date
12
11
10
9
8
7
6
5
4
3
2
1
0
8
7
6
5
4
3
2
1
0
1/11
1/18
1/25
2/1
2/8
2/15
2/22
2/29
3/7
3/14
3/21
3/28


Roseville 2015/2016 Wet Weather Flow Monitoring
Site 4 (B06-195, 15")
Flow (mgd)
Rainfall (in/hr)
Date
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
1.6
1.8
2.0
1/11
1/18
1/25
2/1
2/8
2/15
2/22
2/29
3/7
3/14
3/21
3/28

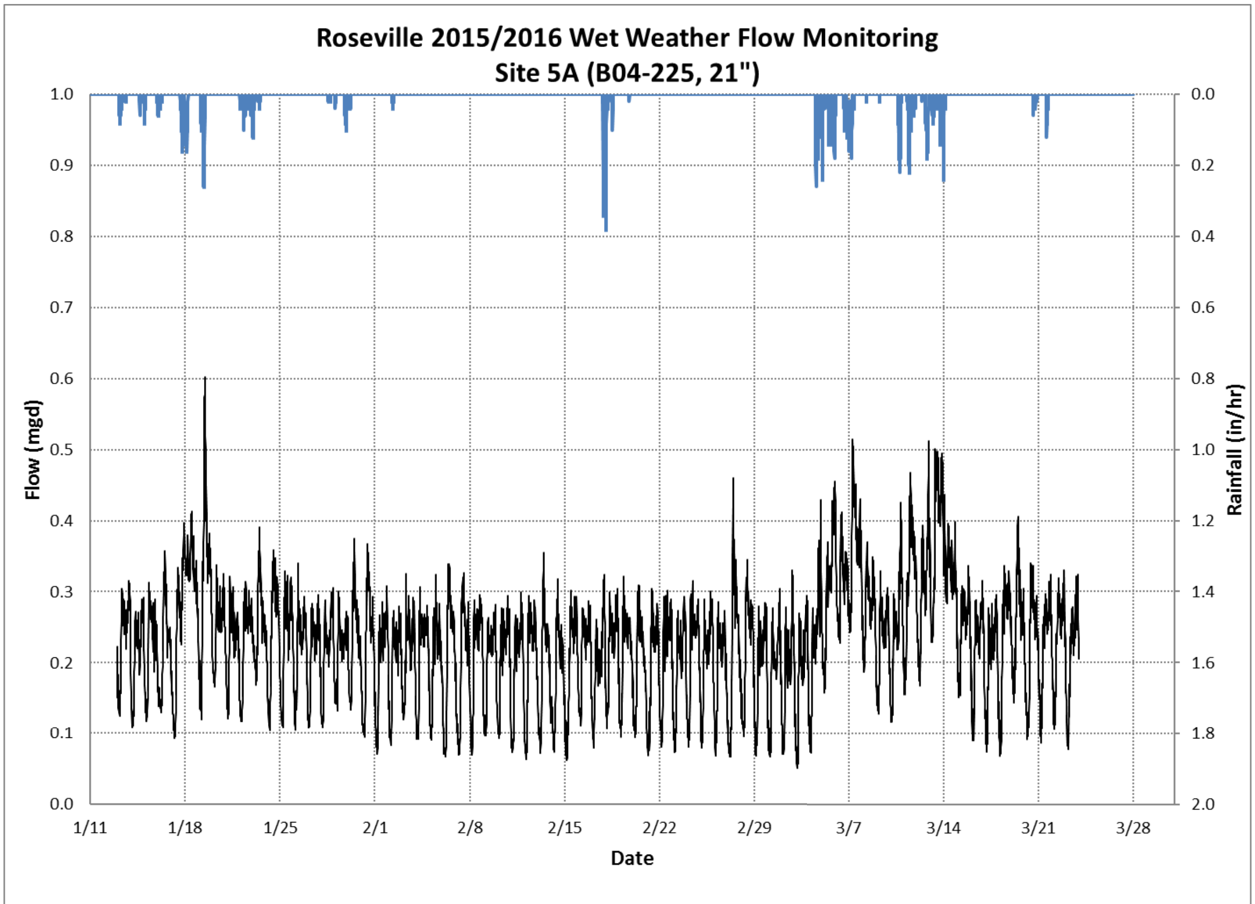

Roseville 2015/2016 Wet Weather Flow Monitoring
Site 4 (B06-195, 15")
Level (in)
Velocity (fps)
Depth (inches)
Velocity (fps)
Date
15
14
13
12
11
10
9
8
7
6
5
4
3
2
1
0
8
7
6
5
4
3
2
1
0
1/11
1/18
1/25
2/1
2/8
2/15
2/22
2/29
3/7
3/14
3/21
3/28

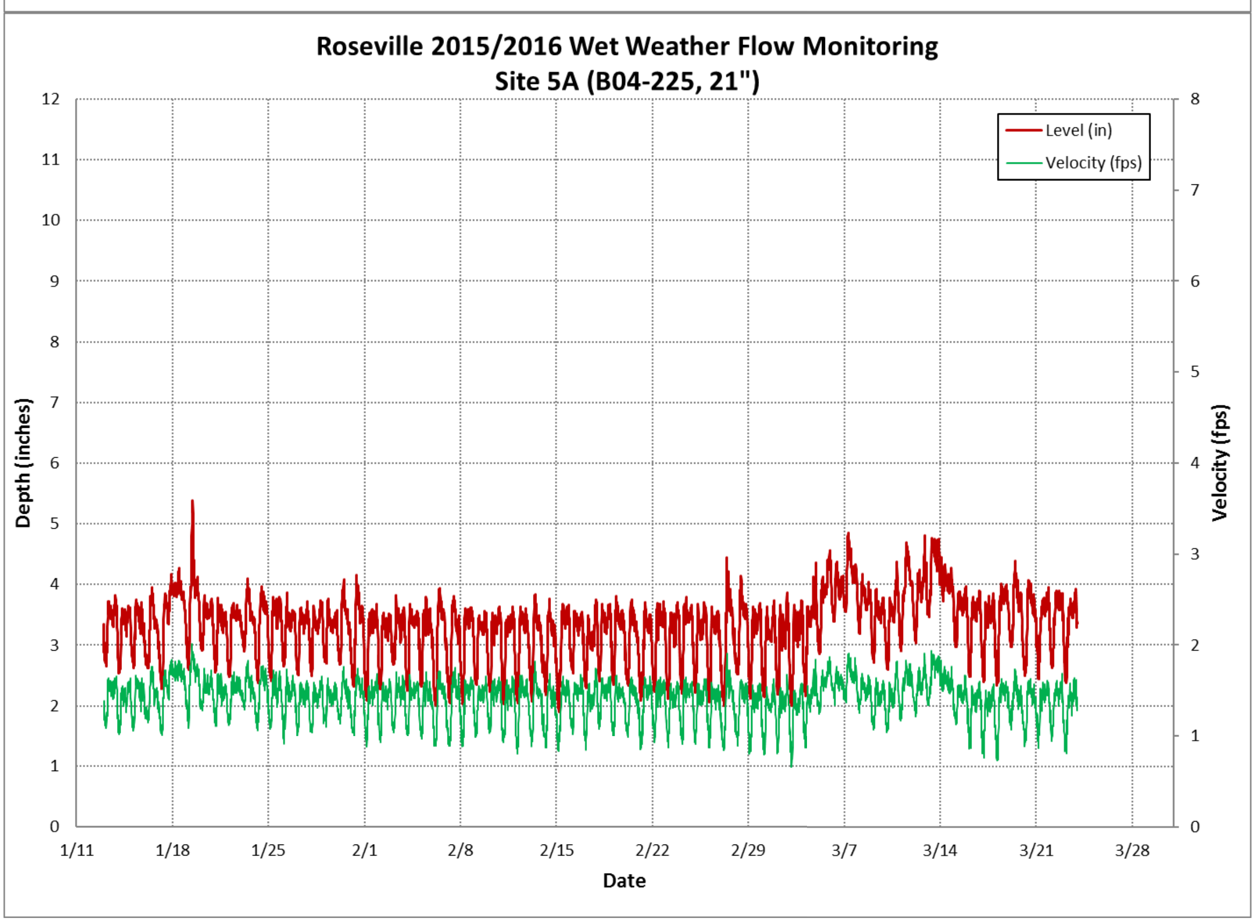


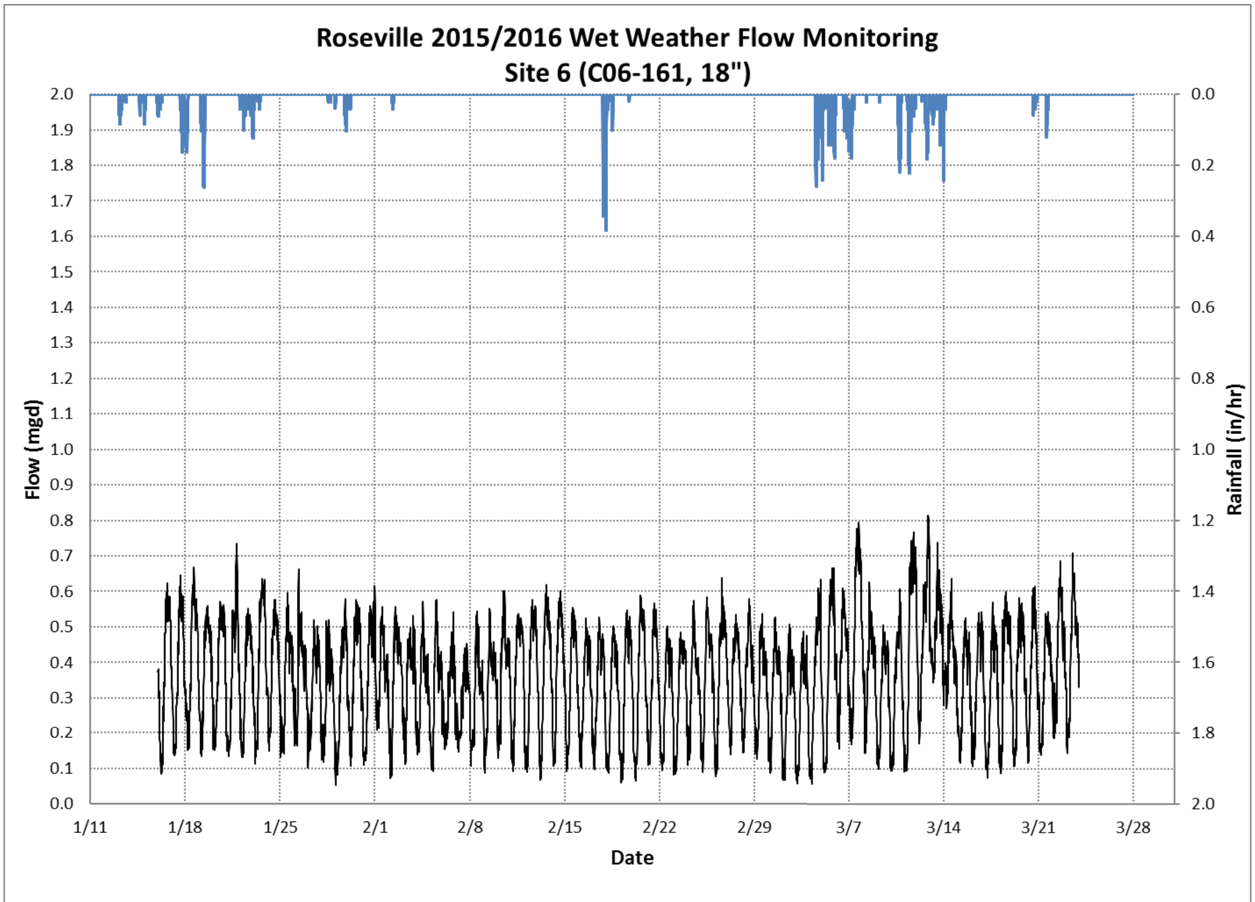
Roseville 2015/2016 Wet Weather Flow Monitoring
Site 5 (B04-005, 12")
Flow (mgd)
Rainfall (in/hr)
Date
2.0
1.9
1.8
1.7
1.6
1.5
1.4
1.3
1.2
1.1
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
1/11
1/18
1/25
2/1
2/8
2/15
2/22
2/29
3/7
3/14
3/21
3/28

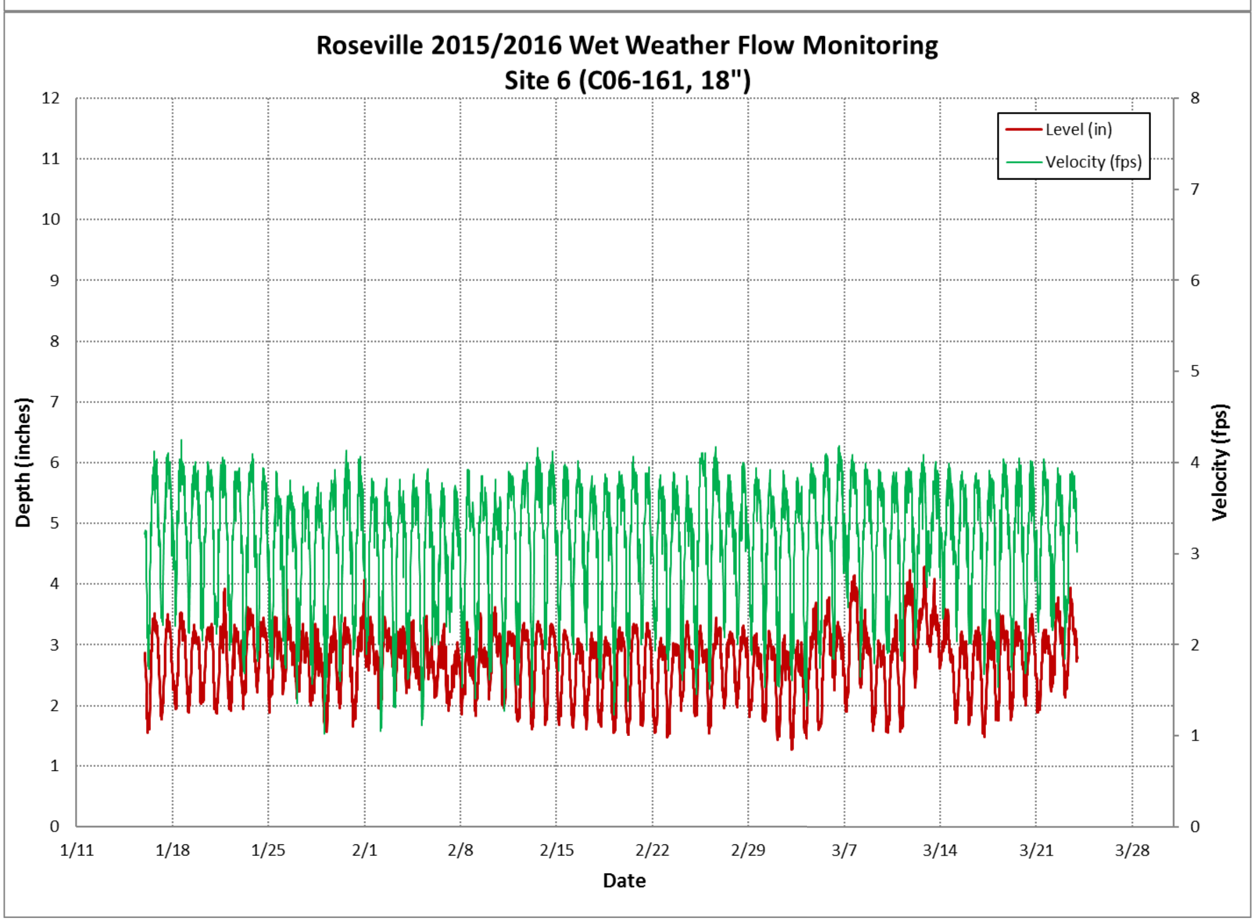
Roseville 2015/2016 Wet Weather Flow Monitoring
Site 5 (B04-005, 12")
Level (in)
Velocity (fps)
Depth (inches)
Velocity (fps)
Date
12
11
10
9
8
7
6
5
4
3
2
1
0
1/11
1/18
1/25
2/1
2/8
2/15
2/22
2/29
3/7
3/14
3/21
3/28


Roseville 2015/2016 Wet Weather Flow Monitoring
Site 5A (B04-225, 21")
Flow (mgd)
Rainfall (in/hr)
Date
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
1.6
1.8
2.0
1/11
1/18
1/25
2/1
2/8
2/15
2/22
2/29
3/7
3/14
3/21
3/28

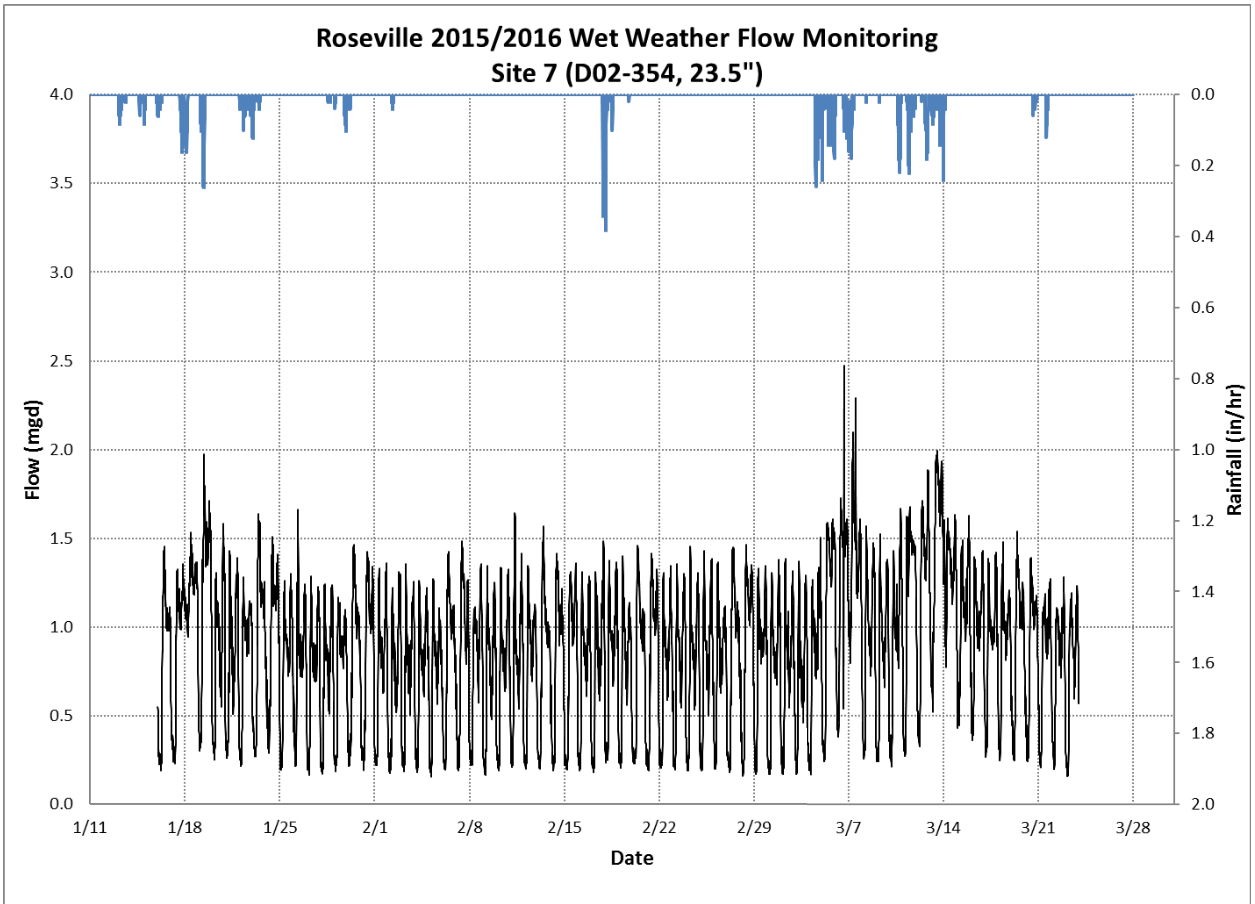

Roseville 2015/2016 Wet Weather Flow Monitoring
Site 5A (B04-225, 21")
Level (in)
Velocity (fps)
Depth (inches)
Velocity (fps)
Date
12
11
10
9
8
7
6
5
4
3
2
1
0
8
7
6
5
4
3
2
1
0
1/11
1/18
1/25
2/1
2/8
2/15
2/22
2/29
3/7
3/14
3/21
3/28

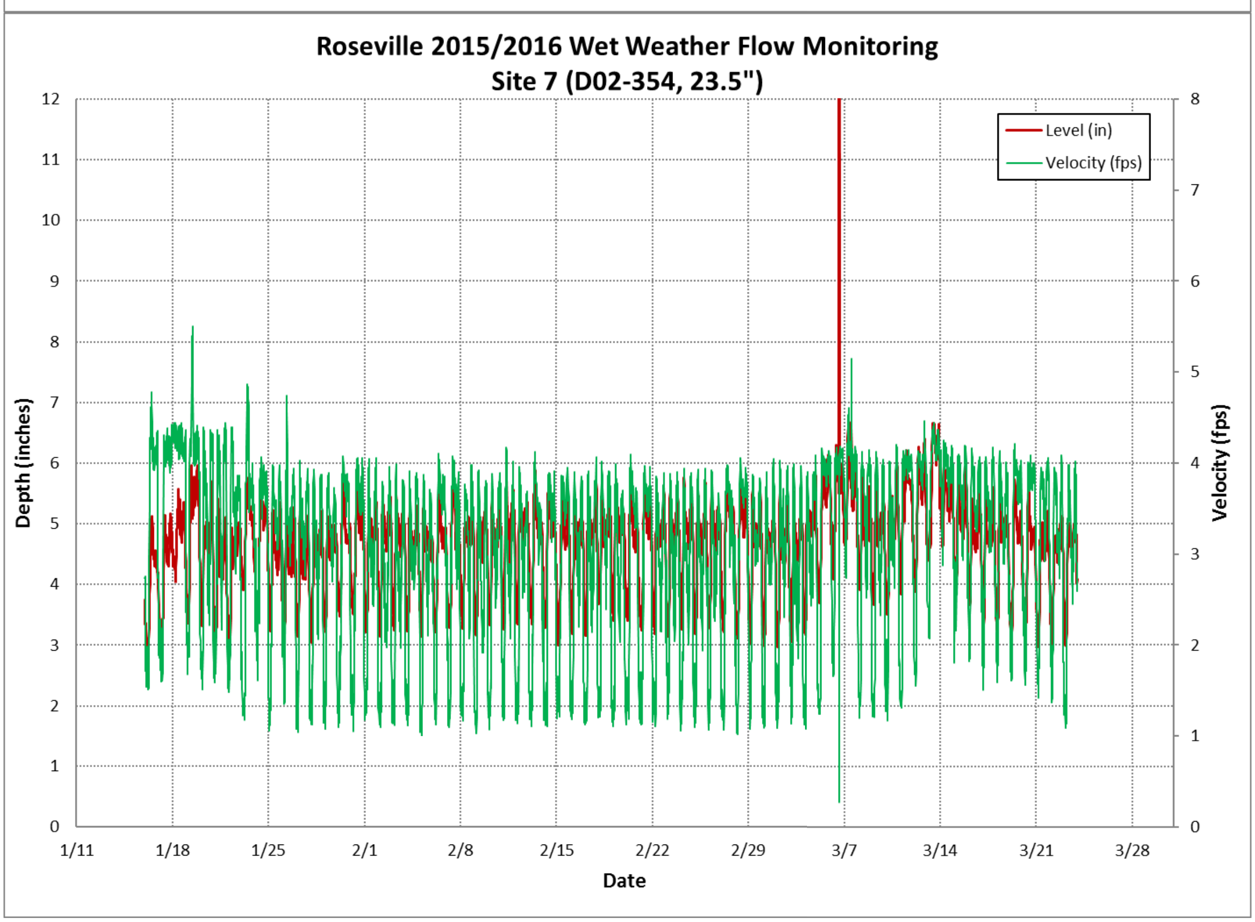


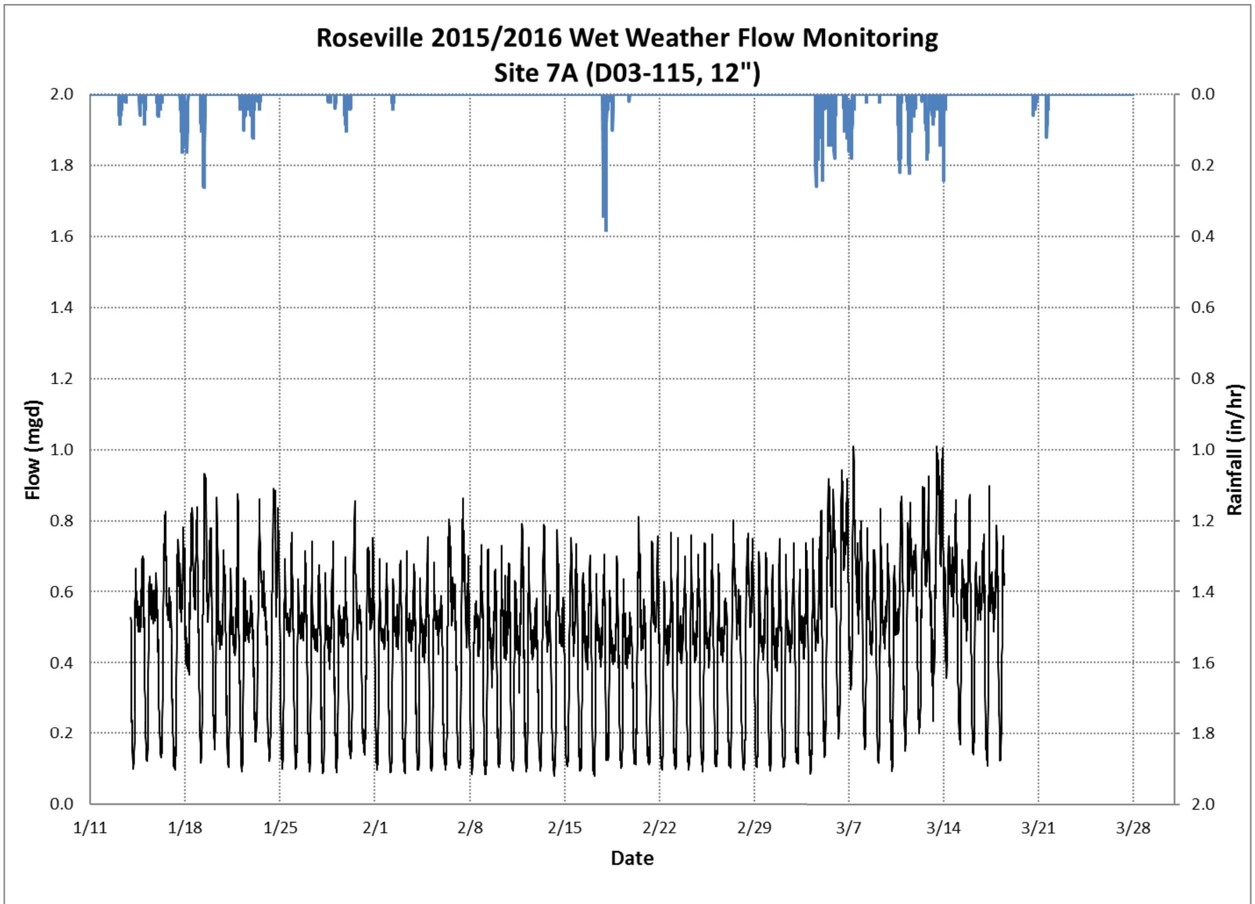
Roseville 2015/2016 Wet Weather Flow Monitoring
Site 6 (C06-161, 18")
Flow (mgd)
Rainfall (in/hr)
Date
1/11
1/18
1/25
2/1
2/8
2/15
2/22
2/29
3/7
3/14
3/21
3/28

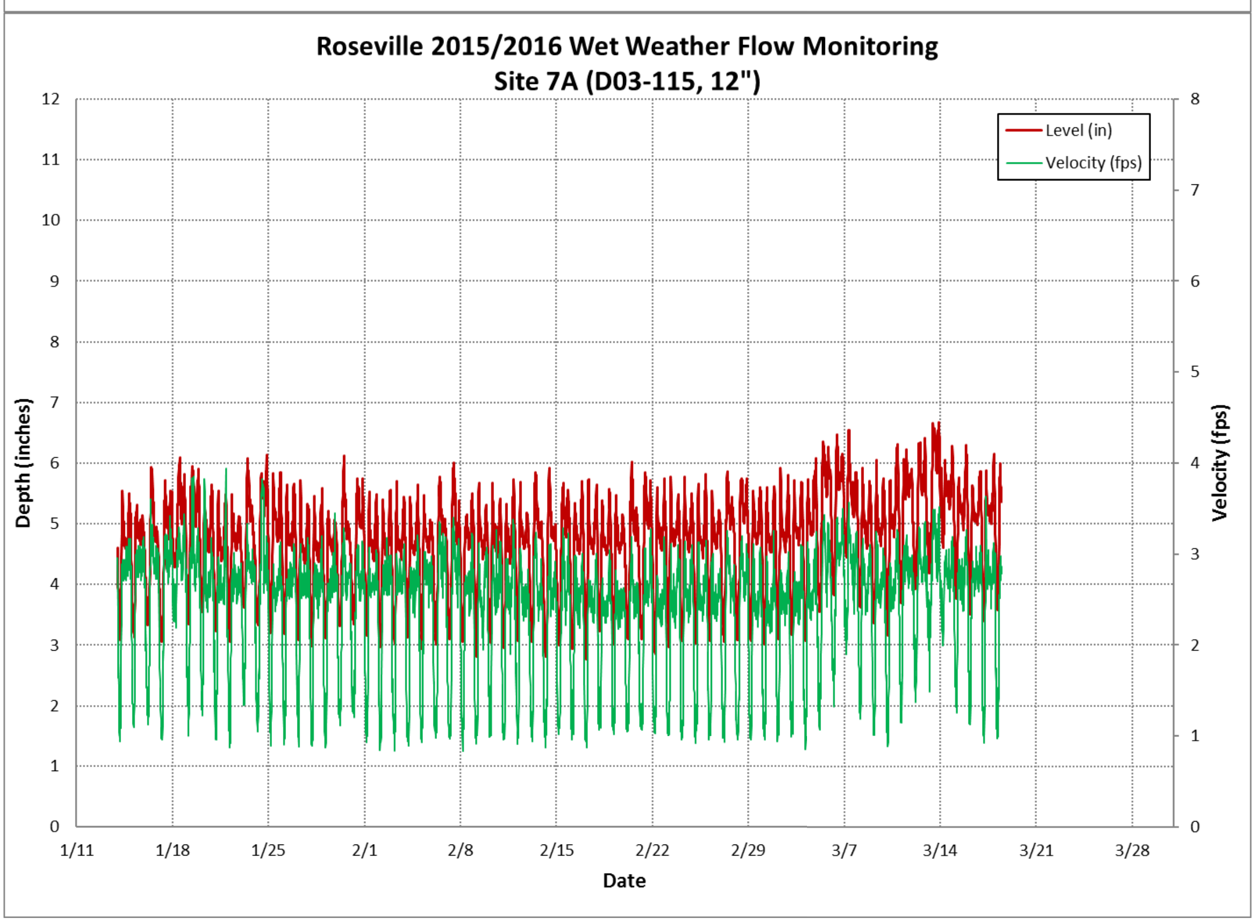
Roseville 2015/2016 Wet Weather Flow Monitoring
Site 6 (C06-161, 18")
Level (in)
Velocity (fps)
Depth (inches)
Velocity (fps)
Date
1/11
1/18
1/25
2/1
2/8
2/15
2/22
2/29
3/7
3/14
3/21
3/28


Roseville 2015/2016 Wet Weather Flow Monitoring
Site 7 (D02-354, 23.5")
Flow (mgd)
Rainfall (in/hr)
Date
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
0.2
0.4
0.6
0.8
1.2
1.4
1.6
1.8
2.0
1/11
1/18
1/25
2/1
2/8
2/15
2/22
2/29
3/7
3/14
3/21
3/28

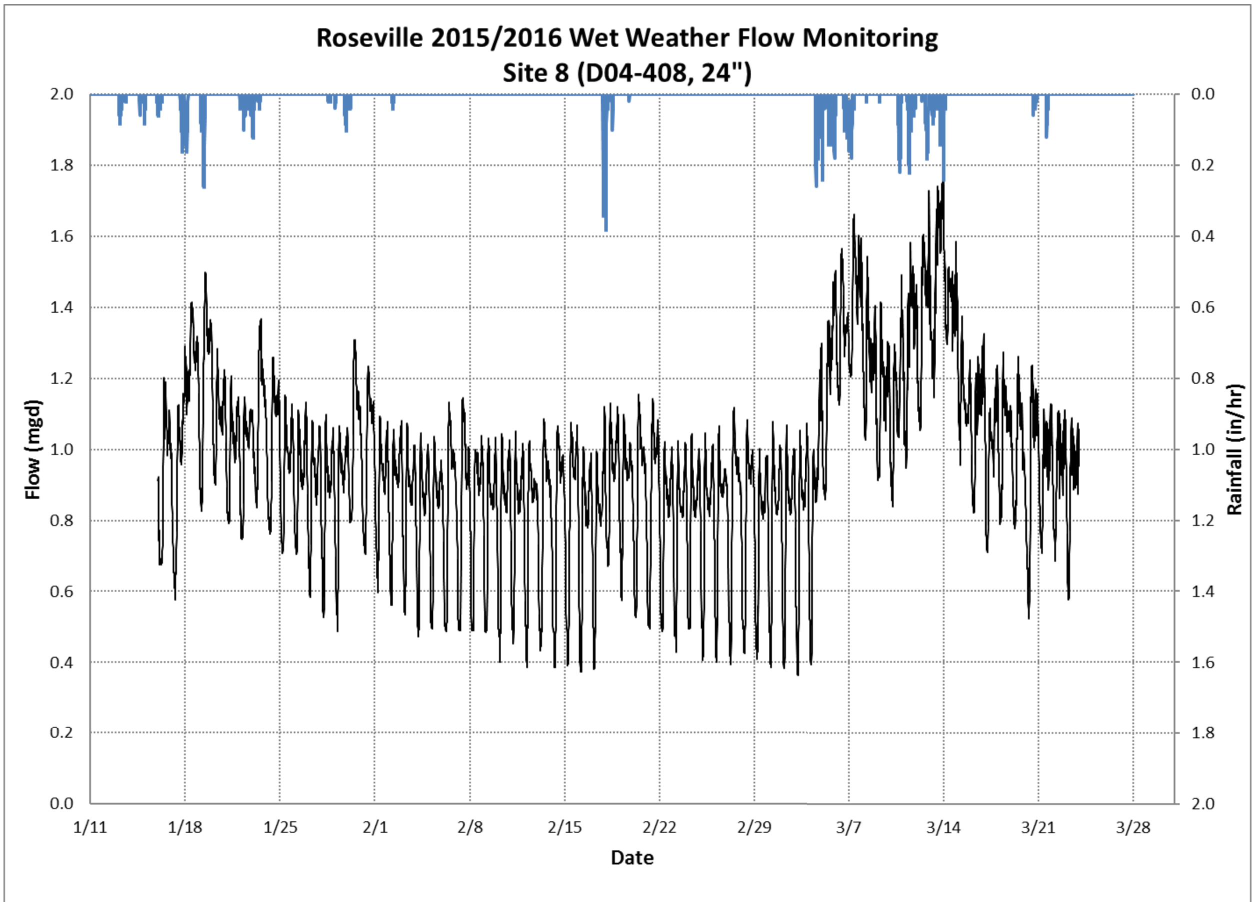

Roseville 2015/2016 Wet Weather Flow Monitoring
Site 7 (D02-354, 23.5")
Level (in)
Velocity (fps)
Depth (inches)
Velocity (fps)
Date
12
11
10
9
8
7
6
5
4
3
2
1
0
1/11
1/18
1/25
2/1
2/8
2/15
2/22
2/29
3/7
3/14
3/21
3/28

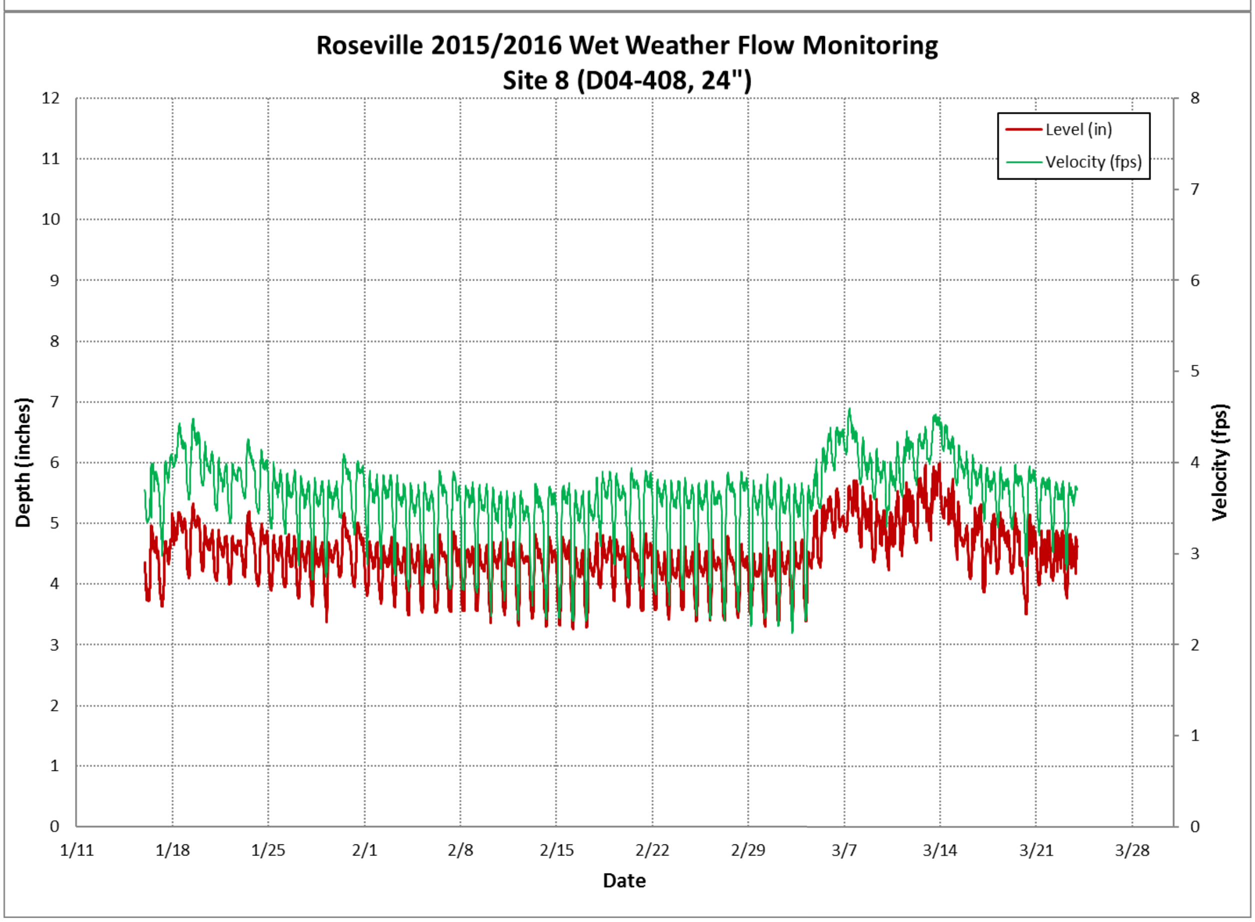


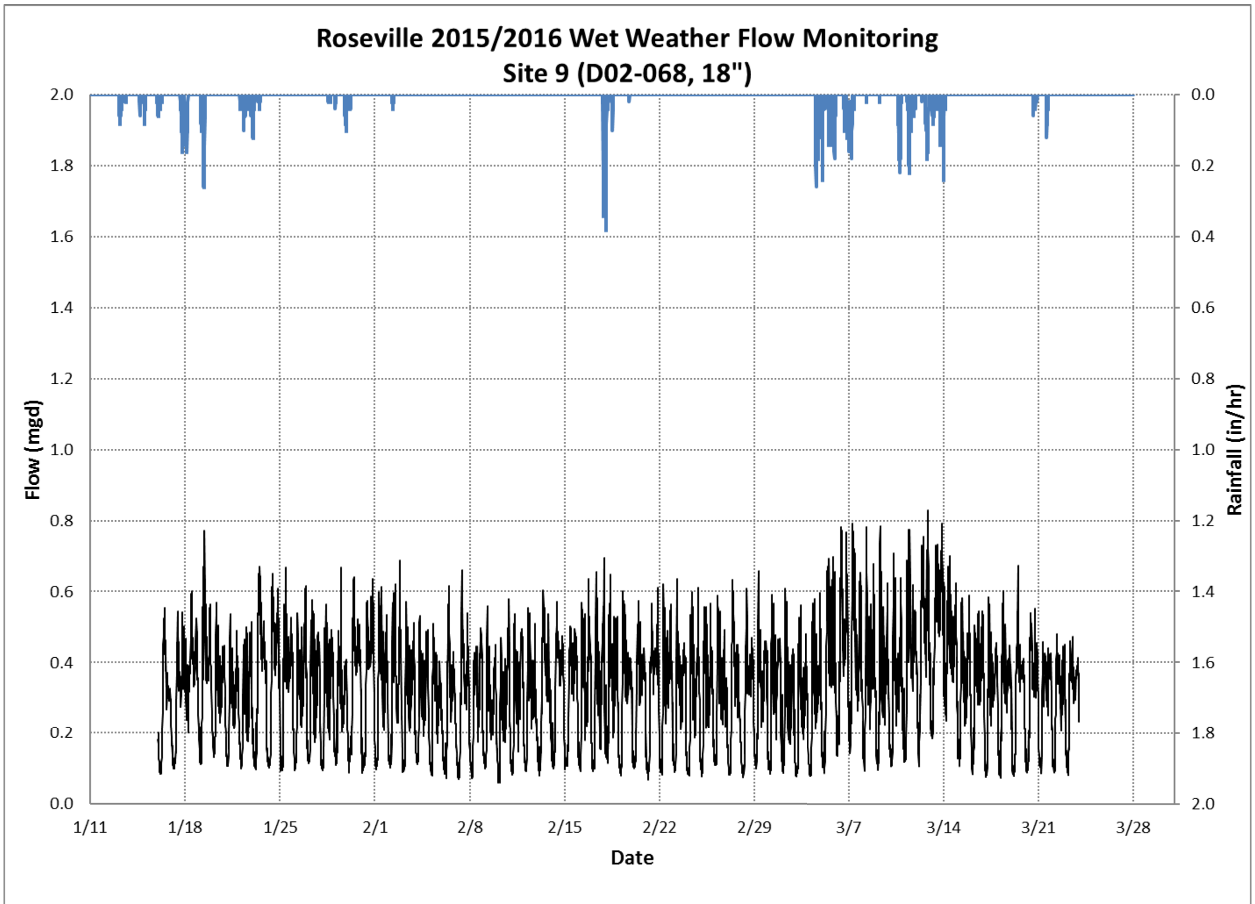
Roseville 2015/2016 Wet Weather Flow Monitoring
Site 7A (D03-115, 12")
Flow (mgd)
Rainfall (in/hr)
Date
2.0
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
1/11
1/18
1/25
2/1
2/8
2/15
2/22
2/29
3/7
3/14
3/21
3/28

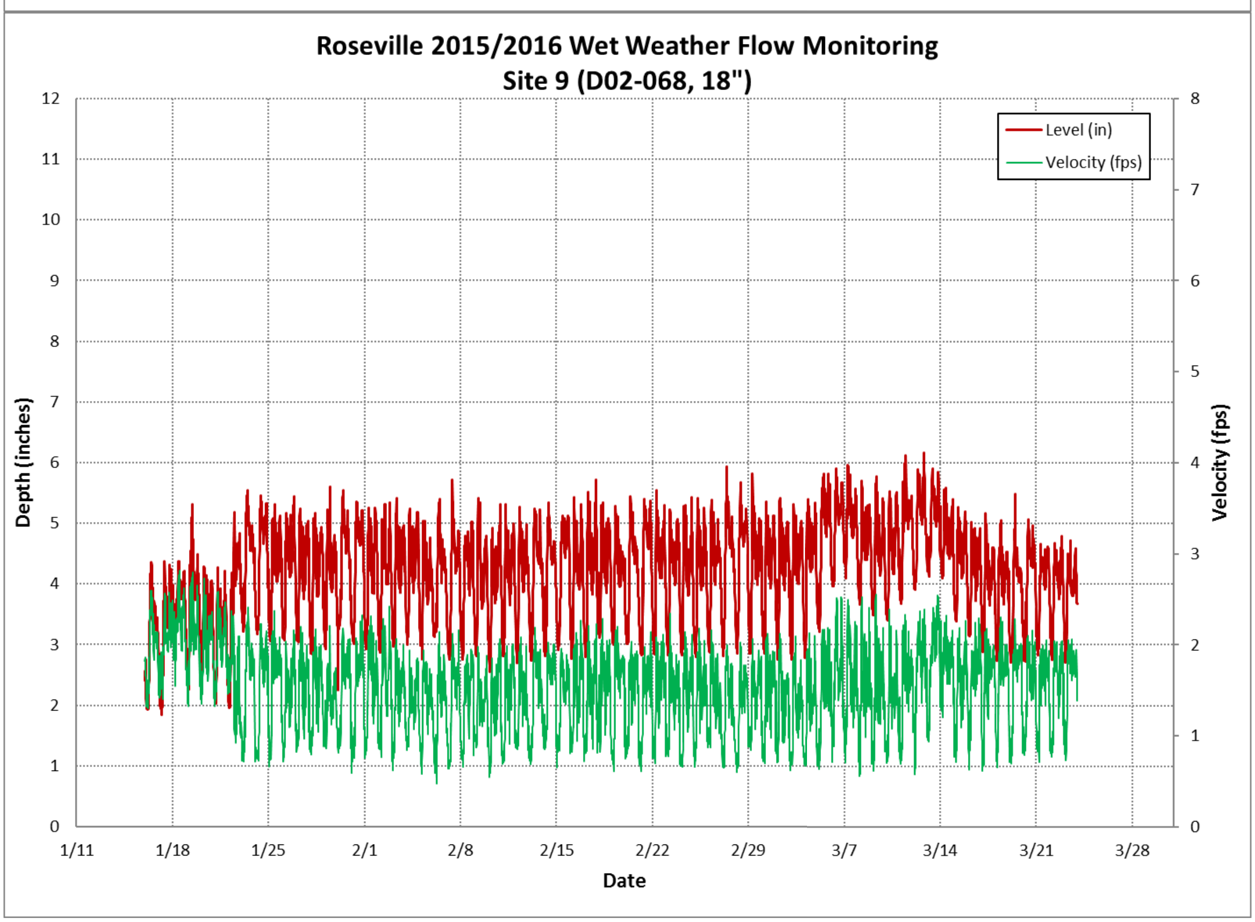
Roseville 2015/2016 Wet Weather Flow Monitoring
Site 7A (D03-115, 12")
Level (in)
Velocity (fps)
Depth (inches)
Velocity (fps)
Date
12
11
10
9
8
7
6
5
4
3
2
1
0
1/11
1/18
1/25
2/1
2/8
2/15
2/22
2/29
3/7
3/14
3/21
3/28


Roseville 2015/2016 Wet Weather Flow Monitoring
Site 8 (D04-408, 24")
Flow (mgd)
Rainfall (in/hr)
Date
2.0
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
1/11
1/18
1/25
2/1
2/8
2/15
2/22
2/29
3/7
3/14
3/21
3/28

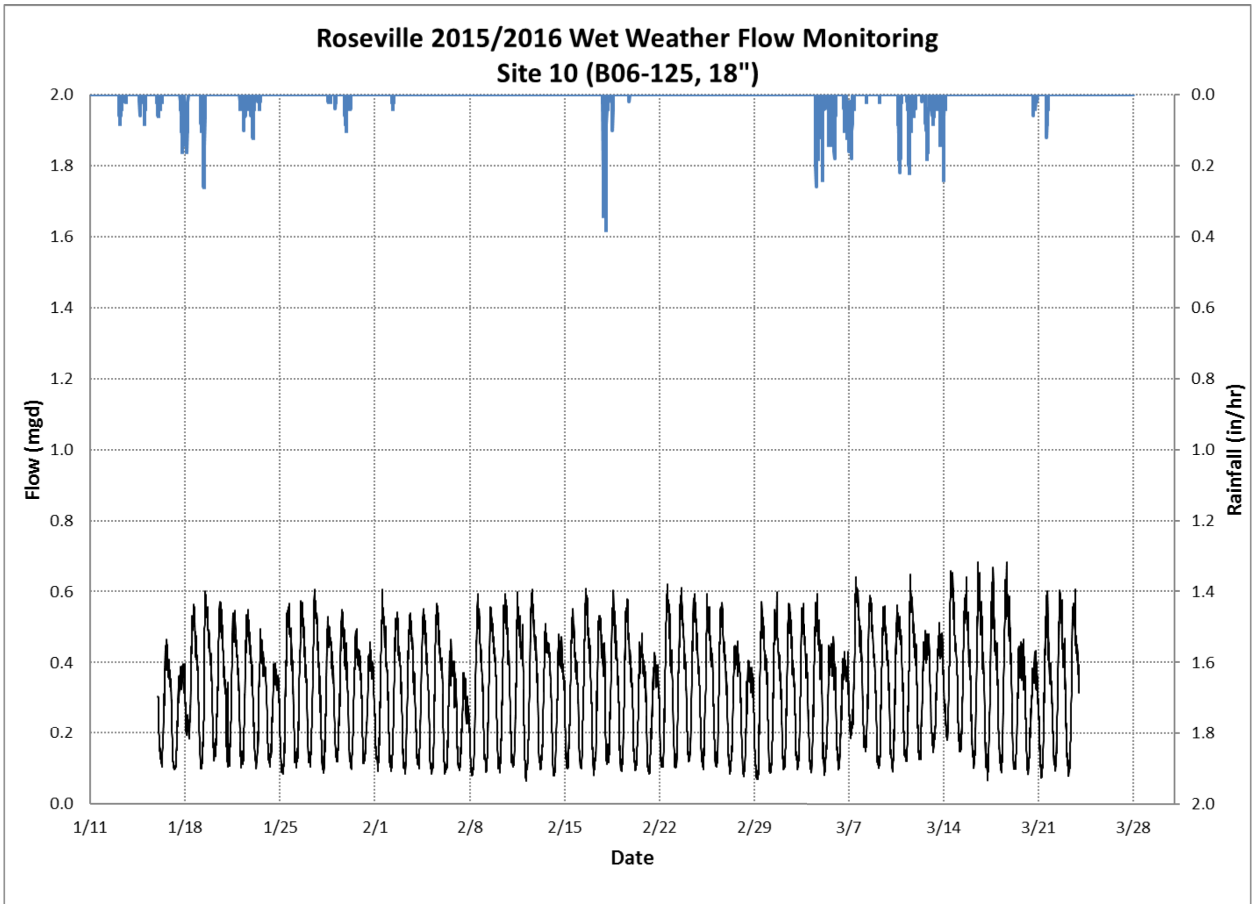

Roseville 2015/2016 Wet Weather Flow Monitoring
Site 8 (D04-408, 24")
Level (in)
Velocity (fps)
Depth (inches)
Velocity (fps)
Date
12
11
10
9
8
7
6
5
4
3
2
1
0
1/11
1/18
1/25
2/1
2/8
2/15
2/22
2/29
3/7
3/14
3/21
3/28

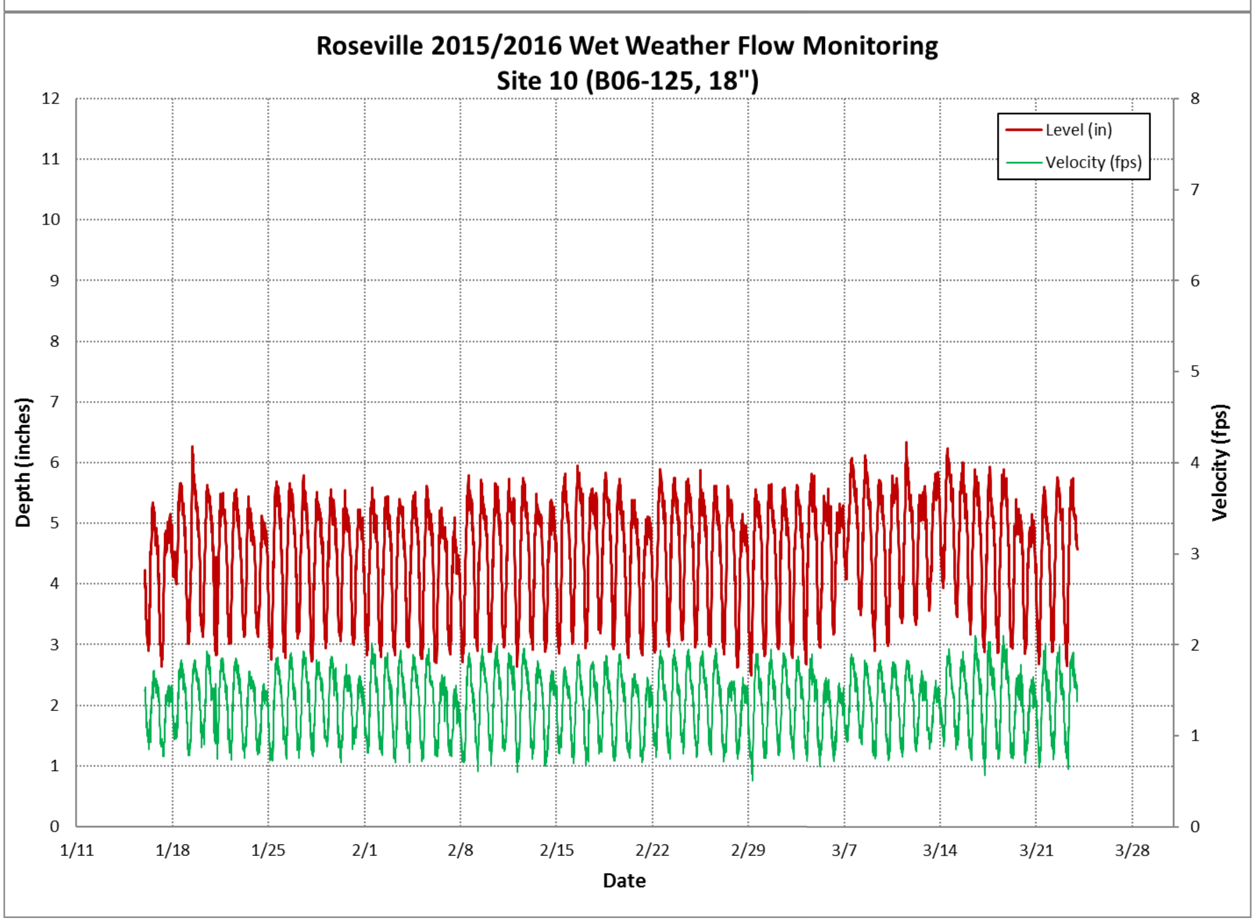


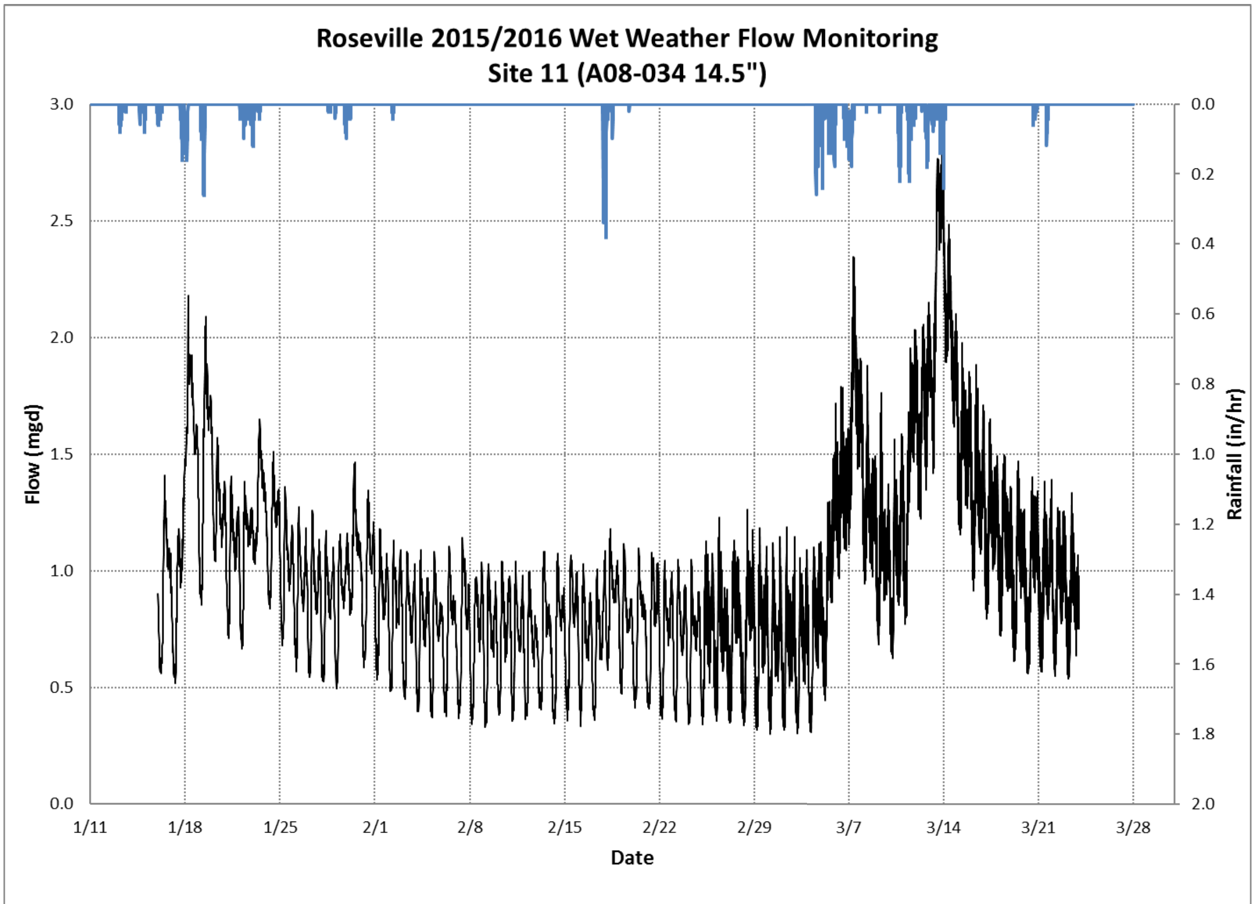
Roseville 2015/2016 Wet Weather Flow Monitoring
Site 9 (D02-068, 18")
Flow (mgd)
Rainfall (in/hr)
2.0
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
1.6
1.8
2.0
1/11
1/18
1/25
2/1
2/8
2/15
2/22
2/29
3/7
3/14
3/21
3/28
Date

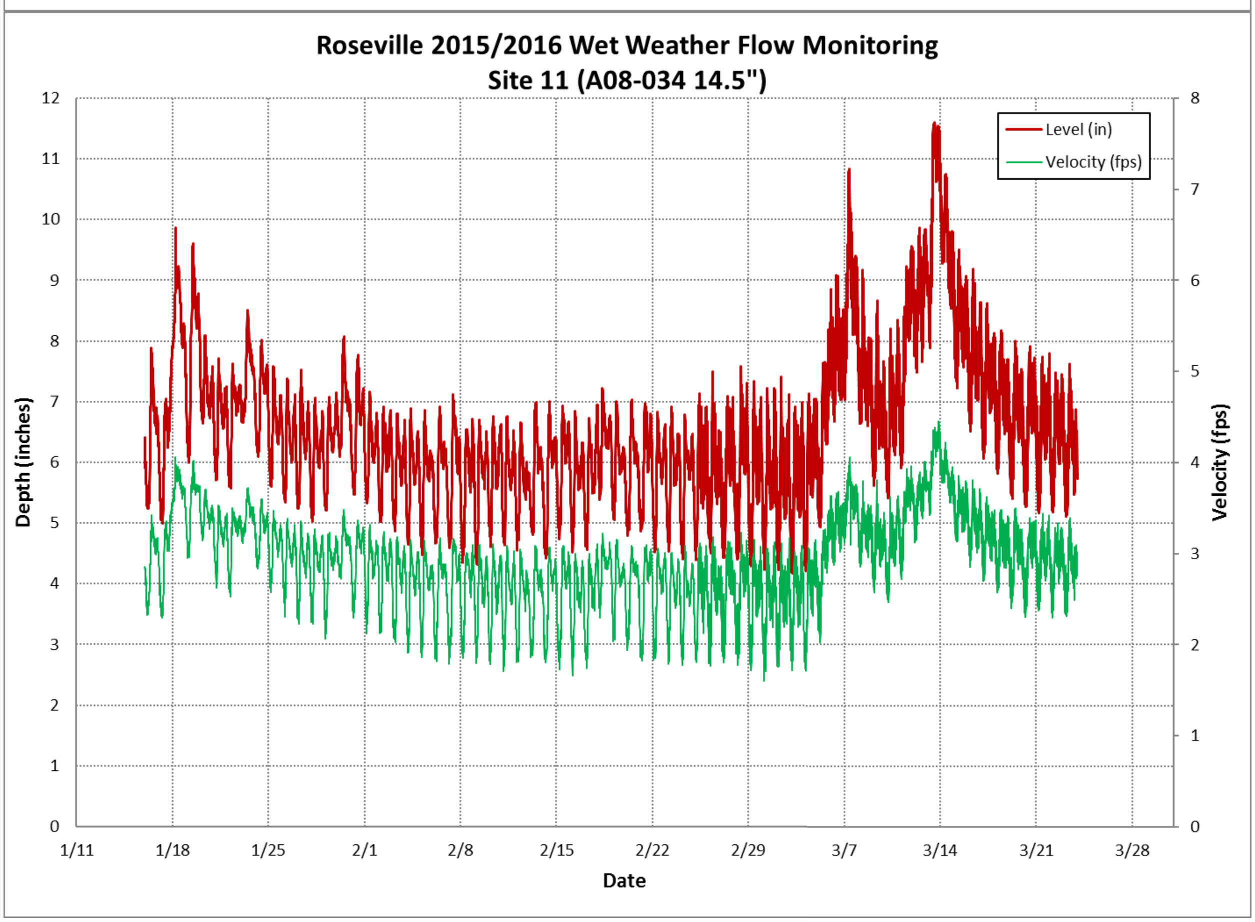



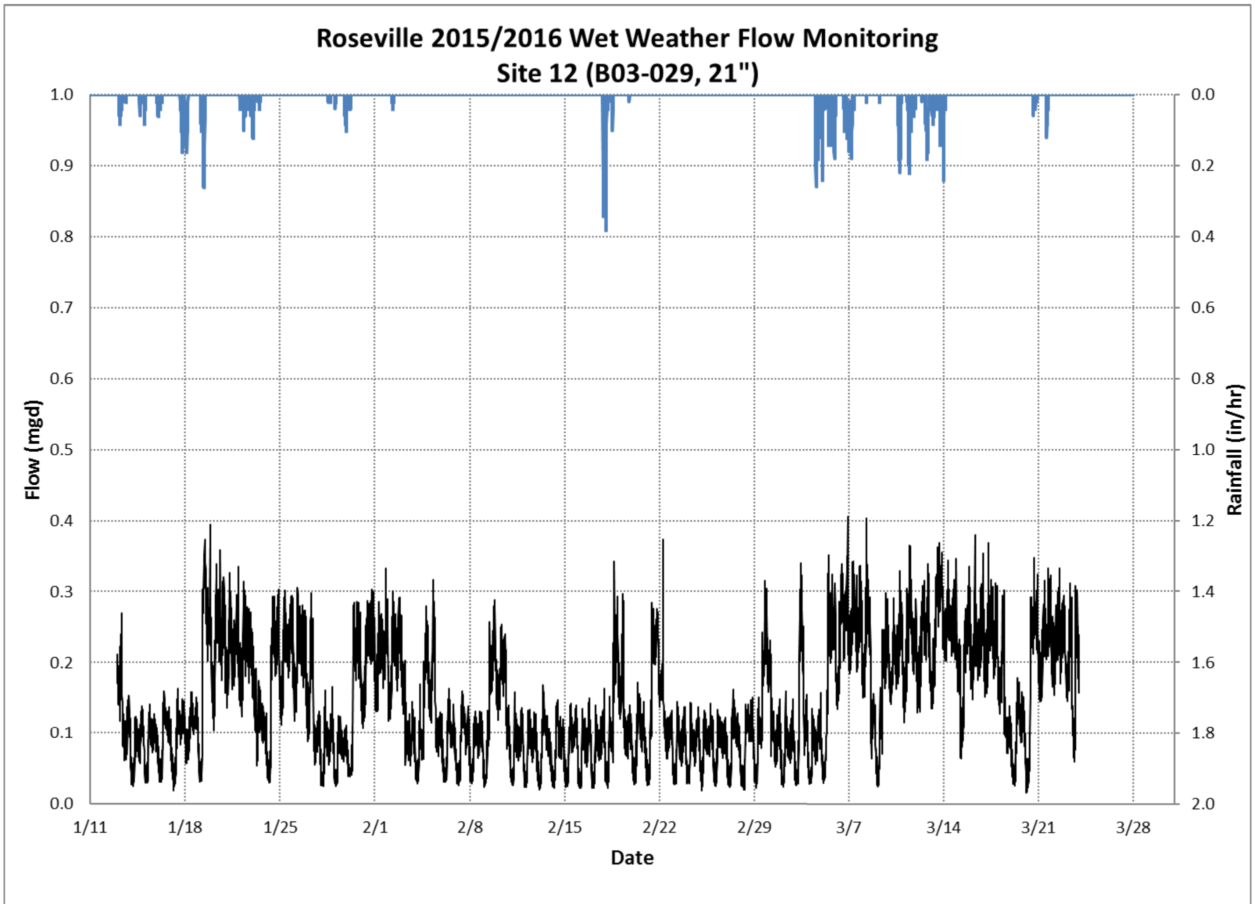
Roseville 2015/2016 Wet Weather Flow Monitoring
Site 9 (D02-068, 18")
Level (in)
Velocity (fps)
Depth (inches)
Velocity (fps)
12
11
10
9
8
7
6
5
4
3
2
1
0
8
7
6
5
4
3
2
1
0
1/11
1/18
1/25
2/1
2/8
2/15
2/22
2/29
3/7
3/14
3/21
3/28
Date


Roseville 2015/2016 Wet Weather Flow Monitoring
Site 10 (B06-125, 18")
Flow (mgd)
Rainfall (in/hr)
Date
2.0
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
1/11
1/18
1/25
2/1
2/8
2/15
2/22
2/29
3/7
3/14
3/21
3/28

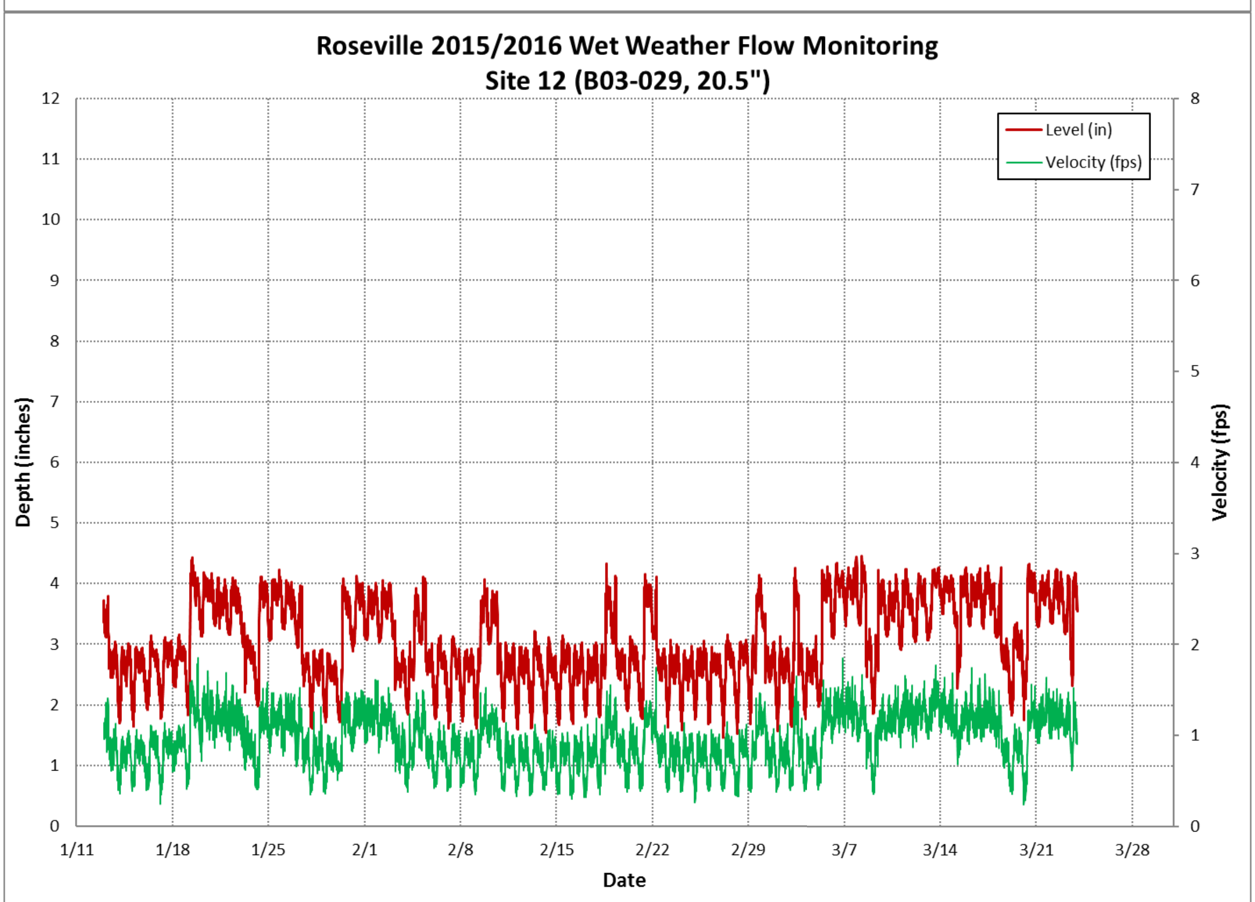

Roseville 2015/2016 Wet Weather Flow Monitoring
Site 10 (B06-125, 18")
Level (in)
Velocity (fps)
Depth (inches)
Velocity (fps)
Date
12
11
10
9
8
7
6
5
4
3
2
1
0
1/11
1/18
1/25
2/1
2/8
2/15
2/22
2/29
3/7
3/14
3/21
3/28


Roseville 2015/2016 Wet Weather Flow Monitoring
Site 11 (A08-034 14.5")
Flow (mgd)
Rainfall (in/hr)
Date
3.0
2.5
2.0
1.5
1.0
0.5
0.0
0.2
0.4
0.6
0.8
1.2
1.4
1.6
1.8
1/11
1/18
1/25
2/1
2/8
2/15
2/22
2/29
3/7
3/14
3/21
3/28

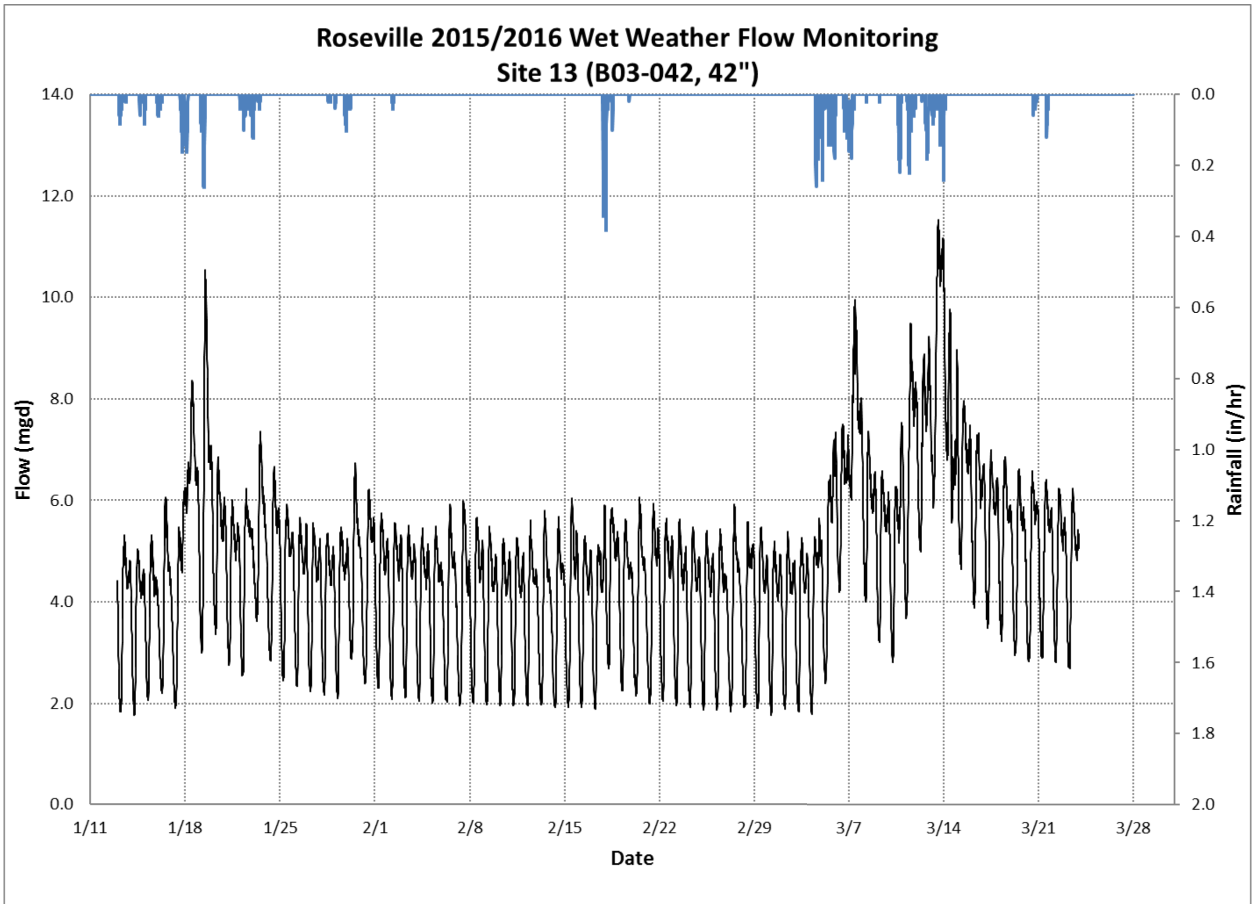

Roseville 2015/2016 Wet Weather Flow Monitoring
Site 11 (A08-034 14.5")
Level (in)
Velocity (fps)
Depth (inches)
Velocity (fps)
Date
12
11
10
9
8
7
6
5
4
3
2
1
0
1/11
1/18
1/25
2/1
2/8
2/15
2/22
2/29
3/7
3/14
3/21
3/28

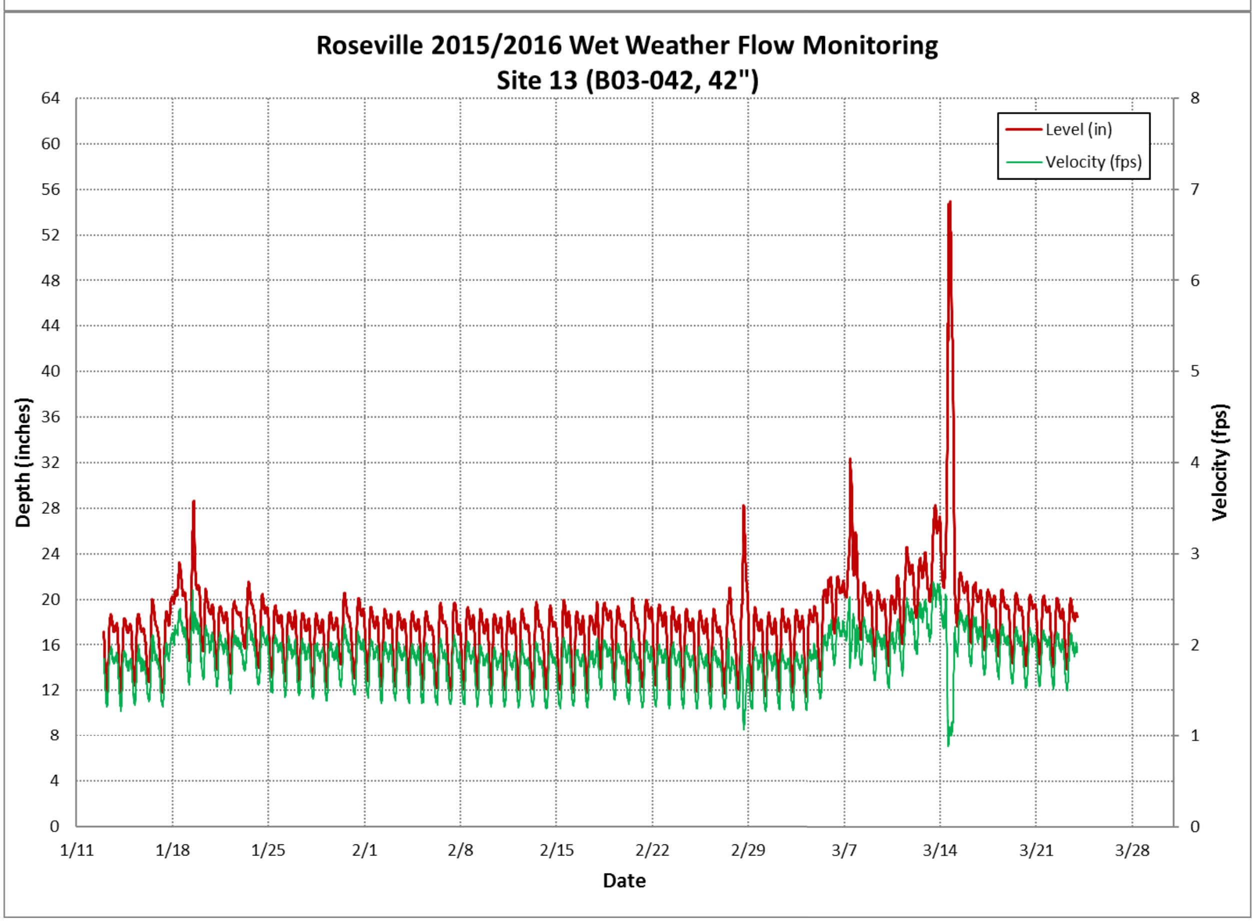


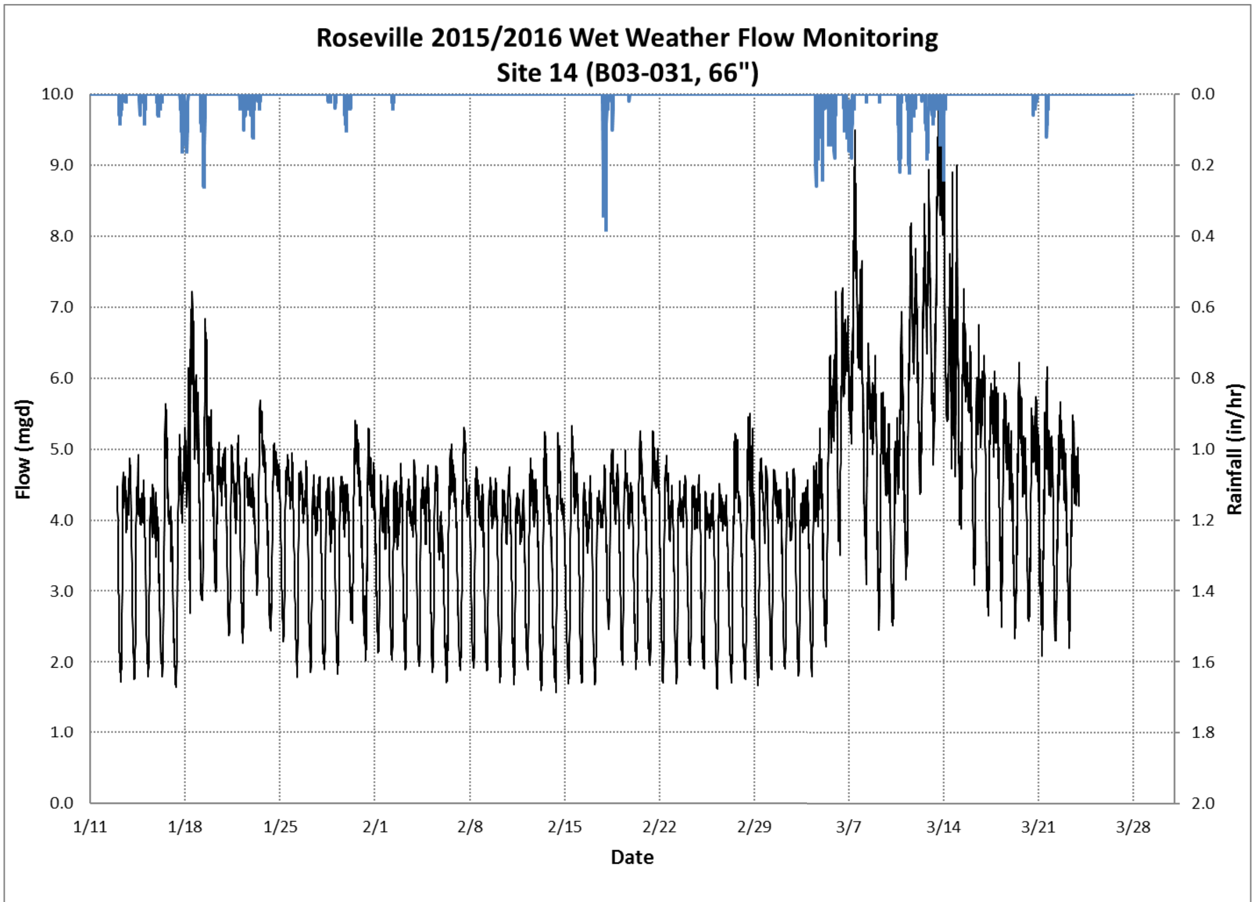
Roseville 2015/2016 Wet Weather Flow Monitoring
Site 12 (B03-029, 21")
Flow (mgd)
Rainfall (in/hr)
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
1.6
1.8
2.0
1/11
1/18
1/25
2/1
2/8
2/15
2/22
2/29
3/7
3/14
3/21
3/28
Date

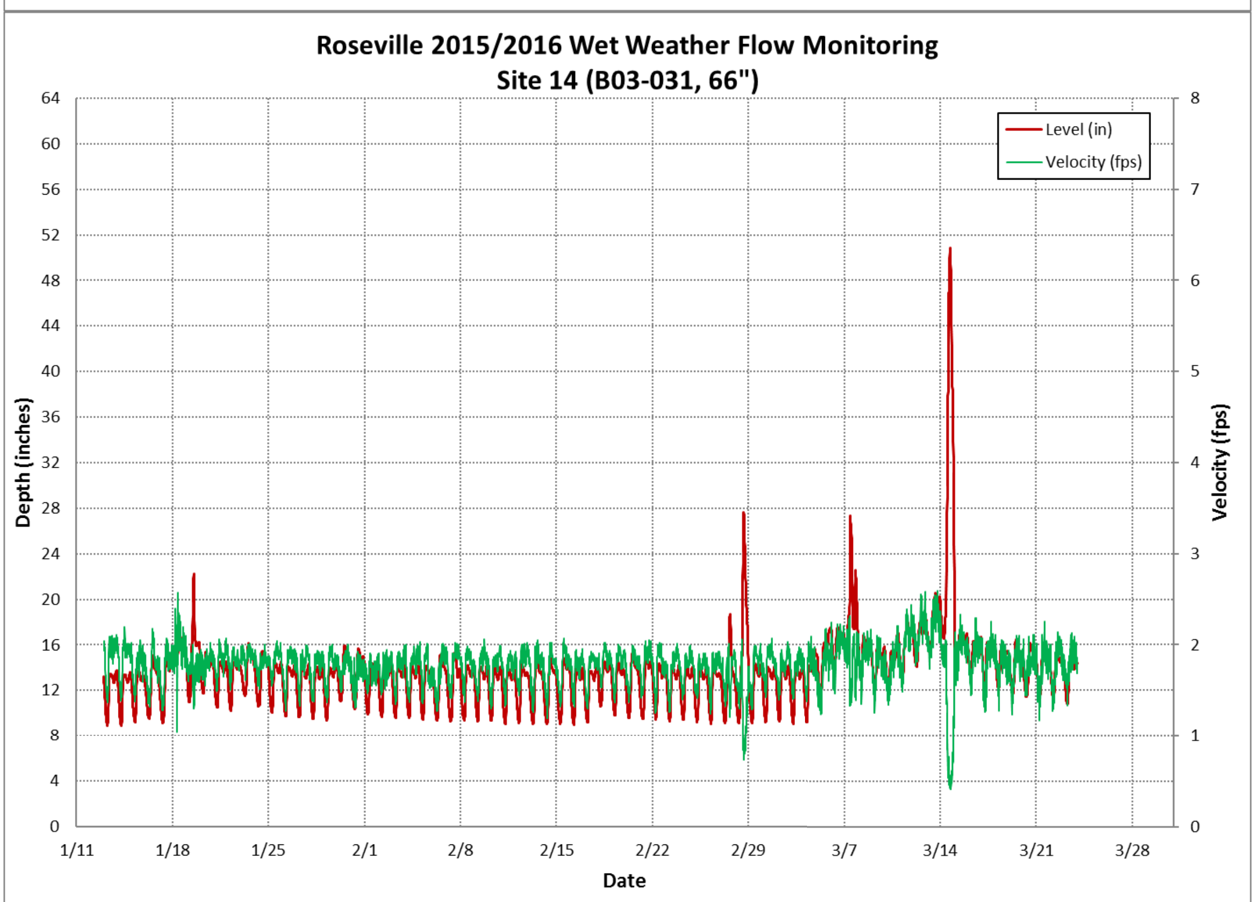



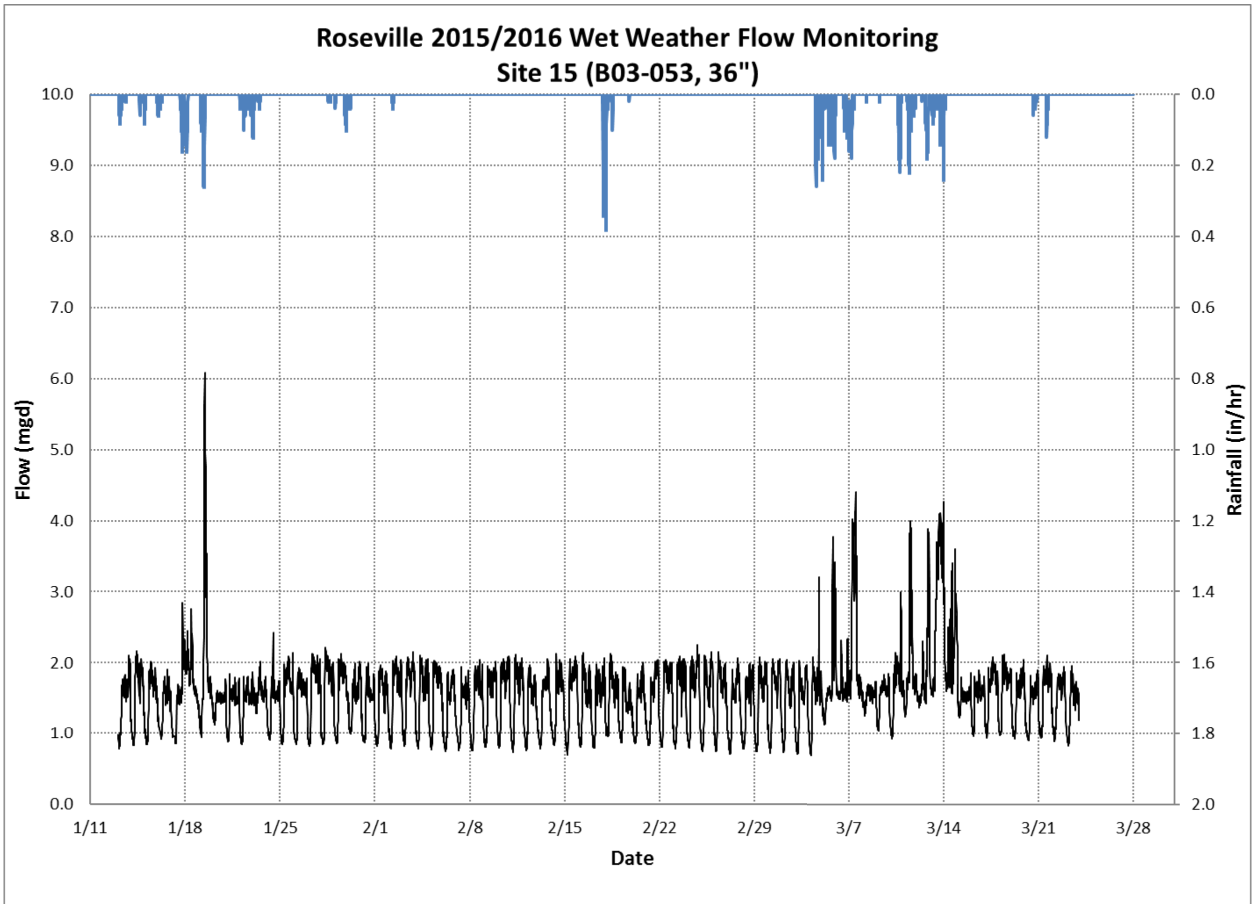
Roseville 2015/2016 Wet Weather Flow Monitoring
Site 12 (B03-029, 20.5")
Level (in)
Velocity (fps)
Depth (inches)
Velocity (fps)
12
11
10
9
8
7
6
5
4
3
2
1
0
8
7
6
5
4
3
2
1
0
1/11
1/18
1/25
2/1
2/8
2/15
2/22
2/29
3/7
3/14
3/21
3/28
Date

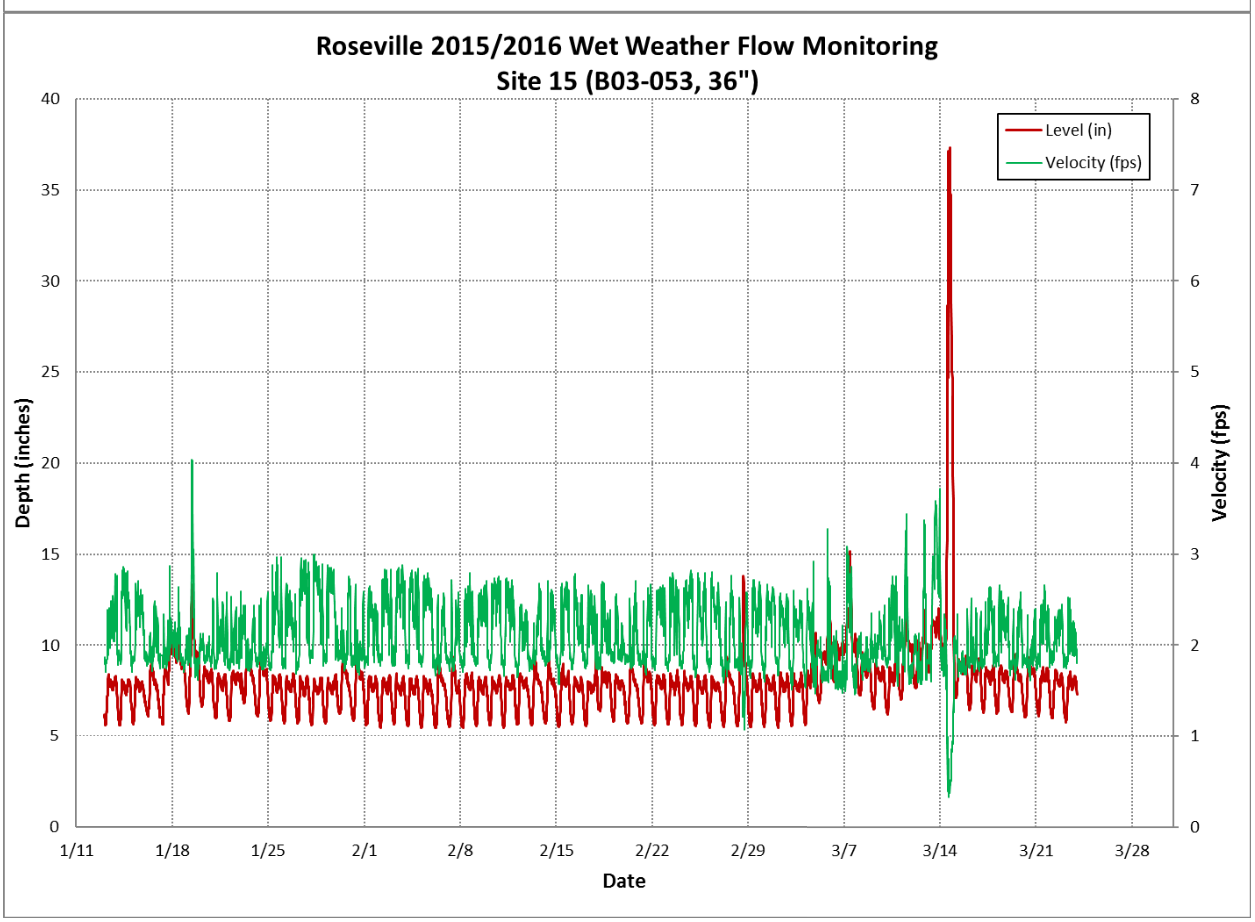

Roseville 2015/2016 Wet Weather Flow Monitoring
Site 13 (B03-042, 42")
Flow (mgd)
Rainfall (in/hr)
Date
14.0
12.0
10.0
8.0
6.0
4.0
2.0
0.0
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
1.6
1.8
2.0
1/11
1/18
1/25
2/1
2/8
2/15
2/22
2/29
3/7
3/14
3/21
3/28

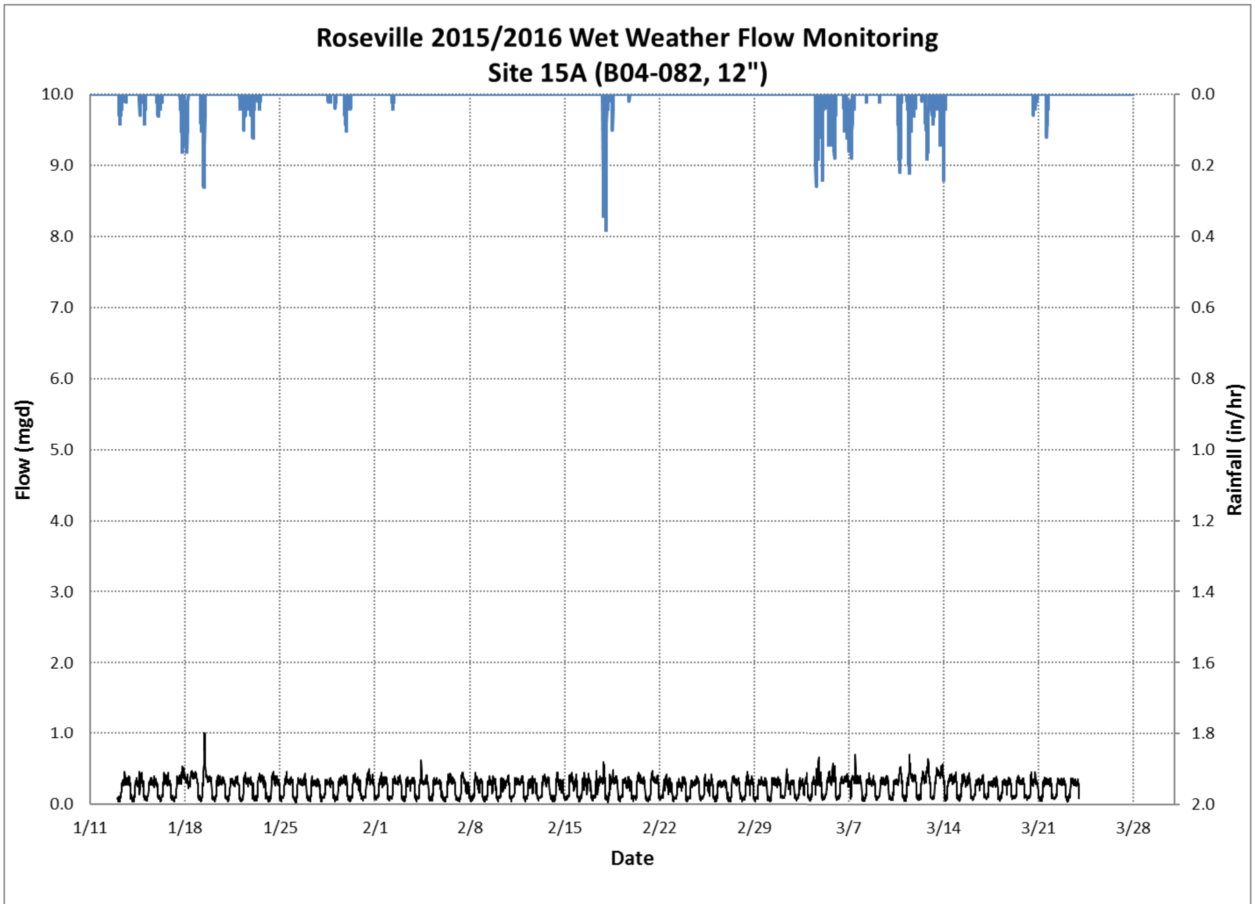

Roseville 2015/2016 Wet Weather Flow Monitoring
Site 13 (B03-042, 42")
Level (in)
Velocity (fps)
Depth (inches)
Velocity (fps)
Date
64
60
56
52
48
44
40
36
32
28
24
20
16
12
8
4
0
8
7
6
5
4
3
2
1
0
1/11
1/18
1/25
2/1
2/8
2/15
2/22
2/29
3/7
3/14
3/21
3/28


Roseville 2015/2016 Wet Weather Flow Monitoring
Site 14 (B03-031, 66")
Flow (mgd)
Rainfall (in/hr)
Date
10.0
9.0
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
0.2
0.4
0.6
0.8
1.2
1.4
1.6
1.8
2.0
1/11
1/18
1/25
2/1
2/8
2/15
2/22
2/29
3/7
3/14
3/21
3/28

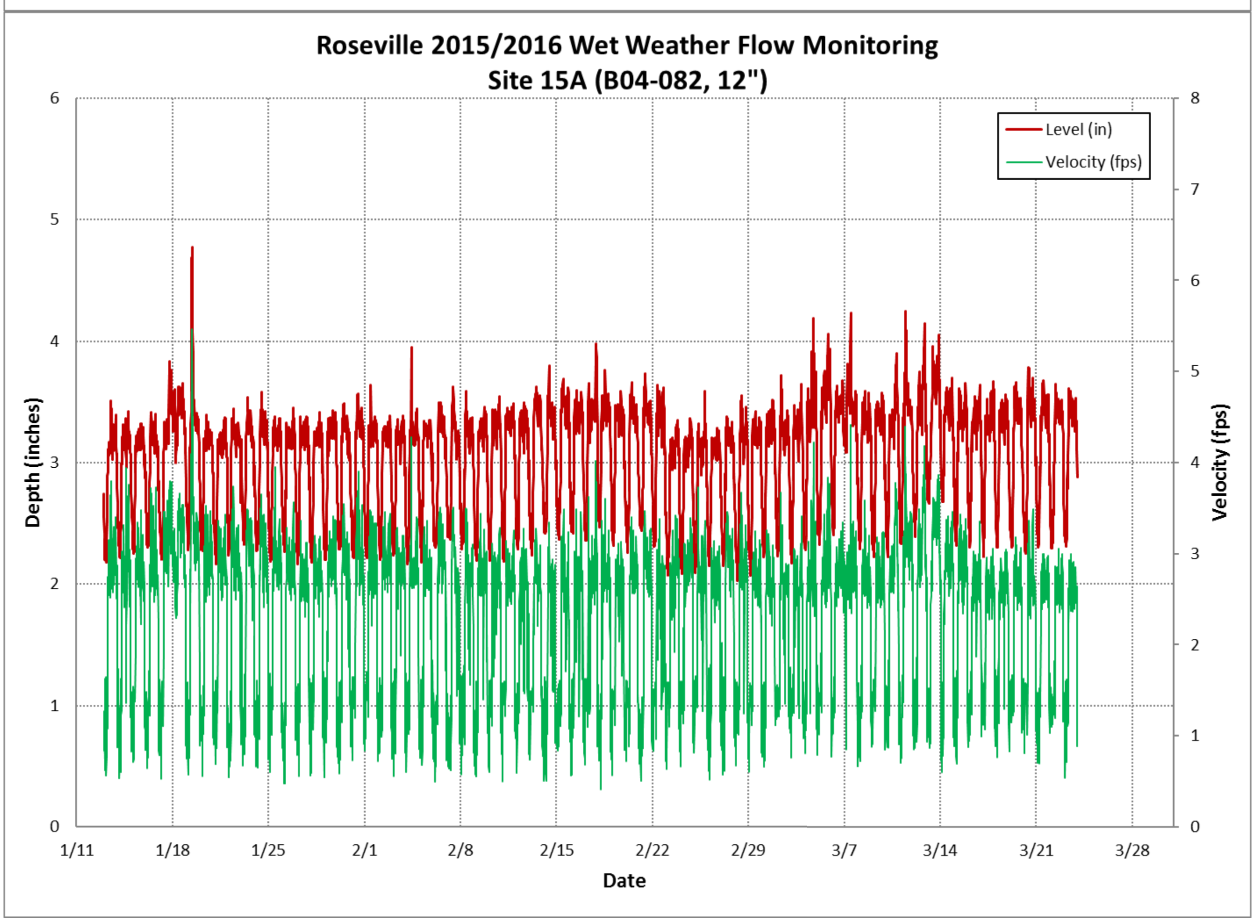

Roseville 2015/2016 Wet Weather Flow Monitoring
Site 14 (B03-031, 66")
Level (in)
Velocity (fps)
Depth (inches)
Velocity (fps)
Date
64
60
56
52
48
44
40
36
32
28
24
20
16
12
8
4
0
7
6
5
3
2
1
1/11
1/18
1/25
2/1
2/8
2/15
2/22
2/29
3/7
3/14
3/21
3/28


Roseville 2015/2016 Wet Weather Flow Monitoring
Site 15 (B03-053, 36")
Flow (mgd)
Rainfall (in/hr)
Date
10.0
9.0
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
1.6
1.8
2.0
1/11
1/18
1/25
2/1
2/8
2/15
2/22
2/29
3/7
3/14
3/21
3/28

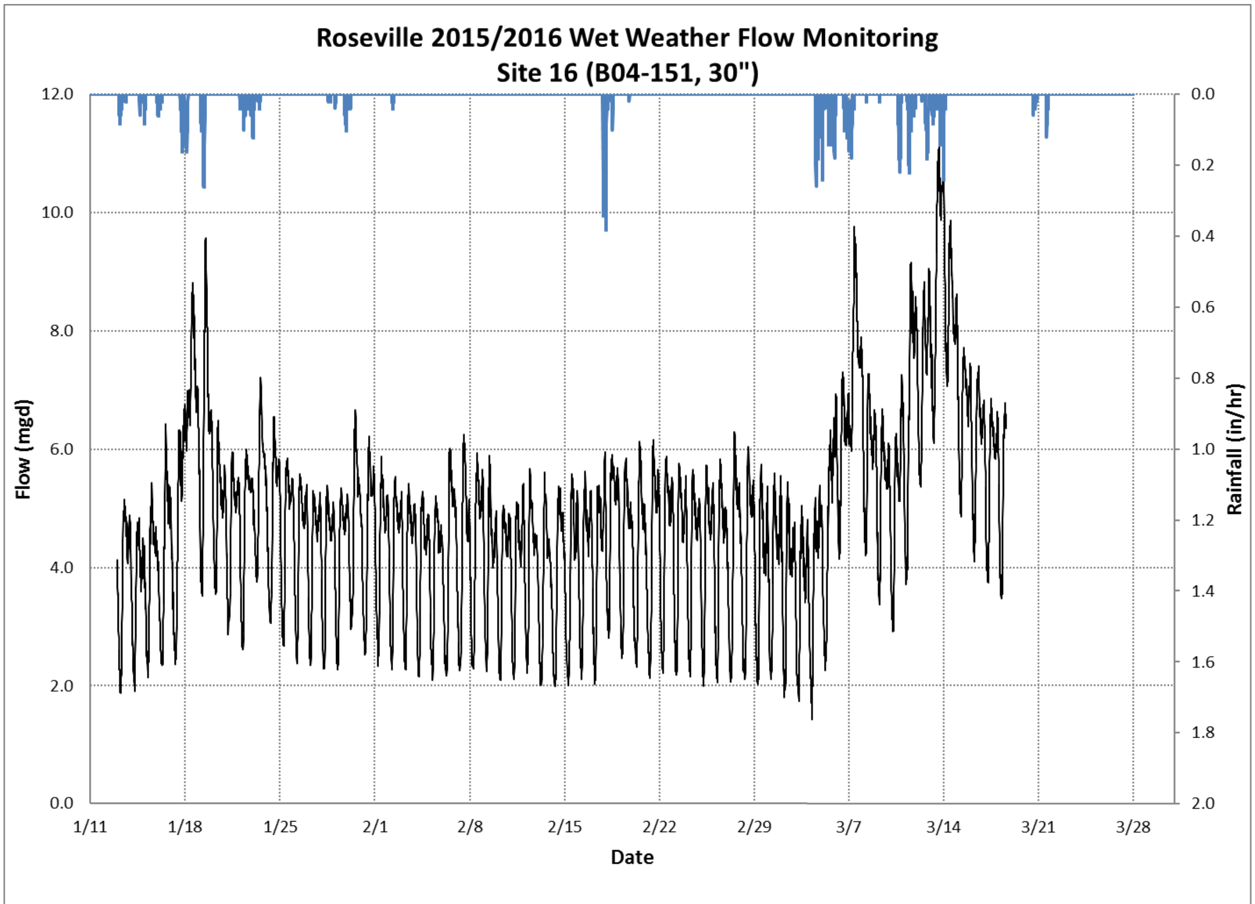

Roseville 2015/2016 Wet Weather Flow Monitoring
Site 15 (B03-053, 36")
Level (in)
Velocity (fps)
Depth (inches)
Velocity (fps)
Date
40
35
30
25
20
15
10
5
0
8
7
6
5
4
3
2
1
0
1/11
1/18
1/25
2/1
2/8
2/15
2/22
2/29
3/7
3/14
3/21
3/28



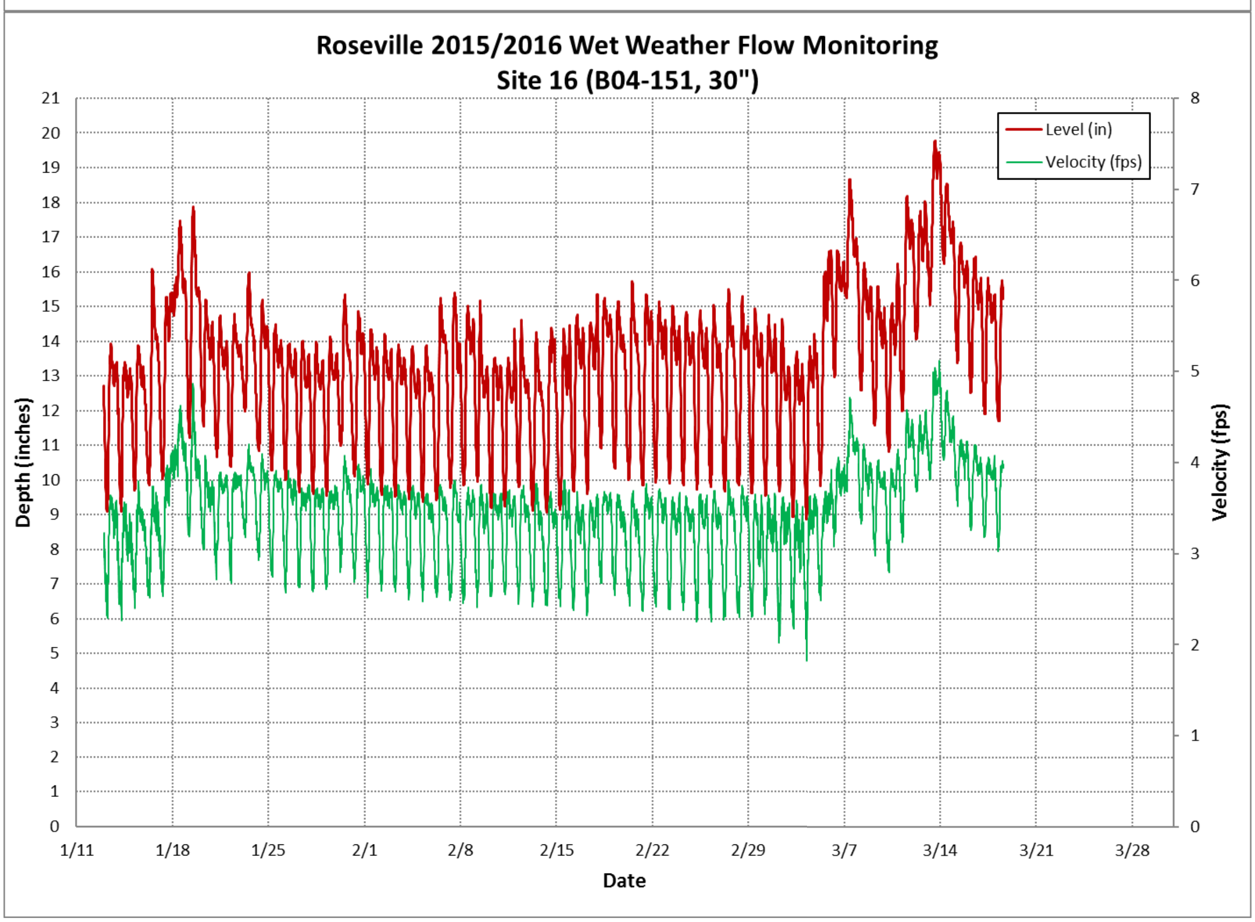
Roseville 2015/2016 Wet Weather Flow Monitoring
Site 15A (B04-082, 12")
Flow (mgd)
Rainfall (in/hr)
10.0
9.0
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
1.6
1.8
2.0
1/11
1/18
1/25
2/1
2/8
2/15
2/22
2/29
3/7
3/14
3/21
3/28
Date

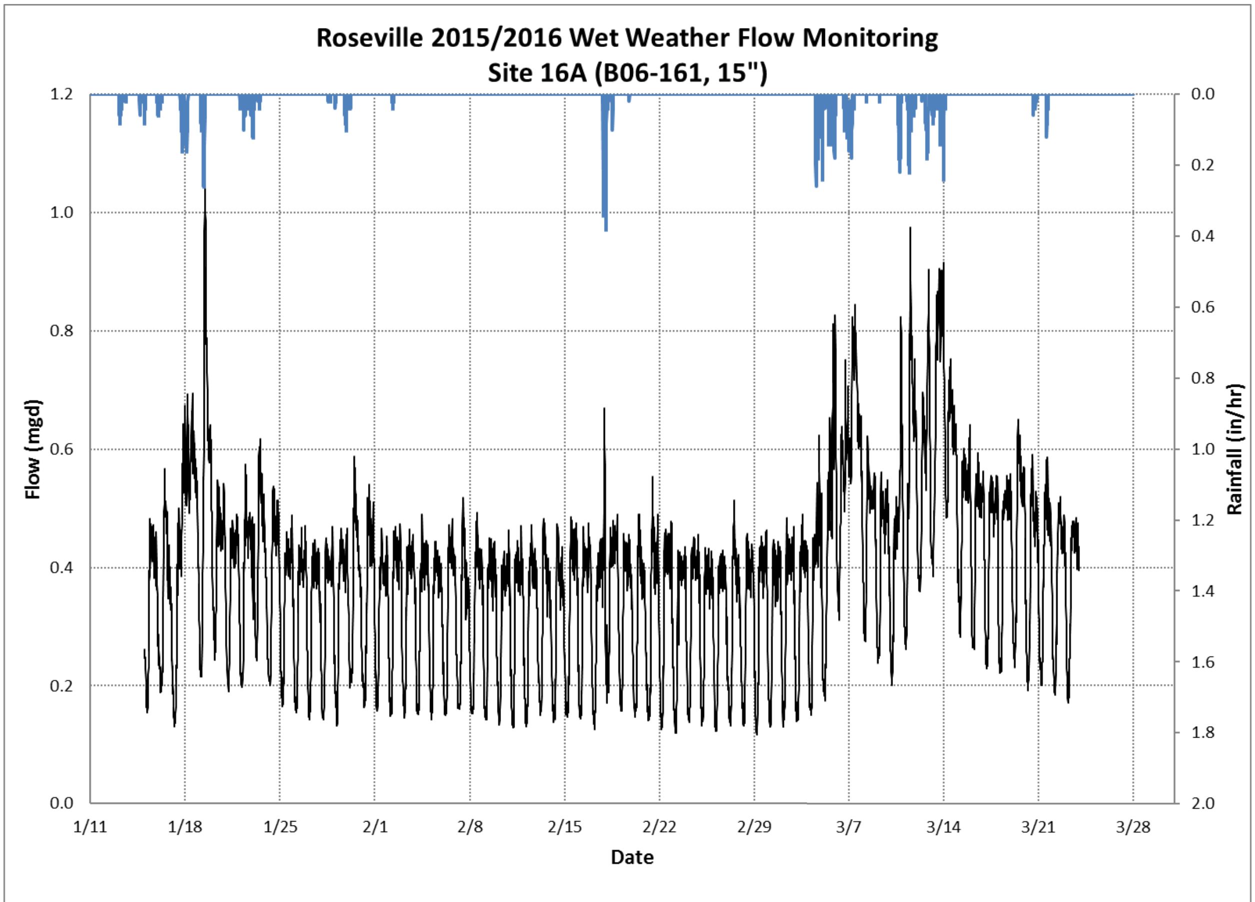
Roseville 2015/2016 Wet Weather Flow Monitoring
Site 15A (B04-082, 12")
Level (in)
Velocity (fps)
Depth (inches)
Velocity (fps)
6
5
4
3
2
1
0
8
7
1/11
1/18
1/25
2/1
2/8
2/15
2/22
2/29
3/7
3/14
3/21
3/28
Date

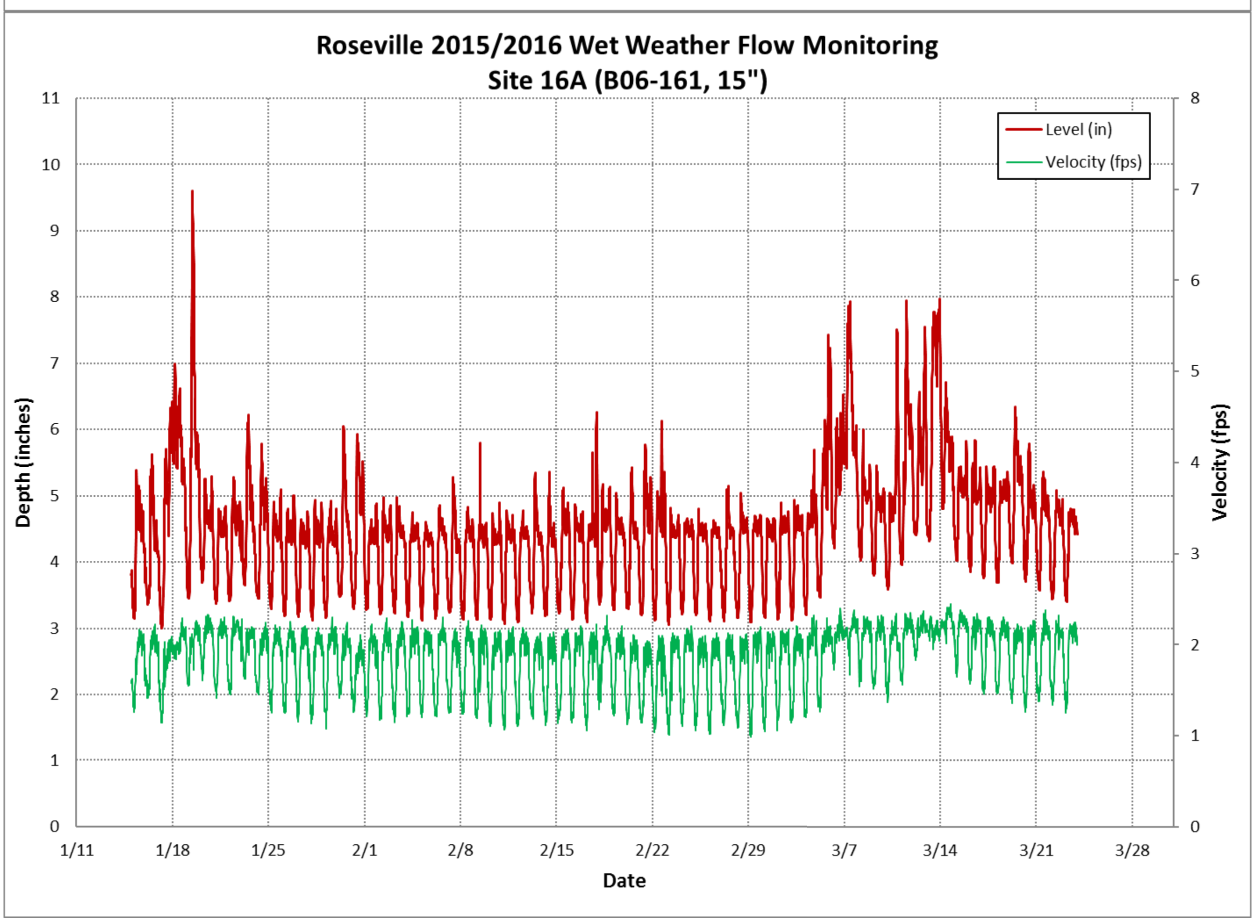


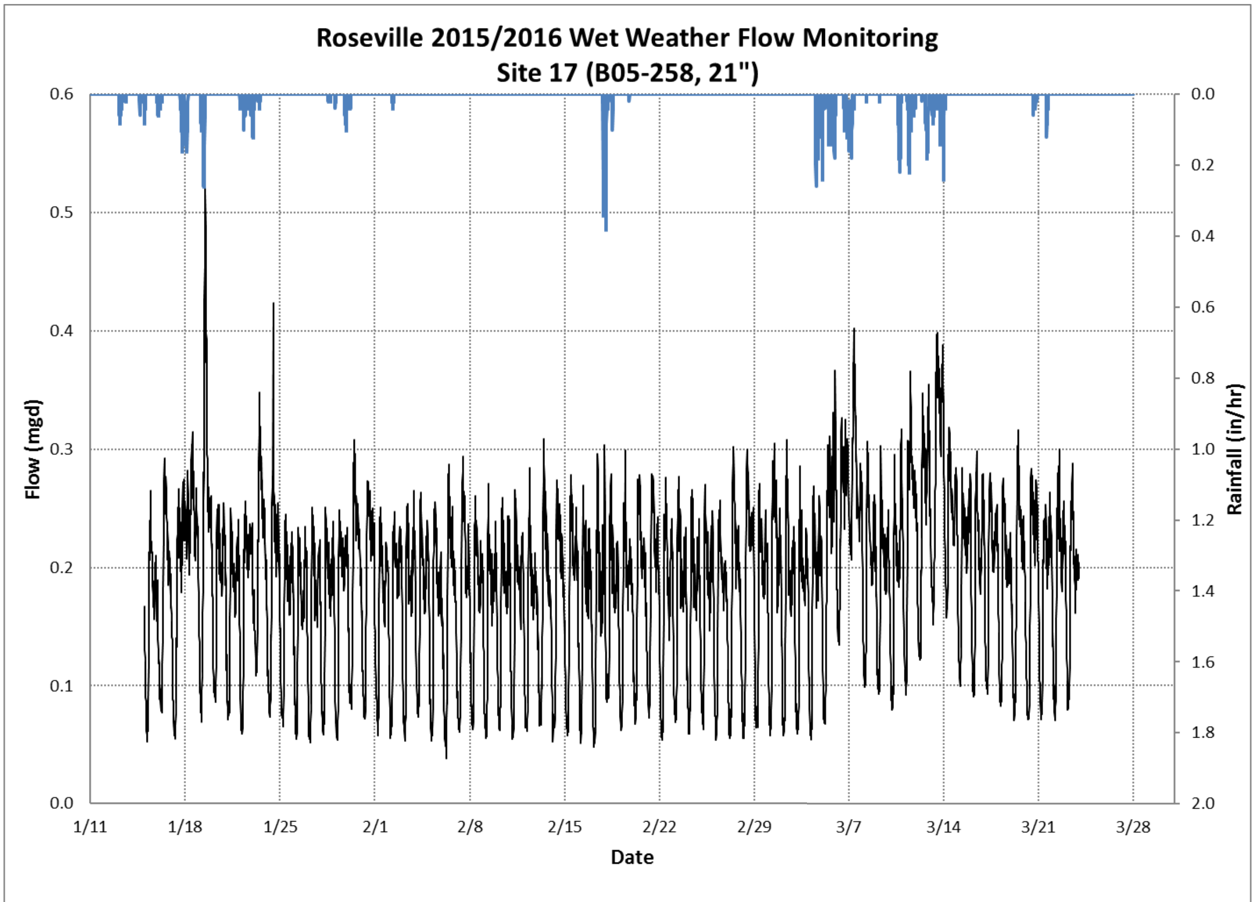
Roseville 2015/2016 Wet Weather Flow Monitoring
Site 16 (B04-151, 30")
Flow (mgd)
Rainfall (in/hr)
Date
1/11
1/18
1/25
2/1
2/8
2/15
2/22
2/29
3/7
3/14
3/21
3/28

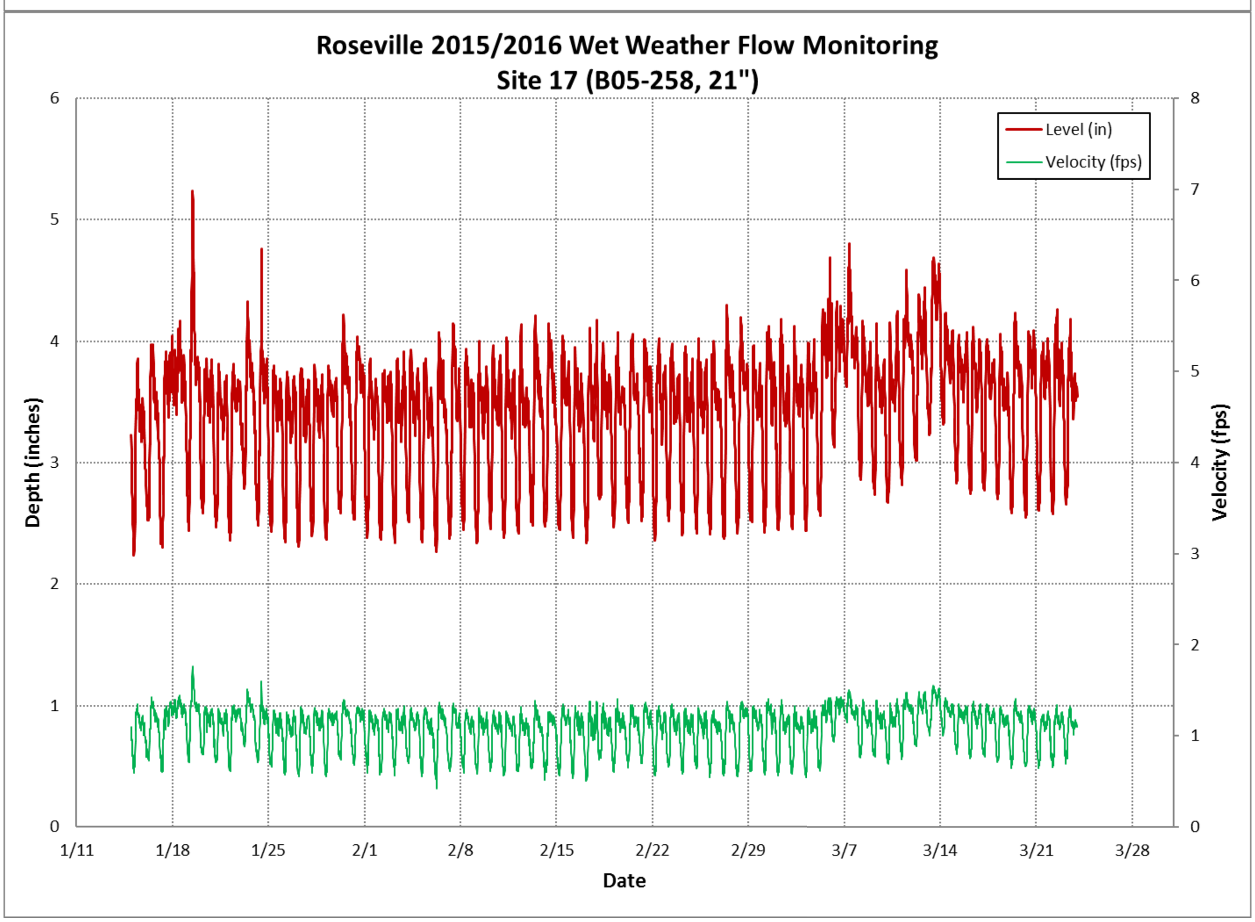



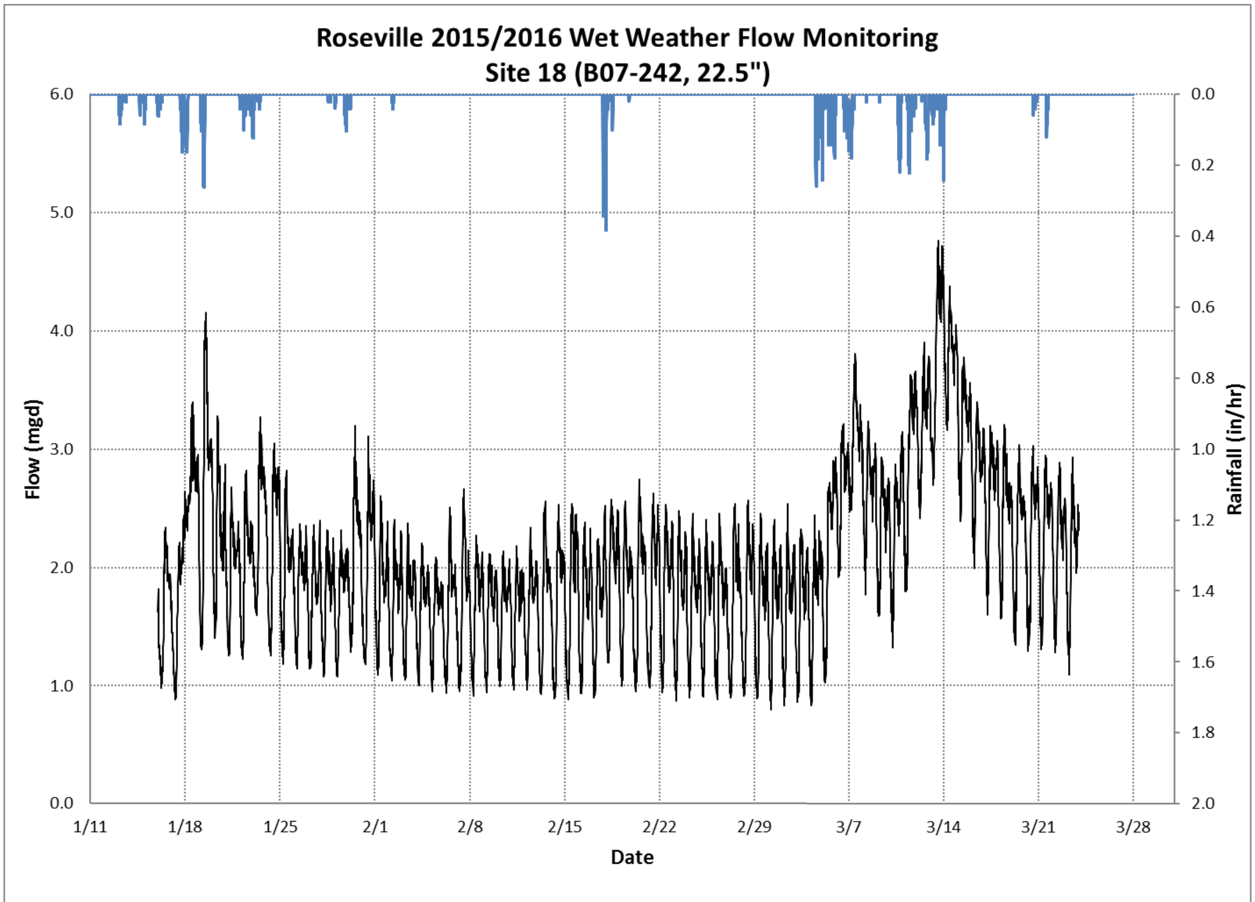
Roseville 2015/2016 Wet Weather Flow Monitoring
Site 16 (B04-151, 30")
Level (in)
Velocity (fps)
Depth (inches)
Velocity (fps)
Date
1/11
1/18
1/25
2/1
2/8
2/15
2/22
2/29
3/7
3/14
3/21
3/28


Roseville 2015/2016 Wet Weather Flow Monitoring
Site 16A (B06-161, 15")
Flow (mgd)
Rainfall (in/hr)
Date
1/11
1/18
1/25
2/1
2/8
2/15
2/22
2/29
3/7
3/14
3/21
3/28

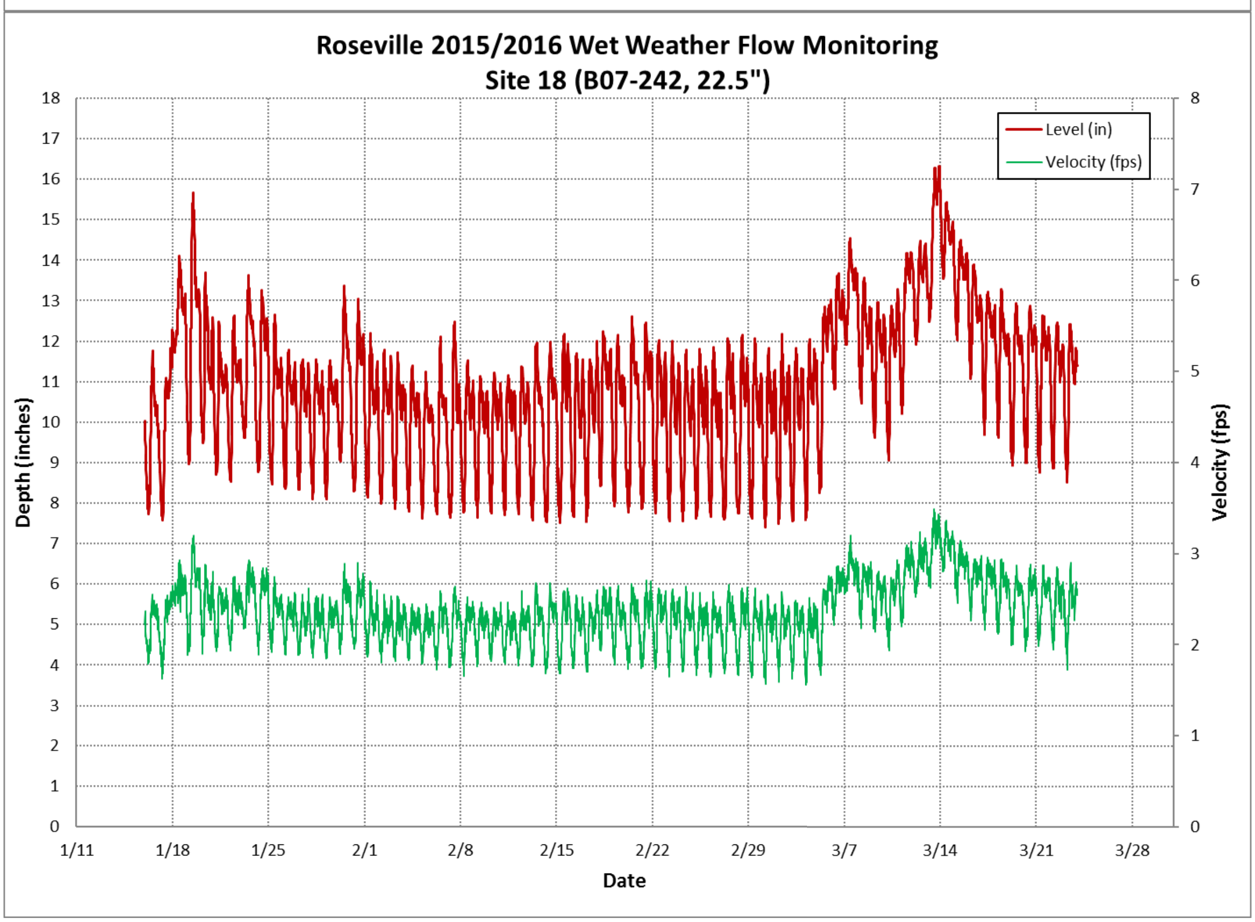

Roseville 2015/2016 Wet Weather Flow Monitoring
Site 16A (B06-161, 15")
Level (in)
Velocity (fps)
Depth (inches)
Velocity (fps)
Date
1/11
1/18
1/25
2/1
2/8
2/15
2/22
2/29
3/7
3/14
3/21
3/28


Roseville 2015/2016 Wet Weather Flow Monitoring
Site 17 (B05-258, 21")
Flow (mgd)
Rainfall (in/hr)
Date
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.2
0.4
0.6
0.8
1.0
1.2
1.4
1.6
1.8
2.0
1/11
1/18
1/25
2/1
2/8
2/15
2/22
2/29
3/7
3/14
3/21
3/28

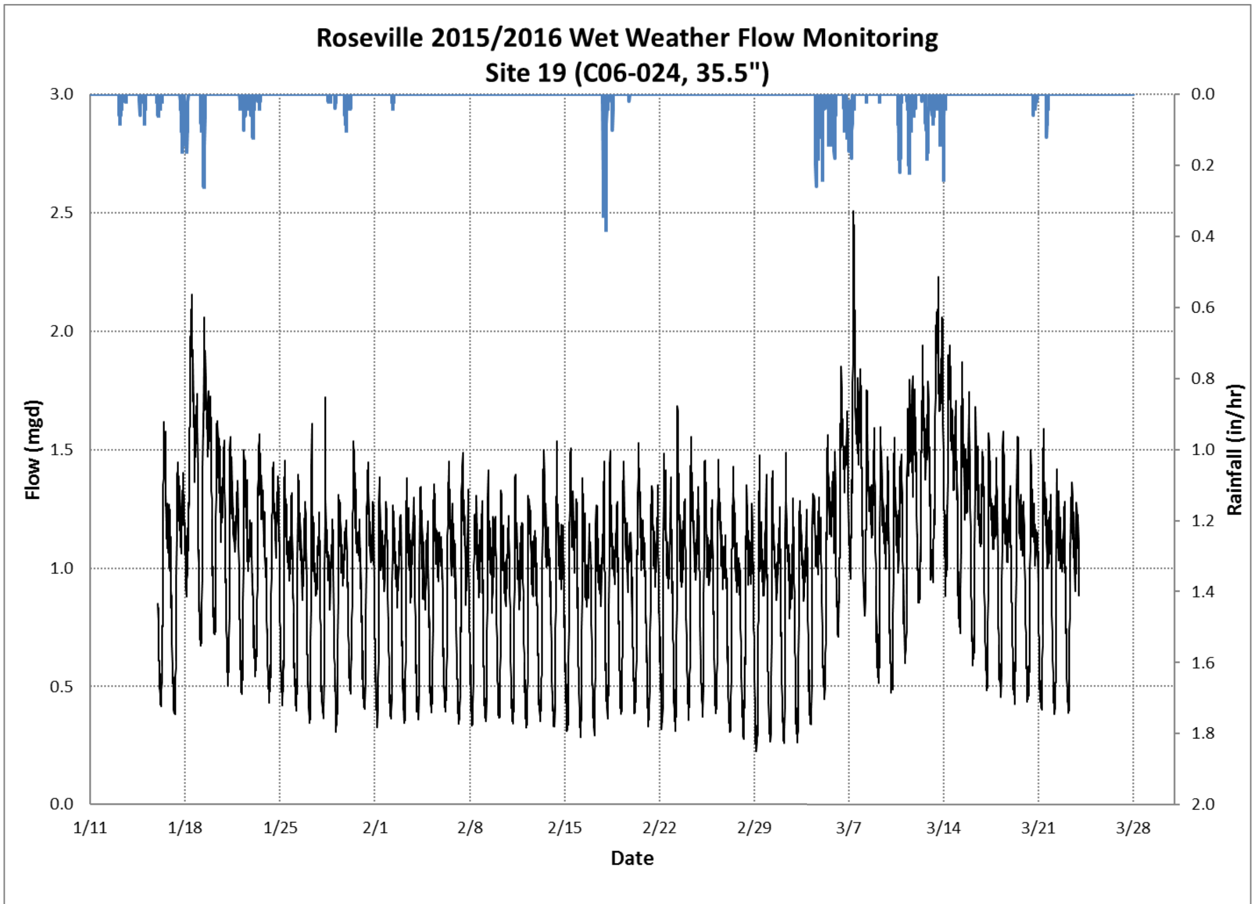

Roseville 2015/2016 Wet Weather Flow Monitoring
Site 17 (B05-258, 21")
Level (in)
Velocity (fps)
Depth (inches)
Velocity (fps)
Date
0
1
2
3
4
5
6
7
8
1/11
1/18
1/25
2/1
2/8
2/15
2/22
2/29
3/7
3/14
3/21
3/28

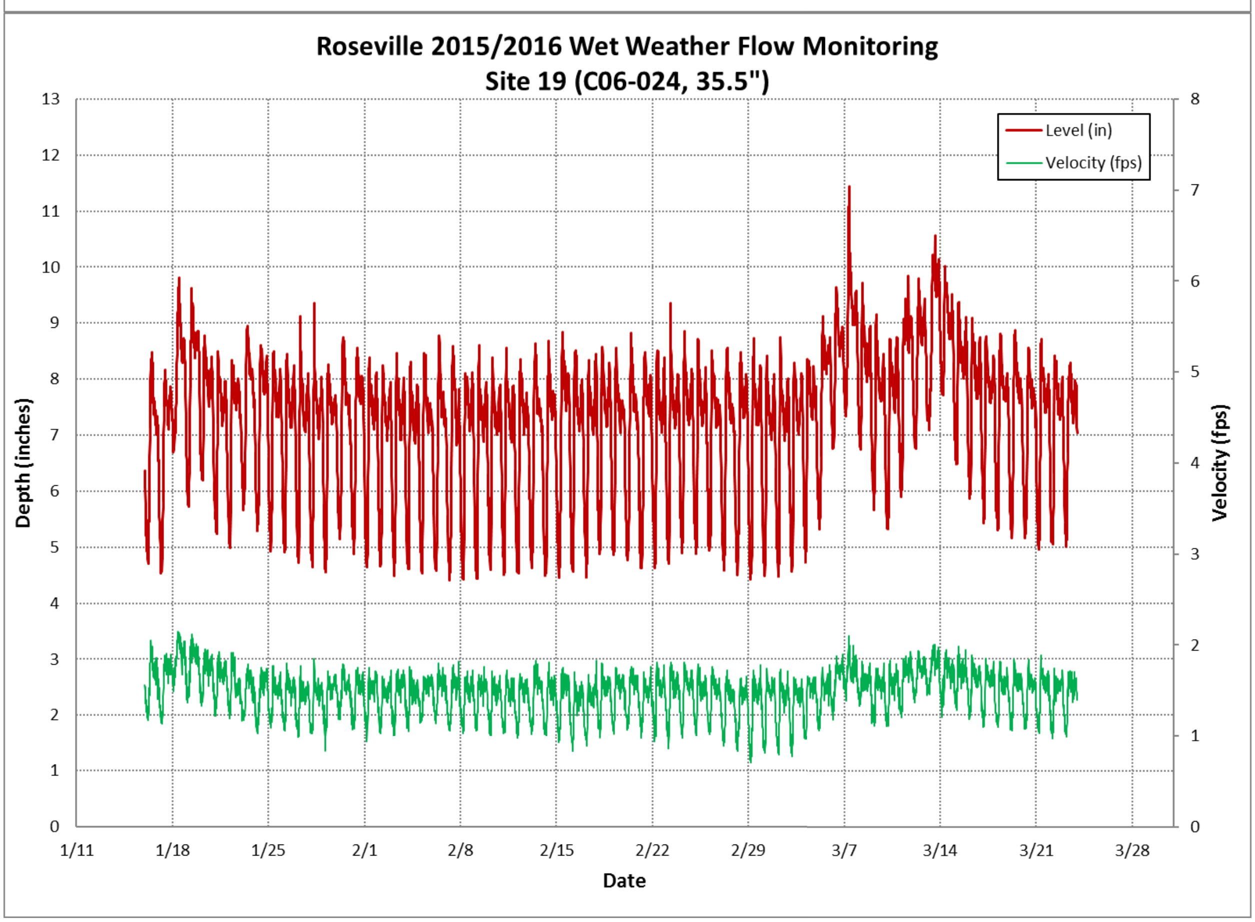


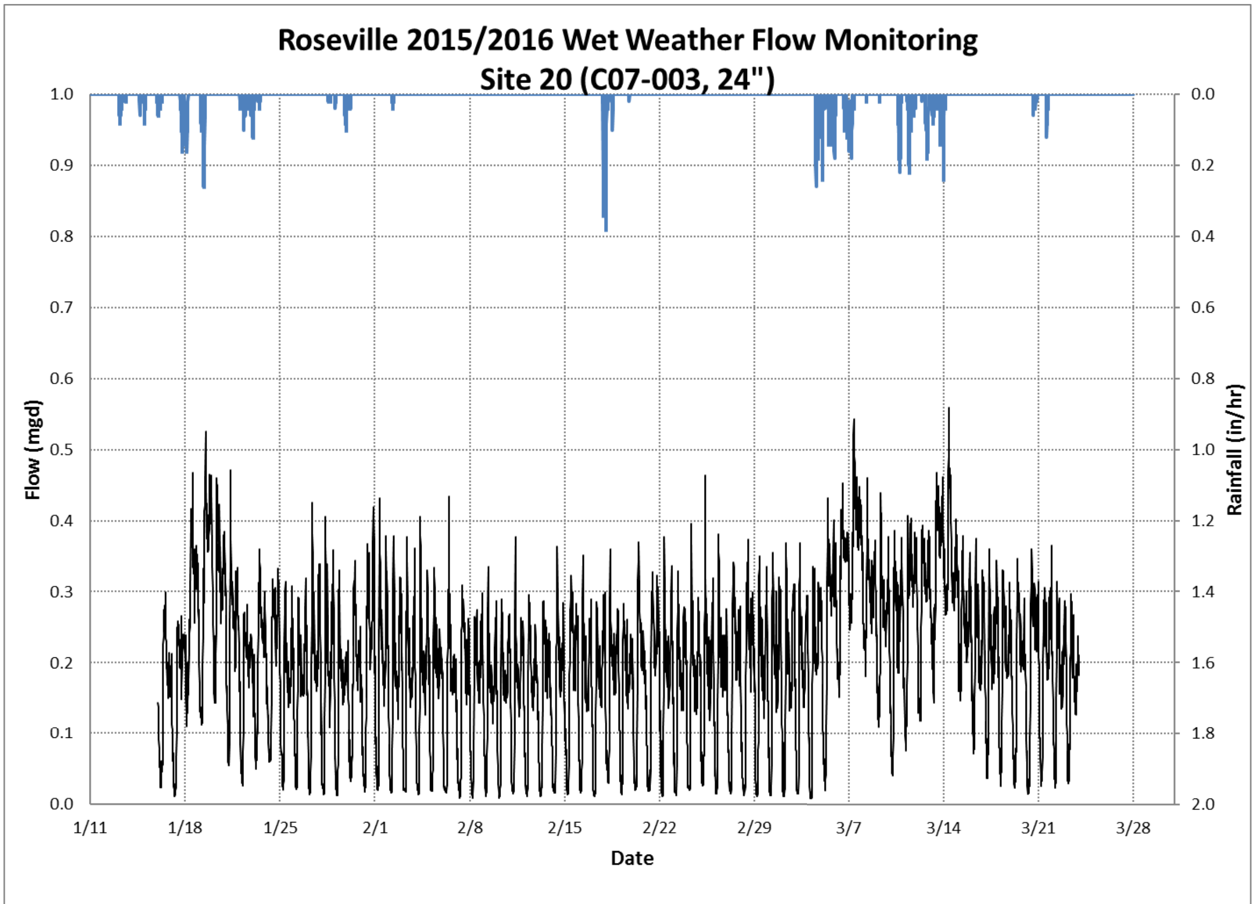
Roseville 2015/2016 Wet Weather Flow Monitoring
Site 18 (B07-242, 22.5")
Flow (mgd)
Rainfall (in/hr)
Date
6.0
5.0
4.0
3.0
2.0
1.0
0.0
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
1.6
1.8
2.0
1/11
1/18
1/25
2/1
2/8
2/15
2/22
2/29
3/7
3/14
3/21
3/28

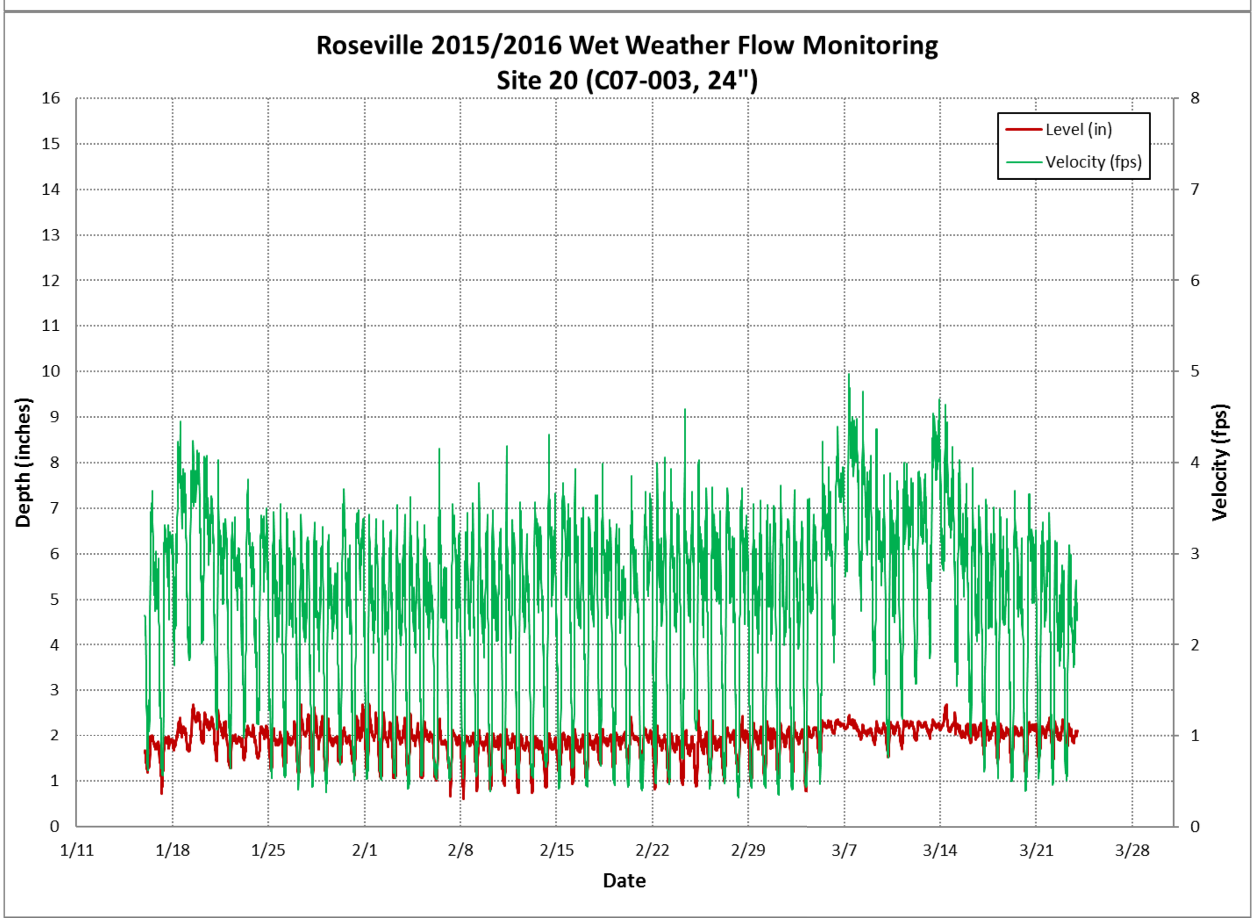
Roseville 2015/2016 Wet Weather Flow Monitoring
Site 18 (B07-242, 22.5")
Level (in)
Velocity (fps)
Depth (inches)
Velocity (fps)
Date
18
17
16
15
14
13
12
11
10
9
8
7
6
5
4
3
2
1
0
8
7
6
5
4
3
2
1
0
1/11
1/18
1/25
2/1
2/8
2/15
2/22
2/29
3/7
3/14
3/21
3/28


Roseville 2015/2016 Wet Weather Flow Monitoring
Site 19 (C06-024, 35.5")
Flow (mgd)
Rainfall (in/hr)
Date
3.0
2.5
2.0
1.5
1.0
0.5
0.0
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
1.6
1.8
2.0
1/11
1/18
1/25
2/1
2/8
2/15
2/22
2/29
3/7
3/14
3/21
3/28

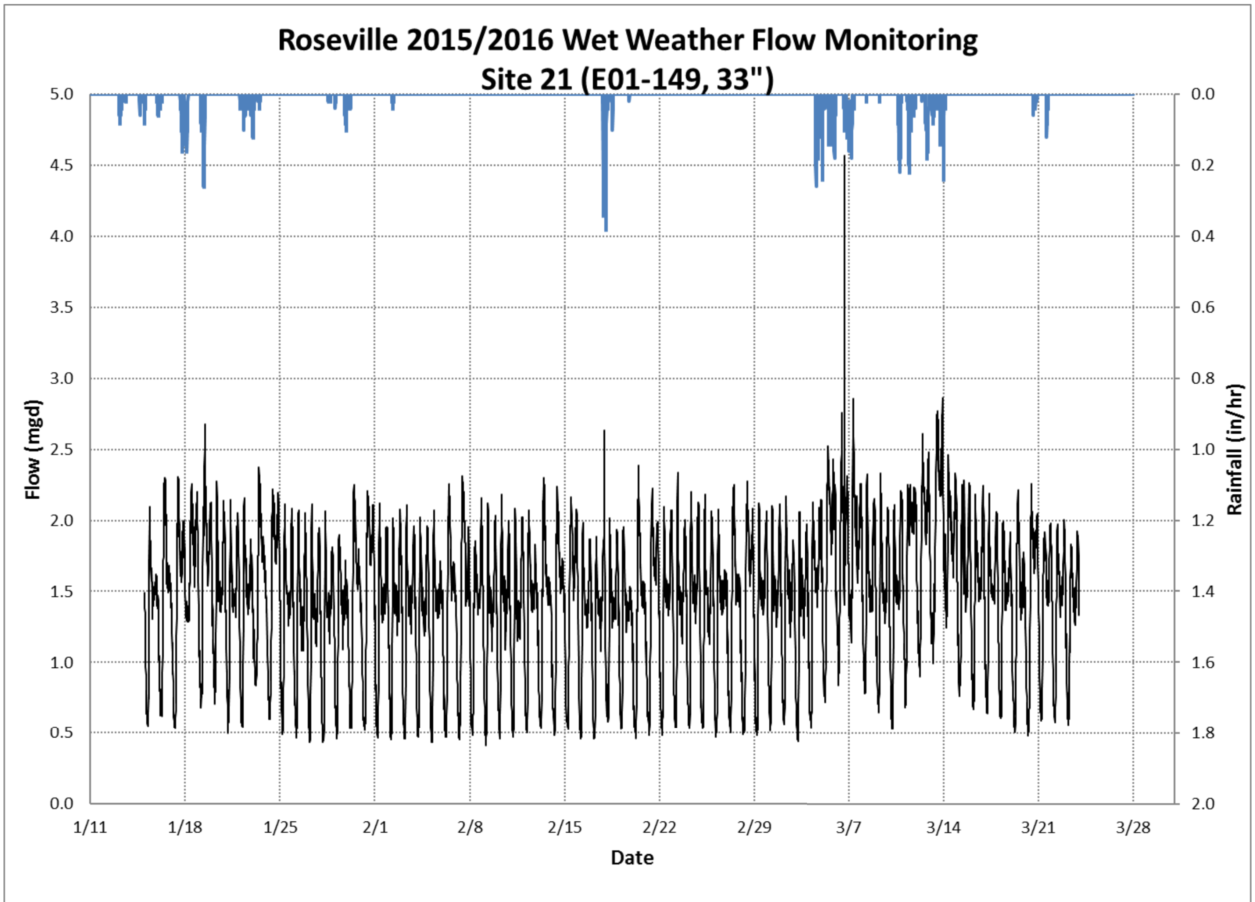

Roseville 2015/2016 Wet Weather Flow Monitoring
Site 19 (C06-024, 35.5")
Level (in)
Velocity (fps)
Depth (inches)
Velocity (fps)
Date
13
12
11
10
9
8
7
6
5
4
3
2
1
0
8
7
6
5
4
3
2
1
0
1/11
1/18
1/25
2/1
2/8
2/15
2/22
2/29
3/7
3/14
3/21
3/28



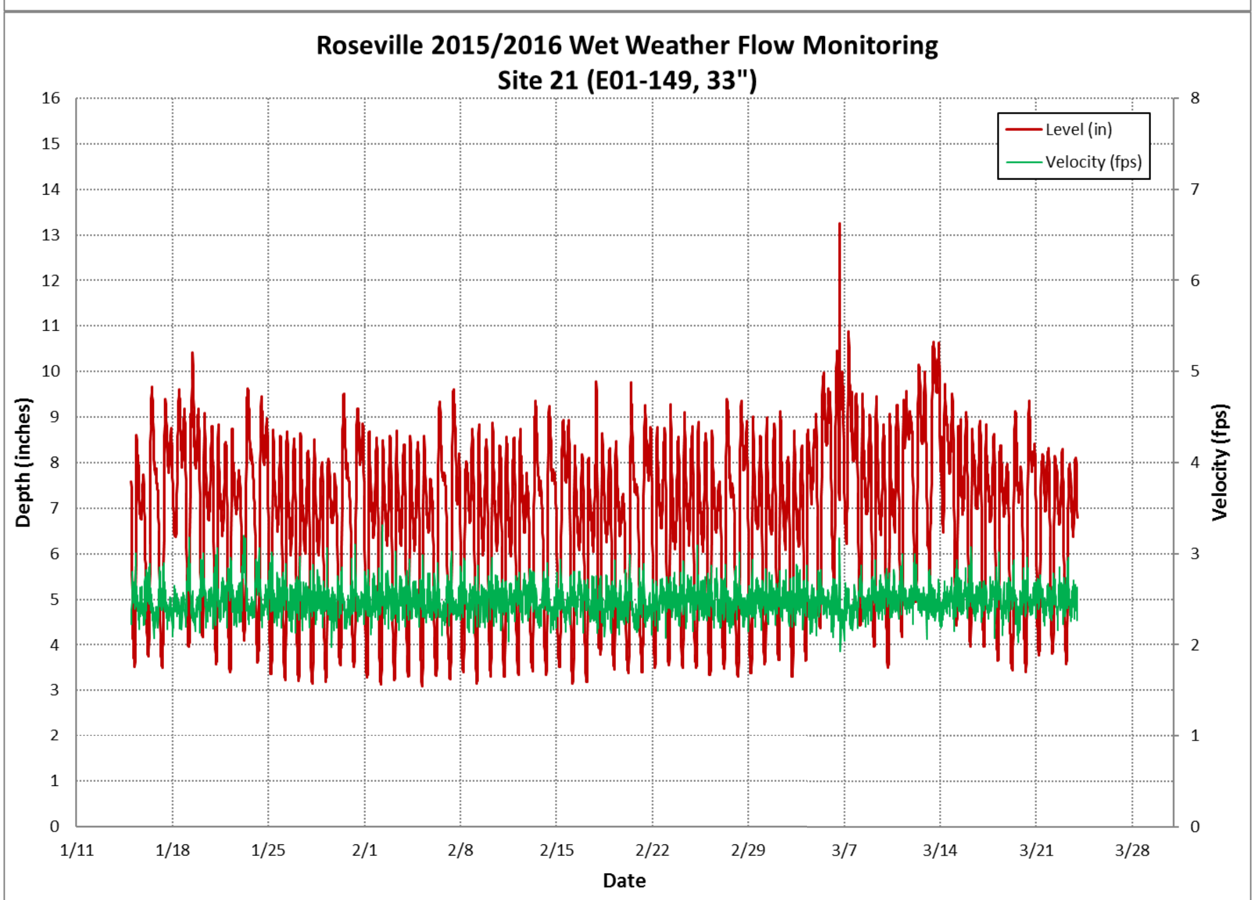
Roseville 2015/2016 Wet Weather Flow Monitoring
Site 20 (C07-003, 24")
Flow (mgd)
Rainfall (in/hr)
Date
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
2.0
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
1/11
1/18
1/25
2/1
2/8
2/15
2/22
2/29
3/7
3/14
3/21
3/28

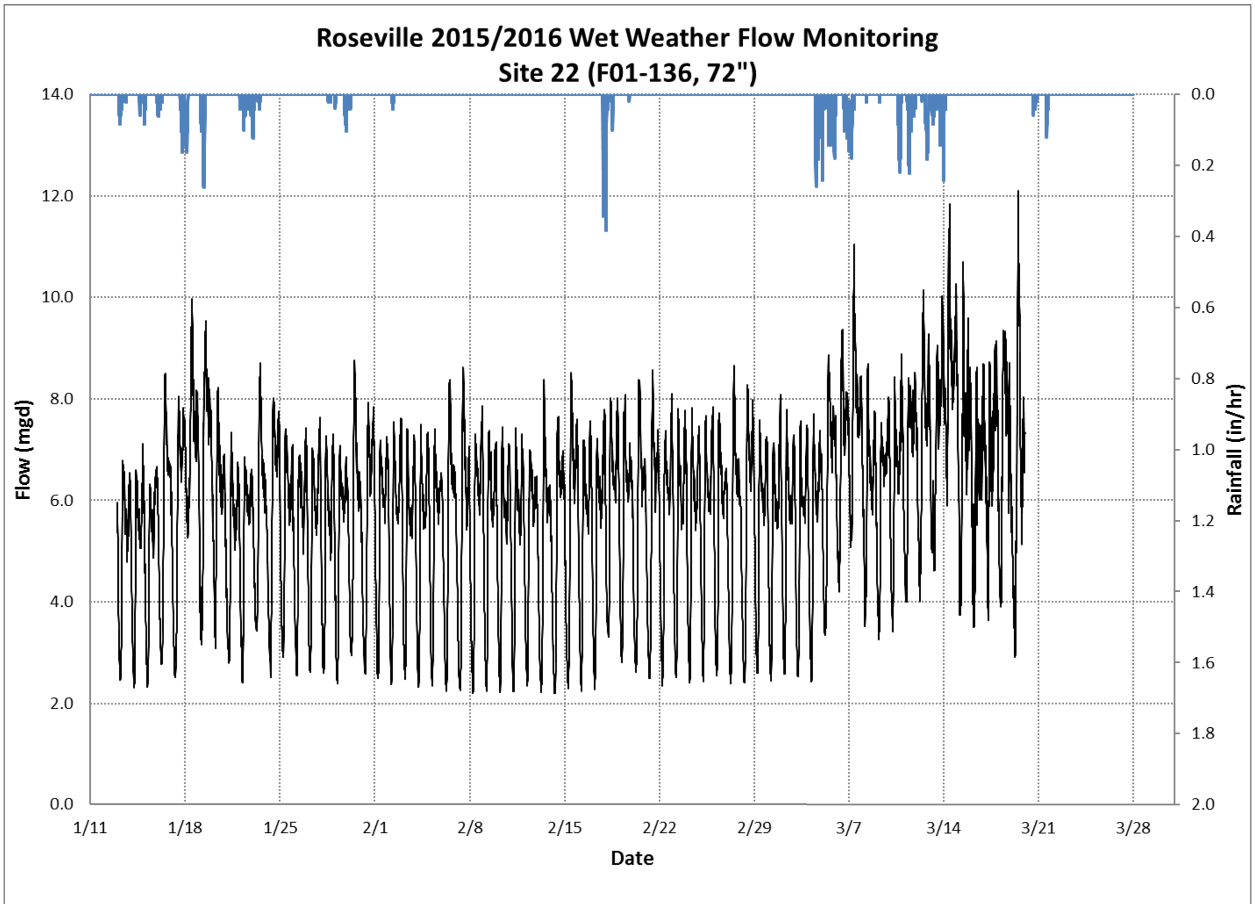
Roseville 2015/2016 Wet Weather Flow Monitoring
Site 20 (C07-003, 24")
Level (in)
Velocity (fps)
Depth (inches)
Velocity (fps)
Date
16
15
14
13
12
11
10
9
8
7
6
5
4
3
2
1
0
1/11
1/18
1/25
2/1
2/8
2/15
2/22
2/29
3/7
3/14
3/21
3/28

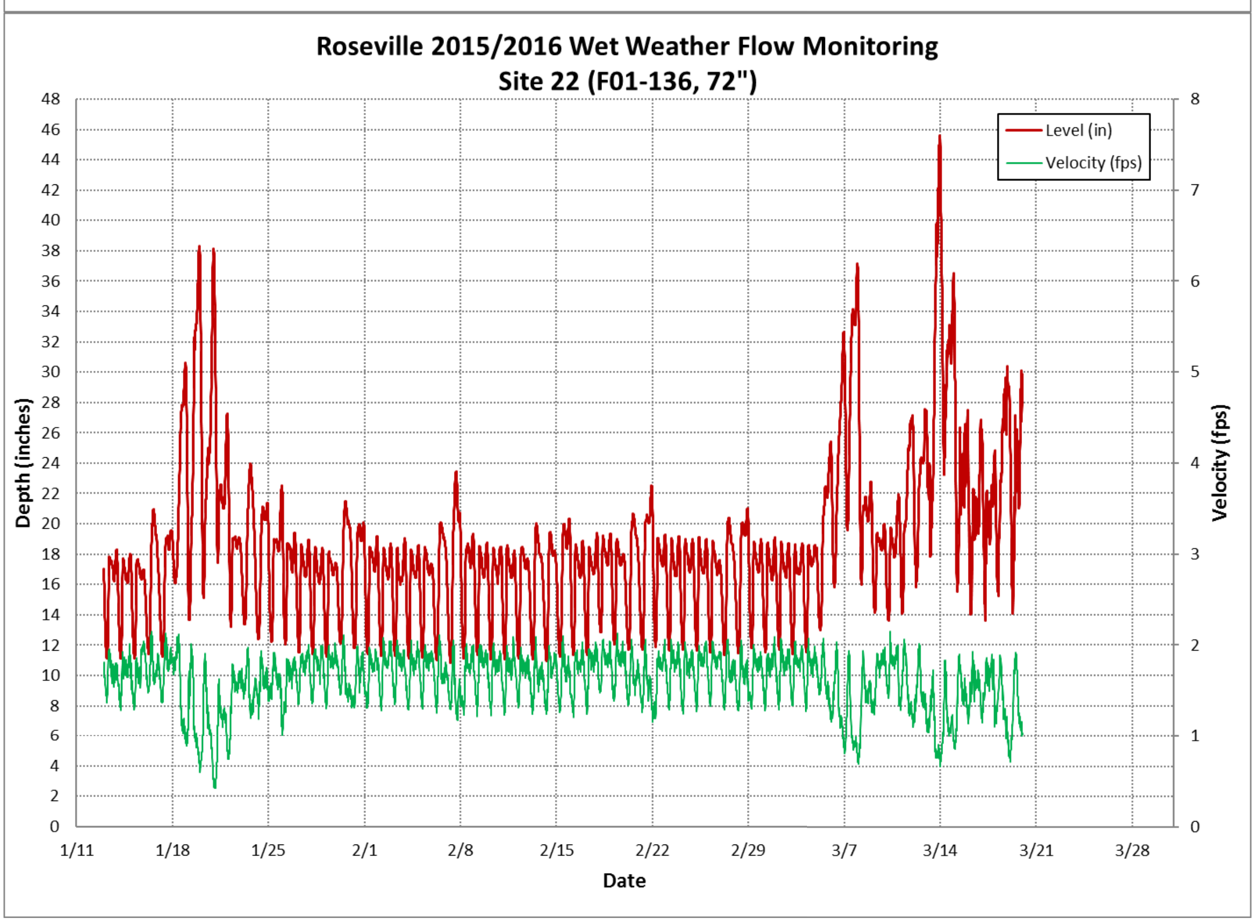


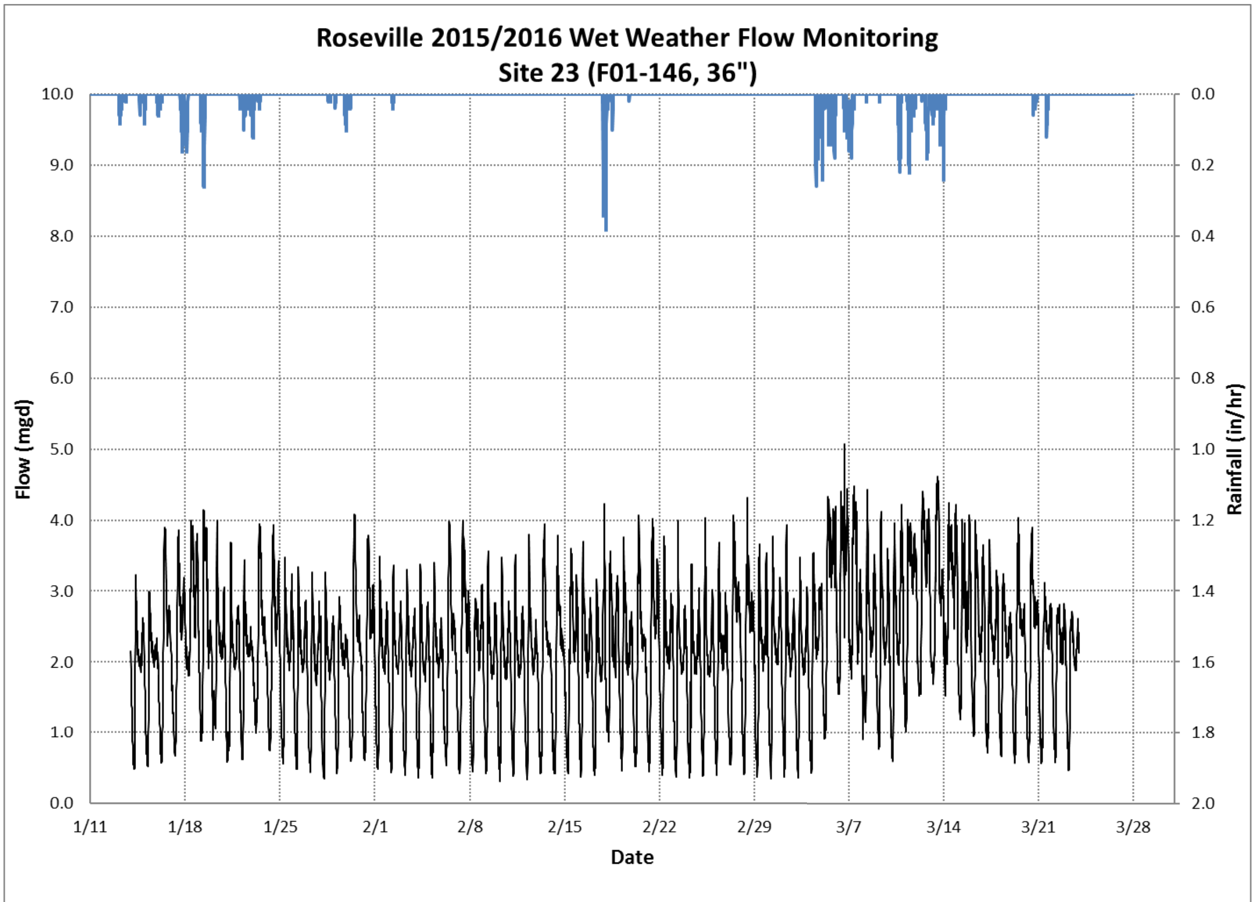
Roseville 2015/2016 Wet Weather Flow Monitoring
Site 21 (E01-149, 33")
Flow (mgd)
Rainfall (in/hr)
Date
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
0.2
0.4
0.6
0.8
1.2
1.4
1.6
1.8
2.0
1/11
1/18
1/25
2/1
2/8
2/15
2/22
2/29
3/7
3/14
3/21
3/28

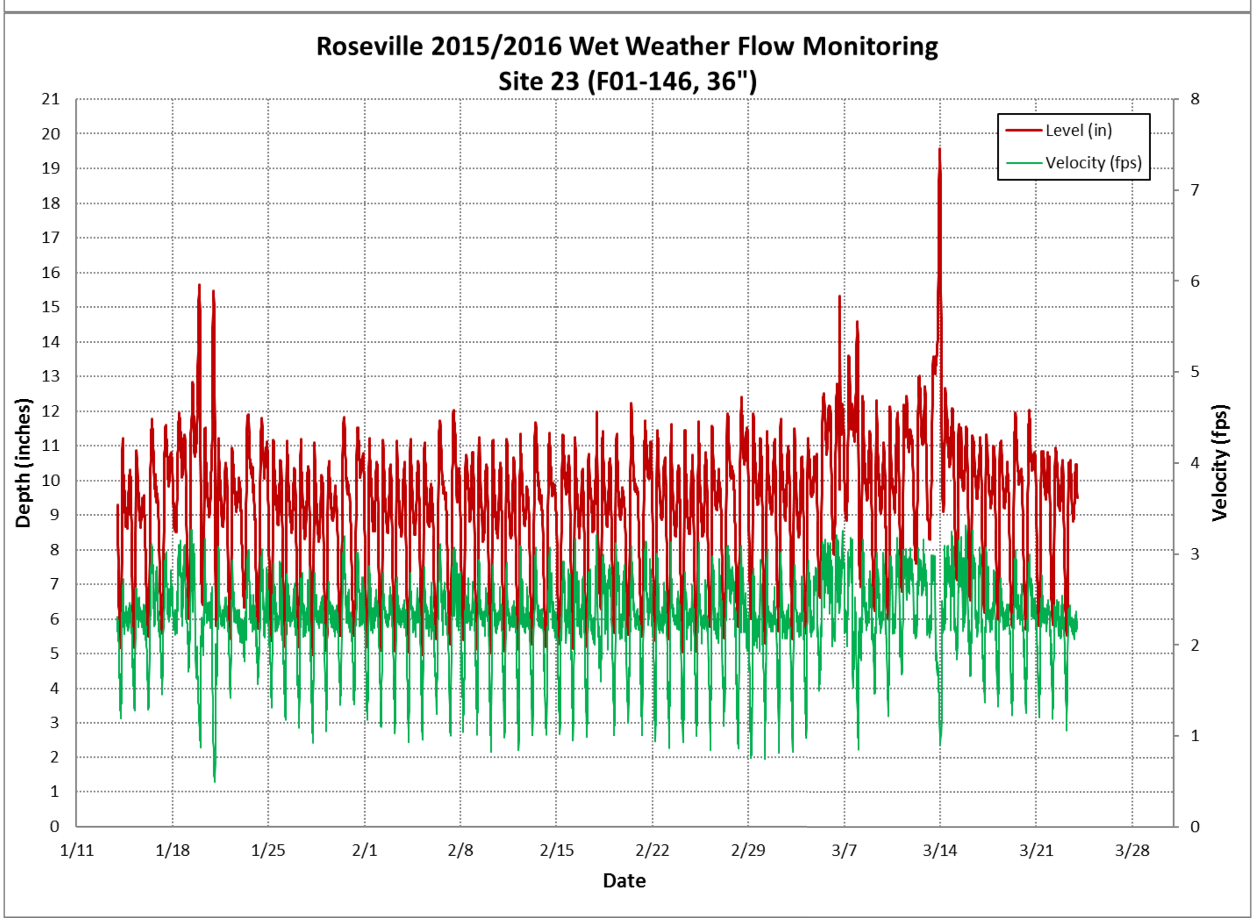
Roseville 2015/2016 Wet Weather Flow Monitoring
Site 21 (E01-149, 33")
Level (in)
Velocity (fps)
Depth (inches)
Velocity (fps)
Date
16
15
14
13
12
11
10
9
8
7
6
5
4
3
2
1
0
1/11
1/18
1/25
2/1
2/8
2/15
2/22
2/29
3/7
3/14
3/21
3/28


Roseville 2015/2016 Wet Weather Flow Monitoring
Site 22 (F01-136, 72")
Flow (mgd)
Rainfall (in/hr)
Date
14.0
12.0
10.0
8.0
6.0
4.0
2.0
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
1.6
1.8
2.0
1/11
1/18
1/25
2/1
2/8
2/15
2/22
2/29
3/7
3/14
3/21
3/28

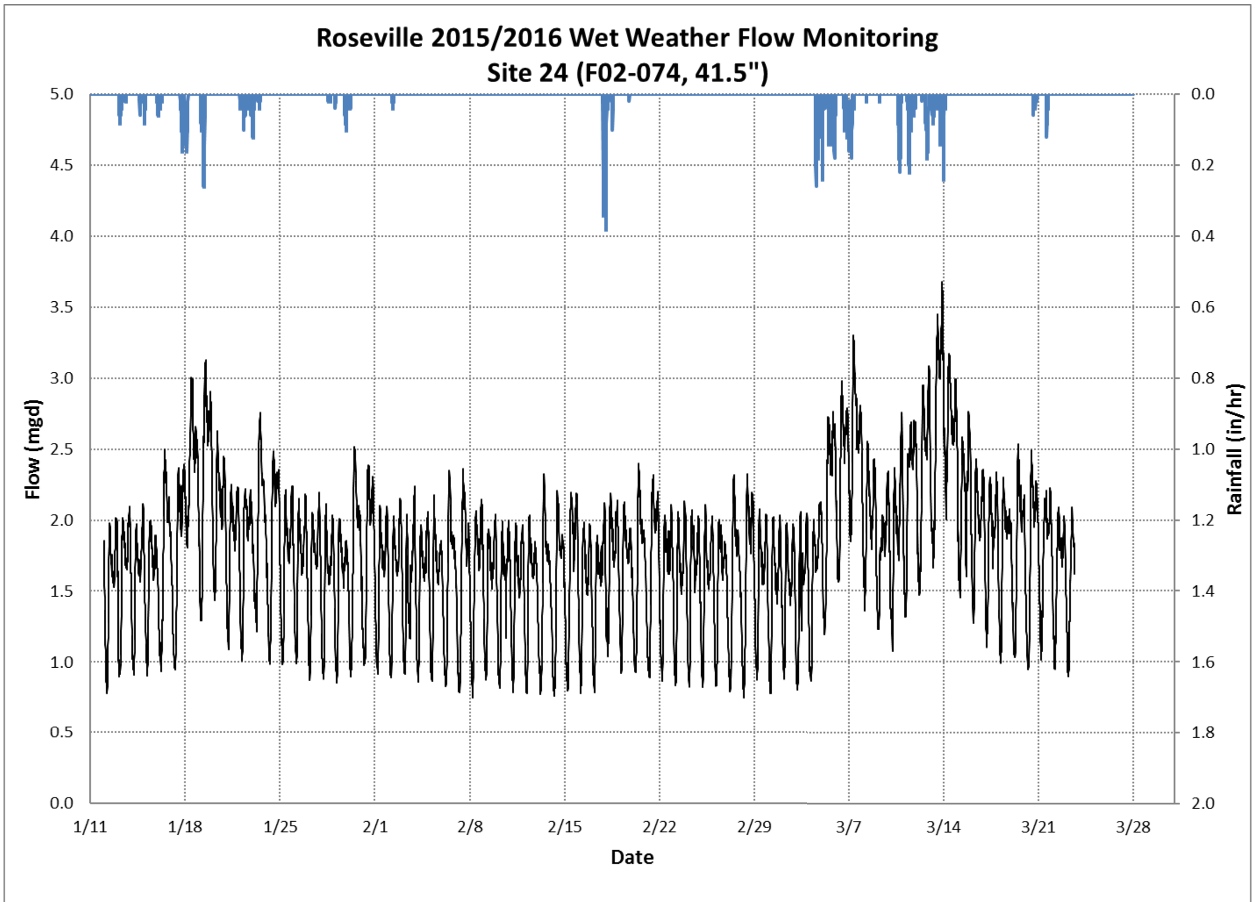

Roseville 2015/2016 Wet Weather Flow Monitoring
Site 22 (F01-136, 72")
Level (in)
Velocity (fps)
Depth (inches)
Velocity (fps)
Date
48
46
44
42
40
38
36
34
32
30
28
26
24
22
20
18
16
14
12
10
8
6
4
2
0
7
5
3
1
1/11
1/18
1/25
2/1
2/8
2/15
2/22
2/29
3/7
3/14
3/21
3/28

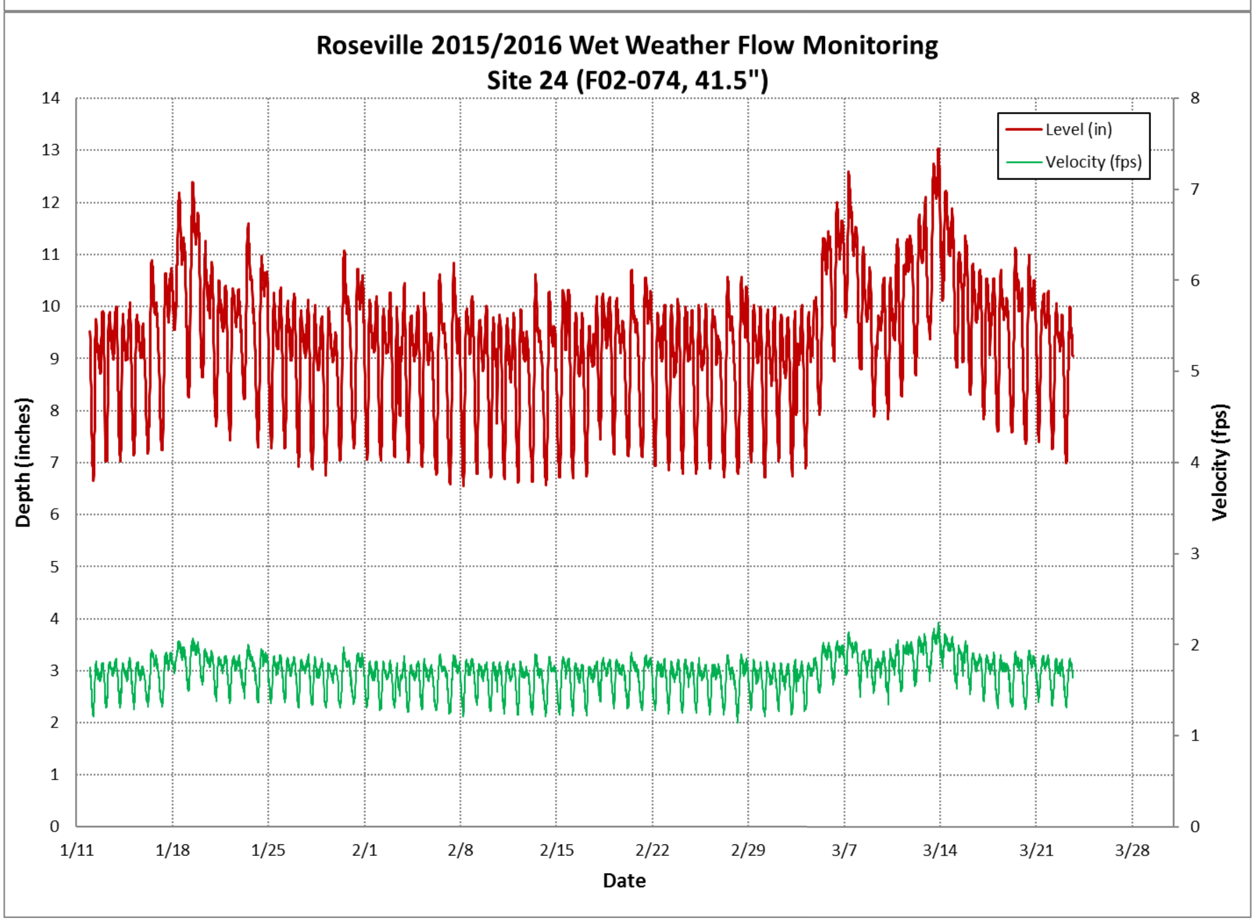


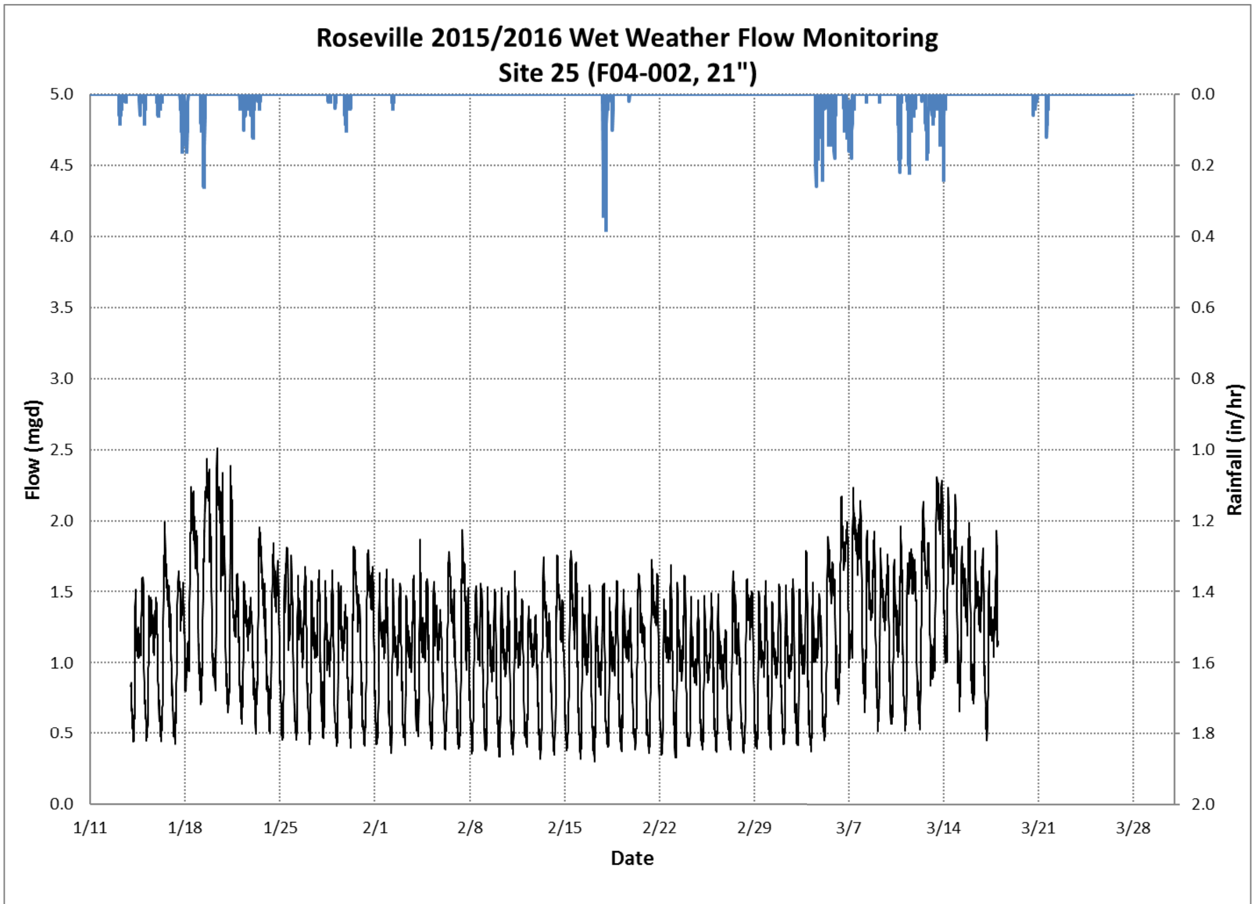
Roseville 2015/2016 Wet Weather Flow Monitoring
Site 23 (F01-146, 36")
Flow (mgd)
Rainfall (in/hr)
Date
10.0
9.0
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
1.6
1.8
2.0
1/11
1/18
1/25
2/1
2/8
2/15
2/22
2/29
3/7
3/14
3/21
3/28

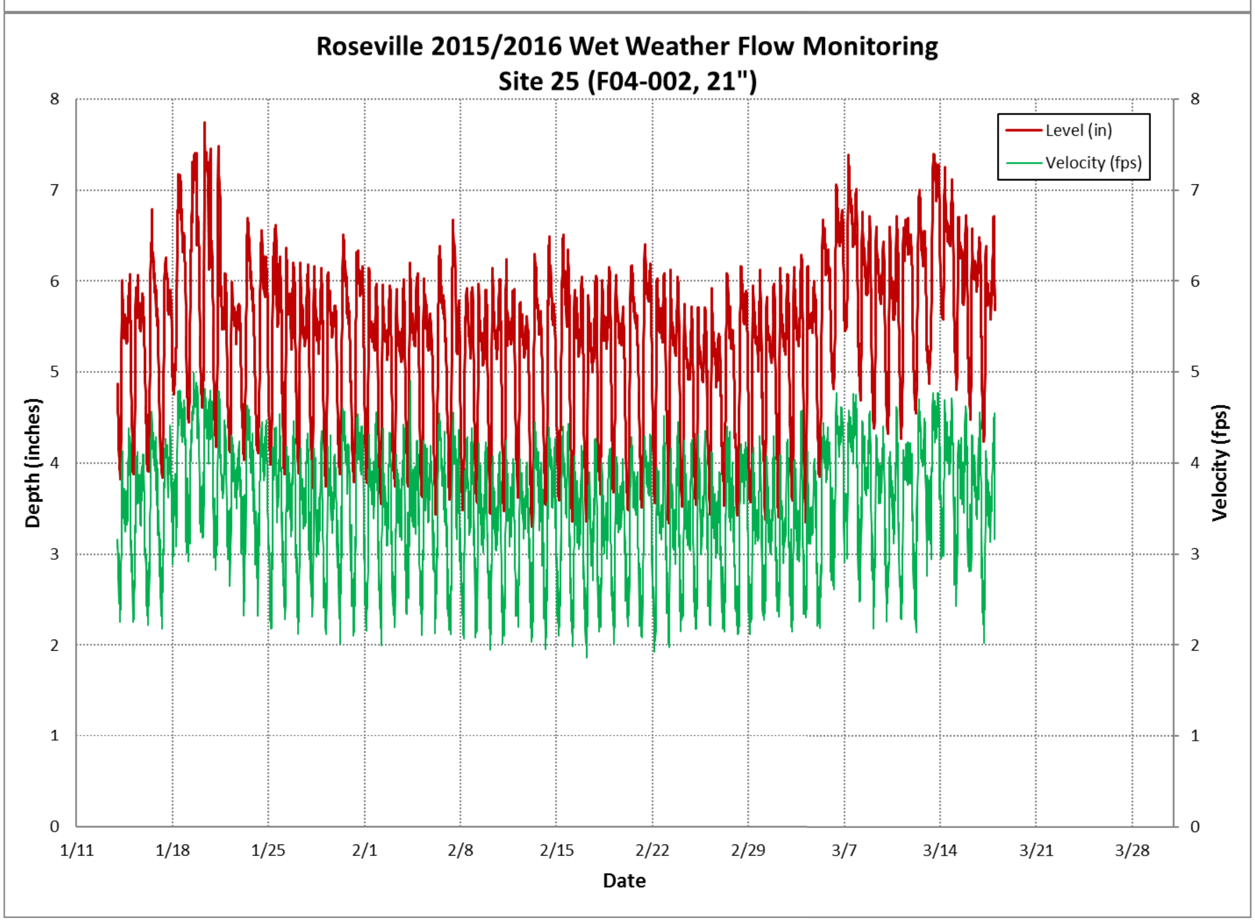
Roseville 2015/2016 Wet Weather Flow Monitoring
Site 23 (F01-146, 36")
Level (in)
Velocity (fps)
Depth (inches)
Velocity (fps)
Date
21
20
19
18
17
16
15
14
13
12
11
10
9
8
7
6
5
4
3
2
1
0
1/11
1/18
1/25
2/1
2/8
2/15
2/22
2/29
3/7
3/14
3/21
3/28


Roseville 2015/2016 Wet Weather Flow Monitoring
Site 24 (F02-074, 41.5")
Flow (mgd)
Rainfall (in/hr)
Date
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
1.6
1.8
2.0
1/11
1/18
1/25
2/1
2/8
2/15
2/22
2/29
3/7
3/14
3/21
3/28

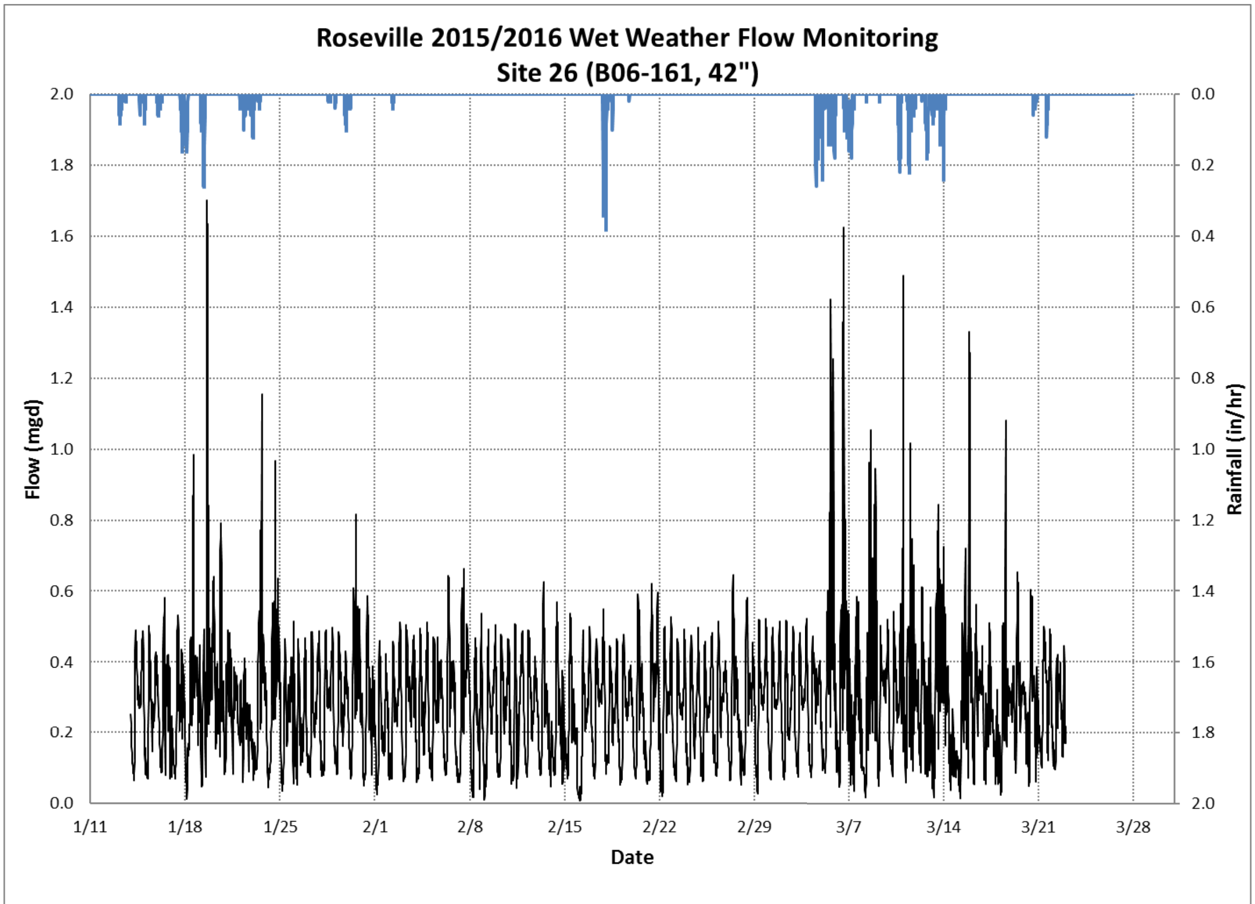

Roseville 2015/2016 Wet Weather Flow Monitoring
Site 24 (F02-074, 41.5")
Level (in)
Velocity (fps)
Depth (inches)
Velocity (fps)
Date
14
13
12
11
10
9
8
7
6
5
4
3
2
1
0
1/11
1/18
1/25
2/1
2/8
2/15
2/22
2/29
3/7
3/14
3/21
3/28

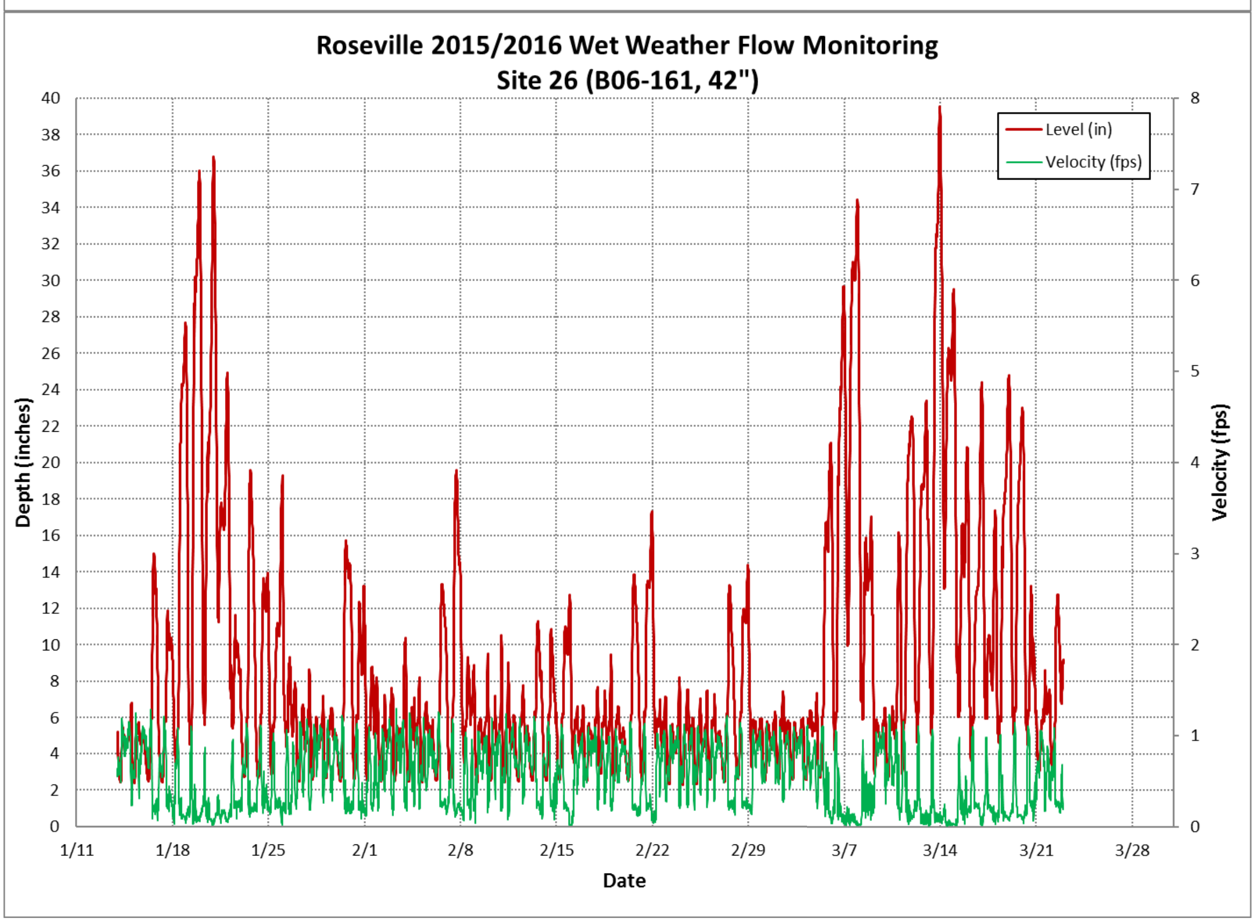


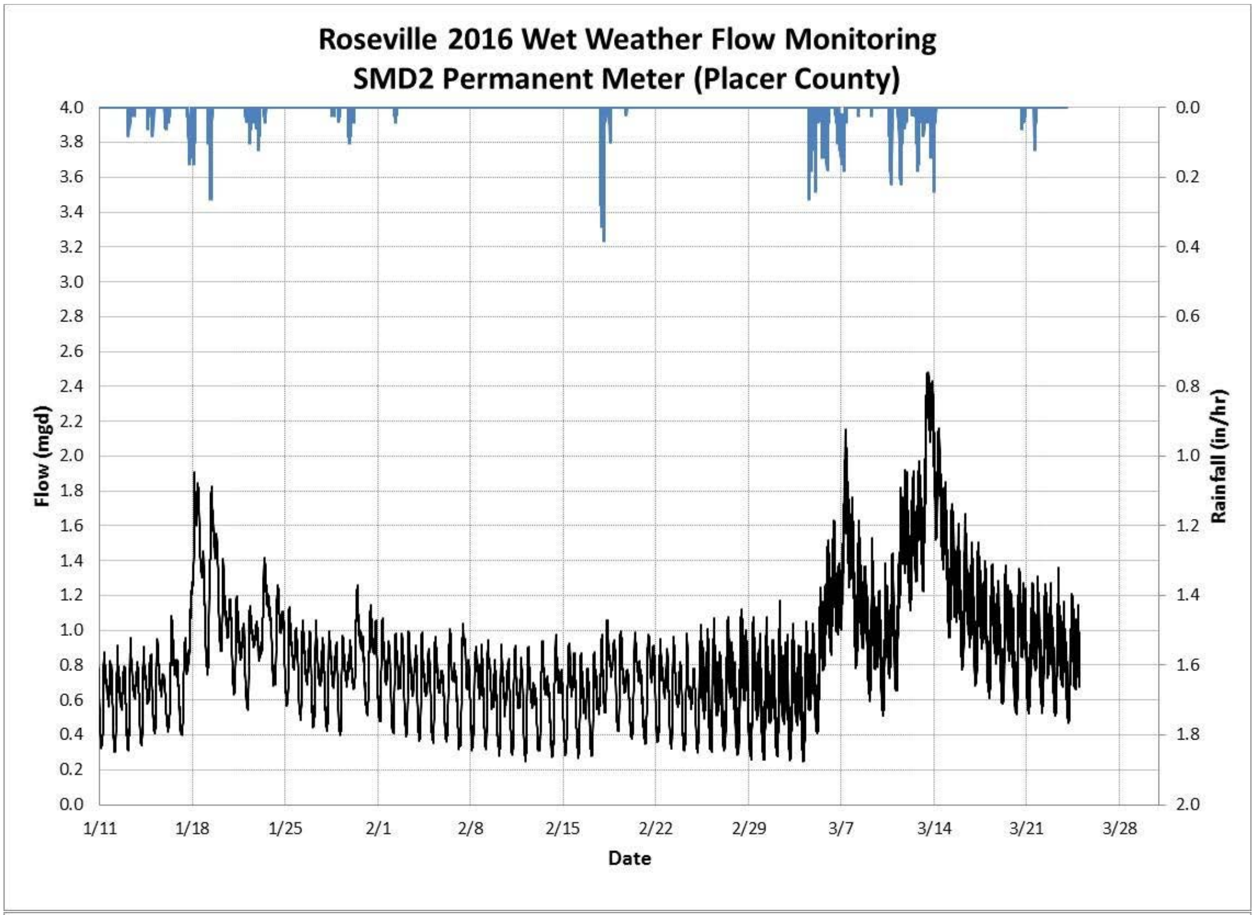
Roseville 2015/2016 Wet Weather Flow Monitoring
Site 25 (F04-002, 21")
Flow (mgd)
Rainfall (in/hr)
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
1.6
1.8
2.0
1/11
1/18
1/25
2/1
2/8
2/15
2/22
2/29
3/7
3/14
3/21
3/28
Date

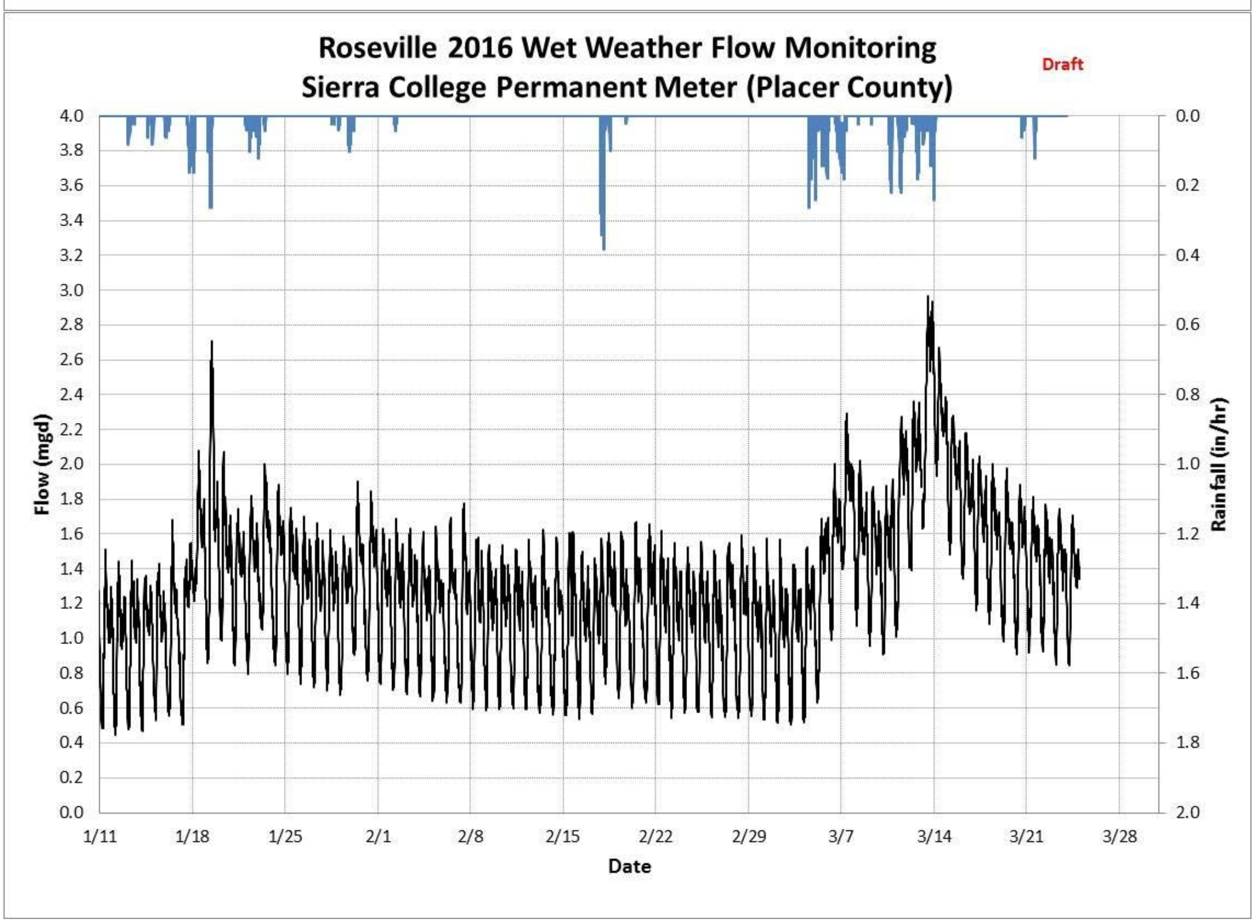



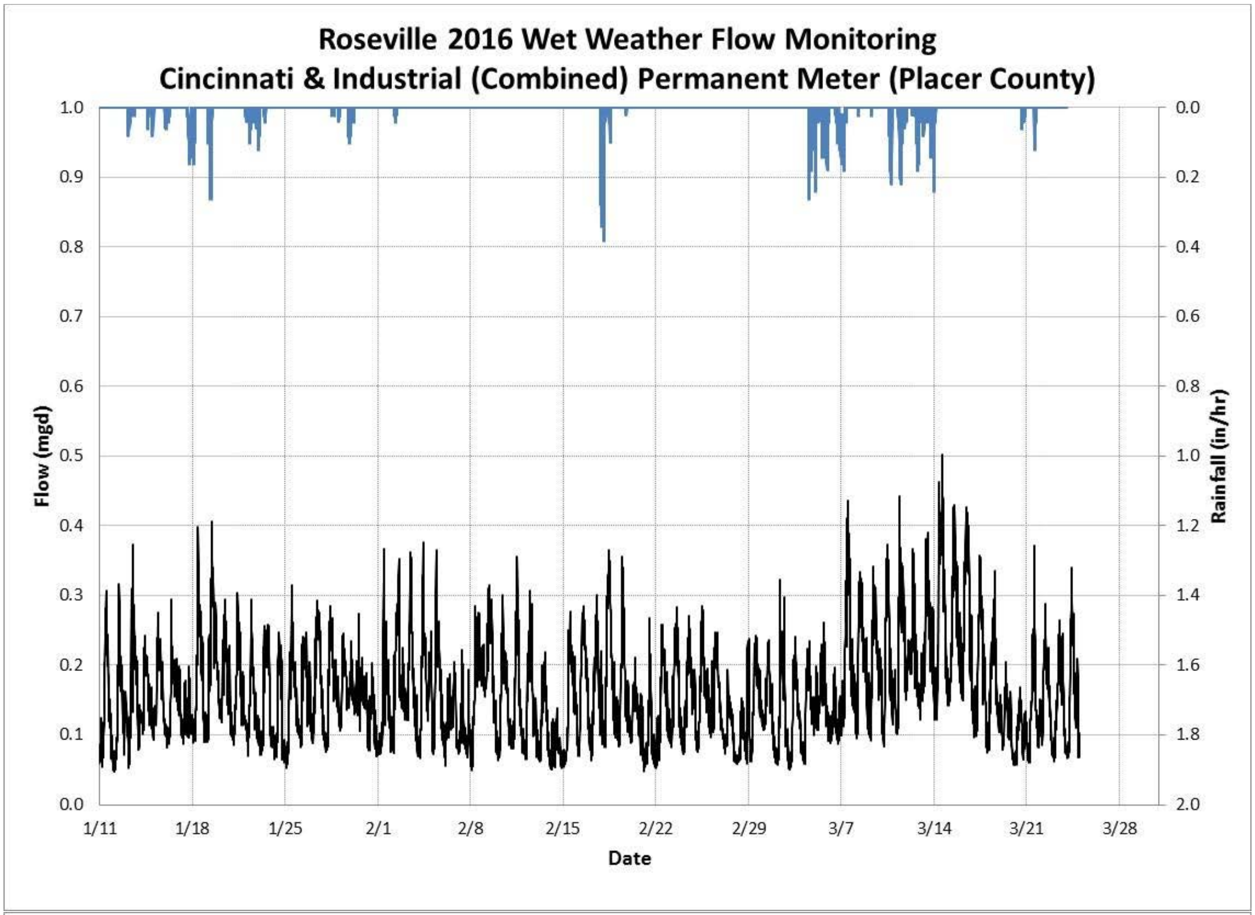
Roseville 2015/2016 Wet Weather Flow Monitoring
Site 25 (F04-002, 21")
Level (in)
Velocity (fps)
Depth (inches)
Velocity (fps)
8
7
6
5
4
3
2
1
0
1/11
1/18
1/25
2/1
2/8
2/15
2/22
2/29
3/7
3/14
3/21
3/28
Date

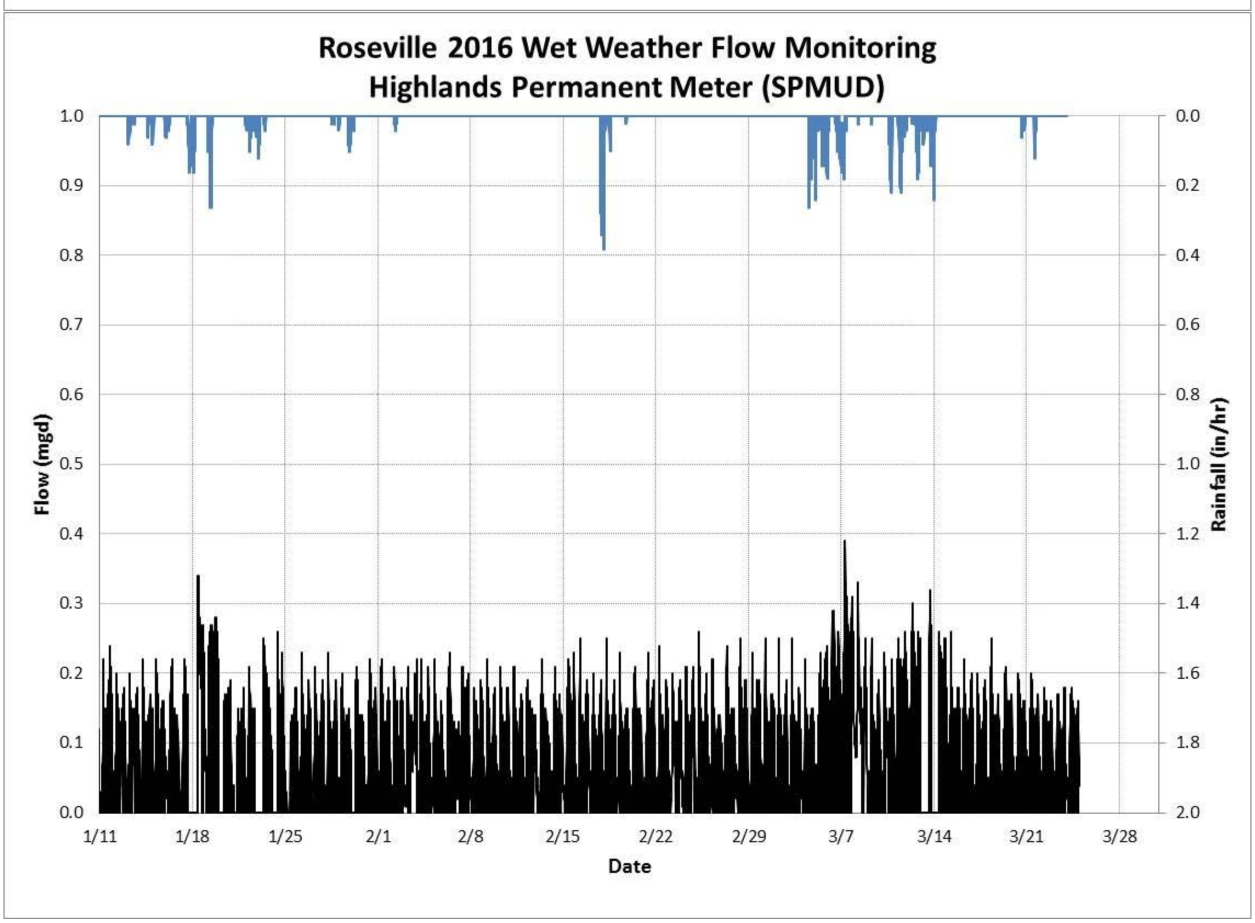

Roseville 2015/2016 Wet Weather Flow Monitoring
Site 26 (B06-161, 42")
Flow (mgd)
Rainfall (in/hr)
Date
2.0
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
1/11
1/18
1/25
2/1
2/8
2/15
2/22
2/29
3/7
3/14
3/21
3/28

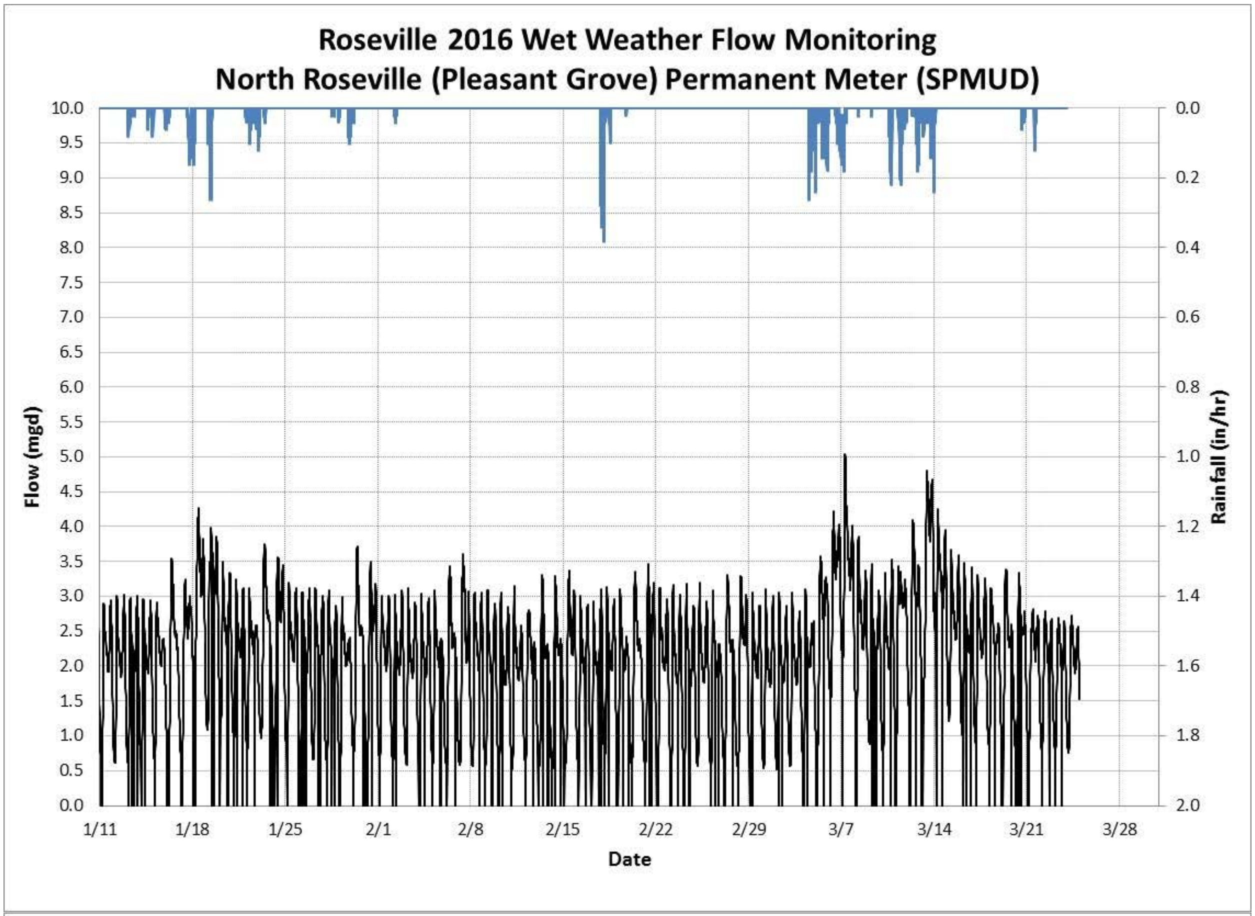

Roseville 2015/2016 Wet Weather Flow Monitoring
Site 26 (B06-161, 42")
Level (in)
Velocity (fps)
Depth (inches)
Velocity (fps)
Date
1/11
1/18
1/25
2/1
2/8
2/15
2/22
2/29
3/7
3/14
3/21
3/28


Roseville 2016 Wet Weather Flow Monitoring
SMD2 Permanent Meter (Placer County)
Flow (mgd)
Rainfall (in/hr)
Date
4.0
3.8
3.6
3.4
3.2
3.0
2.8
2.6
2.4
2.2
2.0
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
1/11
1/18
1/25
2/1
2/8
2/15
2/22
2/29
3/7
3/14
3/21
3/28

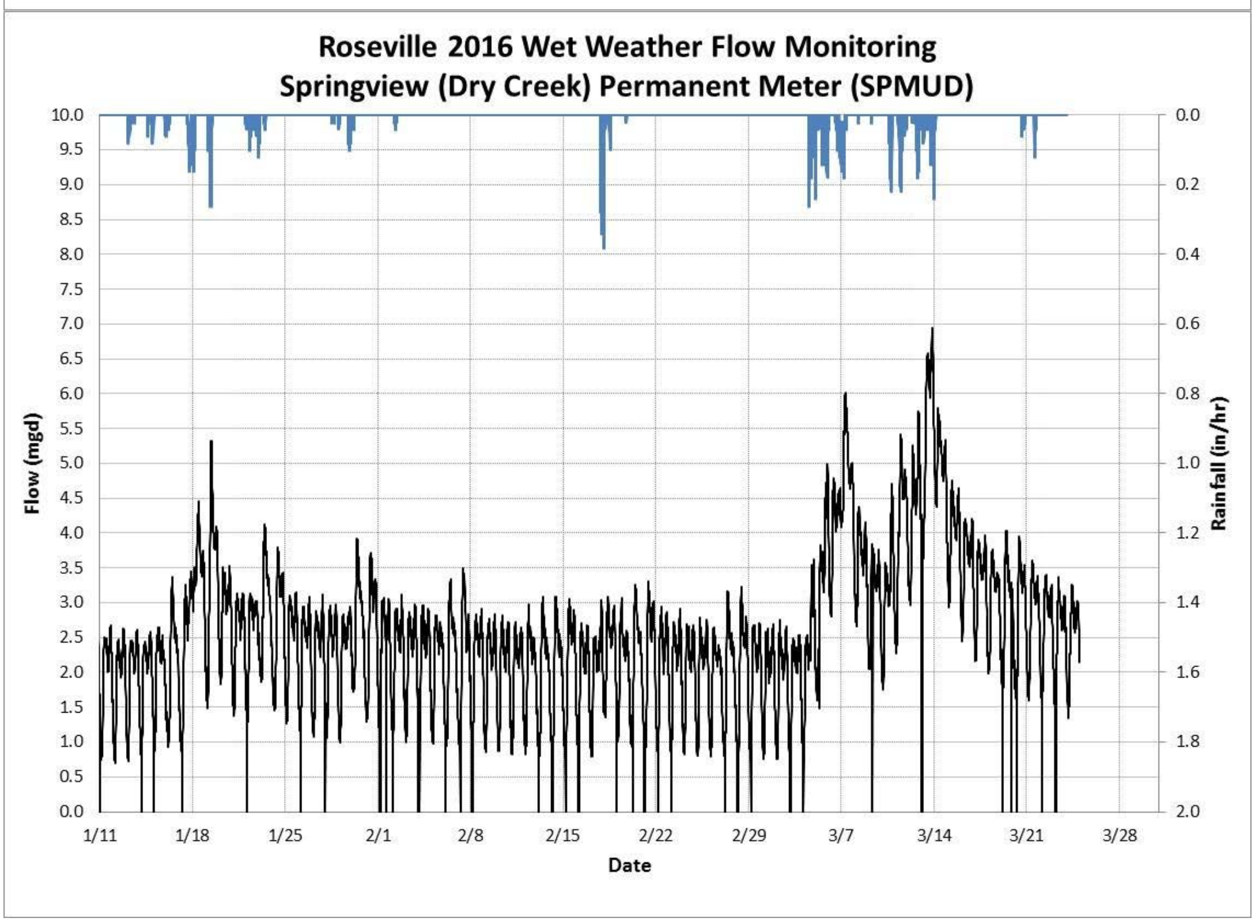

Roseville 2016 Wet Weather Flow Monitoring
Sierra College Permanent Meter (Placer County)
Draft
Flow (mgd)
Rainfall (in/hr)
Date
4.0
3.8
3.6
3.4
3.2
3.0
2.8
2.6
2.4
2.2
2.0
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
1/11
1/18
1/25
2/1
2/8
2/15
2/22
2/29
3/7
3/14
3/21
3/28


Roseville 2016 Wet Weather Flow Monitoring
Cincinnati & Industrial (Combined) Permanent Meter (Placer County)
Flow (mgd)
Rainfall (in/hr)
Date
1/11
1/18
1/25
2/1
2/8
2/15
2/22
2/29
3/7
3/14
3/21
3/28

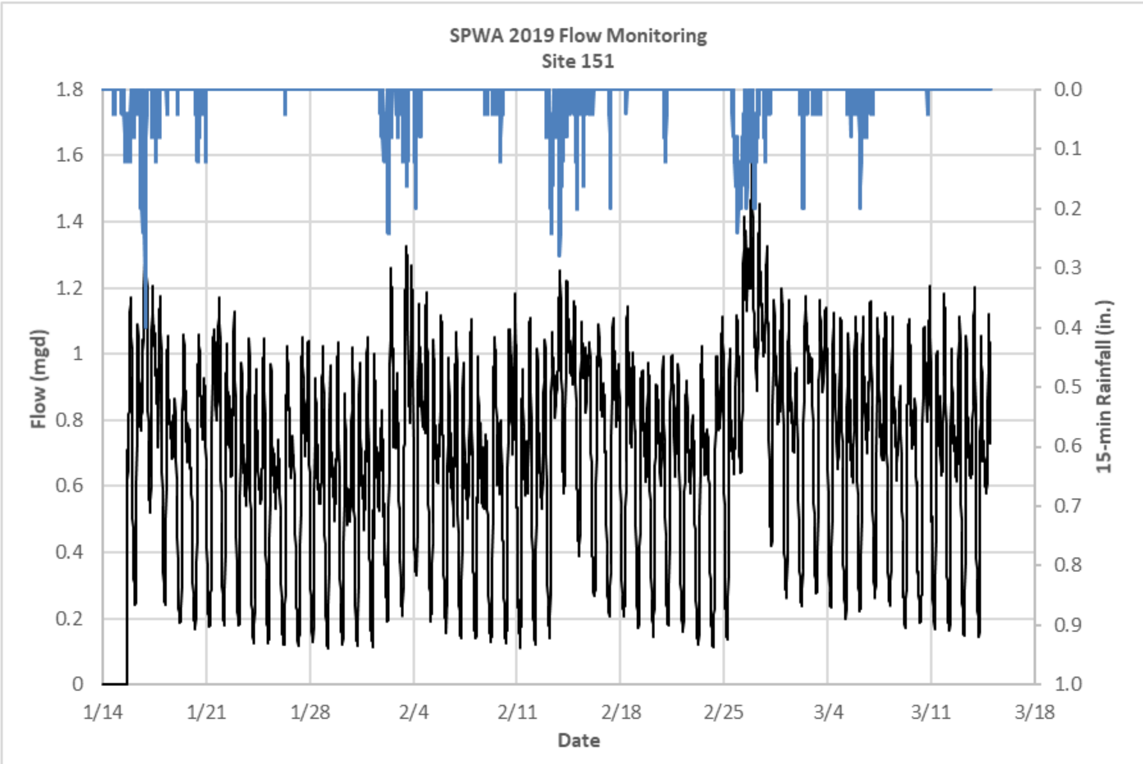

Roseville 2016 Wet Weather Flow Monitoring
Highlands Permanent Meter (SPMUD)
Flow (mgd)
Rainfall (in/hr)
Date
1/11
1/18
1/25
2/1
2/8
2/15
2/22
2/29
3/7
3/14
3/21
3/28

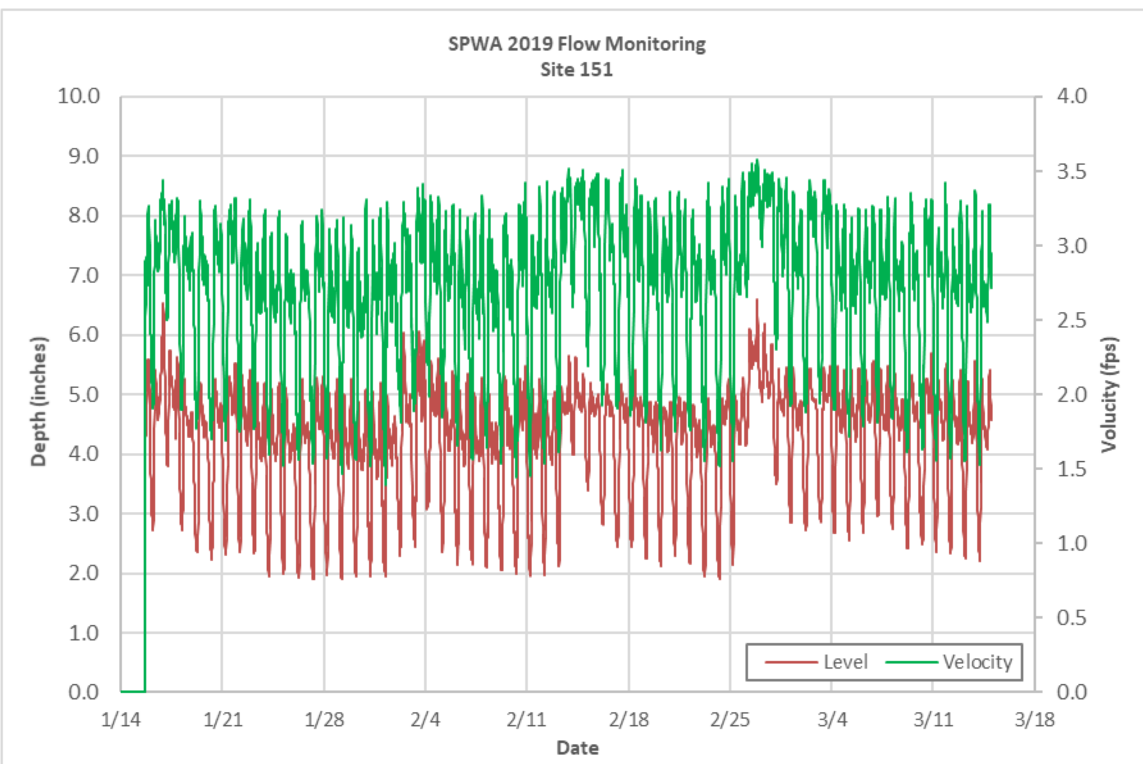


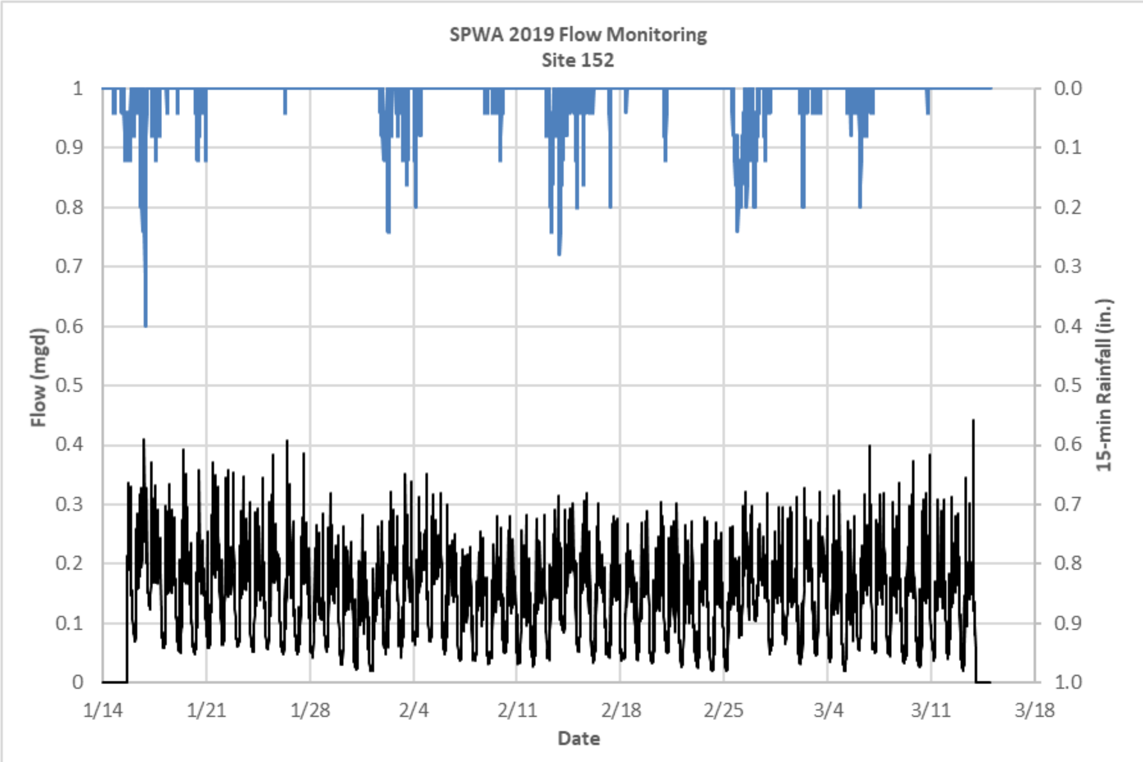
Roseville 2016 Wet Weather Flow Monitoring
North Roseville (Pleasant Grove) Permanent Meter (SPMUD)
Flow (mgd)
Rainfall (in/hr)
Date
10.0
9.5
9.0
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
1.6
1.8
2.0
1/11
1/18
1/25
2/1
2/8
2/15
2/22
2/29
3/7
3/14
3/21
3/28

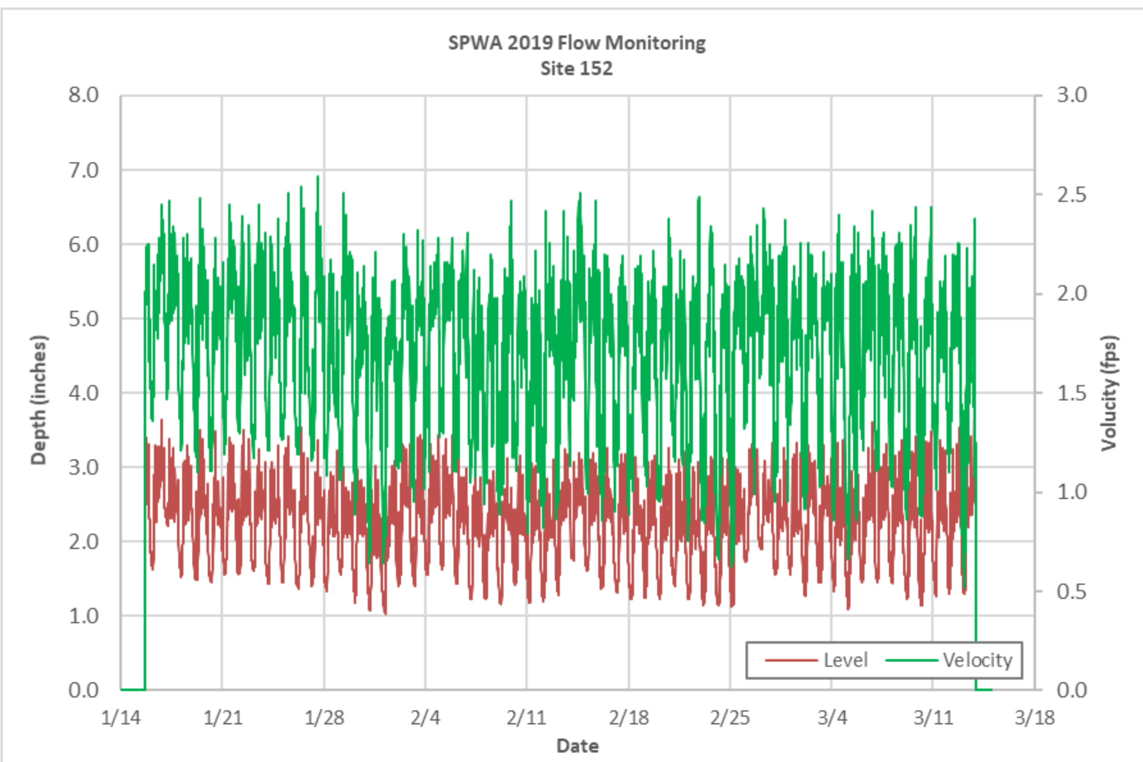



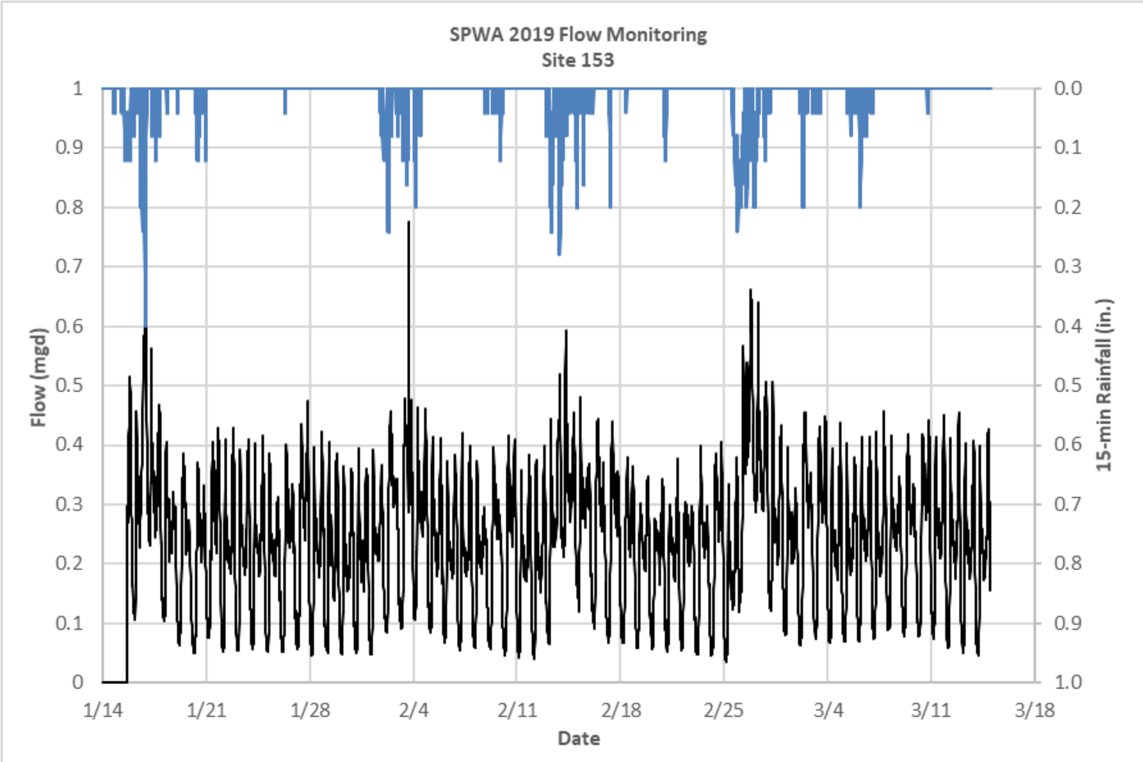
Roseville 2016 Wet Weather Flow Monitoring
Springview (Dry Creek) Permanent Meter (SPMUD)
Flow (mgd)
Rainfall (in/hr)
Date
10.0
9.5
9.0
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
1.6
1.8
2.0
1/11
1/18
1/25
2/1
2/8
2/15
2/22
2/29
3/7
3/14
3/21
3/28


SPWA 2019 Flow Monitoring
Site 151
Flow (mgd)
15-min Rainfall (in.)
Date
1/14
1/21
1/28
2/4
2/11
2/18
2/25
3/4
3/11
3/18

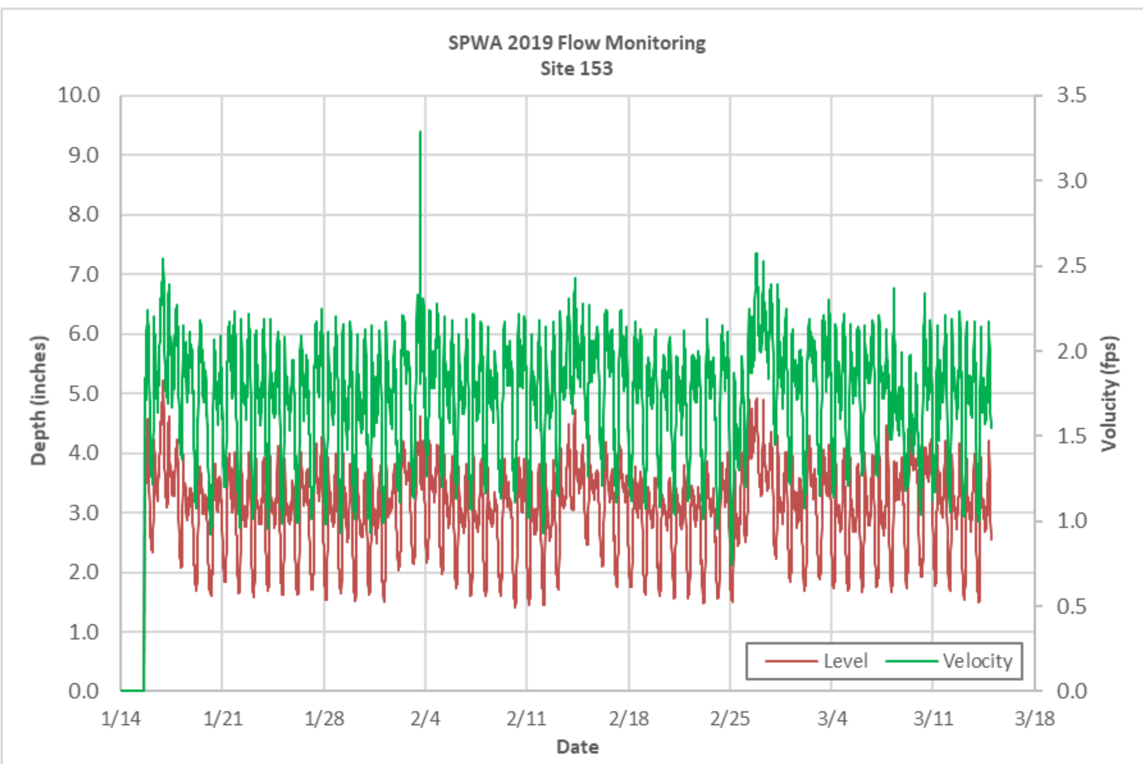

SPWA 2019 Flow Monitoring
Site 151
Depth (inches)
Volucity (fps)
Level
Velocity
Date
1/14
1/21
1/28
2/4
2/11
2/18
2/25
3/4
3/11
3/18


SPWA 2019 Flow Monitoring
Site 152
Flow (mgd)
15-min Rainfall (in.)
Date
1/14
1/21
1/28
2/4
2/11
2/18
2/25
3/4
3/11
3/18

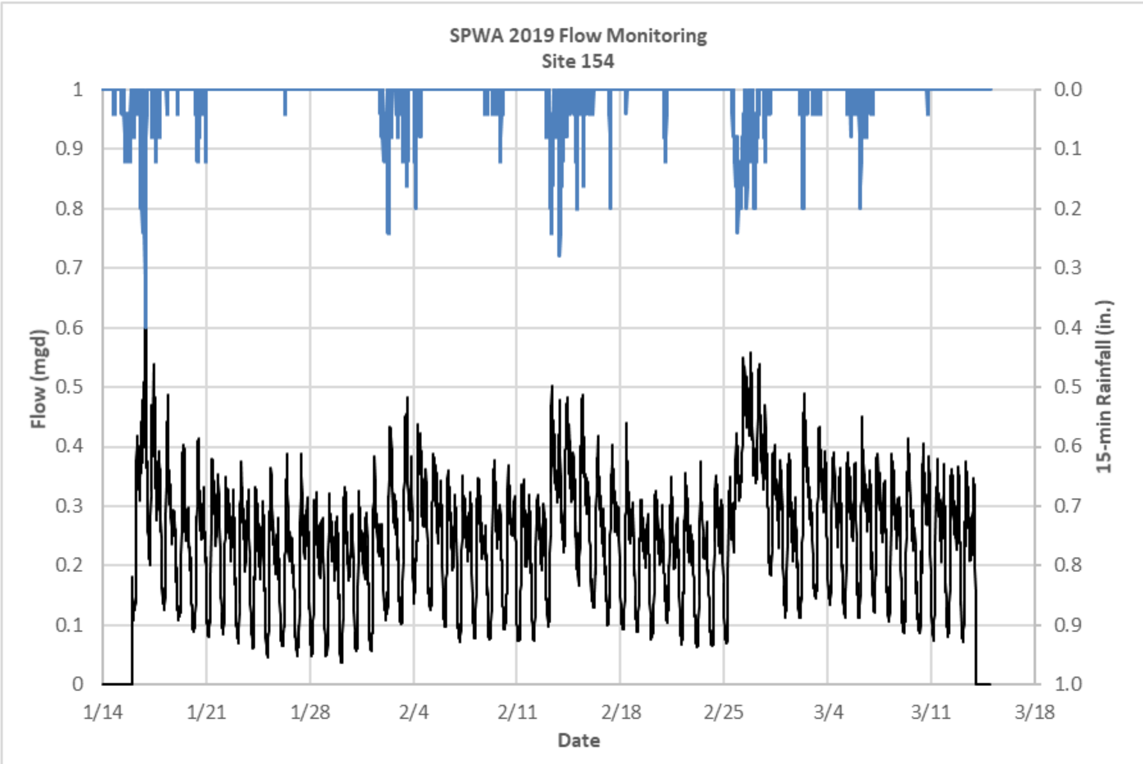

SPWA 2019 Flow Monitoring
Site 152
Depth (inches)
Volucity (fps)
Level
Velocity
Date
1/14
1/21
1/28
2/4
2/11
2/18
2/25
3/4
3/11
3/18

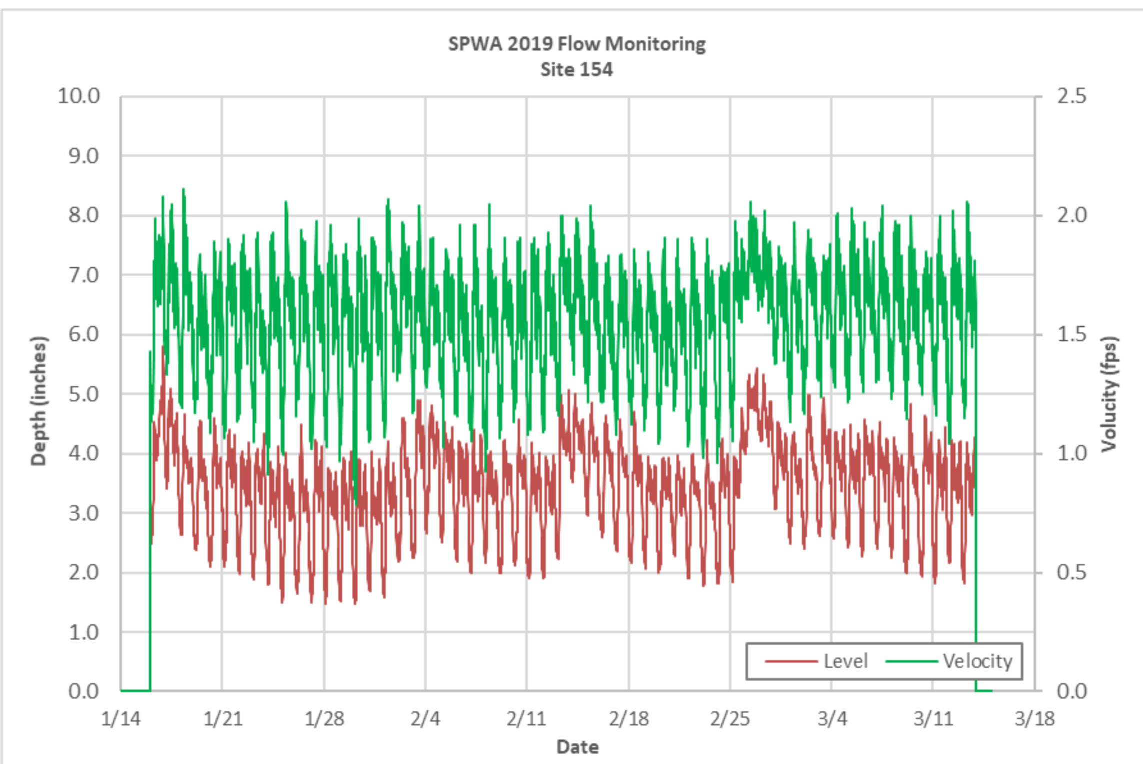


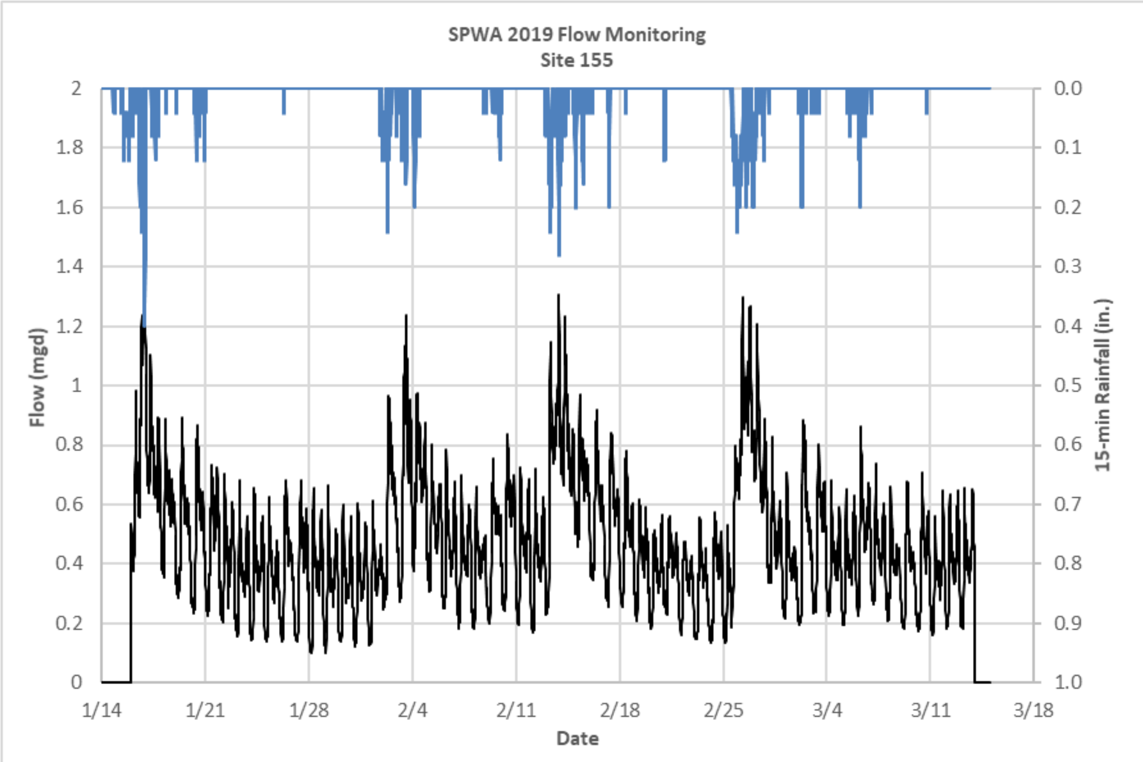
SPWA 2019 Flow Monitoring
Site 153
Flow (mgd)
15-min Rainfall (in.)
Date
1/14
1/21
1/28
2/4
2/11
2/18
2/25
3/4
3/11
3/18

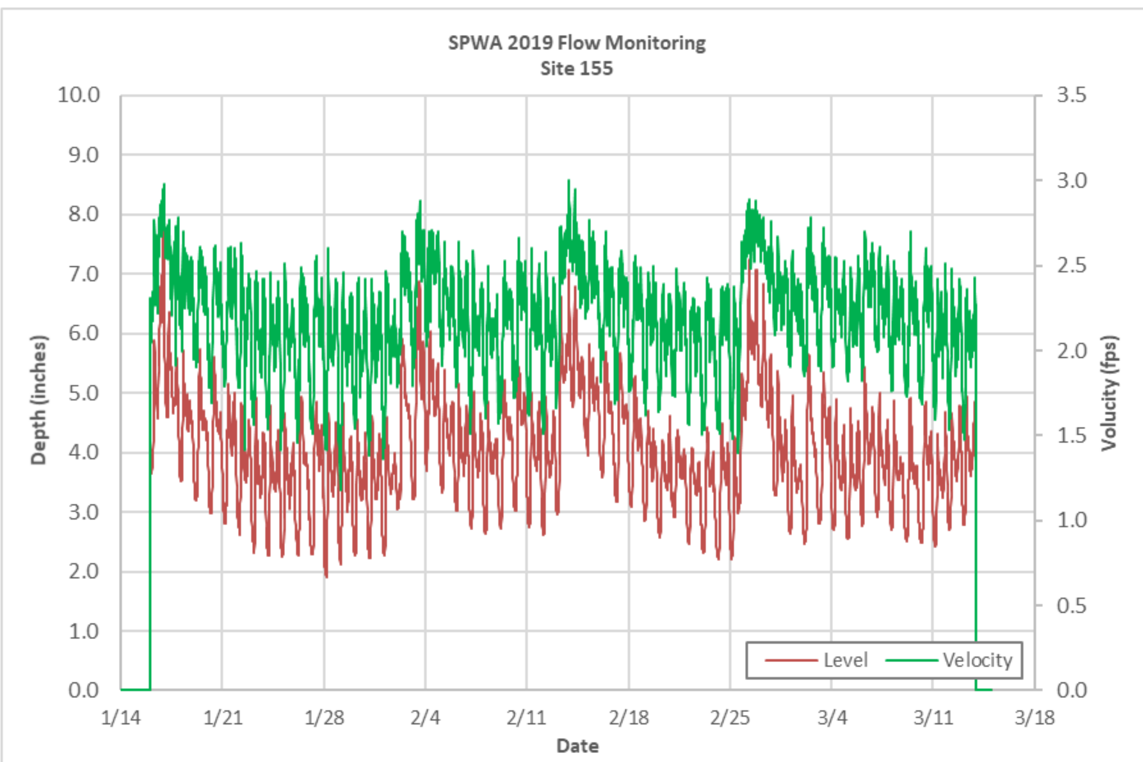



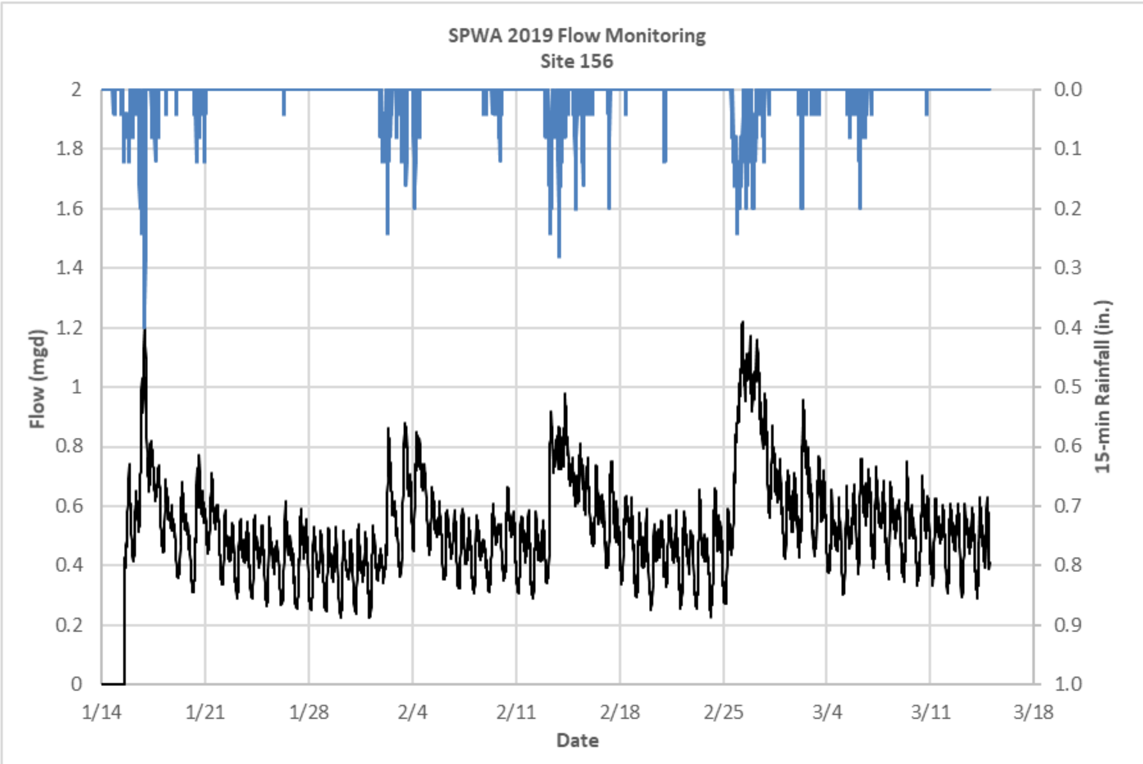
SPWA 2019 Flow Monitoring
Site 153
Depth (inches)
Volucity (fps)
Date
Level
Velocity
1/14
1/21
1/28
2/4
2/11
2/18
2/25
3/4
3/11
3/18

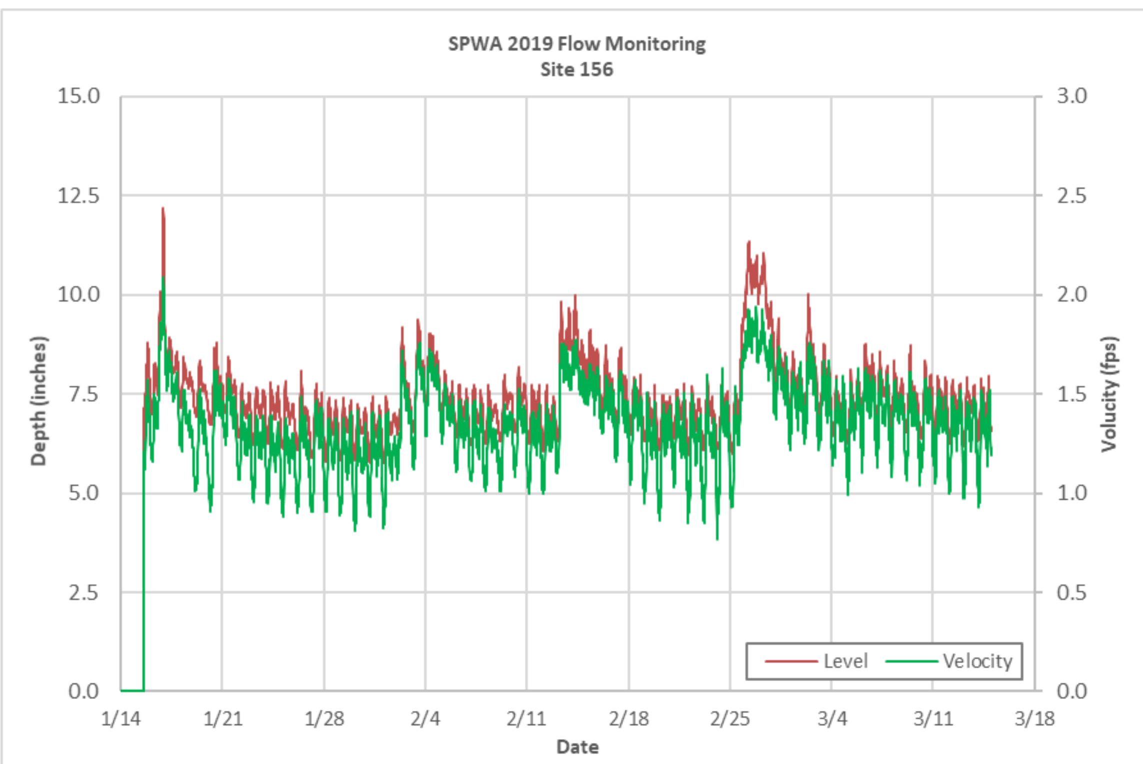

SPWA 2019 Flow Monitoring
Site 154
Flow (mgd)
15-min Rainfall (in.)
Date
1/14
1/21
1/28
2/4
2/11
2/18
2/25
3/4
3/11
3/18

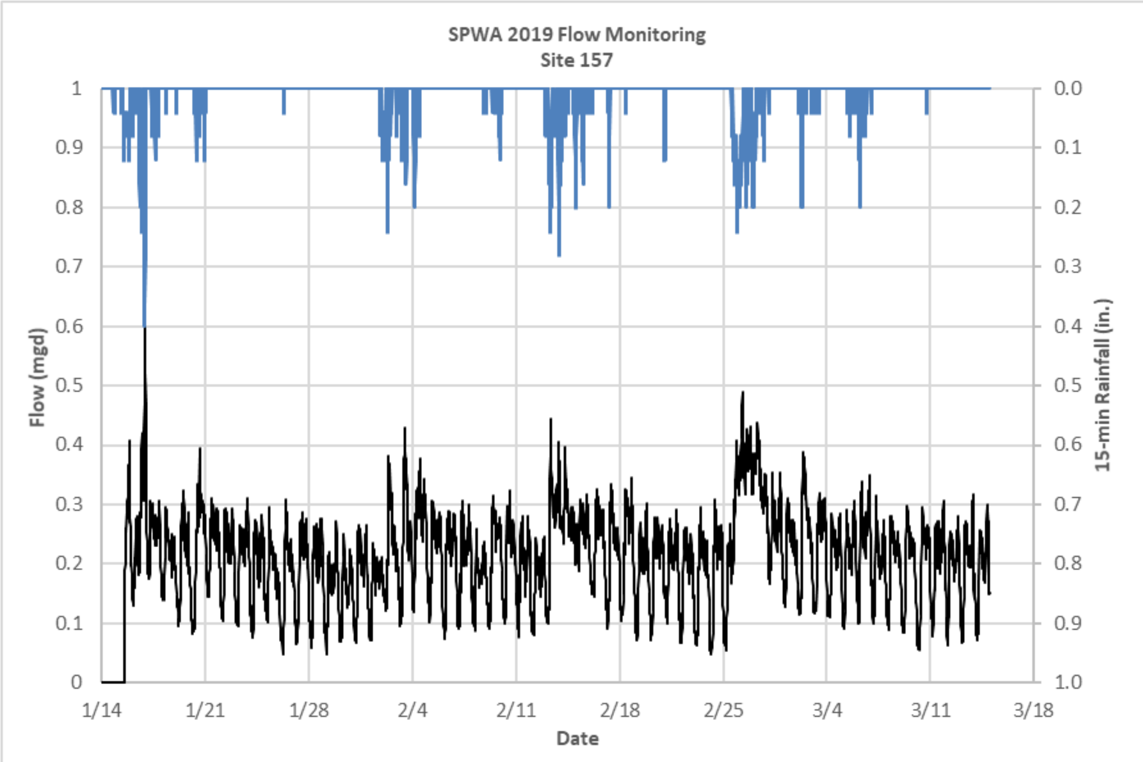

SPWA 2019 Flow Monitoring
Site 154
Depth (inches)
Volucity (fps)
Level
Velocity
Date
1/14
1/21
1/28
2/4
2/11
2/18
2/25
3/4
3/11
3/18

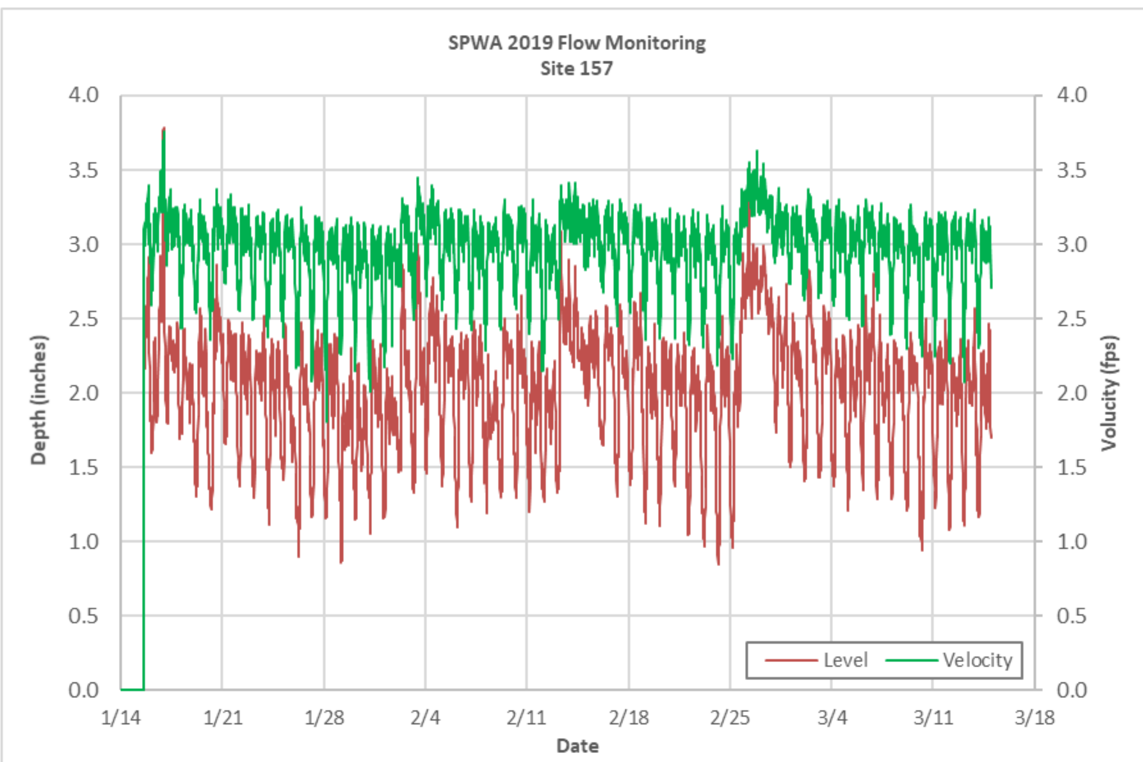

SPWA 2019 Flow Monitoring
Site 155
Flow (mgd)
15-min Rainfall (in.)
Date
2
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
1/14
1/21
1/28
2/4
2/11
2/18
2/25
3/4
3/11
3/18

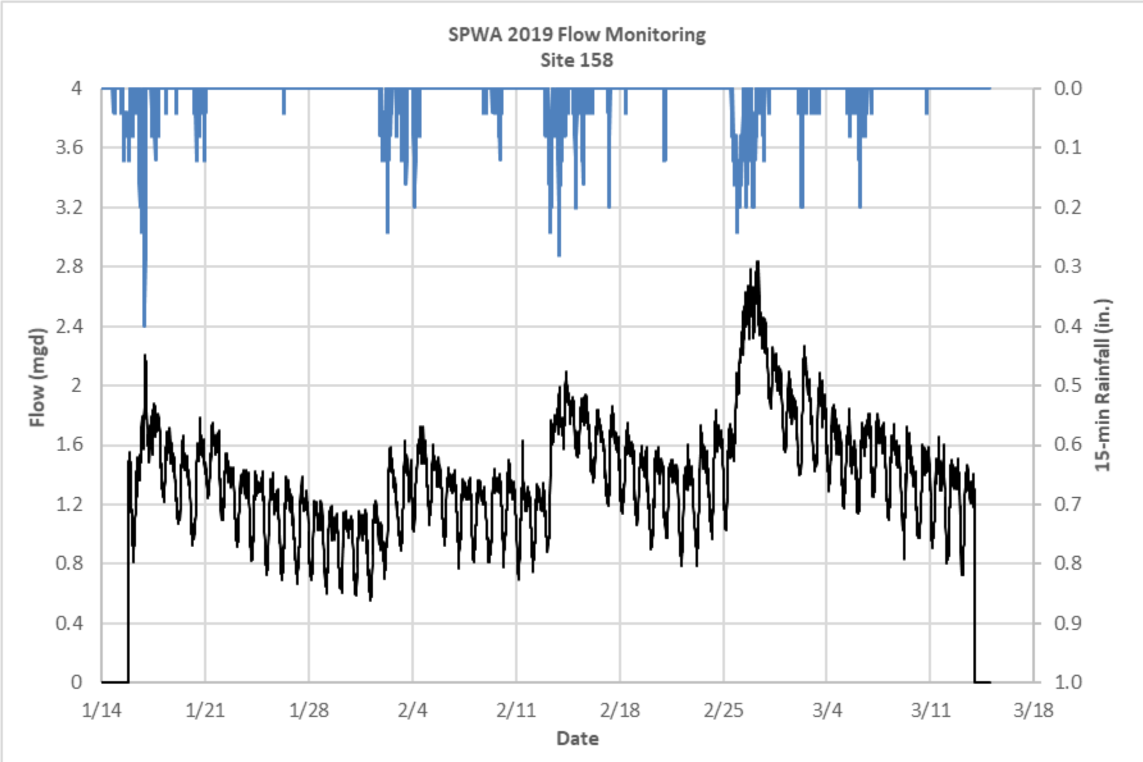

SPWA 2019 Flow Monitoring
Site 155
Depth (inches)
Volucity (fps)
Date
Level
Velocity
10.0
9.0
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
1/14
1/21
1/28
2/4
2/11
2/18
2/25
3/4
3/11
3/18

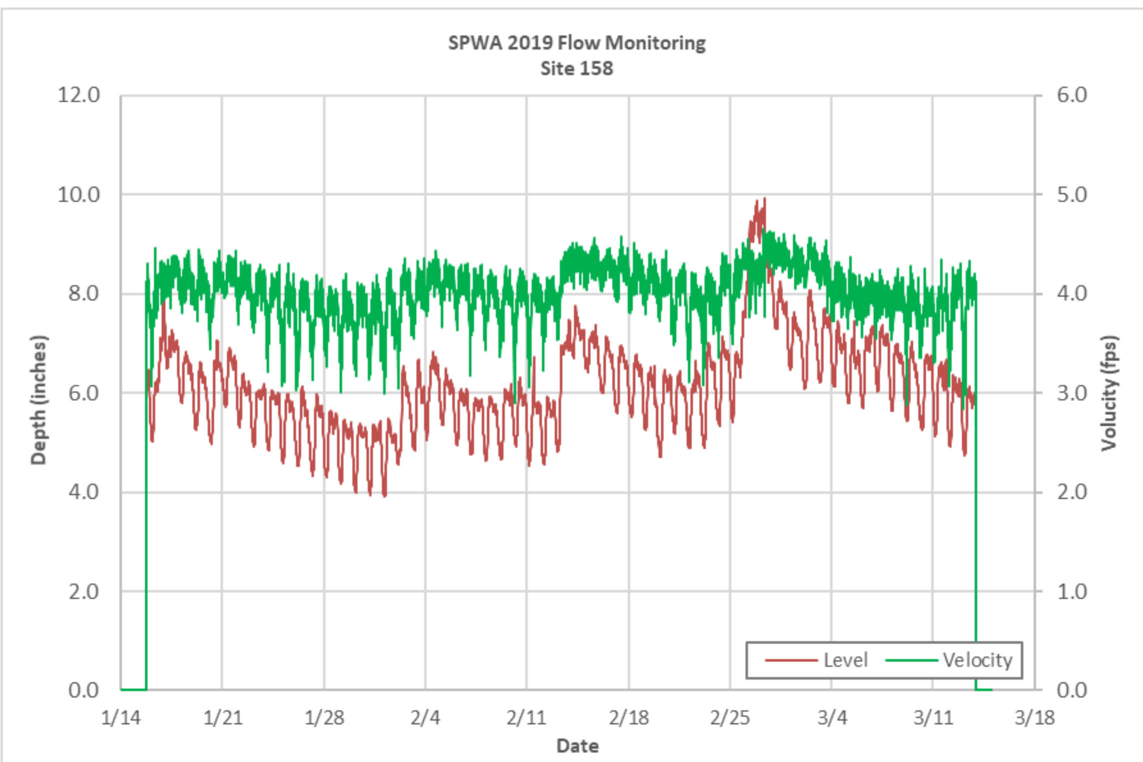

SPWA 2019 Flow Monitoring
Site 156
Flow (mgd)
15-min Rainfall (in.)
Date
2
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
1/14
1/21
1/28
2/4
2/11
2/18
2/25
3/4
3/11
3/18

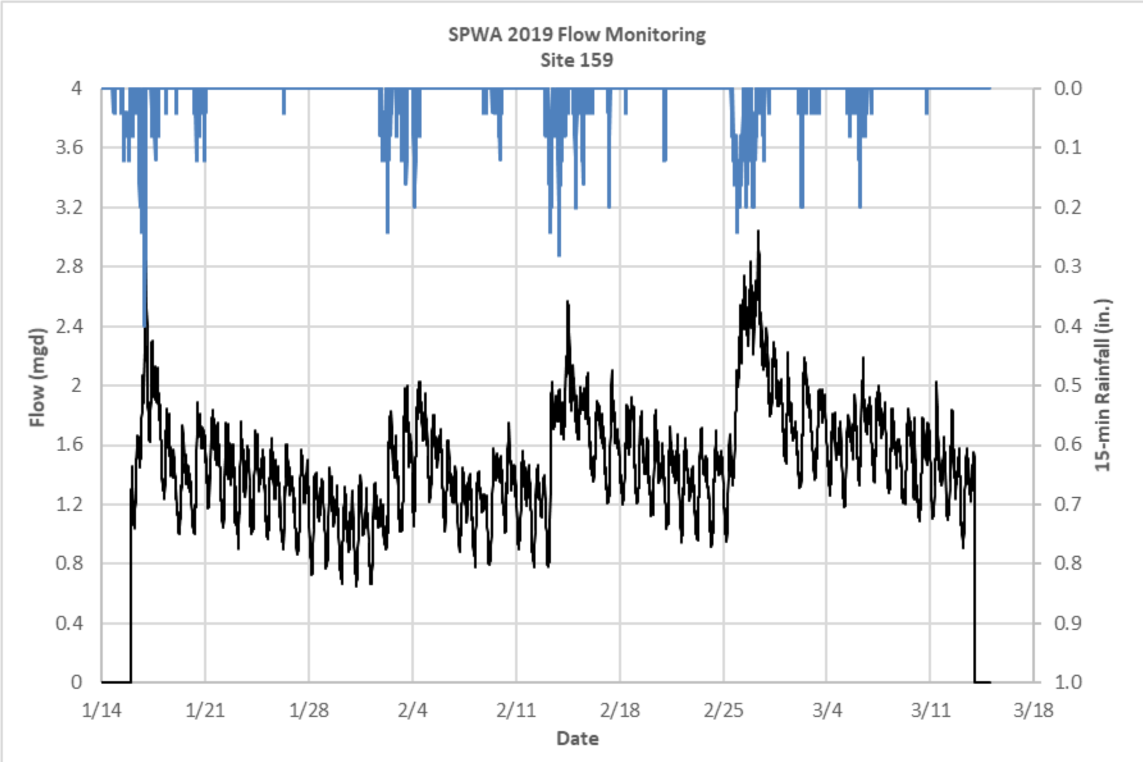

SPWA 2019 Flow Monitoring
Site 156
Depth (inches)
Volucity (fps)
Date
Level
Velocity
15.0
12.5
10.0
7.5
5.0
2.5
0.0
3.0
2.5
2.0
1.5
1.0
0.5
0.0
1/14
1/21
1/28
2/4
2/11
2/18
2/25
3/4
3/11
3/18


SPWA 2019 Flow Monitoring
Site 157
Flow (mgd)
15-min Rainfall (in.)
Date
1/14
1/21
1/28
2/4
2/11
2/18
2/25
3/4
3/11
3/18

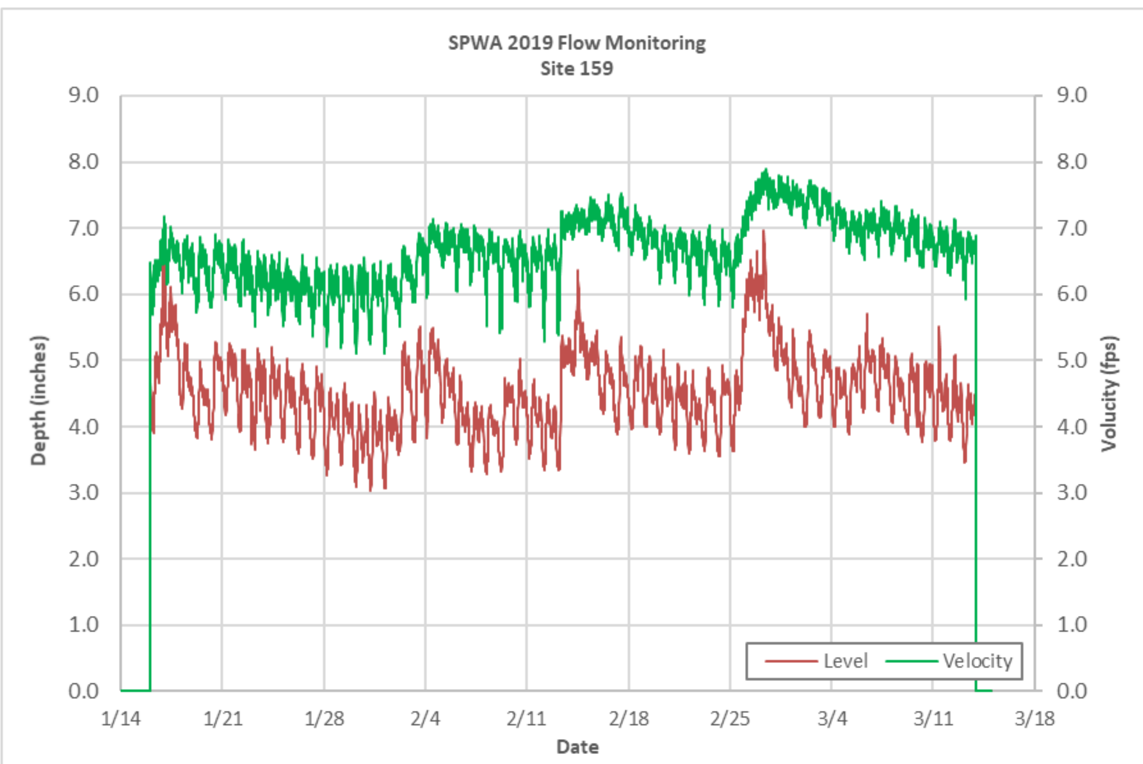

SPWA 2019 Flow Monitoring
Site 157
Depth (inches)
Volucity (fps)
Level
Velocity
Date
1/14
1/21
1/28
2/4
2/11
2/18
2/25
3/4
3/11
3/18


SPWA 2019 Flow Monitoring
Site 158
Flow (mgd)
15-min Rainfall (in.)
Date
4
3.6
3.2
2.8
2.4
2
1.6
1.2
0.8
0.4
0
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
1/14
1/21
1/28
2/4
2/11
2/18
2/25
3/4
3/11
3/18

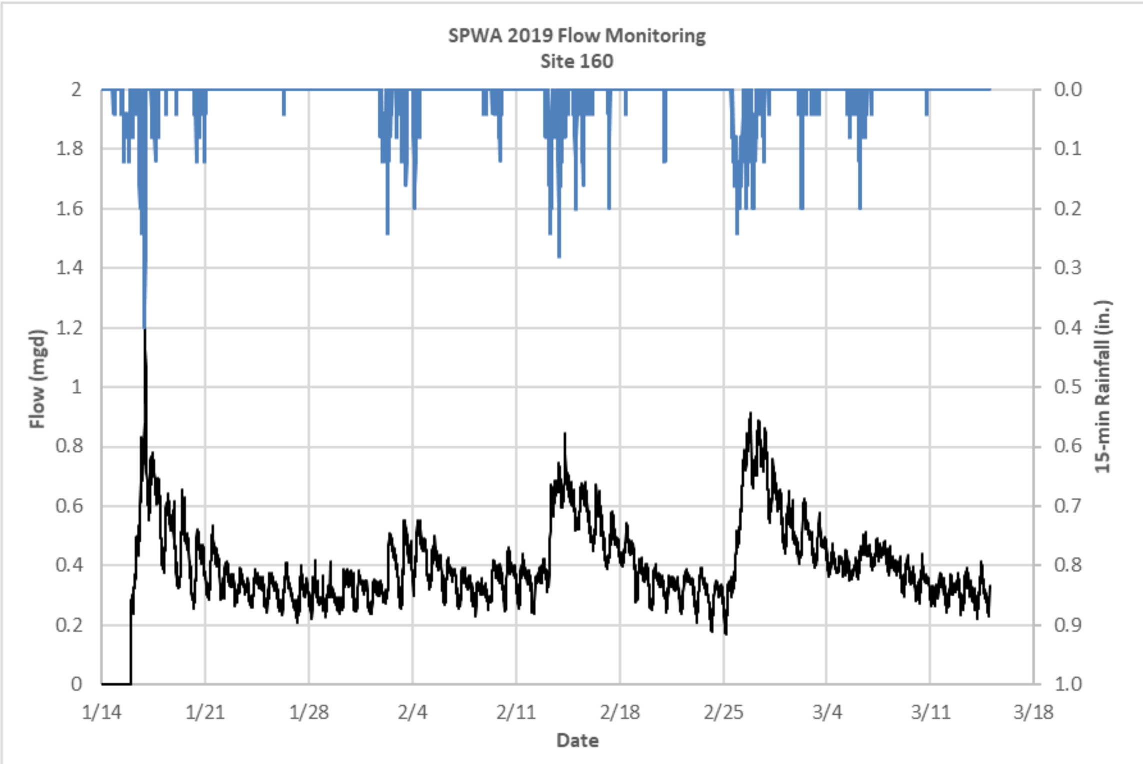

SPWA 2019 Flow Monitoring
Site 158
Depth (inches)
Volucity (fps)
Date
Level
Velocity
12.0
10.0
8.0
6.0
4.0
2.0
0.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
1/14
1/21
1/28
2/4
2/11
2/18
2/25
3/4
3/11
3/18

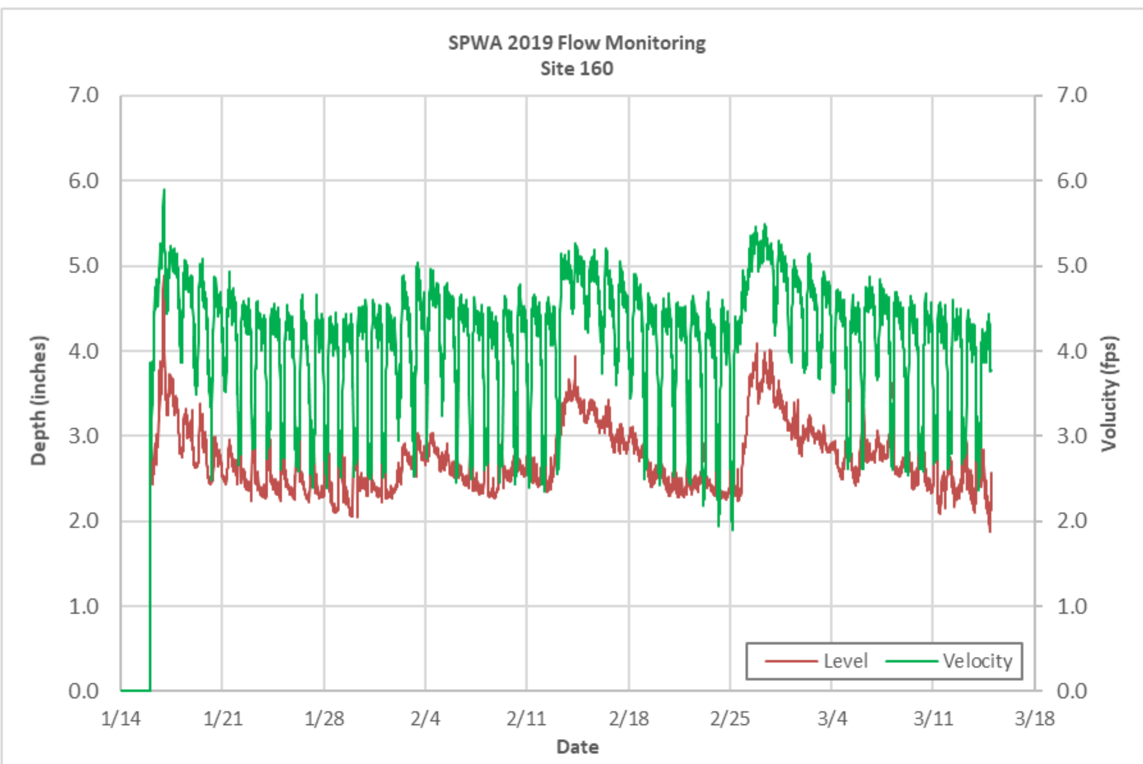


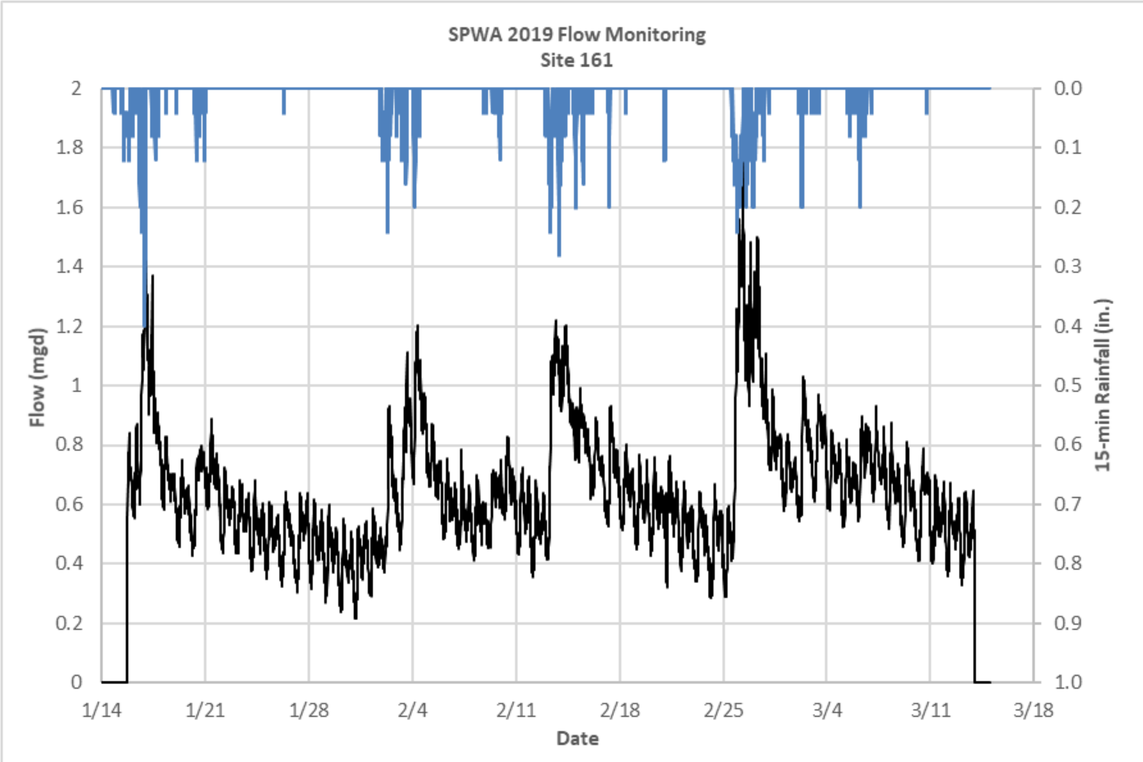
SPWA 2019 Flow Monitoring
Site 159
Flow (mgd)
15-min Rainfall (in.)
Date

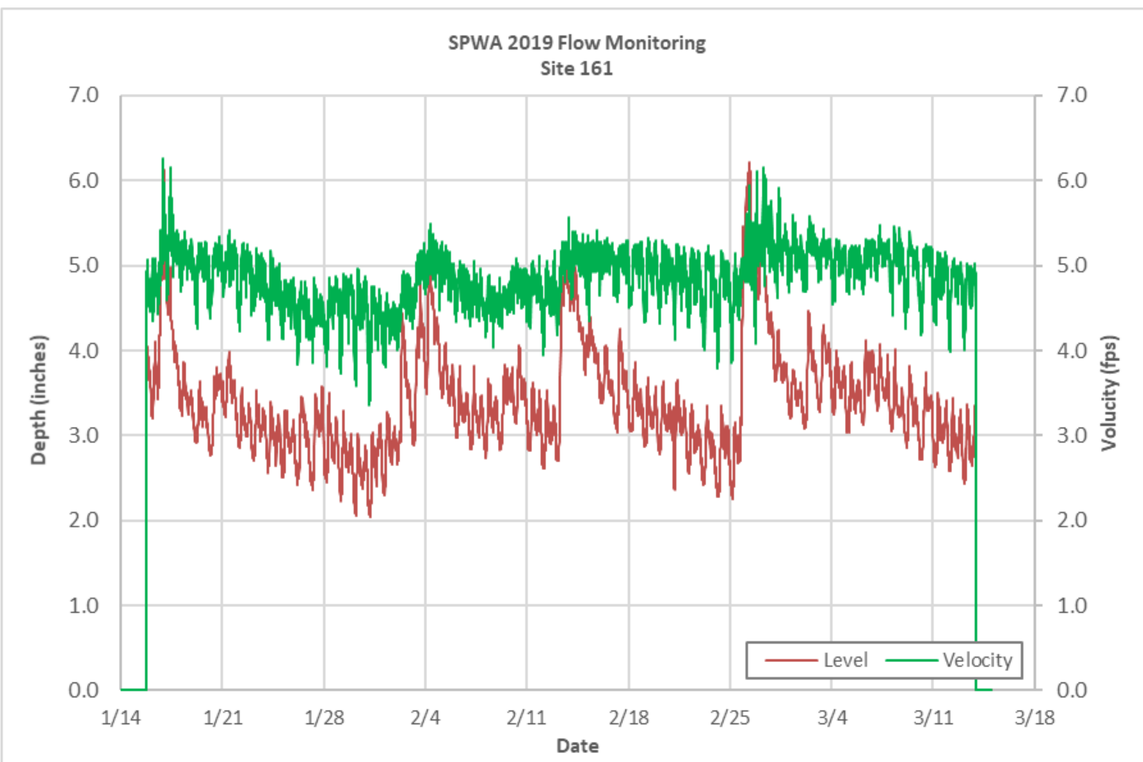



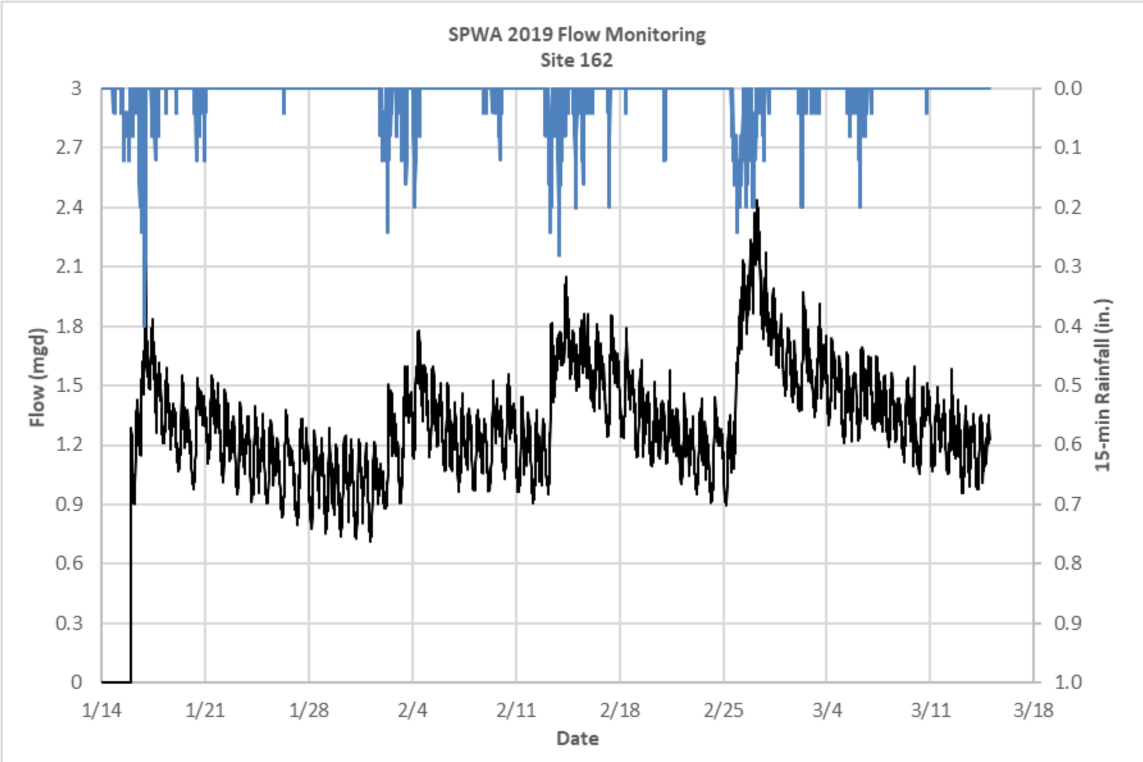
SPWA 2019 Flow Monitoring
Site 159
Depth (inches)
Volucity (fps)
Level
Velocity
Date

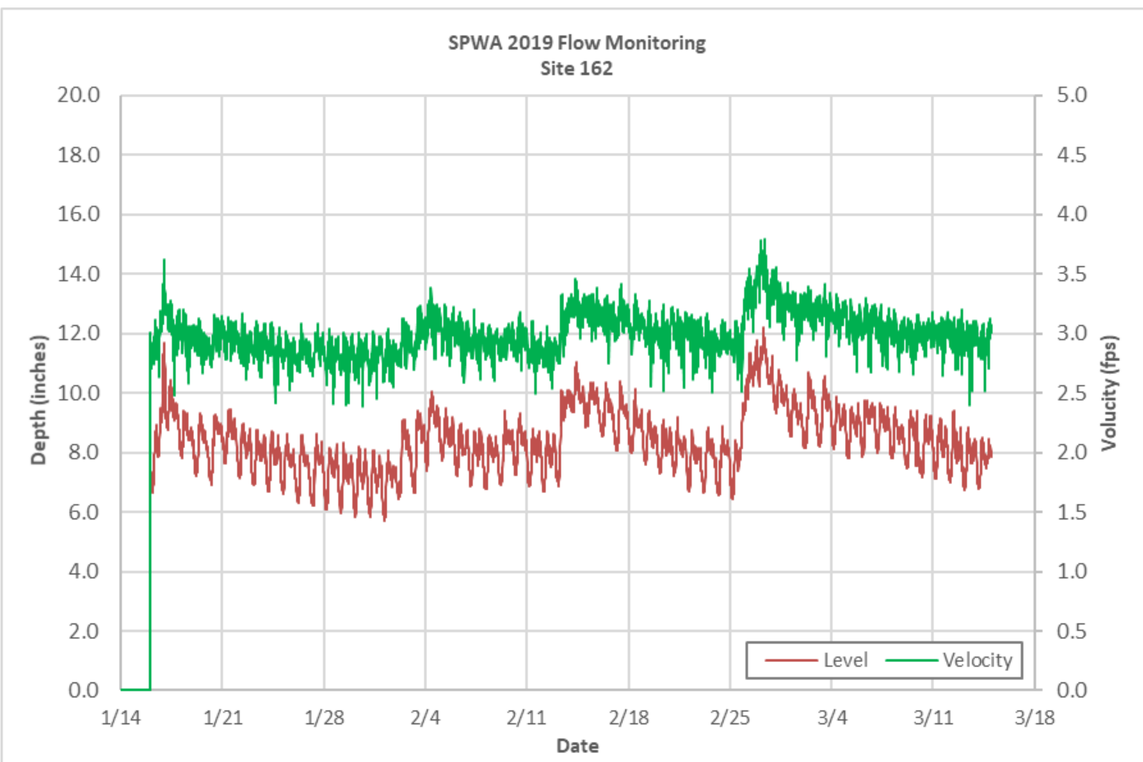

SPWA 2019 Flow Monitoring
Site 160
Flow (mgd)
15-min Rainfall (in.)
2
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
1/14
1/21
1/28
2/4
2/11
2/18
2/25
3/4
3/11
3/18
Date

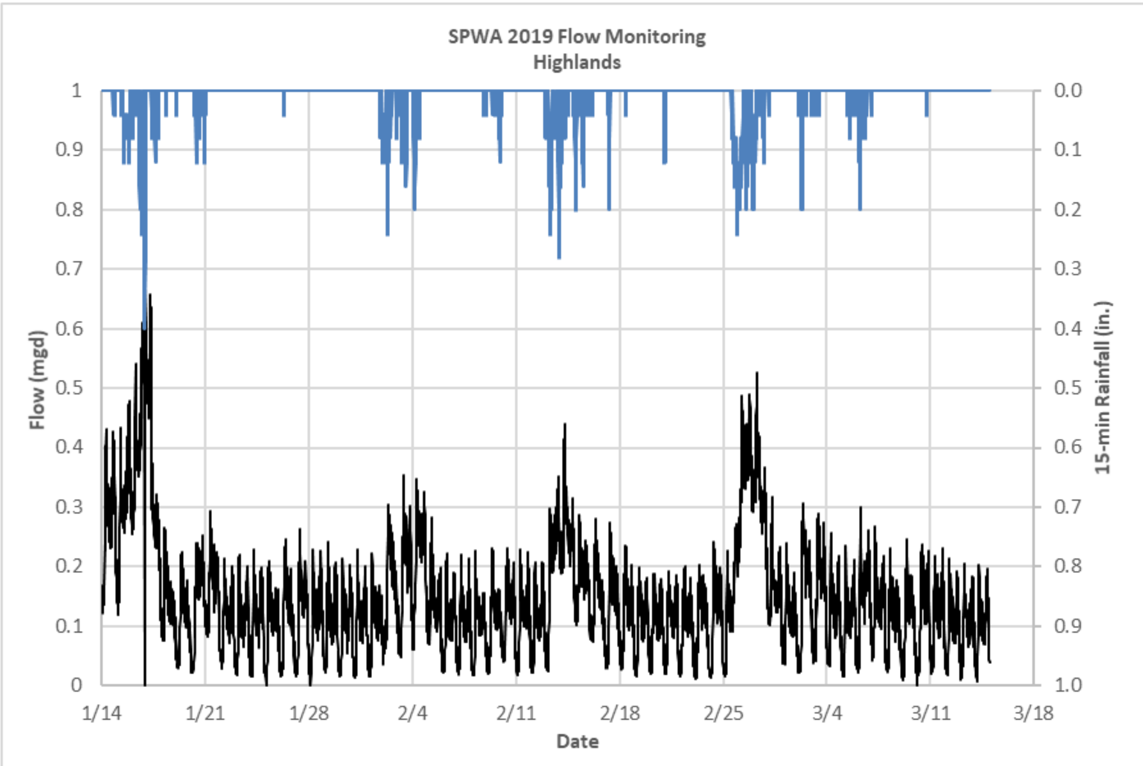

SPWA 2019 Flow Monitoring
Site 160
Depth (inches)
Volucity (fps)
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
1/14
1/21
1/28
2/4
2/11
2/18
2/25
3/4
3/11
3/18
Date
Level
Velocity

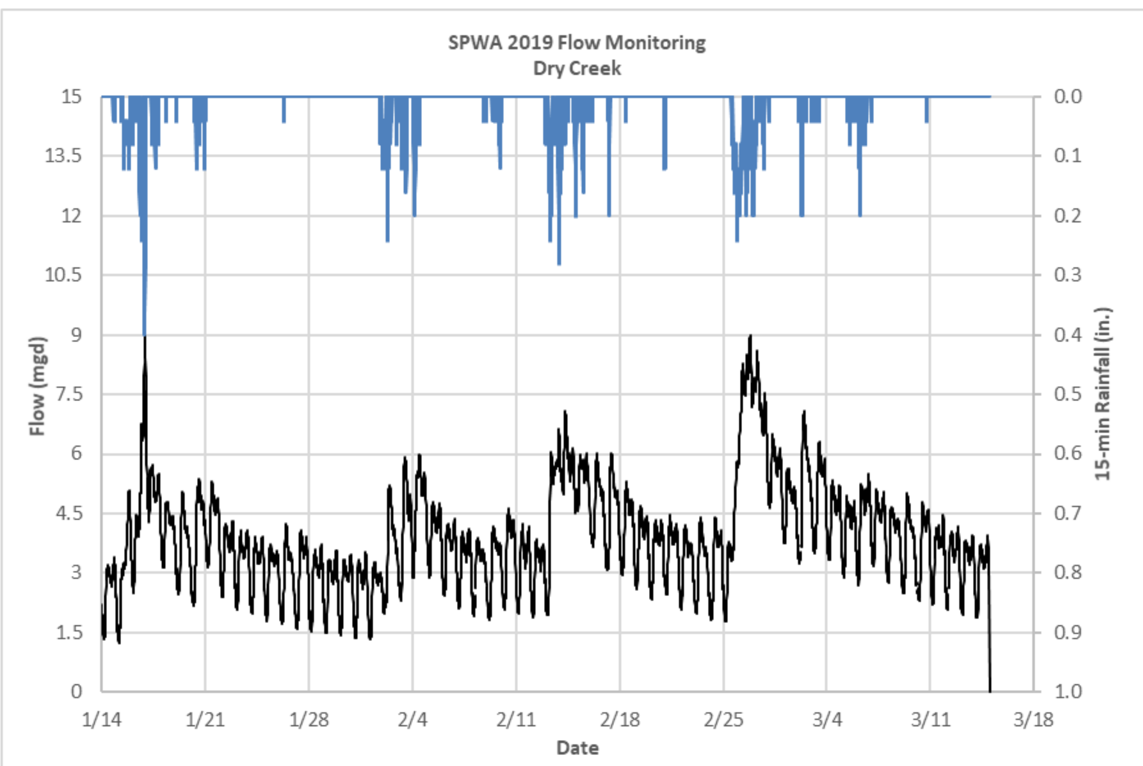

SPWA 2019 Flow Monitoring
Site 161
Flow (mgd)
15-min Rainfall (in.)
Date
2
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
1/14
1/21
1/28
2/4
2/11
2/18
2/25
3/4
3/11
3/18

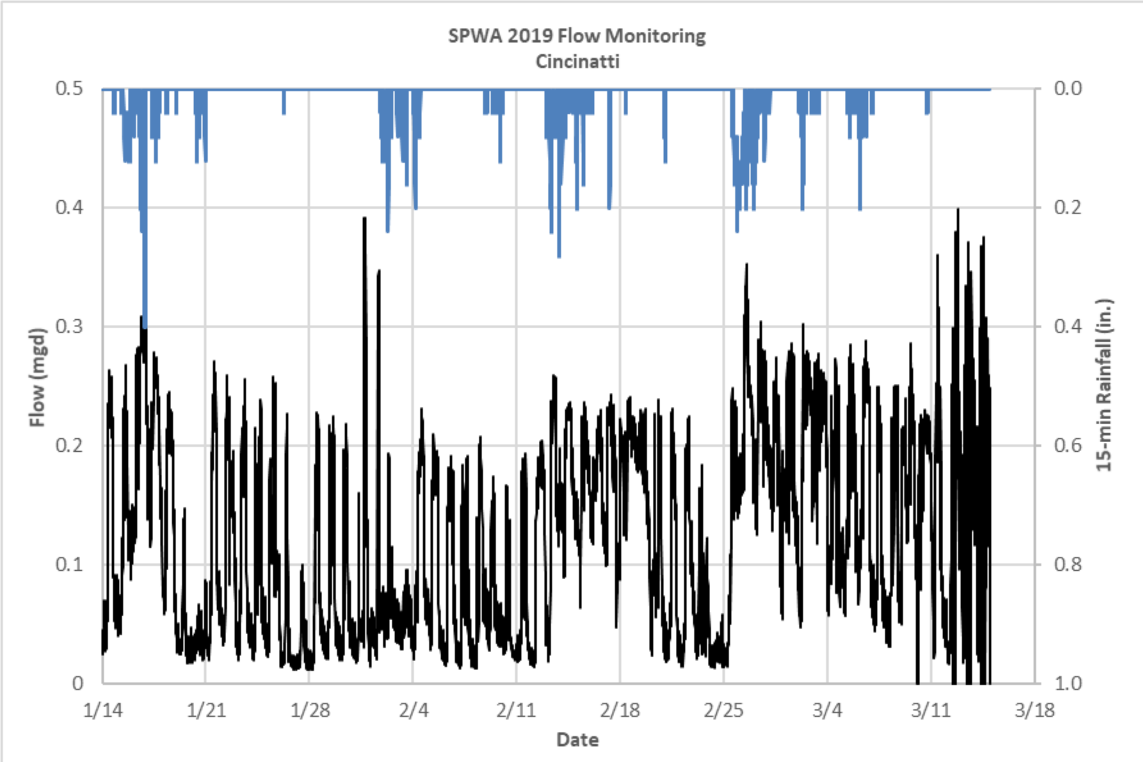

SPWA 2019 Flow Monitoring
Site 161
Depth (inches)
Volucity (fps)
Date
Level
Velocity
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
1/14
1/21
1/28
2/4
2/11
2/18
2/25
3/4
3/11
3/18

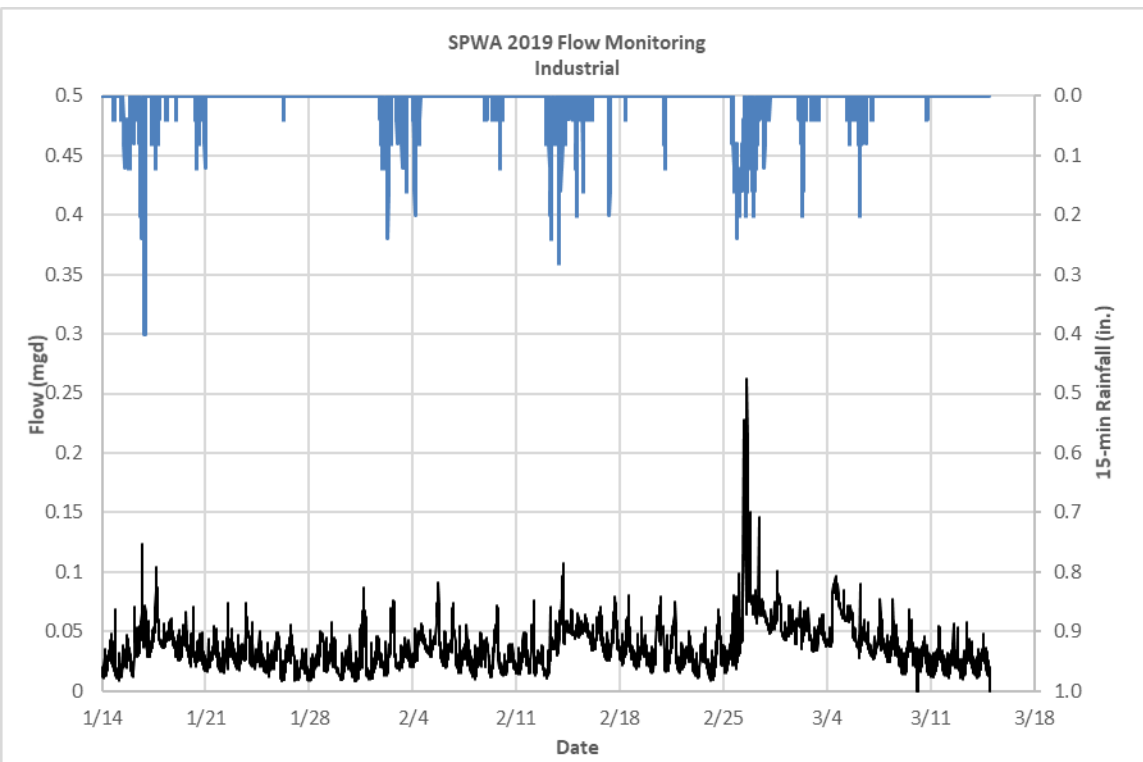

SPWA 2019 Flow Monitoring
Site 162
Flow (mgd)
15-min Rainfall (in.)
3
2.7
2.4
2.1
1.8
1.5
1.2
0.9
0.6
0.3
0
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
1/14
1/21
1/28
2/4
2/11
2/18
2/25
3/4
3/11
3/18
Date

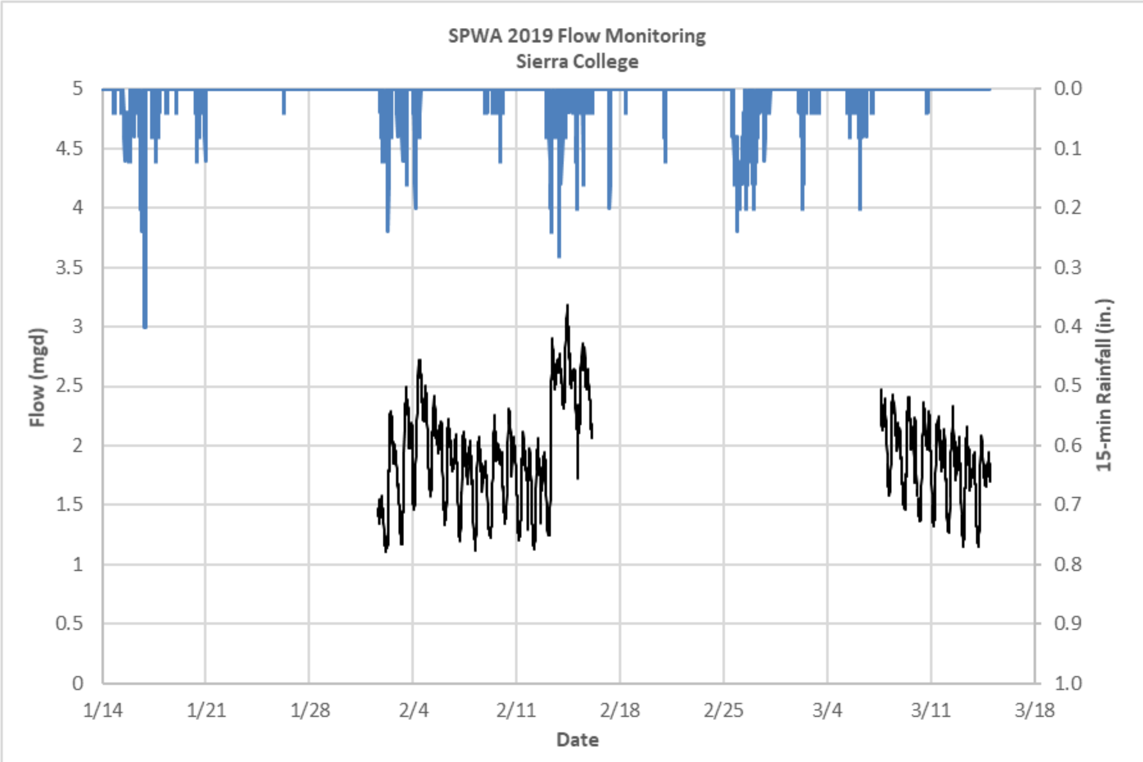

SPWA 2019 Flow Monitoring
Site 162
Depth (inches)
Volucity (fps)
20.0
18.0
16.0
14.0
12.0
10.0
8.0
6.0
4.0
2.0
0.0
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
Level
Velocity
1/14
1/21
1/28
2/4
2/11
2/18
2/25
3/4
3/11
3/18
Date

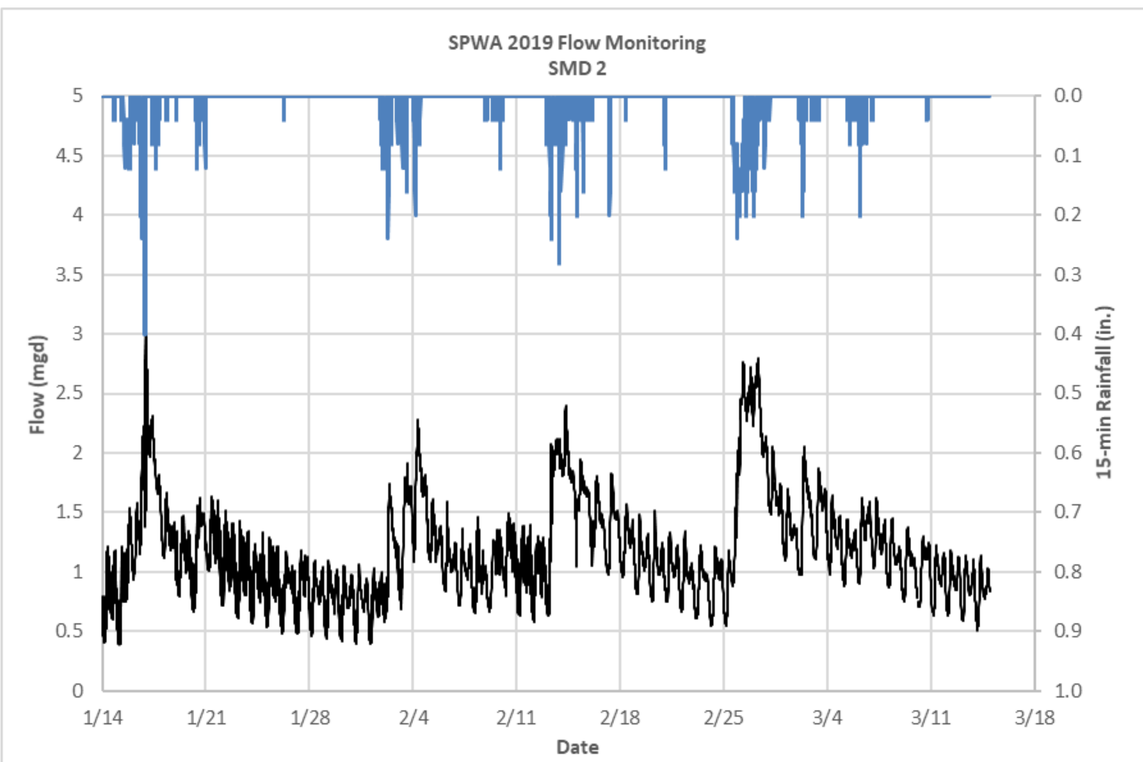

SPWA 2019 Flow Monitoring
Highlands
Flow (mgd)
15-min Rainfall (in.)
Date
1/14
1/21
1/28
2/4
2/11
2/18
2/25
3/4
3/11
3/18


SPWA 2019 Flow Monitoring
Dry Creek
Flow (mgd)
15-min Rainfall (in.)
Date
1/14
1/21
1/28
2/4
2/11
2/18
2/25
3/4
3/11
3/18


SPWA 2019 Flow Monitoring
Cincinatti
Flow (mgd)
15-min Rainfall (in.)
Date
0.5
0.4
0.3
0.2
0.1
0
0.0
0.2
0.4
0.6
0.8
1.0
1/14
1/21
1/28
2/4
2/11
2/18
2/25
3/4
3/11
3/18


SPWA 2019 Flow Monitoring
Industrial
Flow (mgd)
15-min Rainfall (in.)
Date
0.5
0.45
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
1/14
1/21
1/28
2/4
2/11
2/18
2/25
3/4
3/11
3/18

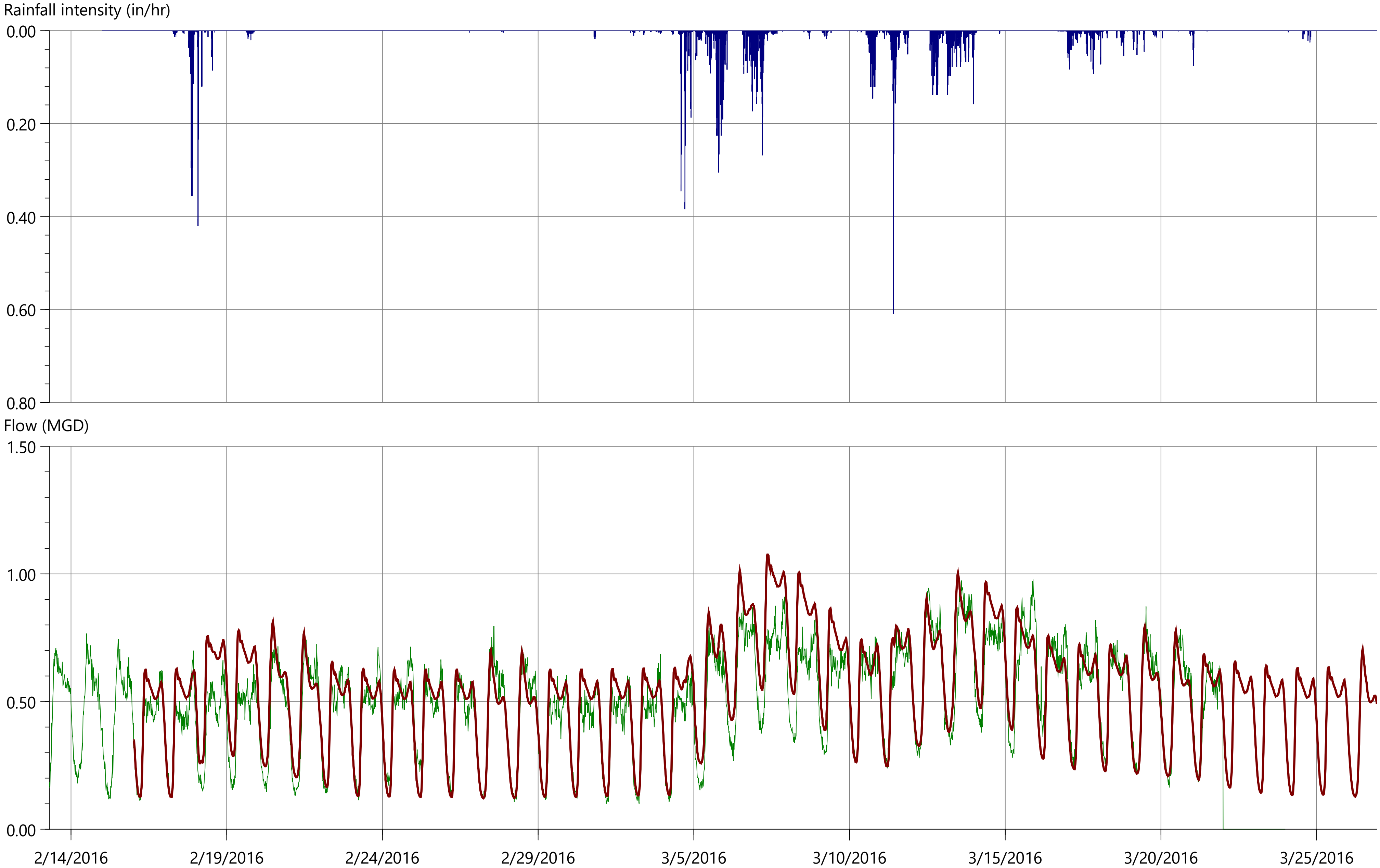

SPWA 2019 Flow Monitoring
Sierra College
Flow (mgd)
15-min Rainfall (in.)
Date
0
0.5
1
1.5
2
2.5
3
3.5
4
4.5
5
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
1/14
1/21
1/28
2/4
2/11
2/18
2/25
3/4
3/11
3/18


SPWA 2019 Flow Monitoring
SMD 2
Flow (mgd)
15-min Rainfall (in.)
Date
0
0.5
1
1.5
2
2.5
3
3.5
4
4.5
5
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
1/14
1/21
1/28
2/4
2/11
2/18
2/25
3/4
3/11
3/18

# APPENDIX D – CALIBRATION GRAPHS

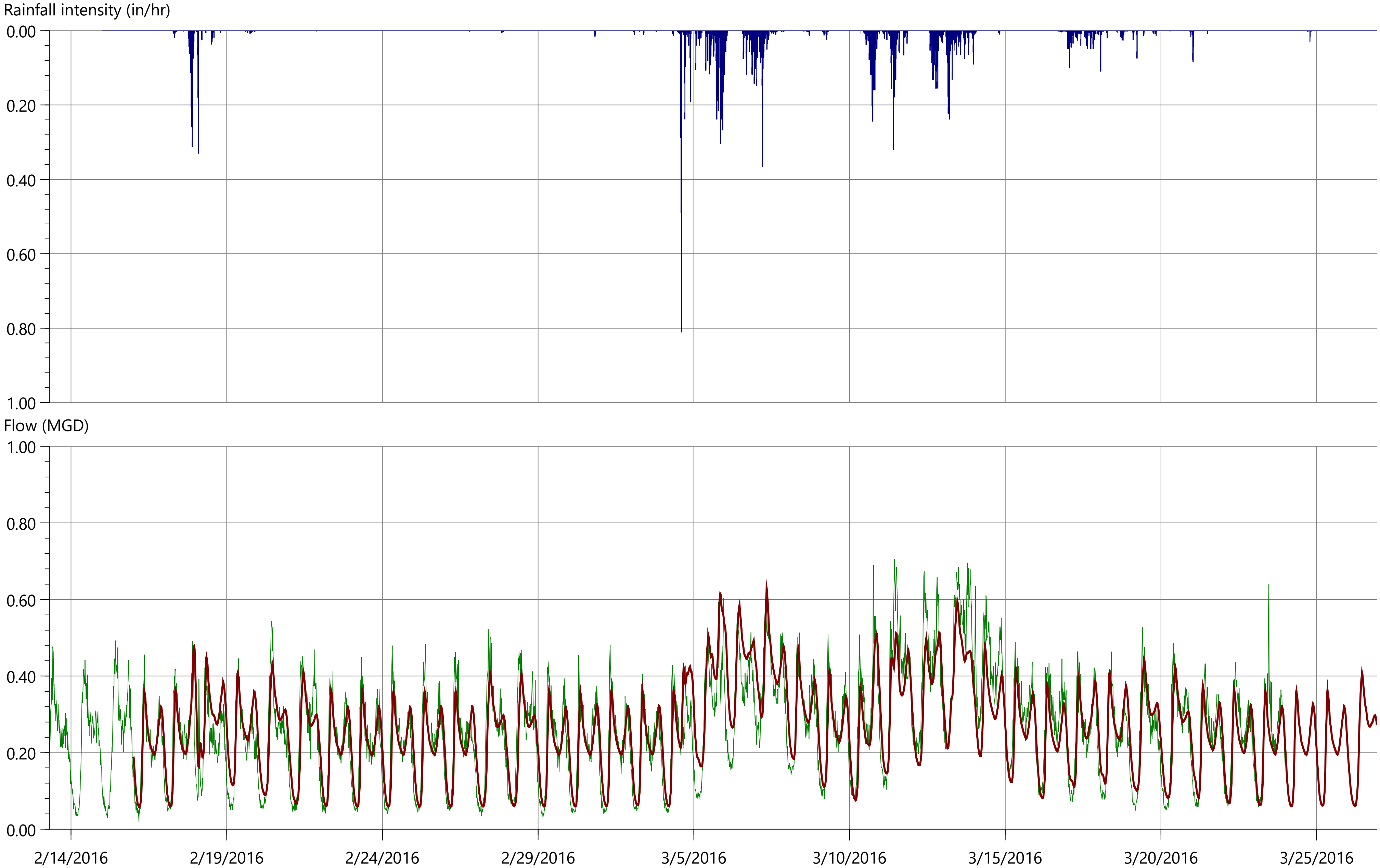
Observed / Predicted Report Produced by cvanlienden (11/7/2019 11:43:54 AM) Page 1 of 40
Flow survey: >Roseville>3. Data>Flow Data>Flow survey - All data (12/1/2016 1:53:11 PM)
Sim: >SPWA>5. Model Runs>Calibration>combined WWF Calibration (2016 rainfall)!!>OneRainData20160215_20160315 (11/6/2019 11:21:22 AM)

Flow Survey Location (Obs.) FM 1, Model Location (Pred.) D/S SMH E04-043.1, Rainfall Profile: 311



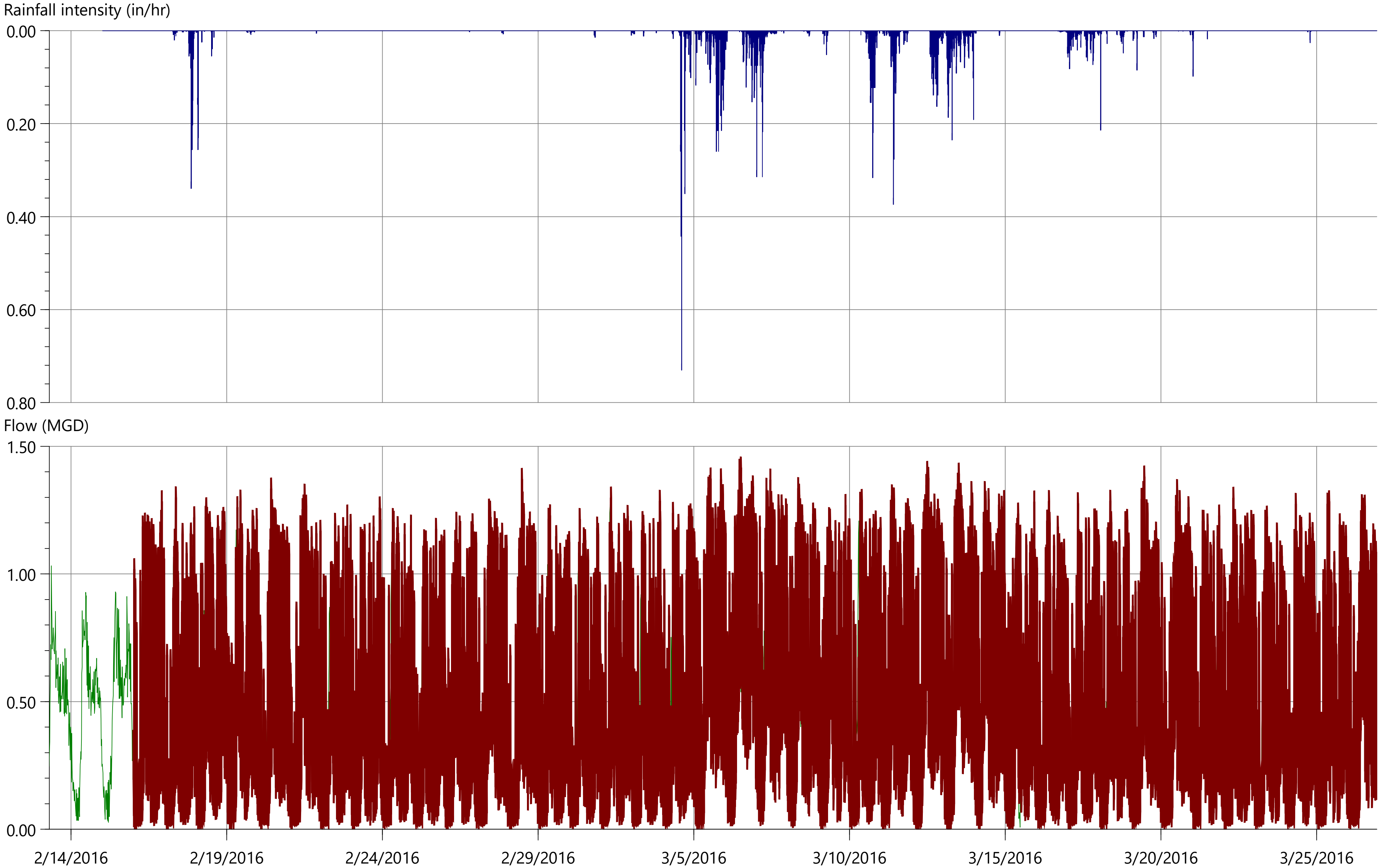

| | Rainfall | | | Flow | | |
|---|---|---|---|---|---|---|
| | Depth (in) | Peak (in/hr) | Average (in/hr) | Min (ft3/s) | Max (ft3/s) | Volume (ft3) |
| Rain | 6.950 | 0.609 | 0.007 | | | |
| Observed | | | | 0.000 | 0.981 | 1628041.595 |
| ...ta20160215_20160315 | | | | 0.121 | 1.076 | 1849194.017 |

Flow survey: >Roseville>3. Data>Flow Data>Flow survey - All data (12/1/2016 1:53:11 PM)
Sim: >SPWA>5. Model Runs>Calibration>combined WWF Calibration (2016 rainfall)!!>OneRainData20160215_20160315 (11/6/2019 11:21:22 AM)
Flow Survey Location (Obs.) FM 2, Model Location (Pred.) D/S SMH E01-166.1, Rainfall Profile: 305



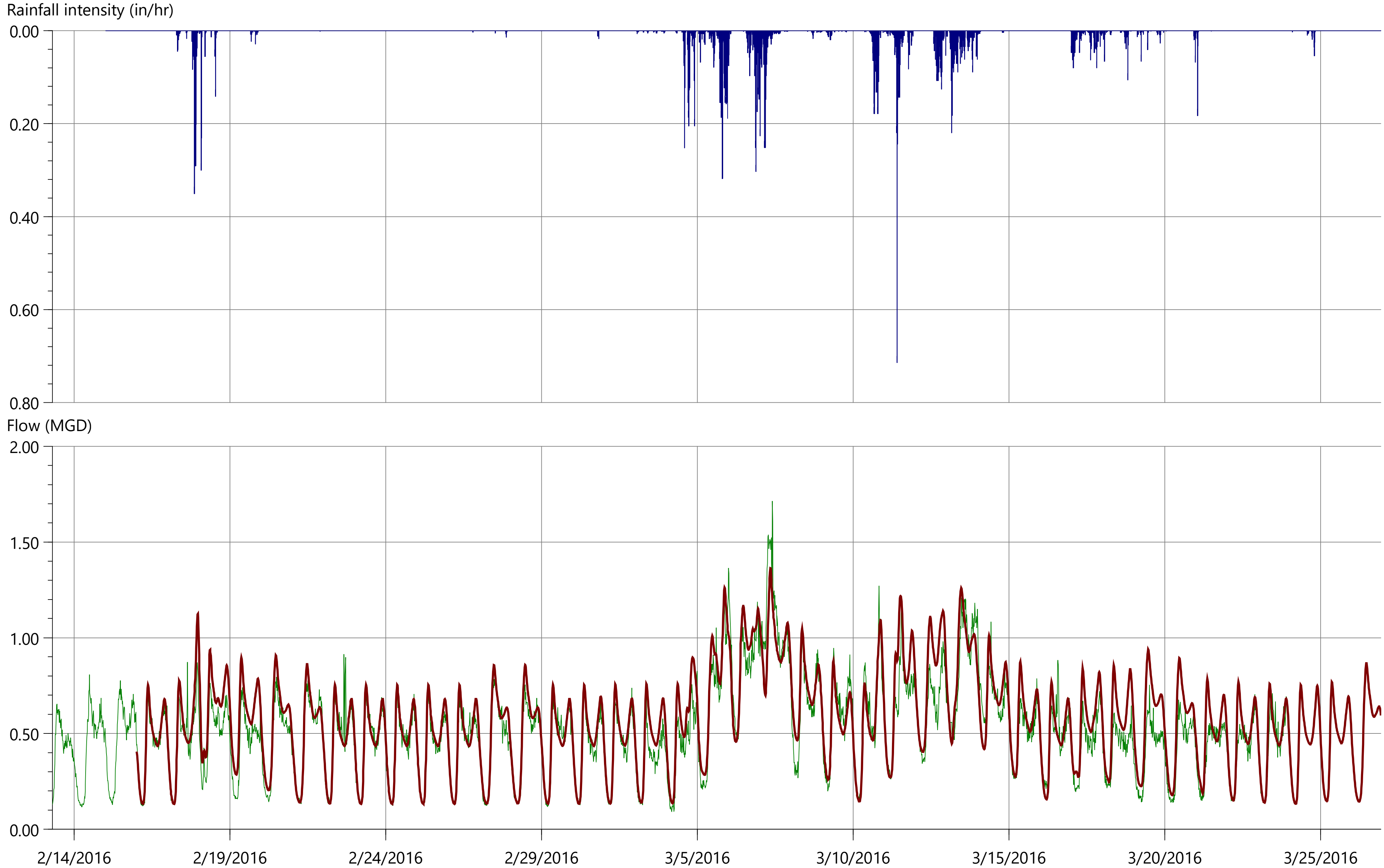

| | Rainfall | | | Flow | | |
|---|---|---|---|---|---|---|
| | Depth (in) | Peak (in/hr) | Average (in/hr) | Min (ft3/s) | Max (ft3/s) | Volume (ft3) |
| Rain | 7.168 | 0.810 | 0.007 | | | |
| Observed | | | | 0.020 | 0.706 | 914240.023 |
| ...ta20160215_20160315 | | | | 0.059 | 0.629 | 906202.549 |

Flow survey: >Roseville>3. Data>Flow Data>Flow survey - All data (12/1/2016 1:53:11 PM)
Sim: >SPWA>5. Model Runs>Calibration>combined WWF Calibration (2016 rainfall)!!>OneRainData20160215_20160315 (11/6/2019 11:21:22 AM)
Flow Survey Location (Obs.) FM 3, Model Location (Pred.) D/S SMH D01-090.1, Rainfall Profile: 273




| | Rainfall | | | Flow | | |
|---|---|---|---|---|---|---|
| | Depth (in) | Peak (in/hr) | Average (in/hr) | Min (ft3/s) | Max (ft3/s) | Volume (ft3) |
| Rain | 7.131 | 0.730 | 0.007 | | | |
| Observed | | | | 0.007 | 1.272 | 1577879.095 |
| ...ta20160215_20160315 | | | | 0.014 | 1.417 | 1694134.628 |

Flow survey: >Roseville>3. Data>Flow Data>Flow survey - All data (12/1/2016 1:53:11 PM)
Sim: >SPWA>5. Model Runs>Calibration>combined WWF Calibration (2016 rainfall)!!>OneRainData20160215_20160315 (11/6/2019 11:21:22 AM)
Flow Survey Location (Obs.) FM 4, Model Location (Pred.) D/S SMH B06-185.1, Rainfall Profile: 182

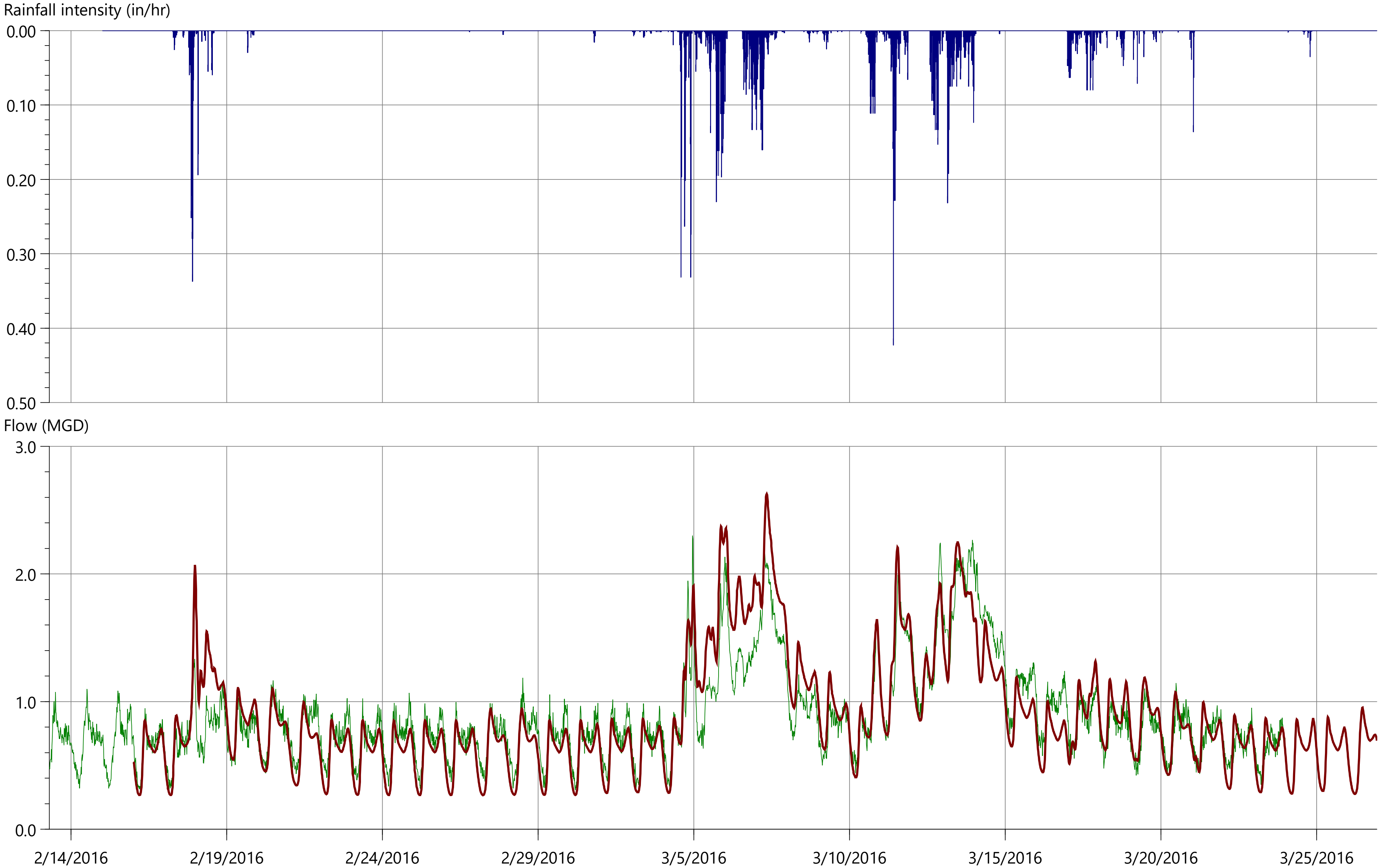



| | Rainfall | | | Flow | | |
|---|---|---|---|---|---|---|
| | Depth (in) | Peak (in/hr) | Average (in/hr) | Min (ft3/s) | Max (ft3/s) | Volume (ft3) |
| Rain | 7.006 | 0.714 | 0.007 | | | |
| Observed | | | | 0.092 | 1.713 | 1767988.571 |
| ...ta20160215_20160315 | | | | 0.132 | 1.364 | 1962773.049 |

Flow survey: >Roseville>3. Data>Flow Data>Flow survey - All data (12/1/2016 1:53:11 PM)

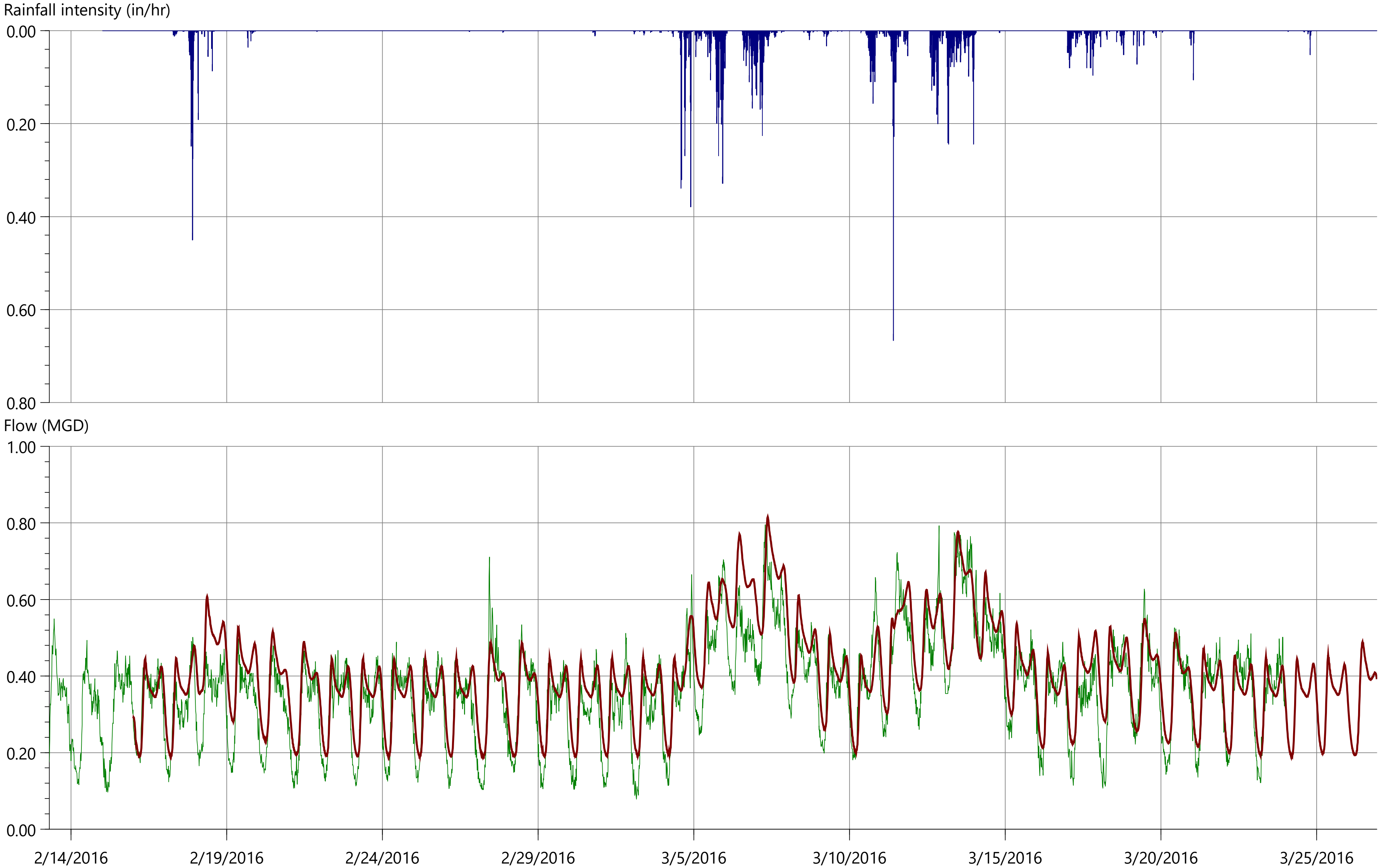
Sim: >SPWA>5. Model Runs>Calibration>combined WWF Calibration (2016 rainfall)!!>OneRainData20160215_20160315 (11/6/2019 11:21:22 AM)

Flow Survey Location (Obs.) FM 5, Model Location (Pred.) D/S SMH B04-006.1, Rainfall Profile: 179



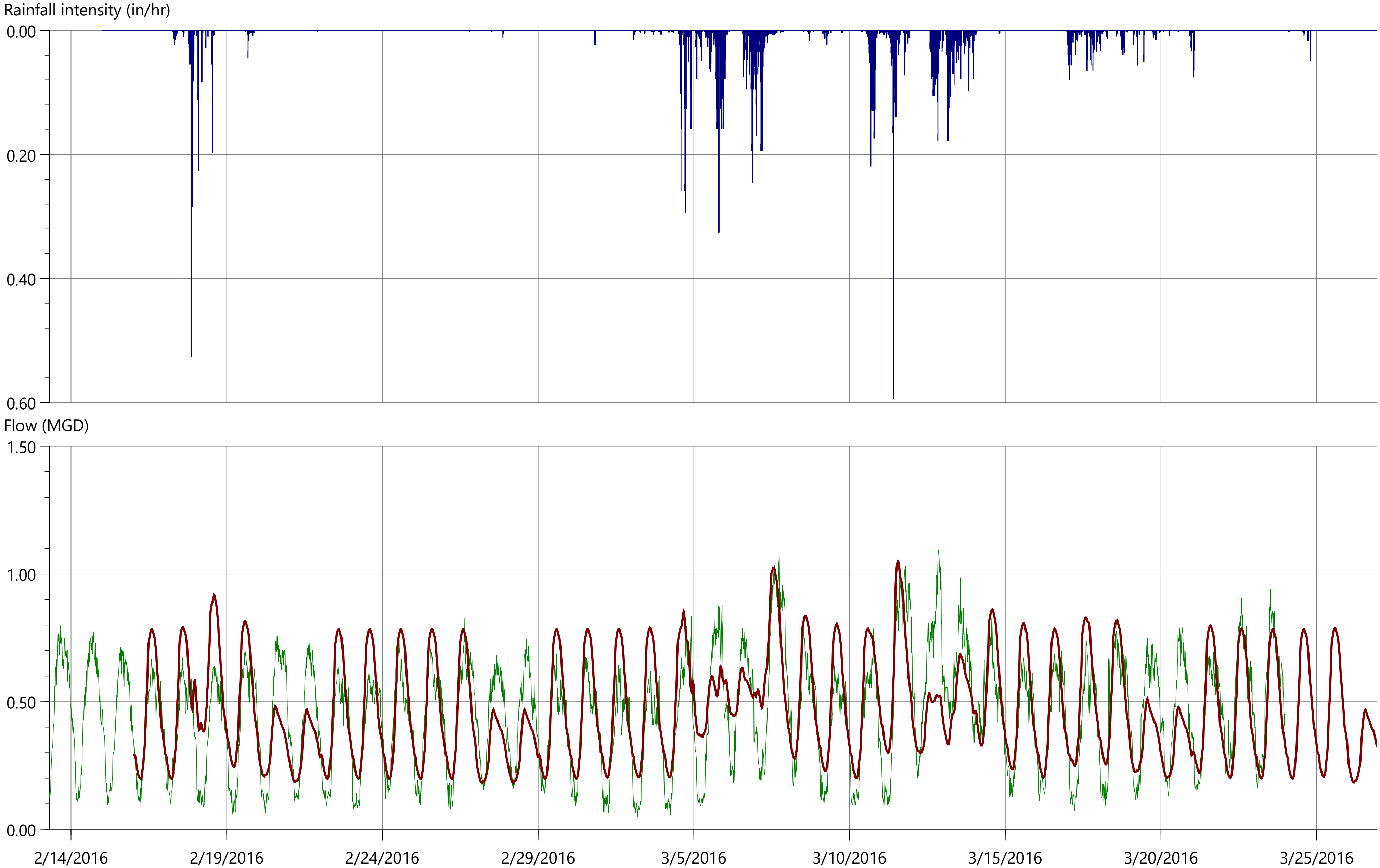

| | Rainfall | | | Flow | | |
|---|---|---|---|---|---|---|
| | Depth (in) | Peak (in/hr) | Average (in/hr) | Min (ft3/s) | Max (ft3/s) | Volume (ft3) |
| Rain | 6.524 | 0.423 | 0.007 | | | |
| Observed | | | | 0.308 | 2.299 | 3030867.347 |
| ...ta20160215_20160315 | | | | 0.267 | 2.627 | 3046741.062 |

Flow survey: >Roseville>3. Data>Flow Data>Flow survey - All data (12/1/2016 1:53:11 PM)
Sim: >SPWA>5. Model Runs>Calibration>combined WWF Calibration (2016 rainfall)!!>OneRainData20160215_20160315 (11/6/2019 11:21:22 AM)
Flow Survey Location (Obs.) FM 5A, Model Location (Pred.) D/S SMH B04-001.1, Rainfall Profile: 178




| | Rainfall | | | Flow | | |
|---|---|---|---|---|---|---|
| | Depth (in) | Peak (in/hr) | Average (in/hr) | Min (ft3/s) | Max (ft3/s) | Volume (ft3) |
| Rain | 6.650 | 0.666 | 0.007 | | | |
| Observed | | | | 0.078 | 0.796 | 1250814.058 |
| ...ta20160215_20160315 | | | | 0.189 | 0.815 | 1385997.841 |

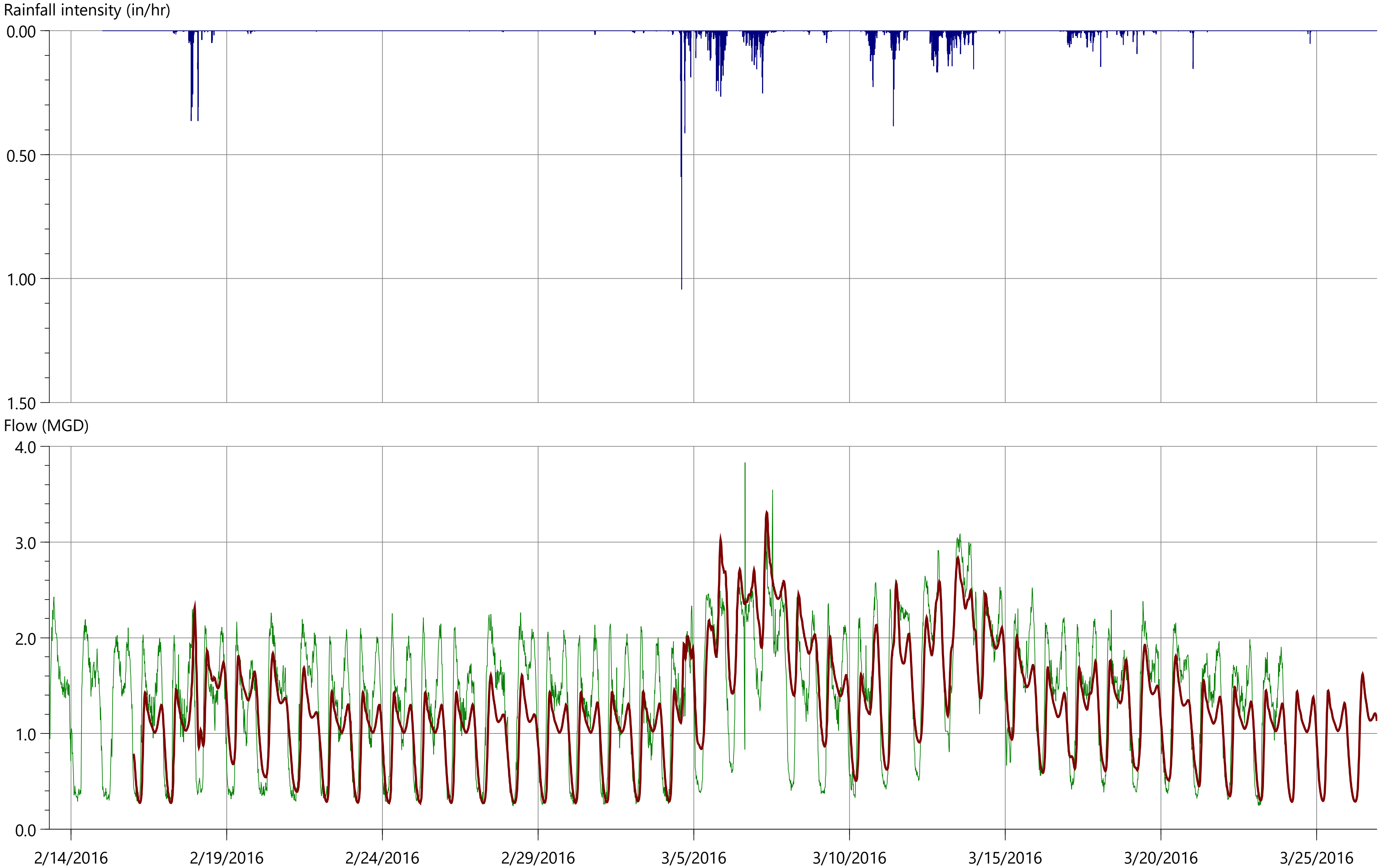
Flow survey: >Roseville>3. Data>Flow Data>Flow survey - All data (12/1/2016 1:53:11 PM)
Sim: >SPWA>5. Model Runs>Calibration>combined WWF Calibration (2016 rainfall)!!>OneRainData20160215_20160315 (11/6/2019 11:21:22 AM)
Flow Survey Location (Obs.) FM 6, Model Location (Pred.) D/S SMH C06-160.1, Rainfall Profile: 248




| | Rainfall | | | Flow | | |
|---|---|---|---|---|---|---|
| | Depth (in) | Peak (in/hr) | Average (in/hr) | Min (ft3/s) | Max (ft3/s) | Volume (ft3) |
| Rain | 6.748 | 0.593 | 0.007 | | | |
| Observed | | | | 0.050 | 1.095 | 1561247.890 |
| ...ta20160215_20160315 | | | | 0.182 | 1.050 | 1627844.217 |

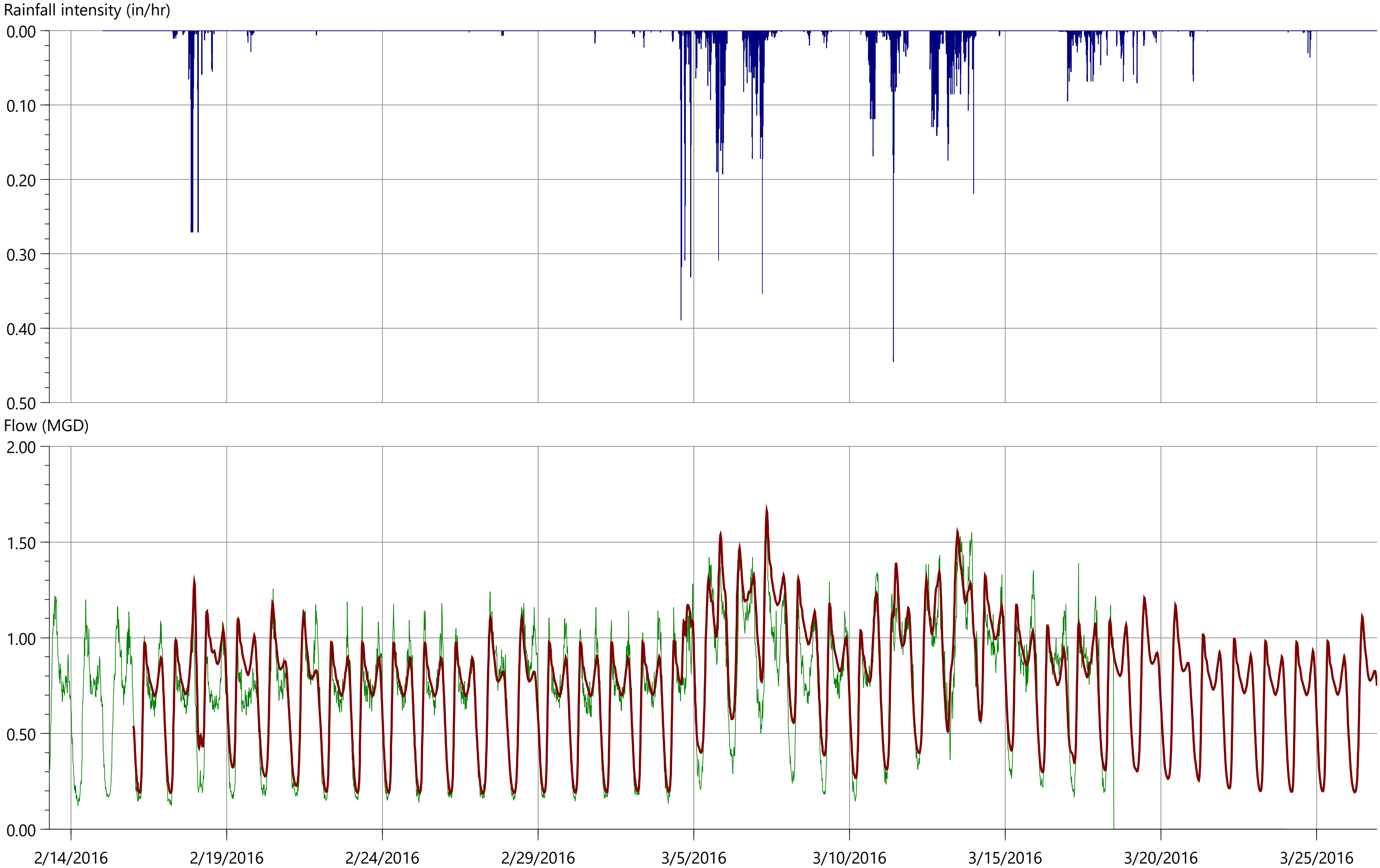
Flow survey: >Roseville>3. Data>Flow Data>Flow survey - All data (12/1/2016 1:53:11 PM)
Sim: >SPWA>5. Model Runs>Calibration>combined WWF Calibration (2016 rainfall)!!>OneRainData20160215_20160315 (11/6/2019 11:21:22 AM)

Flow Survey Location (Obs.) FM 7, Model Location (Pred.) D/S SMH D02-353.1, Rainfall Profile: 274




| | Rainfall | | | Flow | | |
|---|---|---|---|---|---|---|
| | Depth (in) | Peak (in/hr) | Average (in/hr) | Min (ft3/s) | Max (ft3/s) | Volume (ft3) |
| Rain | 7.005 | 1.043 | 0.007 | | | |
| Observed | | | | 0.243 | 3.830 | 4848161.759 |
| ...ta20160215_20160315 | | | | 0.272 | 3.309 | 4389105.386 |

Flow survey: >Roseville>3. Data>Flow Data>Flow survey - All data (12/1/2016 1:53:11 PM)
Sim: >SPWA>5. Model Runs>Calibration>combined WWF Calibration (2016 rainfall)!!>OneRainData20160215_20160315 (11/6/2019 11:21:22 AM)
Flow Survey Location (Obs.) FM 7A, Model Location (Pred.) D/S SMH D03-116.1, Rainfall Profile: 276




| | Rainfall | | | Flow | | |
|---|---|---|---|---|---|---|
| | Depth (in) | Peak (in/hr) | Average (in/hr) | Min (ft3/s) | Max (ft3/s) | Volume (ft3) |
| Rain | 6.644 | 0.445 | 0.007 | | | |
| Observed | | | | 0.000 | 1.560 | 2175152.424 |
| ...ta20160215_20160315 | | | | 0.188 | 1.664 | 2640259.610 |

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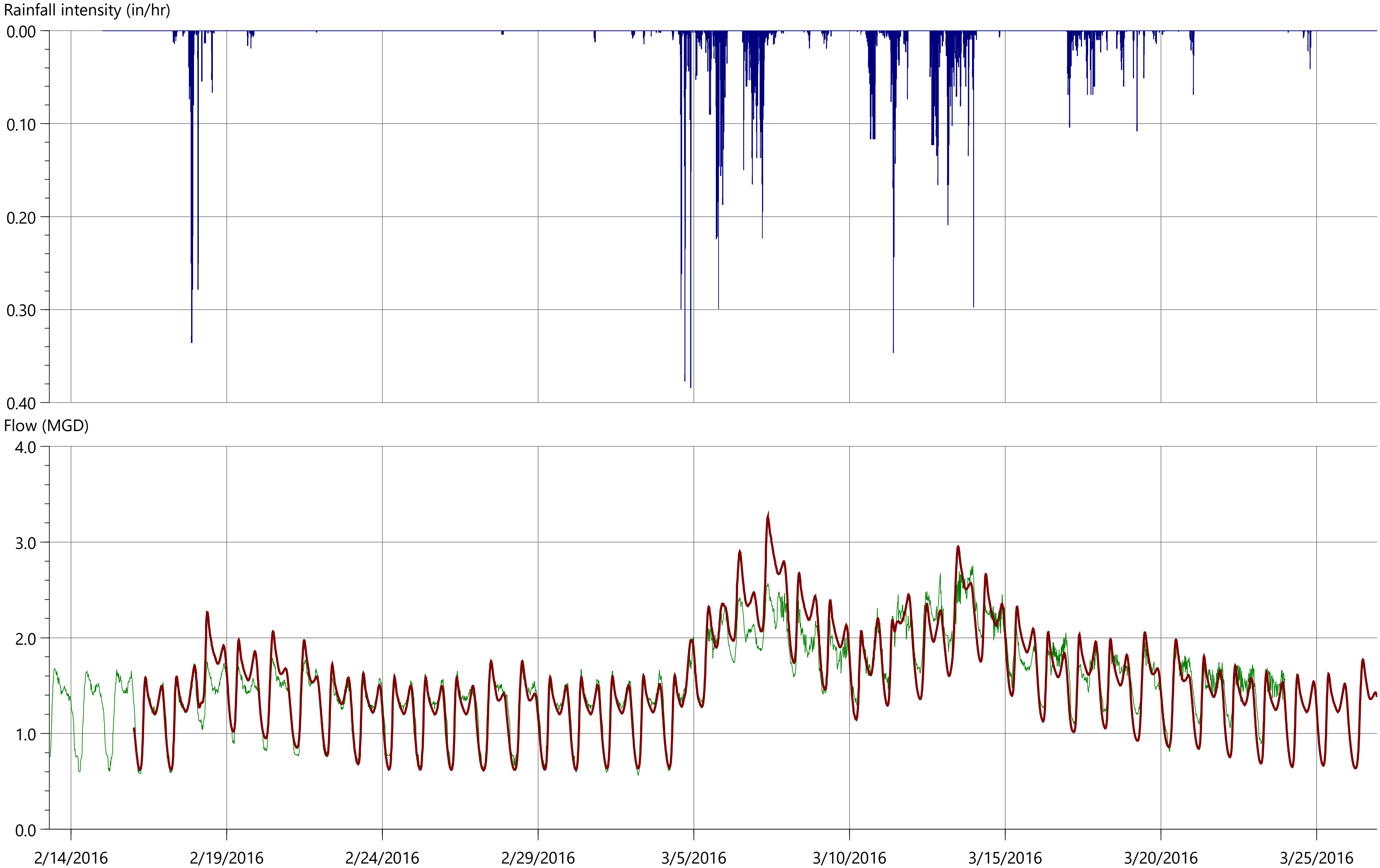
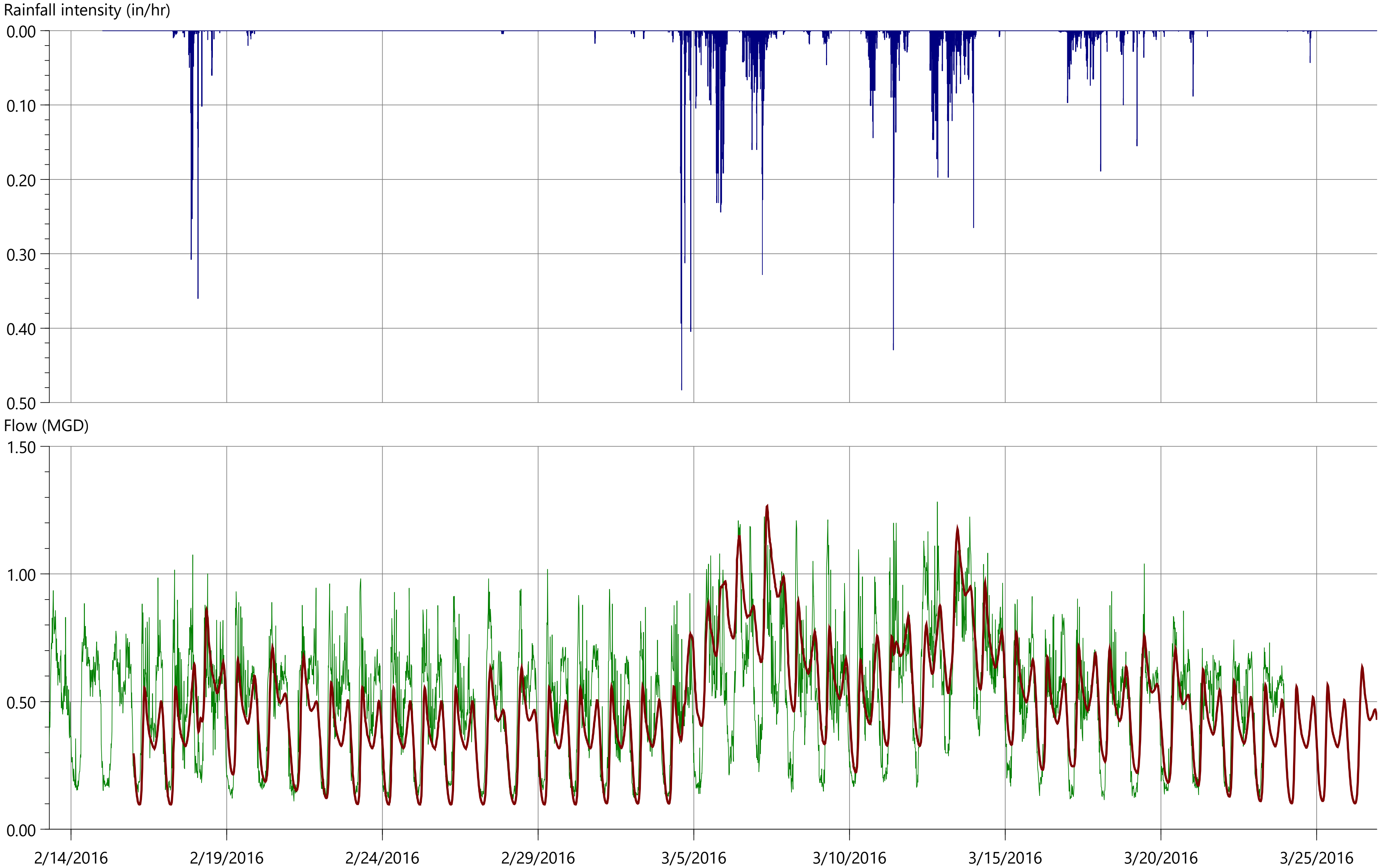
Flow survey: >Roseville>3. Data>Flow Data>Flow survey - All data (12/1/2016 1:53:11 PM)
Sim: >SPWA>5. Model Runs>Calibration>combined WWF Calibration (2016 rainfall)!!>OneRainData20160215_20160315 (11/6/2019 11:21:22 AM)
Flow Survey Location (Obs.) FM 8, Model Location (Pred.) D/S SMH D04-201.1, Rainfall Profile: 277



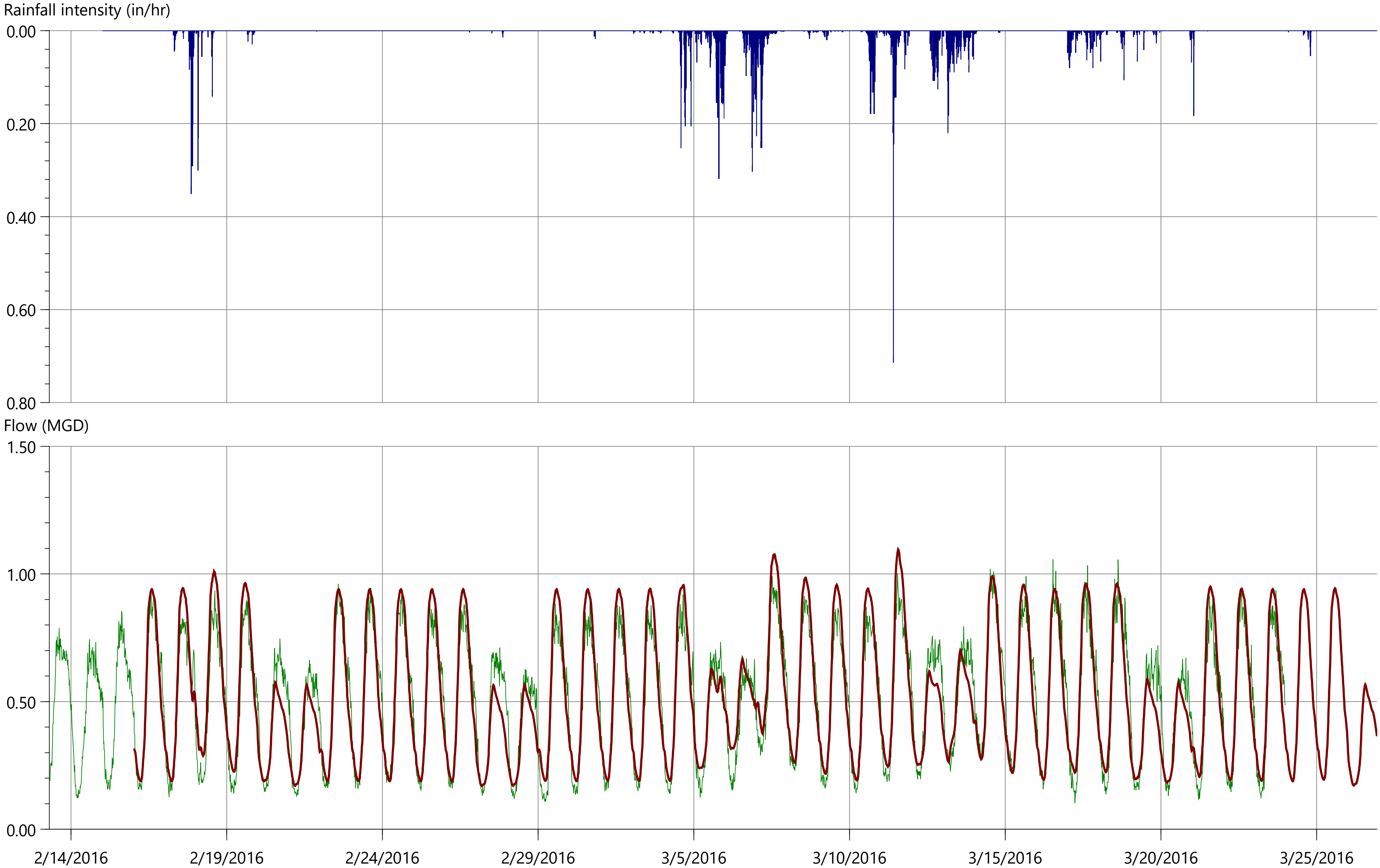

| | Rainfall | | | Flow | | |
|---|---|---|---|---|---|---|
| | Depth (in) | Peak (in/hr) | Average (in/hr) | Min (ft3/s) | Max (ft3/s) | Volume (ft3) |
| Rain | 6.750 | 0.384 | 0.007 | | | |
| Observed | | | | 0.563 | 2.756 | 5257075.125 |
| ...ta20160215_20160315 | | | | 0.617 | 3.265 | 5297174.358 |

Flow survey: >Roseville>3. Data>Flow Data>Flow survey - All data (12/1/2016 1:53:11 PM)
Sim: >SPWA>5. Model Runs>Calibration>combined WWF Calibration (2016 rainfall)!!>OneRainData20160215_20160315 (11/6/2019 11:21:22 AM)
Flow Survey Location (Obs.) FM 9, Model Location (Pred.) D/S SMH D02-069.1, Rainfall Profile: 241



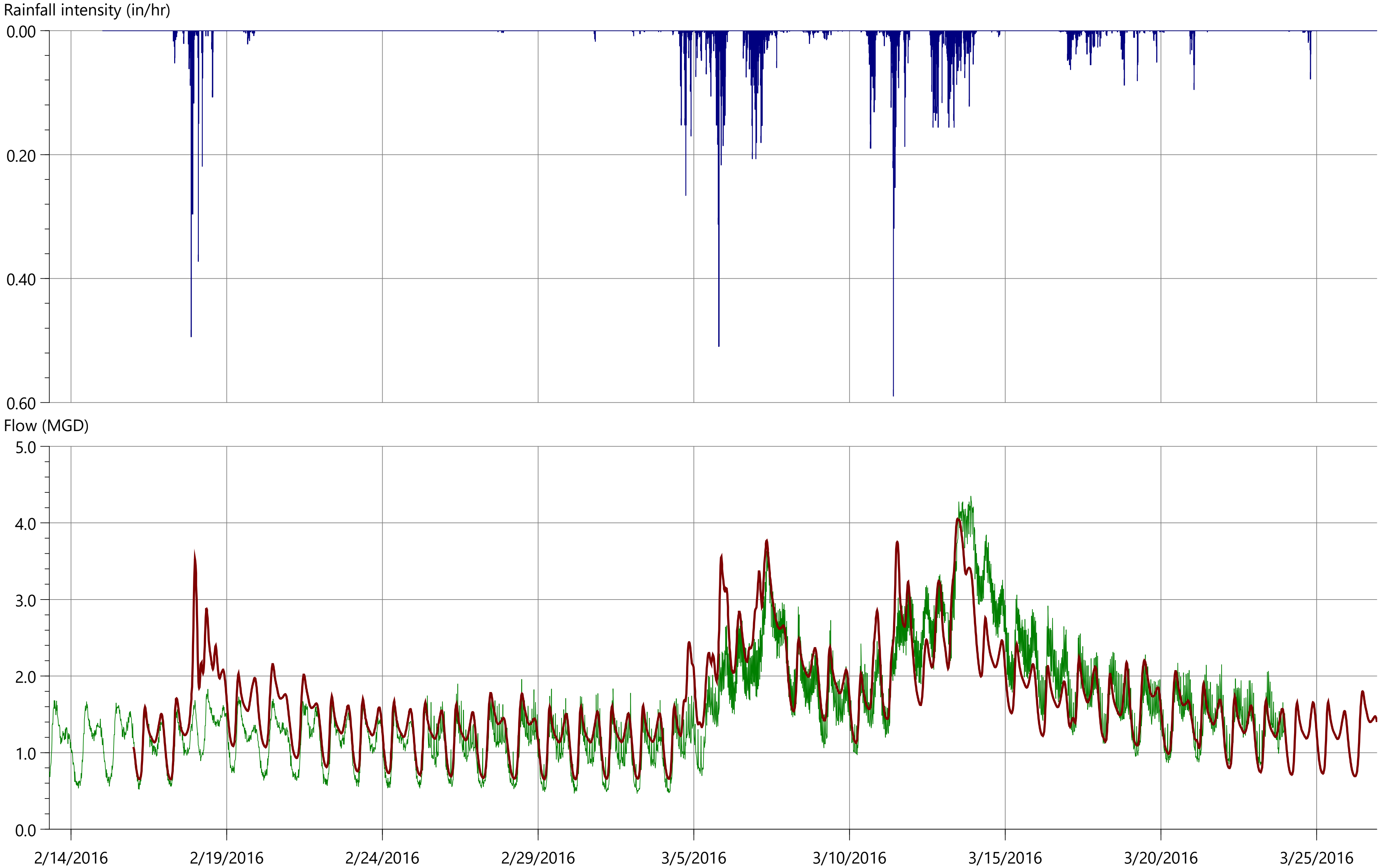

| | Rainfall | | | Flow | | |
|---|---|---|---|---|---|---|
| | Depth (in) | Peak (in/hr) | Average (in/hr) | Min (ft3/s) | Max (ft3/s) | Volume (ft3) |
| Rain | 6.982 | 0.483 | 0.007 | | | |
| Observed | | | | 0.110 | 1.283 | 1753822.349 |
| ...ta20160215_20160315 | | | | 0.097 | 1.266 | 1626219.910 |

Flow survey: >Roseville>3. Data>Flow Data>Flow survey - All data (12/1/2016 1:53:11 PM)
Sim: >SPWA>5. Model Runs>Calibration>combined WWF Calibration (2016 rainfall)!!>OneRainData20160215_20160315 (11/6/2019 11:21:22 AM)
Flow Survey Location (Obs.) FM 10, Model Location (Pred.) D/S SMH B06-340.1, Rainfall Profile: 182




| | Rainfall | | | Flow | | |
|---|---|---|---|---|---|---|
| | Depth (in) | Peak (in/hr) | Average (in/hr) | Min (ft3/s) | Max (ft3/s) | Volume (ft3) |
| Rain | 7.006 | 0.714 | 0.007 | | | |
| Observed | | | | 0.103 | 1.057 | 1756657.949 |
| ...ta20160215_20160315 | | | | 0.169 | 1.096 | 1787262.390 |

Flow survey: >Roseville>3. Data>Flow Data>Flow survey - All data (12/1/2016 1:53:11 PM)
Sim: >SPWA>5. Model Runs>Calibration>combined WWF Calibration (2016 rainfall)!!>OneRainData20160215_20160315 (11/6/2019 11:21:22 AM)
Flow Survey Location (Obs.) FM 11, Model Location (Pred.) D/S SMH A08-019.1, Rainfall Profile: 121




| | Rainfall | | | Flow | | |
|---|---|---|---|---|---|---|
| | Depth (in) | Peak (in/hr) | Average (in/hr) | Min (ft3/s) | Max (ft3/s) | Volume (ft3) |
| Rain | 7.634 | 0.590 | 0.008 | | | |
| Observed | | | | 0.468 | 4.351 | 5269869.468 |
| ...ta20160215_20160315 | | | | 0.651 | 4.054 | 5683303.761 |

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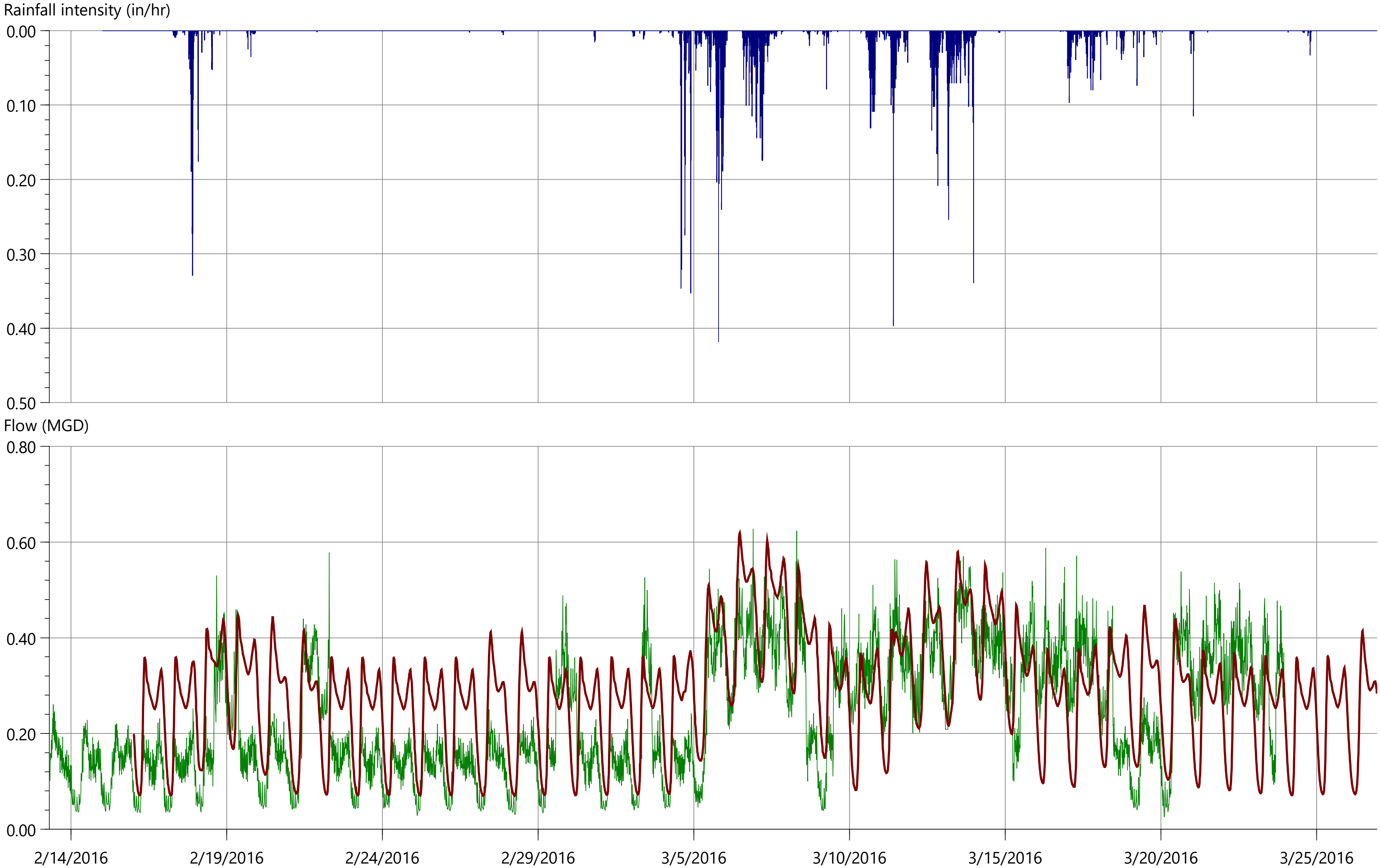
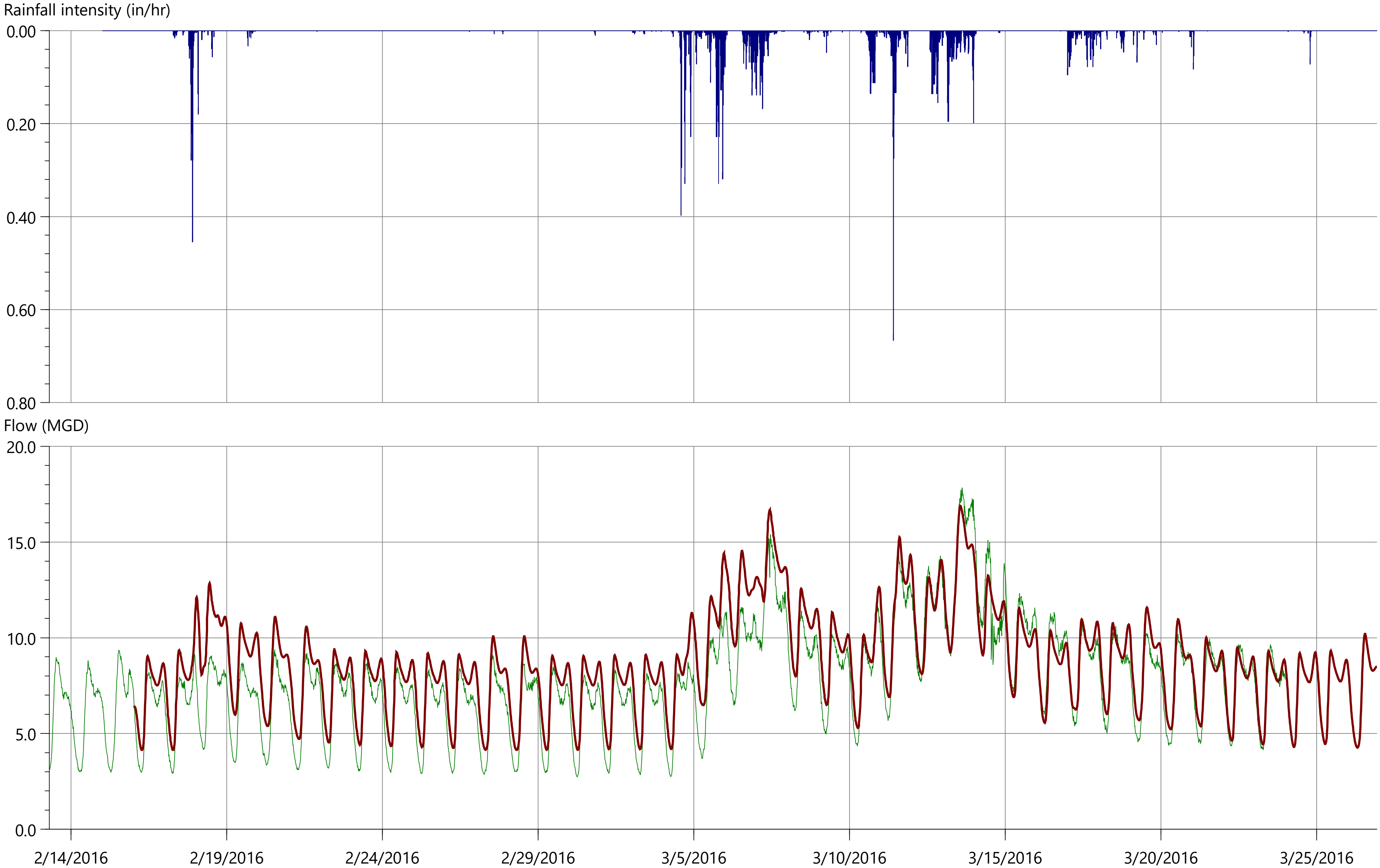
Flow survey: >Roseville>3. Data>Flow Data>Flow survey - All data (12/1/2016 1:53:11 PM)
Sim: >SPWA>5. Model Runs>Calibration>combined WWF Calibration (2016 rainfall)!!>OneRainData20160215_20160315 (11/6/2019 11:21:22 AM)
Flow Survey Location (Obs.) FM 12, Model Location (Pred.) D/S SMH B03-030.1, Rainfall Profile: 177




| | Rainfall | | | Flow | | |
|---|---|---|---|---|---|---|
| | Depth (in) | Peak (in/hr) | Average (in/hr) | Min (ft3/s) | Max (ft3/s) | Volume (ft3) |
| Rain | 6.394 | 0.418 | 0.007 | | | |
| Observed | | | | 0.025 | 0.627 | 798653.119 |
| ...ta20160215_20160315 | | | | 0.070 | 0.620 | 991725.521 |

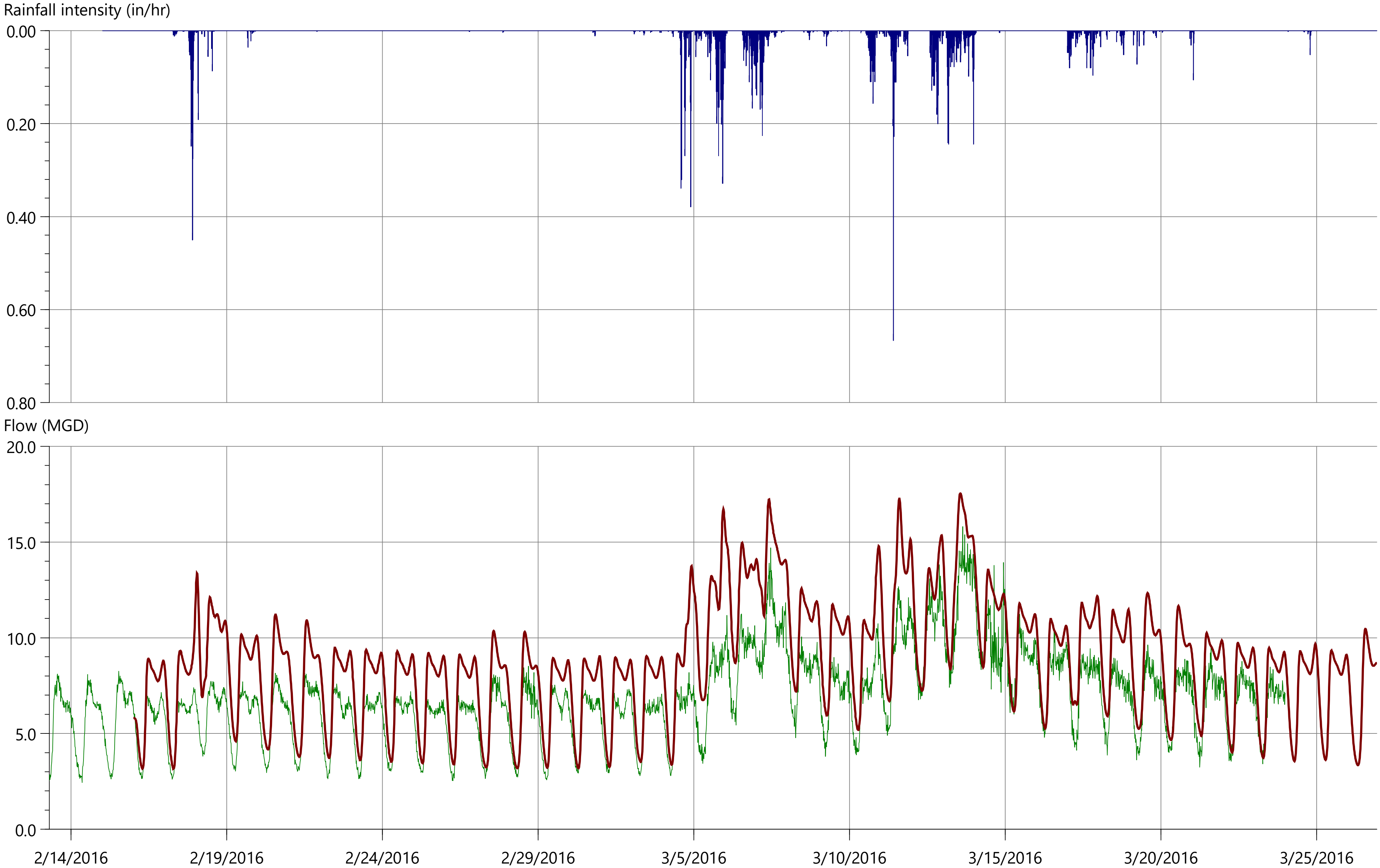
Flow survey: >Roseville>3. Data>Flow Data>Flow survey - All data (12/1/2016 1:53:11 PM)
Sim: >SPWA>5. Model Runs>Calibration>combined WWF Calibration (2016 rainfall)!!>OneRainData20160215_20160315 (11/6/2019 11:21:22 AM)
Flow Survey Location (Obs.) FM 13, Model Location (Pred.) D/S SMH B03-043.1, Rainfall Profile: 145




| | Rainfall | | | Flow | | |
|---|---|---|---|---|---|---|
| | Depth (in) | Peak (in/hr) | Average (in/hr) | Min (ft3/s) | Max (ft3/s) | Volume (ft3) |
| Rain | 6.618 | 0.666 | 0.007 | | | |
| Observed | | | | 2.731 | 17.837 | 26538612.826 |
| ...ta20160215_20160315 | | | | 4.129 | 16.903 | 30158188.130 |

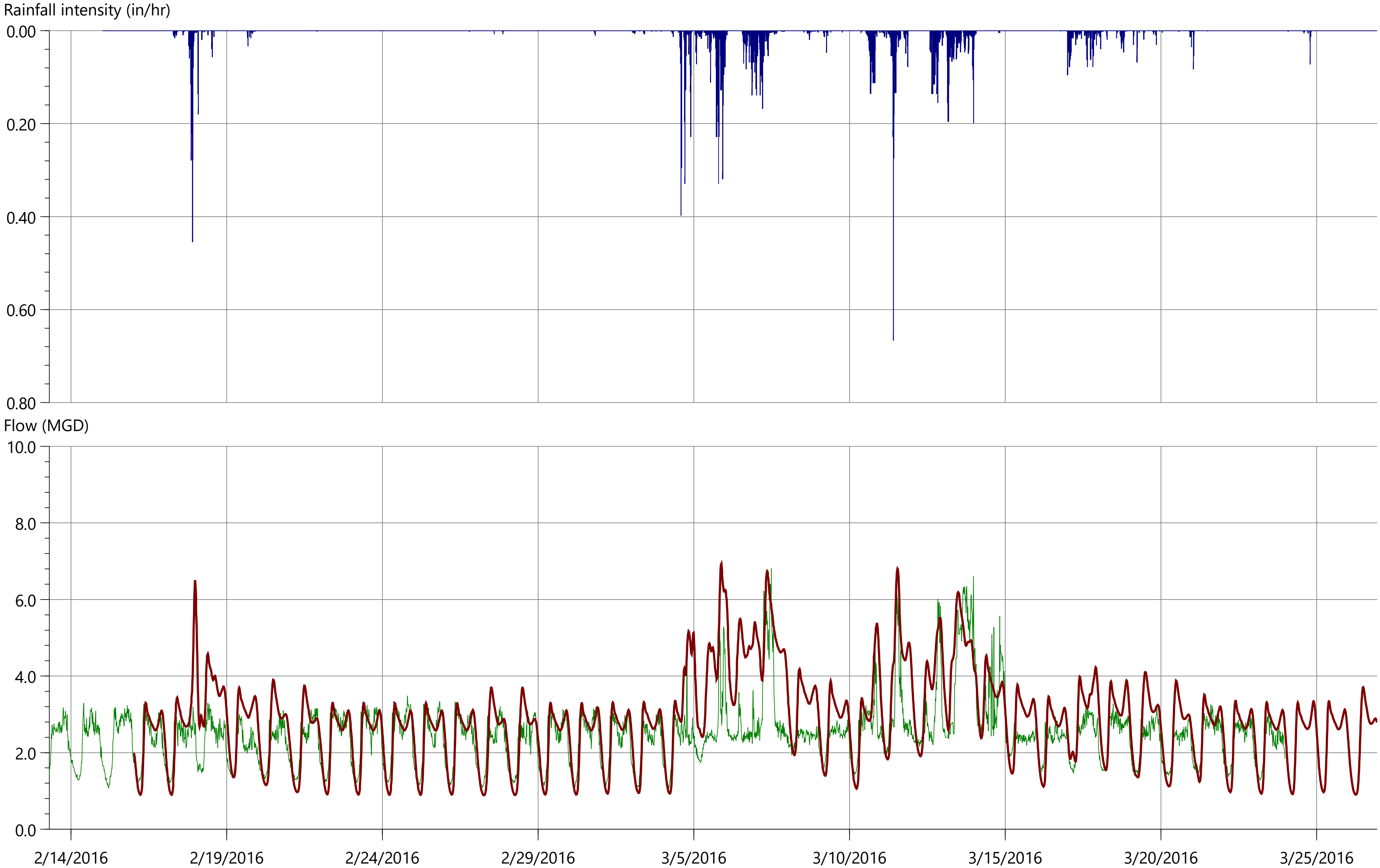
Observed / Predicted Report Produced by cvanlienden (11/7/2019 11:43:54 AM) Page 16 of 40
Flow survey: >Roseville>3. Data>Flow Data>Flow survey - All data (12/1/2016 1:53:11 PM)
Sim: >SPWA>5. Model Runs>Calibration>combined WWF Calibration (2016 rainfall)!!>OneRainData20160215_20160315 (11/6/2019 11:21:22 AM)

Flow Survey Location (Obs.) FM 14, Model Location (Pred.) D/S SMH B03-024.1, Rainfall Profile: 178



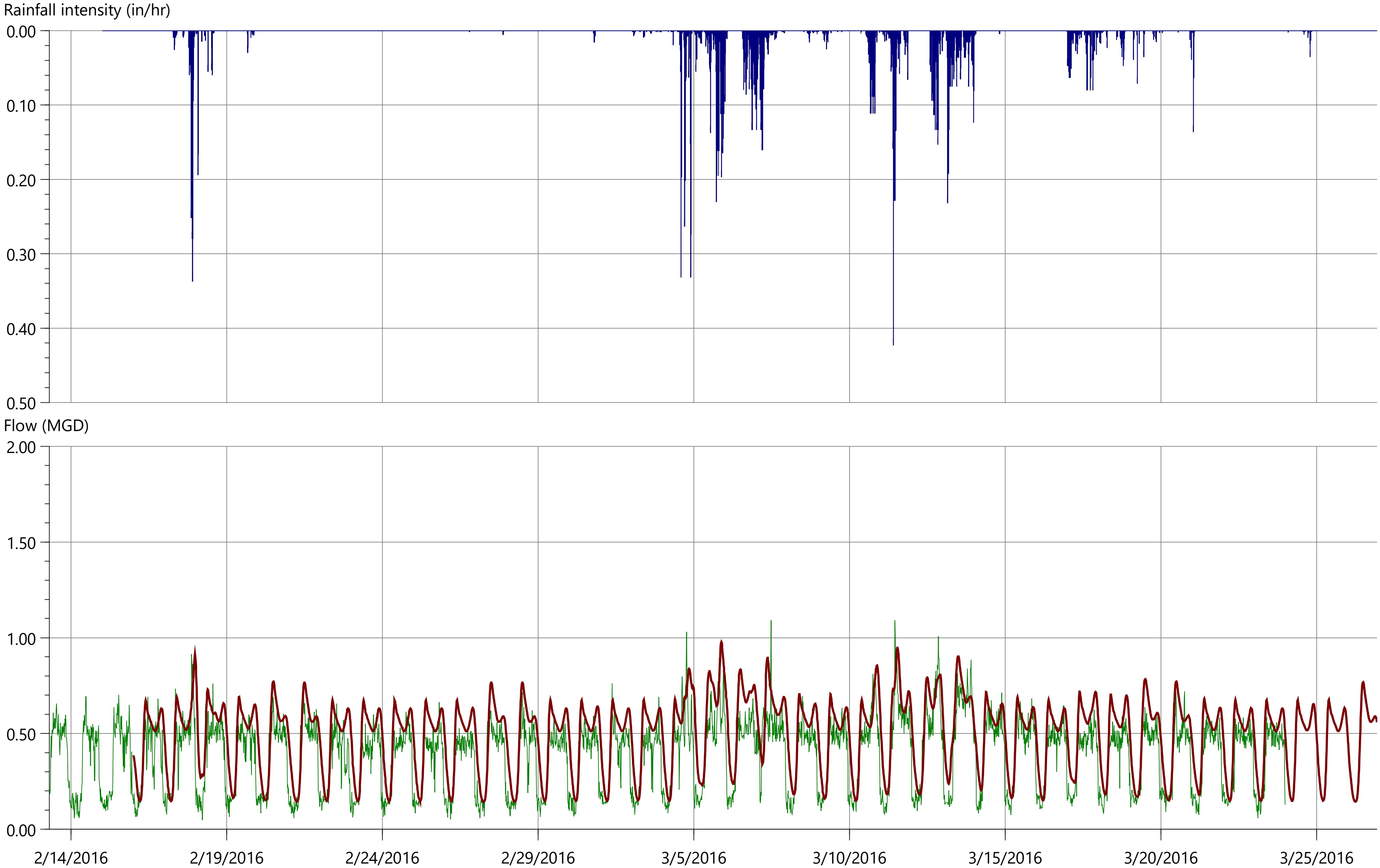

| | Rainfall | | | Flow | | |
|---|---|---|---|---|---|---|
| | Depth (in) | Peak (in/hr) | Average (in/hr) | Min (ft3/s) | Max (ft3/s) | Volume (ft3) |
| Rain | 6.650 | 0.666 | 0.007 | | | |
| Observed | | | | 2.435 | 15.807 | 23553734.551 |
| ...ta20160215_20160315 | | | | 3.164 | 17.544 | 30549718.631 |

Observed / Predicted Report Produced by cvanlienden (11/7/2019 11:43:54 AM) Page 17 of 40
Flow survey: >Roseville>3. Data>Flow Data>Flow survey - All data (12/1/2016 1:53:11 PM)
Sim: >SPWA>5. Model Runs>Calibration>combined WWF Calibration (2016 rainfall)!!>OneRainData20160215_20160315 (11/6/2019 11:21:22 AM)
Flow Survey Location (Obs.) FM 15, Model Location (Pred.) D/S SMH B03-053.1, Rainfall Profile: 145



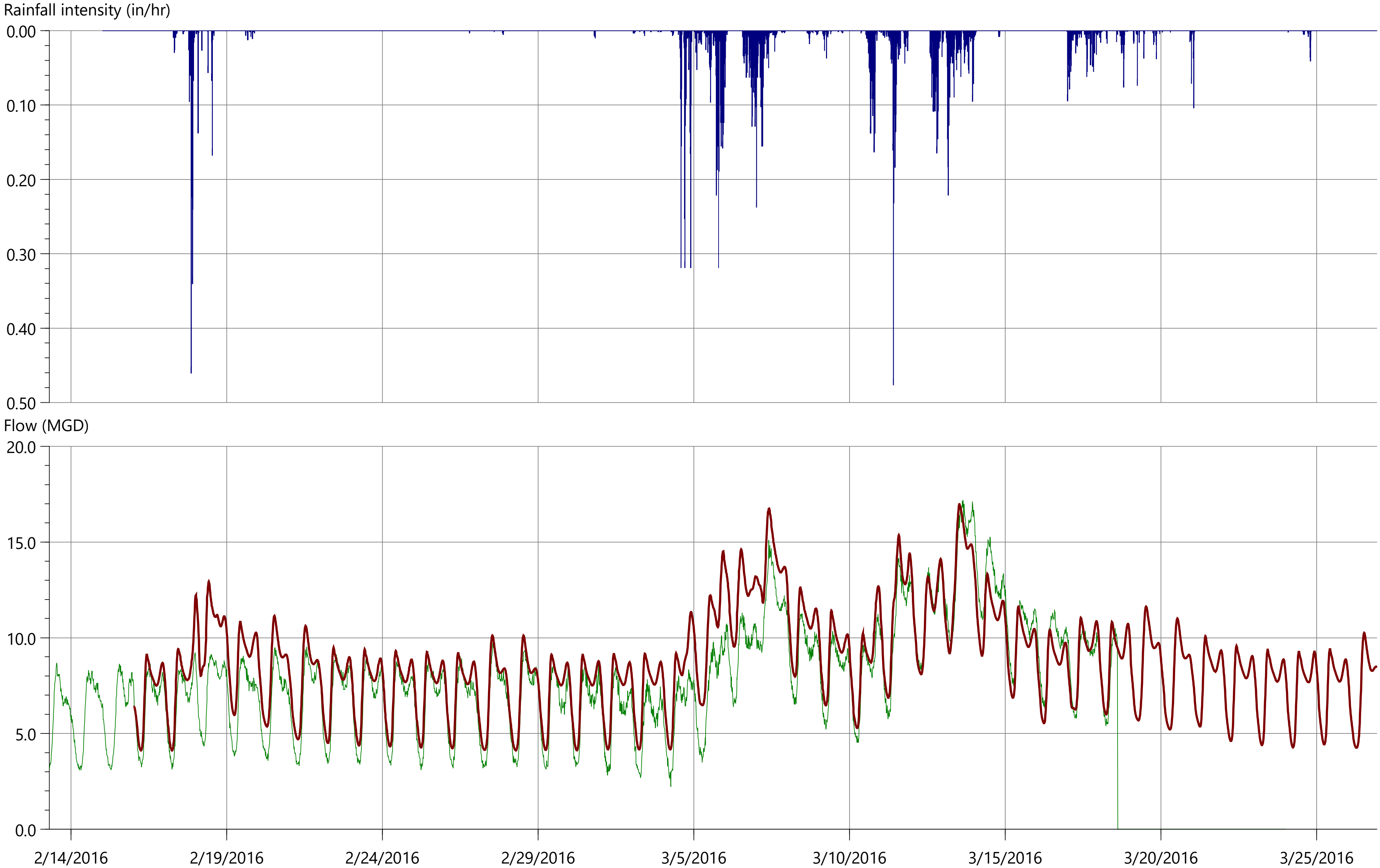

| | Rainfall | | | Flow | | |
|---|---|---|---|---|---|---|
| | Depth (in) | Peak (in/hr) | Average (in/hr) | Min (ft3/s) | Max (ft3/s) | Volume (ft3) |
| Rain | 6.618 | 0.666 | 0.007 | | | |
| Observed | | | | 1.071 | 6.810 | 8508039.397 |
| ...ta20160215_20160315 | | | | 0.886 | 6.940 | 9988758.893 |

Flow survey: >Roseville>3. Data>Flow Data>Flow survey - All data (12/1/2016 1:53:11 PM)
Sim: >SPWA>5. Model Runs>Calibration>combined WWF Calibration (2016 rainfall)!!>OneRainData20160215_20160315 (11/6/2019 11:21:22 AM)
Flow Survey Location (Obs.) FM 15A, Model Location (Pred.) D/S SMH B04-061.1, Rainfall Profile: 179



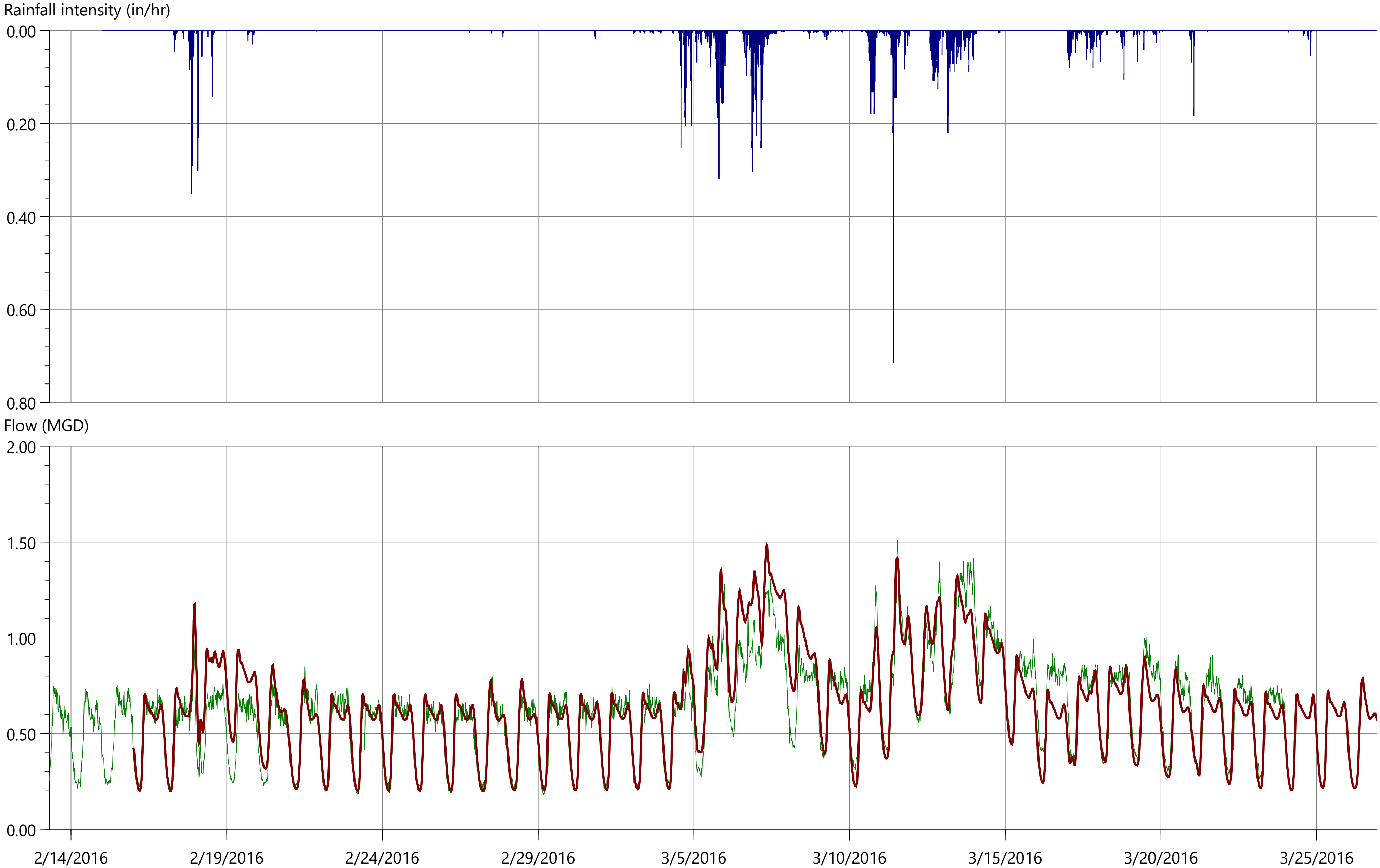

| | Rainfall | | | Flow | | |
|---|---|---|---|---|---|---|
| | Depth (in) | Peak (in/hr) | Average (in/hr) | Min (ft3/s) | Max (ft3/s) | Volume (ft3) |
| Rain | 6.524 | 0.423 | 0.007 | | | |
| Observed | | | | 0.048 | 1.091 | 1332963.500 |
| ...ta20160215_20160315 | | | | 0.143 | 0.978 | 1724557.621 |

Flow survey: >Roseville>3. Data>Flow Data>Flow survey - All data (12/1/2016 1:53:11 PM)
Sim: >SPWA>5. Model Runs>Calibration>combined WWF Calibration (2016 rainfall)!!>OneRainData20160215_20160315 (11/6/2019 11:21:22 AM)
Flow Survey Location (Obs.) FM 16, Model Location (Pred.) D/S SMH B05-230.1, Rainfall Profile: 147




| | Rainfall | | | Flow | | |
|---|---|---|---|---|---|---|
| | Depth (in) | Peak (in/hr) | Average (in/hr) | Min (ft3/s) | Max (ft3/s) | Volume (ft3) |
| Rain | 6.581 | 0.476 | 0.007 | | | |
| Observed | | | | 0.000 | 17.190 | 23376320.562 |
| ...ta20160215_20160315 | | | | 4.111 | 16.980 | 30162930.049 |

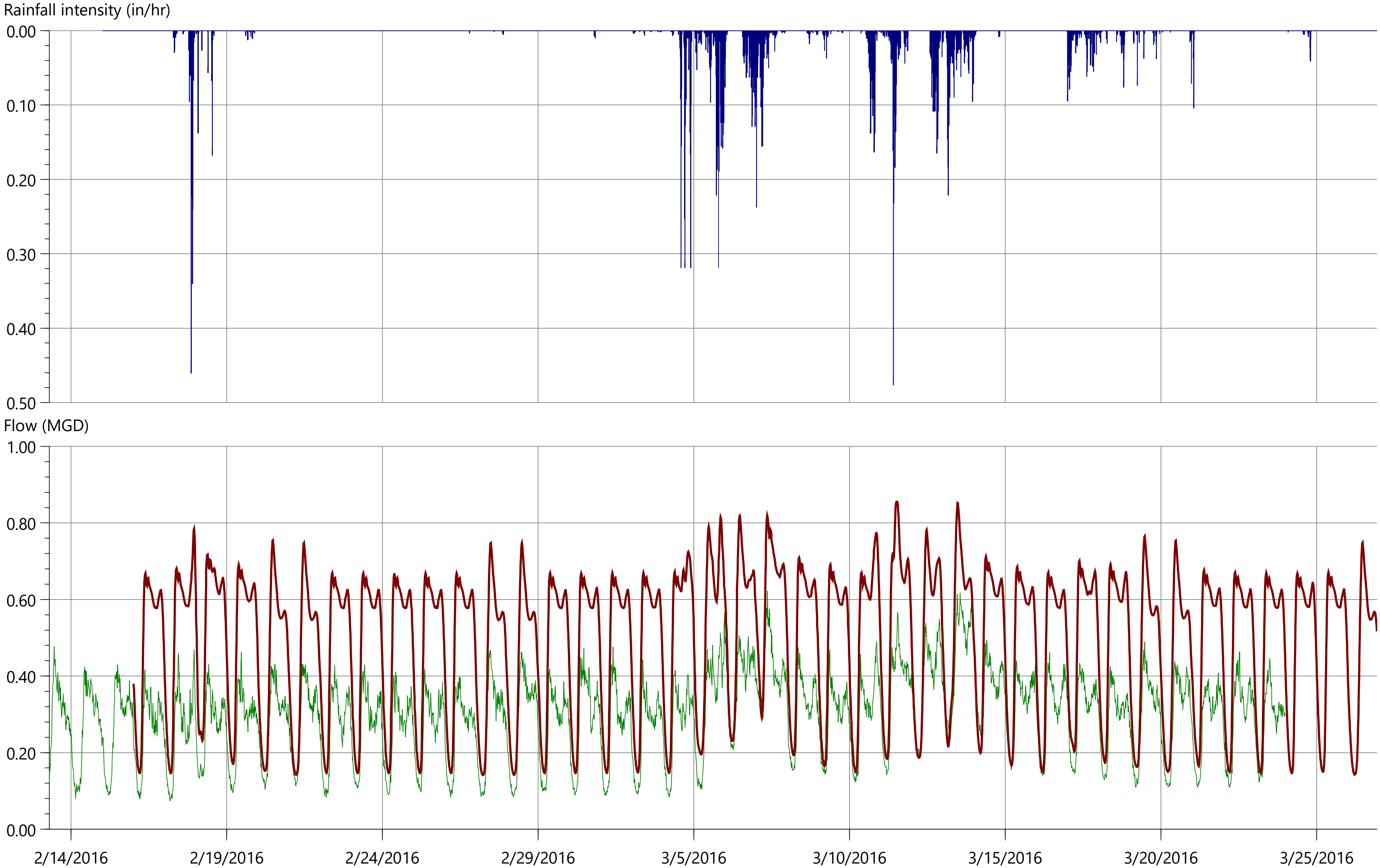
Flow survey: >Roseville>3. Data>Flow Data>Flow survey - All data (12/1/2016 1:53:11 PM)
Sim: >SPWA>5. Model Runs>Calibration>combined WWF Calibration (2016 rainfall)!!>OneRainData20160215_20160315 (11/6/2019 11:21:22 AM)
Flow Survey Location (Obs.) FM 16A, Model Location (Pred.) D/S SMH B06-148.1, Rainfall Profile: 182




| | Rainfall | | | Flow | | |
|---|---|---|---|---|---|---|
| | Depth (in) | Peak (in/hr) | Average (in/hr) | Min (ft3/s) | Max (ft3/s) | Volume (ft3) |
| Rain | 7.006 | 0.714 | 0.007 | | | |
| Observed | | | | 0.179 | 1.509 | 2154876.607 |
| ...ta20160215_20160315 | | | | 0.200 | 1.482 | 2224728.980 |

Flow survey: >Roseville>3. Data>Flow Data>Flow survey - All data (12/1/2016 1:53:11 PM)
Sim: >SPWA>5. Model Runs>Calibration>combined WWF Calibration (2016 rainfall)!!>OneRainData20160215_20160315 (11/6/2019 11:21:22 AM)

Flow Survey Location (Obs.) FM 17, Model Location (Pred.) D/S SMH B05-448.1, Rainfall Profile: 147




| | Rainfall | | | Flow | | |
|---|---|---|---|---|---|---|
| | Depth (in) | Peak (in/hr) | Average (in/hr) | Min (ft3/s) | Max (ft3/s) | Volume (ft3) |
| Rain | 6.581 | 0.476 | 0.007 | | | |
| Observed | | | | 0.074 | 0.623 | 1027152.765 |
| ...ta20160215_20160315 | | | | 0.141 | 0.855 | 1734444.106 |

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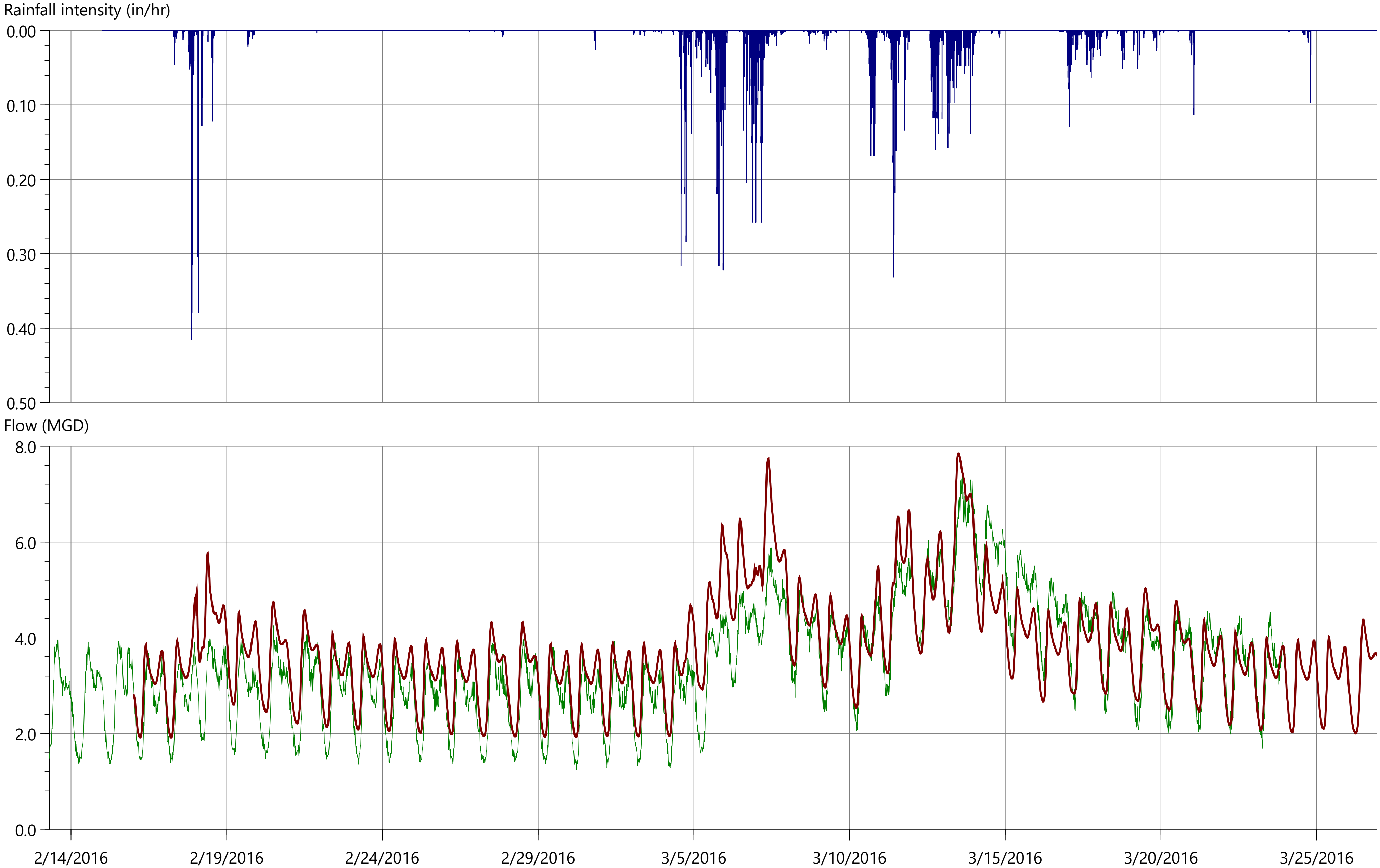
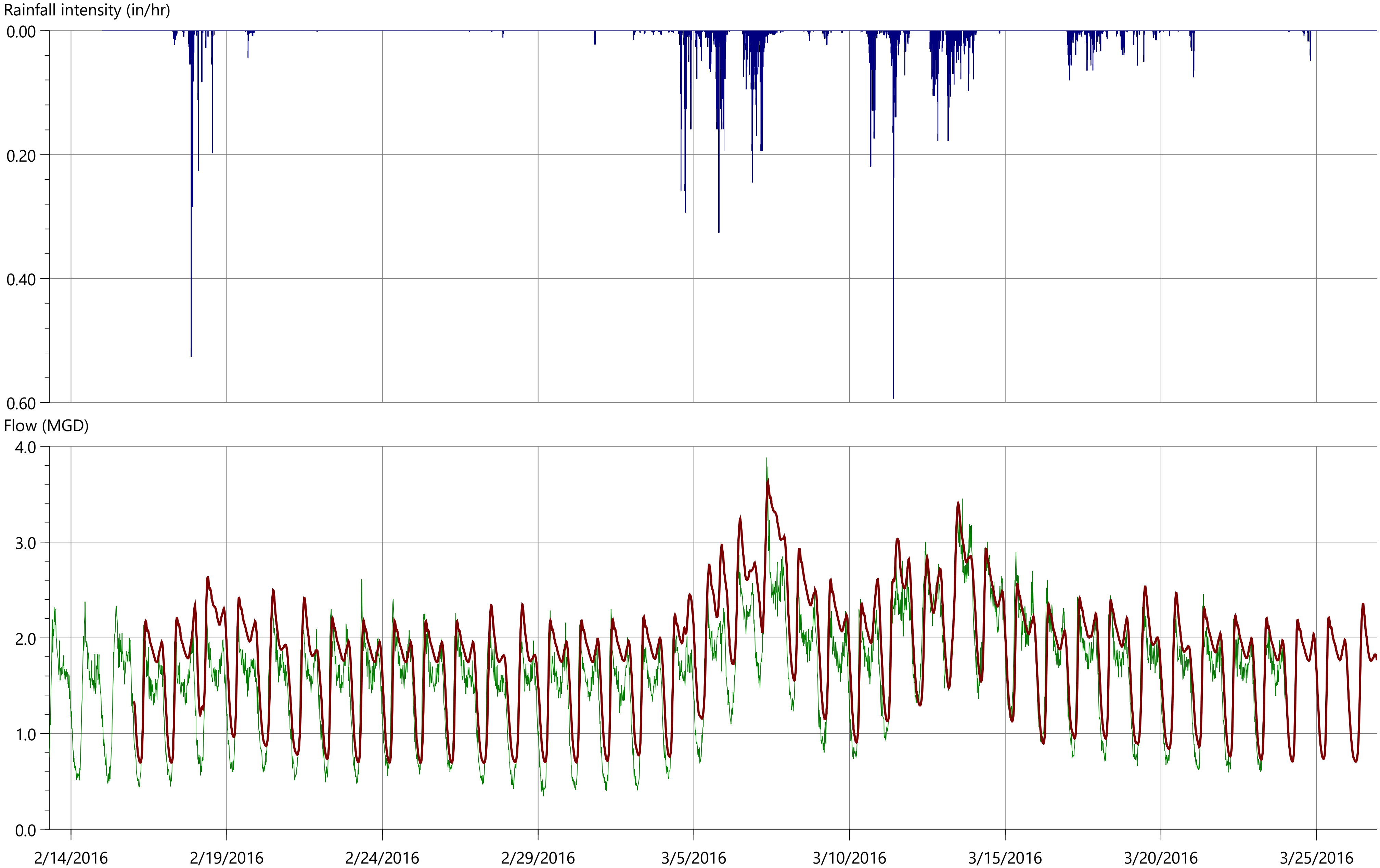
Flow survey: >Roseville>3. Data>Flow Data>Flow survey - All data (12/1/2016 1:53:11 PM)
Sim: >SPWA>5. Model Runs>Calibration>combined WWF Calibration (2016 rainfall)!!>OneRainData20160215_20160315 (11/6/2019 11:21:22 AM)
Flow Survey Location (Obs.) FM 18, Model Location (Pred.) D/S SMH B07-233.1, Rainfall Profile: 151




| | Rainfall | | | Flow | | |
|---|---|---|---|---|---|---|
| | Depth (in) | Peak (in/hr) | Average (in/hr) | Min (ft3/s) | Max (ft3/s) | Volume (ft3) |
| Rain | 7.452 | 0.416 | 0.008 | | | |
| Observed | | | | 1.241 | 7.372 | 11745270.797 |
| ...ta20160215_20160315 | | | | 1.920 | 7.850 | 12994404.563 |

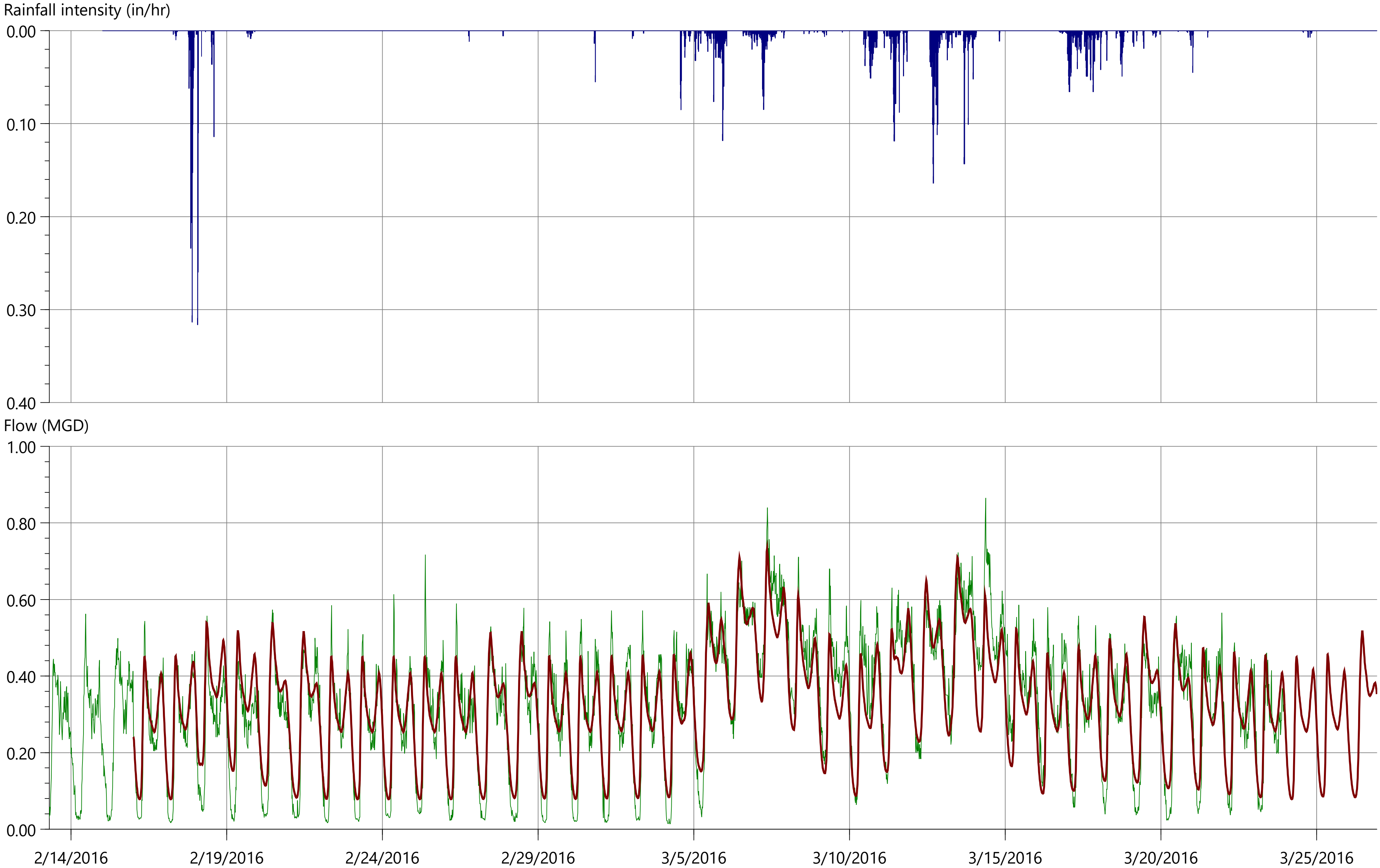
Flow survey: >Roseville>3. Data>Flow Data>Flow survey - All data (12/1/2016 1:53:11 PM)
Sim: >SPWA>5. Model Runs>Calibration>combined WWF Calibration (2016 rainfall)!!>OneRainData20160215_20160315 (11/6/2019 11:21:22 AM)
Flow Survey Location (Obs.) FM 19, Model Location (Pred.) D/S SMH C06-025.1, Rainfall Profile: 248




| | Rainfall | | | Flow | | |
|---|---|---|---|---|---|---|
| | Depth (in) | Peak (in/hr) | Average (in/hr) | Min (ft3/s) | Max (ft3/s) | Volume (ft3) |
| Rain | 6.748 | 0.593 | 0.007 | | | |
| Observed | | | | 0.347 | 3.882 | 5522255.777 |
| ...ta20160215_20160315 | | | | 0.691 | 3.629 | 6310657.038 |

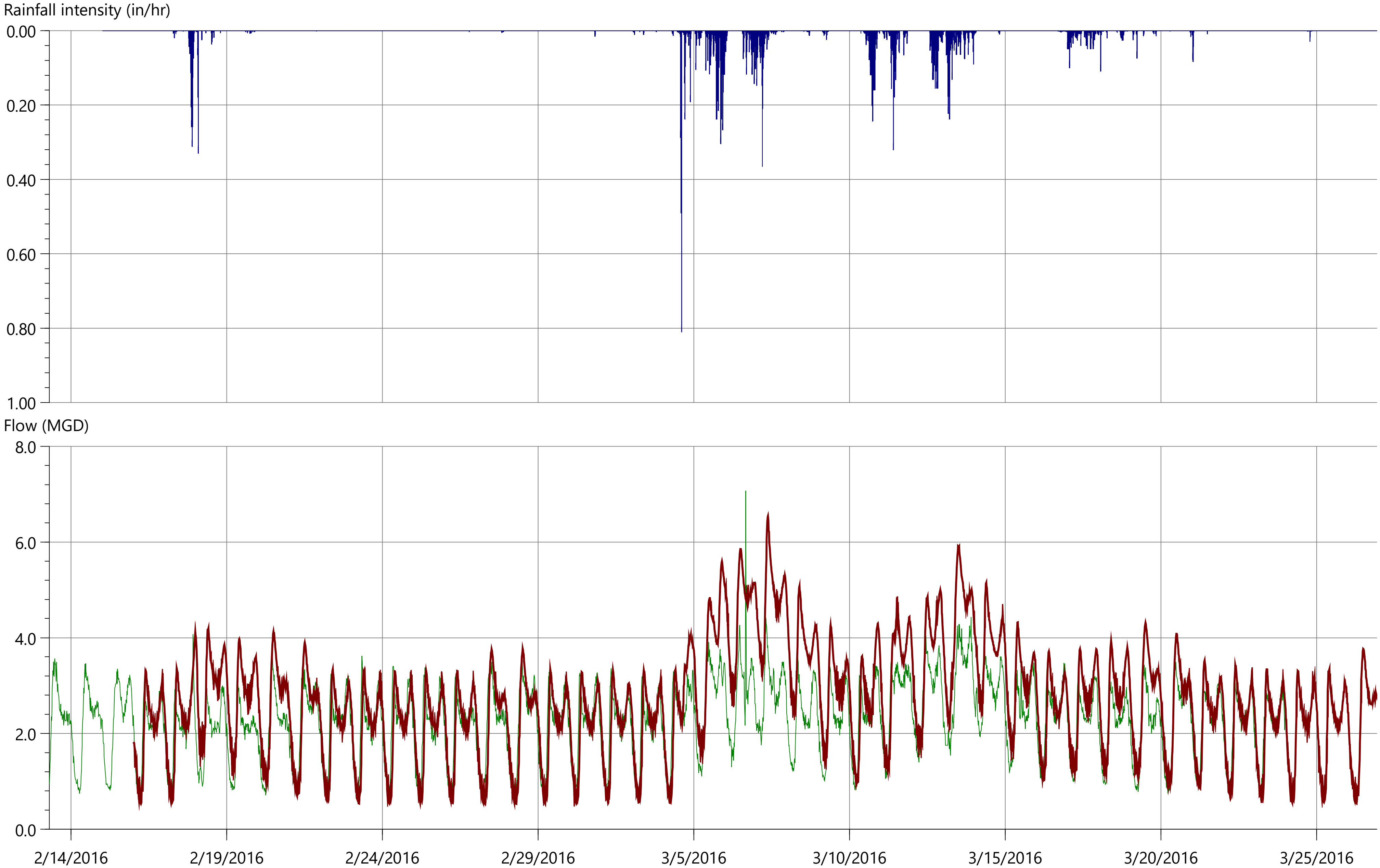
Observed / Predicted Report Produced by cvanlienden (11/7/2019 11:43:54 AM) Page 24 of 40
Flow survey: >Roseville>3. Data>Flow Data>Flow survey - All data (12/1/2016 1:53:11 PM)
Sim: >SPWA>5. Model Runs>Calibration>combined WWF Calibration (2016 rainfall)!!>OneRainData20160215_20160315 (11/6/2019 11:21:22 AM)

Flow Survey Location (Obs.) FM 20, Model Location (Pred.) D/S SMH C07-004.1, Rainfall Profile: 200



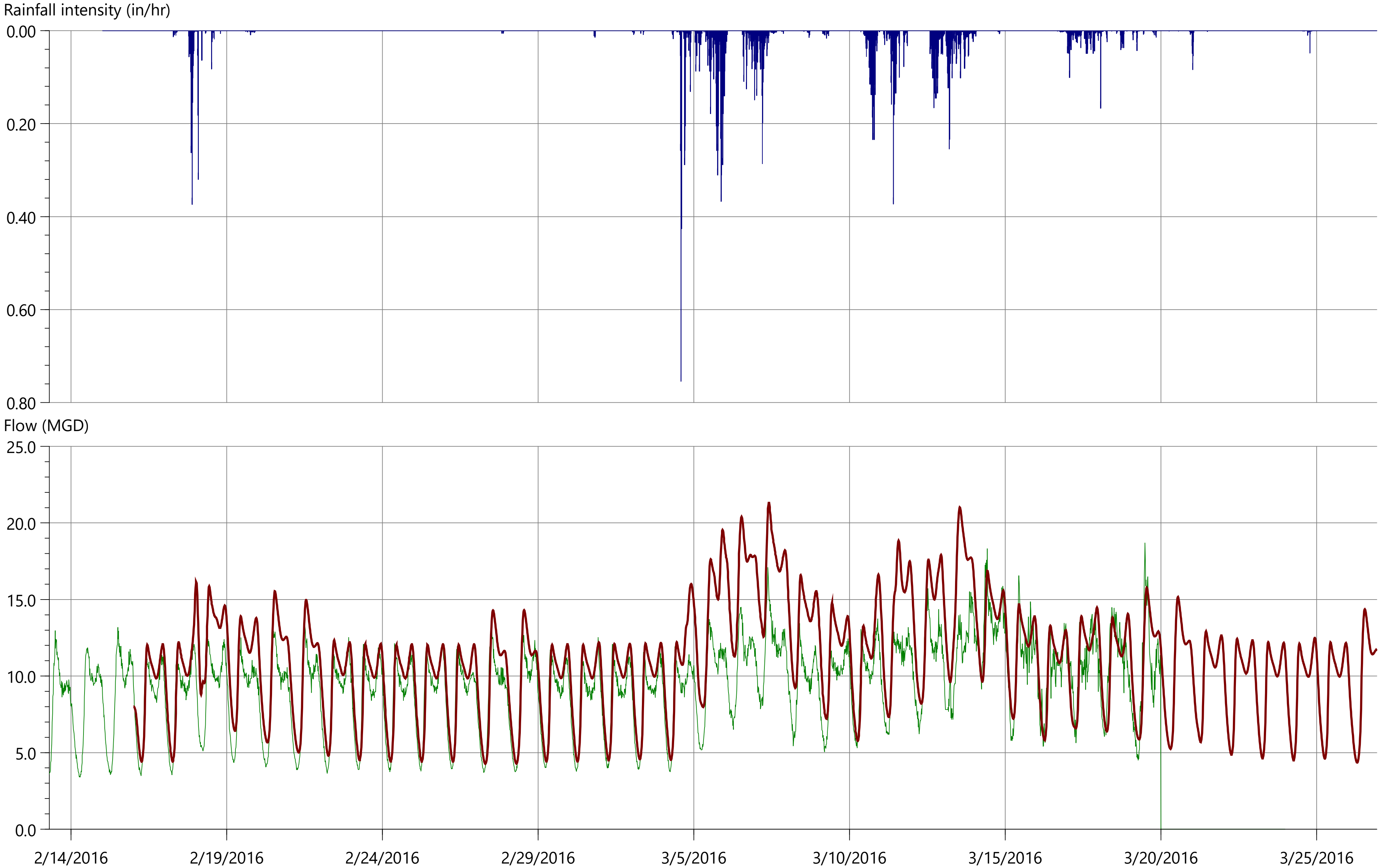

| | Rainfall | | | Flow | | |
|---|---|---|---|---|---|---|
| | Depth (in) | Peak (in/hr) | Average (in/hr) | Min (ft3/s) | Max (ft3/s) | Volume (ft3) |
| Rain | 3.133 | 0.316 | 0.003 | | | |
| Observed | | | | 0.014 | 0.865 | 1110452.108 |
| ...ta20160215_20160315 | | | | 0.078 | 0.732 | 1119212.084 |

Observed / Predicted Report Produced by cvanlienden (11/7/2019 11:43:54 AM) Page 25 of 40
Flow survey: >Roseville>3. Data>Flow Data>Flow survey - All data (12/1/2016 1:53:11 PM)
Sim: >SPWA>5. Model Runs>Calibration>combined WWF Calibration (2016 rainfall)!!>OneRainData20160215_20160315 (11/6/2019 11:21:22 AM)
Flow Survey Location (Obs.) FM 21, Model Location (Pred.) D/S SMH E01-150.1, Rainfall Profile: 305



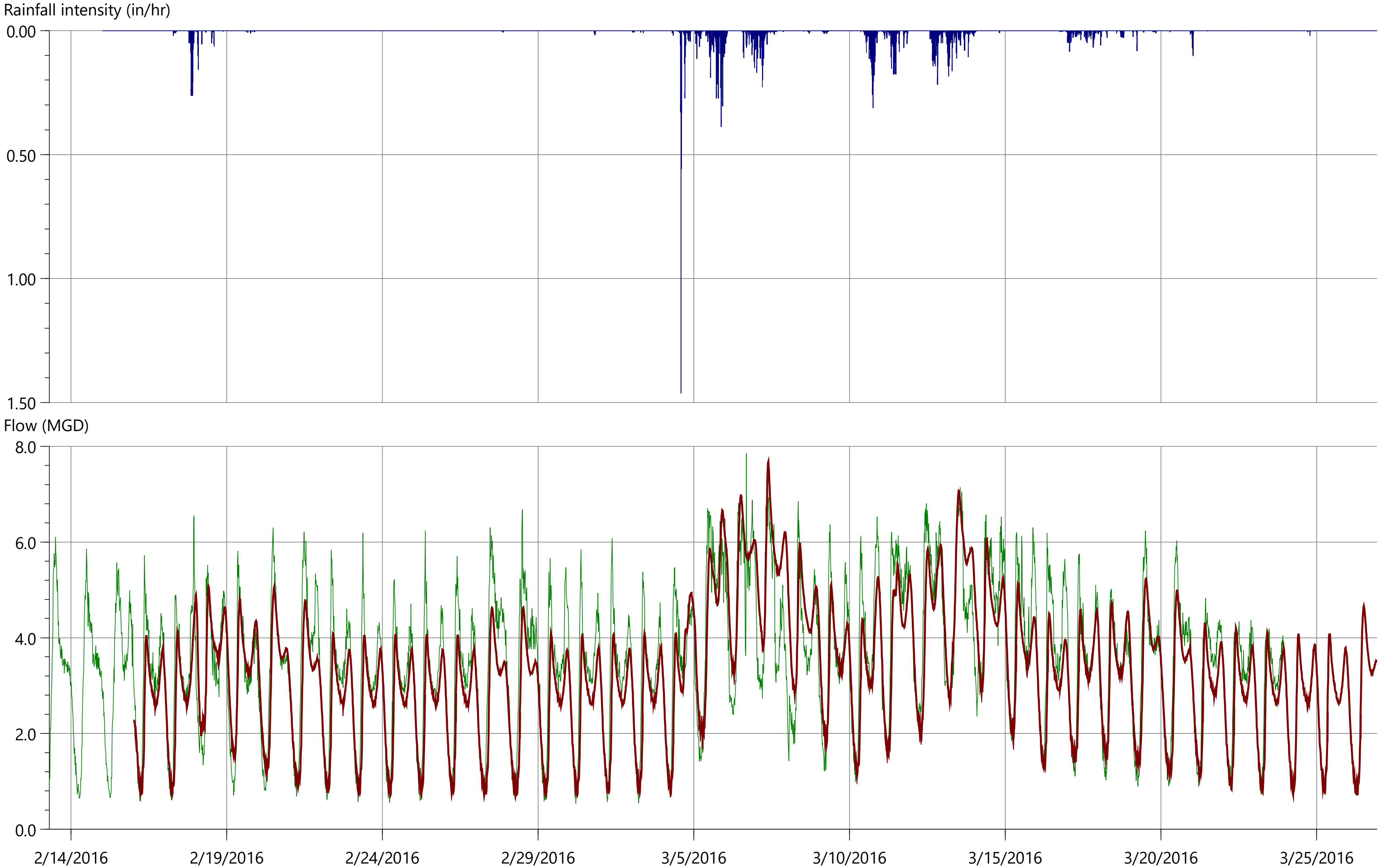

| | Rainfall | | | Flow | | |
|---|---|---|---|---|---|---|
| | Depth (in) | Peak (in/hr) | Average (in/hr) | Min (ft3/s) | Max (ft3/s) | Volume (ft3) |
| Rain | 7.168 | 0.810 | 0.007 | | | |
| Observed | | | | 0.681 | 7.071 | 7871327.215 |
| ...ta20160215_20160315 | | | | 0.529 | 6.540 | 9303644.977 |

Flow survey: >Roseville>3. Data>Flow Data>Flow survey - All data (12/1/2016 1:53:11 PM)
Sim: >SPWA>5. Model Runs>Calibration>combined WWF Calibration (2016 rainfall)!!>OneRainData20160215_20160315 (11/6/2019 11:21:22 AM)
Flow Survey Location (Obs.) FM 22, Model Location (Pred.) D/S SMH F01-135.1, Rainfall Profile: 371



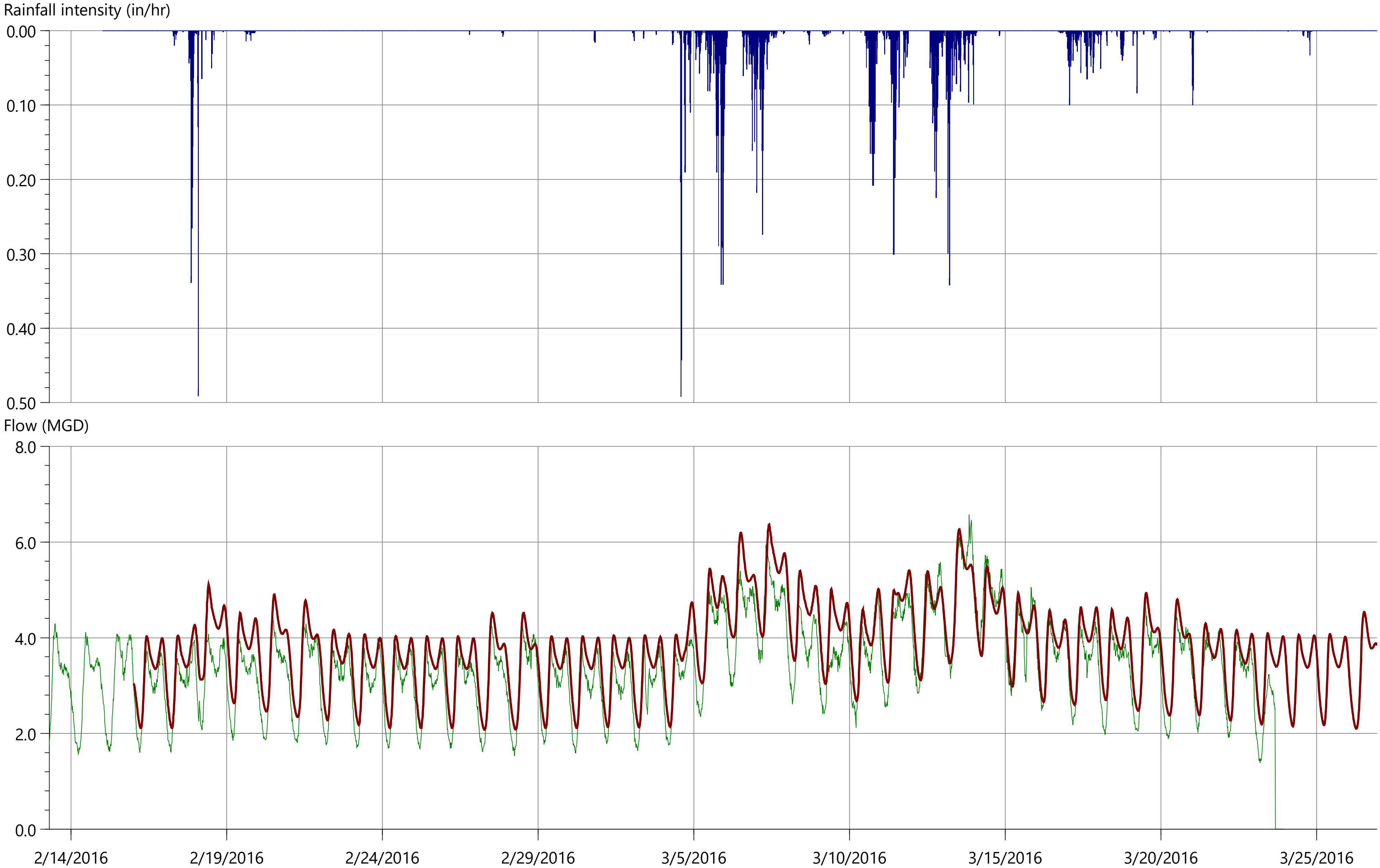

| | Rainfall | | | Flow | | |
|---|---|---|---|---|---|---|
| | Depth (in) | Peak (in/hr) | Average (in/hr) | Min (ft3/s) | Max (ft3/s) | Volume (ft3) |
| Rain | 7.422 | 0.754 | 0.008 | | | |
| Observed | | | | 0.000 | 18.708 | 29305470.700 |
| ...ta20160215_20160315 | | | | 4.271 | 21.309 | 38289677.747 |

Flow survey: >Roseville>3. Data>Flow Data>Flow survey - All data (12/1/2016 1:53:11 PM)
Sim: >SPWA>5. Model Runs>Calibration>combined WWF Calibration (2016 rainfall)!!>OneRainData20160215_20160315 (11/6/2019 11:21:22 AM)
Flow Survey Location (Obs.) FM 23, Model Location (Pred.) D/S SMH F01-147.1, Rainfall Profile: 370



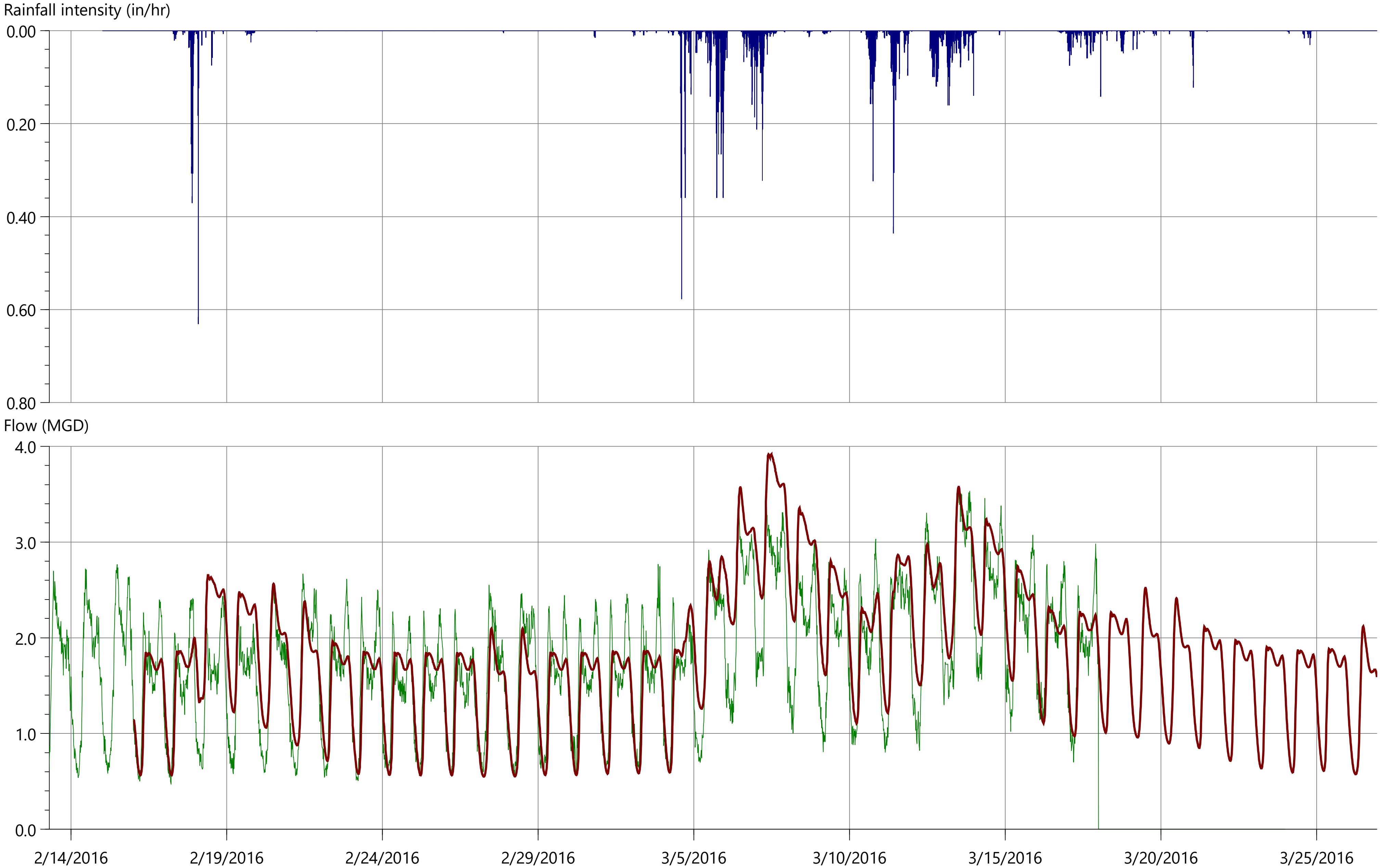

| | Rainfall | | | Flow | | |
|---|---|---|---|---|---|---|
| | Depth (in) | Peak (in/hr) | Average (in/hr) | Min (ft3/s) | Max (ft3/s) | Volume (ft3) |
| Rain | 7.432 | 1.462 | 0.008 | | | |
| Observed | | | | 0.542 | 7.848 | 12177525.807 |
| ...ta20160215_20160315 | | | | 0.707 | 7.678 | 11302643.288 |

Observed / Predicted Report Produced by cvanlienden (11/7/2019 11:43:54 AM) Page 28 of 40
Flow survey: >Roseville>3. Data>Flow Data>Flow survey - All data (12/1/2016 1:53:11 PM)
Sim: >SPWA>5. Model Runs>Calibration>combined WWF Calibration (2016 rainfall)!!>OneRainData20160215_20160315 (11/6/2019 11:21:22 AM)
Flow Survey Location (Obs.) FM 24, Model Location (Pred.) D/S SMH F02-073.1, Rainfall Profile: 406



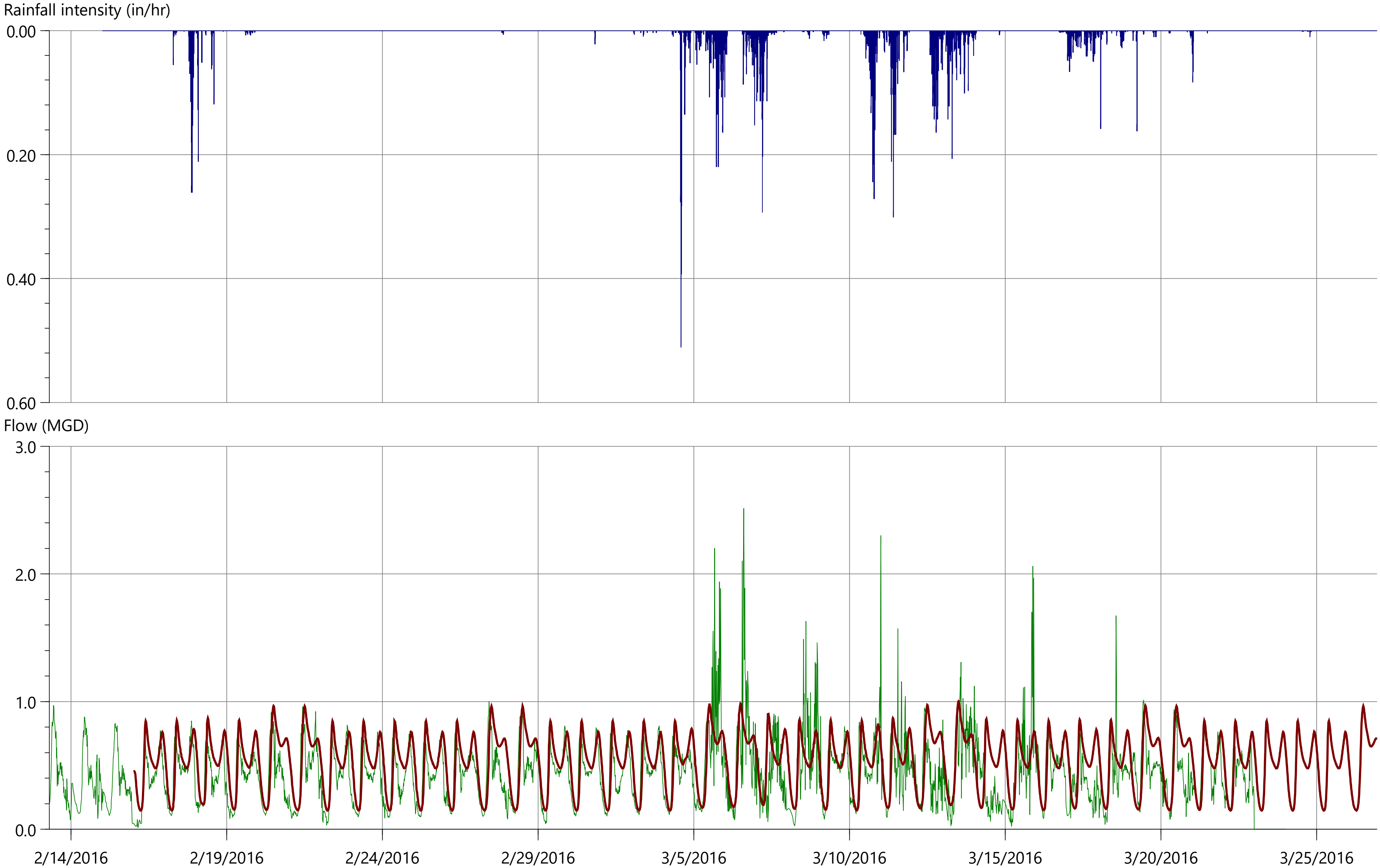

| | Rainfall | | | Flow | | |
|---|---|---|---|---|---|---|
| | Depth (in) | Peak (in/hr) | Average (in/hr) | Min (ft3/s) | Max (ft3/s) | Volume (ft3) |
| Rain | 7.235 | 0.492 | 0.007 | | | |
| Observed | | | | 0.000 | 6.569 | 11673591.208 |
| ...ta20160215_20160315 | | | | 2.078 | 6.365 | 13083521.477 |

Observed / Predicted Report Produced by cvanlienden (11/7/2019 11:43:54 AM) Page 29 of 40
Flow survey: >Roseville>3. Data>Flow Data>Flow survey - All data (12/1/2016 1:53:11 PM)
Sim: >SPWA>5. Model Runs>Calibration>combined WWF Calibration (2016 rainfall)!!>OneRainData20160215_20160315 (11/6/2019 11:21:22 AM)
Flow Survey Location (Obs.) FM 25, Model Location (Pred.) D/S SMH F04-003.1, Rainfall Profile: 409




| | Rainfall | | | Flow | | |
|---|---|---|---|---|---|---|
| | Depth (in) | Peak (in/hr) | Average (in/hr) | Min (ft3/s) | Max (ft3/s) | Volume (ft3) |
| Rain | 7.213 | 0.631 | 0.007 | | | |
| Observed | | | | 0.000 | 3.566 | 5191133.127 |
| ...ta20160215_20160315 | | | | 0.550 | 3.917 | 6371709.144 |

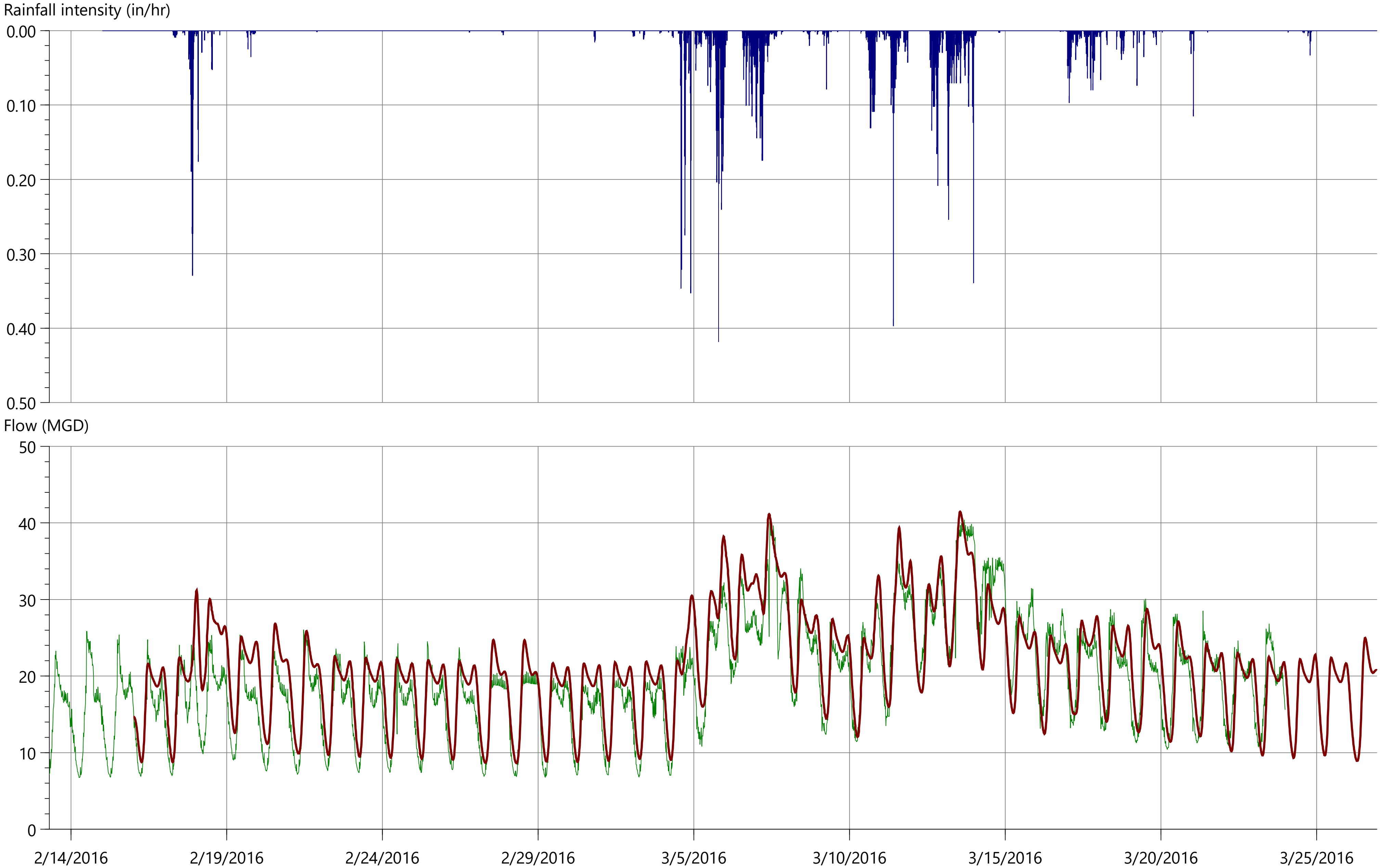
Observed / Predicted Report Produced by cvanlienden (11/7/2019 11:43:54 AM) Page 30 of 40
Flow survey: >Roseville>3. Data>Flow Data>Flow survey - All data (12/1/2016 1:53:11 PM)
Sim: >SPWA>5. Model Runs>Calibration>combined WWF Calibration (2016 rainfall)!!>OneRainData20160215_20160315 (11/6/2019 11:21:22 AM)
Flow Survey Location (Obs.) FM 26, Model Location (Pred.) D/S SMH F99-034.1, Rainfall Profile: 336




| | Rainfall | | | Flow | | |
|---|---|---|---|---|---|---|
| | Depth (in) | Peak (in/hr) | Average (in/hr) | Min (ft3/s) | Max (ft3/s) | Volume (ft3) |
| Rain | 6.185 | 0.510 | 0.006 | | | |
| Observed | | | | 0.000 | 2.513 | 1488940.567 |
| ...ta20160215_20160315 | | | | 0.146 | 1.003 | 1837826.434 |

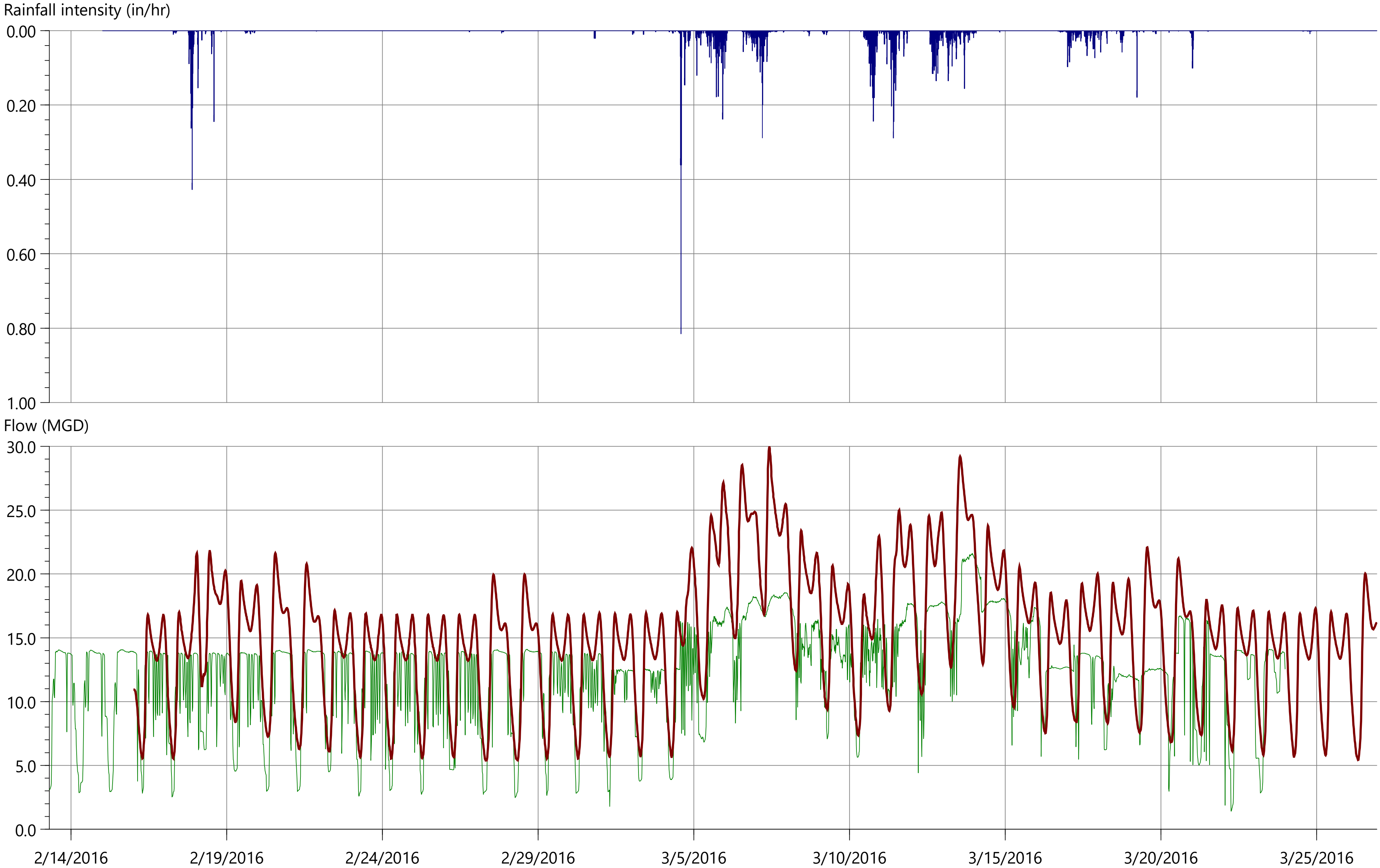
Flow survey: >Roseville>3. Data>Flow Data>Flow survey - All data (12/1/2016 1:53:11 PM)
Sim: >SPWA>5. Model Runs>Calibration>combined WWF Calibration (2016 rainfall)!!>OneRainData20160215_20160315 (11/6/2019 11:21:22 AM)

Flow Survey Location (Obs.) DC WWTP, Model Location (Pred.) D/S CAP B03-DCWWTP.1, Rainfall Profile: 177




| | Rainfall | | | Flow | | |
|---|---|---|---|---|---|---|
| | Depth (in) | Peak (in/hr) | Average (in/hr) | Min (ft3/s) | Max (ft3/s) | Volume (ft3) |
| Rain | 6.394 | 0.418 | 0.007 | | | |
| Observed | | | | 6.736 | 40.725 | 66602465.109 |
| ...ta20160215_20160315 | | | | 8.618 | 41.482 | 73053377.582 |

Flow survey: >Roseville>3. Data>Flow Data>Flow survey - All data (12/1/2016 1:53:11 PM)
Sim: >SPWA>5. Model Runs>Calibration>combined WWF Calibration (2016 rainfall)!!>OneRainData20160215_20160315 (11/6/2019 11:21:22 AM)
Flow Survey Location (Obs.) PG WWTP, Model Location (Pred.) D/S SMH F99-016.1, Rainfall Profile: 368



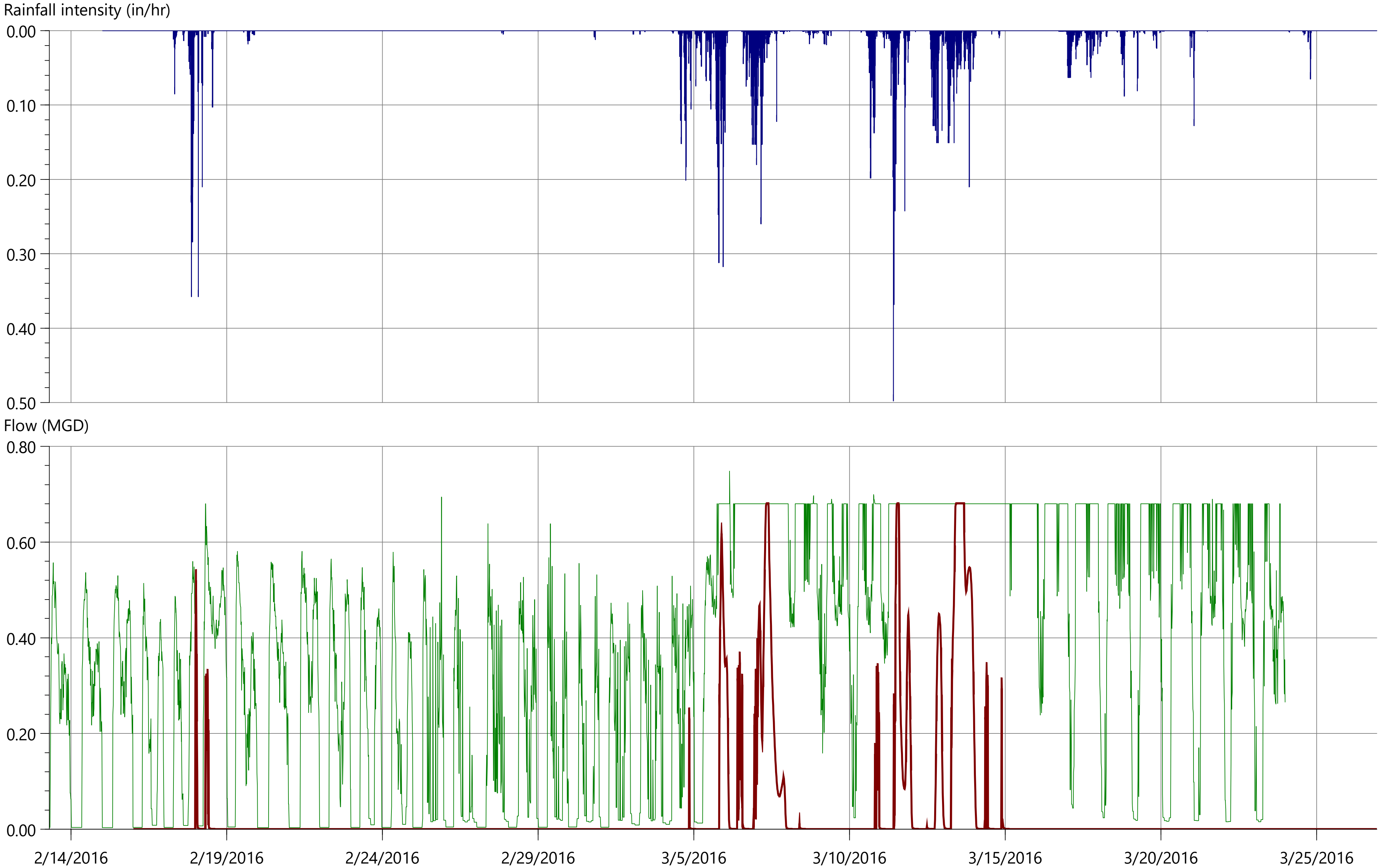

| | Rainfall | | | Flow | | |
|---|---|---|---|---|---|---|
| | Depth (in) | Peak (in/hr) | Average (in/hr) | Min (ft3/s) | Max (ft3/s) | Volume (ft3) |
| Rain | 5.985 | 0.815 | 0.006 | | | |
| Observed | | | | 1.411 | 21.613 | 42223364.633 |
| ...ta20160215_20160315 | | | | 5.391 | 29.963 | 52253557.072 |

Observed / Predicted Report Produced by cvanlienden (11/7/2019 11:43:54 AM) Page 33 of 40

Flow survey: >Roseville>3. Data>Flow Data>Flow survey - All data (12/1/2016 1:53:11 PM)

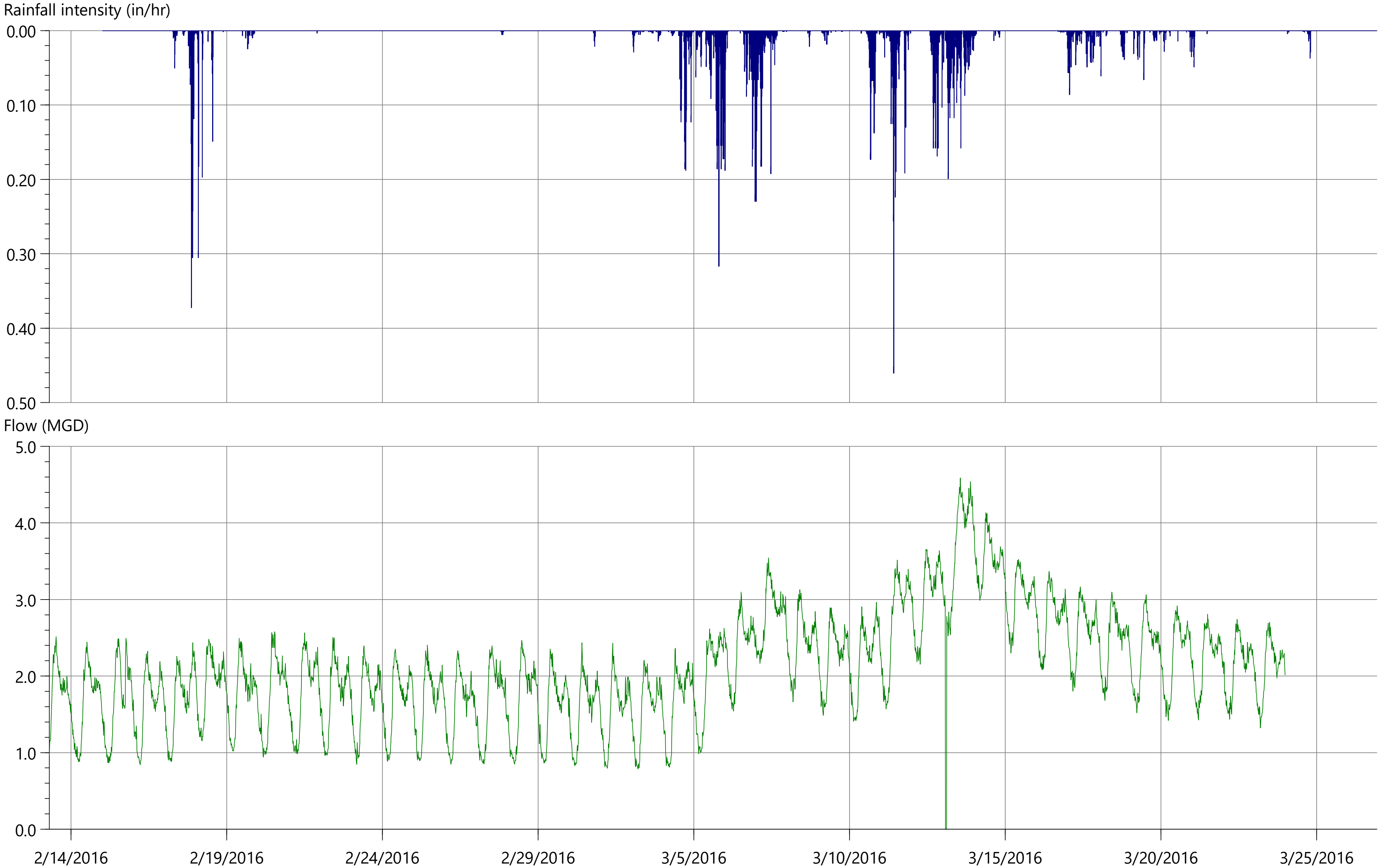
Sim: >SPWA>5. Model Runs>Calibration>combined WWF Calibration (2016 rainfall)!!>OneRainData20160215_20160315 (11/6/2019 11:21:22 AM)

Flow Survey Location (Obs.) PS 26, Model Location (Pred.) D/S A08-169D1.1, Rainfall Profile: 120



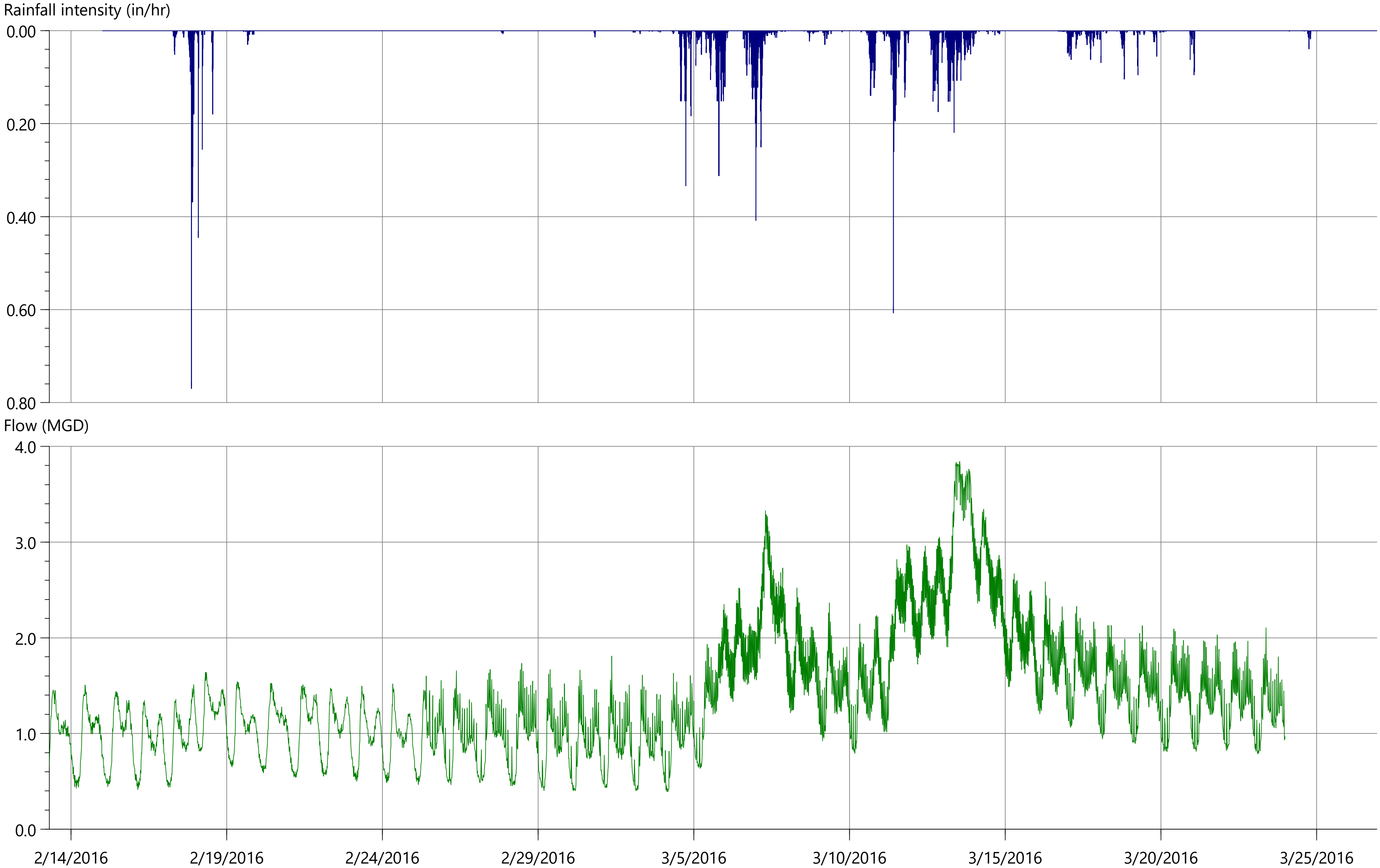

| | Rainfall | | | Flow | | |
|---|---|---|---|---|---|---|
| | Depth (in) | Peak (in/hr) | Average (in/hr) | Min (ft3/s) | Max (ft3/s) | Volume (ft3) |
| Rain | 7.479 | 0.498 | 0.008 | | | |
| Observed | | | | 0.003 | 0.748 | 1268714.090 |
| ...ta20160215_20160315 | | | | 0.000 | 0.681 | 104826.425 |

Flow survey: >Roseville>3. Data>Flow Data>Flow survey - All data (12/1/2016 1:53:11 PM)
Sim: >SPWA>5. Model Runs>Calibration>combined WWF Calibration (2016 rainfall)!!>OneRainData20160215_20160315 (11/6/2019 11:21:22 AM)
Flow Survey Location (Obs.) Sierra College (Placer County), Model Location (Pred.) D/S Sierra College.1, Rainfall Profile: 289




| | Rainfall | | | Flow | | |
|---|---|---|---|---|---|---|
| | Depth (in) | Peak (in/hr) | Average (in/hr) | Min (ft3/s) | Max (ft3/s) | Volume (ft3) |
| Rain | 7.146 | 0.460 | 0.007 | | | |
| Observed | | | | 0.000 | 4.589 | 7230337.020 |
| ...ta20160215_20160315 | | | | | | |

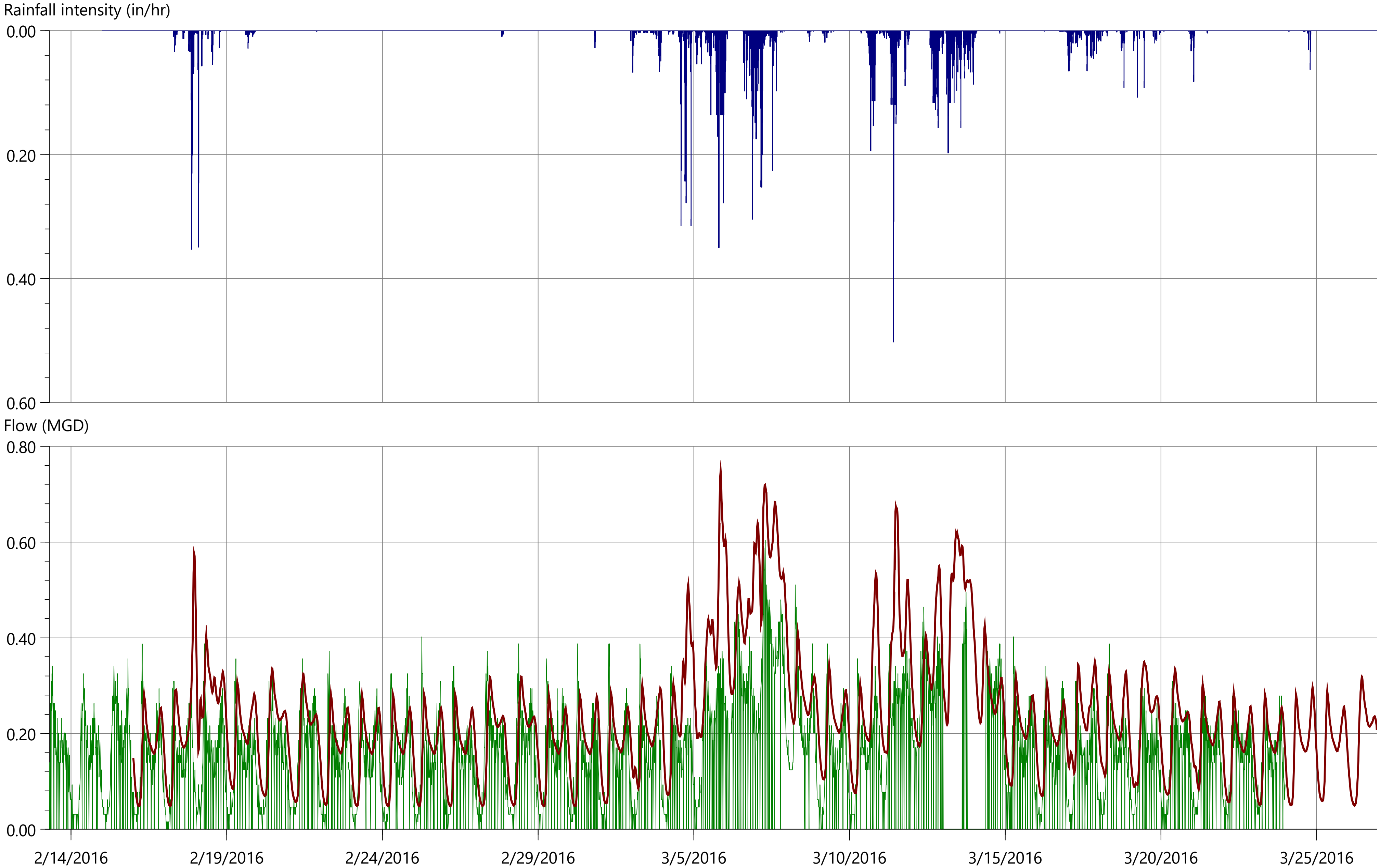
Flow survey: >Roseville>3. Data>Flow Data>Flow survey - All data (12/1/2016 1:53:11 PM)
Sim: >SPWA>5. Model Runs>Calibration>combined WWF Calibration (2016 rainfall)!!>OneRainData20160215_20160315 (11/6/2019 11:21:22 AM)
Flow Survey Location (Obs.) SMD2, Model Location (Pred.) D/S SMH A08-023.1, Rainfall Profile: 157




| | Rainfall | | | Flow | | |
|---|---|---|---|---|---|---|
| | Depth (in) | Peak (in/hr) | Average (in/hr) | Min (ft3/s) | Max (ft3/s) | Volume (ft3) |
| Rain | 7.706 | 0.770 | 0.008 | | | |
| Observed | | | | 0.391 | 3.843 | 4692173.351 |
| ...ta20160215_20160315 | | | | | | |

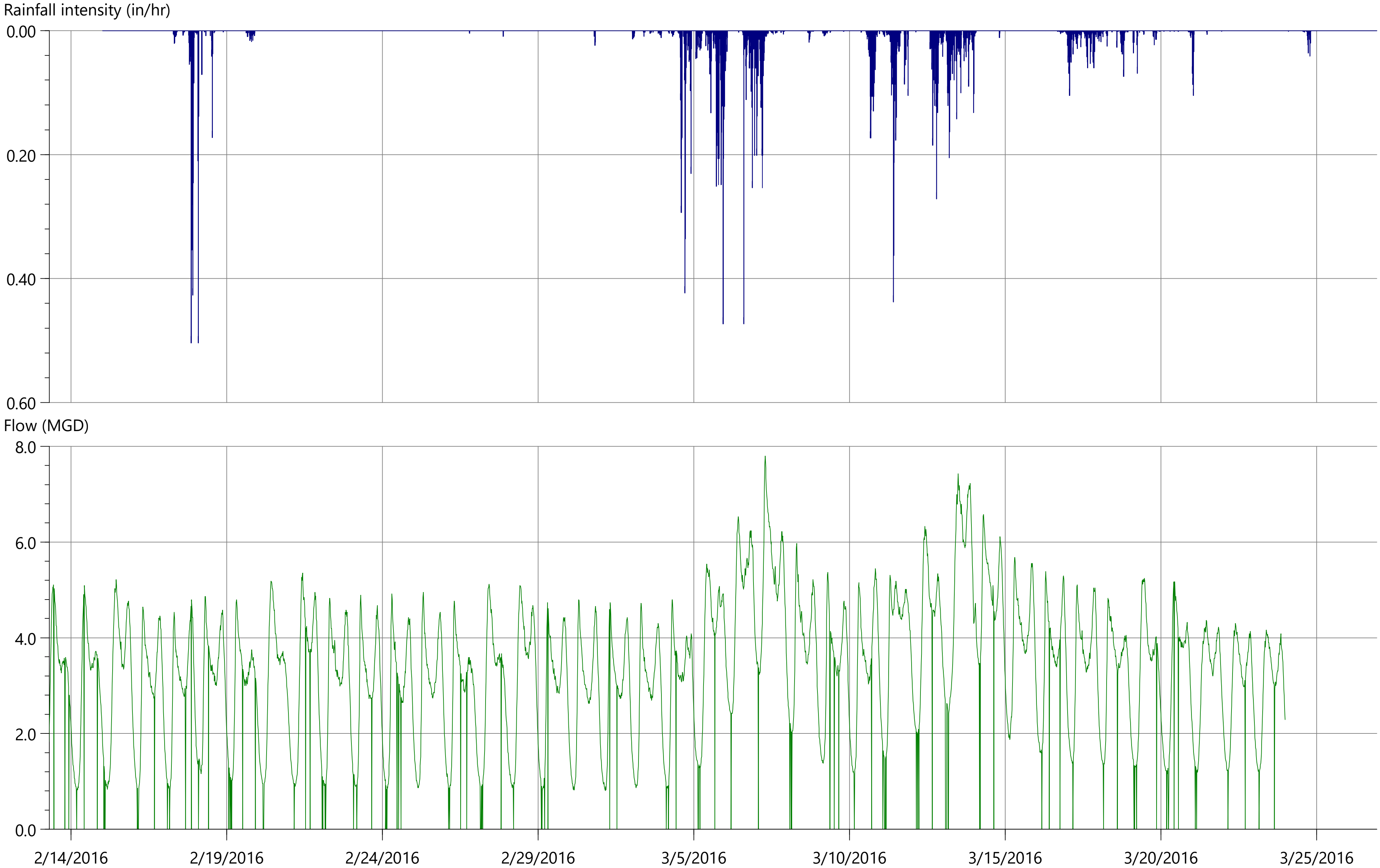
Observed / Predicted Report Produced by cvanlienden (11/7/2019 11:43:54 AM) Page 36 of 40
Flow survey: >Roseville>3. Data>Flow Data>Flow survey - All data (12/1/2016 1:53:11 PM)
Sim: >SPWA>5. Model Runs>Calibration>combined WWF Calibration (2016 rainfall)!!>OneRainData20160215_20160315 (11/6/2019 11:21:22 AM)

Flow Survey Location (Obs.) Highlands, Model Location (Pred.) D/S SMH D08-006.1, Rainfall Profile: 318



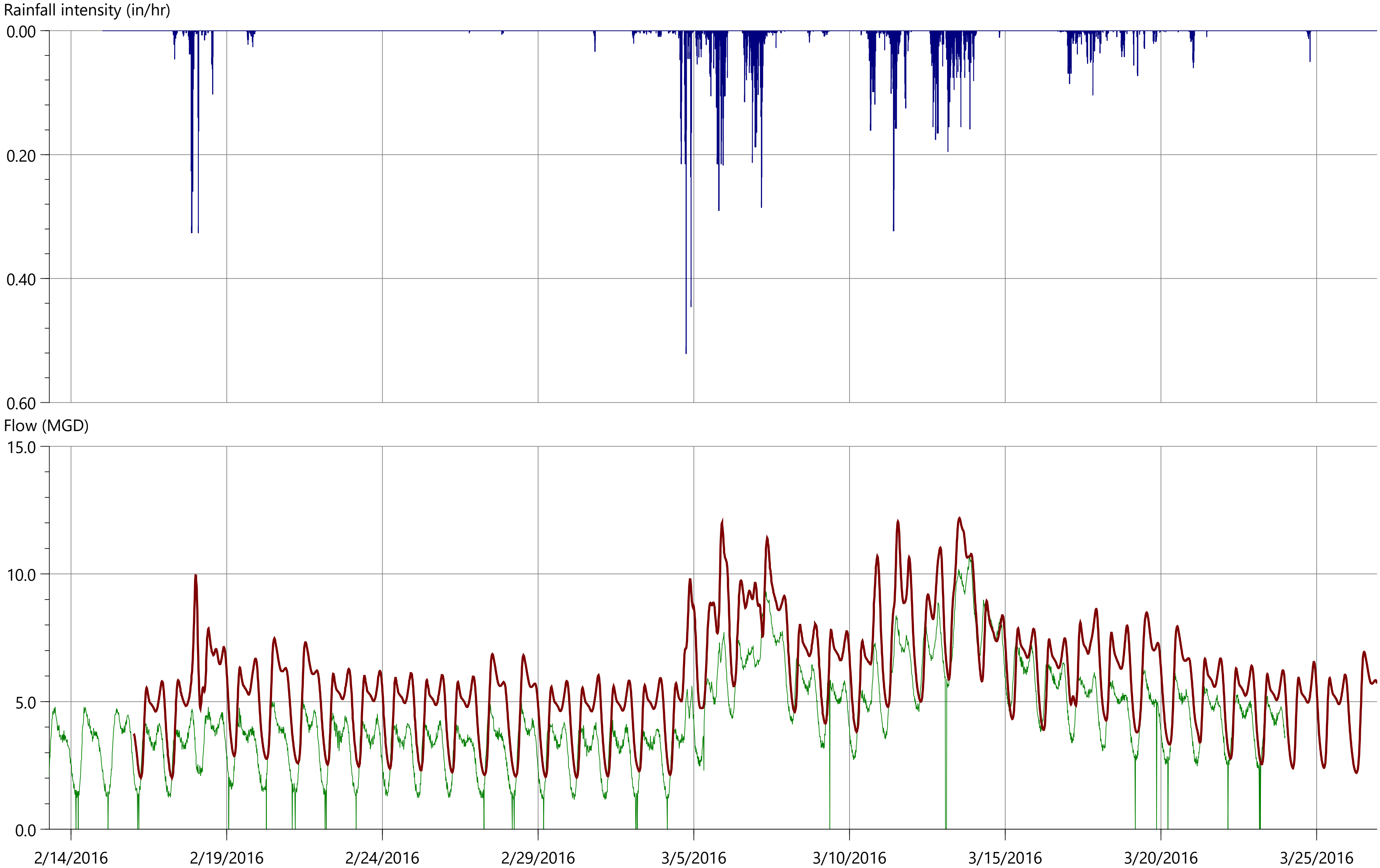

| | Rainfall | | | Flow | | |
|---|---|---|---|---|---|---|
| | Depth (in) | Peak (in/hr) | Average (in/hr) | Min (ft3/s) | Max (ft3/s) | Volume (ft3) |
| Rain | 7.486 | 0.502 | 0.008 | | | |
| Observed | | | | 0.000 | 0.603 | 498513.323 |
| ...ta20160215_20160315 | | | | 0.048 | 0.748 | 814212.771 |

Flow survey: >Roseville>3. Data>Flow Data>Flow survey - All data (12/1/2016 1:53:11 PM)
Sim: >SPWA>5. Model Runs>Calibration>combined WWF Calibration (2016 rainfall)!!>OneRainData20160215_20160315 (11/6/2019 11:21:22 AM)
Flow Survey Location (Obs.) North Roseville, Model Location (Pred.) D/S NorthRoseville.1, Rainfall Profile: 479



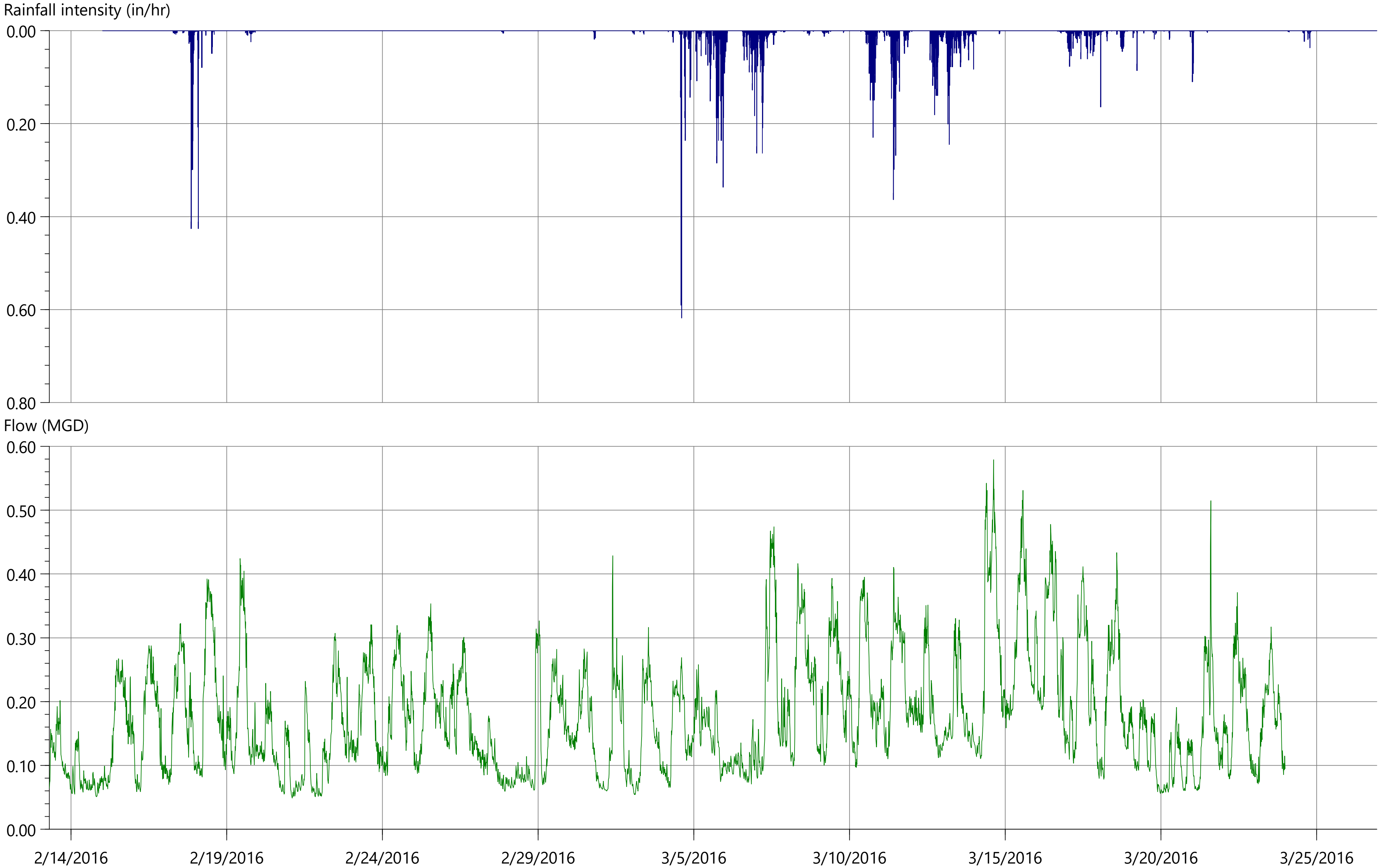

| | Rainfall | | | Flow | | |
|---|---|---|---|---|---|---|
| | Depth (in) | Peak (in/hr) | Average (in/hr) | Min (ft3/s) | Max (ft3/s) | Volume (ft3) |
| Rain | 7.580 | 0.504 | 0.008 | | | |
| Observed | | | | 0.000 | 7.798 | 11333261.397 |
| ...ta20160215_20160315 | | | | | | |

Flow survey: >Roseville>3. Data>Flow Data>Flow survey - All data (12/1/2016 1:53:11 PM)
Sim: >SPWA>5. Model Runs>Calibration>combined WWF Calibration (2016 rainfall)!!>OneRainData20160215_20160315 (11/6/2019 11:21:22 AM)
Flow Survey Location (Obs.) Springview, Model Location (Pred.) D/S SMH C06-213.1, Rainfall Profile: 418



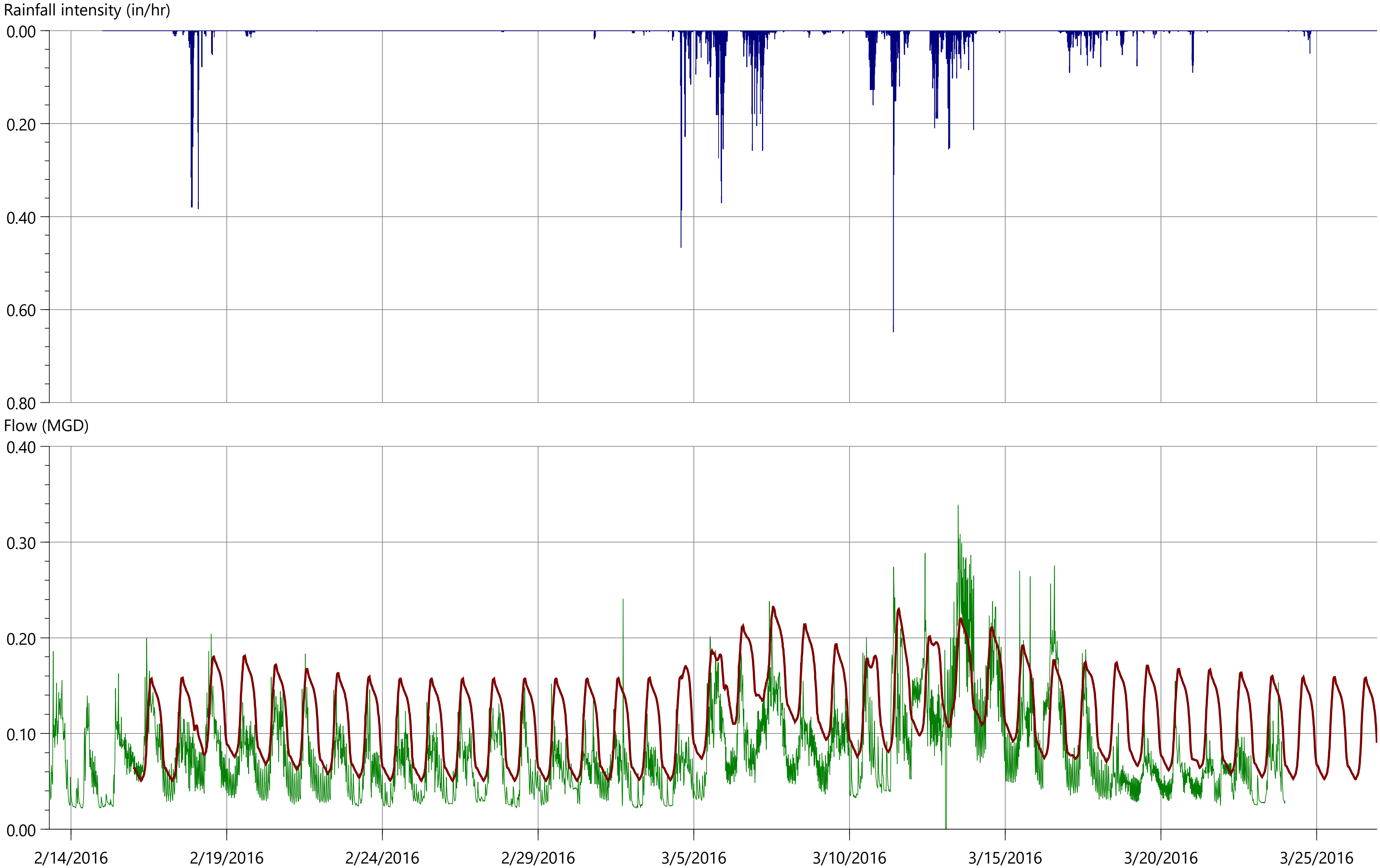

| | Rainfall | | | Flow | | |
|---|---|---|---|---|---|---|
| | Depth (in) | Peak (in/hr) | Average (in/hr) | Min (ft3/s) | Max (ft3/s) | Volume (ft3) |
| Rain | 7.461 | 0.521 | 0.008 | | | |
| Observed | | | | 0.000 | 10.738 | 14884868.215 |
| ...ta20160215_20160315 | | | | 2.010 | 12.195 | 20206568.688 |

Flow survey: >Roseville>3. Data>Flow Data>Flow survey - All data (12/1/2016 1:53:11 PM)
Sim: >SPWA>5. Model Runs>Calibration>combined WWF Calibration (2016 rainfall)!!>OneRainData20160215_20160315 (11/6/2019 11:21:22 AM)
Flow Survey Location (Obs.) Cincinnati, Model Location (Pred.) D/S SMH G03-032.1, Rainfall Profile: 441




| | Rainfall | | | Flow | | |
|---|---|---|---|---|---|---|
| | Depth (in) | Peak (in/hr) | Average (in/hr) | Min (ft3/s) | Max (ft3/s) | Volume (ft3) |
| Rain | 7.365 | 0.618 | 0.007 | | | |
| Observed | | | | 0.049 | 0.579 | 607274.558 |
| ...ta20160215_20160315 | | | | | | |

Flow survey: >Roseville>3. Data>Flow Data>Flow survey - All data (12/1/2016 1:53:11 PM)
Sim: >SPWA>5. Model Runs>Calibration>combined WWF Calibration (2016 rainfall)!!>OneRainData20160215_20160315 (11/6/2019 11:21:22 AM)
Flow Survey Location (Obs.) Industrial, Model Location (Pred.) D/S SMH G03-062.1, Rainfall Profile: 475




| | Rainfall | | | Flow | | |
|---|---|---|---|---|---|---|
| | Depth (in) | Peak (in/hr) | Average (in/hr) | Min (ft3/s) | Max (ft3/s) | Volume (ft3) |
| Rain | 7.576 | 0.648 | 0.008 | | | |
| Observed | | | | 0.000 | 0.339 | 266882.195 |
| ...ta20160215_20160315 | | | | 0.051 | 0.232 | 407592.659 |

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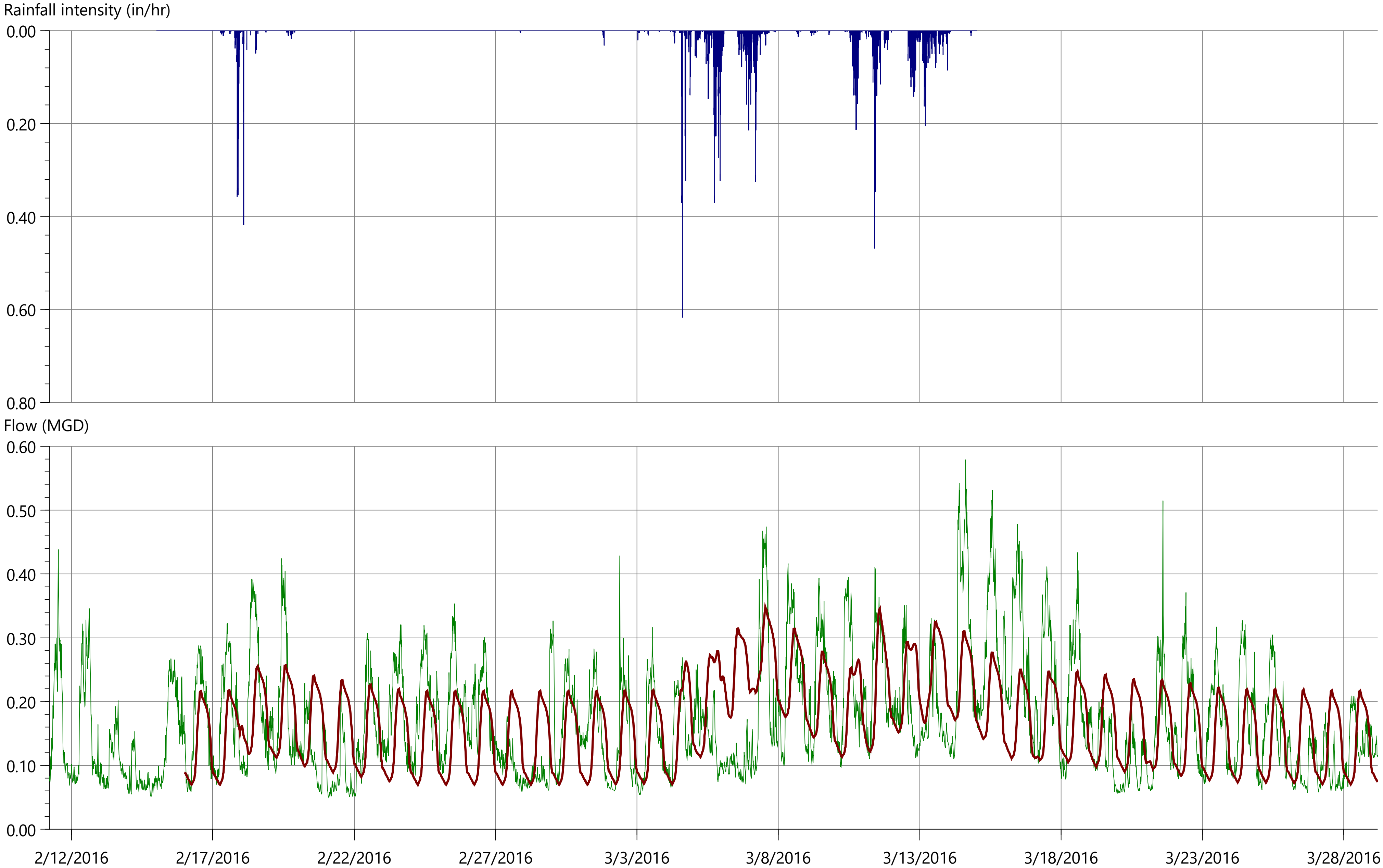
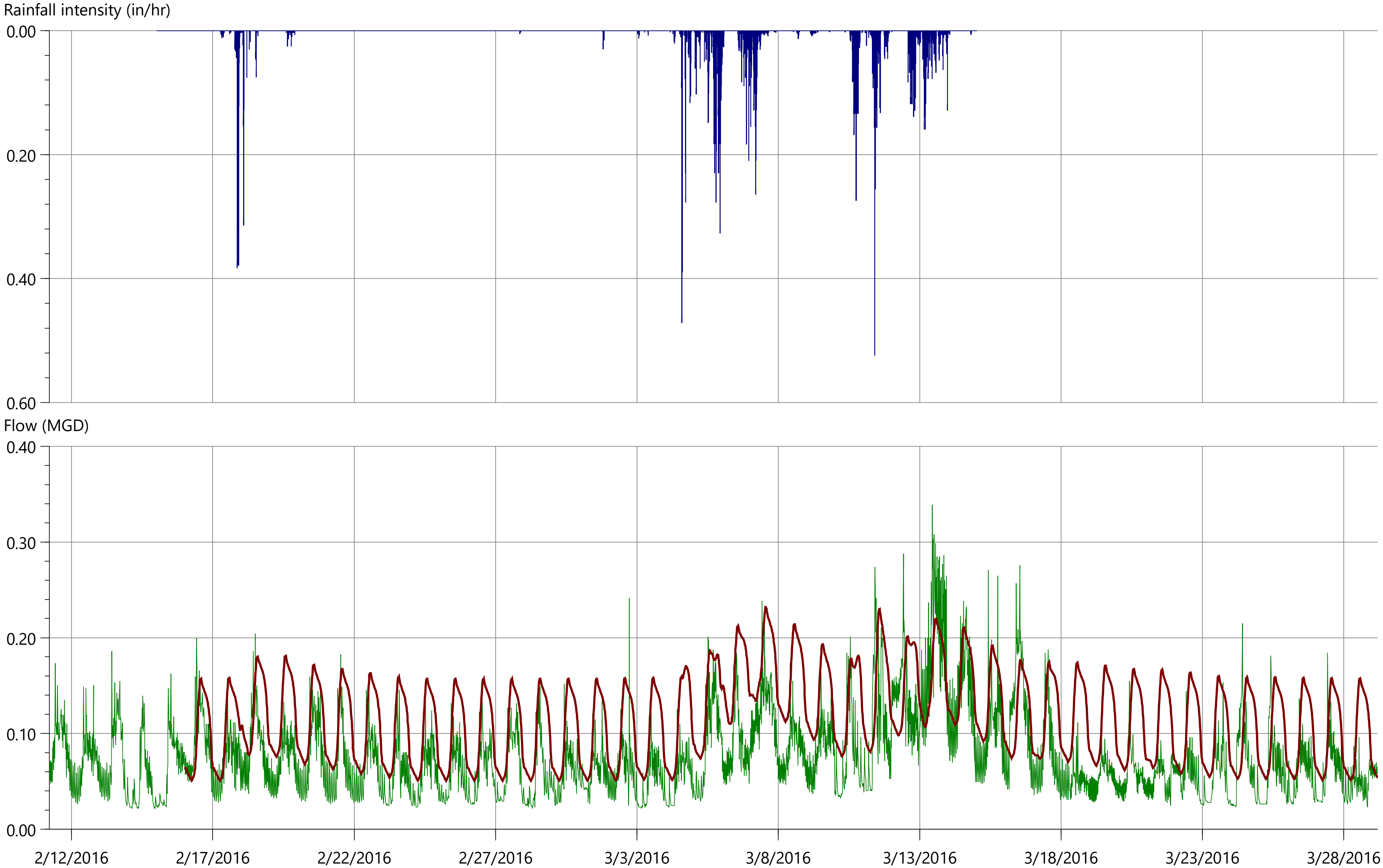
Flow survey: >Roseville>3. Data>Flow Data>Permanent Meter Data (12/1/2016 10:54:47 AM)
Sim: >SPWA>5. Model Runs>Calibration>combined WWF Calibration (2016 rainfall)!!>OneRainData20160215_20160315_RGBoundaries (11/6/2019 11:21:22 AM)

Flow Survey Location (Obs.) Cincinnati, Model Location (Pred.) D/S CA4-RSVL28.1, Rainfall Profile: 408




| | Rainfall | | | Flow | | |
|---|---|---|---|---|---|---|
| | Depth (in) | Peak (in/hr) | Average (in/hr) | Min (ft3/s) | Max (ft3/s) | Volume (ft3) |
| Rain | 6.438 | 0.617 | 0.009 | | | |
| Observed | | | | 0.049 | 0.579 | 695745.611 |
| ...160315_RGBoundaries | | | | 0.069 | 0.348 | 611280.586 |

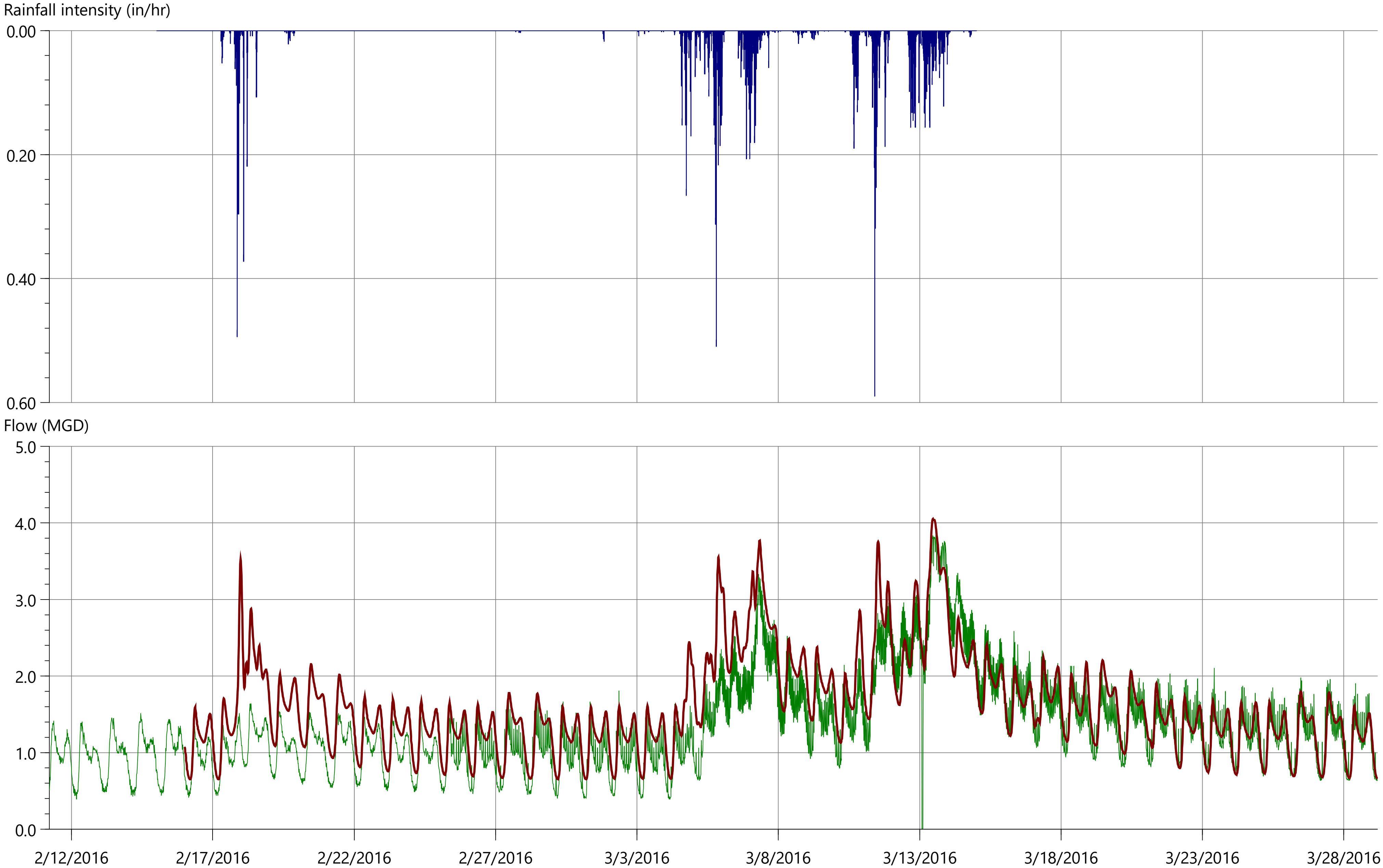
Flow survey: >Roseville>3. Data>Flow Data>Permanent Meter Data (12/1/2016 10:54:47 AM)
Sim: >SPWA>5. Model Runs>Calibration>combined WWF Calibration (2016 rainfall)!!>OneRainData20160215_20160315_RGBoundaries (11/6/2019 11:21:22 AM)
Flow Survey Location (Obs.) Industrial, Model Location (Pred.) D/S SMH G03-062.1, Rainfall Profile: 442




| | Rainfall | | | Flow | | |
|---|---|---|---|---|---|---|
| | Depth (in) | Peak (in/hr) | Average (in/hr) | Min (ft3/s) | Max (ft3/s) | Volume (ft3) |
| Rain | 6.635 | 0.524 | 0.010 | | | |
| Observed | | | | 0.022 | 0.339 | 307302.659 |
| ...160315_RGBoundaries | | | | 0.051 | 0.232 | 426162.383 |

Observed / Predicted Report Produced by cvanlienden (11/7/2019 11:35:25 AM) Page 3 of 7
Flow survey: >Roseville>3. Data>Flow Data>Permanent Meter Data (12/1/2016 10:54:47 AM)
Sim: >SPWA>5. Model Runs>Calibration>combined WWF Calibration (2016 rainfall)!!>OneRainData20160215_20160315_RGBoundaries (11/6/2019 11:21:22 AM)

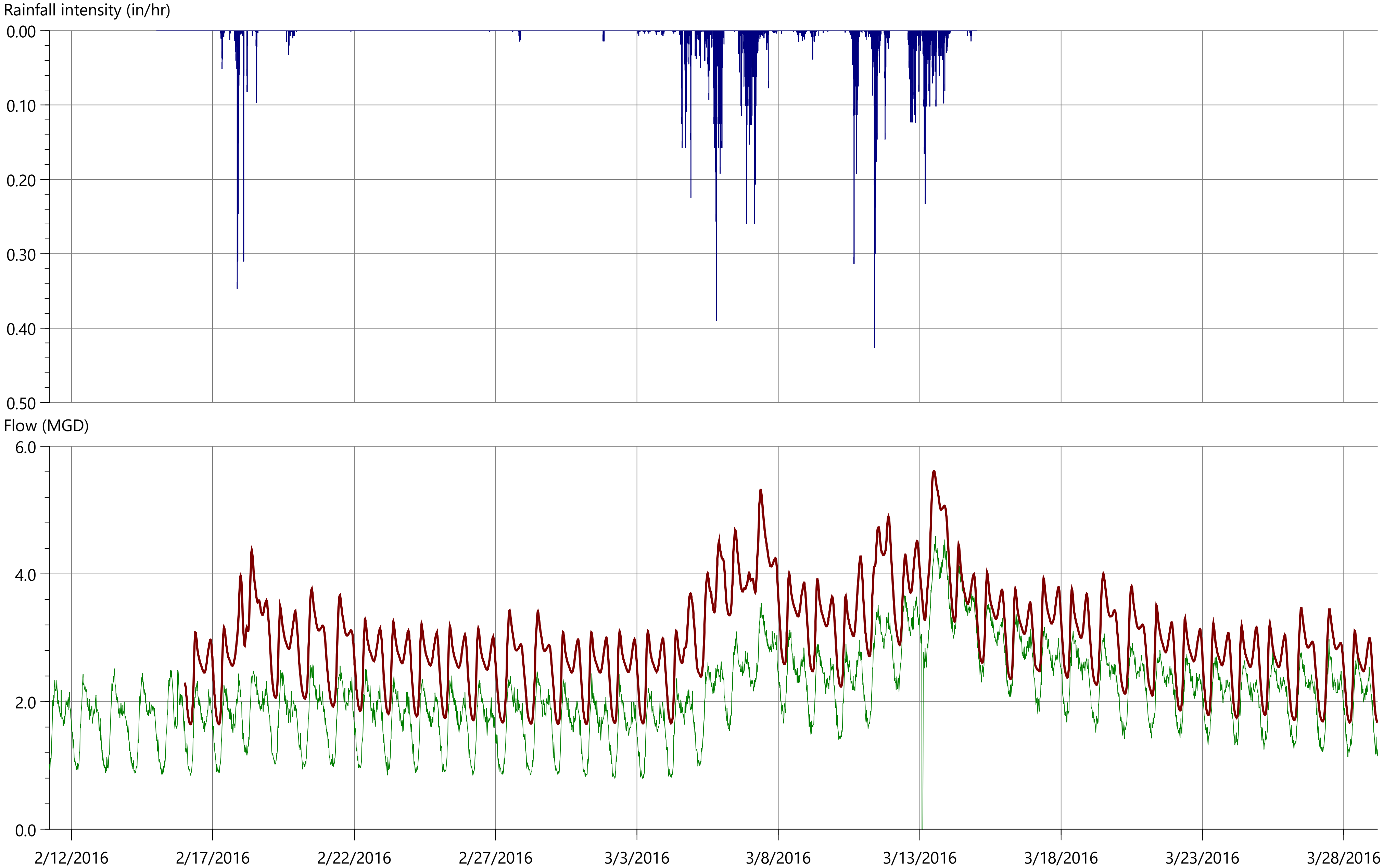
Flow Survey Location (Obs.) SMD2, Model Location (Pred.) D/S A10-03.1, Rainfall Profile: 121




| | Rainfall | | | Flow | | |
|---|---|---|---|---|---|---|
| | Depth (in) | Peak (in/hr) | Average (in/hr) | Min (ft3/s) | Max (ft3/s) | Volume (ft3) |
| Rain | 6.898 | 0.590 | 0.010 | | | |
| Observed | | | | 0.000 | 3.843 | 5383819.870 |
| ...160315_RGBoundaries | | | | 0.651 | 4.053 | 5913576.081 |

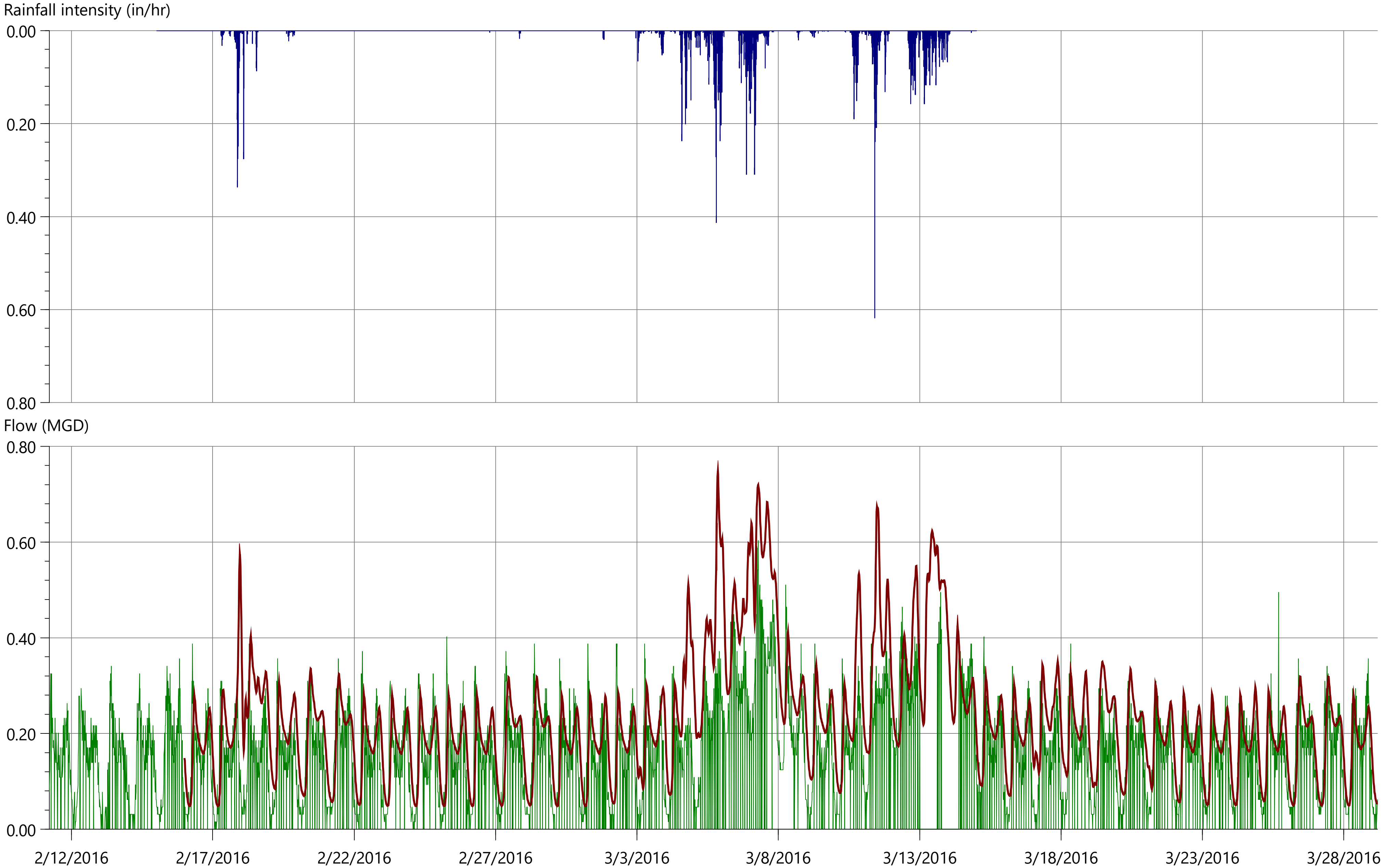
Observed / Predicted Report Produced by cvanlienden (11/7/2019 11:35:25 AM) Page 4 of 7
Flow survey: >Roseville>3. Data>Flow Data>Permanent Meter Data (12/1/2016 10:54:47 AM)
Sim: >SPWA>5. Model Runs>Calibration>combined WWF Calibration (2016 rainfall)!!>OneRainData20160215_20160315_RGBoundaries (11/6/2019 11:21:22 AM)

Flow Survey Location (Obs.) Sierra College/StrapRav, Model Location (Pred.) D/S SMH B08-040.1, Rainfall Profile: 186



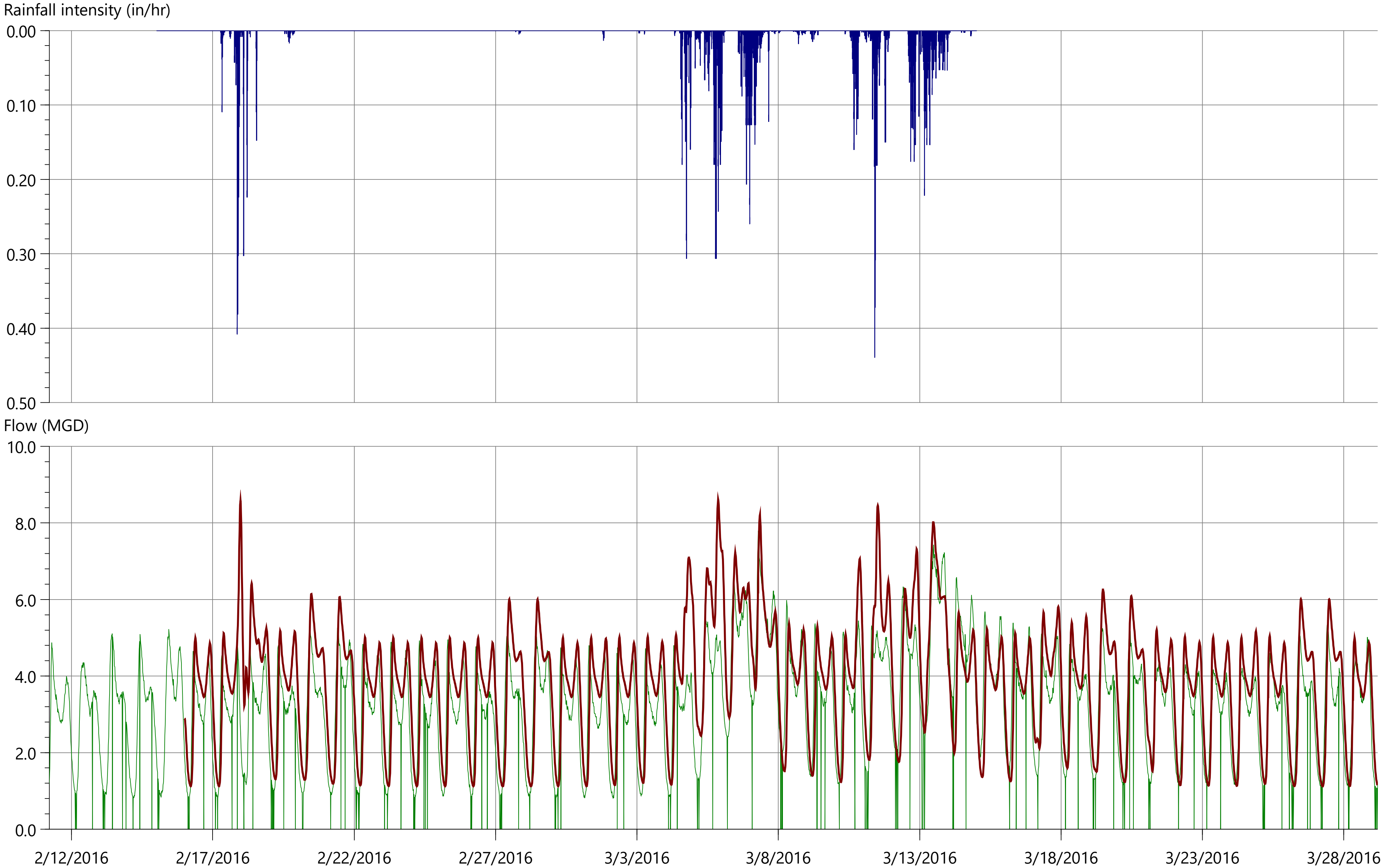

| | Rainfall | | | Flow | | |
|---|---|---|---|---|---|---|
| | Depth (in) | Peak (in/hr) | Average (in/hr) | Min (ft3/s) | Max (ft3/s) | Volume (ft3) |
| Rain | 6.450 | 0.426 | 0.009 | | | |
| Observed | | | | 0.000 | 4.589 | 8440619.727 |
| ...160315_RGBoundaries | | | | 1.646 | 5.613 | 10844812.901 |

Flow survey: >Roseville>3. Data>Flow Data>Permanent Meter Data (12/1/2016 10:54:47 AM)
Sim: >SPWA>5. Model Runs>Calibration>combined WWF Calibration (2016 rainfall)!!>OneRainData20160215_20160315_RGBoundaries (11/6/2019 11:21:22 AM)
Flow Survey Location (Obs.) Highlands, Model Location (Pred.) D/S SMH D08-006.1, Rainfall Profile: 285



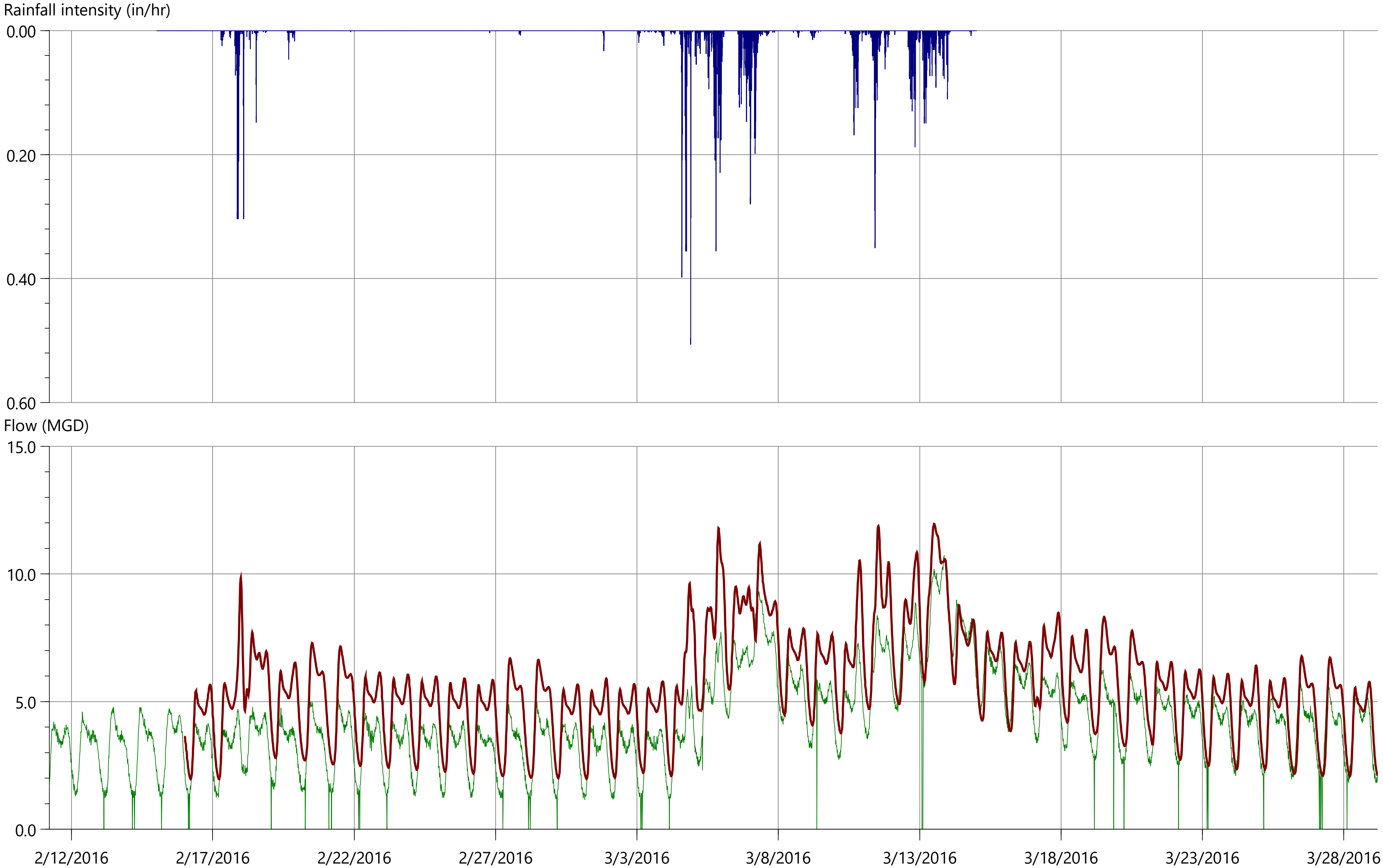

| | Rainfall | | | Flow | | |
|---|---|---|---|---|---|---|
| | Depth (in) | Peak (in/hr) | Average (in/hr) | Min (ft3/s) | Max (ft3/s) | Volume (ft3) |
| Rain | 6.502 | 0.618 | 0.009 | | | |
| Observed | | | | 0.000 | 0.603 | 582182.933 |
| ...160315_RGBoundaries | | | | 0.048 | 0.748 | 847296.033 |

Flow survey: >Roseville>3. Data>Flow Data>Permanent Meter Data (12/1/2016 10:54:47 AM)
Sim: >SPWA>5. Model Runs>Calibration>combined WWF Calibration (2016 rainfall)!!>OneRainData20160215_20160315_RGBoundaries (11/6/2019 11:21:22 AM)
Flow Survey Location (Obs.) North Roseville/PG, Model Location (Pred.) D/S RSVL-001.1, Rainfall Profile: 410




| | Rainfall | | | Flow | | |
|---|---|---|---|---|---|---|
| | Depth (in) | Peak (in/hr) | Average (in/hr) | Min (ft3/s) | Max (ft3/s) | Volume (ft3) |
| Rain | 6.973 | 0.439 | 0.010 | | | |
| Observed | | | | 0.000 | 7.798 | 13146868.221 |
| ...160315_RGBoundaries | | | | 1.119 | 8.612 | 14109574.857 |

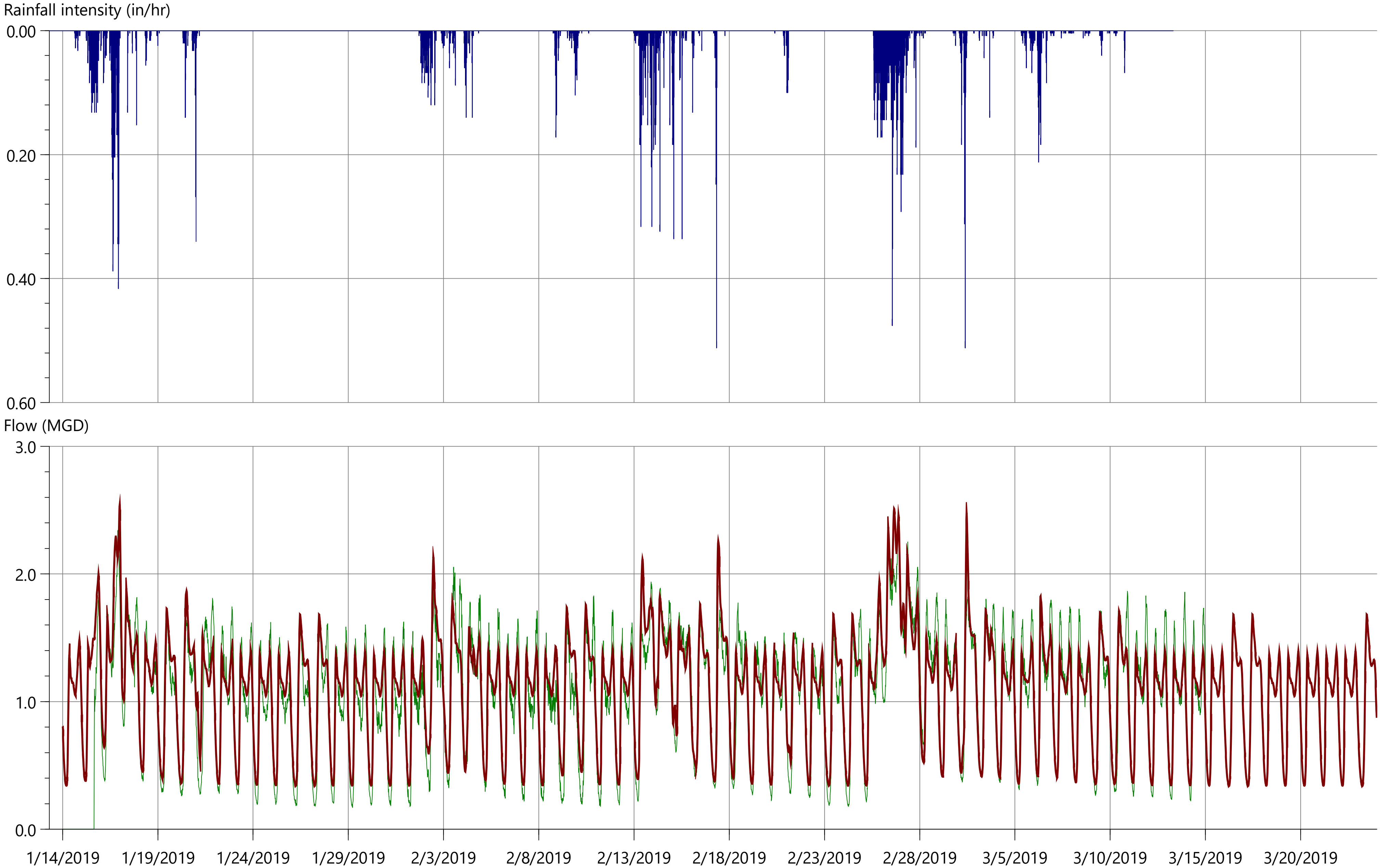
Observed / Predicted Report Produced by cvanlienden (11/7/2019 11:35:25 AM) Page 7 of 7
Flow survey: >Roseville>3. Data>Flow Data>Permanent Meter Data (12/1/2016 10:54:47 AM)
Sim: >SPWA>5. Model Runs>Calibration>combined WWF Calibration (2016 rainfall)!!>OneRainData20160215_20160315_RGBoundaries (11/6/2019 11:21:22 AM)
Flow Survey Location (Obs.) Springview/DC, Model Location (Pred.) D/S H07-168.1, Rainfall Profile: 315




| | Rainfall | | | Flow | | |
|---|---|---|---|---|---|---|
| | Depth (in) | Peak (in/hr) | Average (in/hr) | Min (ft3/s) | Max (ft3/s) | Volume (ft3) |
| Rain | 6.280 | 0.506 | 0.009 | | | |
| Observed | | | | 0.000 | 10.738 | 17143559.755 |
| ...160315_RGBoundaries | | | | 1.960 | 11.958 | 20629240.945 |

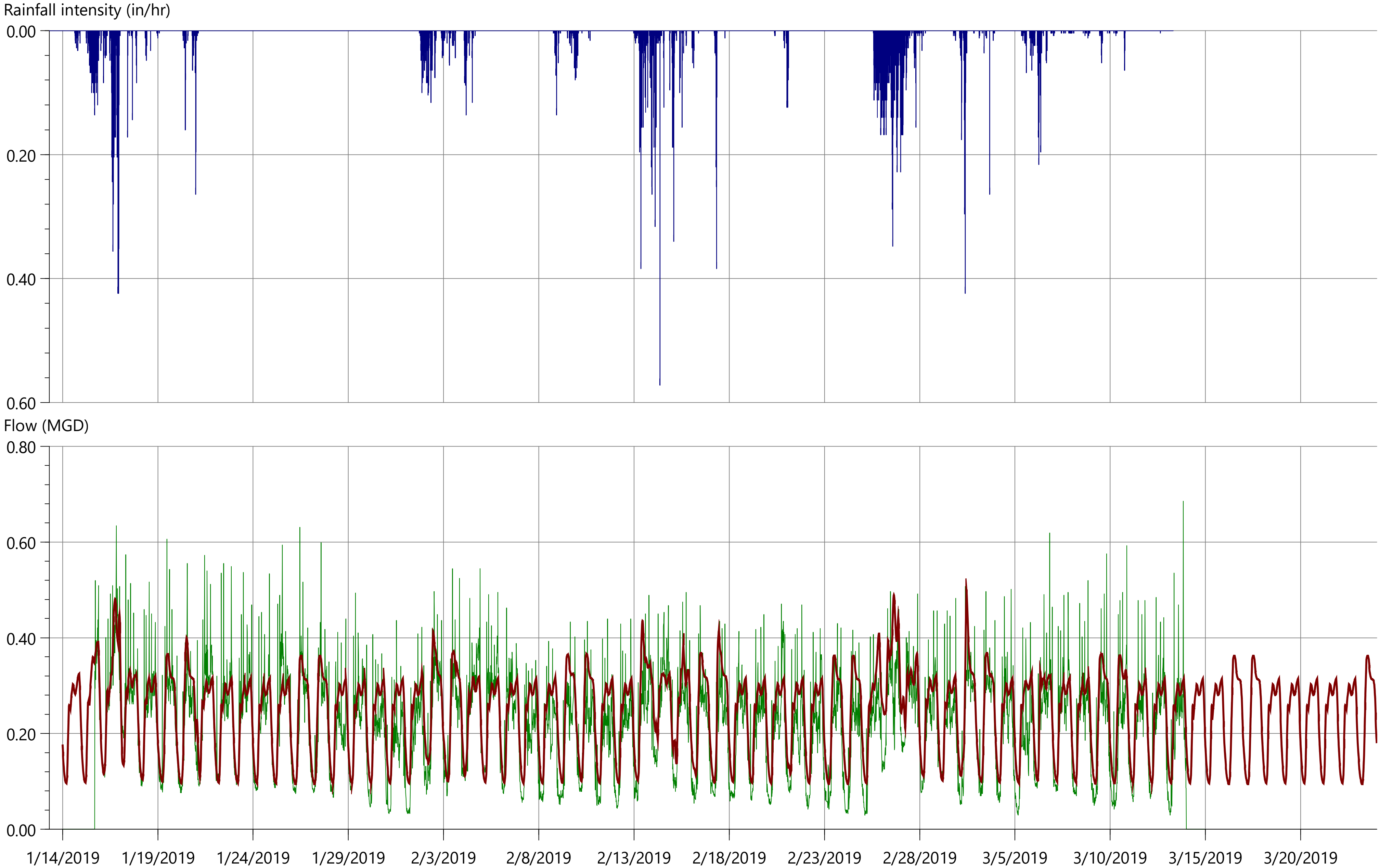
Observed / Predicted Report Produced by cvanlienden (11/7/2019 11:39:30 AM) Page 1 of 12
Flow survey: >SPWA>3. Data>Flow Data>Temp Flow Meter Data Jan01-Mar31 (April 16 2019) (2/11/2019 8:55:41 AM)
Sim: >SPWA>5. Model Runs>Calibration>combined WWF Calibration (2019 10 01)>OneRainData20190113_20190313 (11/6/2019 11:14:10 AM)

Flow Survey Location (Obs.) SIte 151, Model Location (Pred.) D/S L02-001.1, Rainfall Profile: 443



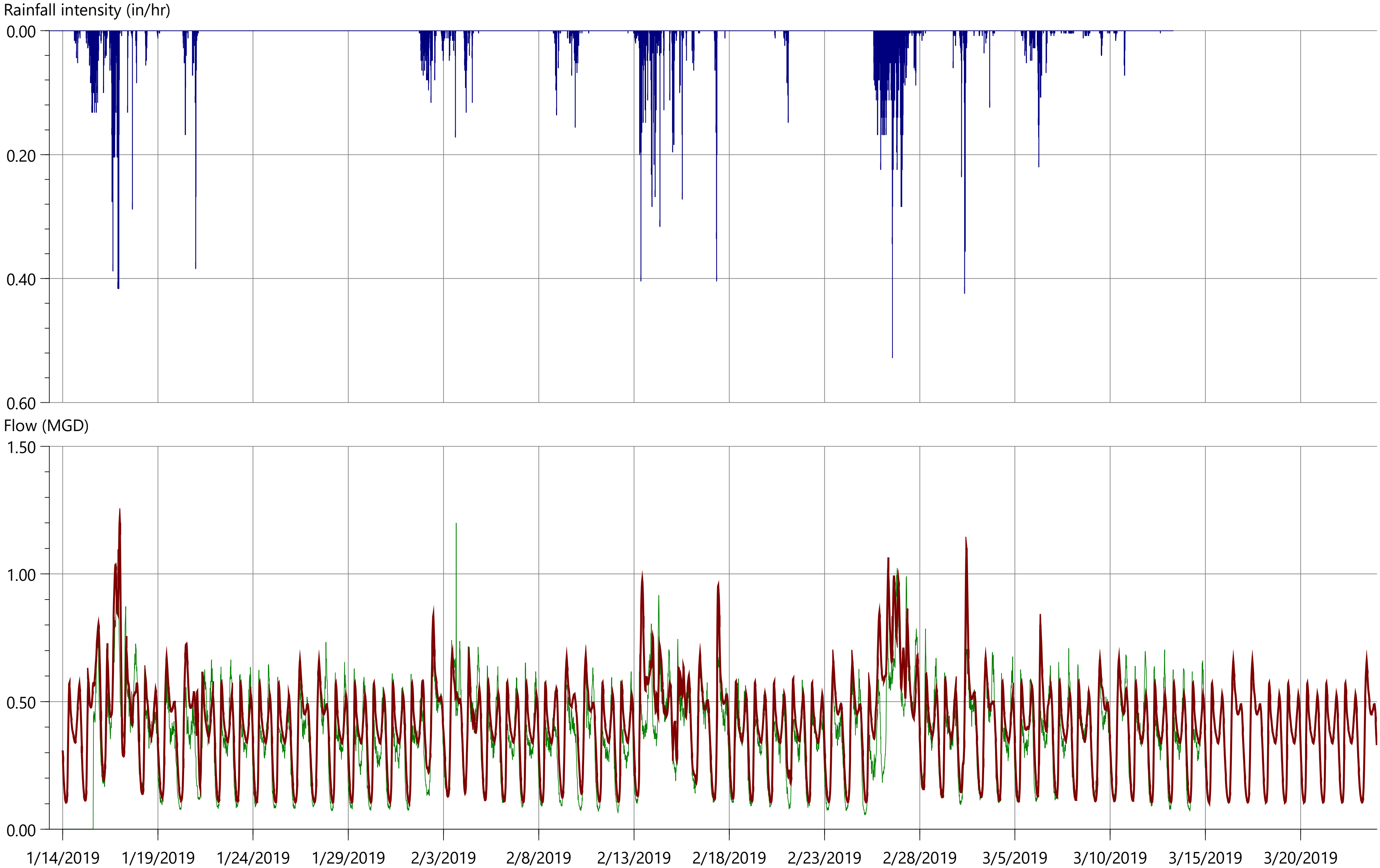

| | Rainfall | | | Flow | | |
|---|---|---|---|---|---|---|
| | Depth (in) | Peak (in/hr) | Average (in/hr) | Min (ft3/s) | Max (ft3/s) | Volume (ft3) |
| Rain | 13.630 | 0.512 | 0.010 | | | |
| Observed | | | | 0.000 | 2.474 | 5395503.465 |
| ...ta20190113_20190313 | | | | 0.337 | 2.542 | 6508637.228 |

Observed / Predicted Report Produced by cvanlienden (11/7/2019 11:39:30 AM) Page 2 of 12
Flow survey: >SPWA>3. Data>Flow Data>Temp Flow Meter Data Jan01-Mar31 (April 16 2019) (2/11/2019 8:55:41 AM)
Sim: >SPWA>5. Model Runs>Calibration>combined WWF Calibration (2019 10 01)>OneRainData20190113_20190313 (11/6/2019 11:14:10 AM)
Flow Survey Location (Obs.) Site 152, Model Location (Pred.) D/S K02-005.1, Rainfall Profile: 410



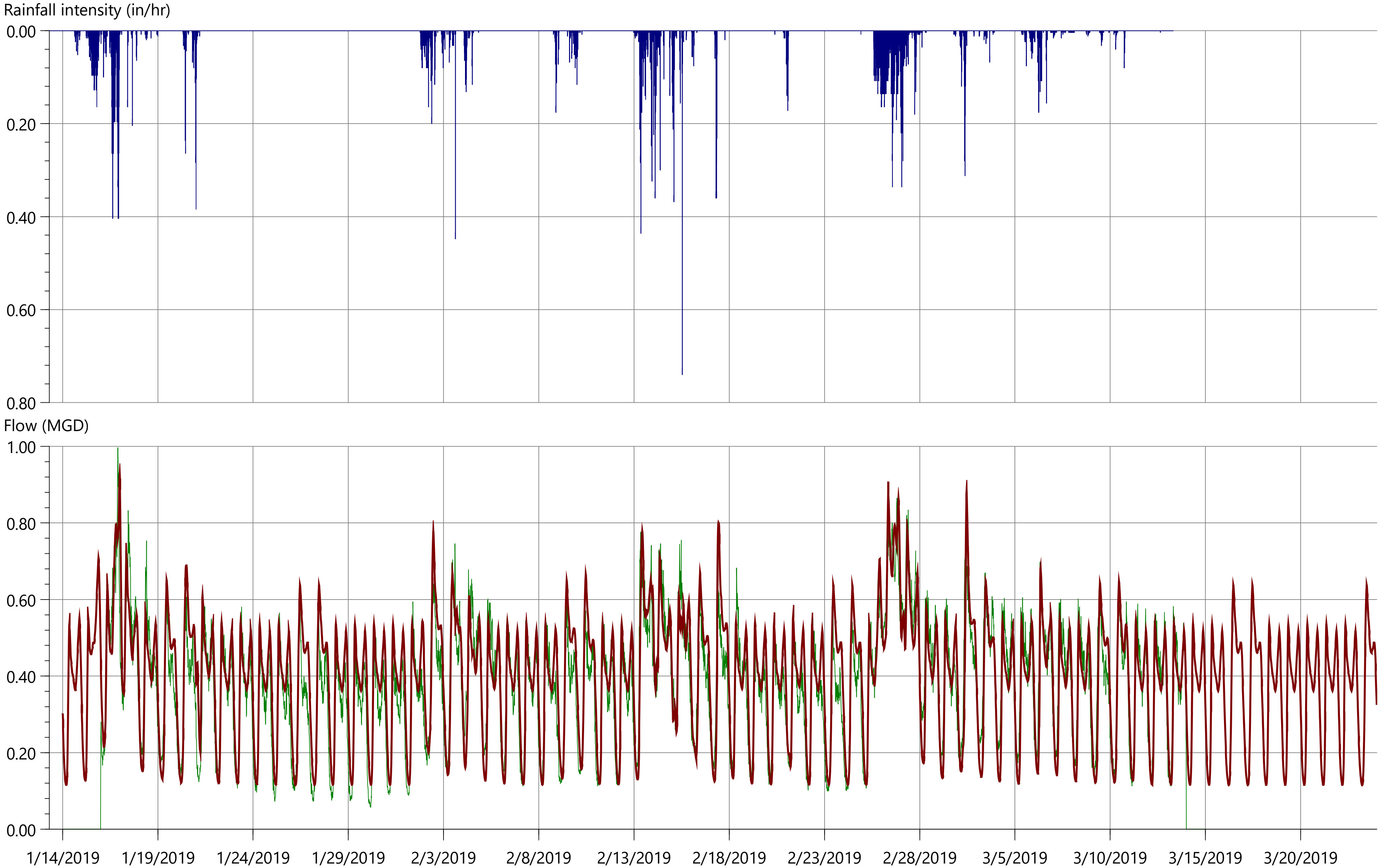

| | Rainfall | | | Flow | | |
|---|---|---|---|---|---|---|
| | Depth (in) | Peak (in/hr) | Average (in/hr) | Min (ft3/s) | Max (ft3/s) | Volume (ft3) |
| Rain | 13.411 | 0.572 | 0.009 | | | |
| Observed | | | | 0.000 | 0.685 | 1076804.266 |
| ...ta20190113_20190313 | | | | 0.094 | 0.501 | 1458697.862 |

Observed / Predicted Report Produced by cvanlienden (11/7/2019 11:39:30 AM) Page 3 of 12
Flow survey: >SPWA>3. Data>Flow Data>Temp Flow Meter Data Jan01-Mar31 (April 16 2019) (2/11/2019 8:55:41 AM)
Sim: >SPWA>5. Model Runs>Calibration>combined WWF Calibration (2019 10 01)>OneRainData20190113_20190313 (11/6/2019 11:14:10 AM)
Flow Survey Location (Obs.) Site 153, Model Location (Pred.) D/S L03-014.1, Rainfall Profile: 411



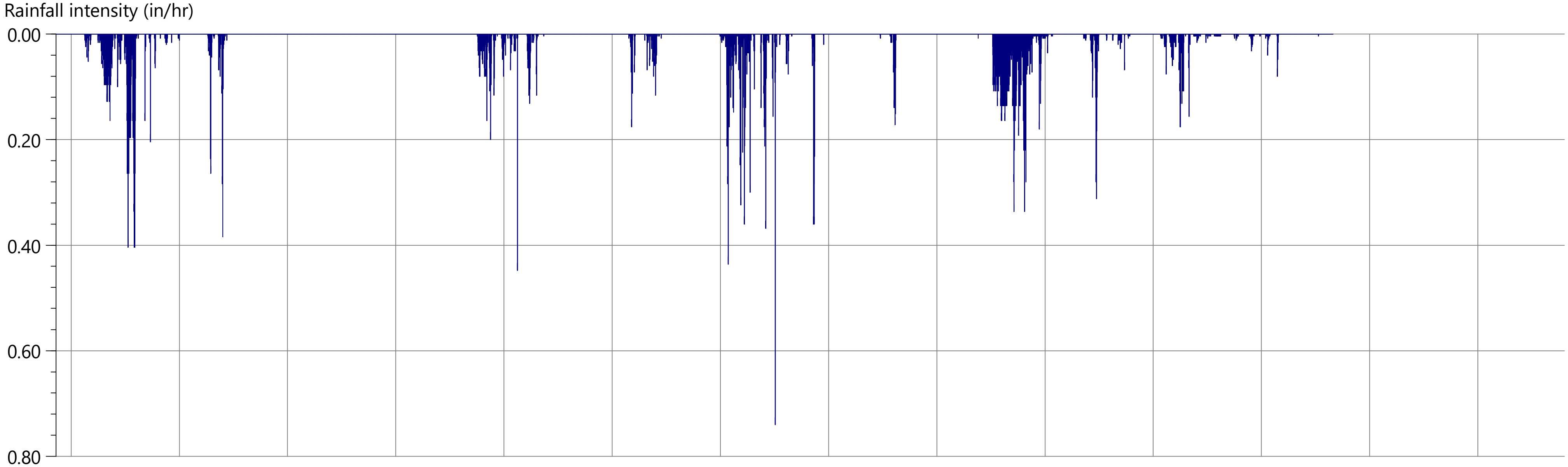

| | Rainfall | | | Flow | | |
|---|---|---|---|---|---|---|
| | Depth (in) | Peak (in/hr) | Average (in/hr) | Min (ft3/s) | Max (ft3/s) | Volume (ft3) |
| Rain | 13.898 | 0.528 | 0.010 | | | |
| Observed | | | | 0.000 | 1.199 | 1862998.190 |
| ...ta20190113_20190313 | | | | 0.105 | 1.214 | 2386062.923 |

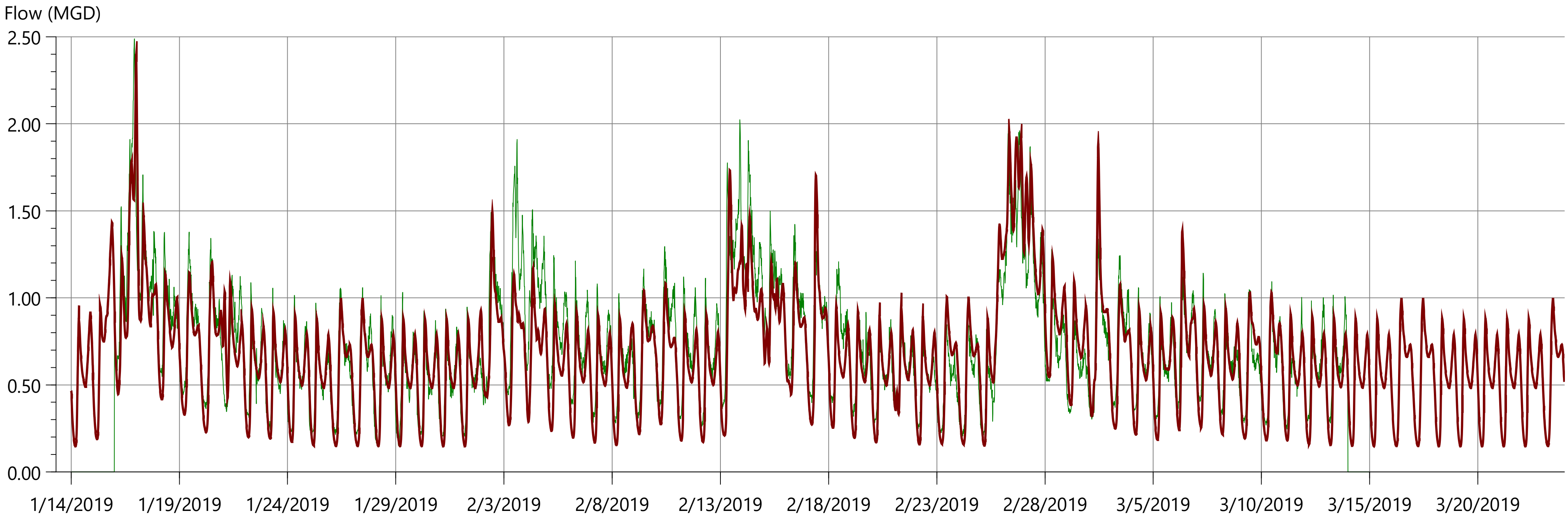
Observed / Predicted Report Produced by cvanlienden (11/7/2019 11:39:30 AM) Page 4 of 12
Flow survey: >SPWA>3. Data>Flow Data>Temp Flow Meter Data Jan01-Mar31 (April 16 2019) (2/11/2019 8:55:41 AM)
Sim: >SPWA>5. Model Runs>Calibration>combined WWF Calibration (2019 10 01)>OneRainData20190113_20190313 (11/6/2019 11:14:10 AM)
Flow Survey Location (Obs.) Site 154, Model Location (Pred.) D/S M06-004.1, Rainfall Profile: 446




| | Rainfall | | | Flow | | |
|---|---|---|---|---|---|---|
| | Depth (in) | Peak (in/hr) | Average (in/hr) | Min (ft3/s) | Max (ft3/s) | Volume (ft3) |
| Rain | 14.389 | 0.740 | 0.010 | | | |
| Observed | | | | 0.000 | 0.996 | 1886813.424 |
| ...ta20190113_20190313 | | | | 0.115 | 0.927 | 2363415.830 |

Flow survey: >SPWA>3. Data>Flow Data>Temp Flow Meter Data Jan01-Mar31 (April 16 2019) (2/11/2019 8:55:41 AM)
Sim: >SPWA>5. Model Runs>Calibration>combined WWF Calibration (2019 10 01)>OneRainData20190113_20190313 (11/6/2019 11:14:10 AM)
Flow Survey Location (Obs.) Site 155, Model Location (Pred.) D/S M06-019.1, Rainfall Profile: 446

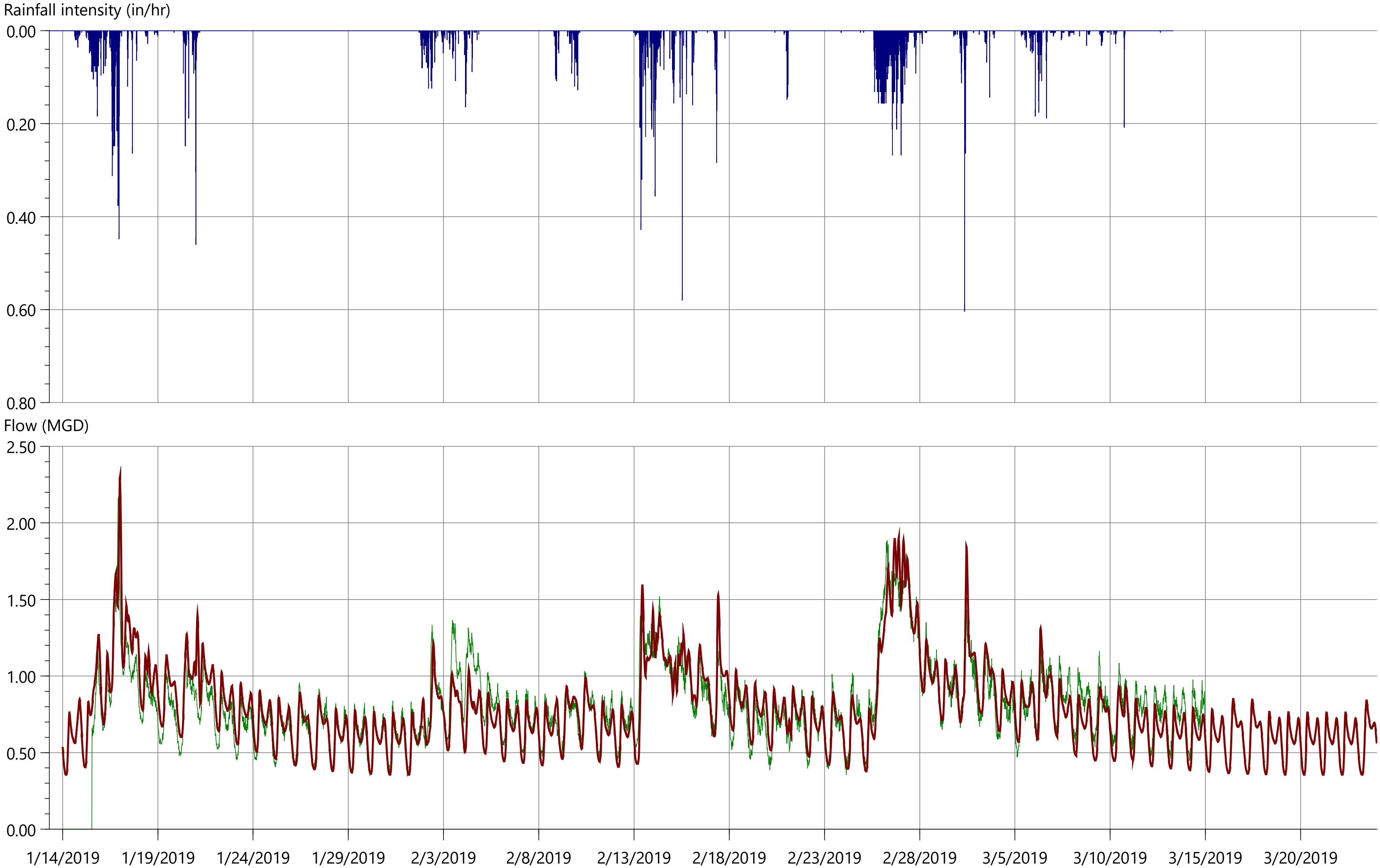



| | Rainfall | | | Flow | | |
|---|---|---|---|---|---|---|
| | Depth (in) | Peak (in/hr) | Average (in/hr) | Min (ft3/s) | Max (ft3/s) | Volume (ft3) |
| Rain | 14.389 | 0.740 | 0.010 | | | |
| Observed | | | | 0.000 | 2.488 | 3621783.843 |
| ...ta20190113_20190313 | | | | 0.148 | 2.402 | 3981049.716 |

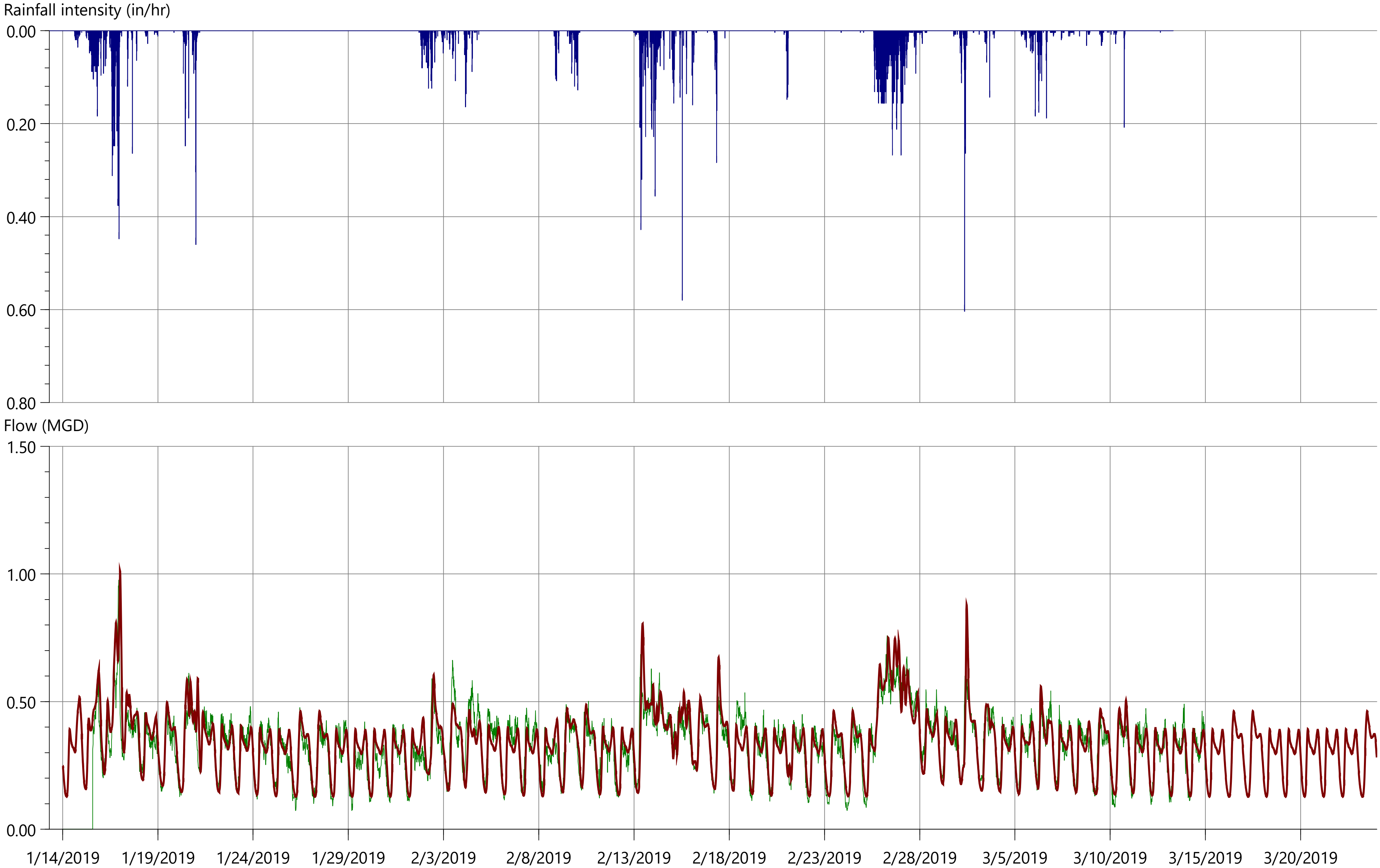
Observed / Predicted Report Produced by cvanlienden (11/7/2019 11:39:30 AM) Page 6 of 12
Flow survey: >SPWA>3. Data>Flow Data>Temp Flow Meter Data Jan01-Mar31 (April 16 2019) (2/11/2019 8:55:41 AM)
Sim: >SPWA>5. Model Runs>Calibration>combined WWF Calibration (2019 10 01)>OneRainData20190113_20190313 (11/6/2019 11:14:10 AM)

Flow Survey Location (Obs.) Site 156, Model Location (Pred.) D/S J07-058.1, Rainfall Profile: 382




| | Rainfall | | | Flow | | |
|---|---|---|---|---|---|---|
| | Depth (in) | Peak (in/hr) | Average (in/hr) | Min (ft3/s) | Max (ft3/s) | Volume (ft3) |
| Rain | 13.556 | 0.604 | 0.010 | | | |
| Observed | | | | 0.000 | 2.172 | 4141187.489 |
| ...ta20190113_20190313 | | | | 0.354 | 2.300 | 4657328.067 |

Observed / Predicted Report Produced by cvanlienden (11/7/2019 11:39:30 AM) Page 7 of 12
Flow survey: >SPWA>3. Data>Flow Data>Temp Flow Meter Data Jan01-Mar31 (April 16 2019) (2/11/2019 8:55:41 AM)
Sim: >SPWA>5. Model Runs>Calibration>combined WWF Calibration (2019 10 01)>OneRainData20190113_20190313 (11/6/2019 11:14:10 AM)
Flow Survey Location (Obs.) Site 157, Model Location (Pred.) D/S J07-060.1, Rainfall Profile: 382




| | Rainfall | | | Flow | | |
|---|---|---|---|---|---|---|
| | Depth (in) | Peak (in/hr) | Average (in/hr) | Min (ft3/s) | Max (ft3/s) | Volume (ft3) |
| Rain | 13.556 | 0.604 | 0.010 | | | |
| Observed | | | | 0.000 | 0.976 | 1682585.005 |
| ...ta20190113_20190313 | | | | 0.127 | 1.012 | 1976167.131 |

Observed / Predicted Report Produced by cvanlienden (11/7/2019 11:39:30 AM) Page 8 of 12
Flow survey: >SPWA>3. Data>Flow Data>Temp Flow Meter Data Jan01-Mar31 (April 16 2019) (2/11/2019 8:55:41 AM)
Sim: >SPWA>5. Model Runs>Calibration>combined WWF Calibration (2019 10 01)>OneRainData20190113_20190313 (11/6/2019 11:14:10 AM)
Flow Survey Location (Obs.) Site 158, Model Location (Pred.) D/S I10-037.1, Rainfall Profile: 352

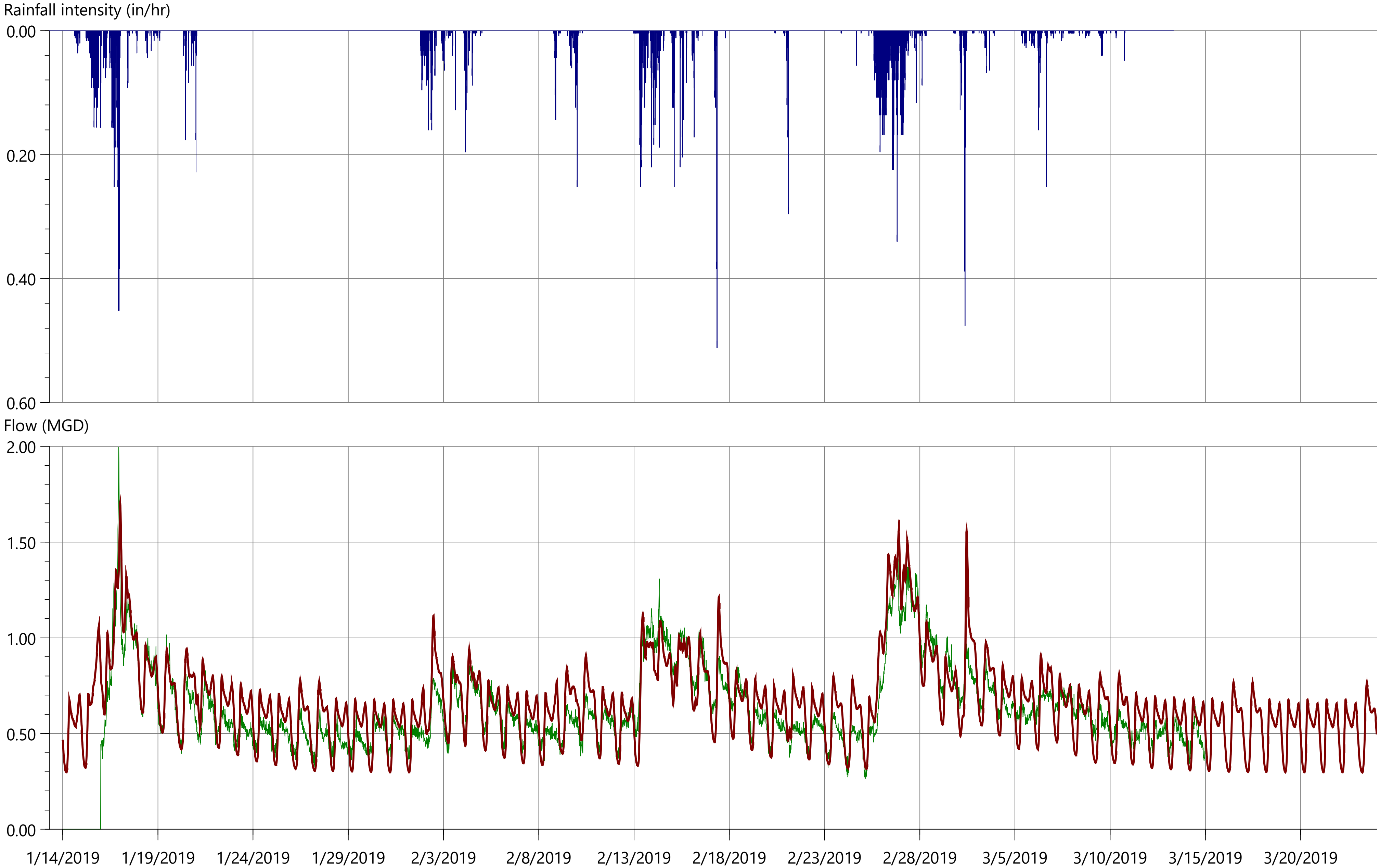

| | Rainfall | | | Flow | | |
|---|---|---|---|---|---|---|
| | Depth (in) | Peak (in/hr) | Average (in/hr) | Min (ft3/s) | Max (ft3/s) | Volume (ft3) |
| Rain | 14.813 | 1.048 | 0.010 | | | |
| Observed | | | | 0.000 | 4.389 | 10714291.384 |
| ...ta20190113_20190313 | | | | 0.794 | 4.452 | 13146876.273 |

Observed / Predicted Report Produced by cvanlienden (11/7/2019 11:39:30 AM) Page 9 of 12
Flow survey: >SPWA>3. Data>Flow Data>Temp Flow Meter Data Jan01-Mar31 (April 16 2019) (2/11/2019 8:55:41 AM)
Sim: >SPWA>5. Model Runs>Calibration>combined WWF Calibration (2019 10 01)>OneRainData20190113_20190313 (11/6/2019 11:14:10 AM)

Flow Survey Location (Obs.) Site 159, Model Location (Pred.) D/S C9-02.1, Rainfall Profile: 186


| | Rainfall | | | Flow | | |
|---|---|---|---|---|---|---|
| | Depth (in) | Peak (in/hr) | Average (in/hr) | Min (ft3/s) | Max (ft3/s) | Volume (ft3) |
| Rain | 13.176 | 0.512 | 0.009 | | | |
| Observed | | | | 0.000 | 4.702 | 11317470.919 |
| ...ta20190113_20190313 | | | | 1.335 | 4.375 | 13934551.632 |

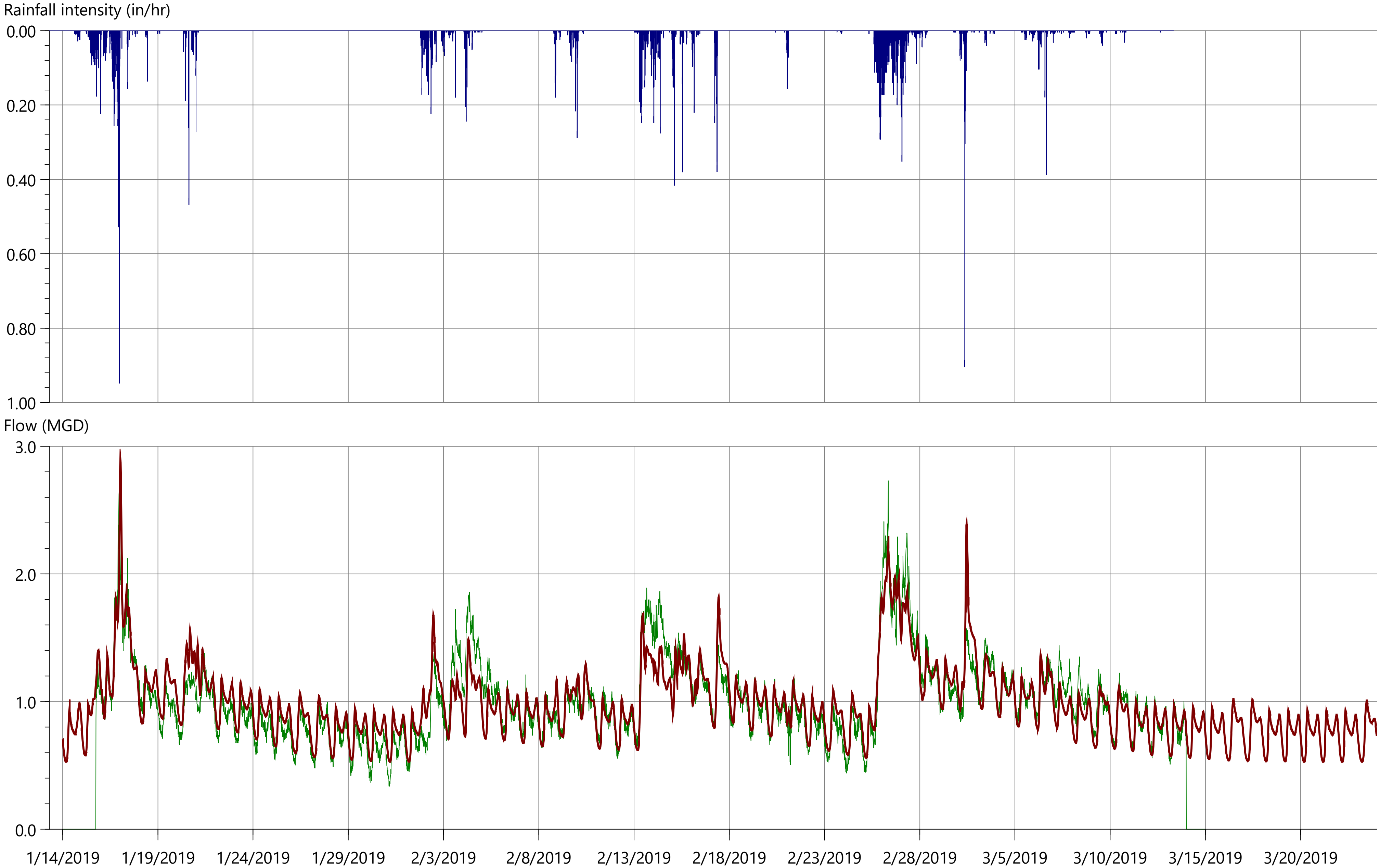
Flow survey: >SPWA>3. Data>Flow Data>Temp Flow Meter Data Jan01-Mar31 (April 16 2019) (2/11/2019 8:55:41 AM)
Sim: >SPWA>5. Model Runs>Calibration>combined WWF Calibration (2019 10 01)>OneRainData20190113_20190313 (11/6/2019 11:14:10 AM)
Flow Survey Location (Obs.) Site 160, Model Location (Pred.) D/S SMH B08-031.1, Rainfall Profile: 186




| | Rainfall | | | Flow | | |
|---|---|---|---|---|---|---|
| | Depth (in) | Peak (in/hr) | Average (in/hr) | Min (ft3/s) | Max (ft3/s) | Volume (ft3) |
| Rain | 13.176 | 0.512 | 0.009 | | | |
| Observed | | | | 0.000 | 1.996 | 3174137.958 |
| ...ta20190113_20190313 | | | | 0.297 | 1.702 | 3927509.288 |

Observed / Predicted Report Produced by cvanlienden (11/7/2019 11:39:30 AM) Page 11 of 12
Flow survey: >SPWA>3. Data>Flow Data>Temp Flow Meter Data Jan01-Mar31 (April 16 2019) (2/11/2019 8:55:41 AM)
Sim: >SPWA>5. Model Runs>Calibration>combined WWF Calibration (2019 10 01)>OneRainData20190113_20190313 (11/6/2019 11:14:10 AM)

Flow Survey Location (Obs.) Site 161, Model Location (Pred.) D/S B12-02.1, Rainfall Profile: 156



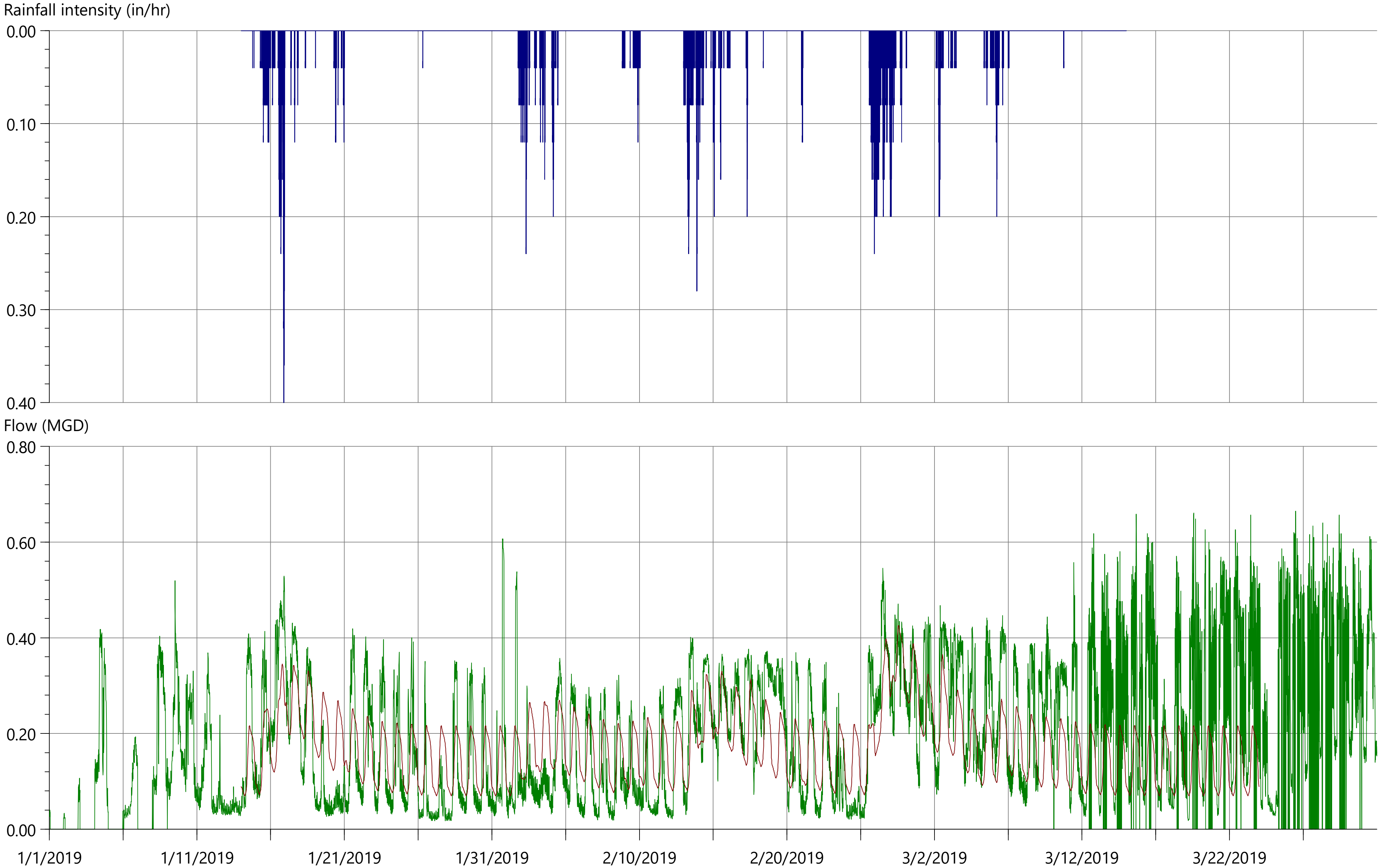

| | Rainfall | | | Flow | | |
|---|---|---|---|---|---|---|
| | Depth (in) | Peak (in/hr) | Average (in/hr) | Min (ft3/s) | Max (ft3/s) | Volume (ft3) |
| Rain | 13.733 | 0.948 | 0.010 | | | |
| Observed | | | | 0.000 | 2.731 | 4995129.055 |
| ...ta20190113_20190313 | | | | 0.528 | 2.894 | 5828937.326 |

Flow survey: >SPWA>3. Data>Flow Data>Temp Flow Meter Data Jan01-Mar31 (April 16 2019) (2/11/2019 8:55:41 AM)
Sim: >SPWA>5. Model Runs>Calibration>combined WWF Calibration (2019 10 01)>OneRainData20190113_20190313 (11/6/2019 11:14:10 AM)
Flow Survey Location (Obs.) Site 162, Model Location (Pred.) D/S D14-03.1, Rainfall Profile: 191


| | Rainfall | | | Flow | | |
|---|---|---|---|---|---|---|
| | Depth (in) | Peak (in/hr) | Average (in/hr) | Min (ft3/s) | Max (ft3/s) | Volume (ft3) |
| Rain | 12.949 | 0.676 | 0.009 | | | |
| Observed | | | | 0.000 | 3.767 | 10312984.650 |
| ...ta20190113_20190313 | | | | 1.214 | 3.671 | 12012636.316 |

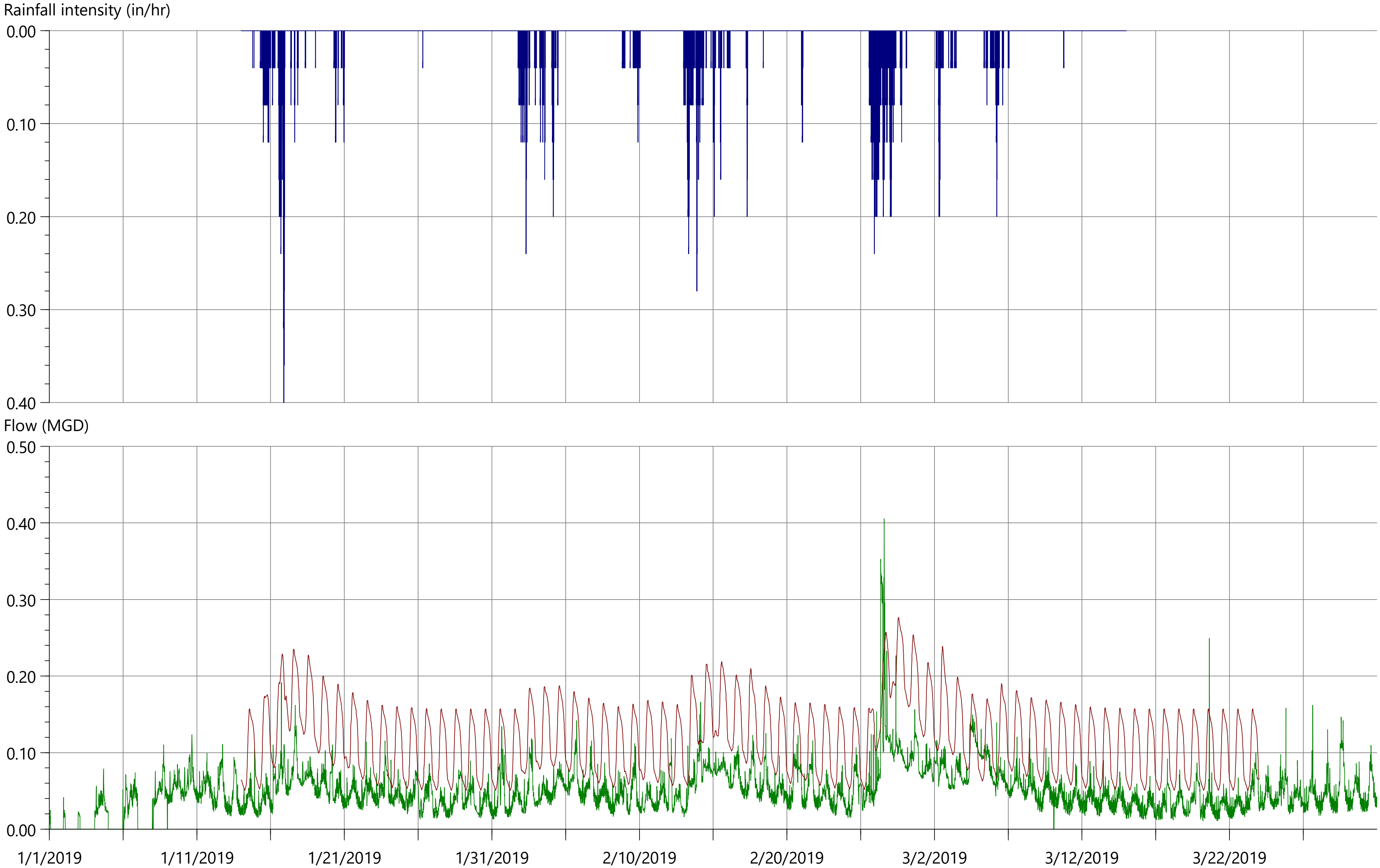
Flow survey: >SPWA>3. Data>Flow Data>Permanent Flow Meter Data Jan01-Mar31 (June 05 2019) (6/5/2019 1:51:15 PM)
Sim: >SPWA>5. Model Runs>Calibration>combined WWF Calibration (2019 10 01)_v29>OneRainData20190113_20190313_*4_RGBoundaries (11/6/2019 11:14:10 AM)

Flow Survey Location (Obs.) Cincinnati, Model Location (Pred.) D/S CA4-RSVL28.1, Rainfall Profile: 408



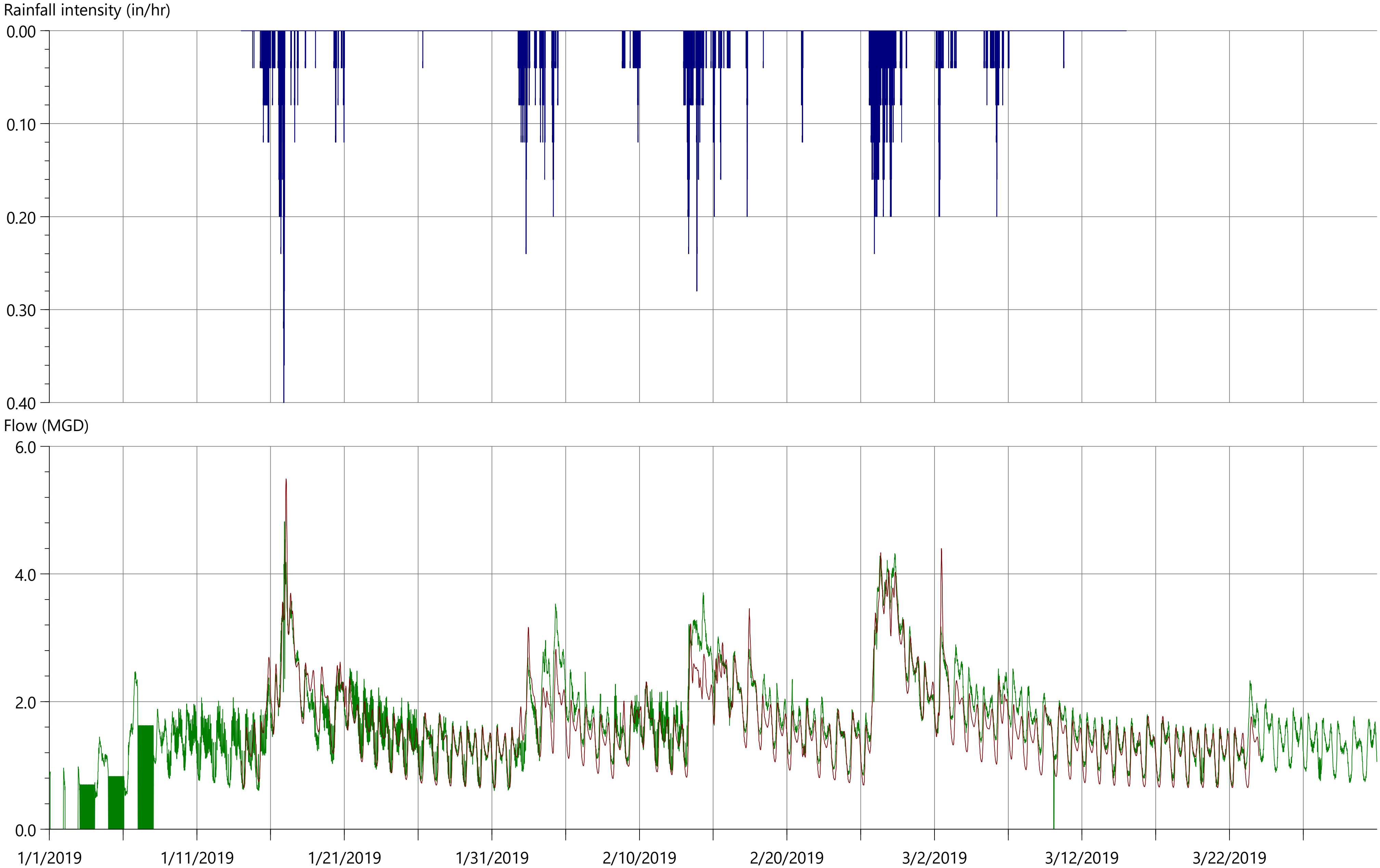

| | Rainfall | | | Flow | | |
|---|---|---|---|---|---|---|
| | Depth (in) | Peak (in/hr) | Average (in/hr) | Min (ft3/s) | Max (ft3/s) | Volume (ft3) |
| Rain | 15.530 | 0.400 | 0.011 | | | |
| Observed | | | | 0.000 | 0.665 | 1464913.927 |
| ...0313_*4_RGBoundaries | | | | 0.069 | 0.425 | 1025101.467 |

Flow survey: >SPWA>3. Data>Flow Data>Permanent Flow Meter Data Jan01-Mar31 (June 05 2019) (6/5/2019 1:51:15 PM)
Sim: >SPWA>5. Model Runs>Calibration>combined WWF Calibration (2019 10 01)_v29>OneRainData20190113_20190313_*4_RGBoundaries (11/6/2019 11:14:10 AM)
Flow Survey Location (Obs.) Industrial, Model Location (Pred.) D/S SMH G03-062.1, Rainfall Profile: 442



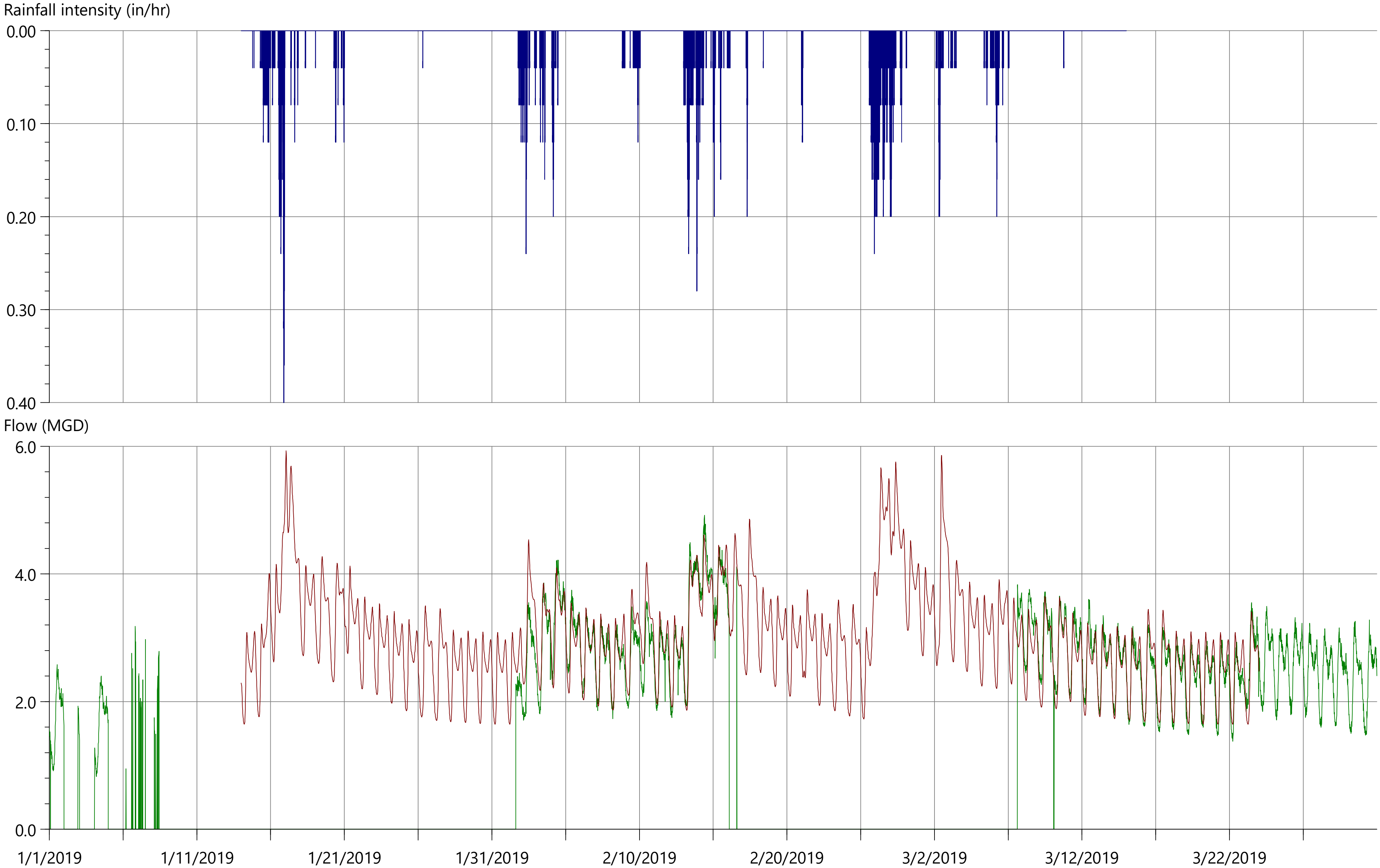

| | Rainfall | | | Flow | | |
|---|---|---|---|---|---|---|
| | Depth (in) | Peak (in/hr) | Average (in/hr) | Min (ft3/s) | Max (ft3/s) | Volume (ft3) |
| Rain | 15.530 | 0.400 | 0.011 | | | |
| Observed | | | | 0.000 | 0.405 | 388057.020 |
| ...0313_*4_RGBoundaries | | | | 0.051 | 0.276 | 712709.520 |

Observed / Predicted Report Produced by cvanlienden (11/7/2019 11:35:28 AM) Page 3 of 7
Flow survey: >SPWA>3. Data>Flow Data>Permanent Flow Meter Data Jan01-Mar31 (June 05 2019) (6/5/2019 1:51:15 PM)
Sim: >SPWA>5. Model Runs>Calibration>combined WWF Calibration (2019 10 01)_v29>OneRainData20190113_20190313_*4_RGBoundaries (11/6/2019 11:14:10 AM)
Flow Survey Location (Obs.) SMD2, Model Location (Pred.) D/S A10-03.1, Rainfall Profile: 121




| | Rainfall | | | Flow | | |
|---|---|---|---|---|---|---|
| | Depth (in) | Peak (in/hr) | Average (in/hr) | Min (ft3/s) | Max (ft3/s) | Volume (ft3) |
| Rain | 15.530 | 0.400 | 0.011 | | | |
| Observed | | | | 0.000 | 4.823 | 12344642.590 |
| ...0313_*4_RGBoundaries | | | | 0.651 | 5.493 | 9792069.402 |

Flow survey: >SPWA>3. Data>Flow Data>Permanent Flow Meter Data Jan01-Mar31 (June 05 2019) (6/5/2019 1:51:15 PM)
Sim: >SPWA>5. Model Runs>Calibration>combined WWF Calibration (2019 10 01)_v29>OneRainData20190113_20190313_*4_RGBoundaries (11/6/2019 11:14:10 AM)
Flow Survey Location (Obs.) Sierra College, Model Location (Pred.) D/S SMH B08-040.1, Rainfall Profile: 186



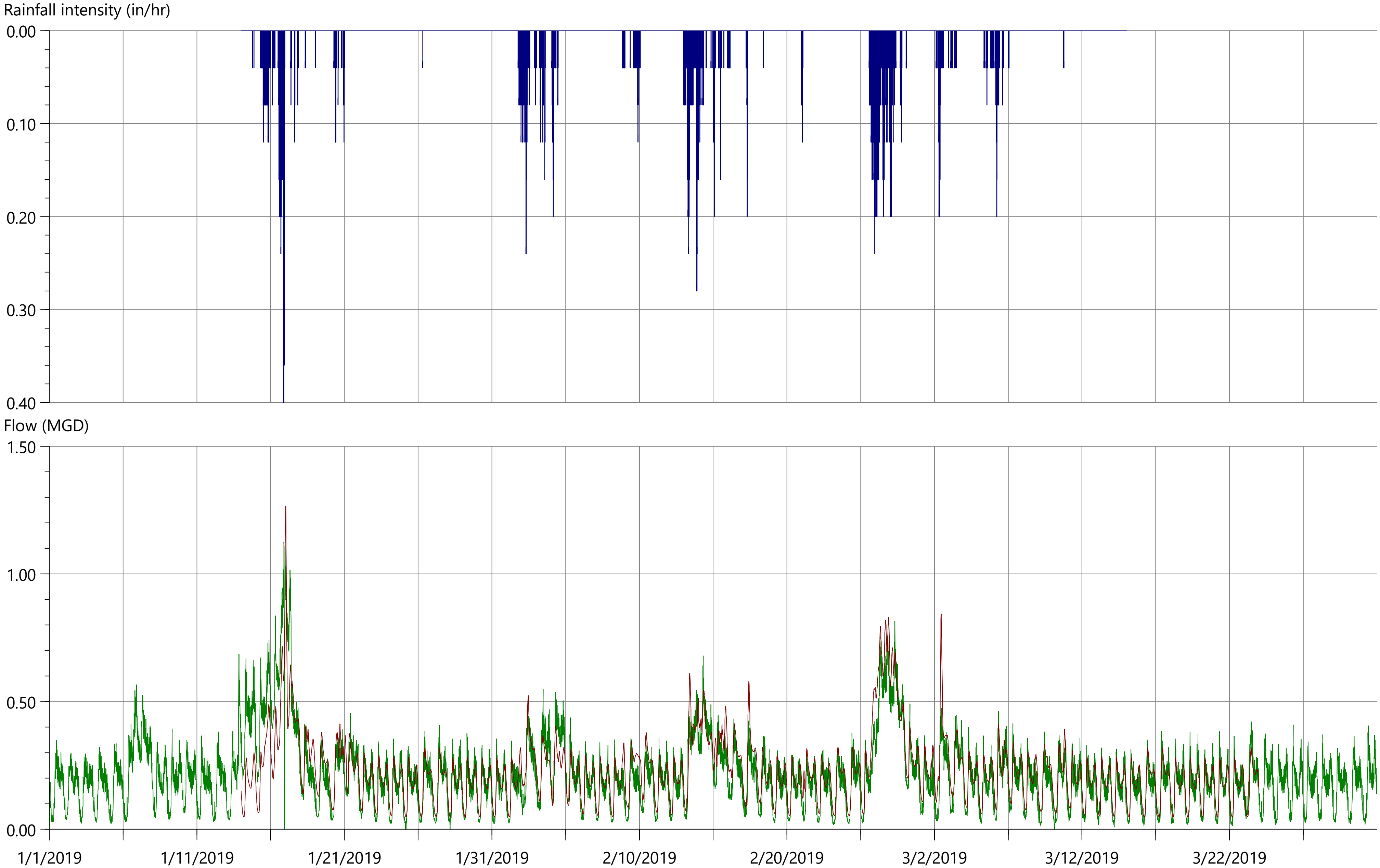

| | Rainfall | | | Flow | | |
|---|---|---|---|---|---|---|
| | Depth (in) | Peak (in/hr) | Average (in/hr) | Min (ft3/s) | Max (ft3/s) | Volume (ft3) |
| Rain | 15.530 | 0.400 | 0.011 | | | |
| Observed | | | | 0.000 | 4.921 | 9530740.132 |
| ...0313_*4_RGBoundaries | | | | 1.644 | 5.931 | 18004207.945 |

Observed / Predicted Report Produced by cvanlienden (11/7/2019 11:35:28 AM) Page 5 of 7

Flow survey: >SPWA>3. Data>Flow Data>Permanent Flow Meter Data Jan01-Mar31 (June 05 2019) (6/5/2019 1:51:15 PM)

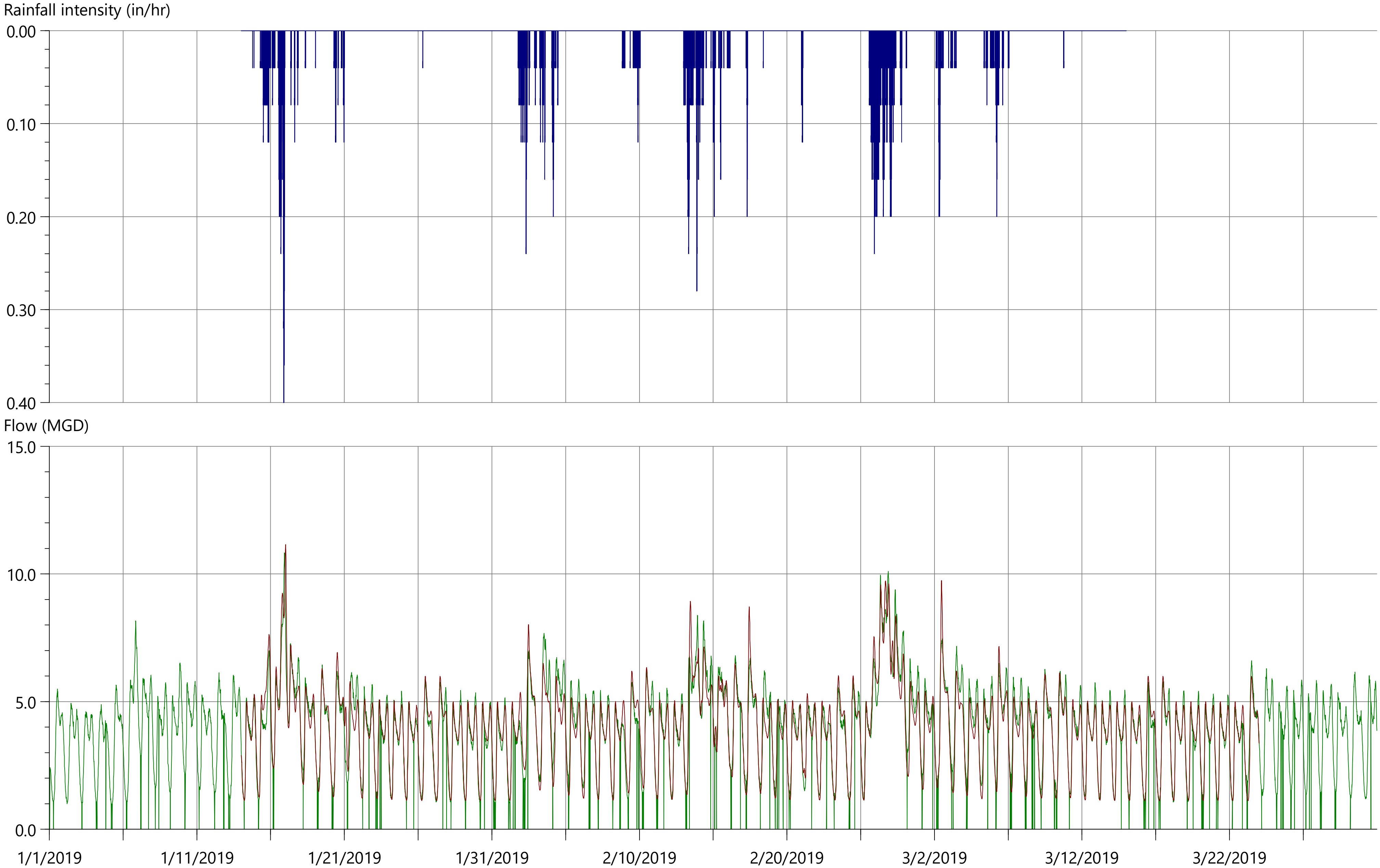
Sim: >SPWA>5. Model Runs>Calibration>combined WWF Calibration (2019 10 01)_v29>OneRainData20190113_20190313_*4_RGBoundaries (11/6/2019 11:14:10 AM)

Flow Survey Location (Obs.) Highlands, Model Location (Pred.) D/S SMH D08-006.1, Rainfall Profile: 285




| | Rainfall | | | Flow | | |
|---|---|---|---|---|---|---|
| | Depth (in) | Peak (in/hr) | Average (in/hr) | Min (ft3/s) | Max (ft3/s) | Volume (ft3) |
| Rain | 15.530 | 0.400 | 0.011 | | | |
| Observed | | | | 0.000 | 1.126 | 1614243.848 |
| ...0313_*4_RGBoundaries | | | | 0.048 | 1.266 | 1387804.155 |

Flow survey: >SPWA>3. Data>Flow Data>Permanent Flow Meter Data Jan01-Mar31 (June 05 2019) (6/5/2019 1:51:15 PM)
Sim: >SPWA>5. Model Runs>Calibration>combined WWF Calibration (2019 10 01)_v29>OneRainData20190113_20190313_*4_RGBoundaries (11/6/2019 11:14:10 AM)
Flow Survey Location (Obs.) Pleasant Grove (SPMUD), Model Location (Pred.) D/S RSVL-001.1, Rainfall Profile: 410




| | Rainfall | | | Flow | | |
|---|---|---|---|---|---|---|
| | Depth (in) | Peak (in/hr) | Average (in/hr) | Min (ft3/s) | Max (ft3/s) | Volume (ft3) |
| Rain | 15.530 | 0.400 | 0.011 | | | |
| Observed | | | | 0.000 | 10.836 | 30336214.148 |
| ...0313_*4_RGBoundaries | | | | 1.119 | 11.157 | 23452688.731 |

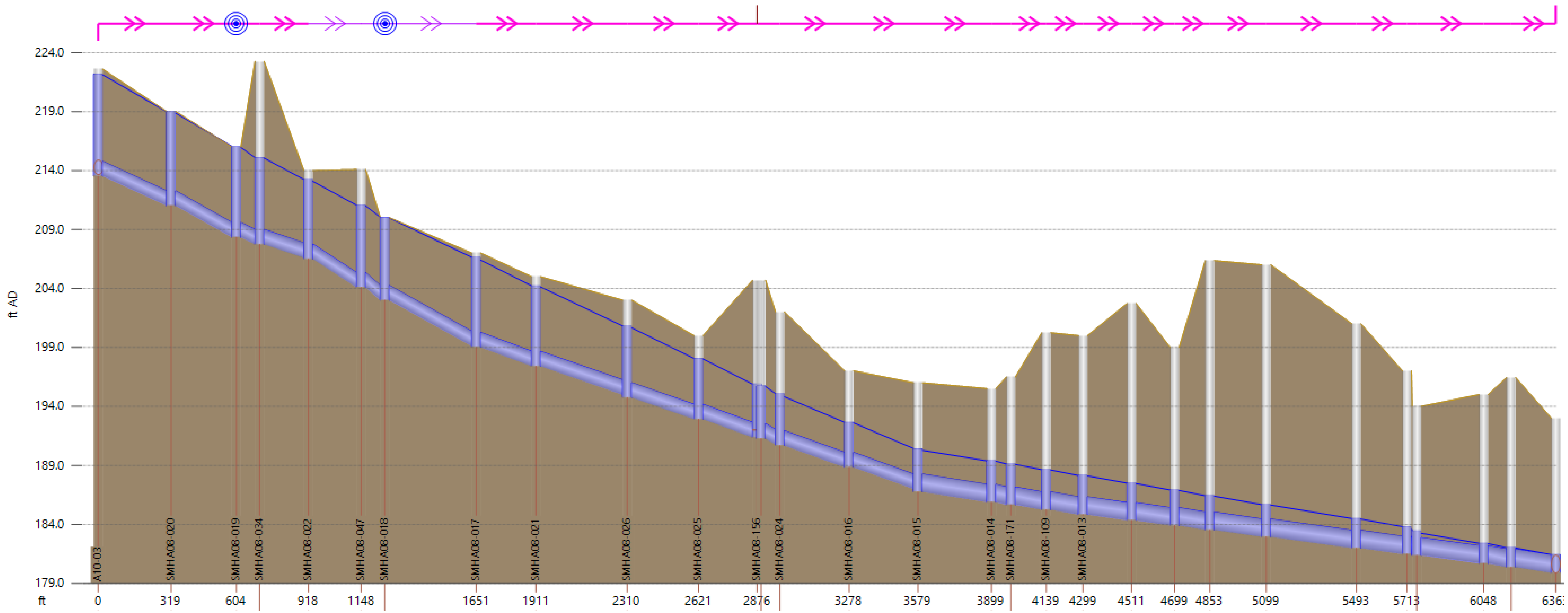
Flow survey: >SPWA>3. Data>Flow Data>Permanent Flow Meter Data Jan01-Mar31 (June 05 2019) (6/5/2019 1:51:15 PM)
Sim: >SPWA>5. Model Runs>Calibration>combined WWF Calibration (2019 10 01)_v29>OneRainData20190113_20190313_*4_RGBoundaries (11/6/2019 11:14:10 AM)

Flow Survey Location (Obs.) Dry Creek, Model Location (Pred.) D/S H07-168.1, Rainfall Profile: 315


| | Rainfall | | | Flow | | |
|---|---|---|---|---|---|---|
| | Depth (in) | Peak (in/hr) | Average (in/hr) | Min (ft3/s) | Max (ft3/s) | Volume (ft3) |
| Rain | 15.530 | 0.400 | 0.011 | | | |
| Observed | | | | 0.000 | 15.348 | 42982669.853 |
| ...0313_*4_RGBoundaries | | | | 1.944 | 16.123 | 35431318.112 |

# APPENDIX E – MODELED HYDRAULIC PROFILES

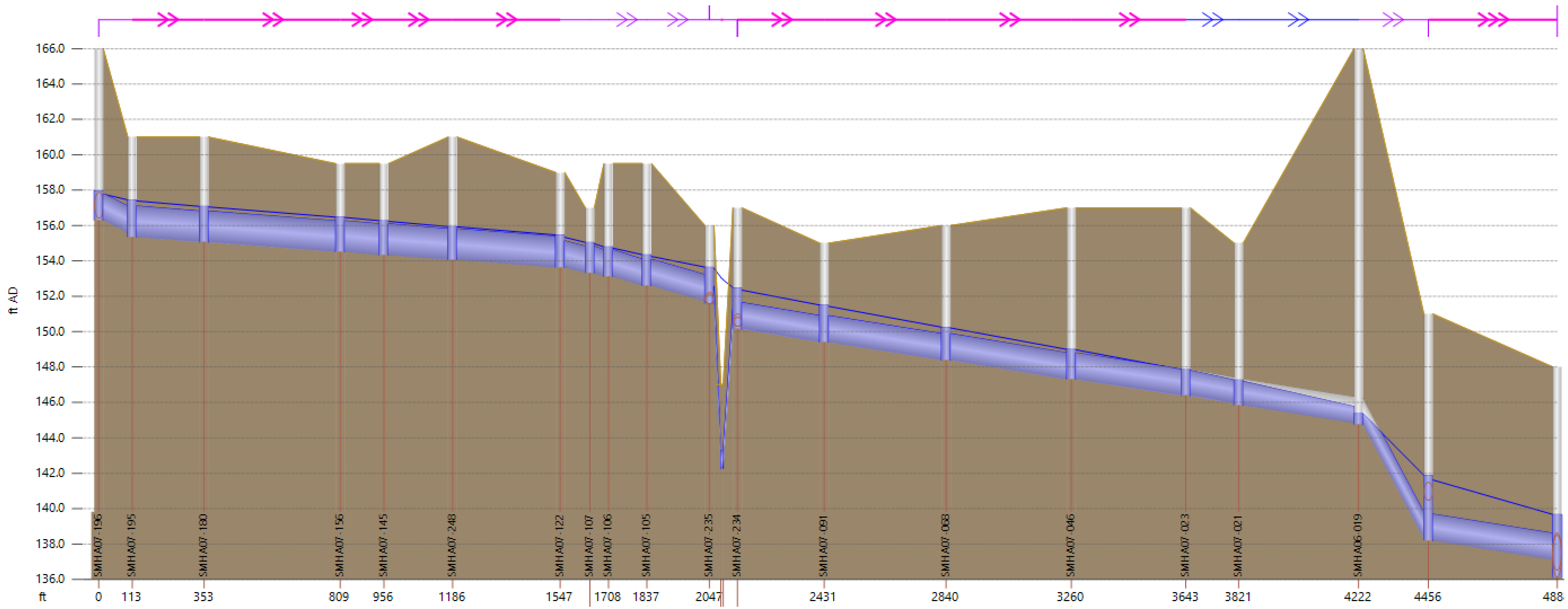
## EXISTING LAND USE – AREA A




| Link | A10-03.1 | - | - | - | - | - | SMH A08-018.1 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| length (ft) | 319.0 | 284.5 | - | 212.9 | 230.3 | - | 398.9 | 260.9 | 398.2 | 311.2 | 255.4 | - | 302.2 | 300.1 | 320.7 | - | 155.0 | 160.0 | 212.0 | 188.0 | 154.0 | 246.0 | 393.4 | 220.7 | 292.1 | - | 195.0 |
| width (in) | 15.0 | 15.0 | - | 15.0 | 15.0 | - | 15.0 | 15.0 | 15.0 | 15.0 | 15.0 | - | 15.0 | 15.0 | 18.0 | - | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 |
| us inv (ft AD) | 213.530 | 211.020 | - | 207.750 | 206.510 | - | 203.000 | 199.010 | 197.410 | 194.750 | 192.920 | - | 190.690 | 188.850 | 186.770 | - | - | - | 184.840 | - | - | 183.550 | 182.960 | 182.000 | 181.380 | - | - |
| ds inv (ft AD) | 211.020 | 208.340 | - | 206.610 | 204.089 | - | 199.110 | 197.420 | 194.990 | 192.920 | 191.390 | - | 188.850 | 187.020 | 185.900 | - | - | - | 184.350 | - | - | 182.960 | 182.000 | 181.490 | 180.690 | - | - |
| grad (%) | 0.787 | 0.942 | - | 0.535 | 1.051 | - | 0.975 | 0.609 | 0.608 | 0.588 | 0.599 | - | 0.609 | 0.610 | 0.271 | - | 0.265 | 0.262 | 0.231 | 0.229 | 0.240 | 0.240 | 0.244 | 0.231 | 0.236 | - | 0.251 |
| surc | 2.00 | 2.00 | - | 2.00 | 1.00 | - | 1.00 | 2.00 | 2.00 | 2.00 | 2.00 | - | 2.00 | 2.00 | 2.00 | - | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |
| r.pfc (MGD) | 3.70 | 4.05 | - | 3.06 | 4.28 | - | 4.12 | 3.26 | 3.26 | 3.20 | 3.23 | - | 3.26 | 3.26 | 3.54 | - | 3.49 | 3.48 | 3.26 | 3.25 | 3.33 | 3.33 | 3.35 | 3.26 | 3.30 | 3.40 | 3.40 |
| DS flow (MGD) | 4.1241 | 4.1241 | - | 3.8486 | 3.8339 | - | 3.8972 | 3.8833 | 3.8673 | 3.8545 | 3.8438 | - | 3.5282 | 3.5230 | 3.5705 | - | - | - | 3.6413 | 3.6412 | - | 3.6412 | 3.6412 | 3.6412 | 3.6412 | - | 3.6411 |

| Node | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ground (ft AD) | - | 219.000 | - | - | - | - | 210.000 | 207.000 | 205.000 | 203.000 | 200.000 | - | - | 197.000 | 196.000 | - | - | - | - | - | - | - | 206.000 | 201.000 | - | - | - | - | - |
| level (ft AD) | - | 218.975 | - | - | - | - | 210.000 | 206.621 | 204.217 | 200.795 | 198.059 | - | - | 192.641 | 190.421 | - | - | - | - | - | - | - | 185.682 | 184.500 | - | - | - | - | - |
| flood dep (ft) | - | -0.025 | - | - | -0.770 | - | 0.000 | -0.379 | -0.783 | -2.205 | -1.941 | - | - | -4.359 | -5.579 | - | - | - | - | - | - | - | -20.318 | -16.500 | - | - | - | - | - |

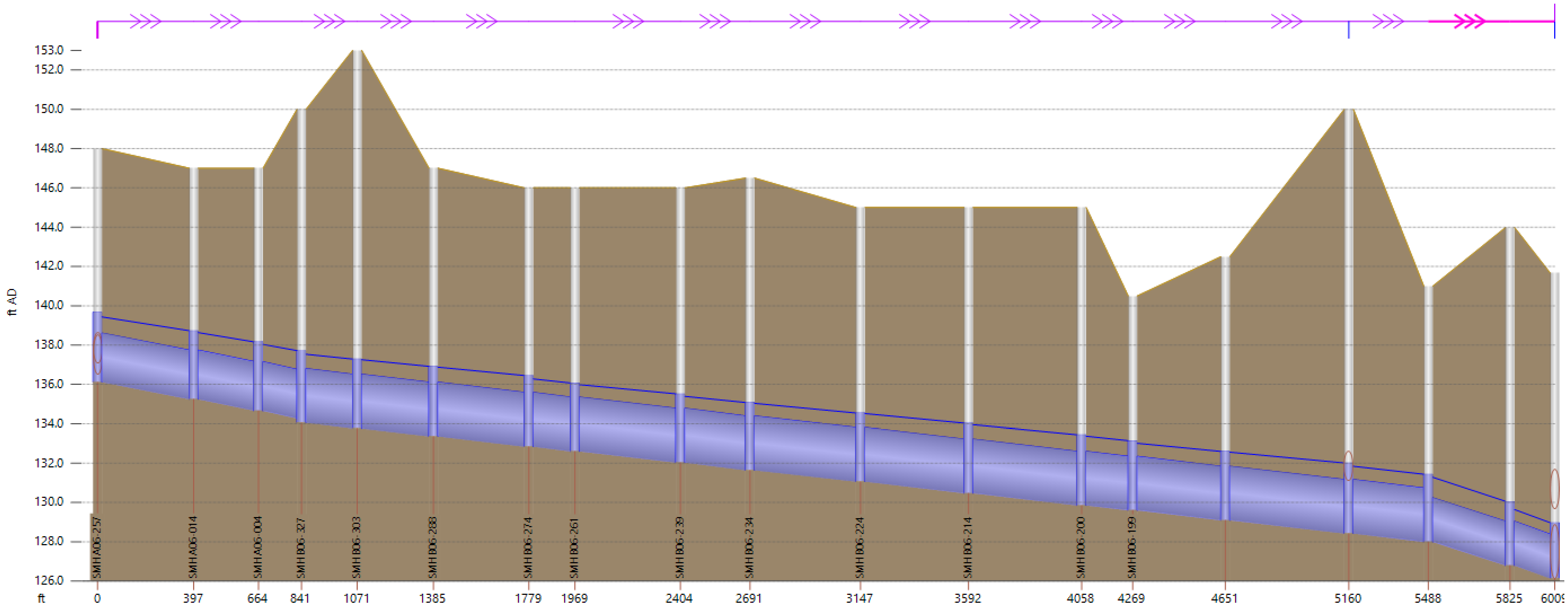
## EXISTING LAND USE – AREA B




| Link | - | - | SMH A07-180.1 | - | - | SMH A07-248.1 | - | - | - | - | - | - | SMH A07-091.1 | SMH A07-068.1 | SMH A07-046.1 | - | SMH A07-021.1 | - | SMH B06-329.1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| length (ft) | 112.5 | 240.7 | 456.0 | 146.8 | 230.3 | 360.3 | 99.4 | - | 128.8 | 209.5 | - | 290.6 | 408.7 | 419.5 | 383.8 | 177.3 | 401.8 | 233.8 | 431.9 |
| width (in) | 18.0 | 21.0 | 21.0 | 21.0 | 21.0 | 21.0 | 18.0 | - | 18.0 | 18.0 | - | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 |
| us inv (ft AD) | - | 155.350 | 155.060 | - | 154.340 | 154.060 | - | - | - | 152.590 | - | 150.140 | 149.400 | 148.380 | 147.300 | 146.380 | 145.830 | 144.740 | 138.190 |
| ds inv (ft AD) | - | 155.060 | 154.510 | - | 154.060 | 153.630 | - | - | - | 151.720 | - | 149.400 | 148.380 | 147.300 | 146.380 | 145.930 | 144.840 | 138.290 | 137.110 |
| grad (%) | 0.622 | 0.120 | 0.121 | 0.116 | 0.122 | 0.119 | - | - | 0.411 | 0.415 | - | 0.255 | 0.250 | 0.257 | 0.240 | 0.254 | 0.246 | 2.759 | 0.250 |
| surc | 1.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 1.00 | - | 1.00 | 1.00 | - | 2.00 | 2.00 | 2.00 | 2.00 | 0.95 | 0.90 | 1.00 | 2.00 |
| r.pfc (MGD) | 5.36 | 3.56 | 3.56 | 3.49 | 3.57 | 3.54 | 3.79 | - | 4.36 | 4.38 | - | 3.43 | 3.39 | 3.45 | 3.32 | 3.42 | 3.37 | 11.28 | 3.40 |
| DS flow (MGD) | - | 3.6566 | 3.6456 | 3.6416 | 3.6391 | 3.6354 | - | - | - | 3.6347 | - | 3.6346 | 3.6346 | 3.6345 | 3.6345 | 3.6344 | 3.6344 | 3.6338 | 4.8577 |

| Node | - | SMH A07-180 | - | - | - | - | - | - | - | - | - | SMH A07-091 | SMH A07-068 | SMH A07-046 | - | - | SMH A06-019 | SMH B06-329 | - |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ground (ft AD) | - | 161.000 | 159.500 | - | 161.000 | 159.000 | - | - | - | - | - | 155.000 | 156.000 | 157.000 | 157.000 | 155.000 | 166.000 | 151.000 | 148.000 |
| level (ft AD) | - | 157.080 | 156.471 | - | 155.938 | 155.463 | - | - | - | - | - | 151.496 | 150.245 | 148.993 | 147.847 | 147.253 | 145.359 | 141.881 | 139.668 |
| flood dep (ft) | -3.561 | -3.920 | -3.029 | -3.231 | -5.062 | -3.537 | - | - | -5.161 | - | -4.535 | -3.504 | -5.755 | -8.007 | -9.153 | -7.747 | -20.641 | -9.119 | -8.332 |

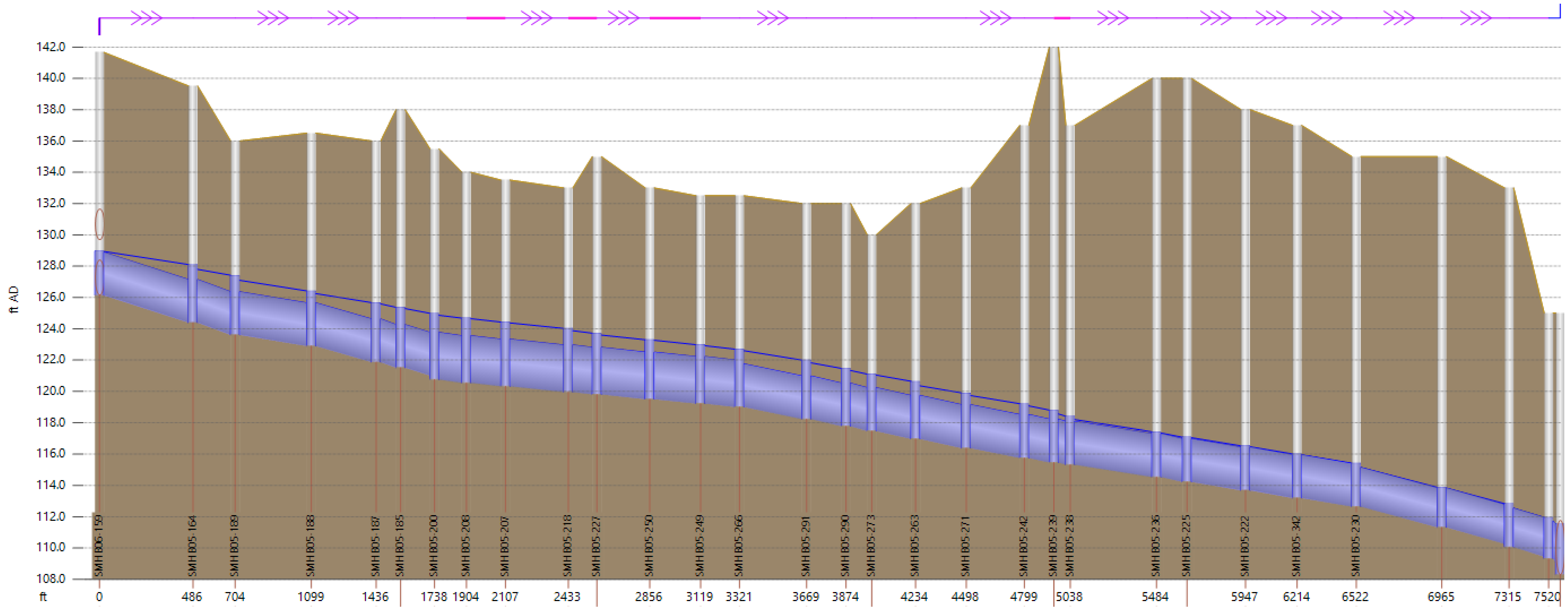
## EXISTING LAND USE – AREA C




| Link | length (ft) | width (in) | us inv (ft AD) | ds inv (ft AD) | grad (%) | surc | r.pfc (MGD) | DS flow (MGD) |
|---|---|---|---|---|---|---|---|---|
| SMH A06-257.1 | 396.7 | 30.0 | 136.110 | 135.240 | 0.219 | 1.00 | 12.42 | 11.4670 |
| - | 267.4 | 30.0 | 135.240 | 134.660 | 0.217 | 1.00 | 12.35 | 11.4562 |
| - | 177.3 | 30.0 | - | - | 0.220 | 1.00 | 12.43 | - |
| - | 229.3 | 33.0 | 134.050 | 133.760 | 0.126 | 1.00 | 12.16 | 11.4373 |
| - | 314.6 | 33.0 | 133.760 | 133.360 | 0.127 | 1.00 | 12.19 | 11.5043 |
| SMH B06-288.1 | 393.4 | 33.0 | 133.360 | 132.840 | 0.132 | 1.00 | 12.43 | 11.4871 |
| - | 190.1 | 33.0 | - | - | 0.126 | 1.00 | 12.15 | - |
| SMH B06-261.1 | 435.0 | 33.0 | 132.600 | 132.030 | 0.131 | 1.00 | 12.37 | 11.4617 |
| - | 287.1 | 33.0 | 132.030 | 131.640 | 0.136 | 1.00 | 12.60 | 11.4509 |
| SMH B06-234.1 | 455.6 | 33.0 | 131.640 | 131.060 | 0.127 | 1.00 | 12.20 | 11.4344 |
| SMH B06-224.1 | 445.4 | 33.0 | 131.060 | 130.470 | 0.132 | 1.00 | 12.44 | 11.4189 |
| SMH B06-214.1 | 466.4 | 33.0 | 130.470 | 129.850 | 0.133 | 1.00 | 12.46 | 11.4033 |
| - | 210.4 | 33.0 | 129.850 | 129.600 | 0.119 | 1.00 | 11.78 | 11.3963 |
| SMH B06-199.1 | 382.2 | 33.0 | 129.600 | 129.090 | 0.133 | 1.00 | 12.49 | 11.3836 |
| SMH B06-186.1 | 509.2 | 33.0 | 129.090 | 128.420 | 0.132 | 1.00 | 12.40 | 11.3678 |
| - | 327.5 | 33.0 | 128.420 | 127.990 | 0.131 | 1.00 | 12.39 | 12.1626 |
| - | 337.3 | 27.0 | 127.990 | 126.792 | 0.355 | 2.00 | 11.93 | 12.1555 |
| - | 184.4 | 27.0 | - | - | 0.358 | 2.00 | 11.98 | - |

| Node | ground (ft AD) | level (ft AD) | flood dep (ft) |
|---|---|---|---|
| - | - | - | -8.332 |
| - | 147.000 | 138.722 | -8.278 |
| - | - | - | -8.851 |
| - | - | - | - |
| - | 153.000 | 137.284 | -15.716 |
| - | 147.000 | 136.911 | -10.089 |
| - | 146.000 | 136.434 | -9.566 |
| - | 146.000 | 136.062 | -9.938 |
| - | 146.000 | 135.504 | -10.496 |
| - | 146.500 | 135.073 | -11.427 |
| SMH B06-224 | 145.000 | 134.537 | -10.463 |
| SMH B06-214 | 145.000 | 134.024 | -10.976 |
| - | 145.000 | 133.439 | -11.561 |
| - | 140.500 | 133.133 | -7.367 |
| SMH B06-186 | 142.500 | 132.597 | -9.903 |
| SMH B06-163 | 150.000 | 131.997 | -18.003 |
| - | 141.000 | 131.432 | -9.568 |
| - | 143.984 | 130.022 | -13.962 |
| - | - | - | - |

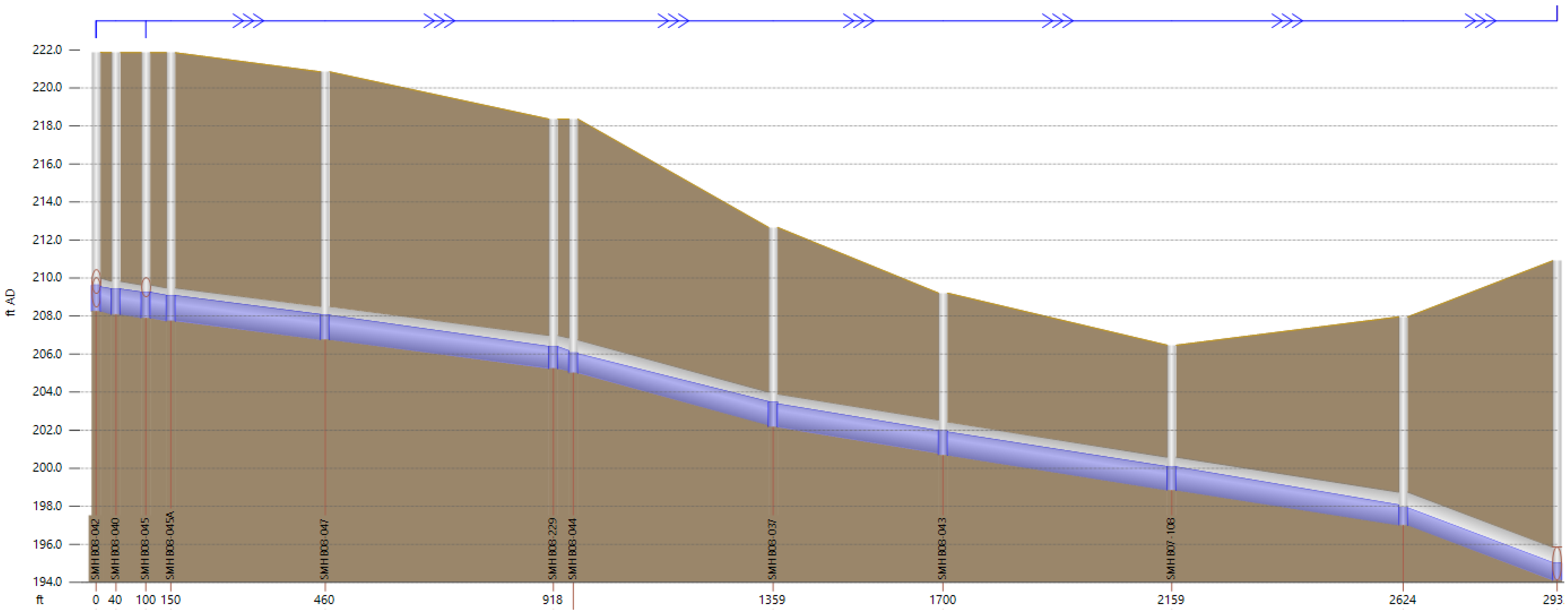
EXISTING LAND USE – AREA D




| Link | SMH B06-159.1 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| length (ft) | 485.7 | 218.4 | 394.8 | 337.0 | - | 176.0 | - | 202.7 | 326.1 | - | 274.6 | 263.3 | 201.7 | 348.2 | 204.6 | - | 227.1 | 263.3 | 301.6 | - | - | 446.8 | - | 303.8 | 267.3 | 307.6 | 443.8 | 349.1 | 205.1 |
| width (in) | 33.0 | 33.0 | 33.0 | 33.0 | - | 33.0 | 36.0 | 36.0 | 36.0 | 36.0 | 36.0 | 36.0 | 36.0 | 33.0 | 33.0 | - | 33.0 | 33.0 | 33.0 | 33.0 | - | 33.0 | 33.0 | 33.0 | 33.0 | 33.0 | 30.0 | 30.0 | 30.0 |
| us inv (ft AD) | 126.132 | - | 123.610 | 122.900 | - | - | - | - | 120.330 | - | 119.810 | 119.500 | - | 119.000 | - | - | - | 116.980 | 116.390 | - | - | 115.330 | - | 114.230 | 113.690 | 113.200 | 112.650 | 111.330 | - |
| ds inv (ft AD) | 124.392 | - | 122.900 | 121.870 | - | - | - | - | 119.960 | - | 119.500 | 119.220 | - | 118.230 | - | - | - | 116.390 | 115.760 | - | - | 114.550 | - | 113.690 | 113.200 | 112.650 | 111.330 | 110.270 | - |
| grad (%) | 0.358 | 0.358 | 0.180 | 0.306 | - | 0.284 | - | 0.109 | 0.113 | - | 0.113 | 0.106 | 0.109 | 0.221 | 0.225 | - | 0.220 | 0.224 | 0.209 | - | - | 0.175 | - | 0.178 | 0.183 | 0.179 | 0.297 | 0.304 | 0.302 |
| surc | 1.00 | 1.00 | 1.00 | 1.00 | - | 1.00 | 1.00 | 2.00 | 1.00 | 2.00 | 1.00 | 2.00 | 1.00 | 1.00 | 1.00 | - | 1.00 | 1.00 | 1.00 | 1.00 | - | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| r.pfc (MGD) | 20.46 | 20.46 | 14.50 | 18.90 | - | 18.22 | - | 14.20 | 14.52 | - | 14.49 | 14.06 | 14.24 | 16.08 | 16.21 | - | 16.04 | 16.18 | 15.62 | - | - | 14.28 | - | 14.41 | 14.64 | 14.46 | 14.46 | 14.61 | 14.58 |
| DS flow (MGD) | 14.6273 | - | 14.5897 | 14.5340 | - | - | - | - | 14.4058 | - | 14.3370 | 14.2976 | - | 14.2118 | - | - | - | 14.1618 | 14.1594 | - | - | 14.1449 | - | 14.1337 | 14.1268 | 14.1198 | 14.1189 | 14.1184 | - |

| Node | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ground (ft AD) | - | 139.514 | 136.000 | 136.500 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 140.000 | - | - | - | 135.000 | 135.000 | - | - |
| level (ft AD) | - | 128.077 | 127.390 | 126.402 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 117.423 | - | - | - | 115.415 | 113.877 | - | - |
| flood dep (ft) | - | -11.437 | -8.610 | -10.098 | - | - | - | - | -9.080 | - | - | -9.706 | - | -9.810 | - | - | - | - | - | - | - | - | -22.577 | - | -21.473 | -20.988 | -19.585 | -21.123 | - | - |

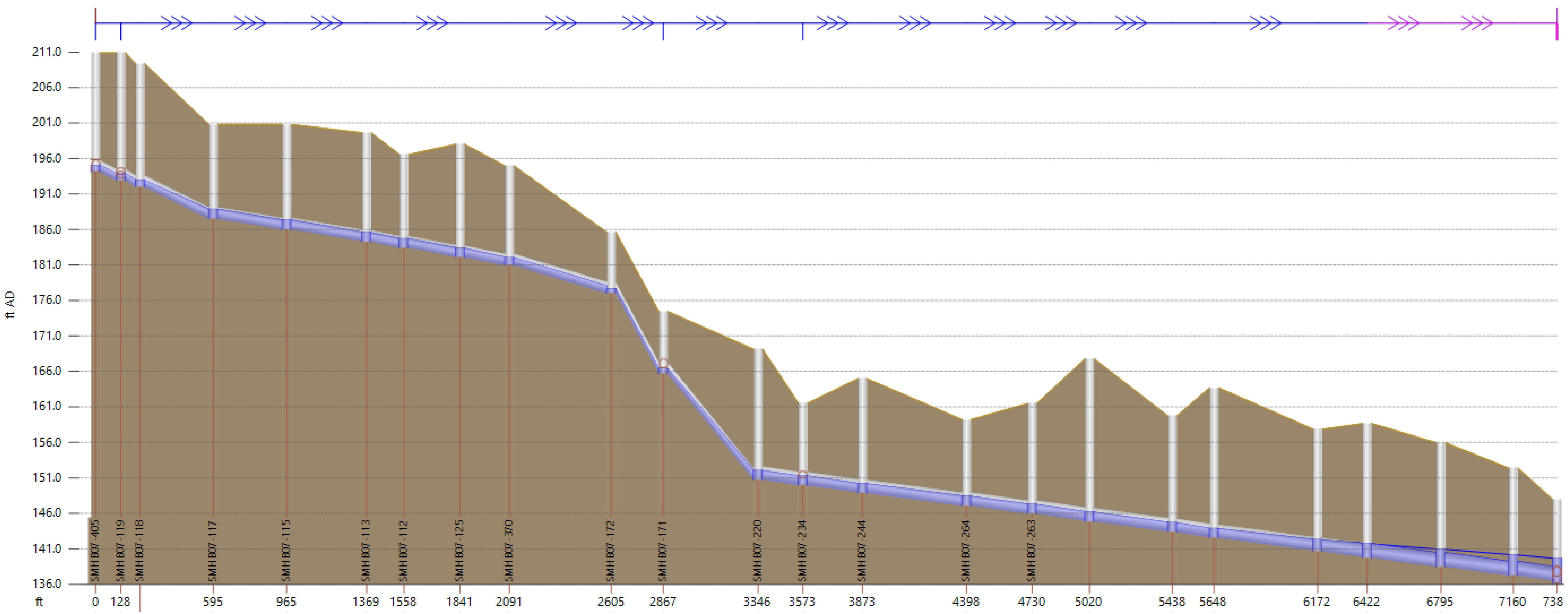
EXISTING LAND USE – AREA E




| Link | - | - | - | SMH B08-045A.1 | SMH B08-047.1 | - | SMH B08-044.1 | SMH B08-037.1 | SMH B08-043.1 | SMH B07-108.1 | SMH B07-107.1 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| length (ft) | - | 60.0 | - | 310.0 | 458.0 | - | 401.0 | 341.0 | 459.2 | 464.7 | 308.9 |
| width (in) | - | 21.0 | - | 21.0 | 21.0 | - | 21.0 | 21.0 | 21.0 | 21.0 | 21.0 |
| us inv (ft AD) | - | - | - | 207.732 | 206.750 | - | 205.000 | 202.150 | 200.680 | 198.840 | 197.000 |
| ds inv (ft AD) | - | - | - | 206.750 | 205.233 | - | 202.250 | 200.780 | 198.840 | 197.000 | 194.107 |
| grad (%) | - | - | - | 0.317 | 0.331 | - | 0.686 | 0.402 | 0.401 | 0.396 | 0.937 |
| surc | - | 0.78 | - | 0.76 | 0.73 | - | 0.71 | 0.70 | 0.71 | 0.70 | 0.53 |
| r.pfc (MGD) | - | 5.76 | - | 5.76 | 5.89 | - | 8.48 | 6.49 | 6.48 | 6.45 | 9.91 |
| DS flow (MGD) | - | - | - | 5.2707 | 5.2707 | - | 5.3000 | 5.3032 | 5.3031 | 5.3031 | 5.3031 |

| Node | - | - | - | SMH B08-047 | SMH B08-229 | SMH B08-044 | SMH B08-037 | SMH B08-043 | SMH B07-108 | SMH B07-107 | - |
|---|---|---|---|---|---|---|---|---|---|---|---|
| ground (ft AD) | - | - | 221.854 | 220.847 | 218.361 | 218.361 | 212.662 | 209.204 | 206.463 | 207.955 | 210.904 |
| level (ft AD) | - | - | 209.080 | 208.068 | 206.386 | 206.059 | 203.479 | 201.956 | 200.078 | 197.921 | 195.031 |
| flood dep (ft) | - | - | -12.774 | -12.779 | -11.975 | -12.302 | -9.183 | -7.248 | -6.385 | -10.034 | -15.873 |

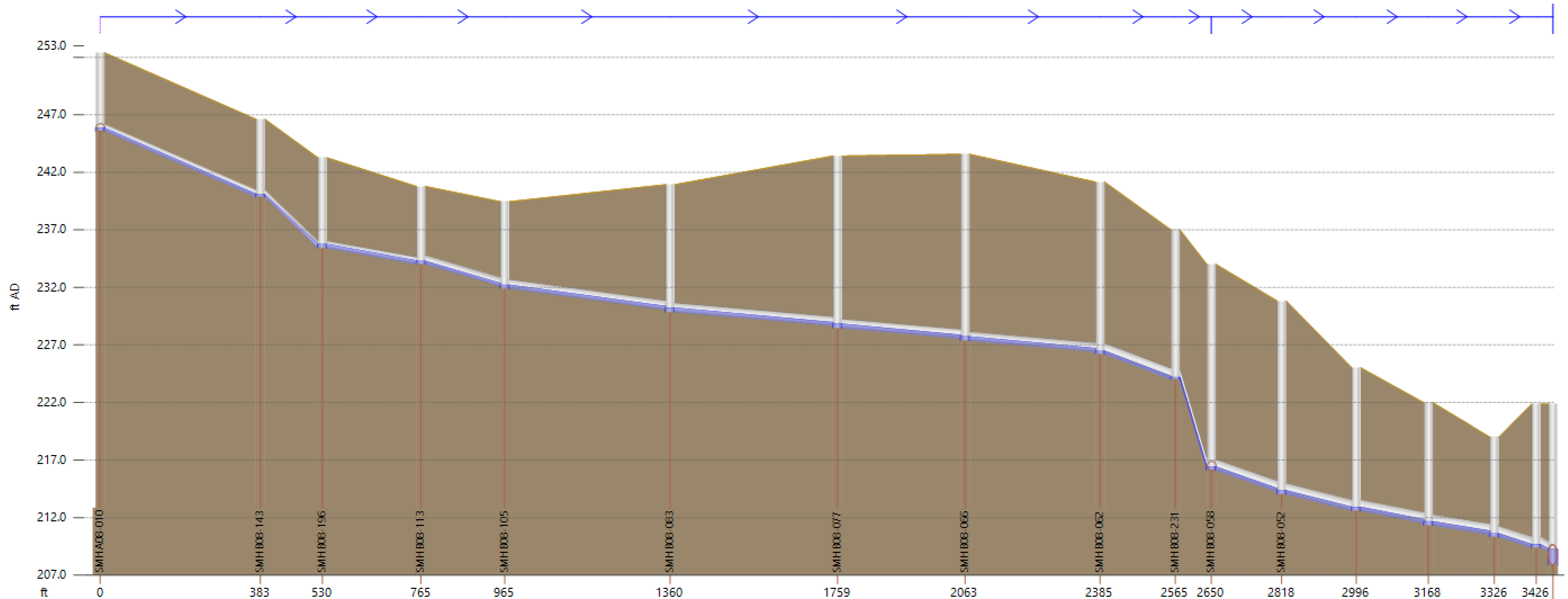
# EXISTING LAND USE – AREA F




| Link | - | - | - | - | - | - | - | - | SMH B07-370.1 | - | SMH B07-171.1 | - | - | SMH B07-244.1 | - | - | - | - | SMH B07-242.1 | - | - | - | - |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| length (ft) | - | - | 370.0 | 370.5 | 403.7 | 189.0 | 282.5 | 249.9 | 514.2 | 262.6 | 479.1 | 226.2 | 300.0 | 525.4 | 331.8 | 289.9 | 418.2 | 210.2 | 523.9 | 249.6 | 373.1 | 365.7 | 220.5 |
| width (in) | - | - | 21.0 | 21.0 | 21.0 | 21.0 | 21.0 | 21.0 | 21.0 | 21.0 | 21.0 | 24.0 | 24.0 | 24.0 | 24.0 | 24.0 | 24.0 | 24.0 | 24.0 | 24.0 | 24.0 | 24.0 | 24.0 |
| us inv (ft AD) | - | - | 192.000 | 187.500 | 186.000 | - | 183.416 | 182.070 | 180.950 | 177.000 | 165.650 | - | 149.975 | 148.860 | 147.080 | 145.950 | 144.870 | - | 142.540 | 140.670 | 139.730 | 138.470 | - |
| ds inv (ft AD) | - | - | 187.500 | 186.000 | 184.350 | - | 182.170 | 180.950 | 177.000 | 165.750 | 150.740 | - | 148.960 | 147.080 | 145.950 | 144.970 | 143.460 | - | 140.770 | 139.830 | 138.470 | 137.230 | - |
| grad (%) | - | - | 1.216 | 0.405 | 0.409 | 0.441 | 0.441 | 0.448 | 0.768 | 4.284 | 3.112 | 0.338 | 0.338 | 0.339 | 0.341 | 0.338 | 0.337 | 0.343 | 0.338 | 0.337 | 0.338 | 0.339 | 0.327 |
| surc | - | - | 0.78 | 0.77 | 0.76 | 0.74 | 0.73 | 0.72 | 0.61 | 0.38 | 0.76 | 0.66 | 0.65 | 0.70 | 0.68 | 0.65 | 0.66 | 0.65 | 0.79 | 0.98 | 1.00 | 1.00 | 1.00 |
| r.pfc (MGD) | - | - | 11.30 | 6.52 | 6.55 | 6.80 | 6.80 | 6.86 | 8.98 | 21.20 | 18.07 | 8.50 | 8.51 | 8.51 | 8.53 | 8.50 | 8.49 | 8.56 | 8.50 | 8.48 | 8.50 | 8.52 | 8.36 |
| DS flow (MGD) | - | - | 5.9914 | 5.9913 | 5.9913 | - | 6.0622 | 6.0622 | 6.0814 | 6.0814 | 6.3607 | 6.3607 | 6.5535 | 6.5534 | 6.5534 | 6.5534 | 6.5533 | 6.5533 | 6.5533 | 6.5529 | 6.5487 | 6.6404 | 6.6295 |

| Node | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ground (ft AD) | - | - | 200.819 | 200.813 | 199.641 | - | - | 194.963 | 185.616 | 174.439 | 169.113 | - | 164.971 | 159.204 | 161.463 | 167.769 | 159.712 | 163.680 | 157.842 | 158.647 | 155.955 | 152.380 | - |
| level (ft AD) | - | - | 188.866 | 187.346 | 185.605 | - | - | 182.039 | 177.667 | 166.399 | 152.061 | - | 150.223 | 148.465 | 147.308 | 146.245 | 144.741 | 143.910 | 142.341 | 141.774 | 140.975 | 140.198 | - |
| flood dep (ft) | - | - | -11.953 | -13.467 | -14.036 | - | - | -12.924 | -7.949 | -8.040 | -17.052 | - | -14.748 | -10.739 | -14.155 | -21.524 | -14.971 | -19.770 | -15.501 | -16.873 | -14.980 | -12.182 | - |

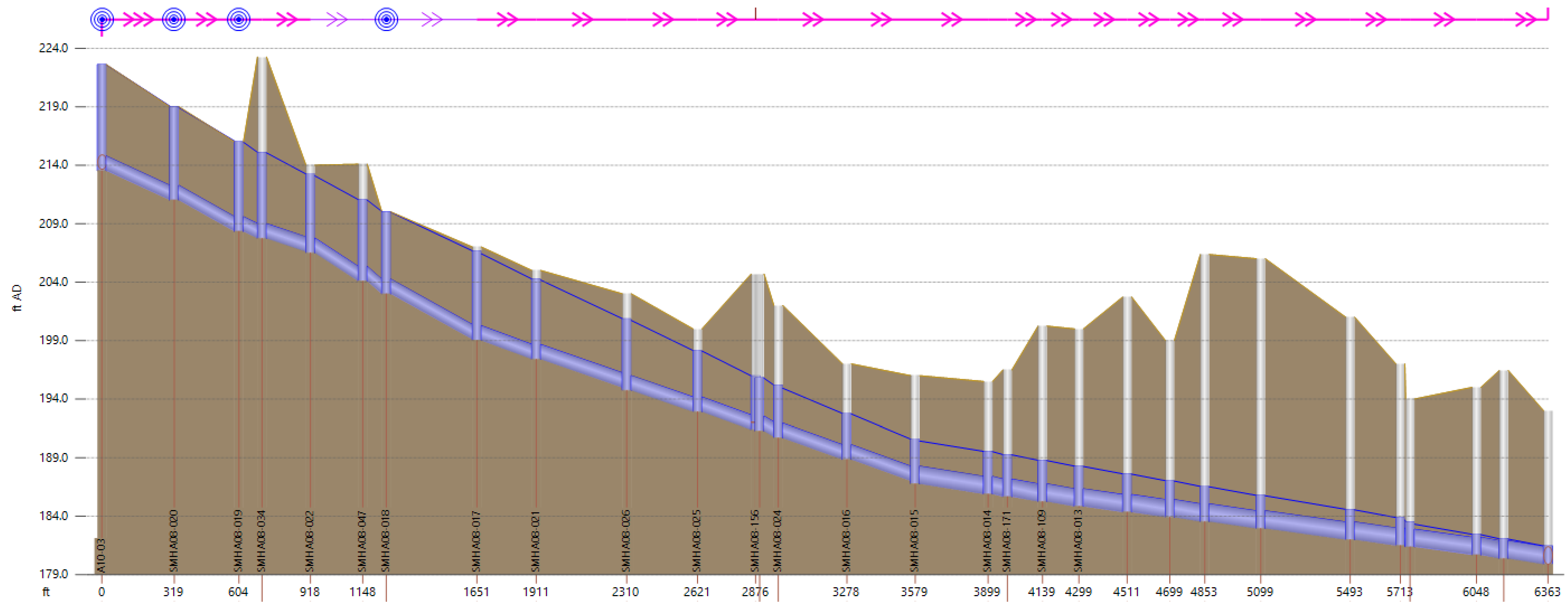
EXISTING LAND USE – AREA G




| Link | SMH A08-010.1 | - | SMH B08-196.1 | - | SMH B08-105.1 | SMH B08-083.1 | SMH B08-077.1 | SMH B08-066.1 | - | - | - | - | - | - | - | - |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| length (ft) | 382.5 | 147.9 | 234.6 | 200.3 | 394.4 | 399.4 | 304.0 | 322.1 | 179.5 | 85.6 | 168.0 | 178.0 | 172.0 | 157.2 | 100.0 | - |
| width (in) | 8.0 | 8.0 | 8.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 12.0 | 12.0 | 12.0 | 12.0 | 12.0 | 12.0 | 12.0 | - |
| us inv (ft AD) | 245.580 | 239.840 | 235.400 | 233.990 | 231.880 | 229.840 | 228.440 | 227.340 | 226.180 | - | 216.100 | 214.030 | 212.580 | 211.300 | - | - |
| ds inv (ft AD) | 239.840 | 235.400 | 233.990 | 232.080 | 230.040 | 228.640 | 227.530 | 226.380 | 223.990 | - | 214.230 | 212.580 | 211.500 | 210.500 | - | - |
| grad (%) | 1.501 | 3.002 | 0.601 | 0.954 | 0.467 | 0.300 | 0.299 | 0.298 | 1.220 | 9.100 | 1.113 | 0.815 | 0.628 | 0.509 | 0.929 | - |
| surc | 0.38 | 0.49 | 0.49 | 0.31 | 0.37 | 0.43 | 0.43 | 0.43 | 0.25 | 0.19 | 0.29 | 0.32 | 0.32 | 0.34 | 0.29 | - |
| r.pfc (MGD) | 0.96 | 1.35 | 0.61 | 1.38 | 0.97 | 0.78 | 0.77 | 0.77 | 2.54 | 6.95 | 2.43 | 2.08 | 1.83 | 1.64 | 2.22 | - |
| DS flow (MGD) | 0.2779 | 0.2779 | 0.2779 | 0.2779 | 0.2779 | 0.2900 | 0.2900 | 0.2900 | 0.2900 | - | 0.3819 | 0.3819 | 0.3819 | 0.3819 | 0.3819 | - |

| Node | - | SMH B08-143 | - | SMH B08-113 | SMH B08-105 | SMH B08-083 | SMH B08-077 | SMH B08-066 | SMH B08-062 | - | - | - | - | - | - | - |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ground (ft AD) | 252.381 | 246.609 | 243.258 | 240.770 | 239.440 | 240.920 | 243.415 | 243.560 | 241.150 | - | - | 230.810 | 225.000 | 221.960 | - | - |
| level (ft AD) | 245.835 | 240.057 | 235.727 | 234.252 | 232.191 | 230.199 | 228.799 | 227.700 | 226.429 | - | - | 214.326 | 212.897 | 211.637 | - | - |
| flood dep (ft) | -6.546 | -6.552 | -7.531 | -6.518 | -7.249 | -10.721 | -14.616 | -15.860 | -14.721 | -12.840 | - | -16.484 | -12.103 | -10.323 | -8.412 | - |

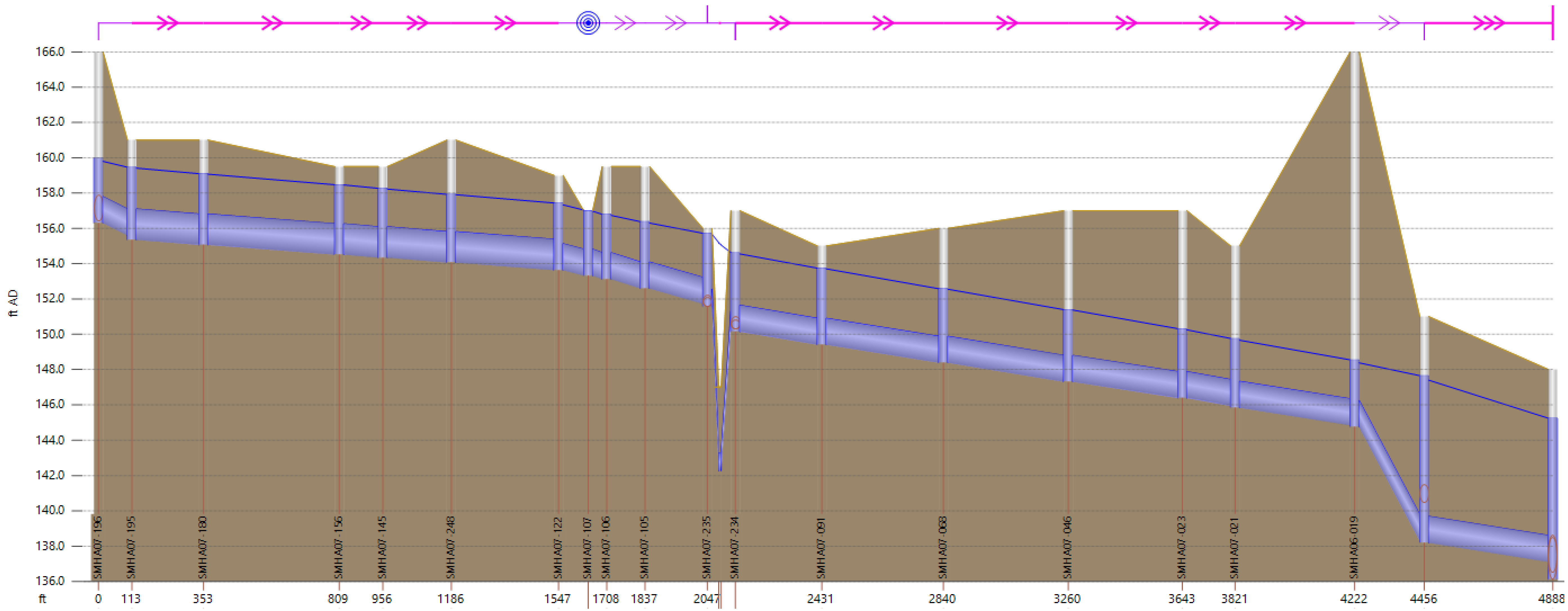
# BUILDOUT LAND USE – AREA A




| Link | A10-03.1 | - | - | - | - | - | SMH A08-018.1 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| length (ft) | 319.0 | 284.5 | - | 212.9 | 230.3 | - | 398.9 | 260.9 | 398.2 | 311.2 | 255.4 | - | 302.2 | 300.1 | 320.7 | - | 155.0 | 160.0 | 212.0 | 188.0 | 154.0 | 246.0 | 393.4 | 220.7 | 292.1 | - | 195.0 |
| width (in) | 15.0 | 15.0 | - | 15.0 | 15.0 | - | 15.0 | 15.0 | 15.0 | 15.0 | 15.0 | - | 15.0 | 15.0 | 18.0 | - | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 |
| us inv (ft AD) | 213.530 | 211.020 | - | 207.750 | 206.510 | - | 203.000 | 199.010 | 197.410 | 194.750 | 192.920 | - | 190.690 | 188.850 | 186.770 | - | - | - | 184.840 | - | - | 183.550 | 182.960 | 182.000 | 181.380 | - | - |
| ds inv (ft AD) | 211.020 | 208.340 | - | 206.610 | 204.089 | - | 199.110 | 197.420 | 194.990 | 192.920 | 191.390 | - | 188.850 | 187.020 | 185.900 | - | - | - | 184.350 | - | - | 182.960 | 182.000 | 181.490 | 180.690 | - | - |
| grad (%) | 0.787 | 0.942 | - | 0.535 | 1.051 | - | 0.975 | 0.609 | 0.608 | 0.588 | 0.599 | - | 0.609 | 0.610 | 0.271 | - | 0.265 | 0.262 | 0.231 | 0.229 | 0.240 | 0.240 | 0.244 | 0.231 | 0.236 | - | 0.251 |
| surc | 2.00 | 2.00 | - | 2.00 | 1.00 | - | 1.00 | 2.00 | 2.00 | 2.00 | 2.00 | - | 2.00 | 2.00 | 2.00 | - | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |
| r.pfc (MGD) | 3.70 | 4.05 | - | 3.06 | 4.28 | - | 4.12 | 3.26 | 3.26 | 3.20 | 3.23 | - | 3.26 | 3.26 | 3.54 | - | 3.49 | 3.48 | 3.26 | 3.25 | 3.33 | 3.33 | 3.35 | 3.26 | 3.30 | 3.40 | 3.40 |
| DS flow (MGD) | 4.3727 | 4.1683 | - | 3.9082 | 3.8859 | - | 3.9267 | 3.9075 | 3.8864 | 3.8696 | 3.8558 | - | 3.5250 | 3.5183 | 3.5582 | - | - | - | 3.6701 | 3.6700 | - | 3.6700 | 3.6699 | 3.6699 | 3.6699 | - | 3.6698 |

| Node | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ground (ft AD) | - | 219.000 | - | - | - | - | 210.000 | 207.000 | 205.000 | 203.000 | 200.000 | - | - | 197.000 | 196.000 | - | - | - | - | - | - | - | 206.000 | 201.000 | - | - | - | - | - |
| level (ft AD) | - | 219.000 | - | - | - | - | 210.000 | 206.648 | 204.261 | 200.863 | 198.146 | - | - | 192.766 | 190.563 | - | - | - | - | - | - | - | 185.784 | 184.585 | - | - | - | - | - |
| flood dep (ft) | - | -0.000 | - | - | -0.764 | - | 0.000 | -0.352 | -0.739 | -2.137 | -1.854 | - | - | -4.234 | -5.437 | - | - | - | - | - | - | - | -20.216 | -16.415 | - | - | - | - | - |

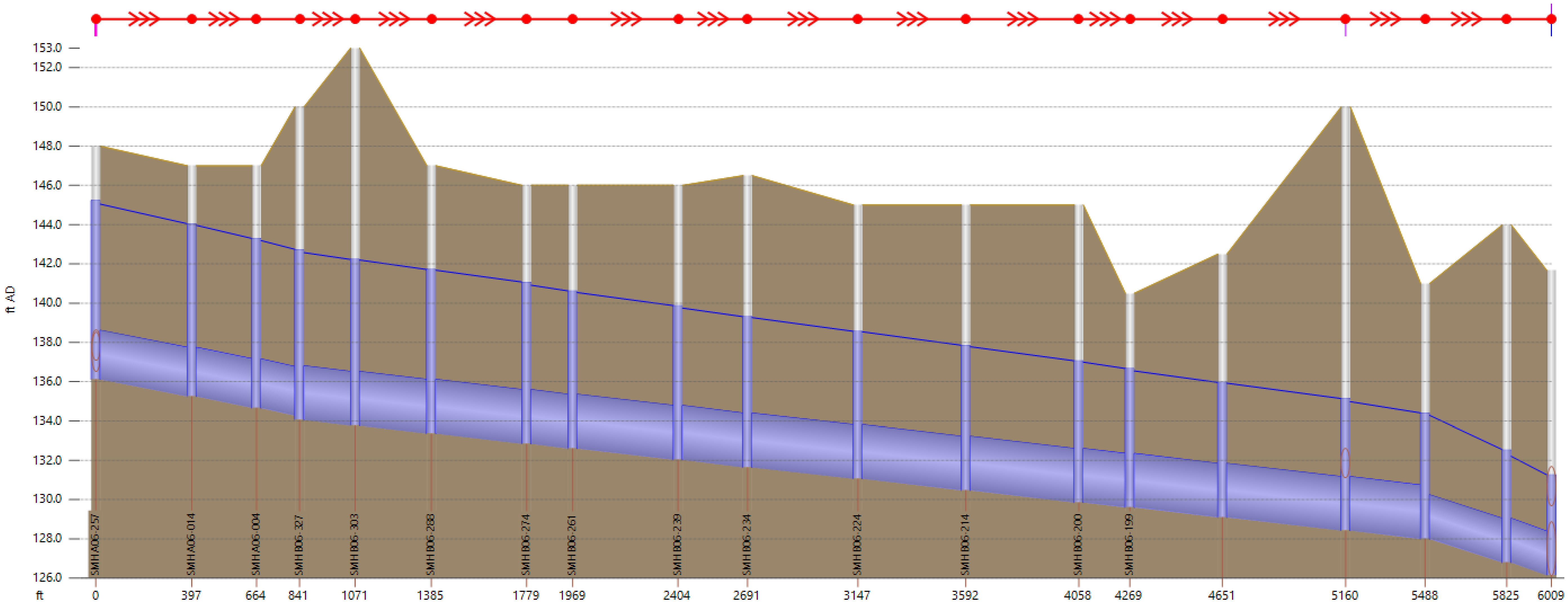
BUILDOUT LAND USE – AREA B




| Link | - | - | SMH A07-180.1 | - | - | SMH A07-248.1 | - | - | - | - | | - | - | SMH A07-091.1 | SMH A07-068.1 | SMH A07-046.1 | - | SMH A07-021.1 | - | SMH B06-329.1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| length (ft) | 112.5 | 240.7 | 456.0 | 146.8 | 230.3 | 360.3 | 99.4 | - | 128.8 | 209.5 | | - | 290.6 | 408.7 | 419.5 | 383.8 | 177.3 | 401.8 | 233.8 | 431.9 |
| width (in) | 18.0 | 21.0 | 21.0 | 21.0 | 21.0 | 21.0 | 18.0 | - | 18.0 | 18.0 | | - | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 |
| us inv (ft AD) | - | 155.350 | 155.060 | - | 154.340 | 154.060 | - | - | - | 152.590 | | - | 150.140 | 149.400 | 148.380 | 147.300 | 146.380 | 145.830 | 144.740 | 138.190 |
| ds inv (ft AD) | - | 155.060 | 154.510 | - | 154.060 | 153.630 | - | - | - | 151.720 | | - | 149.400 | 148.380 | 147.300 | 146.380 | 145.930 | 144.840 | 138.290 | 137.110 |
| grad (%) | 0.622 | 0.120 | 0.121 | 0.116 | 0.122 | 0.119 | - | - | 0.411 | 0.415 | | - | 0.255 | 0.250 | 0.257 | 0.240 | 0.254 | 0.246 | 2.759 | 0.250 |
| surc | 1.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 1.00 | - | 1.00 | 1.00 | | - | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 1.00 | 2.00 |
| r.pfc (MGD) | 5.36 | 3.56 | 3.56 | 3.49 | 3.57 | 3.54 | 3.79 | - | 4.36 | 4.38 | | - | 3.43 | 3.39 | 3.45 | 3.32 | 3.42 | 3.37 | 11.28 | 3.40 |
| DS flow (MGD) | - | 3.6922 | 3.6921 | 3.6921 | 3.6921 | 3.6920 | - | - | - | 3.6350 | | - | 3.6331 | 3.6319 | 3.6309 | 3.6307 | 3.6316 | 3.6328 | 3.6340 | 4.8525 |

| Node | - | SMH A07-180 | - | - | - | - | - | - | - | - | | - | SMH A07-091 | SMH A07-068 | SMH A07-046 | - | - | SMH A06-019 | SMH B06-329 | - |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ground (ft AD) | - | 161.000 | 159.500 | - | 161.000 | 159.000 | - | - | - | - | | - | 155.000 | 156.000 | 157.000 | 157.000 | 155.000 | 166.000 | 151.000 | 148.000 |
| level (ft AD) | - | 159.098 | 158.474 | - | 157.925 | 157.432 | - | - | - | - | | - | 153.744 | 152.576 | 151.392 | 150.307 | 149.750 | 148.534 | 147.638 | 145.233 |
| flood dep (ft) | -1.543 | -1.902 | -1.026 | -1.234 | -3.075 | -1.568 | - | - | -3.128 | - | | -2.386 | -1.256 | -3.424 | -5.608 | -6.693 | -5.250 | -17.466 | -3.362 | -2.767 |

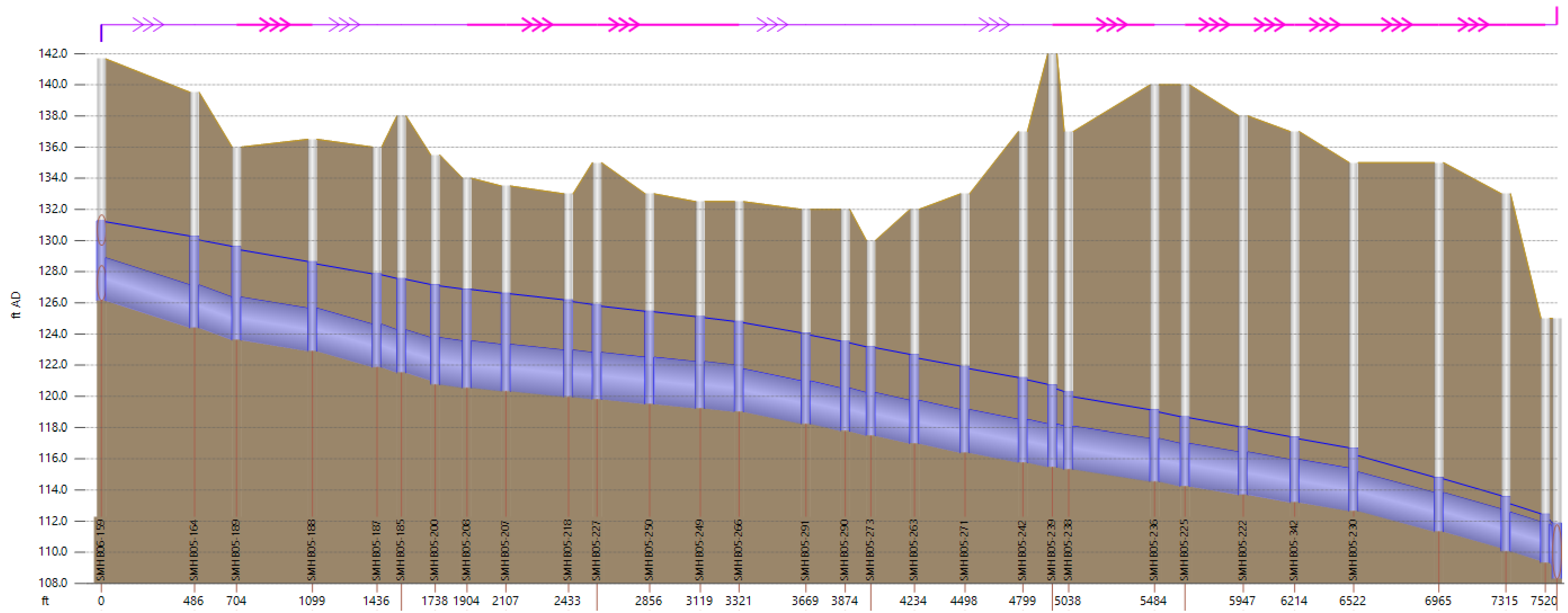
## BUILDOUT LAND USE – AREA C




| Link | length (ft) | width (in) | us inv (ft AD) | ds inv (ft AD) | grad (%) | surc | r.pfc (MGD) | DS flow (MGD) |
|---|---|---|---|---|---|---|---|---|
| SMH A06-257.1 | 396.7 | 30.0 | 136.110 | 135.240 | 0.219 | 2.00 | 12.42 | 13.2598 |
| - | 267.4 | 30.0 | 135.240 | 134.660 | 0.217 | 2.00 | 12.35 | 13.2587 |
| - | 177.3 | 30.0 | - | - | 0.220 | 2.00 | 12.43 | - |
| - | 229.3 | 33.0 | 134.050 | 133.760 | 0.126 | 2.00 | 12.16 | 13.2570 |
| - | 314.6 | 33.0 | 133.760 | 133.360 | 0.127 | 2.00 | 12.19 | 13.3380 |
| SMH B06-288.1 | 393.4 | 33.0 | 133.360 | 132.840 | 0.132 | 2.00 | 12.43 | 13.3370 |
| - | 190.1 | 33.0 | - | - | 0.126 | 2.00 | 12.15 | - |
| SMH B06-261.1 | 435.0 | 33.0 | 132.600 | 132.030 | 0.131 | 2.00 | 12.37 | 13.3354 |
| - | 287.1 | 33.0 | 132.030 | 131.640 | 0.136 | 2.00 | 12.60 | 13.3348 |
| SMH B06-234.1 | 455.6 | 33.0 | 131.640 | 131.060 | 0.127 | 2.00 | 12.20 | 13.3340 |
| SMH B06-224.1 | 445.4 | 33.0 | 131.060 | 130.470 | 0.132 | 2.00 | 12.44 | 13.3333 |
| SMH B06-214.1 | 466.4 | 33.0 | 130.470 | 129.850 | 0.133 | 2.00 | 12.46 | 13.3327 |
| - | 210.4 | 33.0 | 129.850 | 129.600 | 0.119 | 2.00 | 11.78 | 13.3323 |
| SMH B06-199.1 | 382.2 | 33.0 | 129.600 | 129.090 | 0.133 | 2.00 | 12.49 | 13.3318 |
| SMH B06-186.1 | 509.2 | 33.0 | 129.090 | 128.420 | 0.132 | 2.00 | 12.40 | 13.3313 |
| - | 327.5 | 33.0 | 128.420 | 127.990 | 0.131 | 2.00 | 12.39 | 14.2827 |
| - | 337.3 | 27.0 | 127.990 | 126.792 | 0.355 | 2.00 | 11.93 | 14.2828 |
| - | 184.4 | 27.0 | - | - | 0.358 | 2.00 | 11.98 | - |

| Node | ground (ft AD) | level (ft AD) | flood dep (ft) |
|---|---|---|---|
| - | - | - | -2.767 |
| - | 147.000 | 144.039 | -2.961 |
| - | - | - | -3.716 |
| - | - | - | -7.281 |
| - | 153.000 | 142.225 | -10.775 |
| - | 147.000 | 141.711 | -5.289 |
| - | 146.000 | 141.059 | -4.941 |
| - | 146.000 | 140.614 | -5.386 |
| - | 146.000 | 139.861 | -6.139 |
| - | 146.500 | 139.304 | -7.196 |
| SMH B06-224 | 145.000 | 138.562 | -6.438 |
| SMH B06-214 | 145.000 | 137.847 | -7.153 |
| - | 145.000 | 137.055 | -7.945 |
| - | 140.500 | 136.658 | -3.842 |
| SMH B06-186 | 142.500 | 135.954 | -6.546 |
| SMH B06-163 | 150.000 | 135.125 | -14.875 |
| - | 141.000 | 134.398 | -6.602 |
| - | 143.984 | 132.519 | -11.465 |
| - | - | - | - |

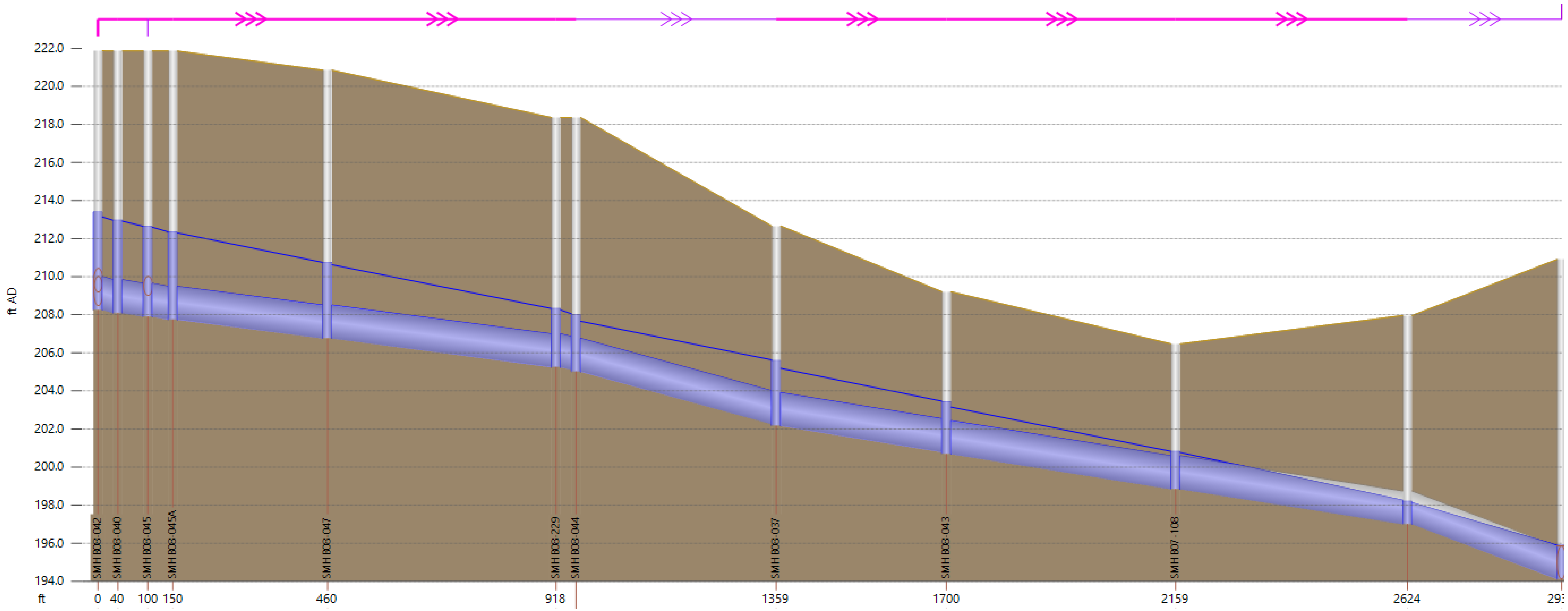
BUILDOUT LAND USE – AREA D




| Link | SMH B06-159.1 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| length (ft) | 485.7 | 218.4 | 394.8 | 337.0 | - | 176.0 | - | 202.7 | 326.1 | - | 274.6 | 263.3 | 201.7 | 348.2 | 204.6 | - | 227.1 | 263.3 | 301.6 | - | - | 446.8 | - | 303.8 | 267.3 | 307.6 | 443.8 | 349.1 | 205.1 |
| width (in) | 33.0 | 33.0 | 33.0 | 33.0 | - | 33.0 | 36.0 | 36.0 | 36.0 | 36.0 | 36.0 | 36.0 | 36.0 | 33.0 | 33.0 | - | 33.0 | 33.0 | 33.0 | 33.0 | - | 33.0 | 33.0 | 33.0 | 33.0 | 33.0 | 30.0 | 30.0 | 30.0 |
| us inv (ft AD) | 126.132 | - | 123.610 | 122.900 | - | - | - | - | 120.330 | - | 119.810 | 119.500 | - | 119.000 | - | - | - | 116.980 | 116.390 | - | - | 115.330 | - | 114.230 | 113.690 | 113.200 | 112.650 | 111.330 | - |
| ds inv (ft AD) | 124.392 | - | 122.900 | 121.870 | - | - | - | - | 119.960 | - | 119.500 | 119.220 | - | 118.230 | - | - | - | 116.390 | 115.760 | - | - | 114.550 | - | 113.690 | 113.200 | 112.650 | 111.330 | 110.270 | - |
| grad (%) | 0.358 | 0.358 | 0.180 | 0.306 | - | 0.284 | - | 0.109 | 0.113 | - | 0.113 | 0.106 | 0.109 | 0.221 | 0.225 | - | 0.220 | 0.224 | 0.209 | - | - | 0.175 | - | 0.178 | 0.183 | 0.179 | 0.297 | 0.304 | 0.302 |
| surc | 1.00 | 1.00 | 2.00 | 1.00 | - | 1.00 | 1.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 1.00 | 1.00 | - | 1.00 | 1.00 | 1.00 | 1.00 | - | 2.00 | 1.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |
| r.pfc (MGD) | 20.46 | 20.46 | 14.50 | 18.90 | - | 18.22 | - | 14.20 | 14.52 | - | 14.49 | 14.06 | 14.24 | 16.08 | 16.21 | - | 16.04 | 16.18 | 15.62 | - | - | 14.28 | - | 14.41 | 14.64 | 14.46 | 14.46 | 14.61 | 14.58 |
| DS flow (MGD) | 15.0889 | - | 15.0329 | 15.0057 | - | - | - | - | 14.9060 | - | 14.8692 | 14.8577 | - | 14.8171 | - | - | - | 14.7435 | 14.7259 | - | - | 14.7239 | - | 14.7225 | 14.7217 | 14.7210 | 14.7201 | 14.7194 | - |

| Node | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ground (ft AD) | - | 139.514 | 136.000 | 136.500 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 140.000 | - | - | - | 135.000 | 135.000 | - | - |
| level (ft AD) | - | 130.268 | 129.608 | 128.638 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 119.125 | - | - | - | 116.675 | 114.817 | - | - |
| flood dep (ft) | - | -9.246 | -6.392 | -7.862 | - | - | - | - | -6.879 | - | - | -7.544 | - | -7.698 | -7.942 | - | - | - | - | - | - | - | -20.875 | - | -19.957 | -19.586 | -18.325 | -20.183 | - | - |

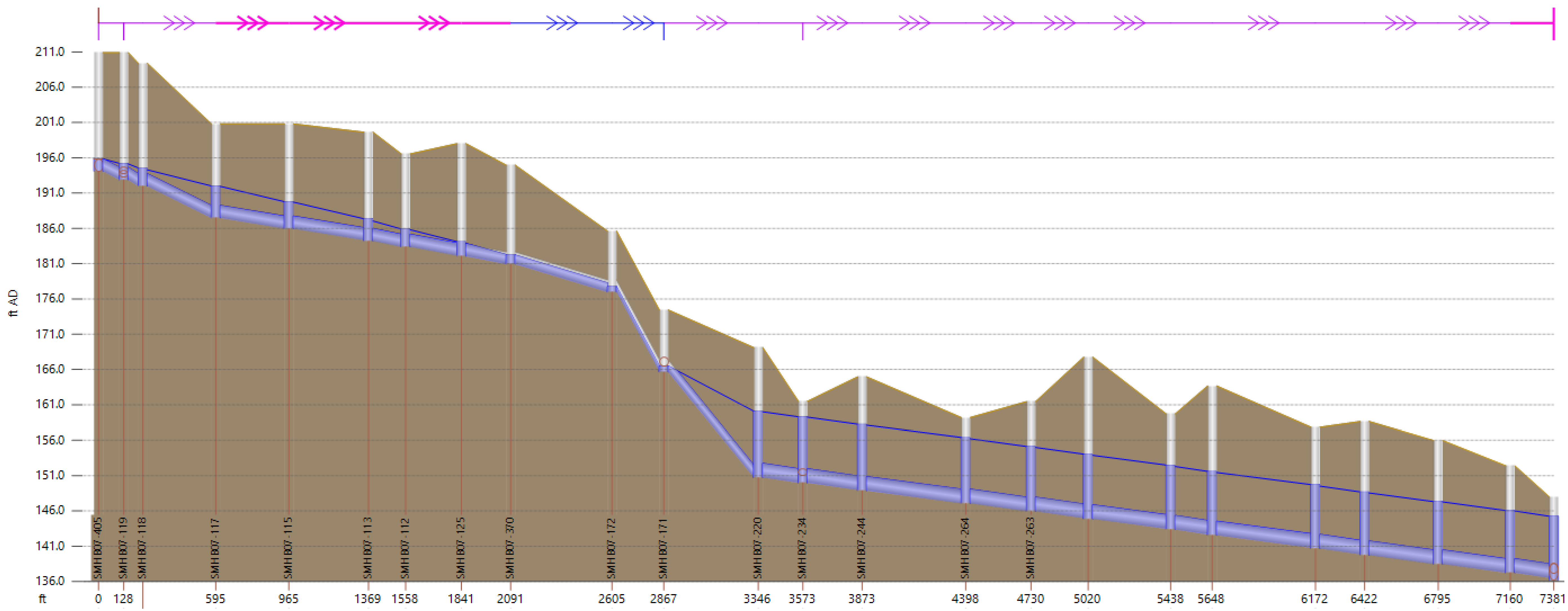
## BUILDOUT LAND USE – AREA E




| Link | - | - | - | SMH B08-045A.1 | SMH B08-047.1 | - | SMH B08-044.1 | SMH B08-037.1 | SMH B08-043.1 | SMH B07-108.1 | SMH B07-107.1 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| length (ft) | - | 60.0 | - | 310.0 | 458.0 | - | 401.0 | 341.0 | 459.2 | 464.7 | 308.9 |
| width (in) | - | 21.0 | - | 21.0 | 21.0 | - | 21.0 | 21.0 | 21.0 | 21.0 | 21.0 |
| us inv (ft AD) | - | - | - | 207.732 | 206.750 | - | 205.000 | 202.150 | 200.680 | 198.840 | 197.000 |
| ds inv (ft AD) | - | - | - | 206.750 | 205.233 | - | 202.250 | 200.780 | 198.840 | 197.000 | 194.107 |
| grad (%) | - | - | - | 0.317 | 0.331 | - | 0.686 | 0.402 | 0.401 | 0.396 | 0.937 |
| surc | - | 2.00 | - | 2.00 | 2.00 | - | 1.00 | 2.00 | 2.00 | 2.00 | 1.00 |
| r.pfc (MGD) | - | 5.76 | - | 5.76 | 5.89 | - | 8.48 | 6.49 | 6.48 | 6.45 | 9.91 |
| DS flow (MGD) | - | - | - | 7.2196 | 7.2195 | - | 7.2509 | 7.2534 | 7.2534 | 7.2534 | 7.2522 |

| Node | - | - | - | SMH B08-047 | SMH B08-229 | SMH B08-044 | SMH B08-037 | SMH B08-043 | SMH B07-108 | SMH B07-107 | - |
|---|---|---|---|---|---|---|---|---|---|---|---|
| ground (ft AD) | - | - | 221.854 | 220.847 | 218.361 | 218.361 | 212.662 | 209.204 | 206.463 | 207.955 | 210.904 |
| level (ft AD) | - | - | 212.343 | 210.734 | 208.318 | 208.010 | 205.584 | 203.427 | 200.820 | 198.192 | 195.893 |
| flood dep (ft) | - | - | -9.511 | -10.113 | -10.043 | -10.351 | -7.078 | -5.777 | -5.643 | -9.763 | -15.011 |

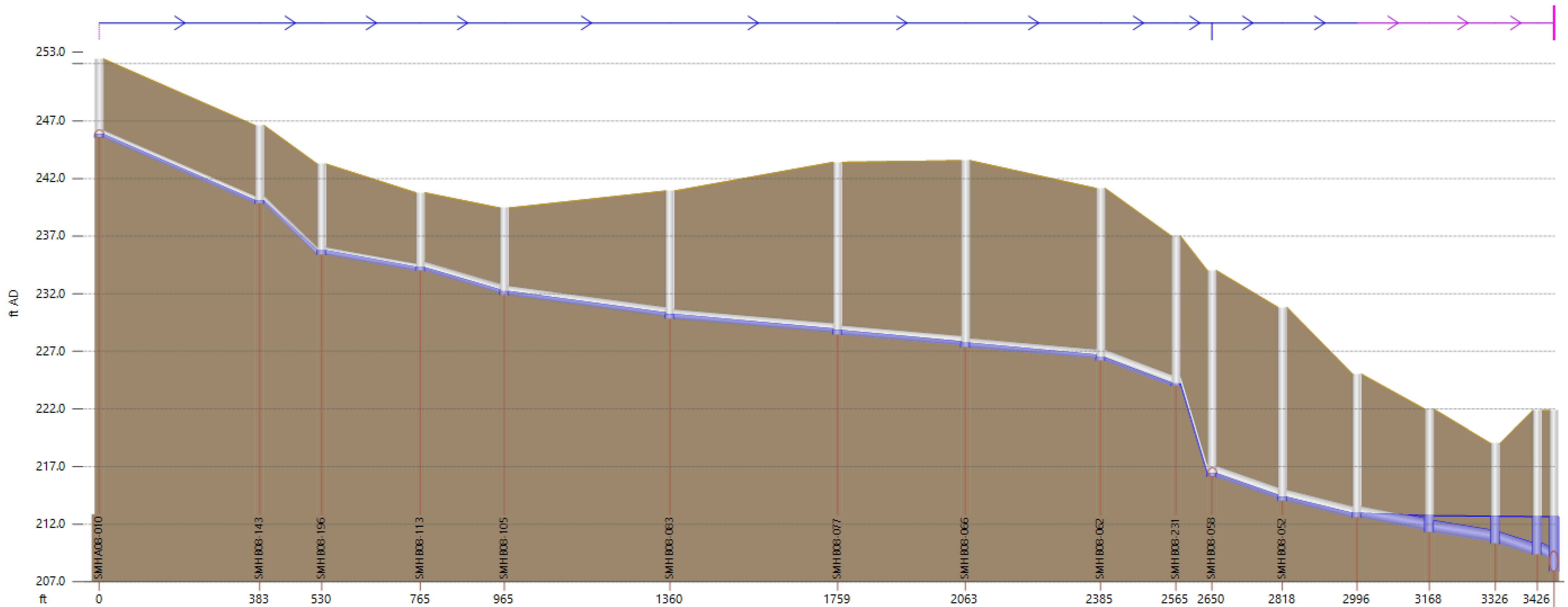
## BUILDOUT LAND USE – AREA F




| Link | - | - | - | - | - | - | - | - | SMH B07-370.1 | - | SMH B07-171.1 | - | - | SMH B07-244.1 | - | - | - | - | SMH B07-242.1 | - | - | - | - |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| length (ft) | - | - | 370.0 | 370.5 | 403.7 | 189.0 | 282.5 | 249.9 | 514.2 | 262.6 | 479.1 | 226.2 | 300.0 | 525.4 | 331.8 | 289.9 | 418.2 | 210.2 | 523.9 | 249.6 | 373.1 | 365.7 | 220.5 |
| width (in) | - | - | 21.0 | 21.0 | 21.0 | 21.0 | 21.0 | 21.0 | 21.0 | 21.0 | 21.0 | 24.0 | 24.0 | 24.0 | 24.0 | 24.0 | 24.0 | 24.0 | 24.0 | 24.0 | 24.0 | 24.0 | 24.0 |
| us inv (ft AD) | - | - | 192.000 | 187.500 | 186.000 | - | 183.416 | 182.070 | 180.950 | 177.000 | 165.650 | - | 149.975 | 148.860 | 147.080 | 145.950 | 144.870 | - | 142.540 | 140.670 | 139.730 | 138.470 | - |
| ds inv (ft AD) | - | - | 187.500 | 186.000 | 184.350 | - | 182.170 | 180.950 | 177.000 | 165.750 | 150.740 | - | 148.960 | 147.080 | 145.950 | 144.970 | 143.460 | - | 140.770 | 139.830 | 138.470 | 137.230 | - |
| grad (%) | - | - | 1.216 | 0.405 | 0.409 | 0.441 | 0.441 | 0.448 | 0.768 | 4.284 | 3.112 | 0.338 | 0.338 | 0.339 | 0.341 | 0.338 | 0.337 | 0.343 | 0.338 | 0.337 | 0.338 | 0.339 | 0.327 |
| surc | - | - | 1.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 0.72 | 0.44 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 2.00 |
| r.pfc (MGD) | - | - | 11.30 | 6.52 | 6.55 | 6.80 | 6.80 | 6.86 | 8.98 | 21.20 | 18.07 | 8.50 | 8.51 | 8.51 | 8.53 | 8.50 | 8.49 | 8.56 | 8.50 | 8.48 | 8.50 | 8.52 | 8.36 |
| DS flow (MGD) | - | - | 7.8057 | 7.8057 | 7.8057 | - | 7.8765 | 7.8765 | 7.8969 | 7.8969 | 8.1616 | 8.1590 | 8.3502 | 8.3481 | 8.3468 | 8.3458 | 8.3447 | 8.3440 | 8.3430 | 8.3424 | 8.3418 | 8.4519 | 8.4514 |

| Node | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ground (ft AD) | - | - | 200.819 | 200.813 | 199.641 | - | - | 194.963 | 185.616 | 174.439 | 169.113 | - | 164.971 | 159.204 | 161.463 | 167.769 | 159.712 | 163.680 | 157.842 | 158.647 | 155.955 | 152.380 | - |
| level (ft AD) | - | - | 192.010 | 189.781 | 187.328 | - | - | 182.280 | 177.763 | 166.511 | 160.091 | - | 158.261 | 156.391 | 155.117 | 154.027 | 152.482 | 151.592 | 149.709 | 148.676 | 147.314 | 146.045 | - |
| flood dep (ft) | - | - | -8.809 | -11.032 | -12.313 | - | - | -12.683 | -7.853 | -7.928 | -9.022 | -2.197 | -6.710 | -2.813 | -6.346 | -13.742 | -7.230 | -12.088 | -8.133 | -9.971 | -8.641 | -6.335 | - |

## BUILDOUT LAND USE – AREA G




| Link | SMH A08-010.1 | - | SMH B08-196.1 | - | SMH B08-105.1 | SMH B08-083.1 | SMH B08-077.1 | SMH B08-066.1 | - | - | - | - | - | - | - | - |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| length (ft) | 382.5 | 147.9 | 234.6 | 200.3 | 394.4 | 399.4 | 304.0 | 322.1 | 179.5 | 85.6 | 168.0 | 178.0 | 172.0 | 157.2 | 100.0 | - |
| width (in) | 8.0 | 8.0 | 8.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 12.0 | 12.0 | 12.0 | 12.0 | 12.0 | 12.0 | 12.0 | - |
| us inv (ft AD) | 245.580 | 239.840 | 235.400 | 233.990 | 231.880 | 229.840 | 228.440 | 227.340 | 226.180 | - | 216.100 | 214.030 | 212.580 | 211.300 | - | - |
| ds inv (ft AD) | 239.840 | 235.400 | 233.990 | 232.080 | 230.040 | 228.640 | 227.530 | 226.380 | 223.990 | - | 214.230 | 212.580 | 211.500 | 210.500 | - | - |
| grad (%) | 1.501 | 3.002 | 0.601 | 0.954 | 0.467 | 0.300 | 0.299 | 0.298 | 1.220 | 9.100 | 1.113 | 0.815 | 0.628 | 0.509 | 0.929 | - |
| surc | 0.38 | 0.49 | 0.49 | 0.31 | 0.37 | 0.43 | 0.43 | 0.43 | 0.25 | 0.19 | 0.29 | 0.36 | 1.00 | 1.00 | 1.00 | - |
| r.pfc (MGD) | 0.96 | 1.35 | 0.61 | 1.38 | 0.97 | 0.78 | 0.77 | 0.77 | 2.54 | 6.95 | 2.43 | 2.08 | 1.83 | 1.64 | 2.22 | - |
| DS flow (MGD) | 0.2779 | 0.2779 | 0.2779 | 0.2779 | 0.2779 | 0.2900 | 0.2900 | 0.2900 | 0.2900 | - | 0.3825 | 0.3827 | 0.3871 | 0.3878 | 0.3885 | - |

| Node | - | SMH B08-143 | - | SMH B08-113 | SMH B08-105 | SMH B08-083 | SMH B08-077 | SMH B08-066 | SMH B08-062 | - | - | - | - | - | - | - |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ground (ft AD) | 252.381 | 246.609 | 243.258 | 240.770 | 239.440 | 240.920 | 243.415 | 243.560 | 241.150 | - | - | 230.810 | 225.000 | 221.960 | - | - |
| level (ft AD) | 245.835 | 240.057 | 235.727 | 234.252 | 232.191 | 230.199 | 228.799 | 227.700 | 226.429 | - | - | 214.326 | 212.939 | 212.742 | - | - |
| flood dep (ft) | -6.546 | -6.552 | -7.531 | -6.518 | -7.249 | -10.721 | -14.616 | -15.860 | -14.721 | -12.840 | - | -16.484 | -12.061 | -9.218 | -6.307 | - |

# APPENDIX F – PROPOSED CAPACITY IMPROVEMENT PROJECT DETAILS

# Project 1: Pump Station 26 Capacity Improvement and Sierra College Blvd. Improvement

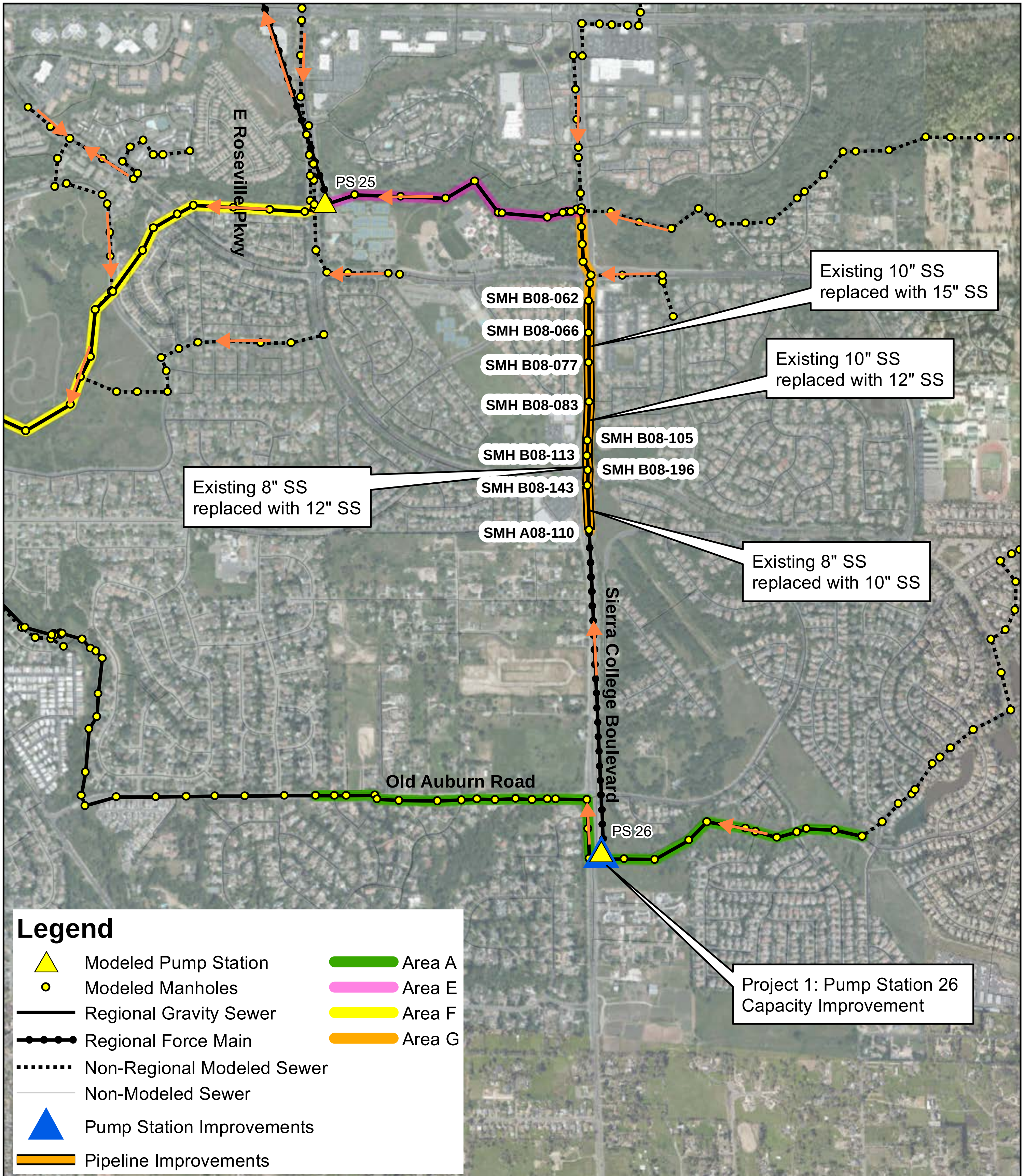
**PROJECT DESCRIPTION**

Project ID ........ 1
Project Name ........ Pump Station 26 Capacity Improvement and Sierra College Blvd. Improvement
Project Location ........ PS 26 and Sierra College Boulevard
Description ........ Increased Capacity of PS 26 and sewers on Sierra College Blvd (from 0.43 to 1.6 mgd)
Estimated Capital Imp. Cost ........ $1,606,000
Comments ........ (i) Pipes are listed in order from upstream to downstream
Assumptions ........ (i) Pipe cost estimates are based on the 20 Cities & SF Average April 2020 ENR CCI of 12115
(ii) Cost assumes project will be implemented using open-cut construction method

**PROJECT COST DETAIL**

| U/S MH ID | D/S MH ID | Existing Diameter (inches) | New Diameter (inches) | Length (feet) | Slope (%) | Pipe Depth (feet BGL) | Construction Method | Unit Cost ($/LF) | | Total Cost ($) |
|---|---|---|---|---|---|---|---|---|---|---|
| SMH A08-010 | SMH B08-143 | 8 | 10 | 383 | 1.50 | 7 | Open Cut | $171 | $ | 65,363 |
| SMH B08-143 | SMH B08-196 | 8 | 10 | 148 | 3.00 | 7 | Open Cut | $171 | $ | 25,274 |
| SMH B08-196 | SMH B08-113 | 8 | 12 | 235 | 0.60 | 7 | Open Cut | $189 | $ | 44,236 |
| SMH B08-113 | SMH B08-105 | 10 | 12 | 200 | 0.95 | 7 | Open Cut | $189 | $ | 37,769 |
| SMH B08-105 | SMH B08-083 | 10 | 12 | 394 | 0.47 | 9 | Open Cut | $189 | $ | 74,368 |
| SMH B08-083 | SMH B08-077 | 10 | 15 | 399 | 0.30 | 13 | Open Cut | $242 | $ | 96,492 |
| SMH B08-077 | SMH B08-066 | 10 | 15 | 304 | 0.30 | 16 | Open Cut | $259 | $ | 78,818 |
| SMH B08-066 | SMH B08-062 | 10 | 15 | 322 | 0.30 | 15 | Open Cut | $259 | $ | 83,511 |
| | | | | | | | | **Baseline Pipeline Construction Cost:** | **$** | **505,831** |

| | | |
|---|---|---|
| Sheeting and Shoring for High Groundwater Area | $ | - |
| Dewatering | $ | - |
| Bypass Pumping (10% of pipe construction cost) | $ | 50,583 |
| Remove & Replace Factor (5% of pipe construction cost) | $ | 25,292 |
| Major Traffic Control (10% of pipe construction cost) | $ | - |
| **Pipeline Construction Cost Subtotal:** | **$** | **581,705** |
| Pumps (including 8.25% sales tax) | $ | 164,540 |
| Allowance for new PG&E Service | $ | 20,000 |
| Electrical improvements (new service, new MCC, new cables, soft starts) | $ | 35,000 |
| Installation (25% of raw cost) | $ | 54,885 |
| Piping & Structural Modifications Allowance | $ | 25,000 |
| Contractor Overhead & Profit (20%) | $ | 59,885 |
| **Pump Station Construction Cost Subtotal:** | **$** | **359,310** |
| **Construction Subtotal:** | **$** | **941,015** |
| Mobilization/Demobilization (5% of subtotal) | $ | 47,051 |
| **Construction Total:** | **$** | **988,066** |
| Contingencies (30% of construction subtotal) | $ | 296,420 |
| **Total Estimated Construction Cost:** | **$** | **1,284,486** |
| Engineering, Administration, Legal (25% of construction cost) | $ | 321,121 |
| **Estimated Capital Improvement Cost:** | **$** | **1,606,000** |




# Improvement Project 1

South Placer Wastewater Authority
2020 Systems Evaluation

0 750 1,500 3,000 Feet

N

WOODARD & CURRAN

Project #: 0011183.00
Map Created: June 2020



Figure Exported: 6/15/2020 By: apdavis Using: \\woodardcurran.net\shared\Projects\RMC\WCR\0091 Roseville, City of\0011183.00 SPWA Systems Evaluation\G. GIS\3 MXDs\Improvement Project 1_cvl.mxd

# Project 2: Eureka Road, E Rosevville Parkway Improvement

**PROJECT DESCRIPTION**

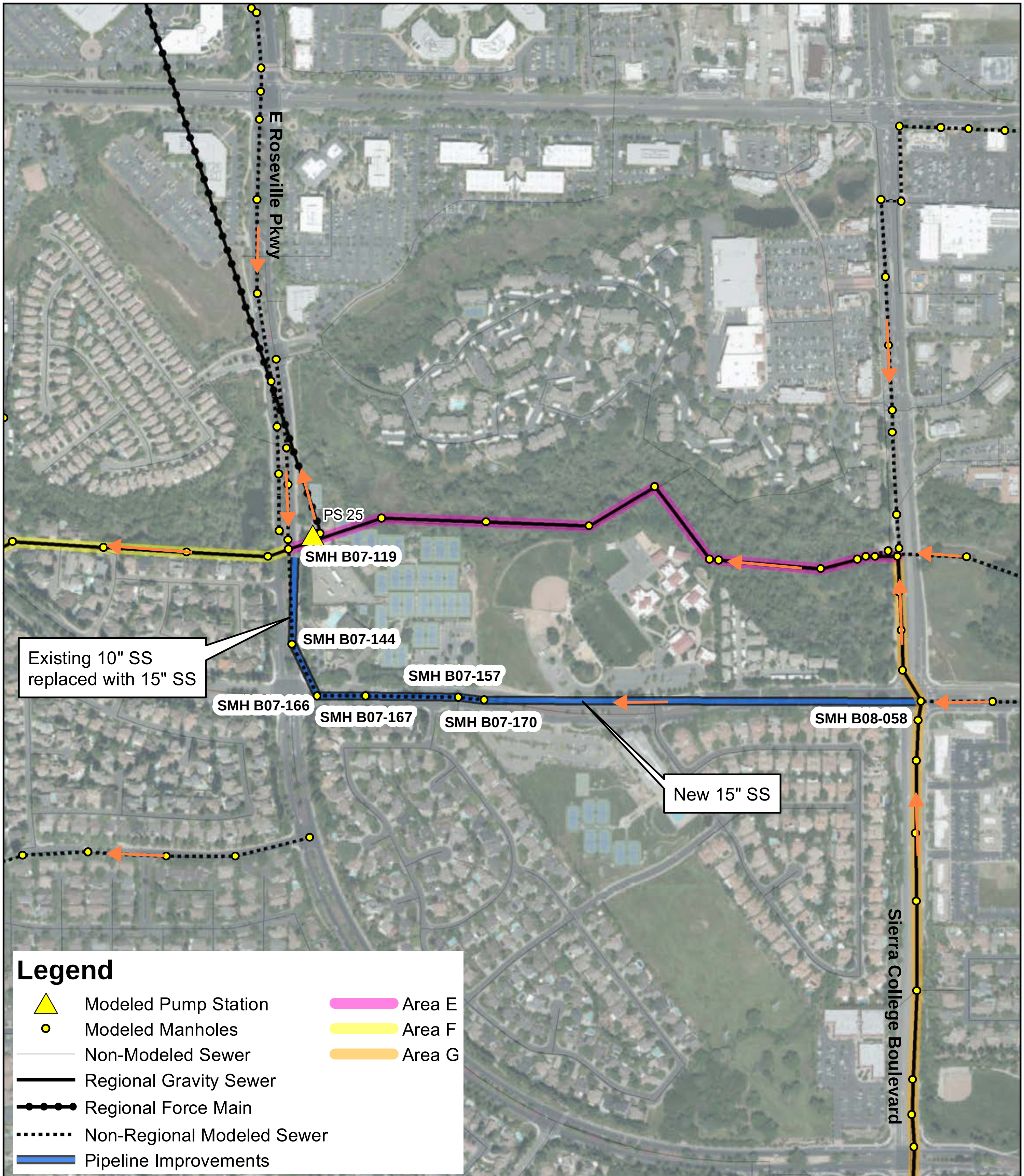
Project ID ........ 2
Project Name ........ Eureka Road, E Rosevville Parkway Improvement
Project Location ........ Eureka Road and E. Roseville Parkway
Description ........ Redirect flows from PS 26 and Sierra College Blvd. down Eureka Rd via upsizing of approximately 1,310ft, installing approximately 2,740 ft of new 15in pipe and 4 new manholes.

Estimated Capital Imp. Cost ........ $1,831,000
Comments ........ (i) Pipes are listed in order from upstream to downstream
Assumptions ........ (i) Cost estimates are based on the 20 Cities & SF Average April 2020 ENR CCI of 12115
(ii) Cost assumes project will be implemented using open-cut construction method

**PROJECT COST DETAIL**

| U/S MH ID | D/S MH ID | Existing Diameter (inches) | New Diameter (inches) | Length (feet) | Slope (%) | Pipe Depth (feet BGL) | Construction Method | Unit Cost ($/LF) | | Total Cost ($) |
|---|---|---|---|---|---|---|---|---|---|---|
| SMH B08-058 | SMH B07-170 | new pipe | 15 | 697 | 0.22 | 15 | Open Cut | $259 | $ | 180,608 |
| SMH B07-170 | SMH B07-157 | new pipe | 15 | 1942 | 0.25 | 13 | Open Cut | $242 | $ | 469,198 |
| SMH B07-157 | SMH B07-167 | 10 | 15 | 413 | 0.97 | 12 | Open Cut | $242 | $ | 99,730 |
| SMH B07-167 | SMH B07-166 | 10 | 15 | 216 | 0.50 | 12 | Open Cut | $242 | $ | 52,112 |
| SMH B07-166 | SMH B07-144 | 10 | 15 | 255 | 0.53 | 11 | Open Cut | $242 | $ | 61,630 |
| SMH B07-144 | SMH B07-119 | 10 | 15 | 424 | 0.48 | 14 | Open Cut | $242 | $ | 102,435 |
| | | | | | | | | **Baseline Pipeline Construction Cost:** | $ | 965,712 |

| | | |
|---|---|---|
| Sheeting and Shoring for High Groundwater Area | $ | - |
| Dewatering | $ | - |
| Bypass Pumping (10% of upsized pipe construction cost) | $ | 31,591 |
| Remove & Replace Factor (5% of upsized pipe construction cost) | $ | 15,795 |
| Major Traffic Control (10% of pipe construction cost) | $ | - |
| **Pipeline Construction Cost Subtotal:** | **$** | **1,013,098** |
| Installation of 4 new manholes | $ | 60,000 |
| **Manhole Construction Cost Subtotal:** | **$** | **60,000** |
| **Construction Subtotal:** | **$** | **1,073,098** |
| Mobilization/Demobilization (5% of subtotal) | $ | 53,655 |
| **Construction Total** | **$** | **1,126,753** |
| Contingencies (30% of construction subtotal) | $ | 338,026 |
| **Total Estimated Construction Cost:** | **$** | **1,464,779** |
| Engineering, Administration, Legal (25% of construction cost) | $ | 366,195 |
| **Estimated Capital Improvement Cost:** | **$** | **1,831,000** |




# Improvement Project 2

South Placer Wastewater Authority
2020 Systems Evaluation

0 375 750 1,500 Feet

N

WOODARD & CURRAN

Project #: 0011183.00
Map Created: June 2020

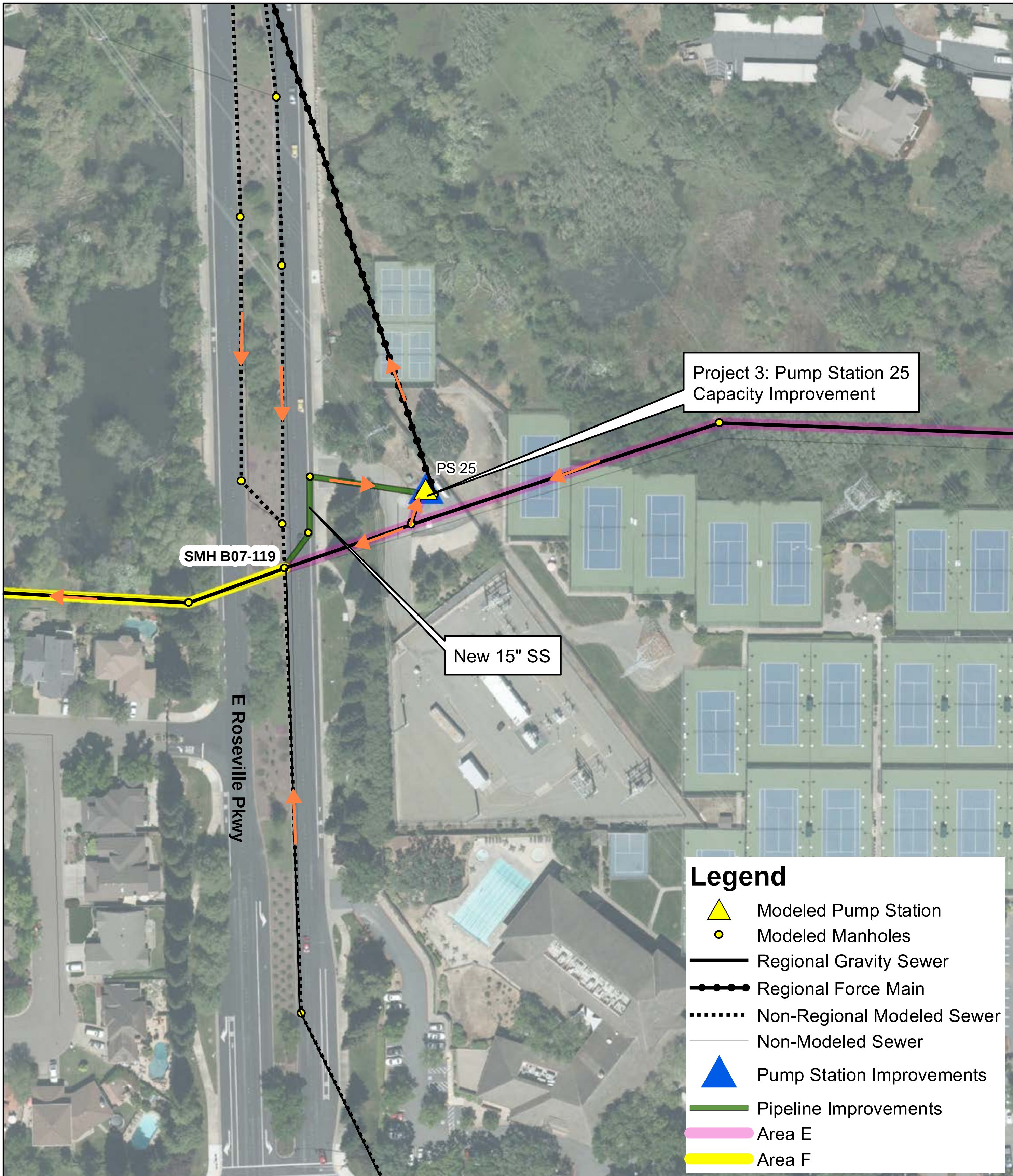
# Project 3 Alternative A: Pump Station 25 Improvements

**PROJECT DESCRIPTION**

Project ID ........ 3 Alternative A
Project Name ........ Pump Station 25 Improvements
Project Location ........ PS 25 (pumps)
Description ........ New weir structure or adjustments to existing structure at PS 25
Estimated Capital Imp. Cost ........ $758,000
Comments ........ (i) Pipes are listed in order from upstream to downstream
Assumptions ........ (i) Cost estimates are based on the 20 Cities & SF Average April 2020 ENR CCI of 12115
(ii) Cost assumes project will be implemented using open-cut construction method

**PROJECT COST DETAIL**

| U/S MH ID | D/S MH ID | Existing Diameter (inches) | New Diameter (inches) | Length (feet) | Slope (%) | Pipe Depth (feet BGL) | Construction Method | Unit Cost ($/LF) | | Total Cost ($) |
|---|---|---|---|---|---|---|---|---|---|---|
| SMH B07-119 | SMH B07-119_DU2 | new pipe | 18 | 10 | 2% | 17 | Open Cut | $298 | $ | 2,982 |
| SMH B07-119_DU2 | PS 25 Wetwell | new pipe | 15 | 215 | 2% | 14 | Open Cut | $242 | $ | 51,942 |
| | | | | | | | | **Baseline Pipeline Construction Cost:** | **$** | **54,924** |
| | | | | | | | | Sheeting and Shoring for High Groundwater Area | $ | - |
| | | | | | | | | Dewatering | $ | - |
| | | | | | | | | Bypass Pumping (10% of pipe construction cost) | $ | - |
| | | | | | | | | Remove & Replace Factor (5% of pipe construction cost) | $ | - |
| | | | | | | | | Major Traffic Control (10% of pipe construction cost) | $ | - |
| | | | | | | | | **Pipeline Construction Cost Subtotal:** | **$** | **54,924** |
| | | | | | | | | Installation of 2 new manhole | $ | 30,000 |
| | | | | | | | | **Manhole Construction Cost Subtotal:** | **$** | **30,000** |
| | | | | | | | | Pumps (including 8.25% sales tax) | $ | 164,540 |
| | | | | | | | | Allowance for new PG&E Service | $ | 20,000 |
| | | | | | | | | Electrical improvements (new service, new MCC, new cables) | $ | 35,000 |
| | | | | | | | | Installation (25% of raw cost) | $ | 54,885 |
| | | | | | | | | Piping & Structural Modifications Allowance | $ | 25,000 |
| | | | | | | | | Contractor Overhead & Profit (20%) | $ | 59,885 |
| | | | | | | | | **Pump Station Construction Cost Subtotal:** | **$** | **359,310** |
| | | | | | | | | **Construction Subtotal:** | **$** | **444,234** |
| | | | | | | | | Mobilization/Demobilization (5% of subtotal) | $ | 22,212 |
| | | | | | | | | **Estimated Construction Cost Subtotal:** | **$** | **466,446** |
| | | | | | | | | Contingencies (30% of construction subtotal) | $ | 139,934 |
| | | | | | | | | **Total Estimated Construction Cost:** | **$** | **606,380** |
| | | | | | | | | Engineering, Administration, Legal (25% of construction cost) | $ | 151,595 |
| | | | | | | | | **Estimated Capital Improvement Cost:** | **$** | **758,000** |




# Improvement Project 3

South Placer Wastewater Authority
2020 Systems Evaluation

0 75 150 300 Feet

N

WOODARD & CURRAN

Project #: 0011183.00
Map Created: June 2020



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woodardcurran.com

COMMITMENT & INTEGRITY DRIVE RESULTS

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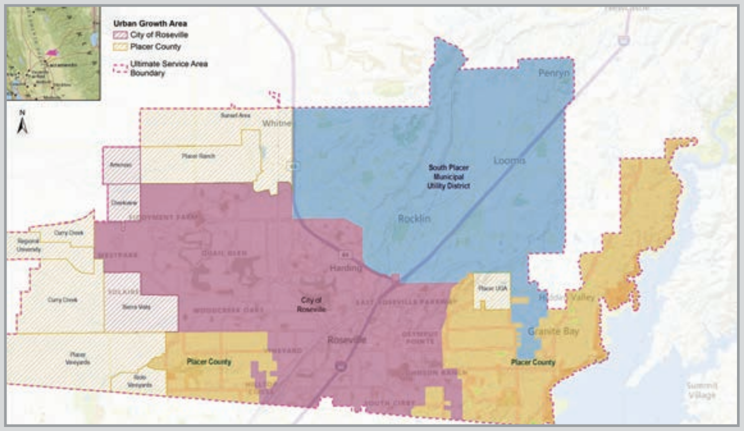


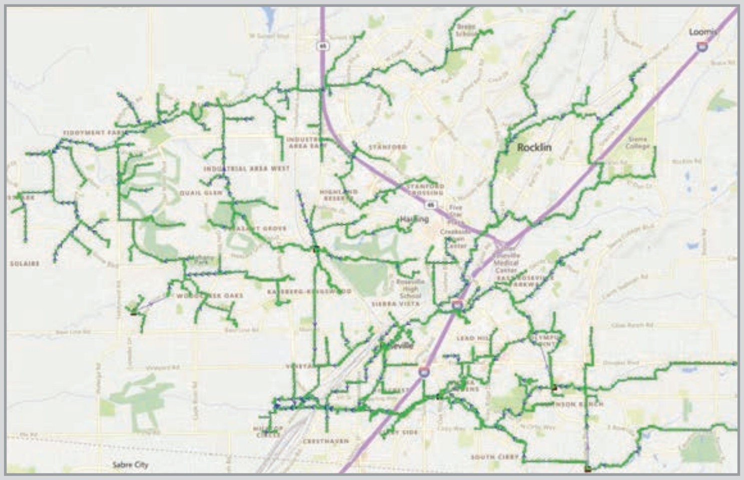


COMMITMENT & INTEGRITY DRIVE RESULTS

# Appendix J – 2015 USBR Record of Decision

RECLAMATION
*Managing Water in the West*

# Record of Decision

# Central Valley Project Municipal and Industrial Water Shortage Policy

*Prepared by*
**United States Department of the Interior**
**Bureau of Reclamation**
**Mid Pacific Region**

**U.S. Department of the Interior**
**Bureau of Reclamation**
**Sacramento, California**

November 2015

## Mission Statements

The mission of the Department of the Interior is to protect and provide access to our Nation's natural and cultural heritage and honor our trust responsibilities to Indian Tribes and our commitments to island communities.

The mission of the Bureau of Reclamation is to manage, develop, and protect water and related resources in an environmentally and economically sound manner in the interest of the American public.

# Record of Decision

# Central Valley Project Municipal and Industrial Water Shortage Policy

Recommended:

Richard J. Woodley
Regional Resources Manager
Mid-Pacific Region

Date Nov. 4, 2015

Concur:

Anastasia T. Leigh
Regional Environmental Officer
Mid-Pacific Region

Date 11/9/2015

Approved:

David Murillo
Regional Director
Mid-Pacific Region

Date 11/13/15

# Summary of Action

The Bureau of Reclamation (Reclamation) prepared the Central Valley Project (CVP) Municipal and Industrial (M&I) Water Shortage Policy (WSP) Environmental Impact Statement (EIS) to evaluate the potential impacts of CVP M&I WSP alternatives. The M&I WSP would be used by Reclamation to: 1) define water shortage terms and conditions for applicable CVP water service contractors, as appropriate; 2) determine the quantity of water made available to CVP water service contractors from the CVP that, together with the M&I water service contractors' drought water conservation measures and other non-CVP water supplies, would assist the M&I water service contractors in their efforts to protect public health and safety (PHS) during severe or continuing droughts; and 3) provide information to CVP water service contractors for their use in water supply planning and development of drought contingency plans. The alternatives evaluated in this EIS utilize different methodologies for allocating available CVP water supplies to CVP water service contractors during a Condition of Shortage[1]. This EIS evaluates potential impacts of the M&I WSP over a 20-year period, 2010 through 2030. Reclamation's decision is the adoption of an updated M&I WSP.

# Background

In January 1993, following the adoption of the Central Valley Project Improvement Act (CVPIA), many CVP M&I water service contractors expressed concerns regarding future allocations of water supplies provided by the CVP. Reclamation subsequently initiated an effort to develop an M&I WSP that would be incorporated into long-term water service contracts during the contract renewal process implemented under the CVPIA. Involved stakeholders submitted language for the M&I WSP as part of several proposed policies. In September 2001, Reclamation released a Draft M&I WSP. Reclamation initiated the preparation of an Environmental Assessment (EA) which included stakeholder input and consideration and evaluation of alternative policies developed in 1993, 1996-1997, and 2000-2001. The M&I WSP EA was released in October 2005 and a Finding of No Significant Impact was signed in December 2005. The M&I WSP currently being implemented by Reclamation is the 2001 Draft M&I WSP, as amended by Alternative 1B from the 2005 EA. Because the assumptions supporting the 2005 EA became outdated and due to significant changes in the Sacramento-San Joaquin River Delta (Delta) and CVP/State Water Project (SWP) operations, Reclamation decided in 2009 to

[1] "Condition of Shortage" is defined in Reclamation water service contracts as "...a condition respecting the Project during any Year *(March 1 through February of the following year)* such that the Contracting Officer is unable to deliver sufficient water to meet the Contract Total".

undertake the M&I WSP EIS to provide an updated M&I WSP that best recognizes the needs of various segments of the water user community and how those needs could be addressed under Conditions of Shortage.

# Decision

Reclamation's decision is to implement Alternative 4, Updated M&I WSP (Preferred Alternative). This alternative comprises the updated M&I WSP developed by Reclamation with stakeholder input received during the M&I WSP stakeholder workshops held between May 2010 and January 2011, with clarifying revisions made to address comments from stakeholders received after Stakeholder Workshop 4 (November 2010) and to address public comments received on the Draft EIS (March 2015). The Updated M&I WSP will apply to the CVP water service contractors noted in Table 1. These water service contractors generally comprise those whose contracts currently reference the M&I WSP and those with a water service contract that is expected to reference the updated policy. These water users are located throughout the Sacramento River Valley, San Joaquin River Valley, Tulare Lake Region, and San Francisco Bay/Central Coast area.

**Table 1. Water Service Contractors Subject to the Updated M&I WSP**

| General Geographical Region | CVP Division | Water Service Contractors | M&I | Ag[1] |
|---|---|---|---|---|
| North of Delta | Shasta and Trinity River | Bella Vista Water District | X | X |
| | | Centerville Community Services District | X | - |
| | | City of Redding | X | - |
| | | City of Shasta Lake | X | - |
| | | Clear Creek Community Services District | X | X |
| | | Mountain Gate Community Services District | X | - |
| | | Shasta Community Services District | X | - |
| | | Shasta County Water Agency | X | - |
| | | United States (U.S.) Forest Service (Shasta) | X | - |
| | Sacramento River | 4-M Water District | X | X |
| | | Colusa County Water District | X | X |
| | | Corning Water District | X | X |
| | | Cortina Water District | X | X |
| | | County of Colusa | X | X |
| | | County of Colusa (Stonyford) | X | - |
| | | Davis Water District | X | X |
| | | Dunnigan Water District | X | X |
| | | Elk Creek Community Services District | X | - |
| | | Glenn Valley Water District | X | X |
| | | Glide Water District | X | X |
| | | Holthouse Water District | X | X |

| General Geographical Region | CVP Division | Water Service Contractors | M&I | Ag[1] |
|---|---|---|---|---|
| North of Delta | Sacramento River | Kanawha Water District | X | X |
| | | Kirkwood Water District | X | X |
| | | La Grande Water District | X | X |
| | | Myers-Marsh Mutual Water Company | X | X |
| | | Orland-Artois Water District | X | X |
| | | Proberta Water District | X | X |
| | | Stony Creek Water District | X | X |
| | | Thomes Creek Water District | X | X |
| | | U.S. Forest Service (Salt Creek) | X | - |
| | | Westside Water District | X | X |
| | | Whitney Construction, Incorporated | X | - |
| | American River | City of Roseville | X | - |
| | | East Bay Municipal Utility District | X | - |
| | | El Dorado Irrigation District | X | - |
| | | Placer County Water Agency | X | - |
| | | Sacramento County Water Agency | X | - |
| | | Sacramento Municipal Utility District | X | - |
| | | San Juan Water District | X | - |
| | Delta | Banta-Carbona Irrigation District | X | X |
| | | Byron-Bethany Irrigation District | X | X |
| | | City of Tracy | X | X |
| | | Coelho Family Trust | X | X |
| | | Contra Costa Water District | X | - |
| | | Del Puerto Water District | X | X |
| | | Eagle Field Water District | X | X |
| | | Fresno Slough Water District | X | X |
| | | James Irrigation District | X | X |
| | | Laguna Water District | X | X |
| | | Mercy Springs Water District | X | X |
| | | Oro Loma Water District | X | X |
| | | Pajaro Valley Water Management Agency, Westlands Water District | X | X |
| | | Patterson Irrigation District | X | X |
| | | Reclamation District No. 1606 | X | X |
| | | Tranquillity Irrigation District | X | X |
| | | Tranquillity Public Utility District | X | X |
| | | U.S. Department of Veteran Affairs | X | - |
| | | West Side Irrigation District | X | X |
| | | West Stanislaus Irrigation District | X | X |
| | | Westlands Water District Distribution Districts | X | X |
| South of Delta | West San Joaquin | City of Avenal | X | - |
| | | City of Coalinga | X | - |
| | | City of Huron | X | - |
| | | Pacheco Water District | X | X |
| | | Panoche Water District | X | X |
| | | San Luis Water District | X | X |
| | | State of California | X | - |

| General Geographical Region | CVP Division | Water Service Contractors | M&I | Ag[1] |
|---|---|---|---|---|
| South of Delta | West San Joaquin | Westlands Water District | X | X |
| | San Felipe | San Benito County Water District | X | X |
| | | Santa Clara Valley Water District | X | X |
| | Cross Valley Canal | County of Fresno | X | X |
| | | County of Tulare | X | X |
| | | Hills Valley Irrigation District (includes Rag Gulch Water District) | X | X |
| | | Kern-Tulare Water District | X | X |
| | | Lower Tule River Irrigation District | - | X |
| | | Pixley Irrigation District | X | X |
| | | Tri-Valley Water District | X | X |

Note:
[1] Ag = Agricultural water service contractor

# Alternatives Considered

## No Action Alternative

The No Action Alternative represents continued implementation of the current Draft M&I WSP. This existing draft policy is currently guiding Reclamation's allocation of CVP water to agricultural and M&I water service contractors during Conditions of Shortage and would continue if none of the action alternatives were selected.

During Conditions of Shortage when the CVP is unable to deliver sufficient water to meet the CVP water service contractors' Contract Total, M&I water service contractors allocations are maintained at 100 percent of their Contract Total as the agricultural water service contractor allocations are reduced to 75 percent of their Contract Total in incremental steps. Then, M&I water service contractor allocations are reduced to 75 percent of their historical use in incremental steps as agricultural water service contractor allocations are reduced to 50 percent of their Contract Total. The M&I water service contractor allocations are maintained at 75 percent of historical use until agricultural water service contractor allocations are reduced in incremental steps to 25 percent of Contract Total. M&I water service contractor allocations are then reduced in incremental steps to 50 percent of historical use until agricultural water service contract allocations are reduced in incremental steps from 25 percent to zero.

In years when the M&I water service contractor allocations are less than 75 percent of historical use, Reclamation would attempt to provide the amount of PHS need unmet by contractors' CVP allocation and other available non-CVP supplies, up to 75 percent of the historical use, subject to the availability of CVP water supplies. There are some years in which allocations to agricultural water service contractors are at or near zero. In those years, CVP water deliveries for unmet PHS need to M&I water service contractors may not be fully realized. Water made available to M&I water service contractors may be reduced below 75 percent of historical use and below the unmet PHS needs when CVP water is not available.

## Action Alternatives

The alternatives that moved forward for more detailed analysis in the EIS were those that responded to the National Environmental Policy Act (NEPA) purpose and need, minimized negative effects, were potentially feasible, and represented a range of reasonable alternatives. As a result of initial alternatives screening, four action alternatives were selected to move forward for analysis in the EIS (in addition to the No Action Alternative). Table 2 presents the alternatives analyzed in the EIS. Analysis of these alternatives will provide the information needed for Reclamation to make a decision.

**Table 2. Alternatives Analyzed in the EIS**

| Alternative Number | Alternative Name | Description |
|---|---|---|
| Alternative 1 | No Action Alternative | Represents a projection of current conditions to the most reasonable future conditions that could occur during the life of the proposed action without any action alternative being implemented. The No Action Alternative represents continued allocation of water in the same way that Reclamation currently allocates CVP water to agricultural and M&I water service contractors during Conditions of Shortage, consistent with the 2001 Draft M&I WSP, as modified by Alternative 1B of the 2005 EA. |
| Alternative 2 | Equal Agricultural and M&I Allocation | Provides no preference for either agricultural or M&I contractors. M&I and agricultural water service contractors receive equal allocation percentages during a Condition of Shortage. |
| Alternative 3 | Full M&I Allocation Preference | M&I water service contractors receive 100% of their Contract Total until CVP supplies are not available to meet those demands. Agricultural allocations are reduced as needed to maintain 100% allocations to M&I contractors. |
| Alternative 4 | Updated M&I WSP (Preferred Alternative) | Similar to Alternative 1 but modified to update the definition of unconstrained years used in calculating historical use. Attempts to provide unmet PHS need, but without a guarantee. Provides implementation guidelines and procedures. |
| Alternative 5 | M&I Contractor Suggested WSP | Similar to Alternative 4 except attempts to provide a greater quantity of unmet PHS need. |

Under Alternative 2, Equal Agricultural and M&I Allocation, M&I water service contractors would receive the same allocation, as a percentage of Contract Total, as the agricultural water service contractors. This means that in years when the CVP water supplies are not adequate to provide water to all water service contractors, agricultural and M&I water service contractor allocations would be reduced by the same percentage. This allocation methodology would provide a larger volume of CVP water to agricultural water service contractors than the No Action Alternative, as there would be no reductions to agricultural contractors to provide a larger volume of CVP water to M&I water service contractors. Deliveries to both north of the Delta and south of Delta M&I contractors would be lower than under the No Action Alternative in order to provide an equal allocation to agricultural water service contractors.

Under Alternative 3, Full M&I Allocation Preference, M&I water service contractors would receive a higher allocation as compared to the No Action Alternative and other action alternatives. Under this alternative, Reclamation would attempt to provide a 100 percent allocation to M&I water service contractors during a Condition of Shortage, to the extent that adequate CVP water supplies are available. This would be achieved by reducing allocations to agricultural water service contractors as needed to maximize the frequency of 100 percent allocations to the M&I water service contractors. This allocation methodology would provide the lowest volume of CVP water to agricultural water service contractors compared to the No Action and other action alternatives. Alternative 3 would have no provisions for unmet PHS needs that would be made available by Reclamation from CVP water supplies.

Alternative 4, Updated M&I WSP, is similar to the No Action Alternative. This alternative comprises the M&I WSP developed by Reclamation with stakeholder input received during the M&I WSP stakeholder workshops held between May 2010 and January 2011, with clarifying revisions made to address comments from stakeholders received after Stakeholder Workshop 4 and to address public comments received on the Draft EIS. Reclamation used this feedback to identify elements of the 2001 Draft M&I WSP (represented in the No Action Alternative) that could be improved. The major modifications made to the 2001 Draft M&I WSP that are reflected in the Updated M&I WSP include the following:

- Reclamation deleted the reference to 1996 M&I Water Rate book.
- At the M&I water service contractors' request, Reclamation modified the method that would be used to adjust an M&I water service contractor's historical use.
- Reclamation expanded the definitions of the key terms and also defined terms not previously defined, to provide greater clarity on the intent and requirements of the M&I WSP's key terms and conditions.

- Term and Condition 1 was revised to remove the sentence stating that Reclamation intended contractors to use their non-CVP supplies first and rely on CVP water as a supplemental supply. Instead, Reclamation expects water service contractors, at their discretion, to use CVP water in conjunction with their other non-CVP supplies to meet demand during all years, including years where a Condition of Shortage exists.

- Clarified M&I allocation for contracts with both irrigation and M&I use which do not set forth individual Contract Totals for each use.

Alternative 5, M&I Contractor Suggested WSP, is similar to Alternative 4, Updated M&I WSP. This alternative was developed and recommended by several M&I water service contractors who participated in the M&I WSP workshops held between May 2010 and January 2011. Alternative 5 attempts to provide an increased quantity of CVP water allocated to M&I water service contractors to supply the unmet portion of the PHS needs during a Condition of Shortage. This would be achieved by increasing the upper limit for consideration of additional allocations to assist in meeting unmet PHS need from an initial allocation of 75 percent of historical use (under Alternative 4) to an initial allocation of 95 percent of historical use (under Alternative 5).

## Environmentally Preferable Alternative

Section 1505.2(b) of NEPA requires that, in cases where an EIS has been prepared, the Record of Decision must identify all alternatives that were considered, specifying the alternative or alternatives which were considered to be environmentally preferable. The environmentally preferable alternative is the alternative that will promote the national environmental policy as expressed in NEPA's Section 101. Ordinarily, this means the alternative that causes the least damage to the biological and physical environment; it also means the alternative which best protects, preserves, and enhances historic, cultural, and natural resources (Council on Environmental Quality 40 Most Asked Questions number 6(a)). It is implicit in NEPA that the environmentally preferable alternative must be reasonable and feasible to implement.

In choosing the environmentally preferable alternative, Reclamation considered impacts to all resources. On balance, Alternative 1, No Action Alternative, and Alternative 4, Updated M&I WSP, would have the least environmental effects associated with implementing a CVP M&I WSP during a Condition of Shortage. Alternative 4 would have no environmental impacts compared to the No Action Alternative. Alternatives 2 and 3 have greater environmental effects to water quality, groundwater resources, air quality, geology and soils, and agricultural resources than Alternative 4. Alternative 5 would have small but greater effects to groundwater resources and air quality compared to Alternative 4.

# Basis of Decision

Reclamation's decision to move forward is based on how the alternatives meet the project's purpose and need and the magnitude of environmental effects. While the alternatives would affect different resources in different ways, Alternative 4 provides Reclamation with the greatest degree of flexibility to address CVP water service contractors' needs during Conditions of Shortage while recognizing that CVP deliveries are subject to the amount of CVP water available and cannot be guaranteed, and provides clarity to the terms, conditions, and procedures of the CVP M&I WSP. Additionally, Alternative 4 has no environmental effects compared to the No Action Alternative; therefore, no mitigation measures are necessary.

## Purpose and Need

The purpose of updating the 2001 Draft M&I WSP, as amended, is to provide detailed, clear, and objective guidelines for the allocation of available CVP water supplies to CVP water service contractors during a Condition of Shortage. The update to the M&I WSP is needed by water managers and CVP water service contractors to help them better plan for and manage available CVP water supplies, and to better integrate the use of CVP water with the use of other available non-CVP water supplies. The update to the M&I WSP is also needed to clarify certain terms and conditions with regard to the applicability and implementation process of the M&I WSP.

The updated M&I WSP would be used by Reclamation to:

- Define water shortage terms and conditions for applicable CVP water service contracts, as appropriate;

- Determine the quantity of water made available to CVP water service contractors from the CVP, that together with the M&I water service contractors' drought water conservation measures and other non-CVP water supplies, would assist the M&I water service contractors in their efforts to protect PHS during severe or continuing droughts; and

- Provide information to CVP water service contractors for their use in water supply planning and development of drought contingency plans.

All action alternatives meet the purpose and need, but the No Action Alternative does not meet the purpose and need.

## Environmental Issues Evaluated

During March 2011, public scoping sessions on the development of the CVP M&I WSP EIS were held in Sacramento, Willows, Fresno, and Oakland, California. Key issues raised during the public scoping process that are applicable for inclusion in the EIS are listed below.

- The final M&I WSP should be a single document that clearly states how Reclamation interprets and implements the M&I WSP.
- Any additional water provided to M&I water service contractors is viewed as water "taken" from agricultural contractors.
- M&I water service contractors would like a guaranteed quantity of CVP water to meet PHS needs and do not want their use of non-CVP supplies to count against their deliveries of CVP water in Conditions of Shortage.
- The analysis should use an appropriate baseline given ongoing regulatory issues regarding CVP/SWP operations.
- The effects analysis should include a cumulative impact discussion in the context of other reasonably foreseeable past, present, and future actions potentially affecting the allocation of CVP water, including the Bay Delta Conservation Plan.
- The EIS should analyze the impacts to water service contractors who have limited access to alternative water supplies and to "mixed use" contractors.
- The M&I WSP EIS should specifically state the agencies that are and are not affected by the policy, and state that the M&I WSP will apply equally to all M&I contractors, including the American River Division contractors.
- Certain American River Division contractors (City of Roseville, Placer County Water Agency, Sacramento Municipal Utility District, and San Juan Water District) disagree with Reclamation's interpretation of Term 14 of State Water Resources Control Board Decision 893 and believe it should provide them with additional supply reliability beyond what the M&I WSP provides in their water service contracts.

The alternatives were evaluated to address issues raised and potential impacts to the range of environmental and socioeconomic resources relevant to NEPA. The action alternatives have the potential to result in impacts to several resources, including surface water, water quality, groundwater, geology and soils, air quality, greenhouse gases (GHGs) and climate change, agricultural resources, socioeconomics, and power[2]. The differences between the action alternatives for these impacts include:

- *Surface Water*: Alternative 2 would increase CVP deliveries to agricultural water service contractors and decrease CVP deliveries to M&I water service contractors, compared to the No Action Alternative. Alternative 3 would decrease CVP deliveries to agricultural water service contractors and increase CVP deliveries to M&I water service contractors, compared to the No Action Alternative. Alternatives 4 and 5 would have no change in CVP deliveries compared to the No Action Alternative. PHS needs would be met for the Sacramento River Division under all alternatives. The American River, Delta, and San Felipe Divisions would have unmet PHS needs under Alternative 2. There would be unmet PHS needs for the Shasta/Trinity River and West San Joaquin Divisions under Alternatives 2, 3, and 4. The Cross Valley Canal Unit would have unmet PHS needs under all alternatives.

  There are only relatively small to no changes to Shasta and Trinity lakes storages, upper Sacramento River flows, and Lake Oroville storage as a result of action alternatives, which do not result in substantial impacts. The effects of changes to other reservoirs' storage and rivers' flows are addressed under other appropriate resource areas (e.g., water quality, recreation, flood hydrology, water quality, etc.).

- *Water Quality:* Changes in CVP deliveries could affect the salinity and bromide concentrations in the Delta Division. Alternative 5 would have only very minimal changes in reservoir or river flows compared to the No Action Alternative that would not affect salinity and bromide concentrations. Alternatives 2 and 3 would cause an increase in electrical conductivity which could affect water quality in the Delta Division.

- *Groundwater*: A reduction in CVP deliveries to agricultural water service contractors could cause these contractors to supplement their surface water supplies through increased groundwater pumping. Alternative 2 would reduce agricultural groundwater pumping in all regions due to increases in CVP deliveries to agricultural water service contractors, while Alternative 3 would increase agricultural groundwater pumping in all regions due to decreases in CVP deliveries to agricultural contractors. M&I water service contractors may need to make use of all their available groundwater supplies under Alternative 2 in order to meet PHS needs in certain years. Alternatives 4 and 5 would have little to no change in groundwater pumping by CVP water service contractors compared to the No Action Alternative.

[2] It was determined that no impacts or only minor impacts would occur to aquatic resources, terrestrial resources, environmental justice, cultural resources, Indian sacred sites, recreation, flood hydrology, and visual resources.

Increased pumping caused by change in deliveries to supplement supply shortages may cause groundwater level declines that could lead to land subsidence. Alternative 2 would cause a net increase in pumping that could potentially increase land subsidence in the San Francisco Bay/Central Coast region. Alternative 3 would cause a net increase in pumping that could potentially increase land subsidence in the Sacramento Valley, San Joaquin Valley, and Tulare Lake regions.

- *Geology and Soils:* Under Alternative 3, reduced CVP deliveries to agricultural water service contractors could indirectly lead to wind erosion if agricultural water service contractors implement crop idling to manage their water supplies.

- *Air Quality*: Increases in CVP deliveries to agricultural water service contractors under Alternative 2 would result in decreased pollutant emissions from reduced groundwater pumping. Decreases in CVP deliveries to agricultural water service contractors under Alternative 3 would result in increased pollutant emissions due to increased groundwater pumping. Under Alternative 3, the general conformity *de minimis* threshold would be exceeded in the San Joaquin Valley Air Basin. Alternatives 4 and 5 would have little to no changes compared to the No Action Alternative.

- *GHGs and Climate Change:* Changes in CVP deliveries to agricultural water service contractors would decrease GHG emissions under Alternative 2 and increase GHG emissions under Alternatives 3 and 5. Alternative 4 would have no change compared to the No Action Alternative.

- *Agricultural Resources*: Alternative 3 would reduce agricultural acreage primarily in the Tulare Lake Region, but minimally to other regions in the study area.

- *Socioeconomics*: Changes in CVP deliveries for CVP water service contractors would have differing effects for agricultural and M&I water service contractors in Alternatives 2 and 3. Generally, effects would be positive for agricultural water service contractors under Alternative 2 and negative under Alternative 3, while the opposite would be true for M&I water service contractors. Alternatives 4 and 5 would have no change compared to the No Action Alternative.

- Power: Changes in CVP deliveries may cause changes in power generation from hydroelectric power generation facilities by changing reservoir releases or by changing reservoir storage, as represented by changes in reservoir elevations. Alternative 2 and 3 would experience minimal reductions to the amount of power generated at the Folsom and Nimbus power plants and slight fluctuations in the amount of power generated at San Luis Reservoir. Alternatives 4 and 5 would have no change compared to the No Action Alternative.

- *Indian Trust Assets*: Under Alternatives 2 and 3, the magnitudes of groundwater level fluctuations are very small compared to overall groundwater supplies and would not be substantial enough to create a noticeable change to water supply at existing wells near Indian Trust Asset sites. Therefore, Alternatives 2 and 3 would not interfere with the exercise of federally-reserved water rights and/or reduce the health of tribal members by decreasing water supplies. Alternatives 4 and 5 would have no change compared to the No Action Alternative, and would not result in impacts to Indian Trust Assets.

## Section 7 of the Federal Endangered Species Act (ESA)

Reclamation coordinated with the U.S. Fish & Wildlife Service during development of the Draft EIS regarding the impact analysis on special status species and environmental commitments. Reclamation further coordinated with National Oceanic and Atmospheric Administration National Marine Fisheries Service in preparing the Final EIS. A full consultation under Section 7 of the ESA with U.S. Fish & Wildlife Service or National Oceanic and Atmospheric Administration National Marine Fisheries Service was determined not to be needed for this action because the potential impacts are within the range of impacts already observed under current operations of the CVP and are covered by the Biological Opinions on the Coordinated Long-Term Operations of the CVP and SWP.

## Section 106 Compliance

Reclamation is responsible for complying with Section 106 of the National Historic Preservation Act. Alternative 4 would not result in the disturbance of land or require any construction activities; therefore, there are no impacts to cultural resources. Under Section 106 of the National Historic Preservation Act, Alternative 4 is the type of activity that does not have the potential to affect historic properties and there are no further obligations under Section 106 [36 Code of Federal Regulations Sec. 800.3(a)(1)].

# Comments Received on the Final EIS

Reclamation's Notice of Availability of the Final EIS was published in the Federal Register on September 10, 2015, and the Environmental Protection Agency's Notice of Availability was published on September 18, 2015. The EIS was posted on Reclamation's website, and copies were distributed to those who requested a copy. A press release was released on September 10, 2015, and was sent to participants in public meetings and commenters on the Draft EIS.

Reclamation received comments from three entities after release of Final EIS. The commenters were: Somach Simmons & Dunn for Glenn-Colusa Irrigation District (Kelley Taber); East Bay Municipal Utility District (Michael Tognolini); and Santa Clara Valley Water District (Cindy Kao). These comments either reiterated comments previously provided during the public comment period, or supported Reclamation's choice of the Preferred Alternative. Reclamation had adequately addressed the previous comments in the Final EIS. The comments consisted of the following:

- Glenn-Colusa Irrigation District (GCID) did not agree that their comments on the Draft EIS were adequately addressed in Appendix I of the Final EIS. GCID was concerned that the M&I WSP's definition of PHS is too broad and would allow a greater amount of water than necessary for domestic use and essential public services to be included in the calculation, thereby overestimating system demands during Conditions of Shortage and influencing the allocation of water within the CVP system. Additionally, GCID was concerned that implementation of the M&I WSP could affect water supply reliability under their Settlement Contract. As described in the Final EIS, the determination of any additional CVP water supplied to M&I water service contractors during a Condition of Shortage to assist in meeting PHS needs would take into account a contractor's estimated PHS demand, as well as their non-CVP supplies available in that year, and, most importantly, the availability of CVP water in that year. Reclamation would closely review the data provided by an M&I water service contractor so that CVP water provided for PHS needs is estimated in accordance with California criteria and used appropriately during a Condition of Shortage. The Final EIS also states in Appendix B that Reclamation does not have discretion to determine water supply allocations to Sacramento River Settlement Contractors, San Joaquin River Exchange Contractors, certain named State Wildlife Areas and National Wildlife Refuges, and the privately owned/managed wetlands comprising the Grassland Resources Conservation District as identified under the CVPIA Section 3406(d). Water supply allocations for these water service contractors are determined annually based on the forecasted full natural inflow to Shasta Lake. CalSim II simulates water supply allocations to these water service contractors based on inflow to Shasta Lake.

- East Bay Municipal Utility District (EBMUD) supports Reclamation's selection of Alternative 4 as the Preferred Alternative for the M&I WSP. However, EBMUD requested that their contractual historic use of 133,000 acre-feet (AF), per their Long Term Renewal Contract, be noted in the M&I WSP as an exception to the methodology used for calculating historical use. Reclamation, when applying the M&I WSP to EBMUD, would use EBMUD's contractual historic use of 133,000 AF as the basis for making adjustments for population growth, extraordinary water conservation measures, and use of non-CVP water supplies. But, Reclamation believes it inappropriate to specifically state or call out such an exception in the M&I WSP.

- Santa Clara Valley Water District (SCVWD) supports Reclamation's selection of Alternative 4 as the Preferred Alternative for the M&I WSP. SCVWD believes an adopted M&I WSP is critically important for water supply reliability in support of the communities and businesses in its service area.

# Appendix K – Water Shortage Contingency Plan

# DRAFT WATER SHORTAGE CONTINGENCY PLAN

CITY OF
ROSEVILLE
CALIFORNIA

# City of Roseville Draft Water Shortage Contingency Plan

May 2021

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## Tables



## Exhibits

# Water Shortage Contingency Plan

Following the severe drought of 2012-2016, the State of California Legislature sought to expand the water shortage contingency analysis under former law and mandated that a water shortage contingency plan (WSCP) be adopted by suppliers. The California Water Code (CWC) recognizes WSCPs as a critical tool during a drought emergency and grants that the State defer to locally adopted WSCPs, to the extent practicable.

> *California Water Code Section 10632.3*
>
> *It is the intent of the Legislature that, upon proclamation by the Governor of a state of emergency under the California Emergency Services Act (Chapter 7 (commencing with Section 8550) of Division 1 of Title 2 of the Government Code) based on drought conditions, the board defer to implementation of locally adopted water shortage contingency plans to the extent practicable.*

The WSCP is the City of Roseville Water Utility's (City's) operational plan in the event of a water shortage. Water shortage would occur when available water supplies are insufficient to meet normal customer water demands. Various causes can bring about a water shortage including population growth, climate change, drought, natural disasters, and catastrophic events.

The WSCP shall address the ten following elements:

1. Water supply reliability assessment analysis
2. Annual assessment procedures
3. Six standard shortage stages
4. Shortage response actions
5. Communication protocols
6. Compliance and enforcement
7. Legal authorities
8. Financial consequences of WSCP
9. Monitoring and reporting
10. WSCP refinement procedures

## 1.1 Water Supply Reliability Analysis

Pursuant to 10632(a)(1) of the CWC, a near-term (5years) and long-term (20 years) water supply reliability analysis is provided herein. The water supply reliability analysis consists of a water service reliability assessment and drought risk assessment (DRA).

### 1.1.1 Constraints on Water Supply

Most of the City's water is surface water received from Folsom Lake. The City's existing surface water contracts with the U.S. Bureau of Reclamation (USBR), Placer County Water Agency (PCWA), and San Juan Water District (SJWD) are received through the Folsom Dam Diversion, making this a critical facility for the reliability of Roseville's surface water supply. Under normal conditions, the capacities of the Folsom Dam Diversion, Roseville Water Treatment Plant, and distribution network are sufficient to meet the City's water demands. However, the water that the City receives is subject to reductions during dry years pursuant to the Water Forum Agreement, the USBR

Operations Criteria and Plan (OCAP), and the Central Valley Project Municipal and Industrial Water Shortage Policy (CVP M&I WSP).

Although Roseville's annual water contract entitlements total 66,000-acre feet (AF), the City along with other Sacramento-area water suppliers are signatory to the January 2000 Water Forum Agreement (updated in 2015), which includes Purveyor Specific Agreements. The City's Purveyor Specific Agreement includes limitations on City surface water diversions from the American River under different hydrologic conditions. The hydrologic conditions are characterized by three categories of year type and the corresponding limitations for the City are given in WSCP Table 1.

**WSCP Table 1** Available Surface Water Supply Under Differing Hydrologic Conditions

| Year Type | Unimpaired Flow into Folsom Reservoir | Roseville Available Supply |
|---|---|---|
| Normal/ Average or Wet Year | Greater or equal to 950,000 AF | Maximum of 58,900 AF |
| Drier Year | Between 400,000 and 950,000 AF | Between 43,800 and 58,900 AF |
| Driest/ Critically Dry Year | Less than 400,000 AF | Maximum of 43,800 AF |

In addition to the impacts of the contractual agreements, the reliability of surface water is also subject to physical constraints. In the event that the water level at Folsom Lake drops close to or below the intake elevation, without additional infrastructure, the City would be unable to divert water. The severe drought of 2015, which was preceded by multiple consecutive dry years, demonstrated the vulnerability of the City's surface water as the water elevation did come close to the intake elevation.

Though the City has begun the process of expanding its groundwater program, under current operations the groundwater is not a major source of water for the City. The City has 4 existing wells with aquifer storage recovery (ASR) injection capability. The City's strategy in normal years is to not pump groundwater from the wells in excess of what was injected, thus creating a bank of water for future use. If a significant drought stage is reached the City can pump additional water to augment its water supply and make up for deficits of the surface water supply. The City continues to invest in development of groundwater infrastructure to increase supply reliability in times of drought, however in any given year type, the City must make determinations of drought stage without consideration of groundwater supplies, per the terms of the municipal code. This is further discussed in Section 1.5. For the purpose of this WSCP, only the resources available to the City in determination of a drought stage are included in calculations of the surplus or shortfall for the DRA shown in WSCP Table 2 and WSCP Table 3.

### 1.1.2 Drought Risk Assessment

The near-term and long-term drought risk assessment was performed by comparing the unconstrained potable water demands to the water supply availability for a single dry year and 5 consecutive dry years. The near-term DRA for a five-year drought is provided in WSCP Table 2. The long-term single and five-year DRA is provided in WSCP Table 3. Note that while typical groundwater supplies are not considered in the calculations of Total Supplies shown in WSCP Table 2 and WSCP Table 3, the volume of groundwater that the City intends to use for each year type is listed separately.

**WSCP Table 2** Near-Term Five-Year Drought Risk Assessment

| Category | 2021 | 2022 | 2023 | 2024 | 2025 |
|---|---|---|---|---|---|
| Total Supplies | 62,719 | 57,870 | 57,920 | 49,971 | 42,022 |
| Total Gross Water Use | 39,172 | 42,276 | 45,380 | 48,484 | 51,589 |
| Surplus/ Shortfall absent of WSCP Action | 23,547 | 15,593 | 12,540 | 1,487 | -9,567 |
| Total Right/ Safe Yield Groundwater Supplies | 1,560 | 1,560 | 1,560 | 1,560 | 7,920 |
| NOTES: All values are in AF. Groundwater supplies are not included in calculation of surplus/ shortfall. | | | | | |

**WSCP Table 3** Long-Term Single and Five-Year Drought Risk Assessment

| Drought Type/ Year | Category | 2025 | 2030 | 2035 | 2040 | 2045 |
|---|---|---|---|---|---|---|
| Single Year | Total Supplies | 42,022 | 42,435 | 46,293 | 46,293 | 46,293 |
| | Total Gross Water Use | 51,589 | 56,990 | 62,547 | 62,547 | 62,547 |
| | Surplus/ Shortfall absent of WSCP Action | -9,567 | -14,555 | -16,254 | -16,254 | -16,254 |
| | Total Right/ Safe Yield Groundwater Supplies | 7,920 | 12,570 | 14,430 | 14,430 | 14,430 |
| Year 1 | Total Supplies | 62,922 | 63,335 | 67,193 | 67,193 | 67,193 |
| | Total Gross Water Use | 51,589 | 56,990 | 62,547 | 62,547 | 62,547 |
| | Surplus/ Shortfall absent of WSCP Action | 11,333 | 6,345 | 4,646 | 4,646 | 4,646 |
| | Reasonably Available Groundwater Supplies | 1,560 | 2,720 | 3,350 | 3,350 | 3,350 |
| Year 2 | Total Supplies | 58,022 | 58,435 | 62,293 | 62,293 | 62,293 |
| | Total Gross Water Use | 51,589 | 56,990 | 62,547 | 62,547 | 62,547 |
| | Surplus/ Shortfall absent of WSCP Action | 6,433 | 1,445 | -254 | -254 | -254 |
| | Reasonably Available Groundwater Supplies | 1,560 | 2,720 | 3,350 | 3,350 | 3,350 |
| Year 3 | Total Supplies | 58,022 | 58,435 | 62,293 | 62,293 | 62,293 |
| | Total Gross Water Use | 51,589 | 56,990 | 62,547 | 62,547 | 62,547 |
| | Surplus/ Shortfall absent of WSCP Action | 6,433 | 1,445 | -254 | -254 | -254 |
| | Reasonably Available Groundwater Supplies | 1,560 | 2,720 | 3,350 | 3,350 | 3,350 |
| Year 4 | Total Supplies | 50,022 | 50,435 | 54,293 | 54,293 | 54,293 |
| | Total Gross Water Use | 51,589 | 56,990 | 62,547 | 62,547 | 62,547 |
| | Surplus/ Shortfall absent of WSCP Action | -1,567 | -6,555 | -8,254 | -8,254 | -8,254 |
| | Reasonably Available Groundwater Supplies | 1,560 | 2,720 | 3,350 | 3,350 | 3,350 |
| Year 5 | Total Supplies | 42,022 | 42,435 | 46,293 | 46,293 | 46,293 |
| | Total Gross Water Use | 51,589 | 56,990 | 62,547 | 62,547 | 62,547 |
| | Surplus/ Shortfall absent of WSCP Action | -9,567 | -14,555 | -16,254 | -16,254 | -16,254 |
| | Total Right/ Safe Yield Groundwater Supplies | 7,920 | 12,570 | 14,430 | 14,430 | 14,430 |
| NOTES: All values are in AF. Groundwater supplies are not included in calculation of surplus/ shortfall. | | | | | | |

### 1.1.3 Seismic Risk Analysis

Seismic risk in California can pose a significant threat to facilities and infrastructure. The City of Roseville 2016 Multi-Hazard Mitigation Plan addresses the seismic risk at critical facilities including those dedicated to water supply and is provided in Exhibit A.

## 1.2 Legal Authorities

Chapter 14.09 Water Conservation of the Roseville Municipal Code (Municipal Code) also cited as Water Conservation and Drought Mitigation Ordinance (Ordinance 5311 § 2, 2014; Ordinance 2413 § 2, 1991), grants the City the authority to declare a water shortage in the City. Chapter 14.09 of the Municipal Code is provided in Exhibit B.

The purpose and scope of the Water Conservation and Drought Mitigation Ordinance as stated in the Municipal Code is provided below:

***14.09.020 General provisions***

A. *Purpose. The purpose of this chapter is to ensure compliance with all federal, state and local requirements relating to water conservation and drought mitigation for the protection of public health, safety and welfare by:*
1. *Reducing the per capita water consumption throughout the City of Roseville (the "city") during years of normal precipitation and during years of drought;*
2. *Protecting and conserving the city's supply of water during specified times of emergency and/or crisis;*
3. *Minimizing and/or eliminating the waste of water through voluntary compliance or punitive action, if necessary;*
4. *Promoting the use of drip irrigation and other low volume irrigation methods that reduce outdoor water use by applying water more efficiently than traditional irrigation methods;*
5. *No person shall use, or cause to be used any city water for landscape irrigation between the hours of 10:00 a.m. and 8:00 p.m., unless the city manager, or designee provides prior written consent to a different time limitation. A waiver may be granted for turf areas if the landscape contains too many irrigation valves to complete an irrigation event within the watering window.*
6. *Upon city declaration of a water shortage, the city manager, or designee, may impose revised and/or additional limitations on outdoor water use, as specified in Section 14.09.040, and no person shall use, or cause to be used, city water in violation of such limitations while the water shortage remains in effect.*

B. *Scope. The provisions of this chapter shall apply to all customers, users and/or recipients (hereinafter "users") of the city's potable and recycled water service within the city's territorial limits.*

The City's development and adoption of the WSCP upholds 14.09.020 General Provisions of the Municipal Code by ensuring compliance with state requirements.

All components of the WSCP comply with Chapter 14.09 of the Municipal Code. Any actions to be taken under the WSCP not explicitly stated in Chapter 14.09 of the Municipal Code are a further refinement of the existing ordinance.

## 1.3 Standard Water Shortage Levels

The California Water Code Section 10632(a)(3) defines six standard water shortage levels. Standardization of water shortage levels provide a consistent regional and statewide approach to characterizing and conveying the severity of a water shortage. However, Chapter 14.09 of the City's Municipal Code defines water shortage stages that are different from those listed in CWC. Pursuant to 10632(a)(3)(B), the six standard water shortage levels are related to the existing shortage stages in the Municipal Code in WSCP Table 4.

**WSCP Table 4** Relation Between Standard Water Shortage Levels and Existing Stages

| CWC Shortage Level Description | CWC Shortage Level | Municipal Code Shortage Stage | Municipal Code Water Conservation and Drought Stage Description |
|---|---|---|---|
| Up to 10% | 1 | Basic Stage | City's water supply is adequate to meet all projected demands |
| | | Stage One Drought | City's water supply is adequate to meet 90% of projected demands |
| Up to 20% | 2 | Stage Two Drought | City's water supply is adequate to meet 80% of projected demands |
| Up to 30% | 3 | Stage Three Drought | City's water supply is adequate to meet 70% of projected demands |
| Up to 40% | 4 | Stage Four Drought | City's water supply is adequate to meet 60% of projected demands |
| Up to 50% | 5 | Stage Five Drought | City's water supply is adequate to meet 50% or less of projected demands |
| Greater than 50% | 6 | | |

## 1.4 Annual Water Supply and Demand Assessment Procedures

Pursuant to CWC 10632.1, all water suppliers are required to conduct an annual water supply and demand assessment on or before July 1 of each year beginning in 2022. If the supplier receives imported water from the State Water Project or the U.S. Bureau of Reclamation (USBR) they shall submit the report within 14 days of receiving final allocations or by July 1 of each year, whichever is later. The steps for conducting the Annual Water Supply and Demands Assessment are outlined in WSCP Table 5.

**WSCP Table 5** Water Supply and Demand Assessment Procedure

| Step | Description | Timeframe | Participants |
|---|---|---|---|
| Step 1 | Request water utility data from all departments. | Jan 1 - Jan 31 | Water Conservation Administrator |
| Step 2 | Coordinate with Planning Division for any significant planned developments and project those water demands. | Jan 15 - Jan 31 | Water Conservation Administrator<br>Planning Division |
| Step 3 | Compile water utility data into Water Utility Reporting Master spreadsheet. | Feb 1 - Feb 14 | Water Conservation Administrator |
| Step 4 | Calculate total projected unconstrained water demands for current year. | Feb 15-Feb 28 | Senior Engineer – Water Utility |

| | | | |
|---|---|---|---|
| Step 5 | Identify any constraints on facilities or infrastructure that could impact the supply of water such as planned maintenance that would take facilities offline or known damage to facilities/ infrastructure. | Feb 15-Feb 28 | Hydrogeologist<br>Senior Engineer – Water Utility<br>Water Distribution Superintendent<br>Water Treatment Plant Chief Operator |
| Step 6 | Commence preparation of Annual Water Shortage Assessment Report. | March-April | Water Conservation Administrator<br>Senior Engineer – Water Utility |
| Step 7 | Receive final allotments from USBR for current year. | April | EU Assistant Director-Water Utility |
| Step 8 | Subtract current year projected water demand from final allotment volume to determine shortage percentage and volume. | 2 Days after notification from USBR | Senior Engineer – Water Utility |
| Step 9 | If a shortage is identified Environmental Utilities (EU) Department is to hold an internal meeting to inform participants that a water shortage for the current year is anticipated and the extent of that shortage. Review the WSCP and Chapter 14.09 of the Roseville Municipal Code. Identify any concerns from the group regarding the ability to carry out the actions described in the WSCP and Chapter 14.09 of the Municipal Code. Assign an individual or group, among the participants, the responsibility of resolving the concern. | Within 7 days of notification from USBR | EU Director<br>EU Assistant Director – Water Utility<br>Hydrogeologist<br>Water Distribution Super Intendent<br>Water Treatment Plant Chief Operator<br>Senior Engineer – Water Utility<br>Water Conservation Administrator<br>Additional participants as needed |
| Step 10 | Inform City Manager of water shortage emergency condition. | Within 14 days of notification from USBR | City Manager<br>EU Director<br>EU Assistant Director – Water Utility<br>Additional participants as needed |
| Step 11 | Finalize and submit Annual Water Shortage Assessment Report to DWR. | By July 1 or 14 days after receiving final allocations | EU Assistant Director – Water Utility<br>Water Conservation Administrator<br>Senior Engineer – Water Utility |
| Step 11 | The City Manager shall inform City Council of the water shortage emergency condition and the "Drought stage," under which the emergency falls. City Council shall declare a water shortage emergency condition to prevail within the area served by the City of Roseville Water Utility. | Within 28 days of notification from USBR | City Manager<br>City Council<br>Public Information Officer |
| Step 12 | The City of Roseville shall coordinate with any city or county within which it provides water supply services for the possible proclamation of a local emergency. | Within 28 days of notification from USBR | City Manager<br>City Council<br>Public Information Officer |

| | | | |
|---|---|---|---|
| Step 13 | The public, interested parties, and local, regional, and state governments shall be noticed of the water shortage emergency condition and of all water shortage response actions triggered by the emergency declaration. Pursuant to Municipal Code Section 14.09.020(E), the City Manager, or assigned designee, shall be responsible for determining the means by which water users shall be notified. Possible means for notification include mass media, newspaper, public notice, mailings, utility billings, or by any combination of such notice. | Beginning 2 business days after declaration of emergency condition and continuing for as long as the emergency condition persists. | Water Conservation Administrator<br>Senior Engineer – Water Utility<br>Public Information Officer |
| Step 14 | The appropriate Water Shortage Response Actions for the drought stage, outlined in WSCP Table 6 and 7, will be carried out by the public and water utility. The City will enforce compliance in accordance with Roseville Municipal Code 14.09. | Duration of emergency condition | EU – Water Utility<br>Water Users<br>City Manager or designee |
| Step 15 | Track customer water use at a minimum on a monthly basis. Ensure that total gross water use for that month, or more frequent tracking period, is reduced by the necessary percentage when compared to that same tracking period of the last normal supply year. | Duration of emergency condition | Water Conservation Administrator<br>Senior Engineer – Water Utility |
| Step 16 | If the needed water use reduction percentage is not met for any month determine which additional strategies or actions would result in the needed reduction. | Upon determination of insufficient water use reduction | EU Director<br>EU Assistant Director – Water Utility<br>Hydrogeologist<br>Senior Engineer – Water Utility<br>Water Conservation Administrator<br>Additional participants as needed |
| Step 17 | The EU Department management shall propose to the City Manager additional shortage response actions and whether or not those actions would require the WSCP and Chapter 14.09 of the Roseville Municipal Code to be changed. | Upon determination of insufficient water use reduction | City Manager<br>EU Director<br>EU Assistant Director – Water Utility<br>Additional participants as needed |
| Step 18 | If deemed necessary, the City Manager and City Council will revise the WSCP and Chapter 14.09 of the Roseville Municipal Code, observing all required procedures with such adoption. | Upon determination of insufficient water use reduction | City Manager<br>City Council<br>Additional participants as needed |
| NOTES: It is the intent of the WSCP that the Water Conservation Administrator and Water Utility Senior Engineer shall jointly be responsible for ensuring that the steps of this plan are carried out by noticing the necessary parties for data requests and facilitating meetings. | | | |

**WSCP Table 6** Demand Reduction Actions to be Implemented at Each Shortage Level

| Standard Shortage Level | Roseville Municipal Code Stage | Demand Reduction Actions | Estimated Percent Reduction | Section of Water Conservation and Drought Mitigation Ordinance corresponding to Demand Reduction Action *Explanations provided as needed* | Penalty, Charge, or Other Enforcement? |
|---|---|---|---|---|---|
| 1 | Basic | Landscape - Restrict or prohibit runoff from landscape irrigation | 0% | 14.09.030(A) | Yes |
| 1 | Basic | Landscape - Limit landscape irrigation to specific times | 0% | 14.09.020(A)(1); No person shall use, or cause to be used, any city water for landscape irrigation between the hours of 10:00 a.m. and 8:00 p.m., unless the city manager, or designee provides prior written consent to a different time limitation. A waiver may be granted for turf areas if the landscape contains too many irrigation valves to complete an irrigation event within the watering window. | Yes |
| 1 | Basic | Landscape - Limit landscape irrigation to specific days | 0% | 14.09.060(E)(2); Irrigation of new landscaping shall be allowed on any day of the week for a period of 30 days after the new landscaping is planted, unless the city manager, or designee, provides prior written consent to extend this time period based on plant type and the season when the new landscaping is planted. After the 30 days, irrigation days and run times should be decreased to settings appropriate for an established landscape. | Yes |
| 1 | Basic | Landscape - Prohibit certain types of landscape irrigation | 0% | 14.09.030(E); Prohibit operation of an irrigation system that applies water to an impervious surface or that is in disrepair. | Yes |
| 1 | Basic | Landscape - Other landscape restriction or prohibition | 0% | 14.09.030(G); Prohibit irrigation of landscaping during rainfall or 48 hours after a measurable rain event. | Yes |
| 1 | Basic | Landscape - Other landscape restriction or prohibition | 0% | 14.090.060(E)(1); All landscaping installed in the City of Roseville shall comply with the water efficient landscape requirements adopted by resolution of the city council. | Yes |
| 1 | Basic | Other water feature or swimming pool restriction | 0% | 14.09.030(C); Prohibit maintaining ponds, waterways, decorative basins, or swimming pools without water recirculation devices. | Yes |
| 1 | Basic | Other water feature or swimming pool restriction | 0% | 14.09.030(D); Prohibit backwashing so as to discharge to waste swimming pools, decorative basins or ponds in excess of the frequency necessary to ensure the healthful condition of the water or in excess of that required by standards for professionally administered maintenance or to address structural considerations, as determined by the city manager, or designee. | Yes |
| 1 | Basic | Other water feature or swimming pool restriction | 0% | 14.09.030(H); Prohibit overfilling of any pond, pool or fountain which results in water discharging to waste. | Yes |

| | | | | | |
|---|---|---|---|---|---|
| 1 | Basic | Other - Customers must repair leaks, breaks, and malfunctions in a timely manner | 0% | 14.09.060(C) | Yes |
| 1 | Basic | Other - Require automatic shut off hoses | 0% | 14.09.060(B); Free-flowing hoses for all uses are prohibited. Automatic shut-off devices shall be attached on any hose or filling apparatus in use. | Yes |
| 1 | Basic | Other | 0% | 14.09.030(B); Prohibit water fixtures (including, but not limited to, toilets, faucets, shower heads) or heating or cooling devices to leak or run to waste. | Yes |
| 1 | Basic | Other | 0% | 14.09.030(A); Prohibit water use for washing in excess of that necessary to wash, wet or clean the dirty or dusty object, such as an automobile, sidewalk, or parking area, flows to waste. | Yes |
| 1 | Basic | Other | 0% | 14.09.060(A); Water shall be confined to the user's property and shall not be allowed to run off to adjoining properties, or to the roadside or to the gutter. Care shall be taken not to water past the point of saturation. | Yes |
| 1 | Basic | Other | 0% | 14.09.060(F); All site reviews shall include an evaluation of using recycled water. Recycled water shall be required if economically feasible. | Yes |
| 1 | Stage 1 | Landscape - Limit landscape irrigation to specific days | 1% | 14.09.070(C) and 14.09.070(D); Residential and non-residential water users shall be permitted to irrigate with city water according to the schedule provided in 14.09.070(C) and 14.09.070(D), respectively. | Yes |
| 1 | Stage 1 | Landscape - Other landscape restriction or prohibition | 1% | 14.09.070(G); City park sites shall, as an aggregate, reduce usage up to 10 percent. | Yes |
| 1 | Stage 1 | CII - Restaurants may only serve water upon request | 1% | 14.09.070(I) | Yes |
| 1 | Stage 1 | Other - Prohibit use of potable water for washing hard surfaces | 1% | 14.09.070(H); Washing streets, parking lots, driveways, sidewalks or buildings, except as necessary for health or sanitary purposes or pursuant to a term or condition in a permit issued by a state or federal agency, is prohibited. | Yes |
| 1 | Stage 1 | Other | 10% | 14.09.070(B); Residential users and non-residential users shall reduce water usage up to 10 percent. | Yes |
| 2 | Stage 2 | Landscape - Other landscape restriction or prohibition | 1% | 14.09.070(C); City park sites shall, as an aggregate, reduce usage up to 20 percent. | Yes |
| 2 | Stage 2 | Other - Prohibit vehicle washing except at facilities using recycled or recirculating water | 1% | 14.09.080(H) | Yes |
| 2 | Stage 2 | Other | 10-18% | 14.09.080(B); Residential users and non-residential landscapes shall reduce water usage up to 20 percent. | Yes |

| | | | | | |
|---|---|---|---|---|---|
| 3 | Stage 3 | Landscape - Limit landscape irrigation to specific days | 1% | 14.09.090(D) and 14.09.090(E); Residential and non-residential water users shall be permitted to irrigate with city water according to the schedule provided in 14.09.090(D) and 14.09.090(E), respectively. | Yes |
| 3 | Stage 3 | Landscape - Other landscape restriction or prohibition | 1% | 14.09.090(C); City park sites shall, as an aggregate, reduce usage up to 30 percent. | Yes |
| 3 | Stage 3 | Landscape - Other landscape restriction or prohibition | 1% | 14.09.090(H); New or expanded landscaping is limited to drought-tolerant trees, shrubs, and groundcover and be irrigated using a low volume irrigation system. No new turf shall be planted, hydroseeded, or laid, unless prior written consent is received from the city manager. Low volume irrigation means the application of irrigation water at low pressure through a system of tubing or lateral lines and low-volume emitters such as drip or drip lines irrigating at less than two gallons per hour. These systems are specifically designed to apply small volumes of water slowly at or near the root zone of plants. | Yes |
| 3 | Stage 3 | Water Features - Restrict water use for decorative water features, such as fountains | 1% | 14.09.090(I) | Yes |
| 3 | Stage 3 | Pools - Allow filling of swimming pools only when an appropriate cover is in place. | 1% | 14.09.090(L) | Yes |
| 3 | Stage 3 | Other - Prohibit use of potable water for construction and dust control | 1% | 14.09.090(K) | Yes |
| 3 | Stage 3 | Other | 1% | 14.09.090(I); Except where recycled water is used, golf courses shall reduce irrigation up to 30 percent. | Yes |
| 3 | Stage 3 | Other | 18-27% | 14.09.090(B). Residential users and non-residential landscapes are to reduce water usage up to 30 percent. | Yes |
| 4 | Stage 4 | Landscape - Limit landscape irrigation to specific days | 2% | 14.09.100(D) and 14.09.100(E); Residential and non-residential water users shall be permitted to irrigate with city water according to the schedule provided in 14.09.100(D) and 14.09.100(E), respectively. | Yes |
| 4 | Stage 4 | Landscape - Other landscape restriction or prohibition | 1% | 14.09.100(C); City park sites shall, as an aggregate, reduce usage up to 40 percent. | Yes |
| 4 | Stage 4 | Landscape - Other landscape restriction or prohibition | 1% | 14.09.100(H); Installation of any new landscaping is prohibited unless irrigation is provided through connection to an active recycled water system. In the case of new construction, the city's building official will issue a temporary final upon completion of the structural development of the property. When the city has returned to a stage two drought restriction, landscaping installation can be completed, and a building final will become available upon inspection by the city. | Yes |

| | | | | | |
|---|---|---|---|---|---|
| 4 | Stage 4 | Other water feature or swimming pool restriction | 1% | 14.09.100(K); Existing pools shall not be emptied and refilled using city water unless required for health or safety reasons until the city has returned to a stage two drought restriction. Pools may be re-filled only to the extent necessary to replace evaporative losses. | Yes |
| 4 | Stage 4 | Other - Prohibit vehicle washing except at facilities using recycled or recirculating water | 1% | 14.09.100(J); Automobiles or equipment shall be washed only at commercial establishments that recycle their water or by equipment and means that separates debris and recycles wash water for continual use. | Yes |
| 4 | Stage 4 | Other | 1% | 14.09.100(I); Except where recycled water is used, golf courses shall reduce irrigation up to 40 percent. | Yes |
| 4 | Stage 4 | Other | 0% | 14.09.100(L); No commitments shall be made to provide water service as part of any new land use entitlement (general plan, specific plan or amendments requesting new water allocations) until the city has returned to a stage two drought restriction. Currently approved specific plans with accompanying development agreements and projects or properties that have received water allocations in advance of full entitlements may be issued building permits so long as they comply with the remainder of this chapter. | Yes |
| 4 | Stage 4 | Other | 27-35% | 14.09.100(B); Residential users and non-residential landscapes are to reduce water usage up to 40 percent. | Yes |
| 5 & 6 | Stage 5 | Landscape - Other landscape restriction or prohibition | 5% | 14.09.110(C); Except where recycled water is used, water users shall reduce landscape irrigation as follows:<br>1. Turf shall not be irrigated.<br>2. Trees and shrubs may be irrigated with a properly functioning low volume landscape irrigation system or by use of a handheld hose equipped with a nozzle capable of completely shutting off the flow of water except when positive action or pressure to maintain the flow of water is applied. Low volume irrigation means the application of irrigation water at low pressure through a system of tubing or lateral lines and low-volume emitters such as drip or drip lines irrigating at less than two gallons per hour. These systems are specifically designed to apply small volumes of water slowly at or near the root zone of plants. | Yes |
| 5 & 6 | Stage 5 | Other water feature or swimming pool restriction | 1% | 14.09.110(D); Filling new or existing swimming pools and spas with city water is prohibited. | Yes |
| 5 & 6 | Stage 5 | Other | 33% | 14.09.110(B); Residential users are to reduce water usage up to 50 percent. | Yes |
| NOTES: For each successive drought level all preceding restrictions shall continue in place, except to the extent they are replaced by more restrictive conditions. | | | | | |

## 1.5 Supply Augmentation and Operational Changes

Under normal operational conditions the City's groundwater strategy is to not pump well water in excess of the potable water that is injected annually. At this time, the City's injection volume of groundwater is planned to exceed extraction volume over time, as the groundwater program is still in development. The positive difference between the injection and extraction volume is the net volume of water that the City places into long-term storage or makes available for other users. Per Section 14.09.050 of the Municipal Code, when determining drought staging, the City cannot consider the effect of well water reducing the need for conservation until a stage three drought level is reached. Specifically, the code mentions that well water cannot be considered as an alternative to declaration of a stage one or stage two drought level. The City may choose to operationalize groundwater infrastructure in any year type based on water supply conditions and/or operations and maintenance strategies for infrastructure, however this shall not be determined to reduce or alleviate the appropriate drought stage given hydrologic conditions and surface water allocations for that year. The percent reduction that could result from this supply augmentation action for the different stages is provided in WSCP Table 7. Note that there are no supply augmentation actions for drought stages 1 and 2.in accordance with the provisions of the Municipal code.

**WSCP Table 7** Supply Augmentation During Stage 3 Droughts and Higher

| Standard Shortage Level | Roseville Municipal Code Stage | Supply Augmentation Methods and Other Actions by Water Supplier | Percent Reduction | Additional Explanation |
|---|---|---|---|---|
| 3 | 3 | Stored Emergency Supply | 0-10% | Groundwater Pumped |
| 4 | 4 | Stored Emergency Supply | 0-20% | Groundwater Pumped |
| 5 & 6 | 5 | Stored Emergency Supply | 0-30% | Groundwater Pumped |

The water utility would need to adjust its operations to support a drought stage that would prompt increased reliance on well water. Tasks for operations may include more frequent maintenance of well pumps and chemical injection pumps, monitoring of ground water level, and filter backwashing.

## 1.6 Compliance and Enforcement

The Water Conservation and Drought Mitigation ordinance grants the City the authority to enforce compliance with the water use limitations outlined in WSCP Table 6. The sections of the Water Conservation and Drought Mitigation Ordinance, detailing compliance and enforcement authority and measures are provided below.

***14.09.020 General provisions***

*C. Administration and Enforcement. The city manager, or designee, including, but not limited to, an enforcement officer as defined herein, shall administer, implement, and enforce the provisions of this chapter. For purposes of this chapter an "enforcement officer" means any city employee or agent of the city with the authority to enforce any provision of this chapter and the authority to make any decision on behalf of the city manager required or called for by this chapter.*

D. *Compliance. All provisions of this chapter are subject to the compliance procedures set forth in this chapter unless otherwise expressly stated herein.*

***14.09.140 Violations***

*It is Unlawful for any user and/or person to violate any provision or fail to comply with any of the requirements of this chapter. Causing, permitting, aiding, abetting or concealing a violation of any provision of this chapter shall constitute a violation of this chapter. A violation of the provisions of this chapter shall occur irrespective of the negligence or intent of the violator and a violation of or failure to comply with any of the requirements of this chapter may be charged as either an infraction or a misdemeanor in the discretion of the city attorney. (Ord. 5311 § 2, 2014; Ord. 4629 § 1, 2008; Ord. 3834 § 3, 2002; Ord. 2413 § 2, 1991.)*

***14.09.150 Enforcement authority***

A. *Whenever the city manager, or designee (including, but not limited to, an enforcement officer), determines that a user and/or person has violated any provision of, or failed to meet a requirement of, this chapter, an administrative citation pursuant to Chapter 2.50 or a written compliance order pursuant to Chapter 2.52 may be issued to any user and/or person responsible for the violation.*
B. *Any compliance order issued may require without limitation any or all of the following:*
1. *The allocation of a particular amount of water to a given user and/or person responsible for the violation;*
2. *The issuance of a fine;*
3. *The installation of a flow restriction device;*
4. *The performance of monitoring, analyses, and reporting;*
5. *That violations shall cease and desist; and/or*
6. *The discontinuance of water service*

*The compliance order shall set forth a deadline within which the requirements of the compliance order must be completed. Said compliance order shall further advise that, should the violator fail to comply with the compliance order within the established deadline, a hearing on the compliance order shall be set. (Ord. 5491 § 11, 2015; Ord. 5311 § 2, 2014; Ord. 4629 § 1, 2008; Ord. 3034 § 3, 2002; Ord. 2817 § 1, 1994; Ord. 2413 § 2, 1991.)*

***14.090.180 Separate offense for each day.***

*Any user and/or person that violates any provision of this chapter shall be guilty of a separate offense for each and every day during any portion of which any user and/or person commits, continues, permits, or causes a violation thereof, and shall be punished accordingly. (Ord. 5311 § 2, 2014; Ord. 4629 § 1, 2008; Ord. 2413 § 2, 1991.)*

## 1.7 Financial Consequences

During times of an emergency condition, the City is expected to see significant revenue reduction as a result of demand reduction actions lowering total gross water use. Additionally, enforcement of demand reduction actions, which could include investigating water waste complaints, follow ups to check for compliance, administering warnings or fines, and installation of flow restriction devices, would incur additional expenses that would not be present during non-emergency conditions.

Revenue loss percentage for each drought stage is anticipated to be approximately equal to the demand reduction percentage for each respective shortage level. Enforcement expenses will vary based on customer compliance and drought stage. For instance, at the onset of demand reduction action implementation, resources needed for enforcement may be high as customers adjust to altering their use or compliance from customers could vary seasonally with customers finding it more difficult to comply during warmer months.

The City plans to mitigate the financial consequences associated with water shortage response actions primarily through their recently adopted water rate structure, which allows for adequate reserves to accommodate reductions in revenue and increases in cost due to drought. If the water shortage rate charges are insufficient to make up for the loss in revenue, the City will use financial reserves to mitigate remaining financial consequences.

## 1.8 Plan Adoption, Submittal, and Availability

The Water Shortage Contingency Plan will be included as an appendix in the 2020 Urban Water Management Plan (UWMP) and will be introduced and discussed with the public and City Council in the same meetings but as separate agenda items. The WSCP is intended to be a stand-alone document and as such will be adopted by the City independently of the UWMP. The WSCP may be updated as needed between the regular 5-year updates of the UWMP and no required WSCP update shall necessitate an update of the UWMP.

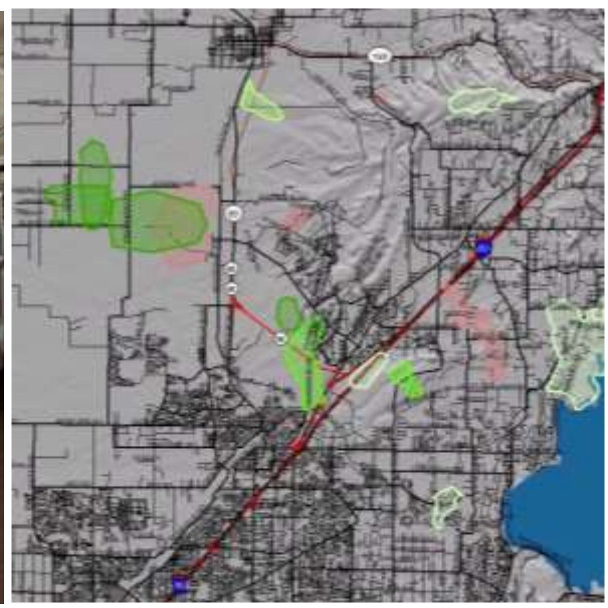
The City has encouraged community and public interest involvement in the WSCP using public meetings and web-based communication. A public meeting will be held on June 16, 2021 and will provide an opportunity for the general public to ask questions and raise concerns regarding the WSCP. Prior to the public hearing the draft WSCP was made available for public inspection on the City's website: www.roseville.ca.us/WSCP/.

The WSCP will be presented to City Council on June 16, 2021 for adoption. Copies of the adoption resolutions will be provided as Exhibit C. A copy of this WSCP will be submitted to DWR within 30 days of adoption and by July 1, 2021. The adopted WSCP will be submitted electronically to DWR. A CD or hardcopy of the adopted WSCP will also be submitted to the California State Library. No later than 30 days after submittal to DWR, copies of the adopted WSCP will be available for public review at the City's public offices. An electronic copy of this plan will also be available for review and download on the City's website: www.roseville.ca.us/WSCP/.

# Exhibit A – City of Roseville 2016 Multi-Hazard Mitigation Plan

CITY OF ROSEVILLE CALIFORNIA

# 2016 Multi-Hazard Mitigation Plan



TETRA TECH

September 2016

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## Appendices



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# ACKNOWLEDGMENTS


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## Stakeholders

Erik Angle, Sutter Roseville Medical Center
Michael Algots, Union Pacific Railroad
Rick Stalker, Placer County Association of Realtors

## Special Acknowledgments

The development of this Plan would not have been possible without the dedication and commitment to this process by the Roseville Hazard Mitigation Plan Steering Committee. The dedication of this volunteer committee to allocate their time to this process is greatly appreciated. Also, the citizens of Roseville are commended for their participation in the outreach strategy identified by the Steering Committee. This outreach success will set the course to the successful implementation of this Plan during its next performance period.

- Grace Keller
- Wayne Wiley
- Rob Jensen
- Jason Rizzi
- Carl Walker
- Helen Dyda
- Erik Angle
- Brenette Macintosh
- Mark Lacher
- Jaime Garrett
- Joseph Van Zant
- Rod Rodriguez
- Rick Stalker
- Michael Algots
- Jim Williams

# EXECUTIVE SUMMARY

The Disaster Mitigation Act (DMA; Public Law 106-390) is the latest federal legislation enacted to encourage and promote proactive, pre-disaster planning as a condition of receiving financial assistance under the Robert T. Stafford Act. The DMA emphasizes planning for disasters before they occur. Under the DMA, a pre-disaster hazard mitigation program and new requirements for the national post-disaster hazard mitigation grant program were established.

The DMA encourages state and local authorities to work together on pre-disaster planning and it promotes sustainability as a strategy for disaster resistance. The intent is three-fold:

- To gather hazard, vulnerability, and mitigation information at the local level for use in state-level planning
- To ensure that state and local hazard mitigation planning is coordinated to the greatest extent practical
- To ensure that local jurisdictions are made aware of the hazards and vulnerabilities within their jurisdiction and to develop strategies to reduce those vulnerabilities.

This process ensures that mitigation actions are based on sound planning processes that account for the risks and capabilities of California communities. "Sustainable hazard mitigation" includes the sound management of natural resources, local economic and social resiliency, and the recognition that hazards and mitigation must be understood in the largest possible social and economic context. The enhanced planning network called for by the DMA helps local governments articulate accurate needs for mitigation, resulting in faster allocation of funding and more cost-effective risk reduction projects.

Using this initiative as a foundation for proactive planning, the City of Roseville has developed and maintained a hazard mitigation plan in an effort to reduce future loss of life and property resulting from disasters. It is impossible to predict exactly when and where disasters will occur or the extent to which they will impact the City. However, with careful planning and collaboration among public agencies, stakeholders, and citizens, it is possible to minimize losses that can occur from disasters.

***Hazard mitigation is a way to reduce or alleviate the loss of life, personal injury, and property damage that can result from a disaster through long- and short-term strategies.*** It involves strategies such as planning, policy changes, programs, projects, and other activities that can mitigate the impacts of hazards on the City of Roseville. The responsibility for hazard mitigation lies with many, including private property owners; business and industry; and local, state, and federal government.

## PLAN UPDATE

Federal regulations stipulate that hazard mitigation plans must describe the method and schedule for monitoring, evaluating, and updating the Plan. Prescribing an update schedule establishes an opportunity to reevaluate recommendations, monitor the impacts of actions that have been accomplished, and determine if there is a need to change the focus of mitigation strategies. DMA compliance is contingent on meeting the plan update requirement. A jurisdiction covered by a plan that has expired is not able to pursue elements of federal funding afforded under the Robert T. Stafford Act for which a current hazard mitigation plan is a prerequisite. The California Office of

Emergency Services (Cal OES) reviews all local hazard mitigation plans in accordance with DMA 2000 regulations and coordinates with local jurisdictions to ensure compliance with state requirements and the Code of Federal Regulations (Title 44 Section 201.6). Once Cal OES planning staff find the local hazard mitigation plan to be approvable, the Plan is forwarded to mitigation planning staff at Region IX of the Federal Emergency Management Agency (FEMA). FEMA performs final review and designates compliant plans as "approved pending adoption."

The City of Roseville used the plan update process to comprehensively revise its initial hazard mitigation plan, which was adopted in 2005. Due to the success of the initial plan, no major changes were made to the plan's approach and function. The subsequent 2011 Plan was enhanced using recent best available data and technology, especially in the risk assessment. For this 2016 planning effort, the enhanced format of the 2011 Plan has been retained in order to ensure the consistency of discussion points on each hazard of concern and address required elements for plan updates. The Plan update followed the same basic planning process as was followed under the initial effort and subsequent update. A Steering Committee was once again the critical component in the process. The Steering Committee consisted of 14 members of the community representing the public, private industry, and government. The Steering Committee met six times between November 2015 and August 2016 to provide recommendations and support throughout the planning process.

## PLAN UPDATE METHODOLOGY

Development of the hazard mitigation plan included five phases:

- Phase 1—Organize resources
- Phase 2—Update the risk assessment
- Phase 3—Engage the public
- Phase 4—Assemble the updated Plan
- Phase 5—Plan adoption

### Phase 1—Organize Resources

The City hired Tetra Tech, Inc. as a consultant to assist with development and implementation of the 2016 Plan. The Tetra Tech project manager assumed the role of the lead project planner and reported directly to a City project manager. Once the technical assistance was secured, a planning team was formed to lead the planning effort. The Steering Committee that oversaw the development of the initial plan remained intact during the initial performance period of the Plan and then provided oversight for the 2016 Plan. For the update process, some new members were added and some previous members left the committee. The planning team facilitated each Steering Committee meeting, which addressed a set of objectives based on the work plan established for the update. The Steering Committee met six times from November 2015 through August 2016. Coordination with other local, state and federal agencies involved in hazard mitigation in the region helped to ensure consistency with other ongoing efforts.

One of the Steering Committee's first action items was to review the State of California Hazard Mitigation Plan, the Roseville 2011 Hazard Mitigation Plan and all of the progress reports completed since the 2011 Plan. The Steering Committee identified hazards listed in the state plan to which Roseville is susceptible, in order to determine if there was a need to expand the scope of the risk assessment. Each annual progress report for the initial plan contains a section that recommends changes or enhancements to the Plan or plan development process. These reports effectively completed a key step of the plan update process before the update process began—identifying needs for changes or enhancements.

## Phase 2 —Update the Risk Assessment

Federal planning guidance specifies comprehensive updates to the risk assessment portion of local hazard mitigation plans if there have been new technical data pertaining to a hazard developed by a creditable source since the Plan's previous development. Updated risk assessment efforts for the 2016 Plan included the following:

- The latest version of the Federal Emergency Management Agency's Hazus-MH risk assessment software was used to enhance the risk assessments for flood, dam failure and earthquake.
- All hazards of concern were updated with new relevant data.
- The Hazus default general building stock was updated using current address point, building footprint, parcel and tax assessor data.

## Phase 3—Engage the Public

The Steering Committee drafted a comprehensive public involvement strategy for this update using multiple media sources. This strategy was built upon the Steering Committee's previous public engagement strategy and enhanced with social media and non-traditional outreach initiatives not regularly employed during the previous planning processes. The planning team identified stakeholders to target through the multi-disciplinary public involvement strategy.

## Phase 4—Assemble the Updated Plan

The base format of the 2011 Plan was maintained in the 2016 Plan. However, enhancements were made to include the following components:

- The update describes the process used to review and analyze each section of the Plan.
- The update provides a discussion on how the public was kept apprised of the Plan's actions during the initial performance period.
- The update describes the need for changes to the risk assessment and what changes were made from the previous update.
- The update describes changes to risk exposure due to either of the following:
  - Successful mitigation projects
  - Changes in land use due to annexation or new development.
- The update describes changes to the action plan and the reasons for them.
- The update identifies completed, deleted, or deferred actions or activities from the previously approved plan as a benchmark for progress in the form of the 2015 Progress Report located in Appendix B. It also includes in its evaluation and prioritization new mitigation actions identified since the previous plan

## Phase 5—Plan Adoption/Implementation

This Plan details a formal process for implementing and maintaining the Plan so that it remains an active and relevant document. The plan maintenance process includes a schedule for monitoring and evaluating the Plan's progress annually and producing a plan revision every five years. This process seeks to keep a steering body that meets the criteria of the original steering committee intact to perform this annual review. This phase includes strategies for continued public involvement and incorporation of the recommendations of this Plan into other planning mechanisms of the City, such as the comprehensive plan, capital improvement plan, building code, and development design guidelines.

# MITIGATION GUIDING PRINCIPLE, GOALS, AND OBJECTIVES

## Guiding Principle

The following guiding principle was identified for this hazard mitigation plan:

> Through community partnerships, establish a plan to reduce vulnerability to hazards in order to protect the health, safety, welfare, and economy of the City.

## Goals

The Steering Committee established the following goals for the Plan update:

- G-1: Protect lives and reduce injury.
- G-2: Promote hazard mitigation as an integrated policy.
- G-3: Protect the continuity of local government to ensure no significant disruption of services during or due to a disaster.
- G-4: Improve community emergency management preparedness, collaboration and outreach.
- G-5: Minimize or reduce damage to property, including critical facilities.
- G-6: Develop and implement mitigation strategies that optimize public funds in an efficient and cost-effective way.
- G-7: Monitor and support the natural environment's capacity to deal with the impacts of natural hazards, taking into account the potential impacts of global climate change.

## Objectives

Plan objectives were developed via a facilitated exercise that focused on finding objectives that meet multiple goals. During this exercise, Steering Committee members were requested to review the 2011 objectives in addition to newly proposed objectives. The selected objectives are listed in Table ES-1.

**Table ES-1.** Objectives for 2016 Multi-Hazard Mitigation Plan

| Objective Number | Objective Statement | Goals for which it can be applied |
|---|---|---|
| **O-1** | Consider the impacts of hazards on future land uses in the City of Roseville by coordinating with other planning mechanisms such as the General Plan and land-use code development. | 1, 2, 5, 7 |
| **O-2** | Protect and sustain reliable local emergency operations and communication facilities during and after disasters. | 1, 3, 4 |
| **O-3** | Develop new or enhance existing early warning response systems and plans. | 1, 3, 4, 5 |
| **O-4** | Seek to enhance emergency response capabilities through improvements to infrastructure and City programs. | 1, 4, 5 |
| **O-5** | Enhance the understanding of all present and future hazards that impact the City of Roseville and the risk they pose. | 1, 3, 4, 5, 7 |
| **O-6** | Seek mitigation projects that provide the highest degree of hazard protection at the least cost. | 1, 5, 6 |
| **O-7** | Seek to update information on natural, environmental, and human-caused hazards, vulnerabilities, and mitigation measures by coordinating planning efforts and creating partnerships with appropriate local, private, county, state, and federal agencies. | 1, 2, 3, 4, 5, 7 |
| **O-8** | Seek to implement codes, standards, and policies that will protect life and property, including natural habitat, from the impacts of hazards within the City of Roseville. | 1, 2, 3, 5, 6 |
| **O-9** | Educate the public on preparedness for and mitigation of potential impacts of hazards on the City of Roseville. | 1, 2, 4 |
| **O-10** | Support efforts to retrofit, purchase, or relocate structures in high hazard areas, including those known to be repetitively damaged. | 3, 5, 6 |

## MITIGATION ACTION PLAN

The hazard mitigation action plan is a key element of this Plan. It is through the implementation of this action plan that the City of Roseville can strive to become disaster-resilient through sustainable hazard mitigation. This action plan includes an assessment of the capabilities of the City to implement hazard mitigation actions, a review of alternatives, a prioritization schedule, and a mitigation strategy matrix that identifies the following:

- Description of recommended actions
- Hazards addressed
- Objectives addressed
- Lead implementation agency (or agencies)
- Estimated benefits
- Estimated costs
- Timeframe for implementation
- Funding sources

For the purposes of this document, mitigation actions are defined as activities designed to reduce or eliminate losses resulting from the impacts of natural hazards of concern. Table ES-2 summarizes the hazard mitigation actions identified by this Plan update.

## IMPLEMENTATION

Full implementation of the recommendations of this Plan will require time and resources. This Plan reflects an adaptive management approach in that specific recommendations and plan review protocols are provided to evaluate changes in vulnerability and action plan prioritization after the Plan is adopted. Funding resources are always evolving, as are requirements under state or federal mandates, and the true measure of the Plan's success will be its ability to adapt to the ever-changing climate of hazard mitigation.

Roseville has a long-standing tradition of progressive, proactive response to issues that may impact its citizens. This tradition is reflected in the development of this Plan. The Roseville City Council will assume responsibility for adopting the recommendations of this Plan and committing City resources toward its implementation. The City's track record in the mitigation of hazards impacting its citizens is exemplary. The framework established by this Plan will help maintain this tradition in that it identifies a strategy to maximize the potential for implementation based on available and potential resources. It commits the City to pursue actions when the benefits of a project exceed its costs. Most important, the City developed this Plan with extensive public input, which sets the stage for acceptance of the actions recommended for implementation in this Plan.

**Table ES-2.** Hazard Mitigation Action Plan Matrix

| Action Number and Description | Timeframe |
|---|---|
| **DAM FAILURE** | |
| DF-1—Create a dam failure element for the City's emergency response plan that includes a phased warning protocol in response to the findings of the Folsom Dam Containment Dike Risk Assessment. | Short-term |
| **DROUGHT** | |
| D-1—Perform a groundwater recharge feasibility study to determine the most cost-effective way to replenish groundwater resources within Roseville. | Ongoing |
| D-2—Implement aquifer storage and recovery program that uses direct injection technique in areas identified as appropriate. | Ongoing |
| D-3—Continue to implement the Environmental Utility Department's recycled water program and seek all opportunities to expand its coverage, focusing first on the Sunset Industrial area. The City pumps recycled water through a system of purple pipes completely separate from potable (drinking water) pipes. The City pumps the recycled water to customers such as streetscapes, golf courses and parks, where it irrigates turf and shrubs. Using recycled water for uses such as landscape irrigation reduces demand on the potable water system, creating a more reliable water supply for the entire City. Recycled water is not subject to the effects of drought. | Ongoing |
| D-4—Promote active water conservation techniques and strategies to private property owners through Roseville-sponsored outreach projects such as printed media and the City's website. | Ongoing |
| **EARTHQUAKE** | |
| EQ-1—Perform building-specific, structural seismic vulnerability assessment of City-owned critical facilities constructed prior to 1980 (including infrastructure). Included in this assessment will be recommended mitigation alternatives that meet goals and objectives of this Plan. | Short-term; Ongoing |
| EQ-2—Incorporate earthquake mitigation measures for private property into existing City-sponsored outreach programs such as printed media and the City's website. | Short-term |
| EQ-3—Reassess the overall vulnerability to the earthquake hazard using the best available science and technology as it becomes available. State-sponsored programs, Seismic Hazards Mapping Act, and future FEMA-sponsored initiatives are anticipated to create a wealth of knowledge regarding this hazard that did not exist during the preparation of this Plan update | Short-term; Ongoing |
| **FLOOD** | |
| F-1—The City shall designate all areas identified as the 100-year floodplain. The boundaries of the 100-year floodplain shall be as specified in the floodplain designations section of this component of the City's general plan. Floodplain areas shall be preserved as specified in the open space and conservation element. Such preservation may include required dedication to the City. If needed, modify the City's ordinances to include floodplain use regulations consistent with the goals, policies, and implementation measures of the safety, land use, open space and conservation, and parks and recreation elements of the City's general plan. | Ongoing |
| F-2—Refer any development proposal that has a direct or indirect impact on flood protection to Public Works for comment. In addition, forward such proposals to other agencies as applicable, including the U.S. Army Corps of Engineers, California Reclamation Board, FEMA, California Department of Fish and Wildlife, Placer County Resource Conservation District, and Placer County Flood Control District. Consider the comments of the agencies during the development review process. | Ongoing |
| F 3—Continue City participation in the National Flood Insurance Program and the Community Rating System (CRS). Maintain the City's current CRS status as the nation's only Class 1 CRS community. | Ongoing |
| F 4—Maintain Roseville's compliance and good standing under the National Flood Insurance program | Ongoing |
| F 5—Continue the City's outreach program to flood-prone property owners and the citizens of Roseville to program is to help make them aware of the flood threat and how best to deal with them. | Ongoing |
| F 6—Continue to pursue a regional approach to flood issues by remaining actively involved in the Placer Co Flood Control District. This involvement includes cooperation in the development of a comprehensive regional database. Continue to participate in regional flooding studies, including the Auburn Creek/Coon Creek/Pleasant Grove Creek flood mitigation plan and the Dry Creek watershed flood control plan. | Ongoing |

| Action Number and Description | Timeframe |
|---|---|
| F 7—Continue City coordination with other agencies on issues of flood control. Coordination between the City and adjacent jurisdictions occurs through several mechanisms, including distribution of development proposals for review and comment. Continue City cooperation with federal, state, and local agencies, including the U.S. Army Corps of Engineers, California Reclamation Board, FEMA, California Department of Fish and Wildlife, Placer County Resource Conservation District, and Placer County Flood Control District. | Ongoing |
| F 8—Continue to develop, implement, and expand the Flood Alert and Early Warning Program systems and integrate the systems with other local jurisdictions to form a regional warning program. | Ongoing |
| F 9—Ensure that future specific plans and specific plan amendments are consistent with the goals and policies of the general plan. The specific plans shall include the designation and preservation of floodplain areas and adjacent habitat. Provisions shall be incorporated to ensure that public infrastructure, utilities, and emergency services remain functional during flood conditions. Such infrastructure and facilities include water, sewer and gas mains, telephone and electric lines, streets and bridges, hospitals, and fire and police stations. Financing mechanisms shall be explored to fund necessary flood protection improvements and maintenance. Development agreements may be used to secure implementation and funding provisions. (Specific plans have 100% cost recovery by developers). | Short -term |
| F 10—Monitor and regularly update City flood studies, modeling, and associated land use, zoning, and other development regulations at a minimum of every 5 years or whenever information becomes available that would significantly modify previous data. New information could include new studies, change in City policy, consideration of a major development project or specific plan, or implementation of a flood control project. | Short-term; Ongoing |
| F 11-Require a master drainage plan as part of the approval process for all specific plans and large development projects as determined by the Public Works director. The master drainage plan should consider cumulative regional drainage and flooding mitigation. The plan's intent is to ensure that the overall rate of runoff from a project does not exceed predevelopment levels. If necessary, this objective shall be achieved by incorporating run-off control measures to minimize peak flows and/or assistance in financing or otherwise implementing comprehensive drainage plans. | Short-term |
| F-12—Continue the Department of Parks, Recreation and Libraries' regular creek maintenance program within the City's creeks and floodplain areas. This program clears and removes debris that could contribute to blockage and flooding and may include the removal of silt. This is only done in areas of high risk to flood damage or where property or facilities are threatened by flooding. | Ongoing |
| F 13—Continue annual inspection and maintenance program of City storm drain systems. Review after every major storm system function and performance. This program removes debris that could contribute to blockage of the storm drain system. | Ongoing |
| F 14—Complete the final two phases of the Cirby/Linda/Dry Creek flood control project (Phase 1 and 2). Five of the seven phases of this project have been completed at a cost of about $18,000,000. The basis for determining viability of this project will be a benefit /cost analysis to determine if project meets federal grant eligibility requirements. | Long-term |
| F 15—Analyze alternative improvements to the Cirby/Linda/Dry Creek flood control project that may be cost effective in the flood-prone areas of Roseville:<br>• Dry Creek from Darling Way to Riverside Avenue<br>• Area on Dry Creek upstream of Folsom Road in the Columbia Avenue/Marilyn Avenue/Bonita Street area<br>• Linda Creek near Samoa Way/Hurst Way area<br>• Cirby Creek in the Trimble Way/Zien Court area | Long –term; depends on funding |
| F 16—Replace the Huntington Drive/Cirby Creek culvert with a bridge to protect Queens Court/Huntington Drive area. This project is overseen by Public Works department. | Long-term; depends on funding |
| F 17—Divert the main drainage storm drain system down Crestmont Avenue to Cirby Way and then into Dry Creek so that the existing system will not exceed capacity. If system capacity is exceeded, the intersection on Cirby Way and Crestmont Avenue and nearby homes will flood during major flood events. | Short-term |
| F 18—Continue to promote and sponsor programs to buy out, relocate, and flood-proof existing flood-prone structures within Roseville. | Long-term; depends on funding |
| F-19—Implement recommendation of Downtown Roseville Specific Plan to relocate the Public safety Building. | Long-term |
| F-20—Retrofit the City's Downtown library by sealing the exterior and installing a flood door to protect against flood damage should Dry Creek overspill the existing floodwall. | Short-term; Ongoing |

| Action Number and Description | Timeframe |
|---|---|
| F-21—Continue the Tree Mitigation Fund program administered by the Open Space Division in conjunction with non-profit organizations. The planting of oak trees in the open spaces adjacent to riparian zones increases infiltration and slows storm water surges. | Ongoing |
| F-22—Manage beaver dam sites for flood control protection and habitat restoration after dam removal. One primary issue is impacts to floodwater capacity of creeks. Part of the desired comprehensive approach to beaver management includes establishment of quantitative and qualitative “carrying capacity,” including acre-feet of flood capacity lost. Implement a standard monitoring and reporting process to track beaver dam locations, population, and impacts. Gain regulatory approval for beaver management techniques such as biological control and habitat manipulation using the most benign options first. | Ongoing |
| F-23 – Develop the City’s multi-use, multi-benefit stormwater retention project within the Pleasant Grove Creek Watershed, the Reason Farms Stormwater Retention Project. | Long-term |
| **LANDSLIDE** | |
| LS-1—Once California Geological Survey completes soils mapping for the Roseville vicinity under the Seismic Hazards Mapping Act, reassess landslide hazard using best available data to gauge the true vulnerability to this hazard. | Long-term |
| LS-2—Continue to implement policies adopted by the general plan that promote open space land uses within identified steep slope areas of Roseville. The City of Roseville Northeast Roseville Specific Plan and Stoneridge Specific Plans include the identified steep slope areas within Roseville. Both Plan Areas have continuing development. When individual projects are submitted, | Ongoing |
| **SEVERE WEATHER** | |
| SW-1—Continue the Shade Tree Program, an energy conservation rebate program provided by Roseville Electric | Ongoing |
| SW-2—Continue ongoing line clearing and weed abatement of electrical utilities to reduce exposure to severe weather hazards. | Ongoing |
| SW-3—Continue education/outreach programs to improve winter preparedness and minimize loss of life or injury. | Short-term, ongoing |
| SW-4—Enhance and implement strategies for debris management and removal during severe weather events. | Ongoing |
| SW 5-Continue to operate the Roseville Energy Park to support the City’s electrical requirements and maintain service continuity during severe weather events. | Ongoing |
| SW 6-Take over ownership and operation of the Roseville Combustion Turbines from Northern CA Power Agency to support the City’s electrical requirements and maintain service continuity during severe weather events. | Ongoing |
| **WILDFIRE** | |
| WF-1—Continue “Goat Grazing” program for removal of grassland in areas of Roseville potentially vulnerable to wildfire. Implement goat grazing in City open space and preserve areas for fire and invasive plant species management and native plant restoration. | Ongoing |
| WF-2—Enhance existing City public outreach programs to include information on fire safety, defensible spaces, and areas of concern. | Short-term; Ongoing |
| **MULTIPLE HAZARDS** | |
| MH-1—Continue to maintain Cal OES certification of all City inspectors for post-disaster damage assessment. | Ongoing |
| MH-2—Continue to maintain the hazard mitigation page on City website that provides following types of information:<br>• The Hazard Management Plan and its progress reports<br>• Hazard-specific information<br>• Mitigation information by hazard, with specific emphasis on private property<br>• Emergency response and warning information<br>• Links to county, state, and federal related agencies | Ongoing |

| Action Number and Description | Timeframe |
|---|---|
| MH-3—Establish/maintain a post-disaster action plan to be part of the City Emergency operations plan that will include following elements:<br>• Procedures for public information<br>• Post-disaster damage assessment<br>• Grant writing<br>• Code enforcement<br>• Redundant operations | Ongoing |
| MH-4—Implement an "Adopt an Open Space" program in coordination with the open space management program. Develop "adoption contracts" with neighborhoods, organizations, businesses, etc., describing the level of stewardship and the terms of the "adoption." Publicize these activities through online resource directory and other media to encourage participation. | Long--term |
| MH-5—Develop and disseminate best practices information to private property owners whose land is adjacent to open space areas describing stewardship opportunities and owners' role in preserving beneficial uses of open space areas (including vernal pool grassland and creek or riparian uses). Offer classes to provide in-depth information, such as demonstration projects, techniques for ecologically friendly weed abatement and vegetation control, and creating a backyard habitat compatible with open space areas. | Short-term; Ongoing |
| MH-6—Work with the Roseville City School District, local high school districts, and non-profit organizations to promote ecology-oriented curricula and stewardship activities. Identify resource and administrative barriers that may be limiting schools' abilities to more actively participate in stewardship, and work collaboratively to identify solutions. | Short-term; Ongoing |
| MH 7—Strive to maintain high availability of essential communication services | Ongoing |
| MH 8-Secure the City's physical locations that contain technology infrastructure | Ongoing |
| **HUMAN-CAUSED** | |
| HC 1-Commit support to initiatives within the Sacramento-Roseville-Arden-Arcade Metropolitan Statistical Area; continue to seek funding from other federal sources to fund its initiatives | Short-term |
| HC-2—Enhance emergency response capability of City by contingency planning for specific events based on identified vulnerabilities. | Short-term, ongoing |
| HC-3— Seek to establish appropriate staffing levels of public safety personnel to address vulnerabilities identified through an incremental targeted study that provides immediate needs as well as anticipated needs in 1 year, 5 years, and 10 years. | Short Term; depends on funding |
| HC-4—Prepare a site-specific vulnerability assessment of City-owned critical facilities that use the best available science and technology with regards human-caused hazards. | Long-term |
| HC-5—Address vulnerabilities identified in vulnerability assessment of water facilities performed by Environmental Utilities Department in response to EPA initiative. | Long-term |
| HC 6-Maintain compliance with California Energy Commission license conditions for the operations of the Roseville Energy Park with respect to Hazardous Material Management | Ongoing |
| HC 7-Establish and maintain compliance with state and local laws and regulations for the operation of the Roseville Combustion Turbines upon transfer of ownership from Northern CA Power Agency to City. | Ongoing |
| HC-8-Maintain compliance with North American Electric Reliability Corporation mandatory reliability standards related to plant operation, sabotage reporting and critical infrastructure protection (cyber security. | Ongoing |
| HC 9—Protect the City's data, technology infrastructure and staff against Cyber terrorism such as but not limited to:<br>• Identity Theft<br>• Virus/Malware/Ransomware/Spyware/Spam/Phishing<br>• Network and system attacks<br>• Web site hacking | Short Term; depends on funding |
| HC-10: Improve evacuation transportation routes within the City of Roseville by removing traffic constrictions. | Long-term |
| **HUMAN HEALTH** | |
| HH-1—Continue to collaborate with the Placer County Health Department to ensure the health and welfare of the community | Ongoing |

| Action Number and Description | Timeframe |
|---|---|
| HH-2—Support the public education efforts of the Placer County Health Department and the Placer Mosquito Abatement District | Ongoing |
| HH-3—Collaborate with the Placer County Mosquito Abatement District to review resource protection policies that conflict with human health protection in the City of Roseville and work to resolve these policy issues | Short-term; Ongoing |

# Part 1. Planning Process and Community Profile

# 1. INTRODUCTION TO HAZARD MITIGATION PLANNING

## 1.1 WHY PREPARE THIS PLAN?

### 1.1.1 The Big Picture

Hazard mitigation is defined as any action taken to reduce or alleviate the loss of life, personal injury, and property damage that can result from a disaster. It involves long- and short-term actions implemented before, during and after disasters. Hazard mitigation activities include planning efforts, policy changes, programs, studies, improvement projects, and other steps to reduce the impacts of hazards.

For many years, federal disaster funding focused on relief and recovery after disasters occurred, with limited funding for hazard mitigation planning in advance. The Disaster Mitigation Act (DMA; Public Law 106-390), passed in 2000, shifted the federal emphasis toward planning for disasters before they occur. The DMA requires state and local governments to develop hazard mitigation plans as a condition for federal disaster grant assistance. Regulations developed to fulfill the DMA's requirements are included in Title 44 of the Code of Federal Regulations (44 CFR).

The responsibility for hazard mitigation lies with many, including private property owners, commercial interests, and local, state and federal governments. The DMA encourages cooperation among state and local authorities in pre-disaster planning. The enhanced planning network called for by the DMA helps local governments articulate accurate needs for mitigation, resulting in faster allocation of funding and more cost-effective risk-reduction projects.

The DMA also promotes sustainability in hazard mitigation. To be sustainable, hazard mitigation needs to incorporate sound management of natural resources and address hazards and mitigation in the largest possible social and economic context.

### 1.1.2 Roseville's Response to the DMA

Roseville has a long-standing reputation as a national leader in risk reduction through proactive mitigation. This reputation has been built through innovative planning and a commitment to protecting its citizens from the impacts of natural disasters. Embracing the goals of the DMA, Roseville created an initial hazard mitigation plan that became a model nationally and has been touted by the Federal Emergency Management Agency (FEMA) as a "mitigation success story." The *City of Roseville Hazard Mitigation Plan* was adopted by the Roseville City Council on July 20, 2005, and was formally approved by FEMA Region IX on August 10, 2005. The initial plan was developed with the following objectives:

- Meet or exceed program requirements specified under the DMA, thereby enabling the City of Roseville to continue using federal grant funding to reduce risk through mitigation.
- Meet not only state and federal requirements but also the needs of the City (this Plan addresses human-caused hazards, which are not required to be addressed under the DMA).
- Develop the Plan according to FEMA's Community Rating System (CRS) guidelines so that Roseville can meet requirements to become the nation's first CRS Class 1 community.

- Create a risk assessment that focuses on the City of Roseville hazards of concern.
- Coordinate existing plans and programs so that high-priority actions and projects to mitigate possible disaster impacts are funded and implemented.

The initial plan was developed according to the requirements of 44 CFR, qualifying the City to pursue funding under the Robert T. Stafford Act. The City has achieved numerous objectives identified in the Plan. Local hazard mitigation plans must be regularly updated to comply with the DMA. The City responded to this requirement with a plan update process that resulted in the 2011 Multi-Hazard Mitigation Plan, and now this 2016 Multi-Hazard Mitigation Plan.

This hazard mitigation plan update identifies resources, information, and strategies for reducing risk from natural hazards. Elements and strategies in the Plan were selected because they meet a program requirement and because they best meet the needs City residents. The Plan will help guide and coordinate mitigation activities throughout the planning area. It also will meet the planning requirements of the CRS, allowing the City of Roseville to maintain its CRS Class 1 rating.

## 1.2 WHO WILL BENEFIT FROM THIS PLAN?

All residents and businesses of the City of Roseville are the ultimate beneficiaries of this hazard mitigation plan update. The Plan reduces risk for those who live in, work in, and visit the City. It provides a viable planning framework for all foreseeable natural hazards. Participation in development of the Plan by key stakeholders helped ensure that outcomes will be mutually beneficial. The Plan’s goals and recommendations can lay groundwork for the development and implementation of local mitigation activities and partnerships.

## 1.3 CONTENTS OF THIS PLAN

This hazard mitigation plan is organized into three primary parts:

- Part 1—Planning Process and Community Profile
- Part 2—Risk Assessment
- Part 3—Mitigation Strategy.

Each part includes elements required under federal guidelines. DMA compliance requirements are cited at the beginning of subsections as appropriate to illustrate compliance.

The following appendices provided at the end of the Plan include information or explanations to support the main content of the Plan:

- Appendix A—Public outreach information used in preparation of this update
- Appendix B—The 2015 Progress Report.

# 2. PLAN UPDATE—WHAT HAS CHANGED

## 2.1 THE PREVIOUS PLAN

Several factors initiated the first hazard mitigation planning effort for the City of Roseville:

- The Roseville area has significant exposure to numerous natural hazards that have caused millions of dollars in past damage.
- Limited local resources make it difficult to be pre-emptive in risk reduction actions. Being able to leverage federal financial assistance is paramount to successful hazard mitigation in the area.
- The City wanted to be proactive in its preparedness for natural hazards.

With these factors in mind, the City of Roseville committed to the preparation of its initial plan by attaining grant funding for the effort and then securing technical assistance to complete a planning process that complied with all requirements. Five years later, the City followed a similar process to update the Plan.

Due to the success of the 2005 effort, no major changes were made to the Plan's approach and function during the 2011 planning process. The 2011 update enhanced the 2005 effort but remained consistent on discussion points for each hazard of concern. The 2011 Plan format changed to address required elements for plan updates. A major addition to the 2011 Plan, per recommendations from FEMA Region IX, was the inclusion of dam failure as a hazard of concern.

The 2011 Plan update followed a phased approach to planning per FEMA's July 2008 *Local Hazard Mitigation Planning Guidance*.

## 2.2 MITIGATION SUCCESS STORIES

One of the principal objectives of the initial plan was to create a plan that would help the City achieve the highest possible rating under FEMA's Community Rating System (CRS) program. The CRS program has stringent requirements for Classes 4 or better, and especially for Class 1. Several of these requirements are related to planning, and the initial plan was developed to meet these requirements. The Insurance Services Office (ISO), which performs classification reviews for the CRS, determined that the initial plan met the Class 1 requirements. In December 2005, the City was verified with sufficient credit to become the nation's first and only CRS Class 1 community. This classification went into effect on October 1, 2006, and was confirmed again during the re-verification process in 2008, and most recently in 2014. As of the writing of this Plan, the City of Roseville maintains its status as the nation's only CRS Class 1 community.

Detailed accounts of other successful mitigation actions completed by the City during each reporting period are included in the progress reports on the previous hazard mitigation plan, including the 2015 Progress Report contained in Appendix B of this Plan.

## 2.3 WHY UPDATE?

### 2.3.1 Federal Eligibility

Under 44 CFR, hazard mitigation plans must present a schedule for monitoring, evaluating, and updating the Plan. This provides an opportunity to reevaluate recommendations, monitor the impacts of actions that have been accomplished, and determine if there is a need to change the focus of mitigation strategies. A jurisdiction covered by a plan that has expired is not able to pursue elements of federal funding under the Robert T. Stafford Act for which a current hazard mitigation plan is a prerequisite.

### 2.3.2 Changes in Development

Hazard mitigation plan updates must be revised to reflect changes in development within the planning area during the previous performance period of the Plan (44 CFR Section 201.6(d)(3)). The Plan must describe changes in development in hazard-prone areas that increased or decreased vulnerability since the last plan was approved. If no changes in development impacted the jurisdiction's overall vulnerability, then plan updates may validate the information in the previously approved plan. The intent of this requirement is to ensure that the mitigation strategy continues to address the risk and vulnerability of existing and potential development and takes into consideration possible future conditions that could impact vulnerability.

The Roseville planning area experienced a 31-percent increase in population between 2003 and 2013, an average annual growth rate of 3.1 percent per year (Placer County Office of Economic Development, 2014). The City has adopted a comprehensive plan that governs land-use decisions and policy-making, as well as a building code and specialty ordinances based on state and federal mandates. This Plan update assumes that some new development triggered by the increase in population occurred in hazard areas. Because all such new development would have been regulated pursuant to local programs and codes, it is assumed that vulnerability did not increase even if exposure did.

## 2.4 THE UPDATED PLAN—WHAT IS DIFFERENT?

The updated Plan differs from the initial plan in a variety of ways:

- **Climate Change Impacts**—The most recent version of the California hazard mitigation plan noted specific hazards that are created or augmented by the environmental impacts of climate change. Additionally, the recent passage of Senate Bill 379 brings the effects of climate change into focus as it relates to mitigation and general planning. As a result, instead of briefly reviewing the impact of climate change in each individual hazard profile, this 2016 Plan update dedicates a comprehensive chapter to the issue of climate change and its effects on the state-identified climate-related hazards.
- **Drought Chapter Enhancements**—Enhancements to the drought Chapter were made to reflect current, historic drought conditions of the stat, region, and city. This information was supplemented with new information provided by the City's 2015 Urban Water Management Plan (UWMP) update.
- **Public Engagement Enhancements through Social Media** —Social media platforms not available during the previous planning initiative were used to enhance public outreach capabilities.
- **Planning Area Changes**—The City adopted 3 new Specific Plans since the previous plan update. As such, all development and demographic information will include data pertaining to these new Specific Plan Areas of Sierra Vista, Creekview, and Amaruso Ranch.
- **Separation of Natural from Non-natural Hazards**—In an effort to draw distinction from the natural hazards from the non-natural hazards, the non-natural hazards (Human Caused and Human Health Hazards) are placed after the natural hazards instead of listed alphabetically with the natural hazards.

- **Human-Caused Hazards**—The human-caused hazards noted in the 2011 effort were updated for the 2016 Plan. These human-caused hazards were moved within the document to after the natural hazards due to the difference in assessing risk. Cyber threat was included as a new human-caused hazard, due to the increase in connectivity, technological advances, and emergence of “hacktivist” groups.
- **Human Health Hazards**—The human health hazards noted in the 2011 effort were updated for the 2016 Plan. These human health hazards were moved within the document to after the natural hazards due to the difference in assessing risk. Ebola was included as a new human health hazard due to the 2014 West Africa Ebola outbreak that threatened the United States, though that threat never fully materialized. Zika virus is included in the discussion, as well.
- **Additional Demographic Information**—Additional demographic data are included—beyond age and disability/access and function need—addressing Roseville’s industry, business and institutional footprint. Employment trends and occupations are included to develop a fuller understanding of the population of Roseville.
- **Disabilities, Access and Functional Need Language Revision**—The entire Plan was updated to reflect appropriate references when discussing individuals with disabilities and others with access and functional needs. This includes person-first language and references to individuals instead of the more general term of populations.
- **Guiding Principle**—A guiding principle for the hazard mitigation plan was developed. The goals and objectives of the Plan support the guiding principle.

Table 2-1 indicates the major changes between the 2011 and 2016 plans as they relate to 44 CFR planning requirements.

**Table 2-1.** Plan Changes Crosswalk

| 44 CFR Requirement | Previous Plan (2011) | Updated Plan (2016) |
|---|---|---|
| **§201.6(b): In order to develop a more comprehensive approach to reducing the effects of natural disasters, the planning process shall include:**<br>• **An opportunity for the public to comment on the Plan during the drafting stage and prior to Plan approval;**<br>• **An opportunity for neighboring communities, local and regional agencies involved in hazard mitigation activities, and agencies that have the authority to regulate development, as well as businesses, academia and other private and non-profit interests to be involved in the planning process; and**<br>• **Review and incorporation, if appropriate, of existing plans, studies, reports, and technical information.** | The plan development process deployed under this update was similar to the 2005 Plan. Chapters 1, 2, and 3 describe the planning process for the 2011 updated Plan. | The plan development process deployed under this update was similar to the 2011 Plan; however, additional public outreach initiatives were conducted through new social media platforms. Chapters 1, 2, and 3 describe the planning process for the 2016 updated Plan. |

| 44 CFR Requirement | Previous Plan (2011) | Updated Plan (2016) |
|---|---|---|
| **§201.6(c)(2): The Plan shall include a risk assessment that provides the factual basis for activities proposed in the strategy to reduce losses from identified hazards. Local risk assessments must provide sufficient information to enable the jurisdiction to identify and prioritize appropriate mitigation actions to reduce losses from identified hazards.** | Chapters 6 through 15 presents a risk assessment of eight hazards of concern: Climate change, dam failure, drought, earthquake, flood, landslide, severe weather, and wildfire. These hazards are profiled as they impact Roseville. Additionally, human-caused and health hazards were qualitatively assessed to develop a more complete picture of the hazards facing the county. | The 2016 Plan presents a risk assessment of the same hazards as the 2011 Plan—in Chapters 6 through 16. Each hazard was updated with new occurrence information from 2011 through 2015 where applicable, and a new comprehensive risk assessment was conducted using updated building stock, demographics, and land use information. |
| **§201.6(c)(2)(i): [The risk assessment shall include a] description of the … location and extent of all natural hazards that can affect the jurisdiction. The Plan shall include information on previous occurrences of hazard events and on the probability of future hazard events.** | Chapters 6 through 15 presents a risk assessment of each hazard of concern. Each chapter includes the following components:<br>• Hazard profile-including maps of extent and location, historical occurrences, frequency, severity and warning time.<br>• Secondary hazards<br>• Climate change impacts<br>• Exposure of people, property, critical facilities and environment.<br>• Vulnerability of people, property, critical facilities and environment.<br>• Future trends in development<br>• Scenarios<br>• Issues | The 2016 Plan presents a risk assessment of the same hazards as the 2011 Plan—from Chapters 6 through 16.<br>Each hazard was updated with new occurrence information from 2011 through 2015 where applicable, and a new comprehensive risk assessment was conducted using updated building stock, demographics, and land use information.<br>Climate change impacts were omitted from the individual hazards of concern, as the new climate change chapter provides a more detailed and comprehensive overview of climate change impacts for identified hazards. |
| **§201.6(c)(2)(ii): [The risk assessment shall include a] description of the jurisdiction's vulnerability to the hazards described in paragraph (c)(2)(i). This description shall include an overall summary of each hazard and its impact on the community** | Vulnerability was assessed for all hazards of concern. The Hazus-MH computer model was used for the dam failure, earthquake and flood hazards. These were Level 2 user-defined analyses using City data.<br>Site-specific data on City-identified critical facilities was entered into the Hazus model.<br>Hazus outputs were generated for other hazards by applying an estimated damage function to an asset inventory was extracted from Hazus-MH. | Vulnerability was again assessed for all hazards of concern using the Hazus-MH computer model for dam failure, earthquake, and flood hazards. Level 2 analysis was again conducted for these hazards.<br>Site-specific data on City-identified critical facilities was entered into the Hazus model.<br>Hazus outputs were generated for other hazards by applying an estimated damage function to an asset inventory extracted from Hazus-MH. All assets were updated using current available data. |
| **§201.6(c)(2)(ii): [The risk assessment] must also address National Flood Insurance Program insured structures that have been repetitively damaged floods** | The Plan includes a comprehensive analysis of repetitive loss areas that includes an inventory of the number and types of structures in the repetitive loss area.<br>Repetitive loss areas are delineated, causes of repetitive flooding are cited, and these areas are reflected on maps | The Plan includes a comprehensive analysis of repetitive loss areas that includes an inventory of the number and types of structures in the repetitive loss area.<br>Repetitive loss areas are delineated, causes of repetitive flooding are cited, and these areas are reflected on maps. |

| 44 CFR Requirement | Previous Plan (2011) | Updated Plan (2016) |
|---|---|---|
| **§201.6(c)(2)(ii)(A): The plan should describe vulnerability in terms of the types and numbers of existing and future buildings, infrastructure, and critical facilities located in the identified hazard area.** | A complete inventory of the numbers and types of buildings exposed was generated for each hazard of concern. The Steering Committee defined "critical facilities" for the planning area, and these were inventoried by exposure. Each hazard chapter provides a discussion on future development trends. | Building inventory was updated and the Steering Committee revised the critical facilities definition to reflect 2016 priorities. Each hazard chapter again provides a discussion on future development trends. |
| **§201.6(c)(2)(ii)(B): [The plan should describe vulnerability in terms of an] estimate of the potential dollar losses to vulnerable structures identified in paragraph (c)(2)(i)(A) and a description of the methodology used to prepare the estimate.** | Loss estimations in terms of dollar loss were generated for all hazards of concern. These were generated by Hazus-MH for the dam failure, earthquake and flood hazards. For the other hazards, loss estimates were generated by applying a regionally relevant damage function to the exposed inventory. In all cases, a damage function was applied to an asset inventory.<br>The asset inventory was the same for all hazards and was generated in Hazus. | Loss estimates were recalculated using new data and the new asset inventory. |
| **§201.6(c)(2)(ii)(C): [The plan should describe vulnerability in terms of] providing a general description of land uses and development trends within the community so that mitigation options can be considered in future land use decisions.** | There is a discussion on future development trends as they pertain to each hazard of concern. This discussion looks predominantly at the existing land use and the current regulatory environment that dictates this land use. | The Plan contains a discussion on development trends from the previous planning period, through future trends anticipated in the next five years as they pertain to each hazard. |
| **§201.6(c)(3): The plan shall include a mitigation strategy that provides the jurisdiction's blueprint for reducing the potential losses identified in the risk assessment, based on existing authorities, policies, programs and resources, and its ability to expand on and improve these existing tools.** | The Plan contains a guiding principal, goals, objectives and actions. The actions strive to meet multiple objectives. The objectives are broad and overarching; each meets multiple goals and stands alone as a component of the Plan. The City of Roseville completed a capability assessment that looks at its regulatory, technical and financial capabilities. | The Steering Committee reviewed the 2011 guiding principle, goals, objectives, and actions and made minor adjustments to reflect 2016 priorities.<br>The City of Roseville updated its capability assessment to reflect regulatory revisions and new initiatives. |
| **§201.6(c)(3)(i): [The hazard mitigation strategy shall include a] description of mitigation goals to reduce or avoid long-term vulnerabilities to the identified hazards.** | The Steering Committee identified a guiding principal, goals and objectives. | The Steering Committee reviewed the 2011 guiding principle, goals, objectives, and actions and made minor adjustments to reflect 2016 priorities. |
| **§201.6(c)(3)(ii): [The mitigation strategy shall include a] section that identifies and analyzes a comprehensive range of specific mitigation actions and projects being considered to reduce the effects of each hazard, with particular emphasis on new and existing buildings and infrastructure.** | Chapter 18 includes a hazard mitigation catalog that was developed through a facilitated process. This catalog identifies actions that manipulate the hazard, reduce exposure to the hazard, reduce vulnerability, or increase mitigation capability. The catalog further segregates actions by scale of implementation. A table in the action plan section analyzes each action by mitigation type to illustrate the range of actions selected. | The hazard mitigation catalog developed in 2011 was enhanced with results of the 2016 planning effort focusing on updated program capabilities and the dam failure and cyber threat hazards. |
| **§201.6(c)(3)(ii): [The mitigation strategy] must also address the jurisdiction's participation in the National Flood Insurance Program, and continued compliance with the program's requirements, as appropriate.** | The City of Roseville has identified an action stating its commitment to maintain compliance and good standing under the National Flood Insurance Program. Additionally, the City identified multiple actions to maintain its Class 1 standing under the CRS program. | The City of Roseville has identified an action stating its commitment to maintain compliance and good standing under the National Flood Insurance Program. Additionally, the City identified multiple actions to maintain its Class 1 standing under the CRS program. |

| 44 CFR Requirement | Previous Plan (2011) | Updated Plan (2016) |
|---|---|---|
| **§201.6(c)(3)(iii): [The mitigation strategy shall describe] how the actions identified in Section (c)(3)(ii) will be prioritized, implemented, and administered by the local jurisdiction. Prioritization shall include a special emphasis on the extent to which benefits are maximized according to a cost benefit review of the proposed projects and their associated costs.** | Each recommended initiative is prioritized using a qualitative methodology that looked at the objectives the project will meet, the timeline for completion, how the project will be funded, the impact of the project, the benefits of the project and the costs of the project. This prioritization scheme is detailed in Chapter 19. | The updated Plan uses the same qualitative approach to prioritization as used for the 2011 Plan. |
| **§201.6(c)(4)(i): [The plan maintenance process shall include a] section describing the method and schedule of monitoring, evaluating, and updating the mitigation plan within a five-year cycle.** | Chapter 7 details a plan maintenance strategy | Chapter 19 retains the plan maintenance strategy developed in 2011. |
| **§201.6(c)(4)(ii): [The plan shall include a] process by which local governments incorporate the requirements of the mitigation plan into other planning mechanisms such as comprehensive or capital improvement plans, when appropriate.** | Chapter 7 details recommendations for incorporating the Plan into other planning mechanisms such as:<br>• General plan<br>• Emergency response plan<br>• Capital improvement programs<br>• Municipal code<br>• Stormwater Master Plan<br>This chapter additionally discusses current and future integration opportunities. | Recommendations are provided for incorporating the Plan into other planning mechanisms. This update additionally discusses current and future integration opportunities. |
| **§201.6(c)(4)(iii): [The plan maintenance process shall include a] discussion on how the community will continue public participation in the plan maintenance process.** | Chapter 7 details a comprehensive strategy for continuing public involvement. | A comprehensive strategy is provided for continuing public involvement with additional information regarding social media. |
| **§201.6(c)(5): [The local hazard mitigation plan shall include] documentation that the plan has been formally adopted by the governing body of the jurisdiction requesting approval of the plan (e.g., City Council, County Commission, Tribal Council).** | Chapter 6 contains the resolution for adoption of this Plan. | The implementation chapter for this update contains the resolution of adoption. |

# 3. PLAN UPDATE APPROACH

Local governments are required to review and revise their hazard mitigation plans and resubmit them for approval within five years in order to remain eligible for mitigation project grant funding (44 CFR §201.6(d)(3)). FEMA's July 2008 *Local Hazard Mitigation Planning Guidance* outlines five phases for updates:

- Phase 1—Organize resources
- Phase 2—Update the risk assessment
- Phase 3—Engage the public
- Phase 4—Assemble the updated Plan
- Phase 5—Plan adoption/implementation.

Phases 1 through 4 are discussed in the following sections. The elements of Phase 5 are described in Chapter 19.

## 3.1 PLANNING RESOURCE ORGANIZATION

The first phase of planning was to organize needed resources. This phase had the following primary objectives:

- Secure grant funding
- Form a planning team
- Confirm political support for the process
- Establish a steering committee
- Coordinate with other agencies
- Review existing programs.

### 3.1.1 Internal Funding

The planning effort was made possible through local funds for the City of Roseville.

### 3.1.2 Formation of the Planning Team

The City hired Tetra Tech, Inc. as a consultant to assist with the 2016 Plan update. The Tetra Tech project manager acted as lead project planner, reporting directly to a City project manager. Once the technical assistance was secured, a planning team made up of the following members was formed to lead the planning effort:

- Rob Jensen (Roseville City Manager's Office)—City Manager, project oversight
- Carl Walker (City of Roseville Department of Public Works)—Floodplain management
- Jason Rizzi (City of Roseville Fire Department)—Emergency preparedness
- Wayne Wiley (City of Roseville Development Services Department)-City planning lead
- Rob Flaner (Tetra Tech)—Lead project planner
- Carol Baumann (Tetra Tech)—Hazus-MH/GIS lead
- Jessica Cerutti (Tetra Tech)—Hazard Identification and profiling
- Dan Portman (Tetra Tech)—Lead editor.

## 3.1.3 The Steering Committee

Hazard mitigation planning is one of the best ways to enhance collaboration and gain support among the parties whose interests might be affected by hazard losses. By working together, a broad range of stakeholders can identify and create partnerships that pool resources to achieve a common vision for the community. The Steering Committee that oversaw development of the initial plan remained intact during the performance period of that plan and subsequently provided oversight for the 2011 Plan. For this 2016 update process, some new members were added and some previous members left the committee. Table 3-1 lists the 2016 Steering Committee members.

**Table 3-1.** Steering Committee Members

| Name | Title | Jurisdiction/Agency |
|---|---|---|
| **Grace Keller**[a] | Citizen | Community Emergency Response Team |
| **Wayne Wiley**[b] | Associate Planner | The City of Roseville Development Services |
| **Rob Jensen** | City Manager | The City of Roseville City Manager's Office |
| **Jason Rizzi** | Emergency Preparedness Manager | City of Roseville Fire Department |
| **Carl Walker** | Senior Civil Engineer | The City of Roseville Public Works |
| **Helen Dyda** | Public Information Specialist | City of Roseville Communications |
| **Jaime Garrett** | Fire Department Public Information Officer | City of Roseville Fire Department |
| **Erik Angle** | Emergency Preparedness Manager | Sutter Roseville Medical Center |
| **Brenette Macintosh** | Safety Officer | Consolidated Communications |
| **Mark Lacher** | Risk Manager | Consolidated Communications |
| **Jim Williams** | Citizen | Meadow Oaks Neighborhood Association |
| **Joseph Van Zant** | Citizen/Hazardous Materials Consultant | Roseville Coalition of Neighborhood Associations |
| **Rod Rodriguez** | Senior Emergency Services Specialist | Placer County Office of Emergency Services |
| **Rick Stalker** | Stalker & Burnett RE Group | Placer County Association of Realtors |
| **Michael Algots** | Manager, Hazardous Materials | Union Pacific Railroad |

a. Steering Committee Chairperson
b. Steering Committee Vice Chairperson

Leadership roles and ground rules were reconfirmed during the Steering Committee's initial meeting for the plan update on November 3, 2015. The Steering Committee agreed to meet on the first Tuesday of every month as needed throughout the course of the 2016 Plan's development. The planning team facilitated each Steering Committee meeting, which addressed a set of objectives based on the work plan established for the update. The Steering Committee met six times from November 2015 through June 2016. Meeting agendas, minutes and attendance logs are available for review. All Steering Committee meetings were open to the public, and agendas and meeting minutes were posted to the internet.

## 3.1.4 Coordination with Other Agencies

Coordination with other local, state and federal agencies involved in hazard mitigation in the region helped to ensure consistency with other ongoing efforts. 44 CFR requires that opportunities for involvement in the planning process be provided to neighboring communities, local and regional agencies involved in hazard mitigation, agencies with authority to regulate development, businesses, academia, and other interests (Section 201.6.b.2). Agency coordination was accomplished as follows:

- **Steering Committee Involvement**—Agency representatives were invited to participate on the Steering Committee.

- **Coordination with Placer County**—Placer County had recently finished updating its multi-jurisdictional hazard mitigation plan and was invited to join the Steering Committee. County staff were able to provide insight into lessons learned through the County's update process. The County's involvement also allowed for integration between the two plan updates.
- **Agency Notification**—The following agencies were invited to participate in the process and were kept apprised of plan development milestones:
  - FEMA Region IX
  - California Governor's Office of Emergency Services (Cal OES)
  - California Department of Water Resources
  - Placer County Office of Emergency Services
  - Placer County Flood Control District
  - Placer County Office of Education
  - Sacramento County Department of Water Resources
  - City of Rocklin
  - City of Citrus Heights
  - Roseville City School District
  - Eureka School District
  - Dry Creek School District
  - Center School Districts
  - Roseville Joint Union High School District
  - U.S. Bureau of Reclamation

  All of these agencies received meeting announcements, meeting agendas, and meeting minutes by e-mail throughout the plan development process. This approach proved to be beneficial when these agencies supported the effort by attending meetings or providing feedback on issues. All of these agencies were also informed about the plan update web page for up-to-date information.

- **Pre-Adoption Review**—All the agencies listed above were provided means to review and comment on the mitigation action plan for the 2016 Plan. The predominant means for this review was through the project web page. Each agency was sent an e-mail informing them that draft portions of the update were available for review. In addition, the complete draft plan was sent for a pre-adoption review to FEMA Region IX, the ISO, and the Placer County Office of Emergency Services. No immediate comments were received from these agencies during the pre-adoption public review period.

## 3.1.5 Review of Existing Programs

Hazard mitigation planning must include review and incorporation, if appropriate, of existing plans, studies, reports and technical information (44 CFR Section 201.6.b(3)). Chapter 4 of this Plan provides a review of laws and ordinances in effect within the planning area that can affect hazard mitigation actions, as well as an assessment of the City's regulatory, technical and financial capabilities to implement hazard mitigation actions.

Of particular interest for the plan update effort are the City of Roseville General Plan, the City of Roseville Emergency Response Plan (an emergency support function-based plan that directs emergency response actions in the planning area), and the State of California 2013 Enhanced Hazard Mitigation Plan.

One of the Steering Committee's first action items was to review the State of California Enhanced Hazard Mitigation Plan and all of the progress reports completed during the performance period for the initial plan. The Steering Committee identified hazards listed in the state plan to which the Roseville area is susceptible, in order to determine if there was a need to expand the scope of the risk assessment. The committee also reviewed the goals, objectives and strategies of the state plan in order to select goals, objectives, and actions for the City's Plan that are consistent with those of the state.

Each annual progress report for the initial plan contains a section that recommends changes or enhancements to the Plan or plan development process. These reports effectively completed a key step of the plan update process before the update process began—identifying needs for changes or enhancements.

## 3.2 RISK ASSESSMENT UPDATE

Local hazard mitigation plans must provide sufficient hazard and risk information to identify and prioritize appropriate actions to reduce hazard-related losses. This includes detailed descriptions of all the hazards that could affect the jurisdiction, along with an analysis of the jurisdiction's vulnerability to those hazards. The update of the risk assessment is typically the most involved part of the plan update process.

FEMA planning guidance specifies comprehensive updates to the risk assessment portion of local hazard mitigation plans if there have been new technical data pertaining to a hazard developed by a creditable source since the plan's initial development or previously completed update. Updated risk assessment efforts for the 2016 Plan included the following:

- The latest version (2.2) of FEMA's Hazus-MH risk assessment software was used to enhance the risk assessments for the flood, dam and earthquake hazards.
- All hazards of concern were updated with new relevant data.
- The Hazus default general building stock was updated using current address point, building footprint, parcel and tax assessor data.

A detailed description of the methodology deployed in the update of the risk assessment is provided in Chapter 5.

## 3.3 PUBLIC INVOLVEMENT

Broad public participation in the planning process helps ensure that diverse points of view about the planning area's needs are considered and addressed. The public must have opportunities to comment on disaster mitigation plans during the drafting stages and prior to plan approval (44 CFR, Section 201.6(b)(1)). The Community Rating System expands on these requirements by making CRS credits available for optional public involvement activities.

### 3.3.1 Strategy

The Steering Committee drafted a comprehensive public involvement strategy for this update using multiple media sources. This strategy was built upon the Steering Committee's perception of what was effective during development of the update, in addition to the use of social media as a major message distribution vehicle. The planning team identified stakeholders to target through the multi-disciplinary public involvement strategy. The strategy for involving the public in the development of the Plan emphasized the following elements:

- Include members of the public on the Steering Committee.
- As was done for the previous update, use a survey to reassess the public's perception of risk and support of hazard mitigation and to get direction on alternatives.
- Hold public meetings to describe the plan update process and progress and to collect input from a wide range of the public.
- Develop a unified message for distribution on social media platforms.
- Attempt to reach as many citizens in the planning area as possible through the use of multiple media, including websites and brochures.

#### Steering Committee

Eleven of the fourteen members of the Steering Committee live or work in the City of Roseville. This body has provided a mechanism for continuing public involvement in the maintenance of the Plan by meeting annually to monitor the progress of the plan implementation and creating annual progress reports. The ongoing participation of some members from the time that the initial plan was developed provided a valuable historical perspective for the committee during the update process. All Steering Committee meetings were open to the public and advertised on the City's hazard mitigation plan website. The Steering Committee met six times during the course of the plan update process. One of the meetings was attended by two members of the public. Steering Committee documentation can be found in Appendix C.

## Survey

The Steering Committee elected to use a survey for the update process to collect new information from the public about household preparedness for hazards, the level of knowledge about tools and techniques for reducing loss from hazards, and areas of public concern about hazards.

The Steering Committee reviewed the previous survey and requested a simplification of the process to keep residents engaged while ensuring the collection of useful information. The survey asked 26 quantifiable questions and provided opportunities for written comment. The final survey used some of the same questions asked on the initial survey, which helped to show whether citizens' perception of risk and vulnerability has changed over the last five years. The survey also revised some questions to support the plan update process and fulfill the Steering Committee's request for simplification.

The web-based survey tool "Survey Monkey" was used to set up and deploy the survey. The survey was made available to all citizens of Roseville via a web-link posted on the City's website, advertised via press releases, sent via e-mail to community residents, and linked through various forms of social media, including Nextdoor, a geographically based social media website. Over 670 surveys were completed during the course of the plan update process. These results were distributed to the Steering Committee during the strengths, weaknesses, obstacles and opportunities session to inform the Steering Committee of public concerns and opportunities for new public engagement strategies. Multiple survey respondents indicated concern about radon, which the Steering Committee will consider adding as a hazard of concern during the next plan update. The survey and a summary of its findings are provided in Appendix A.

## Public Meetings

Participation in a well-attended community event was used as the vehicle to introduce the plan update process, to share the results of the revised risk assessment, and to gauge the public's perception of risk. A final public hearing was held at the end of the process to provide the public an opportunity to comment on the draft Plan.

### *Community Event Participation—Public Meeting*

A public meeting was held as part of the City of Roseville's Earth Day celebration on Saturday, April 16, 2016 from 10 a.m. to 3 p.m. at the Utility Exploration Center, 1501 Pleasant Grove Boulevard (see Figure 3-1 through Figure 3-4). The public meeting was an open-house-format meeting, allowing citizens to come and go as they pleased during the meeting time frame.

The principal objective of the meeting was to share the results of the revised risk assessment with the public, then gage their perception of risk by having them complete a survey. Multiple members of the Steering Committee and planning team were present to speak with residents and answer questions about the process and their risk. Hazus-MH work stations were set up, allowing citizens to see information on their property, including exposure and damage estimates for earthquake and flood events. The 20 property owners who elected to receive a risk assessment were provided printouts of this information for their properties. This tool was highly effective in illustrating risk to the public. This Earth Day event was well attended, with thousands in attendance. During this event, the planning team recorded direct contact and discussion regarding the Plan with 50 event attendees. One resident, a local veterinarian, requested additional information to share with her clients which was later provided to her in electronic form by the City.


**Figure 3-1.** Hazard Mitigation Booth

**Figure 3-2.** City of Roseville Earth Day Festival

**Figure 3-3.** Hazus-MH Work Station

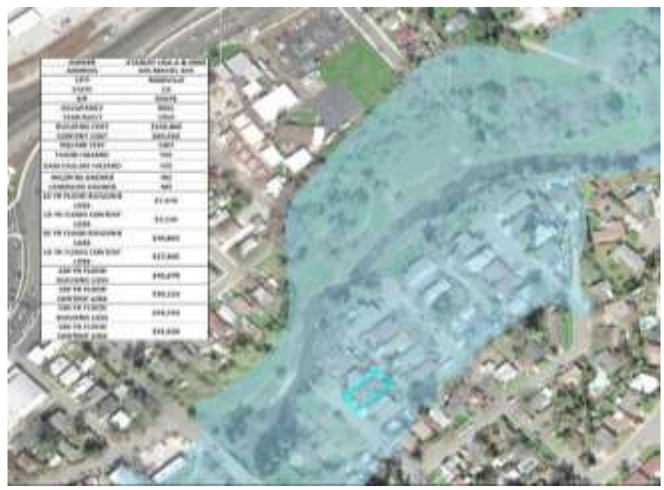

**Figure 3-4.** Sample Printout from Work Station

### *Public Comment Period*

Once the draft updated Plan was assembled, a comment period for public input was open from August 2, 2016 through August 19, 2016. The public comment period was advertised via the City website, a press-release, and through the use of social media. A public comment link was established on the City's Hazard Mitigation Plan website. During this public comment period, the City received one comment from the public on the Draft Plan regarding the dam failure chapter. This comment requested additional information regarding exposure and vulnerability to the hazard. The City of Roseville decided to address the comment directly with the individual with no change to the plan for dam facility operational security and safety. A copy of the exchange is available upon request.

## Use of Media

### *Press Releases*

Press releases were distributed over the course of the 2016 Plan's development as key milestones were achieved and prior to each public meeting.

### *Social Media*

Social media was identified by the Steering Committee as an appropriate method for spreading public messages. The Steering Committee decided to use multiple platforms to reach a variety of audiences:

- Twitter is a messaging platform that allows users to send brief messages to followers (Figure 3-5).
- Facebook is a social network that connects friends, businesses, and governments. The City of Roseville shared messages on its Public Safety Facebook page, allowing other government pages to share (Figure 3-6).
- Nextdoor is a neighborhood social network launched in 2013. On this platform, users must be confirmed members of a community. Once verified, neighbors can receive community updates from local government, share or sell unused goods, or coordinate community events. The City's public information specialists regularly used Nextdoor to engage Roseville's neighborhoods (Figure 3-7).

### *Internet*

The City used its web-based capabilities to keep the public apprised of the plan update process. Upon completion of the initial Plan, a permanent hazard mitigation plan website was established on the Roseville website (see Figure 3-8):

www.roseville.ca.us/HazardPlan

This page can be accessed from the City's home page using the site's search engine. This page housed all pertinent information on the hazard mitigation plan, its progress, and its implementation status. This site has proven to be a highly effective measure for ongoing public access to the Plan. The update scope of work was posted on the website during the update process, along with announcements of all key milestones of the plan update development. Steering Committee meeting announcements, agendas and meeting minutes were also made available on the site. This website also was the principal means of disseminating the survey for the 2016 Plan.

## 3.3.2 Public Involvement Results

The public involvement strategy used for the plan update introduced the concept of mitigation to the public and provided the Steering Committee with feedback to use in developing the Plan. All citizens of Roseville were provided ample opportunities to provide comment during all phases of this plan update process. Details of attendance and comments received from the public meeting are provided in Appendix A and summarized in Table 3-2. Detailed analysis of the survey findings from the 671 electronically submitted surveys is presented in Appendix A.

**Table 3-2.** Summary of Public Meetings

| Date | Location | Number of Citizens in Attendance | Number of Contacts Made |
|---|---|---|---|
| **April 16, 2016** | City of Roseville Earth Day | 5,000 | Over 50 |
| **August 2, 2016** | Steering Committee Meeting – Public Draft | 1 | 1 |


**Figure 3-5.** Twitter Survey Announcement


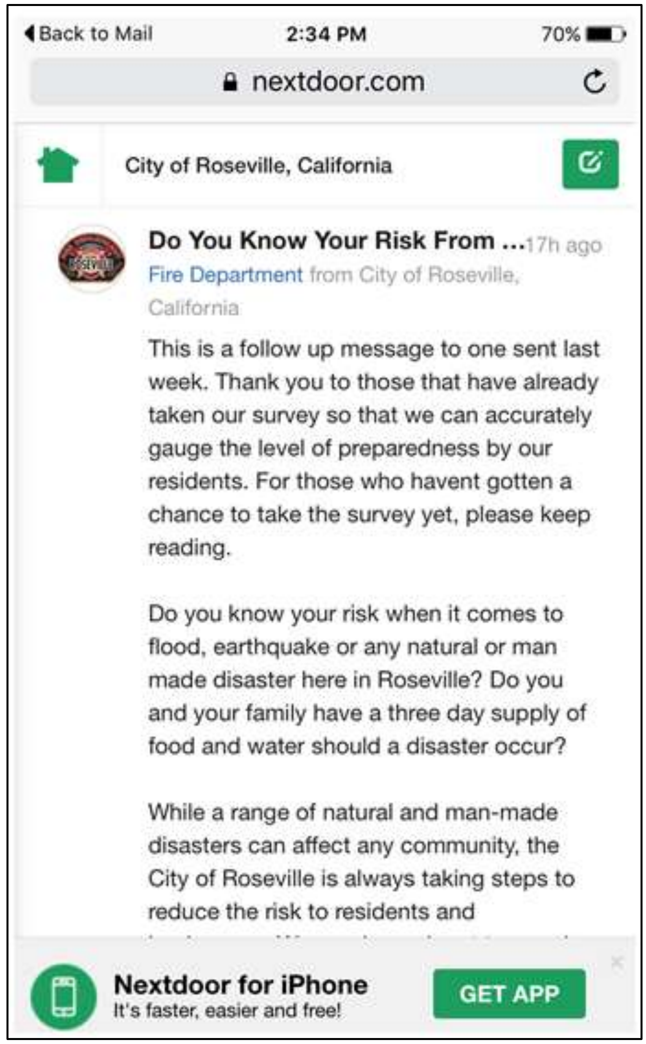


**Figure 3-6.** Facebook Survey Announcement

**Figure 3-7.** Nextdoor Survey Announcement

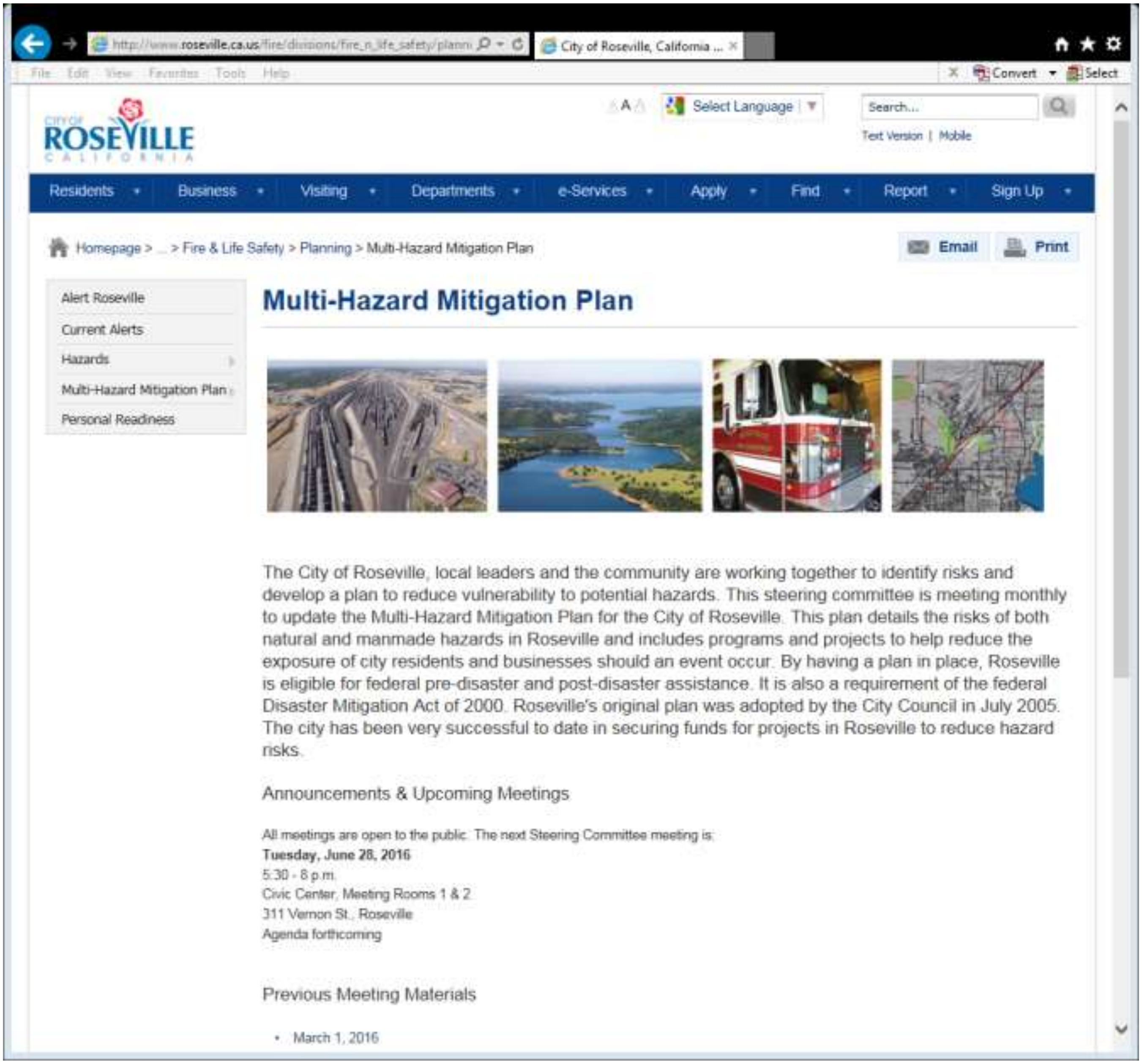


**Figure 3-8.** Sample Page from Hazard Mitigation Plan Website

## 3.4 ASSEMBLE THE UPDATED PLAN

The base format of the 2011 Plan was retained for the 2016 Plan. Enhancements were made to include the following components:

- The 2016 update provides a discussion on new mediums used to keep the public apprised of the Plan's actions during the project performance period.
- The 2016 update describes the need for changes to the risk assessment and what changes were made in comparison to the previous plan update.
- The update describes changes to risk exposure due to either of the following:

  - Successful mitigation projects
  - Changes in land use due to annexation or new development.

- The 2016 update describes changes to the action plan and the reasons for them.
- The 2016 update identifies completed, deleted, or deferred actions or activities from the previously approved plan as a benchmark for progress.
- The 2016 Plan includes in its evaluation and prioritization new mitigation actions identified since the previous plan update.
- To be compliant with California Senate Bill 379, the 2016 hazard mitigation plan includes linkage with the City's General Plan. The bill requires the update to include a set of goals, policies, and objectives based on a vulnerability assessment, identification of the risks that climate change poses to the local jurisdiction and the geographic areas at risk from climate change impacts, and specified information from federal, state, regional, and local agencies.

## 3.5 PLAN DEVELOPMENT CHRONOLOGY/MILESTONES

Table 3-3 summarizes important milestones in the plan update process.

**Table 3-3.** Plan Development Chronology/Milestones

| Date | Event | Description | Attendance |
|---|---|---|---|
| **2014** | | | |
| **9/23** | CRS re-verification visit | City undergoes its re-verification visit as the nation's only CRS Class 1 community. The Class 1 is re-verified by this process. | N/A |
| **2015** | | | |
| **10/18** | Selection of Tetra Tech as plan facilitation consultant through sole source contract | Technical assistance secured | N/A |
| **11/3** | 1st Steering Committee meeting | Reconfirm Steering Committee organization/ground rules<br>Review the plan update work plan<br>Risk assessment update<br>Review progress reports and state plan | 13 |
| **11/30** | 2nd Steering Committee meeting | Progress Report Recommendations<br>Hazards of Concern Confirmation<br>Guiding Principle/Vision/Mission Statement<br>Confirm Goals and Objectives<br>Public Involvement Strategy | 14 |
| **2016** | | | |
| **1/5** | 3rd Steering Committee Meeting | Risk Assessment Update<br>Public Involvement Strategy<br>Critical Facilities Definition<br>General Plan Update<br>Emergency Operations Plan Review<br>Debris Management Plan | 17 |
| **2/2** | 4th Steering Committee Meeting | Risk Assessment Update<br>Public Involvement Strategy, Survey Finalization<br>Public Involvement, PPI<br>Alternatives Analysis | 15 |
| **2/8** | Survey Deployment | The public survey was deployed via multiple platforms including City websites, Facebook, Nextdoor, Twitter, and public announcement. | N/A |
| **3/1** | 5th Steering Committee meeting | Risk assessment update<br>Public Involvement Strategy Update, Public Meeting (Strengths, weaknesses, obstacles and opportunities) | 16 |
| **4/16** | Public information open house—Roseville Earth Day | Public open house held at the Roseville Earth Day Festival at Mahany Park outside of the Roseville Utility Exploration Center, 1501 Pleasant Grove Boulevard, Roseville from 10:00 AM to 4:00 PM. Risk assessment data shared with the public as well as distribution of hazard specific information. | 50 |
| **8/2** | 6th Steering Committee meeting/Public Review Meeting | Review the public draft and launch the public comment period for the 2016 Plan | 13 |
| **8/19** | Public Comment Period Ends | Draft Plan posted on Hazard Mitigation Plan website.<br>Press release advertising public comment period | N/A |
| **9/01** | Plan review | Plan sent to Cal OES and ISO for review and approval pending adoption (APA) | N/A |
| **TBD** | Final public meeting and Plan adoption | APA Plan presented to City Council for adoption. The public was provided opportunity to provide comment prior to formal adoption. | ## |
| **TBD** | CRS approval | Plan was approved by ISO for CRS credit at ___ points | N/A |
| **TBD** | Final approval | FEMA granted final approval of the adopted plan | N/A |

# 4. CITY OF ROSEVILLE PROFILE

## 4.1 GEOGRAPHIC PROFILE

The City of Roseville lies to the west of the foothills of the Sierra Nevada Range, about 16 miles northeast of downtown Sacramento. It is the largest city in Placer County and has experienced considerable residential and commercial growth in the past two decades.

The focus of this Hazard Mitigation Plan is the primary planning area defined in the *City of Roseville General Plan 2035*. The planning area includes 43.39 square miles of incorporated lands and an additional 796 acres making up the City's sphere of influence, as shown in Figure 4-1. It is divided into smaller areas called "Specific Plan Areas" for which more detailed individual plans have been developed to implement the General Plan. The City of Roseville is unusual in that 14 specific plans have been adopted. These Plan Areas contain detailed design guidelines and development agreements to guide development and ensure that development is funded and built as planned.

Roseville is largely urbanized. The greatest area of undeveloped property is in the western portion of the City, which includes the remainder of the developing West Roseville Specific Plan, as well as planned specific Plan Areas including Sierra Vista, Creekview and Amoruso Ranch. The incorporated area and sphere of influence are the primary focus of General Plan policies, but "secondary planning areas" also bear relationship to Roseville planning efforts, depending on the planning issue. For example:

- For the issue of air quality, the secondary planning area includes the City and all areas outside the City that are within the associated Sacramento Valley air basin.
- For flood protection, the secondary planning area encompasses the complete drainage basins of surface waters that flow through Roseville.
- Other secondary planning areas encompass varying boundaries beyond the primary planning area for issues such as solid waste, recycling, transportation and wastewater treatment.

The City's area is characterized by gently sloping terrain with areas of steep ravines in the northeast, and relatively flat valley on the western portion of the City. It is segmented by topographical and physical features, including streams, natural parkways, open space, Interstate 80 and Highway 65, the Union Pacific railroad, and industrial facilities. Traffic is directed around several of these topographical features by bridges and an underpass. These limitations may create traffic congestion and delay emergency response. Heavy traffic congestion at peak commute times on the City's major roadways acts as a barrier to timely response for emergency services. In the event of an accident or other emergency at one of the key intersections between a road and a stream, freeway, or railway, sections of the City could be isolated or have response time slowed.

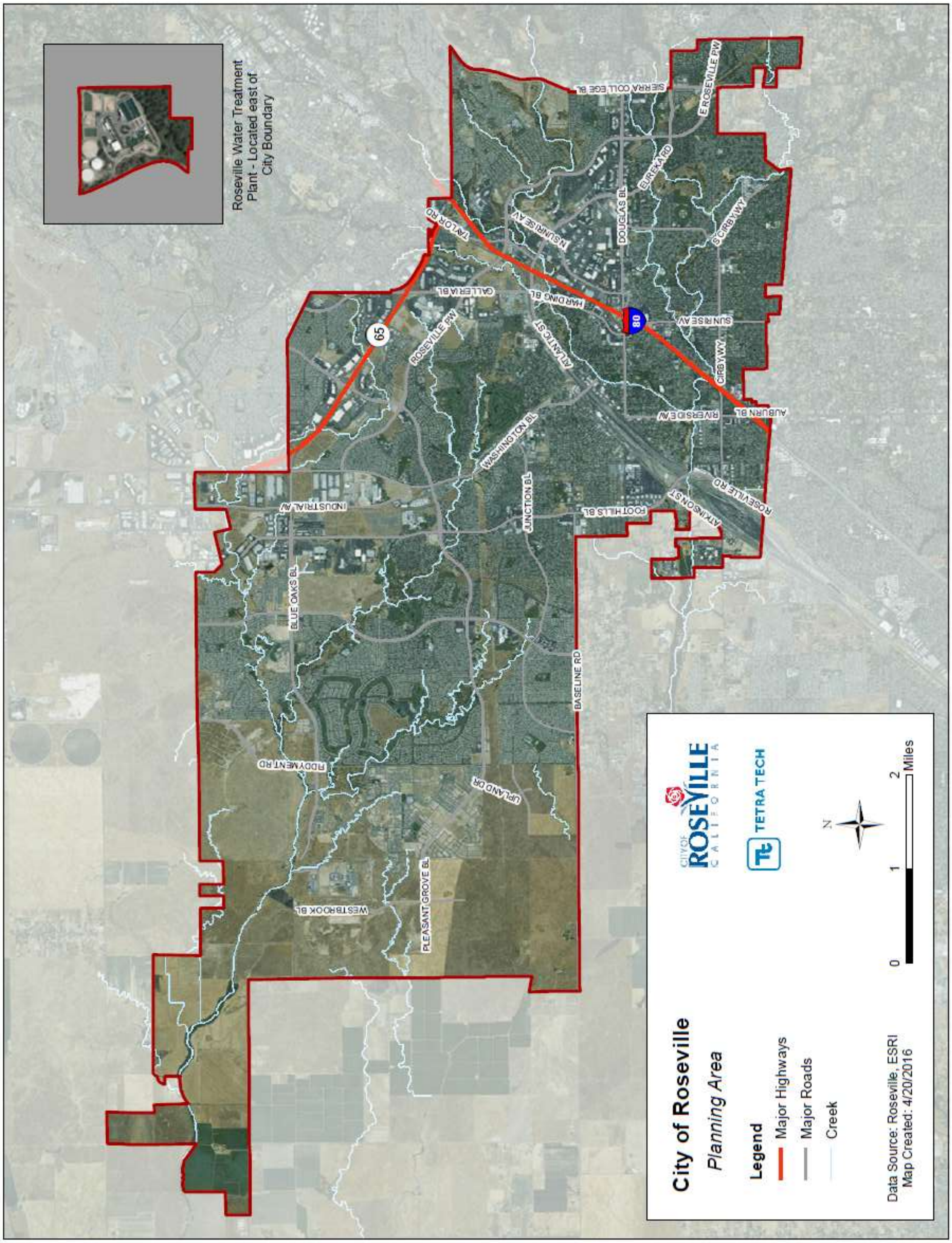


**Figure 4-1.** Roseville Planning Area

# 4.2 HISTORICAL OVERVIEW

## 4.2.1 Pre-Development

The Placer County region was first inhabited by the Maidu Indians, whose territory extended from the Sacramento River Valley to the Sierra Nevada Range. The Southern Maidu occupied the American River basin, along with the Bear and Yuba River basins in the area now recognized as the City of Roseville. An abundance of plants and animals supported the Maidu tribes' large population. Evidence of the Maidu communities still exists along the banks of Strap Ravine and Dry Creek.

## 4.2.2 Founding of the Community

Fur trapping expeditions came to the area in the early 1800s, and James Marshall discovered gold in the region in 1848. Some of the miners who came in search of gold became the area's first pioneers, taking up farming along the fertile creeks. Eventually, disease, gold miners and early settlers killed or forcibly removed the Maidu from their traditional lands. By 1864, track-laying crews from the Central Pacific Railroad had pushed eastward from Sacramento building the western half of the nation's first transcontinental railroad line. At the site of today's Roseville, the rails of the Central Pacific intersected with those of the California Central, a small line which then linked the towns of Folsom and Lincoln. The place where the two lines joined was labeled on railroad maps as "The Junction." The small freight and passenger center called Roseville developed around the junction.

For many years, Roseville remained a small railroad shipping point of about 250 inhabitants, centered on the train depot and a few small businesses and houses lining the two principal streets, Atlantic and Pacific. This changed between 1906 and 1908, when railroad roundhouse and repair facilities were moved to Roseville from nearby Rocklin. By 1908, the population increased to 2,000. New subdivisions were laid out to accommodate newcomers, many of whom moved from Rocklin. The business district expanded along Lincoln, Main, Church, and Vernon Streets. A chamber of commerce was organized to provide municipal services such as water, electricity, police and fire protection. In April 1909, the town incorporated and began to grow until it became Placer County's largest city.

## 4.2.3 Post-Incorporation Development

Railroad expansion continued, and local businesses grew as well. In the 1920s, the Pacific Fruit Express ice plant was the world's largest artificial ice plant. Also by the 1920s, the Southern Pacific Railroad boasted the largest freight marshaling yards west of the Mississippi River at Roseville. By the start of the Great Depression in 1929, Roseville's population had risen to 6,425.

During World War II, thousands of troop and munitions trains made their way through Roseville. The City continued to boom as a railroad center into the post-war years, but by the 1950s it faced competition from airlines and interstate trucking. The introduction of jet aircraft and the construction of Interstate 80 through Roseville caused the once-booming passenger train service to decline abruptly. The local depot was closed in 1972 and razed the following year. The Pacific Fruit Express ice plant closed in 1974, rendered obsolete by the introduction of self-refrigerating shipping options.

Completion of Roseville Community Hospital in 1952, the Folsom Dam in 1955, and the Roseville Freeway (Interstate 80) in 1956 gradually shifted the population away from downtown Roseville to what would become known as East Roseville. Roseville Square, the town's first shopping complex, was completed in 1961. Today, Roseville has more than 28 million square feet of commercial, office, and industrial floor space, and is ranked 10th statewide in total taxable retail sales.

In 1964, Roseville was selected as one of Look magazine's All America Cities. Roseville experienced a population surge in the 1980s as developers built up its broad expanses of cheap open land with easy transportation access. As the population expanded, so did the need for water, electrical, sewage, police, fire protection, recreational and educational services.

### 4.2.4 Current Conditions

The City has continued to grow outward. An expansive industrial zone lies north of Roseville adjacent to Highway 65, along with numerous corporate headquarters along Douglas Boulevard and the Johnson Ranch Road area. Although Roseville is no longer just a railroad town, the railroad remains a major factor in the local economy, and Roseville is still one of the principal railroad centers of the West. Passenger service was reintroduced in 1987 and a new intermodal depot facility was completed.

Today Roseville is an emerging urban center with a mix of residential and employment uses. The center of the City is typified by the downtown and small lot, single-family residences, while newer commercial and office development and larger suburban-type residences characterize the edges of town. As of January 2016, the California Department of Finance estimated the City's population to be 134,073—a 61-percent increase since 2000. It is anticipated that Roseville, along with the remainder of the South Placer/Sacramento Region, will continue to be the focus of significant development. Currently, the focus of new development is along the eastern, western, and northern portions of the community.

## 4.3 MAJOR PAST HAZARD EVENTS

Presidential disaster declarations are typically issued for hazard events that cause more damage than state and local governments can handle without assistance from the federal government, although no specific dollar loss threshold has been established for these declarations. A presidential disaster declaration puts federal recovery programs into motion to help disaster victims, businesses and public entities. Some of the programs are matched by state programs. Table 4-1 lists the presidential major disasters and other federal declarations since 1950 that have affected Placer County, according to Placer County's Multi-Hazard Mitigation Plan, Cal OES, and FEMA.

Review of these events helps identify targets for risk reduction and ways to increase a community's capability to avoid large-scale events in the future. Many natural hazard events do not trigger federal disaster declaration protocol but have significant impacts on their communities. These events are also important to consider in establishing recurrence intervals for hazards of concern.

## 4.4 PHYSICAL SETTING

### 4.4.1 Geology

Roseville is within the Great Valley and Sierra Nevada geomorphic provinces of California. Located on the east side of the Sacramento Valley, Roseville's geology consists of water deposited (alluvial) sediments from the erosion of the Sierra Nevada mountain range.

### 4.4.2 Soils

Soils in Roseville include some Quaternary (less than 1.8 million years old) sands, sandstones and mudstones, some Upper Tertiary (1.8 to 24 million years old) sandstones, mudstones and limestone, some Lower Tertiary (24 to 64 million years old) mudstones and sandstones, and Franciscan melange and serpentinite. These soils tends to be very dense or in some areas, soft rock. Some Quaternary muds, sands, gravels, silts and mud are located along 100-year floodplains. Soils in Roseville also include mehrten lava flow, which restricts permeability.

**Table 4-1.** Presidential Major Disaster, Emergency, and Fire Management Assistance Declarations

| Type of Event | FEMA Disaster # | Date |
|---|---|---|
| **Flooding** | DR-47 | 12/23/1955 |
| **Flooding** | DR-82 | 4/4/1958 |
| **Flooding** | DR-138 | 10/24/1962 |
| **Late Winter Storms/Flooding** | DR-145 | 2/7/1963 |
| **Late Winter Storms/Flooding** | DR-183 | 12/28/1964 |
| **1969 Storms** | DR-253 | 1/26/1969 |
| **Winter storms** | DR-682 | 2/9/1983 |
| **Spring Storms/Flooding** | DR-758 | 2/18/1986 |
| **Severe Winter Storms** | DR-1044 | 1/10/1995 |
| **Late Winter Storms** | DR-1046 | 1/13/1995 |
| **Winter Storms/Flooding** | DR-1155 | 1/4/1997 |
| **Sierra Fire** | FM-2463 | 9/19/2002 |
| **Stevens Fire** | FM-2541 | 8/8/2004 |
| **Hurricane Katrina Evacuations: Economic** | EM-3248 | 9/13/2005 |
| **Severe Rainstorms, Flooding, Landslides, and Mudslides** | DR-1628 | 2/3/2006 |
| **Severe Storms, Flooding, Landslides, and Mudslides** | DR-1646 | 6/5/2006 |
| **Wildfire** | FM-2786 | 9/1/2008 |
| **Wildfire** | FM-2832 | 8/31/2009 |

Source: FEMA, Placer County Multi-Hazard Mitigation Plan, 2016

### 4.4.3 Climate

Roseville and the northern Central Valley have a Mediterranean climate with warm, dry days and cool nights during the summer, when the average temperature is 93ºF during the day and 57ºF at night. In 2001, the California Energy Commission developed climate zones based on energy use, temperature, and other factors and created representative temperature data for each zone. Roseville is located in Zone 11: Red Bluff. As a whole, Zone 11 experiences sharply defined seasons with summers consisting of almost constant sunshine and dry air and winters with piercing winds and thick ground fog.

Table 4-2 presents a summary of annual climate conditions. Precipitation from May through October is rare, with most of the rainfall in the Greater Sacramento area, including Roseville, occurring between November and April. Prevailing winds in the summer can be light to gusty from the south. In the late summer and early fall, several wind events typically occur, with northerly winds that cause critical fire weather conditions in the City and surrounding areas.

## 4.5 DEVELOPMENT PROFILE

### 4.5.1 Land Use Policies

In addition to a considerable jump in residential growth, Roseville has experienced considerable growth in commercial and industrial development. Based on growth projections and current land use allocations in the General Plan, the City has sufficient development potential through 2035 for both residential and commercial uses. Typically residential land uses will be built out well before complete buildout of nonresidential land could occur, anticipated after 2050.

**Table 4-2.** Roseville Climate

| | Average High Temperature (°F) | Average Low Temperature (°F) | Record High Temperature (°F) | Record Low Temperature (°F) | Total Inches of Precipitation |
|---|---|---|---|---|---|
| **January** | 54 | 39 | 73 | 17 | 4.5 |
| **February** | 61 | 42 | 78 | 19 | 4.5 |
| **March** | 65 | 45 | 86 | 26 | 4.3 |
| **April** | 72 | 47 | 106 | 60 | 1.8 |
| **May** | 80 | 52 | 112 | 35 | 0.5 |
| **June** | 89 | 57 | 115 | 43 | 0.3 |
| **July** | 95 | 61 | 115 | 50 | 0.1 |
| **August** | 94 | 60 | 114 | 45 | 0.1 |
| **September** | 89 | 58 | 108 | 46 | 0.5 |
| **October** | 79 | 53 | 102 | 32 | 1.3 |
| **November** | 64 | 45 | 86 | 26 | 3.5 |
| **December** | 55 | 39 | 74 | 16 | 3.4 |
| **Annual Average or Total** | **77** | **51** | **100** | **36** | **24.8** |

Source: The Weather Channel

Numerous factors will influence growth throughout the South Placer County/Sacramento region:

- General economic conditions of the state
- Federal and state budget issues and cutbacks
- Competition from other growth areas
- Perceptions about the quality of life
- Housing costs and availability
- Employment opportunities
- Infrastructure and resource availability.

Management of the City's growth is guided by the Land Use Element of Roseville's General Plan, which consists of a land use map and land use policies. The overall goal of the Land Use Element is to promote a balanced and innovative land use pattern that retains and enhances the distinct character and identity of Roseville. It is organized into the following six components:

- **Existing Conditions and Projections—**Provides a description of the planning area, an existing land use inventory, and future projections.
- **Land Use Designations, Definitions and Standards—**Identifies and defines the City's land use categories, incorporating general use, development, intensity, siting, and compatibility standards.
- **Community Form—**Provides goals and policies to define and direct the future form and pattern of the City. Issues addressed include community character; relationship to transit and pedestrian uses; air quality; downtown and neighborhoods; jobs and housing; economic development; community involvement; and inter-jurisdictional coordination.
- **Community Design—**Includes goals and policies that address aesthetics and function; the integration of the built and natural environment; and community character. Emphasis is on the development of a design framework that reflects the City's goal of high quality, community-wide design.
- **Growth Management—**Focuses on the proactive management of growth in the community. Included is the identification of performance standards to regulate potential future growth areas. Policies addressing annexations and expansion of the City's sphere of influence are also included.

- **Relationship to Specific Plans—**Discusses the interrelationship between the General Plan and the City's Specific Plans.

The land use map included in the Land Use Element generally shows the City's existing and planned land use mix and pattern. The total land use allocation at buildout is shown in Figure 4-2. The land use map reflects only those policies that can be graphically shown. Land use decision-making is guided not only by the land use map but also by the goals, policies and implementation measures in the Land Use Element.

*Source: City of Roseville, General Plan, 2015*

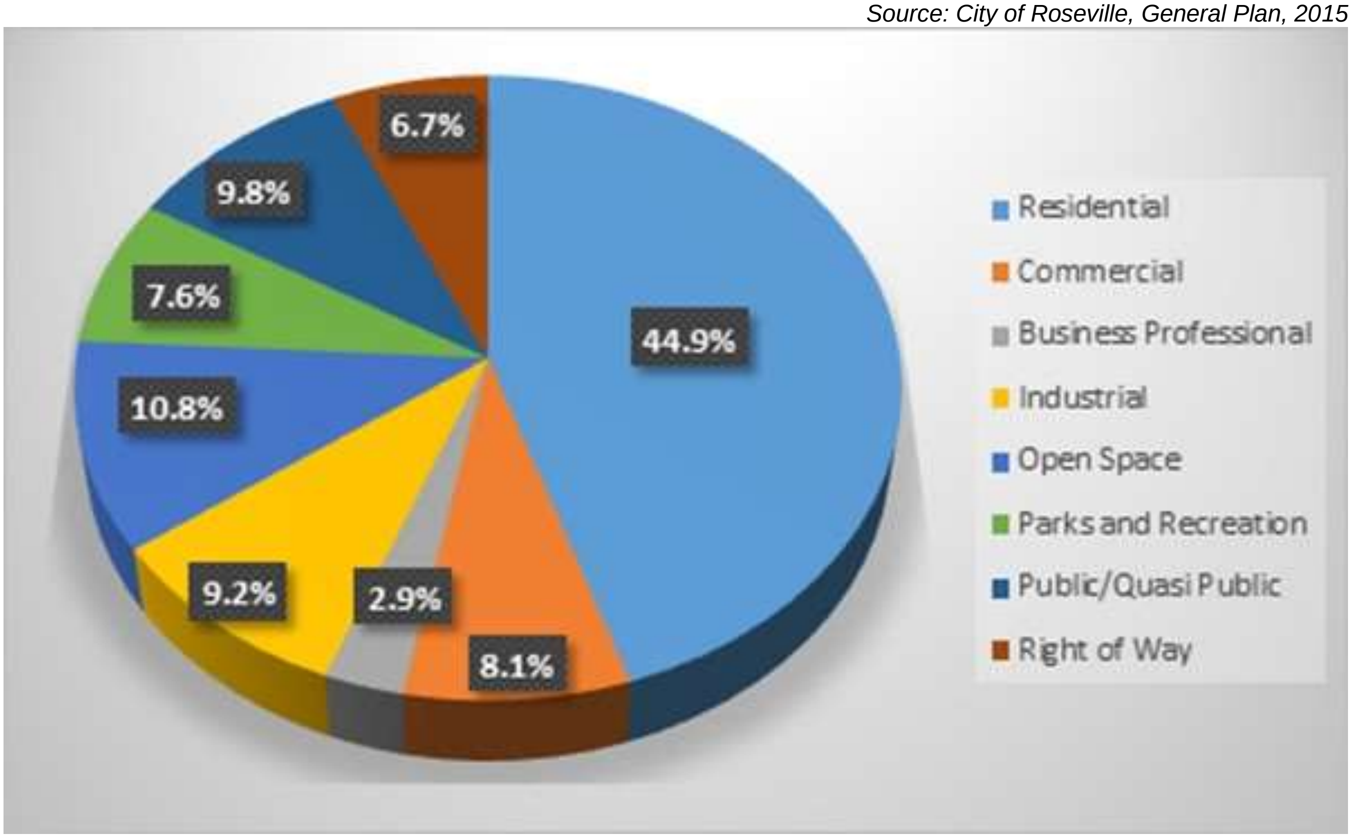


**Figure 4-2.** Total Land Use Allocation in Roseville

The City's land use policies are built upon underlying principles that were established based on input the City received from its residents and the Growth Management Committee established in 2005. These principles have impacted the overall policy direction and land use pattern in the City of Roseville. They include the following:

- Promote and enhance Roseville's unique character and identity.
- Distinguish Roseville from adjacent communities through the quality of development and design, and the level of public services and facilities provided.
- Protect and enhance Old Town/ Downtown and the City's established neighborhoods.
- Promote new development as an integrated and connected part of the City's land use pattern.
- Provide a variety of housing types and opportunities, including those for all income groups.
- Create a balanced land use pattern with an appropriate mix of uses to accommodate resident employment, service, and social needs within the community.
- Promote a land use pattern that provides a high level of open space and recreational amenities and is sensitive to the natural environment.

- Create a land use mix and pattern that accommodates and promotes alternative transportation modes for ease of access and improved air quality.
- Proactively manage and plan for growth.
- Ensure that new development is fiscally neutral, and does not impact existing residents.

State, regional and local growth projections indicate that Roseville and the South Placer County/Sacramento region will continue to draw residential and employment growth. Much of this attraction can be attributed to desirable location and access, availability of an educated and skilled workforce, land costs and overall quality of life. Local and regional economic conditions will drive the local growth potential, and existing land use allocations may require modification in the near future.

## 4.5.2 Residential Development

The Land Use Element of the General Plan identifies three primary residential land uses:

- **Low-Density Residential**—The low-density residential land use category is for development of the single-family dwelling units that make up the majority of Roseville's housing supply. The lower densities are assigned to lands that require flexibility to accommodate development constraints (e.g., slopes, trees, etc.). Typically, low-density residential lands should require minimal grading or disturbance of natural features.
- **Medium-Density Residential**—The medium-density residential land use category is for small-lot single-family detached dwelling units and attached patio homes, half-plexes, townhouses, condominiums, and mobile home parks. This residential land use accommodates a variety of housing types and designs, and is often used as a transition or buffer between higher intensity land uses and low-density residential land use. It may also be applied as a transition between higher volume roadways and lower density residential uses.
- **High-Density Residential**—The high-density residential land use category is normally developed with multiple-story apartment or condominium structures containing multiple attached dwelling units. The broad range of densities in this category yields a variety of design options. In some areas, this land use category may be combined with commercial uses to form a mixed-use development where higher densities are desirable and beneficial.

According to the State Department of Finance, there are 51,590 housing units in the City. Single-family detached homes made up over 75 percent of the housing stock as of January 2016. Multi-family homes made up 24 percent, and mobile homes accounted for less than 1 percent. Residential construction valuation reached $208,581,000 in 2015. The Building Division reported that $19,111,000 in new construction was completed during the 2015 – 2016 fiscal year. The Placer County Association of Realtors provided statistics indicating that the median purchase price of single-family houses and condominiums in Roseville rose approximately 9 percent between May 2015 and May 2016, from $391,500 to $425,000 and $168,500 to $178,300, respectively. As indicated by the increase in housing prices, the demand for single-family homes continues and available land for single-family homes is ample.

## 4.5.3 Non-Residential Development

Roseville's non-residential land use designations include areas designated for commercial, office, industrial uses, special areas, and combining districts. Special designations include Central Business District, Public and Quasi-Public uses, Parks and Recreation, Open Space, and Urban Reserve. Like the residential designations, each non-residential designation includes a purpose statement, primary and secondary uses, and development standards, including a floor area ratio. Unlike the specific secondary uses listed for residential designations, which are intended to be subordinate and may be permitted only to support neighborhood convenience, the non-residential land use designations permit secondary land uses that are supportive and complementary of the primary uses, not necessarily subordinate. Typically, the size of secondary uses is limited and therefore does not warrant a separate land use designation. Table 4-3 summarizes the non-residential land uses. A summary of non-residential development in Roseville is given in Table 4-4.

**Table 4-3.** Non-Residential Land Uses

| Land Use | Purpose |
|---|---|
| **Neighborhood Commercial** | The neighborhood commercial land use designation is intended to provide basic commercial services for the convenience of surrounding neighborhoods within walking distance of major residential areas. |
| **Community Commercial** | The community commercial land use designation is distinguished from the neighborhood commercial designation by providing a broader range of goods and services to an expanded service area. |
| **Regional Commercial** | The regional commercial land use designation is intended to accommodate larger shopping centers and commercial activities where uses provide goods and services to a citywide and regional service area. |
| **Business Professional** | The business professional land use designation provides areas for small and large office uses, including uses supportive of offices. |
| **Light Industrial** | The light industrial land use designation is applied to lands reserved for office, industrial, and research and development uses that generate very limited noise, vibration, odor, dust, smoke, light, or other pollutants, and are either integrated or compatible with surrounding uses. |
| **General Industrial** | The general industrial land use designation is intended to provide areas for industrial uses that tend to generate noise, vibration, odor, dust, smoke, light, and an aesthetic appearance not compatible with residential and other sensitive receptors. The intent of this category is to provide a place for industrial uses within the City that is properly buffered from other uses. |
| **Central Business District** | The Central Business District is a distinct land use category that acknowledges land use patterns of significantly greater intensities and traditional mixed uses of retail, office, and apartment. The district is limited in its application to Central Roseville, the West Roseville Village Center, and areas of greater urban intensity. |
| **Open Space** | The open space land use designation is used to preserve and protect public and private lands that are significant due to wildlife habitat, natural features, or flood hazard. Within new development areas, the 100-year floodplain boundaries will be designated as Open Space. In addition, sensitive or unique natural features, including, but not limited to, wetlands, vernal pools, and oak woodlands, are to be designated as open space as part of specific plans and other major development review processes. |
| **Public/Quasi-Public** | The public/quasi-public land use designation is used to establish areas for education, religious assembly, governmental offices, municipal corporation yards, and water treatment plants. |
| **Urban Reserve** | The urban reserve land use designation is applied to lands that are anticipated to receive urban land entitlements, but at the present time are constrained by growth management policies, availability of services or other limitations. |
| **Park/ Recreation** | The park and recreation designation is used to identify public parks in Roseville |
| **Floodplain** | The floodplain designation identifies lands that are within the 100-year floodplain boundaries as defined in the Safety Element of the General Plan. Development of lands with a floodplain land use designation is strictly regulated by the City of Roseville. In areas with existing development, the floodplain designation is an overlay or combining land use. As part of a specific plan, the land use designation may be combined with an open space or parks designation, if found consistent with the policies of the Safety Element. |
| **Study Area** | The study area land use designation is used as a combining land use to identify future General Plan or neighborhood study areas. This combining designation may be applied to any area where the City believes that additional land use analysis and amendment of the General Plan may be desirable to resolve specific neighborhood or land use issues. |
| **Village Center** | The Village Center land use designation is intended allow for a mix and density of land uses common to a traditional downtown, urban setting. It allows for flexibility and deviation from the standards and permitted uses contained in the primary land use designation for which it is combined. |
| **Transfer Station** | The transfer station land use designation is intended to preserve and protect industrial areas suitable for a solid waste transfer station. |

**Table 4-4.** Non-Residential Development Profile as of July 2016

| Activity/Use | Total Developed Building Area (square feet) | Total Area Zoned for Use (acres) |
|---|---|---|
| **Commercial** | 11,249,499 | 2,249 |
| **Office** | 8,080,479 | 802.69 |
| **Industrial** | 8,997,392 | 2,369 |
| **Public/Quasi Public** | 2,037,310 | 2,702 |

## 4.5.4 Critical Facilities and Infrastructure

Critical and essential facilities and infrastructure are those that are critical to the health and welfare of the population. These become especially important after a hazard event. The Steering Committee created the following definition specific to Roseville, regarding which facilities are considered critical:

> *A structure or other improvement, public or private, that, because of its function, size, service area, or uniqueness, has the potential to cause serious bodily harm, extensive property damage, or disruption of vital socioeconomic activities if it is destroyed or damaged or if its functionality is impaired. Critical facilities may include, but are not limited to, health and safety facilities, utilities, government facilities, hazardous materials facilities, and transportation infrastructure.*

The location of critical facilities and infrastructure in the planning area is shown on Figure 4-3 through Figure 4-5. Due to the sensitivity of this information, a detailed list of facilities is not provided. The list is on file with the City of Roseville. Table 4-5 and Table 4-6 provide summaries of the general types of critical facilities and infrastructure, respectively.

**Table 4-5.** Planning Area Critical Facilities

| Facility Type | Number in Planning Area |
|---|---|
| **Medical and Health** | 2 |
| **Government Functions** | 27 |
| **Protective Functions** | 10 |
| **Schools** | 49 |
| **Hazmat** | 6 |
| **Other Critical Functions** | 78 |
| **Total** | **172** |

**Table 4-6.** Planning Area Critical Infrastructure

| Facility Type | Number in Planning Area |
|---|---|
| **Bridges** | 68 |
| **Water Supply** | 11 |
| **Wastewater** | 23 |
| **Power** | 18 |
| **Communications** | 98 |
| **Other** | 6 |
| **Total** | **224** |

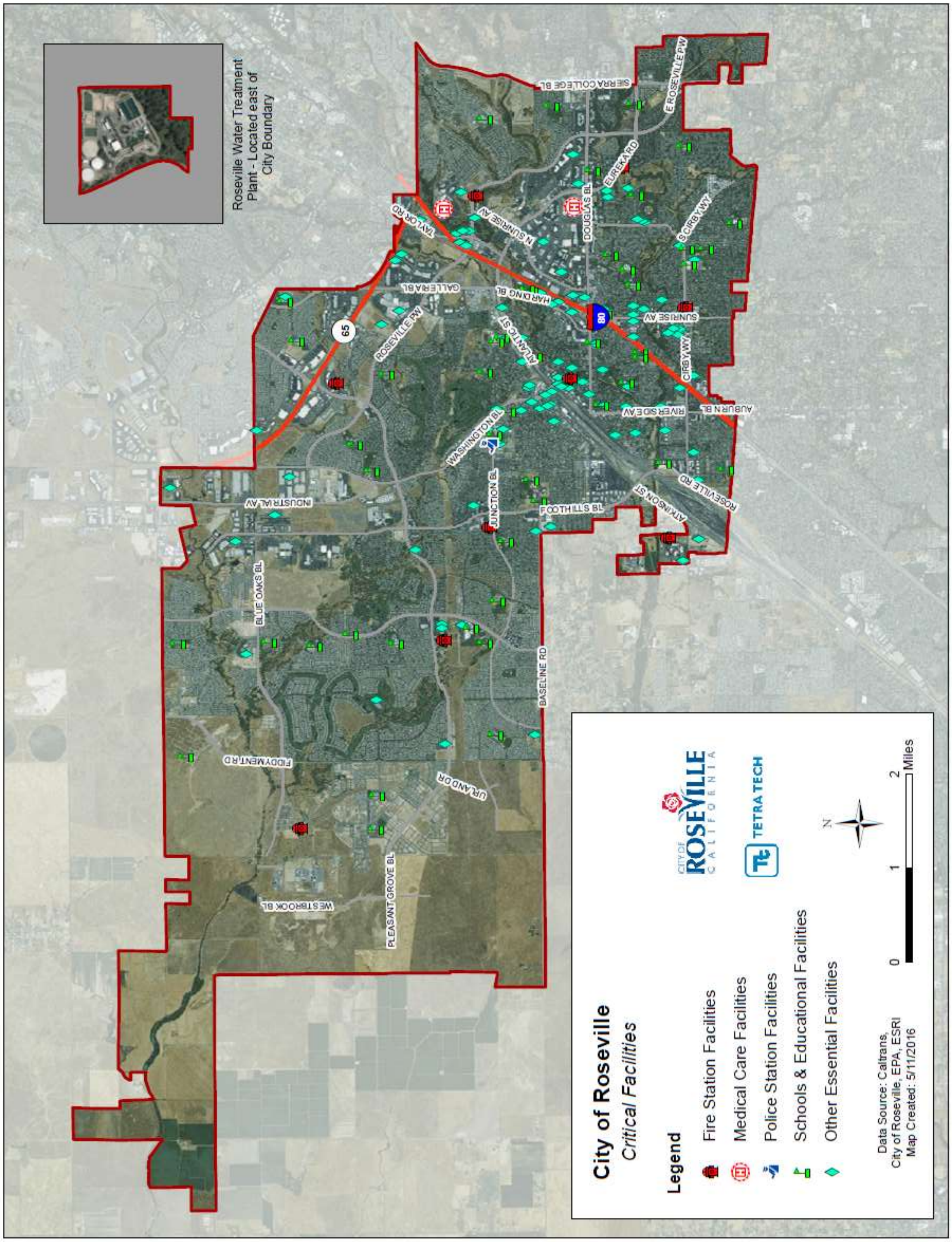


**Figure 4-3.** Critical Facilities in the Planning Area

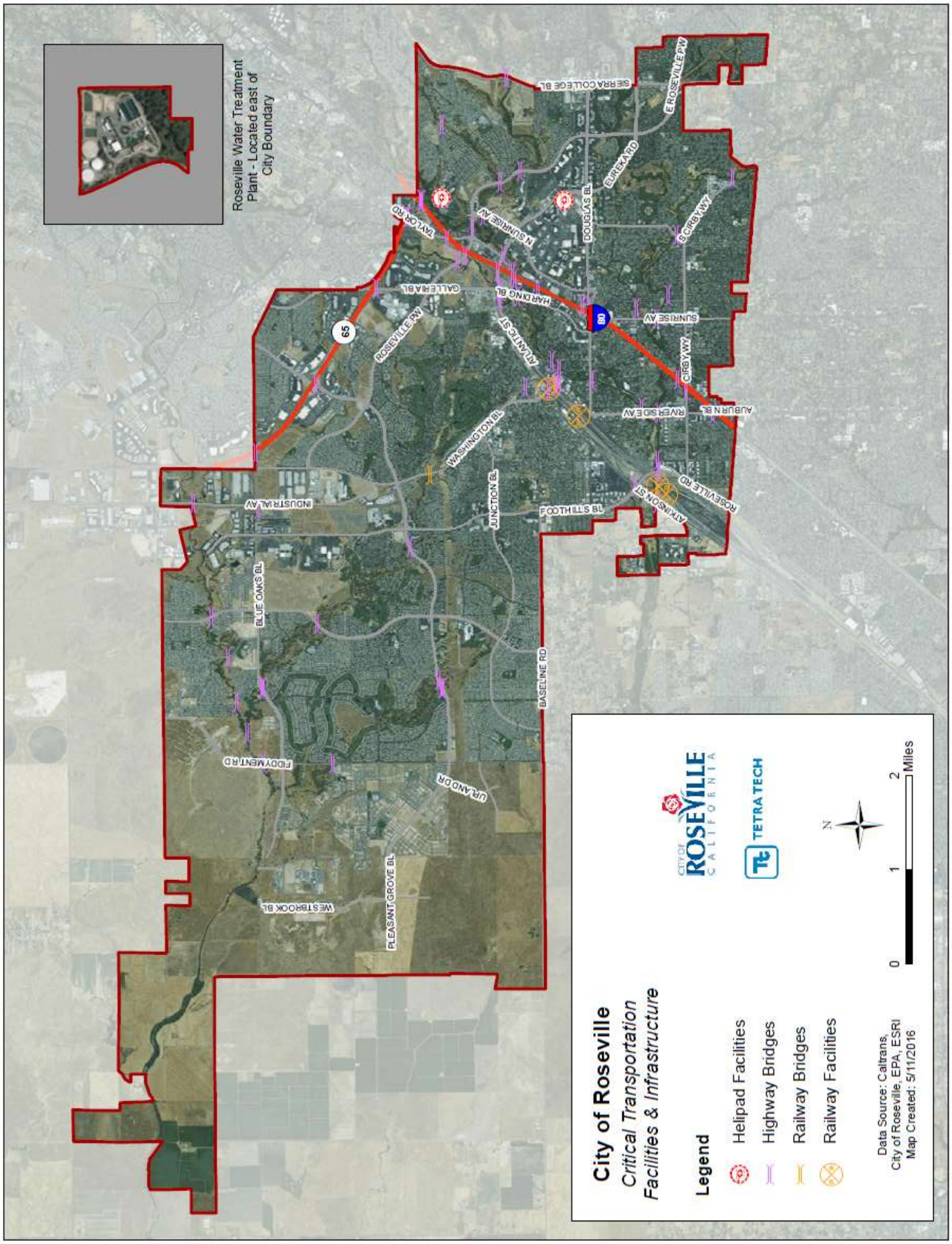


**Figure 4-4.** Critical Infrastructure in the Planning Area—Transportation

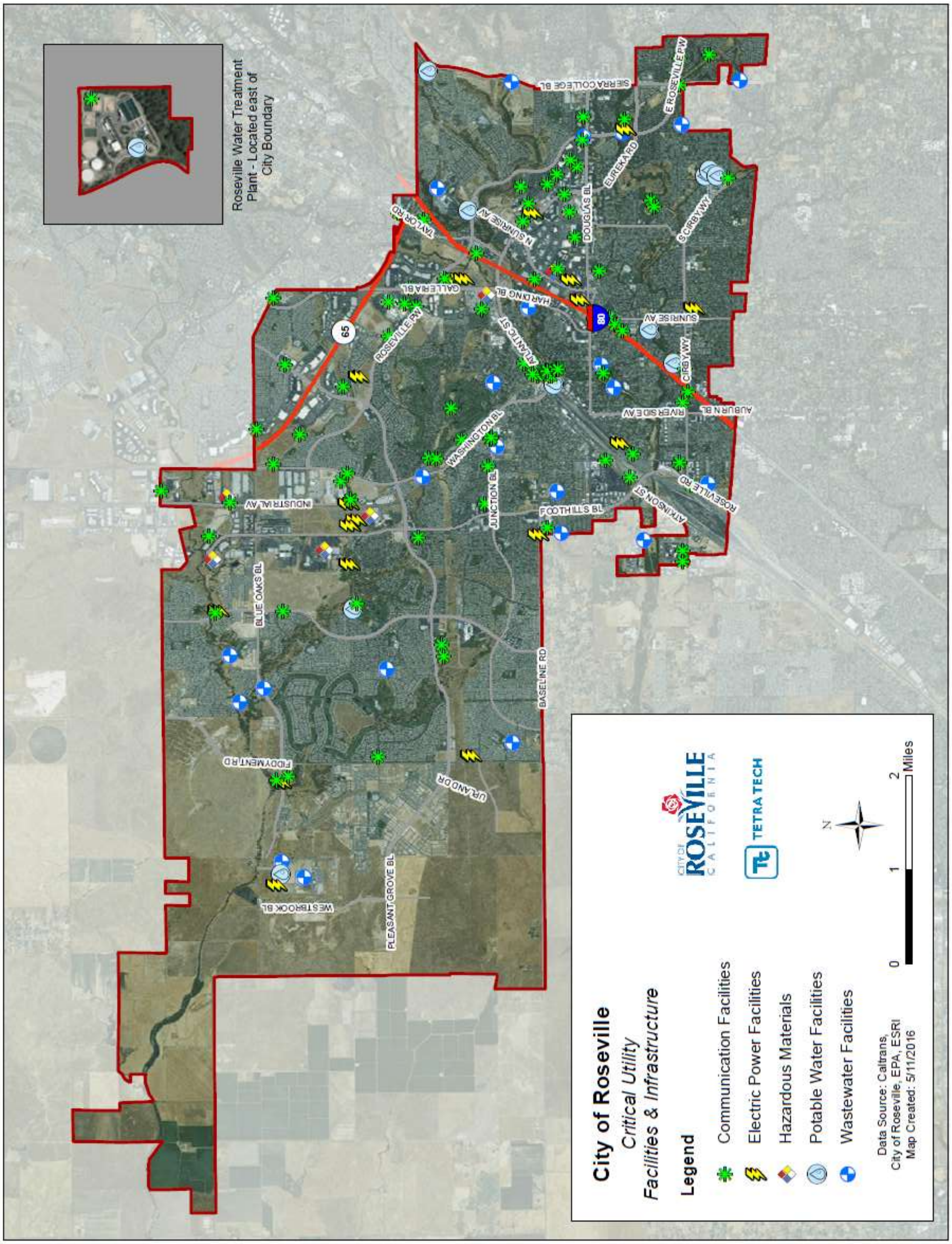


**Figure 4-5.** Critical Infrastructure in the Planning Area—Utilities

### 4.5.5 Future Trends in Development

The Roseville General Plan and associated specific area plans govern land use decision and policy-making. Decisions on land use will be governed by these programs. This Plan will work together with these programs to support wise land use in the future by providing vital information on the risk associated with natural hazards in the planning area. The City of Roseville will incorporate by reference the updated Hazard Mitigation Plan in the Safety Element of its General Plan. In addition to proactively planning for the implementation of Senate Bill (SB) 379 upon the next plan update process (see Section 4.9 for a discussion of this state law), this incorporation will ensure that all future trends in development can be established with the benefits of the information on risk and vulnerability to natural hazards identified in this Plan.

## 4.6 OPEN SPACE AND HABITAT

The City recognizes that open space land is limited and that valuable resources must be conserved wherever possible. For many, the City's open space setting is a highly valued natural resource. Given the strong interrelationship between open space and conservation issues, the City of Roseville has chosen to address these issues in a single element of its General Plan: the Open Space and Conservation Element. Vegetation and wildlife resources and corridors are an important component of the overall open space system and have been the historical focus of preservation efforts in Roseville. If future generations are to enjoy and benefit from the resources available to the present generation, these finite and fragile resources must be preserved and managed.

The vegetation and wildlife resources of Roseville can be broadly classified by habitat type—grasslands, oak woodlands, riparian areas, and seasonal wetlands—as discussed below. Whenever possible, the focus of preservation efforts is multipurpose. It is therefore preferred, for example, to preserve woodlands, grasslands, and wetlands in combined rather than separate and unconnected settings.

### 4.6.1 Grasslands

Relatively small amounts of self-sustaining grasslands remain in the northern and western undeveloped edges of Roseville. Less extensive areas of grassland are present in smaller undeveloped areas scattered throughout the City. Before Spanish and later settlers arrived in the Central Valley, the grasslands contained native species. The effects of grazing and clearing of large tracts for agriculture resulted in the decline of native species. Today, most of the grasslands in the region contain non-native species. These areas do, however, provide important habitat for birds and other wildlife.

### 4.6.2 Oak Woodlands and Riparian Areas

Oak woodlands are generally present near the City's major stream channels. The microclimates and alluvial soils in the woodlands provide ideal conditions for deep-rooting shrubs and trees. Most woodland areas are relatively open, with little shrub growth.

Riparian areas support a much wider biological diversity. Situated along and within the City's creeks and watercourses, riparian corridors are a source of food and water and provide cover, nesting sites, and migration and dispersal corridors for wildlife. Riparian areas are also important in flood protection and improve air and water quality through natural filtering.

Oak woodland and riparian areas are City resources not only because of the diversity of species they support but also because they provide natural open space and aesthetic value. The City's creek systems are described in detail in the groundwater recharge and water quality component of the Open Space and Conservation Element. The City regulates the protection of native oak trees through the Tree Preservation Ordinance, which includes standards that limit disturbance within protected zones of oaks and emphasizes avoidance of tree removal. Where avoidance is not feasible and tree removal is authorized by the City, mitigation is required on an inch-for-inch basis. The Tree Preservation Ordinance is a valuable tool in protecting Roseville's oak trees and habitats. A creek and riparian management and restoration plan is being developed that will provide standards for riparian area management and enhancement. Additionally, the City maintains an overarching management plan for upholding the City's requirements in maintaining open space.

## 4.6.3 Seasonal Wetlands

Many of the wetland areas in Roseville are seasonal and therefore receive, retain, and transport water only during the wet season. Wetlands are subject to the regulations of the U.S. Army Corps of Engineers under the provisions of Section 404 of the Clean Water Act. Two primary types of seasonal wetlands are present in the City: intermittent drainage and vernal pool wetlands.

Intermittent drainage wetlands typically consist of channels 1 to 10 feet wide that flow over a variety of substrata. Most are wet only during winter and transport runoff. They are typically dry during summer, with scattered ponds, but they may contain water from adjacent urban runoff.

Vernal pools represent a significant seasonal wetland resource in Roseville. Although relatively abundant in Roseville and the Sacramento/Placer County region, they are considered rare statewide for their limited natural occurrence and distribution and for the unique native plant and animal species they support. Found in valley grassland areas, vernal pools are typically small, shallow, hardpan-floored depressions that fill with water during the winter wet season, gradually drying by late spring or early summer. Several plant species occur only in association with these special habitats, which has triggered concern about their inventory and preservation. Two types of vernal pools are present in the Roseville area:

- Northern volcanic mud flow vernal pools occur in shallow depressions on Mehrten mud flow formations where the slope is generally less than 2 percent.
- Northern hardpan pools generally occur on the Inks or Cometa soil series at the lower basin portions of creek floodplains. During the wet season, the pools provide special habitat for unique plant and animal species whose germination, growth, and reproductive cycles coincide with the availability of collected water. Individual pools vary significantly in the length of time they remain wet and in the diversity of plant species present.

## 4.6.4 Sensitive Species

The California Department of Fish and Wildlife maintains the California Natural Diversity Data Base, which includes known locations of state and federally listed endangered, rare, and threatened plant and animal species, including species considered by the scientific community to be deserving of such listing.

The sensitive plant species that may be present in Roseville are primarily associated with vernal pool environments and include the following: Bogg's Lakehedge Hyssop (*Gratiola heterosepala*), Dwarf Downingia *(Downingia humilis*), and Vernal Pool Brodiaca (*Dichelostemma lacunavernalis*). Bogg's Lake Hyssop is listed as endangered by the state and California Native Plant Society. Dwarf Downingia and Vernal Pool Brodiaca are both included on the California Native Plant Society "watch list" and have sufficiently limited distribution to warrant continued monitoring. Vernal pools in the City may also contain federally listed, endangered vernal pool tadpole shrimp (*Lepidurus packardi*) and federally listed threatened vernal pool fairy shrimp (*Branchinecta lynchi*).

Anadromous chinook salmon (*Oncorhynchus tshawytscha*) and Central Valley steelhead (*Oncorhynchus mykiss*) are known to be present seasonally in Dry Creek and its upper tributaries. Steelhead is listed by the U.S. Fish and Wildlife Service as a threatened species under the Endangered Species Act. Chinook salmon within the Central Valley Fall/Late Fall Run are listed as a candidate species. In addition to the federal and state classified rare or endangered wildlife species known to inhabit Roseville, favorable habitats for other listed species are present in the area. Other special status species potentially present in Roseville include Cooper's Hawk, Swainson's Hawk, Valley Elderberry, Longhorn Beetle, Sanford's Arrowhead, and the Northwestern Pond Turtle. Bald eagles have been sighted near Folsom Lake, and the American peregrine falcon is present in the Sacramento Valley. All of these species thrive in the riparian habitats of floodplain environments.

Preservation of habitat for sensitive species benefits from the City of Roseville's Open Space Preserve Overarching Management Plan, as described in Section 4.9.3.

## 4.7 DEMOGRAPHICS

Some populations are at greater risk from hazard events because of decreased resources or physical abilities. Elderly people, for example, may be more likely to require additional assistance. Research has shown that people living near or below the poverty line, the elderly (especially older single men), individuals with disabilities, individuals with access and functional needs, women, children, ethnic minorities and renters all experience, to some degree, more severe effects from disasters than the general population. These vulnerable populations may vary from the general population in risk perception, living conditions, access to information before, during and after a hazard event, capabilities during an event, and access to resources for post-disaster recovery. Indicators of vulnerability often overlap spatially and often in the geographically most vulnerable locations. Detailed spatial analysis to locate areas where there are higher concentrations of vulnerable community members would help to extend focused public outreach and education to these most vulnerable citizens.

### 4.7.1 Population Trends

According to the California Department of Finance, Roseville's estimated population for 2015 was 134,073 and the estimated daytime population, which includes those coming into Roseville to work, shop, and do business, was 145,000. Roseville is the 45th largest of California's 482 cities. The City has been striving to accommodate growth while retaining and enhancing its distinct character.

The full-time population increased by 38,223 from 2000 to 2010, a 31.9-percent increase (see Figure 4-6). The 2010 population was more than four times that of 1982, when the City had 26,127 residents. The 2.6-percent growth rate from 2009 to 2010 was comparable to average annual growth rates of the past decade. This rate exceeded annual growth rates for Placer County (1.7 percent) and California (1.0 percent) for the same time period.

Between 2010 and the end of 2015, Roseville experienced an estimated 10.9 percent increase in population—averaging 2.2 percent per year. This trend indicates that the population of Roseville will continue to grow through the end of the decade, albeit more slowly than the population boom experienced between 2000 and 2010.

The average household size in Roseville is 2.61 persons, according to U.S. Census Bureau American Community Survey estimates for 2010-2014. This household average may vary by land use and location in the City. For example, the 3,814 age-restricted low-density residential units in the Del Webb and West Roseville planning areas have an estimated average household size of 1.8.

The General Plan's estimates of when Roseville will achieve buildout (the maximum development allowed by zoning) vary based on the methodology used. Under all scenarios, however, Roseville and the Placer County/Sacramento Metropolitan region are expected to remain attractive to both residential and commercial development. As growth rates continue to climb in the region, the City of Roseville has captured an increasing share of that growth. Considerable recent growth in Roseville is attributed to the annexation of the Sierra Vista Specific Plan Area of 2,064 acres and the Creekview Specific Plan of 500 acres in 2012.

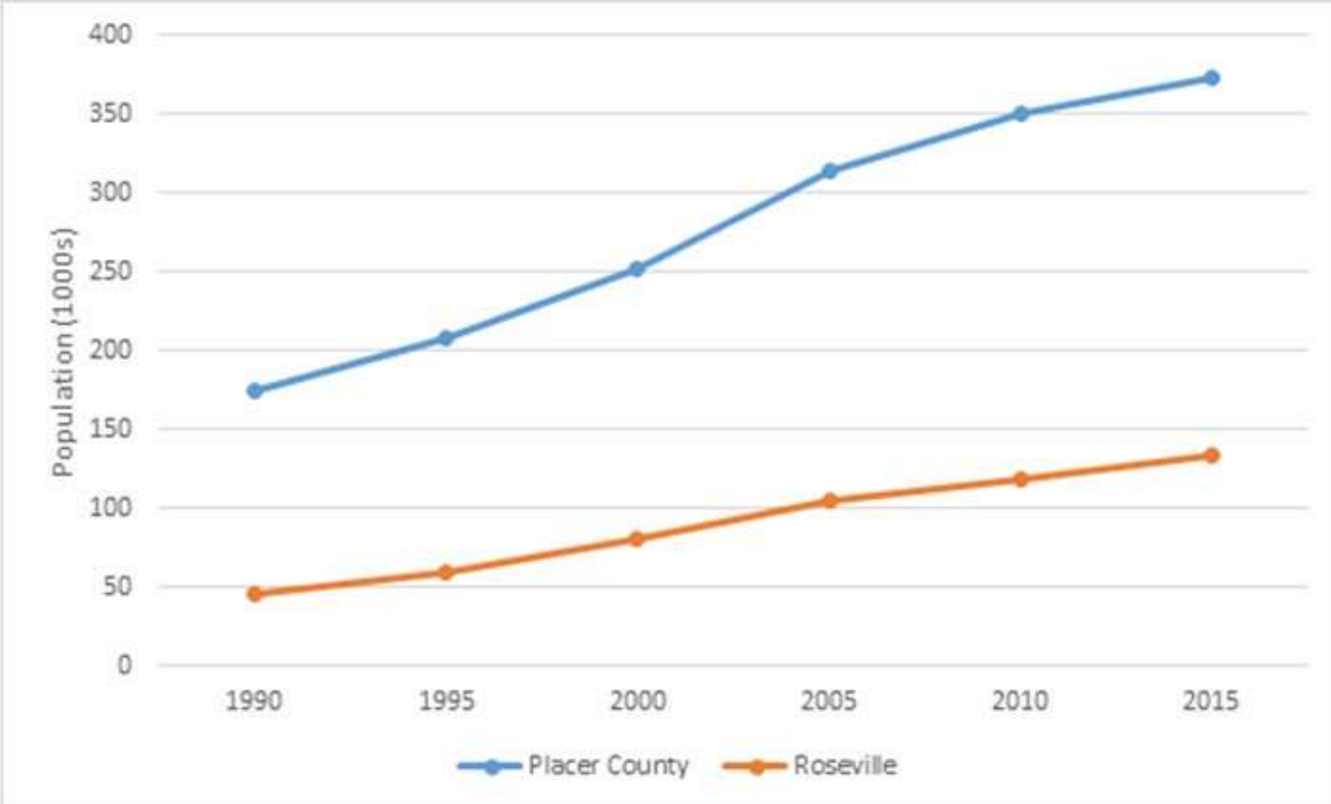


**Figure 4-6.** Placer County and Roseville Population Growth

Additionally, the City is in the process of annexing the 694-acre Amoruso Ranch Specific Plan, located on the northwest boundary of the City. Through buildout, these western specific Plan Areas are projected to experience the highest increase in population. The overall population, when all residential property is developed, is projected to be over 185,000. Table 4-7 shows the General Plan's population forecasts by Specific Plan Area.

## 4.7.2 Age Distribution

The vulnerability of elderly citizens can vary significantly based on health, age, and economic security. However, as a group, the elderly are more apt to lack the physical and economic resources necessary for response to hazard events and are more likely to suffer health-related consequences making recovery slower. They are more likely to be vision, hearing, and/or mobility impaired, and more likely to experience mental impairment.

Additionally, the elderly are more likely to live in assisted-living facilities where emergency preparedness occurs at the discretion of facility operators. These facilities are typically identified as "critical facilities" by emergency managers because they require extra notice to implement evacuation. Elderly residents living in their own homes may have more difficulty evacuating their homes and could be stranded in dangerous situations. This population group is more likely to need special medical attention, which may not be readily available during natural disasters due to isolation caused by the event. Specific planning attention for the elderly is an important consideration given the current aging of the American population.

Children under 14 are particularly vulnerable to disaster events because of their young age and dependence on others for basic necessities. Very young children may additionally be vulnerable to injury or sickness; this vulnerability can be worsened during a natural disaster because they may not understand the measures that need to be taken to protect themselves from hazards.

**Table 4-7.** General Plan Projections of Residential Units and Population by Specific Plan Area

| Specific Plan Area | Dwelling Units | | | Population | | |
|---|---|---|---|---|---|---|
| | 2016 | 2035 | Buildout | 2016 | 2035 | Buildout |
| **Infill** | 15,409 | 16,349 | 16,349 | 40,217 | 42,671 | 42,671 |
| **Southeast Roseville** | 3,047 | 3,163 | 3,163 | 7,953 | 8,255 | 8,255 |
| **Northeast Roseville** | 933 | 1,514 | 1,514 | 2,435 | 3,952 | 3,952 |
| **Northwest Roseville** | 8,941 | 9,068 | 9,068 | 23,336 | 23,667 | 23,667 |
| **North Central Roseville** | 4,247 | 4,487 | 4,711 | 11,085 | 11,711 | 12,296 |
| **North Industrial** | 1,043 | 1,043 | 1,043 | 2,722 | 2,722 | 2,722 |
| **Del Webb** | 3,210 | 3,210 | 3,210 | 5,895 | 5,859 | 5,895 |
| **Highland Reserve North** | 1,669 | 1,669 | 1,669 | 4,356 | 4,356 | 4,356 |
| **North Roseville** | 4,887 | 6,072 | 6,072 | 12,755 | 15,848 | 15,848 |
| **Stoneridge** | 2,446 | 2,861 | 2,861 | 6,384 | 7,467 | 7,467 |
| **West Roseville** | 2,899 | 10,478 | 10,478 | 6,996 | 26,651 | 26,651 |
| **Riverside Gateway** | 204 | 456 | 456 | 532 | 1,190 | 1,190 |
| **Downtown** | 255 | 638 | 2,272 | 666 | 1,665 | 5,930 |
| **Sierra Vista** | 0 | 5,905 | 8,679 | 0 | 15,412 | 22,652 |
| **Creekview** | 0 | 2,011 | 2,011 | 0 | 5,249 | 5,249 |
| **Amoruso Ranch** | 0 | 2,827 | 2,827 | 0 | 7,379 | 7,379 |
| **Total** | **49,190** | **71,751** | **76,383** | **125,332** | **184,054** | **196,180** |

According to the 2010-2014 U.S. Census American Community Survey estimates, 14.3 percent of Roseville's population is 65 or older, 21.1 percent of the population is under the age of 14 and the median age is 37.5. Figure 4-7 shows the age distribution for Roseville.

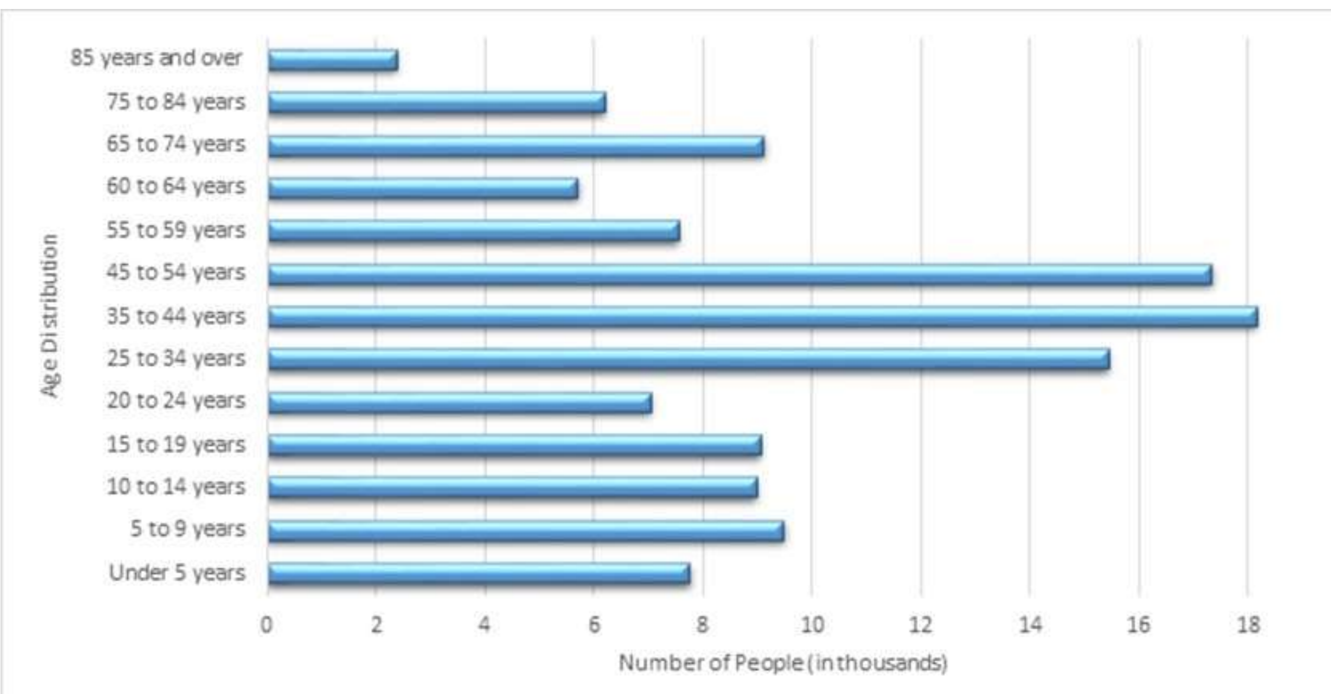


**Figure 4-7.** Planning Area Age Distribution

## 4.7.3 Race, Ethnicity and Language

Many disaster researchers have focused on the increased vulnerability that ethnic minorities experience in the United States. Research shows that minorities are less likely to be involved in pre-disaster planning and experience higher mortality rates during a disaster event. Post-disaster recovery can be ineffective and is often characterized by cultural insensitivity. Since higher proportions of ethnic minorities live below the poverty line than the majority white population, poverty can compound vulnerability.

According to the U.S. Census, Roseville's racial composition is predominately white, at about 80 percent of the City population. The largest minority population in Roseville is Hispanic, followed by Asian. Figure 4-8 shows the racial distribution of Roseville.

About 12 percent of Roseville's population is foreign-born, with the majority born in Latin America, according to 2014 U.S. Census estimates. Other than English, the most commonly spoken language in the City is Spanish. In the U.S. Census estimates, 5.6 percent of the City's residents reported speaking English "less than very well." Of the foreign born population, 38.5 percent speak English "less than very well." This has important implications for emergency managers, who must get crucial information out to all members of the population before, during and after emergency events.

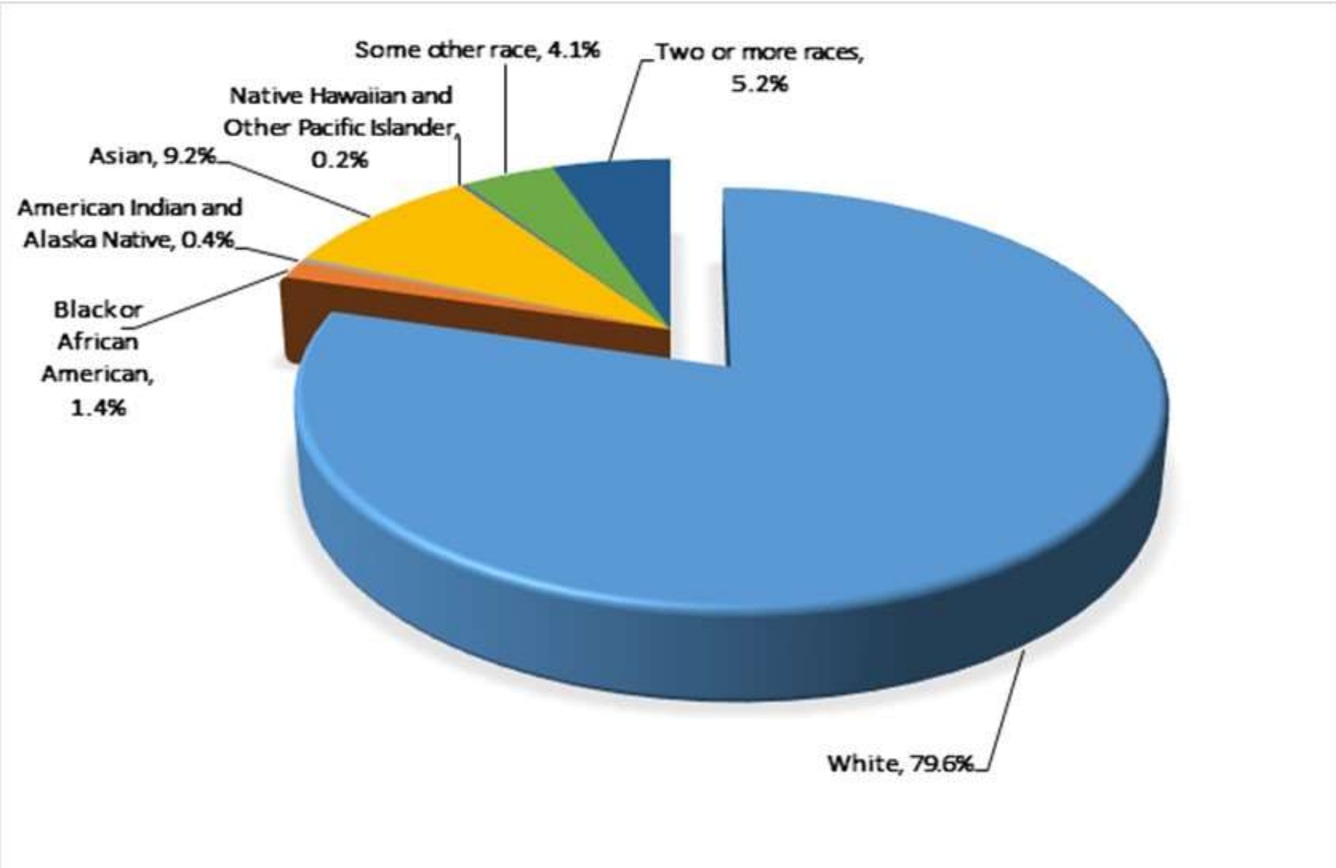


**Figure 4-8.** Planning Area Race Distribution

### 4.7.4 Individuals with Disabilities and Others with Access and Functional Needs

Individuals with disabilities and others with access and functional needs have a special stake in emergency planning because they are more likely to have difficulty responding to a hazard event than the general population. According to the 2010 U.S. Census, 12.3 percent of the U.S. noninstitutionalized population lives with a disability. As individuals with disabilities and others with access and functional needs are increasingly integrated into society, relatively large segments of the population may require assistance during the first 72 hours post-disaster, the period generally reserved for self-help.

Disabilities and access/functional needs can vary greatly in severity and permanence, making these individuals difficult to define and track. There is no "typical" disability or need, which can complicate disaster-planning processes that attempt to incorporate them. Furthermore, disabilities and access/functional needs are likely to be compounded with other vulnerabilities, such as age, economic disadvantage and ethnicity, all of which mean that housing is more likely to be substandard.

While the City of Roseville's percentage of individuals with disabilities and others with access and functional needs does not differ much from that of the state as a whole, the overall numbers are significant and warrant attention from planners and emergency managers (see Table 4-8). According to 2014 U.S. Census data, 10.3 percent of the City's population over the age of 5 has a disability.

**Table 4-8.** Status of Non-Institutionalized Population with Disabilities

| Age | Individuals with Disabilities and Others with Access and Functional Needs | % of Age Group Population |
|---|---|---|
| **5-17 years** | 1,065 | 4.7 |
| **18-64 years** | 5,038 | 7.2 |
| **65+ years** | 5,979 | 34.9 |

## 4.8 ECONOMY

### 4.8.1 Income

In the United States, individual households are expected to use some private resources to prepare for, respond to and recover from disasters. This means that households living in poverty are automatically disadvantaged when confronting hazards. Additionally, the poor typically occupy more poorly built and inadequately maintained housing. Mobile or modular homes, for example, are more susceptible to damage in earthquakes and floods than other types of housing. In urban areas, the poor often live in older houses and apartment complexes, which are more likely to be made of un-reinforced masonry, a building type that is particularly susceptible to damage during earthquakes. Furthermore, residents below the poverty level are less likely to have insurance to compensate for losses incurred from natural disasters. This means that residents below the poverty level have a great deal to lose during an event and are the least prepared to deal with potential losses. The events following Hurricane Katrina in 2005 illustrated that personal household economics significantly impact people's decisions on evacuation. Individuals who cannot afford gas for their cars will likely decide not to evacuate.

Based on U.S. Census American Community Survey estimates for 2014, per capita income in Roseville was $34,6514, and the median household income was $76,712. Table 4-9 compares the income and poverty estimates at the city, county, and state level. About 8.6 percent of Roseville residents are below the poverty level (meaning they spend more than a third of income on an economy food budget); this includes 10.2 percent of those under the age of 18 and 7.4 percent of those 65 or older.

**Table 4-9.** Population Under the Poverty Level

| | Median Household Income | Percent of Total Population Below Poverty Level | Percent of Children (18 and Under) Below Poverty Level | Percent of Elderly (65 and Older) Below Poverty Level |
|---|---|---|---|---|
| **City of Roseville** | $76,712 | 8.6 | 10.2 | 7.4 |
| **Placer County** | $73,747 | 8.9 | 11.2 | 6.8 |
| **California** | $61,489 | 16.4 | 22.7 | 10.2 |

## 4.8.2 Industry, Businesses and Institutions

The planning area's economy is strongly based in the educational/healthcare/social service industry (22 percent), followed by the retail trade and professional/scientific industries. Information, wholesale trade, and agriculture make up the smallest sources of the local economy, with less than 1 percent of local economy driven by agriculture. Figure 4-9 shows the breakdown of industry types in the planning area.

The planning area benefits from a variety of business activity. Major businesses include Kaiser Permanente, Union Pacific Railroad, Adventist Health and Sutter Roseville Medical Center.

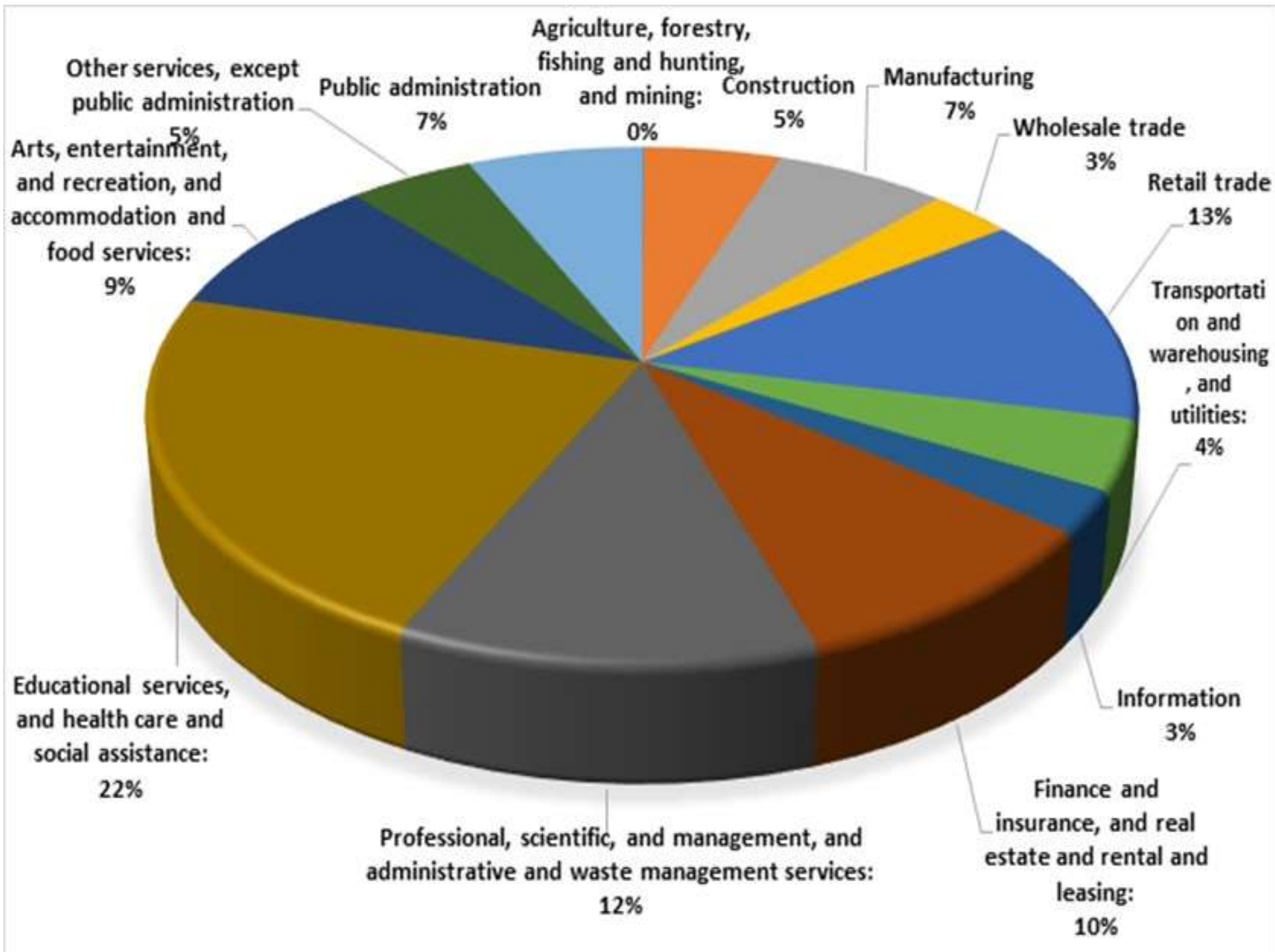


**Figure 4-9.** Industry in the Planning Area

## 4.8.3 Employment Trends and Occupations

According to the American Community Survey, about 48.4 percent of the planning area's population is in the labor force. Of the working-age population group (ages 20 – 64), 88.5 percent of men and 75.6 percent of women are in the labor force. Figure 4-10 compares California's and Roseville's unemployment trends from 2009 through 2014. Roseville's unemployment rate was lowest in 2009, at 5.9 percent. Unemployment rates significantly dropped from 9.5 percent to 8.3 percent between 2013 and 2014.

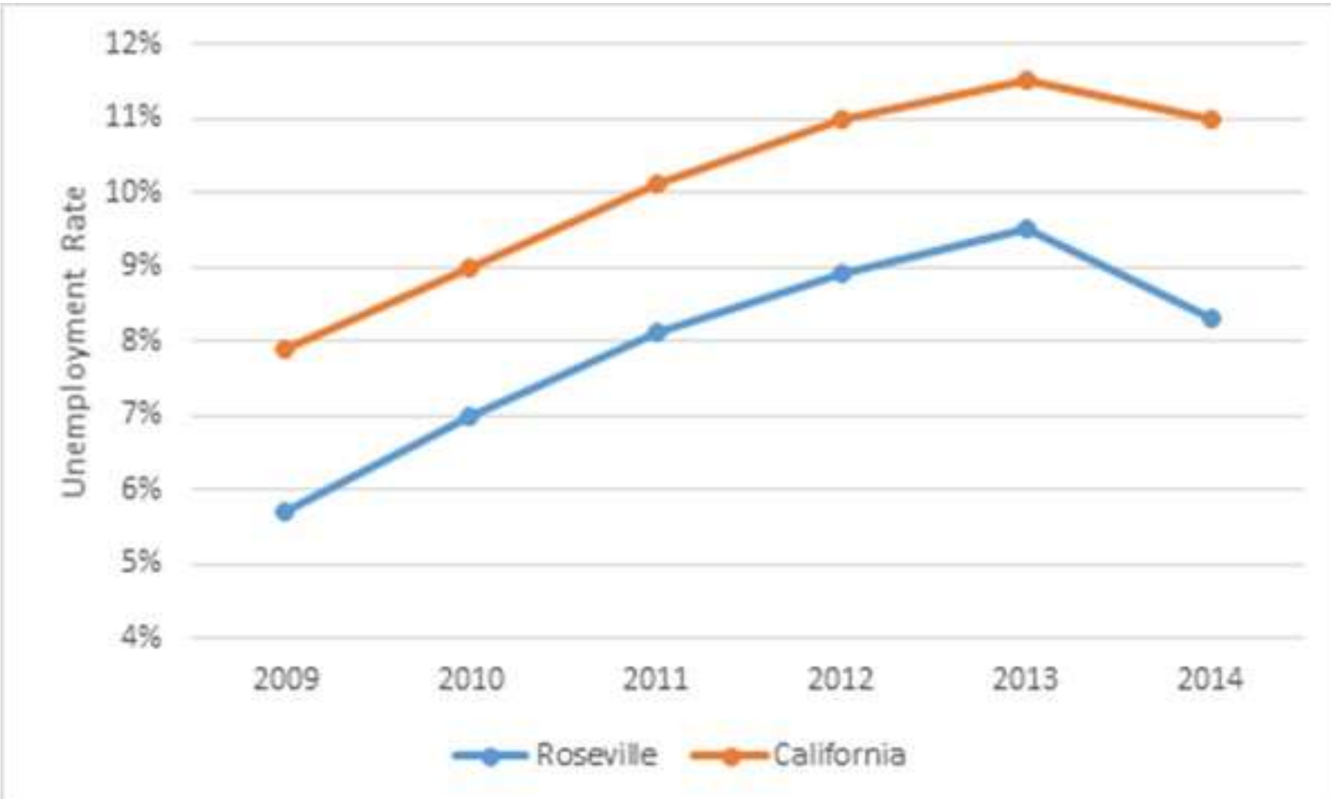


**Figure 4-10.** California and Roseville Unemployment Rate (U.S. Census, 2009 – 2014)

Management, business, science and arts occupations and sales and office occupations make up 72 percent of the jobs in the planning area (see Figure 4-11). Service occupations make up 16 percent of the local working population.

As of October 2014, the largest employer is Kaiser Permanente, with 3,231 employees, followed by Hewlett-Packard, which employs 2,132. Other major employers include the following:

- Sutter-Roseville Medical Group
- Roseville Joint Union High School District
- Union Pacific Railroad Company
- Adventist Health System West
- Roseville City School District
- City of Roseville
- Wal-Mart Superstore (PG Blvd)
- LB Construction, Inc.

The U.S. Census estimates that over 79.6 percent of workers in the planning area commute alone (by car, truck or van) to work, and mean travel time to work is 26.1 minutes (the state average is 27.6 minutes).

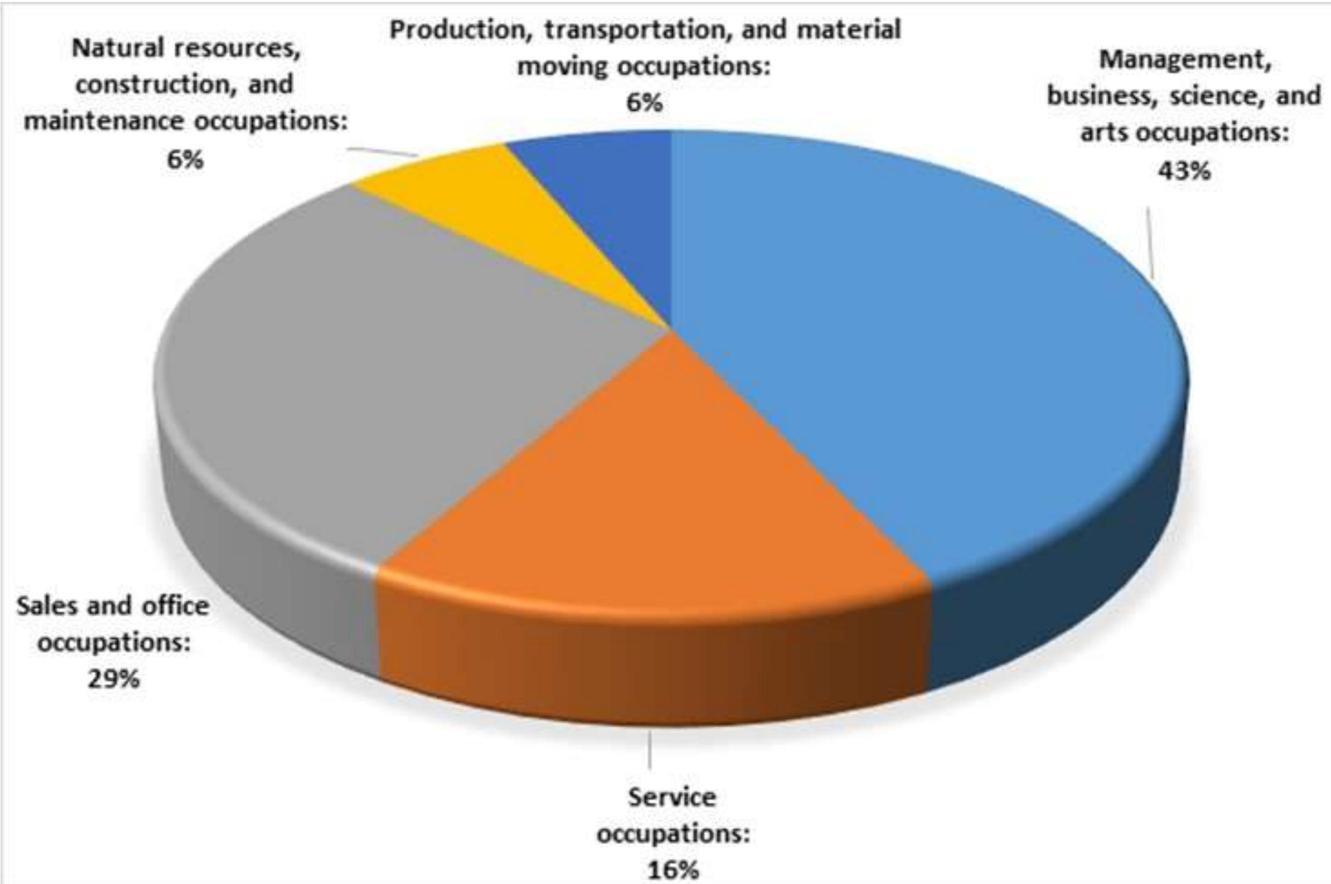


**Figure 4-11.** Occupations in the Planning Area

## 4.9 LAWS AND ORDINANCES

Existing laws, ordinances and plans at the federal, state and local level can support or impact hazard mitigation actions identified in this Plan. Hazard mitigation plans are required by 44 CFR to include a review and incorporation, if appropriate, of existing plans, studies, reports, and technical information as part of the planning process (Section 201.6.b(3)). The following federal, state, and local laws described below were reviewed to inform this plan update process. Not all laws and ordinances reviewed during this process are relevant to the immediate process of plan development. In such instances, the City will assure compliance, where relevant, upon implementation of programs that overlap with the requirements of the following programs at project implementation.

### 4.9.1 Federal

#### Disaster Mitigation Act of 2000

The DMA is the latest federal legislation addressing hazard mitigation planning. It reinforces the importance of mitigation planning and emphasizes planning for disasters before they occur. It specifically addresses planning at the local level, requiring plans to be in place before Hazard Mitigation Grant Program funds are available to communities. The 2016 Plan is designed to meet the requirements of the DMA.

## Endangered Species Act

The Endangered Species Act (ESA) was enacted in 1973 to conserve species that are facing depletion or extinction and the ecosystems that support them. The act sets forth a process for determining which species are threatened and endangered and requires the conservation of the critical habitat in which those species live. The ESA provides broad protection for species of fish, wildlife and plants that are listed as threatened or endangered. Provisions are made for listing species, as well as for recovery plans and the designation of critical habitat for listed species. The ESA outlines procedures for federal agencies to follow when taking actions that may jeopardize listed species and contains exceptions and exemptions. It is the enabling legislation for the Convention on International Trade in Endangered Species of Wild Fauna and Flora. Criminal and civil penalties are provided for violations of the ESA and the Convention.

The purposes of the ESA are to provide a means of conserving the ecosystems upon which endangered and threatened species depend; to provide a program for conserving those species; and to take steps necessary to achieve the purposes of international treaties and conventions. The policy of Congress is that federal agencies must seek to conserve endangered and threatened species and use their authorities in furtherance of the ESA's purposes. The ESA defines three fundamental terms:

- **Endangered** means that a species of fish, animal or plant is "in danger of extinction throughout all or a significant portion of its range." (For salmon and other vertebrate species, this may include subspecies and distinct population segments.)
- **Threatened** means that a species "is likely to become endangered within the foreseeable future." Regulations for a threatened species may be less restrictive than if it were endangered.
- **Critical habitat** means "specific geographical areas that are…essential for the conservation and management of a listed species, whether occupied by the species or not."

Five sections of the ESA are of critical importance to understanding it:

- **Section 4: Listing of a Species**—The National Oceanic and Atmospheric Administration Fisheries Service (NOAA Fisheries) is responsible for listing marine species; the U.S. Fish and Wildlife Service is responsible for listing terrestrial and freshwater aquatic species. The agencies may initiate reviews for listings, or citizens may petition for them. A listing must be made "solely on the basis of the best scientific and commercial data available." After a listing has been proposed, agencies receive comment and conduct further scientific reviews for 12 to 18 months, after which they must decide if the listing is warranted. Economic impacts cannot be considered in this decision, but it may include an evaluation of the adequacy of local and state protections. Critical habitat for the species may be designated at the time of listing.
- **Section 7: Consultation**—Even when a listing has only been proposed, all federal agencies must ensure that any action they authorize, fund, or carry out is not likely to jeopardize the continued existence of a listed species or adversely modify its critical habitat. This includes private and public actions that require a federal permit. Once a final listing is made, non-federal actions are subject to the same review, termed a "consultation." If the listing agency finds that an action will "take" a species, it must propose mitigations or "reasonable and prudent" alternatives to the action; if the proponent rejects these, the action cannot proceed.
- **Section 9: Prohibition of Take—**It is unlawful to "take" an endangered species, including killing or injuring it or modifying its habitat in a way that interferes with essential behavioral patterns, including breeding, feeding or sheltering.
- **Section 10: Permitted Take**—Through voluntary agreements with the federal government that provide protections to an endangered species, a non-federal applicant may commit a take that would otherwise be prohibited as long as it is incidental to an otherwise lawful activity (such as developing land or building a road). These agreements often take the form of a "Habitat Conservation Plan."

- **Section 11: Citizen Lawsuits**—Civil actions initiated by any citizen can require the listing agency to enforce the ESA's prohibition of taking or to meet the requirements of the consultation process

## The Clean Water Act

The Clean Water Act (CWA) is the cornerstone of surface water quality protection in the United States. (The Act does not deal directly with groundwater or with water quantity issues.) The statute employs a variety of regulatory and non-regulatory tools to sharply reduce direct pollutant discharges into waterways, finance municipal wastewater treatment facilities, and manage polluted runoff. These tools are employed to achieve the broader goal of restoring and maintaining the chemical, physical, and biological integrity of the nation's waters so that they can support "the protection and propagation of fish, shellfish and wildlife and recreation in and on the water."

Evolution of CWA programs over the last decade has included a shift from a program-by-program, source-by-source, pollutant-by-pollutant approach to more holistic watershed-based strategies. Under the watershed approach, equal emphasis is placed on protecting healthy waters and restoring impaired ones. A full array of issues are addressed, not just those subject to CWA regulatory authority. Involvement of stakeholder groups in the development and implementation of strategies for achieving and maintaining state water quality and other environmental goals is another hallmark of this approach.

## National Flood Insurance Program

The National Flood Insurance Program (NFIP) provides federally backed flood insurance in exchange for communities enacting and enforcing floodplain regulations. Since its inception in 1968, the NFIP has been successful in requiring new buildings to be protected from probable damage by 100-year flood events. Requirements for participation in this program are stipulated in Parts 59 through 79 of 44 CFR. At the time of the preparation of this Plan, the City is in good standing with the requirements of the NFIP. Participation and good-standing under NFIP are prerequisites for funding eligibility under the Robert T. Stafford Act.

## National Incident Management System

The National Incident Management System (NIMS) is a systematic approach for government, nongovernmental organizations, and the private sector to work together to manage incidents involving hazards. The NIMS provides a flexible but standardized set of incident management practices. Incidents typically begin and end locally, and they are managed at the lowest possible geographical, organizational, and jurisdictional level. In some cases, success depends on the involvement of multiple jurisdictions, levels of government, functional agencies, and emergency responder disciplines. These cases necessitate coordination across a spectrum of organizations. Communities using NIMS follow a comprehensive national approach that improves the effectiveness of emergency management and response personnel across the full spectrum of potential hazards (including natural hazards, terrorist activities, and other human-caused disasters) regardless of size or complexity.

## Americans with Disabilities Act and Amendments

The Americans with Disabilities Act (ADA) seeks to prevent discrimination against people with disabilities in employment, transportation, public accommodation, communications, and government activities. Title II of the ADA deals with compliance with the Act in emergency management and disaster-related programs, services, and activities. It applies to state and local governments as well as third parties, including religious entities and private nonprofit organizations.

The ADA has implications for sheltering requirements and public notifications. During an emergency alert, officials must use a combination of warning methods to ensure that all residents have all necessary information. Those with hearing impairments may not hear radio, television, sirens, or other audible alerts, while those with visual impairments may not see flashing lights or visual alerts. Two technical documents issued for shelter operators address physical accessibility needs of people with disabilities as well as medical needs and service animals.

The ADA intersects with disaster preparedness programs in regards to transportation, social services, temporary housing, and rebuilding. Persons with disabilities may require additional assistance in evacuation and transit (e.g., vehicles with wheelchair lifts or paratransit buses). Evacuation and other response plans should address the unique needs of residents. Local governments may be interested in implementing a special-needs registry to identify the home addresses, contact information, and needs for residents who may require more assistance.

## Civil Rights Act of 1964

The Civil Rights Act of 1964 prohibits discrimination based on race, color, religion, sex or nation origin and requires equal access to public places and employment. The Act is relevant to emergency management and hazard mitigation in that it prohibits local governments from favoring the needs of one population group over another. Local government and emergency response must ensure the continued safety and well-being of all residents equally, to the extent possible.

## Rural Development Program

The mission of the U.S. Department of Agriculture (USDA) Rural Development Program is to help improve the economy and quality of life in rural America. The program provides project financing and technical assistance to help rural communities provide the infrastructure needed by rural businesses, community facilities, and households. The program addresses rural America's need for basic services, such as clean running water, sewage and waste disposal, electricity, and modern telecommunications and broadband. Loans and competitive grants are offered for various community and economic development projects and programs, such as the development of essential community facilities including fire stations (USDA, 2015b).

## Community Development Block Grant Disaster Resilience Program

In response to disasters, Congress may appropriate additional funding for the U.S. Department of Housing and Urban Development Community Development Block Grant programs to be distributed as Disaster Recovery grants (CDBG-DR). These grants can be used to rebuild affected areas and provide seed money to start the recovery process. CDBG-DR assistance may fund a broad range of recovery activities, helping communities and neighborhoods that otherwise might not recover due to limited resources. CDBG-DR grants often supplement disaster programs of the Federal Emergency Management Agency, the Small Business Administration, and the U.S. Army Corps of Engineers. Housing and Urban Development generally awards noncompetitive, nonrecurring CDBG-DR grants by a formula that considers disaster recovery needs unmet by other federal disaster assistance programs. To be eligible for CDBG-DR funds, projects must meet the following criteria:

- Address a disaster-related impact (direct or indirect) in a presidentially declared county for the covered disaster
- Be a CDBG-eligible activity (according to regulations and waivers)
- Meet a national objective.

Incorporating preparedness and mitigation into these actions is encouraged, as the goal is to rebuild in ways that are safer and stronger.

## Emergency Watershed Program

The USDA Natural Resources Conservation Service (NRCS) administers the Emergency Watershed Protection (EWP) Program, which responds to emergencies created by natural disasters. Eligibility for assistance is not dependent on a national emergency declaration. The program is designed to help people and conserve natural resources by relieving imminent hazards to life and property caused by floods, fires, wind-storms, and other natural occurrences. EWP is an emergency recovery program. Financial and technical assistance are available for the following activities (Natural Resources Conservation Service, 2016):

- Remove debris from stream channels, road culverts, and bridges
- Reshape and protect eroded banks
- Correct damaged drainage facilities
- Establish cover on critically eroding lands
- Repair levees and structures
- Repair conservation practices.

## Presidential Executive Orders 11988 and 13690

Executive Order 11988 requires federal agencies to avoid to the extent possible the long and short-term adverse impacts associated with the occupancy and modification of flood plains and to avoid direct and indirect support of floodplain development wherever there is a practicable alternative. In accomplishing this objective, "each agency shall provide leadership and shall take action to reduce the risk of flood loss, to minimize the impact of floods on human safety, health, and welfare, and to restore and preserve the natural and beneficial values served by flood plains in carrying out its responsibilities" for the following actions:

- Acquiring, managing, and disposing of federal lands and facilities
- Providing federally-undertaken, financed, or assisted construction and improvements
- Conducting federal activities and programs affecting land use, including but not limited to water and related land resources planning, regulation, and licensing activities (FEMA, 1982).

Executive Order 13690 amends and expands Executive Order 11988, acknowledging that the impacts of flooding are anticipated to increase over time due to the effects of climate change and other threats. It mandates a Federal Flood Risk Management Standard, which is a flexible framework to increase resilience against flooding and help preserve the natural values of floodplains. This standard expands management of flood issues from the current base flood level to a higher vertical elevation and corresponding horizontal floodplain to address current and future flood risk and ensure that projects funded with taxpayer dollars last as long as intended (Office of the Press Secretary, 2015).

## Presidential Executive Orders 11990

Executive Order 11990 requires federal agencies to provide leadership and take action to minimize the destruction, loss or degradation of wetlands, and to preserve and enhance the natural and beneficial values of wetlands. The requirements apply to the following activities (National Archives, 2016):

- Acquiring, managing, and disposing of federal lands and facilities
- Providing federally undertaken, financed, or assisted construction and improvements
- Conducting federal activities and programs affecting land use, including but not limited to water and related land resources planning, regulation, and licensing.

## Emergency Relief for Federally Owned Roads Program

The U.S. Forest Service's Emergency Relief for Federally Owned Roads Program was established to assist federal agencies with repair or reconstruction of tribal transportation facilities, federal lands transportation facilities, and other federally owned roads that are open to public travel and have suffered serious damage by a natural disaster over a wide area or by a catastrophic failure. The program funds both emergency and permanent repairs (Office of Federal Lands Highway, 2016).

## 4.9.2 State

### California General Planning Law

California state law requires that every county and city prepare and adopt a comprehensive long-range plan to serve as a guide for community development. The general plan expresses the community's goals, visions, and policies relative to future land uses, both public and private. The general plan is mandated and prescribed by state law (Cal. Gov. Code §65300 et seq.), and forms the basis for most local government land use decision-making.

The plan must consist of an integrated and internally consistent set of goals, policies, and implementation measures. In addition, the plan must focus on issues of the greatest concern to the community and be written in a clear and concise manner. City actions, such as those relating to land use allocations, annexations, zoning, subdivision and design review, redevelopment, and capital improvements, must be consistent with the plan.

### California Environmental Quality Act

The California Environmental Quality Act (CEQA) was passed in 1970, shortly after the federal government passed the National Environmental Policy Act, to institute a statewide policy of environmental protection. CEQA requires state and local agencies in California to follow a protocol of analysis and public disclosure of the potential environmental impacts of development projects. CEQA makes environmental protection a mandatory part of every California state and local agency's decision making process.

CEQA establishes a statewide environmental policy and mandates actions all state and local agencies must take to advance the policy. For any project under CEQA's jurisdiction with potentially significant environmental impacts, agencies must identify mitigation measures and alternatives by preparing an environmental impact report and may approve only projects with no feasible mitigation measures or environmentally superior alternatives.

The Roseville City Council certified a mitigated negative declaration (MND) for the initial City of Roseville hazard plan on July 20, 2005. The MND evaluated potential environmental effects associated with adoption and implementation of the initial hazard plan. It was circulated for a 20-day public review and comment period (per CEQA Guidelines Section 15073(a)), and no comments were received.

Under CEQA guidelines (Section 15164), an addendum to an adopted MND shall be prepared if only minor technical changes or additions are necessary and none of the conditions have occurred calling for the preparation of a new negative declaration or Environmental Impact Report (as described in CEQA Section 15162). The addendum need not be circulated for public review; however, an addendum is to be considered by the decision-making body prior to making a decision on the project.

The City has determined that the 2016 Plan required a new Initial Study/Mitigated Negative Declaration (IS/MND).The public comment period for the IS/MND ran concurrently with the public comment period for the plan update. During this time, no comments were received on the IS/MND. The results of this study were presented to the Council for consideration prior to their consideration of the revised Plan.

### AB 52: Addition of Tribal Cultural Resources CEQA

This bill adds "tribal cultural resources" to the categories of cultural resources in CEQA, which had formerly been limited to historic, archeological, and paleontological resources. Recognizing that tribes may have expertise with regard to their tribal history and practices, AB 52 requires lead agencies to provide notice to tribes that are traditionally and culturally affiliated with the geographic area of a proposed project if they have requested notice of projects proposed within that area. If the tribe requests consultation within 30 days upon receipt of the notice, the lead agency must consult with the tribe.

In accordance with AB 52, in July 2016 the City of Roseville provided certified mail notification of the proposed hazard mitigation plan update to tribes that requested such notification. The City's notice included a summary project description, a location map and request for written response should the tribe desire formal AB 52 consultation on tribal cultural resources. Many of the hazard mitigation alternatives and selected actions contained in Chapter 19 are ongoing City activities and programs, some of which were previously subject to CEQA and do not require further CEQA compliance for continued implementation. However future action plan items that still require Council approval would also require future project-level CEQA compliance and therefore an additional opportunity for AB 52 consultation prior to implementation.

## AB 162: Flood Planning, Chapter 369, Statutes of 2007

This California State Assembly bill passed in 2007 requires cities and counties to address flood-related matters in the land use, conservation, and safety and housing elements of their general plans. The land use element must identify and annually review the areas covered by the general plan that are subject to flooding as identified in floodplain mapping by either FEMA or the state Department of Water Resources (DWR). Upon the next revision of the housing element on or after January 1, 2009, the conservation element of the general plan must identify rivers, creeks, streams, flood corridors, riparian habitat, and land that may accommodate floodwater for the purposes of groundwater recharge and stormwater management. The safety element must identify information regarding flood hazards including:

- Flood hazard zones
- Maps published by FEMA, DWR, the U.S. Army Corps of Engineers, the Central Valley Flood Protection Board, Cal OES, etc.
- Historical data on flooding
- Existing and planned development in flood hazard zones.

The general plan must establish goals, policies and objectives to protect from unreasonable flooding risks including:

- Avoiding or minimizing the risks of flooding new development
- Evaluating whether new development should be located in flood hazard zones
- Identifying construction methods to minimize damage.

AB 162 establishes goals, policies and objectives to protect from unreasonable flooding risks. It establishes procedures for the determination of available land suitable for urban development, which may exclude lands where FEMA or DWR has determined that the flood management infrastructure is not adequate to avoid the risk of flooding.

## AB 2140: General Plans: Safety Element, Chapter 739, Statutes of 2006

This bill provides that the state may allow for more than 75 percent of public assistance funding under the California Disaster Assistance Act only if the local agency is in a jurisdiction that has adopted a local hazard mitigation plan as part of the safety element of its general plan. The local hazard mitigation plan needs to include elements specified in this legislation. In addition this bill requires Cal OES to give federal mitigation funding preference to cities and counties that have adopted local hazard mitigation plan. The intent of the bill is to encourage cities and counties to create and adopt hazard mitigation plans. The City of Roseville linked the Roseville Hazard Mitigation Plan to the Safety Element of the General Plan by City Council resolution on May 10, 2010. The 2016 Roseville Hazard Mitigation Plan will continue to link to the Roseville General Plan.

## AB 70: Flood Liability, Chapter 367, Statutes of 2007

This bill provides that a city or county may be required to contribute a fair and reasonable share to compensate for property damage caused by a flood to the extent that it has increased the state's exposure to liability for property damage by unreasonably approving new development in a previously undeveloped area that is protected by a state flood control project, unless the city or county meets specified requirements.

## AB 32: The California Global Warming Solutions Act

This bill addresses greenhouse gas emissions. It identifies the following potential adverse impacts of global warming:

> "… the exacerbation of air quality problems, a reduction in the quality and supply of water to the state from the Sierra snowpack, a rise in sea levels resulting in the displacement of thousands of coastal businesses and residences, damage to marine ecosystems and the natural environment, and an increase in the incidences of infectious diseases, asthma, and other human health-related problems."

AB 32 establishes a state goal of reducing greenhouse gas emissions to 1990 levels by 2020 (a reduction of approximately 25 percent from forecast emission levels) with further reductions to follow. The law requires the state Air Resources Board to do the following:

- Establish a program to track and report greenhouse gas emissions.
- Approve a scoping plan for achieving the maximum technologically feasible and cost-effective reductions from sources of greenhouse gas emissions.
- Adopt early reduction measures to begin moving forward.
- Adopt, implement and enforce regulations—including market mechanisms such as "cap and-trade" programs—to ensure that the required reductions occur.

The Air Resources Board recently adopted a statewide greenhouse gas emissions limit and an emissions inventory, along with requirements to measure, track, and report greenhouse gas emissions by the industries it determined to be significant sources of greenhouse gas emissions.

## Senate Bill 97

Senate Bill 97, enacted in 2007, amended the California Environmental Quality Act (CEQA) to clearly establish that greenhouse gas emissions and the effects of greenhouse gas emissions are appropriate subjects for CEQA analysis. It directed the Governor's Office of Planning and Research to develop draft CEQA guidelines for the mitigation of greenhouse gas emissions or their effects by July 1, 2009 and directed the California Natural Resources Agency to certify and adopt the CEQA Guidelines by January 1, 2010.

## Senate Bill 5: Central Valley Flood Protection Act of 2008

The fundamental change imposed through this legislation was the directive for local agencies to revise their general plans no later than July 2, 2015 to address flood risk for affected land use decisions based on an Urban Level of Flood Protection. The legislation also requires local agencies to revise their zoning codes to reflect this new standard within one year following the adoption of their revised general plans. In areas not subject to the Urban Level of Flood Protection standards, the 100-year floodplain standards will continue to apply.

## Senate Bill 1241: General Plans: Safety Element—Fire Hazard Impacts

In 2012, Senate Bill 1241 passed requiring that all future general plans address fire risk in state responsibility areas and very high fire hazard severity zones in their safety element. In addition, the bill requires cities and counties to make certain findings regarding available fire protection and suppression services before approving a tentative map or parcel map.

## Senate Bill 379: General Plans: Safety Element—Climate Adaptation

Senate Bill 379 builds upon the flood planning inclusions into the safety and housing elements and the hazard mitigation planning safety element inclusions in general plans outlined in AB 162 and AB 2140, respectively. SB 379 focuses on a new requirement that cities and counties include climate adaptation and resiliency strategies in the safety element of their general plans beginning January 1, 2017. In addition, this bill requires general plans to include a set of goals, policies and objectives, and specified implementation measures based on the conclusions drawn from climate adaptation research and recommendations. In anticipation of the implementation of this bill in 2017, the 2016 Hazard Mitigation Plan includes relevant information regarding climate adaptation and resiliency strategies for incorporation into the Roseville General Plan through existing linkage resulting from AB 2140.

## California State Building Code

California Code of Regulations Title 24 (CCR Title 24), also known as the California Building Standards Code, is a compilation of building standards from three sources:

- Building standards that have been adopted by state agencies without change from building standards contained in national model codes
- Building standards that have been adopted and adapted from the national model code standards to meet California conditions
- Building standards authorized by the California legislature that constitute extensive additions not covered by the model codes adopted to address particular California concerns.

The state Building Standards Commission is authorized by California Building Standards Law (Health and Safety Code Sections 18901 through 18949.6) to administer the processes related to the adoption, approval, publication, and implementation of California's building codes. These building codes serve as the basis for the design and construction of buildings in California. The national model code standards adopted into Title 24 apply to all occupancies in California except for modifications adopted by state agencies and local governing bodies. Since 1989, the Building Standards Commission has published new editions of Title 24 every three years.

On January 1, 2014, California Building Code Accessibility Standards found in Chapter 11B incorporated the 2010 Americans with Disabilities Act (ADA) Standards as the model accessibility code for California. The purpose for this incorporation was to ensure consistency with federal guidelines. As a result of this incorporation, the California standards will fully implement and include 2010 ADA Standards within the California Building Code while maintaining enhanced levels of accessibility already provided by existing California accessibility regulations.

## Standardized Emergency Management System

CCR Title 19 establishes the Standardized Emergency Management System (SEMS) to standardize the response to emergencies involving multiple jurisdictions. SEMS is intended to be flexible and adaptable to the needs of all emergency responders in California. It requires emergency response agencies to use basic principles and components of emergency management. Local governments must use SEMS by December 1, 1996 in order to be eligible for state funding of response-related personnel costs under CCR Title 19 (Sections 2920, 2925 and 2930). Individual agencies' roles and responsibilities contained in existing laws or the state emergency plan are not superseded by these regulations.

## California State Hazard Mitigation Plan

Under the DMA, California must adopt a federally approved state multi-hazard mitigation plan in order to be eligible for certain disaster assistance and mitigation funding. The intent of the California State Hazard Mitigation Plan is to reduce or prevent injury and damage from hazards in the state through the following:

- Documenting statewide hazard mitigation planning in California
- Describing strategies and priorities for future mitigation activities
- Facilitating the integration of local and tribal hazard mitigation planning activities into statewide efforts
- Meeting state and federal statutory and regulatory requirements.

The plan is an annex to the State Emergency Plan. It identifies past and present mitigation activities, current policies and programs, and mitigation strategies for the future. It also establishes hazard mitigation goals and objectives. The plan will be reviewed and updated annually to reflect changing conditions and new information, especially information on local planning activities.

## Governor's Executive Order S-13-08

Governor's Executive Order S-13-08 enhances the state's management of climate impacts from sea level rise, increased temperatures, shifting precipitation and extreme weather events. It required the following key actions:

- Initiate California's first statewide climate change adaptation strategy to assess expected climate change impacts, identify where California is most vulnerable, and recommend adaptation policies by early 2009. This effort will improve coordination within state government so that better planning can more effectively address climate impacts on human health, the environment, the state's water supply and the economy.
- Request that the National Academy of Science establish an expert panel to report on sea level rise impacts in California, to inform state planning and development efforts.
- Issue interim guidance to state agencies for how to plan for sea level rise in designated coastal and floodplain areas for new projects.
- Initiate a report on critical infrastructure projects vulnerable to sea level rise.

# 4.9.3 City Plans and Programs

## General Plan

The City of Roseville General Plan 2035 was developed concurrently with the mitigation planning effort. Roseville proactively addresses problems through the General Plan, which includes a Safety Element designed to address hazards. The 2016 General Plan and the 2016 Hazard Mitigation Plan will work together to achieve the goal of hazard risk reduction. Many of the action items identified in this 2016 Plan are recommendations of the General Plan. Updating the General Plan will serve as a trigger for future updates of the hazard mitigation plan.

### *Purpose*

The General Plan is a long-term policy guide for the City's physical, economic, and environmental growth. City actions, such as those relating to land use allocations, annexations, zoning, subdivision, design review, redevelopment and capital improvements, must be consistent with the General Plan. The General Plan emphasizes performance policies or standards that define levels of service and other less tangible factors that the City is seeking to achieve. It also designates land use categories for the entire City. Land use category definitions in the General Plan include information on general uses, development, intensity, siting and compatibility standards. The General Plan serves these purposes:

- It enables the Roseville City Council and Planning Commission to establish long-range development policies.
- It provides a basis for judging whether private development proposals and public projects are in harmony with the policies.
- It guides public agencies and private developers in designing projects consistent with City policies.

The General Plan is designed to be:

- **Long-range**—Most development decisions have effects lasting more than 20 years. In order to create a useful context for development decisions, the General Plan looks toward 2035 and beyond.
- **Comprehensive**—The General Plan provides direction to coordinate all major components of the community's physical development.
- **General**—The General Plan's purpose is to serve as a framework for detailed public and private development proposals. It establishes requirements for additional planning studies that must be completed before modifying land-use allocations.

### *Contents*

Two primary components constitute the City of Roseville General Plan:

- The General Plan document, which presents goals, policies, and implementation measures
- The land use map, which graphically represents the City's existing and planned land use mix and pattern.

The General Plan document is organized into nine elements. The state-mandated elements are land use, circulation, open space and conservation, safety, housing, and noise. The optional elements are air quality, parks and recreation, and public facilities. Each element includes a brief setting and outlook section describing existing conditions and critical issues for the topic area, followed by goals, policies and implementation measures. The goals state the overall desired conditions that the City would like to achieve. The policies indicate an action or direction that the City must take as a step toward achieving the goals. The implementation measures include precise actions to achieve the stated policies. The general content of each element is as follows:

- **Land Use Element** discusses existing and projected land-use conditions, land-use designations and standards, community form, community design, and growth management. The goals and policies are intended to promote a balanced land-use pattern that supports innovative land-use approaches and retains and enhances the distinct character and identity of Roseville.
- **Circulation Element** identifies the general locations and extent of existing and proposed roadways, highways, railroads, and transit routes. The element identifies policies and programs to reduce traffic congestion, promote alternative forms of transportation, and provide safe travel throughout the City.
- **Air Quality and Climate Change Element** integrates related land-use, transportation and circulation, transit, and energy issues. The policies and implementation measures are intended to improve air quality and encourage cooperation among the jurisdictions involved in regional air quality efforts.
- **Open Space and Conservation Element** provides for the conservation, development, and use of natural resources; details plans and measures for the preservation of open space; and provides for outdoor recreation, public health and safety. It is the overall goal of the element to preserve a comprehensive interconnected system of open space encompassing preservation and enhancement of natural habitat areas for the use and enjoyment of the community.
- **Parks and Recreation Element** provides goals and policies for both traditional "active" park lands and non-traditional "open space recreational" park lands. It specifies standards and conditions as guidelines for planning parks and recreation facilities, including size, type, and location.
- **Public Facilities Element** identifies facility and service needs of the community and performance standards to ensure that desired service levels are maintained. Discussed under this element are civic

facilities, libraries, schools, electric and privately owned utilities, water and wastewater systems, solid waste and recycling, water and energy conservation, and the extension of City services. Emphasis is placed on the fair-share contribution of new development toward the provision of services and facilities.

- **Safety Element** establishes standards and plans for the protection of the community from a variety of hazards, including earthquakes, flooding, crime, fire, hazardous materials, and electromagnetic fields.
- **Noise Element** establishes standards for transportation and fixed noise sources to protect the health and welfare of the community.
- **Housing Element** identifies the existing and projected housing needs and establishes goals, policies, and implementation measures for the preservation, improvement and development of housing to meet the needs of all economic sectors of the community.

## Specific Plans

Roseville's specific plans are comprehensive planning documents that guide the development of defined geographic areas. Specific plans typically include more detailed information than the General Plan about land use, traffic circulation, affordable housing programs, resource management strategies, development standards and a comprehensive infrastructure plan. Specific plans currently exist for the Amoruso Ranch, Creekview, Del Webb, Downtown, Highland Reserve North, North Central Roseville, Northeast Roseville, North Industrial, North Roseville, Northwest Roseville, Riverside Gateway, Sierra Vista, Southeast Roseville, Stoneridge, West Roseville, and the Infill Area. All of these specific plans were adopted by the City Council after extensive review by City staff, commissions and the public. Specific plans contain detailed regulations, conditions, programs and design criteria unique to specific areas of the City and serve to implement the General Plan. Each specific plan includes a menu of strategies.

## Development Agreements

California planning law authorizes cities and developers to enter into contracts to lock in regulations and policies governing a property. Development agreements benefit the City and its residents by detailing the developer's responsibilities for public improvements and infrastructure, such as street lights and roads. Development agreements also give developers the certainty they need to develop their property. With the obligations of both the City and the developer detailed and in writing, the project is able to move ahead smoothly with few obstacles.

## Community Design Guidelines

Community design guidelines identify the City's expectations for planning, designing and reviewing development proposals in Roseville. They establish standards for high quality development and design. The community design guidelines provide design professionals, property owners, commissioners, staff, and residents with a clear and common understanding of the City's expectations for the planning, design, and review of development proposals in Roseville. They also increase the community's awareness and appreciation of design considerations.

### Open Space Preserve Overarching Management Plan

In August 2011, the City of Roseville adopted an Open Space Preserve Overarching Management Plan (OSPOMP), which provides a City-wide approach to open space management, maintenance, and monitoring of the City's open space preserves. The OSPOMP also provides the same approach for the management and maintenance of open space areas outside of a preserve areas. Prior to adoption of the OSPOMP, the City managed, monitored, and provided reports to the U.S. Army Corps of Engineers for over 30 individual preserve management plans regulated by natural resource agencies, with various requirements for management and monitoring that had evolved in comprehensiveness and complexity since the 1990s. Adoption of the OSPOMP eliminates the need for additional management plans when new open space is dedicated through the development process or habitat conservation efforts.

### Urban Water Management Plan

The City of Roseville Urban Water Management Plan assumes an important role in water supply planning and management. Current drought conditions have resulted in unprecedented State mandates for water conservation, and the 2015 UWMP serves as the primary compliance document for interim water use targets required by the Water Conservation Act of 2009. The primary objective of the UWMP is to provide a framework for long term water supply planning and document how urban water suppliers carry out long term resource planning responsibilities.

The 2015 UWMP describes City water system, historical and projected use, water supply sources, and a comparison of projected water supply to water demands during normal, single-dry, and multiple dry years in 5 year increments from 2020 to 2040.

### Emergency Operations Plan

The City of Roseville Emergency Operations Plan (EOP) establishes an emergency management organization and assigns functions and tasks consistent with California's Standardized Emergency Management System. It provides for the integration and coordination of planning efforts of multiple jurisdictions. This plan was reviewed and approved by representatives from each City of Roseville department, local special districts with emergency services responsibilities in the City, and the Placer County Office of Emergency Services. The content is based on guidance approved and provided by the State of California and FEMA. The EOP provides direction on how to respond to an emergency from the initial onset, through an extended response, and into the recovery process.

A key element of the update process for this hazard mitigation plan was the simultaneous review of the EOP. The Steering Committee remained informed of major review findings of the EOP with an eye toward integration with key components of the hazard mitigation plan. Updates to the EOP will continue to coincide with the future updates of the multi-hazard mitigation plan.

## 4.9.4 Incorporation of Information into the 2016 Planning Process

Pursuant to 44 CFR §201.6(b)(3), the City of Roseville specifically reviewed certain plans and programs for inclusion into this update for the purpose of planning consistency among documents. The full capability assessment includes these reviewed plans, as well as additional regulatory, administrative, fiscal, and NFIP compliance information. Relevant information from reviewed plans, studies, reports, and technical information incorporated into the mitigation plan includes:

- **State Hazard Mitigation Plan** – The State Hazard Mitigation Plan was reviewed for recent updates on state-wide hazard events and hazard information.

- **Placer County Hazard Mitigation Plan** – The Placer County Hazard Mitigation Plan was reviewed for planning consistency and augmented hazard event history for hazards that extend beyond Roseville city limits, such as drought and severe weather.
- **General Plan and Specific Plans** – General Plan demographics and land use was cross referenced for inclusion into this Plan as part of the overall community profile. Additionally, area vulnerabilities identified in Specific Plan Areas were included as part of the vulnerability and risk assessment for wildfire, landslide, and flood. The General Plan and Specific Plans were also included as part of the capability inventory for the City's capability assessment.
- **Urban Water Management Plan** – the information provided in the City's UWMP provided the main resource for illustrating the historical and current conditions for the drought chapter. The UWMP was also included as part of the capability inventory for the City's capability assessment.
- **Open Space Preserve Overarching Management Plan –** This plan was reviewed in reference to the open space policies regarding the City's floodplain management program and the flood chapter of this Plan.
- **Emergency Operations Plan** – The EOP was reviewed to augment hazard information as it relates to response to the assessed natural hazards. Additionally, the EOP underwent a gap analysis review in coordination with the Plan development so as to identify further consistency opportunities among documents. The EOP was also included as part of the capability inventory for the City's capability assessment.
- **Additional Resources and Technical Information –** A complete listing of technical reports, research materials, and articles used during development of this Plan is found in the References section.

## 4.10 CAPABILITY ASSESSMENT

The planning team performed an inventory and analysis of existing authorities and capabilities called a "capability assessment." A capability assessment creates an inventory of an agency's mission, programs and policies, and evaluates its capacity to carry them out. An assessment of legal and regulatory capabilities is presented in Table 4-10. An assessment of administrative and technical capabilities is presented in Table 4-11. An assessment of fiscal capabilities is presented in Table 4-12. Information on National Flood Insurance Program compliance is presented in Table 4-13. An assessment of education and outreach capabilities is presented in Table 4-14. Classifications under various community mitigation programs are presented in Table 4-15.

**Table 4-10.** Legal and Regulatory Capability

| | Local Authority | State or Federal Prohibitions | Other Jurisdiction Authority | State Mandated |
|---|---|---|---|---|
| **Codes, Ordinances & Requirements** | | | | |
| **Building Code** | Y | NA | N | Y |
| ***Comments:*** *The 2013 California Building Standards Code was adopted by the City of Roseville and incorporated by reference into the City of Roseville Municipal Code.* | | | | |
| **Zoning Code** | Y | NA | N | N |
| ***Comments:*** *RMC, Title 19* | | | | |
| **Subdivisions** | Y | NA | N | Y |
| ***Comments:*** *RMC, Title 18* | | | | |
| **Stormwater Management** | Y | NA | N | Y |
| ***Comments:*** *RMC, Chapter 14.20* | | | | |
| **Post-Disaster Recovery** | N | NA | N | N |
| ***Comments:*** *None at this time.* | | | | |
| **Real Estate Disclosure** | N | NA | Y | N |
| ***Comments:*** *California Civil Code 1102 governs real estate and various disclosure laws. It does not mandate disclosure at the local government level but does require local governments to make known information on natural hazards available to the real estate community.* | | | | |
| **Growth Management** | Y | NA | N | Y |
| ***Comments:*** *Growth management strategies are incorporated into the Land Use Element of the General Plan.* | | | | |
| **Site Plan Review** | Y | NA | N | N |
| ***Comments:*** *The Zoning Ordinance (RMC 19.74.010.(C)) requires a design review permit for all new construction except single-family and two-family residences. Site design, building architecture, landscape design, and lighting are reviewed through the design review permit. Design review permits are reviewed and approved by the City's Design Committee or Planning Commission.* | | | | |
| **Flood Damage Prevention** | Y | N/A | Y | Y |
| ***Comments:*** *The Roseville Zoning Ordinance incorporates combining or overlay of districts to regulate floodplain development, open space preservation, and other sensitive habitat. The Flood Damage Prevention Ordinance (RMC 9.80) regulates development in special flood hazard areas. Outside agencies with jurisdiction over sensitive habitats include the U.S. Army Corps of Engineers and California Department of Fish and Wildlife.* | | | | |
| **Public Health and Safety** | Y | NA | N | N |
| ***Comments:*** *RMC, Title 9 includes multiple public health and safety regulations.* | | | | |
| **Environmental Protection** | N | NA | N | N |
| ***Comments:*** *None at this time.* | | | | |
| **Planning Documents** | | | | |
| **General or Comprehensive Plan** | Y | NA | N | Y |
| ***Is the plan equipped to provide linkage to this mitigation plan?*** *Yes* | | | | |
| ***Comments:*** *The City's General Plan was most recently updated in 2016 and is implemented through 14 specific plans (Amoruso Ranch, Sierra Vista, Creekview, Downtown, Riverside Gateway, Southeast Roseville, Northeast Roseville, Northwest Roseville, North Central Roseville, North Roseville, Highland Reserve North, Stoneridge, Del Webb, and West Roseville) and one other planning area (North Industrial).* | | | | |
| **Capital Improvement Plan** | Y | NA | N | N |
| ***What types of capital facilities does the plan address?*** Roads, water, and sewer | | | | |
| ***How often is the plan updated?*** Every 2-3 Years. | | | | |
| ***Comments:*** *6-year CIP* | | | | |

| | Local Authority | State or Federal Prohibitions | Other Jurisdiction Authority | State Mandated |
|---|---|---|---|---|
| **Floodplain or Basin Plan** | Y | NA | N | N |
| ***Comments:*** *RMC 9.80 and Safety Element of the General Plan* | | | | |
| **Stormwater Plan** | Y | NA | Y | Y |
| ***Comments:*** *City of Roseville 2004 Stormwater Management Plan. The plan is required by the State of California as part of the federal National Pollution Discharge Elimination System program. Outside jurisdictional authority is through the State Water Resources Control Board and Regional Water Quality Control Board (Central Valley Region).* | | | | |
| **Habitat Conservation Plan** | N | NA | N | N |
| ***Comments:*** *There are no Habitat Conservation Plans within the City. However, preserve areas have been established as a condition of Section 404 permits and biological opinions of the U.S. Fish and Wildlife Service and are regulated through the City's Overarching Open Space Preserve Management Plan approved by the U.S. Fish and Wildlife Service and U.S. Army Corps of Engineers. The Open Space and Conservation Element of the City's General Plan also contains policies relative to habitat conservation.* | | | | |
| **Economic Development Plan** | Y | NA | N | N |
| ***Comments:*** *Current economic development strategy was adopted by the City Council on May 23, 2012. This document will guide the City for efforts related to business attraction, retention, expansion and creation.* | | | | |
| **Shoreline Management Plan** | Y | NA | N | Y |
| ***Comments:*** *This is not applicable to Roseville. Shoreline management plans are applicable to coastal communities and are incorporated into local coastal plans reviewed and approved by the California Coastal Commission.* | | | | |
| **Community Wildfire Protection Plan** | N | NA | Y | Y |
| ***Comments:*** | | | | |
| **Response/Recovery Planning** | | | | |
| **Comprehensive Emergency Management Plan** | Y | NA | N | Y |
| ***Comments:*** *The City of Roseville emergency operations plan was adopted by the City Council on July 21, 2004 (Resolution #04-301) and previously updated in conjunction with the 2011 hazard mitigation plan update. The EOP was subsequently reviewed parallel to the 2016 hazard mitigation plan update. The plan is mandated by the California Office of Emergency Services.* | | | | |
| **Threat & Hazard Identification & Risk Assessment** | N | NA | N | N |
| ***Comments:*** | | | | |
| **Terrorism Plan** | Y | NA | N | N |
| ***Comments:*** *Terrorism Contingency Plan, 2004* | | | | |
| **Hazard Mitigation Plan** | Y | N | N | N |
| ***Comments:*** *The Roseville Multi-Hazard Mitigation Plan was adopted on January 19, 2011. The City received formal approval by FEMA on March 28, 2011.* | | | | |
| **Post-Disaster Recovery Plan** | N | NA | N | N |
| ***Comments:*** | | | | |
| **Continuity of Operations Plan** | Y (partial) | NA | N | N |
| ***Comments:*** *The EOP contains a general overview of continuity of government and continuity of operations guidelines. The City does not have a stand-alone plan for continuity of government or continuity of operations.* | | | | |
| **Public Health Plan** | N | NA | N | N |
| ***Comments:*** | | | | |

**Table 4-11.** Administrative and Technical Capability

| Staff/ Personnel Resources | Available (Y or N) | Department or Agency (Positions) |
|---|---|---|
| **1. Planners or engineers with knowledge of land development and land management practices** | Y | Departments of Development Services, Public Works, Environmental Utilities, Electric, and Parks, Recreation & Libraries (Planners, Engineers, Landscape Architect) |
| **2. Engineers or professionals trained in construction practices related to buildings and/or infrastructure** | Y | Public Works, Development Services Department- Engineering Division (Engineering Inspectors); Building Inspection Division (Building Inspectors); Environmental Utilities Department (Engineers and Inspectors for Water/Sewer/Storm water), Parks, Recreation & Libraries (Park Development) |
| **3. Planners or engineers with an understanding of natural hazards** | Y | Development Services Department (Planners, Engineering); Public Works (Engineers); Environmental Utilities (Engineers) |
| **4. Floodplain manager** | Y | Public Works, Floodplain Management Division (Engineer) |
| **5. Surveyors** | N | No licensed surveyors on City staff. City can and has contracted for survey work on as-needed basis. |
| **6. Personnel skilled or trained in GIS Applications** | Y | Development Services Department (Business Services Technicians); Public Works (Engineering Assistants); Fire Department (GIS Analysts); Environmental Utilities Department (Mapping Manager); Information Technology Division (GIS Manager) |
| **7. Scientist familiar with local natural hazards** | N | |
| **8. Emergency manager** | Y | Fire Department (Emergency Preparedness Manager) |
| **9. Grant writers** | Y | City Manager's Office (Government Relations Manager) |
| **10. Staff with expertise or training in benefit/cost analysis** | Y | Finance Department (administration and budget); City Manager's Office (Economic Development Team); Public Works; Environmental Utilities Department; Electric Department |

**Table 4-12.** Fiscal Capability

| Financial Resources | Accessible or Eligible to Use (Y or N) |
|---|---|
| **1. Community Development Block Grants** | Y |
| **2. Capital Improvements Project Funding** | Y |
| **3. Authority to Levy Taxes for Specific Purposes** | Y |
| **4. User Fees For Water, Sewer, Gas or Electric Service** | Y |
| **5. Impact Fees for Buyers or Developers of New Development/Homes** | Y |
| **6. Incur Debt through General Obligation Bonds** | Y |
| **7. Incur Debt through Special Tax Bonds** | Y |
| **8. Incur Debt through Private Activity Bonds** | N |
| **9. Could Withhold Public Expenditures in Hazard-Prone Areas** | N |
| **10. State-Sponsored Grant Programs** | Y |
| **11. Other** | NA |

**Table 4-13.** National Flood Insurance Program Compliance

| Compliance Issue | Local Response |
|---|---|
| **What local department is responsible for floodplain management?** | City of Roseville Public Works |
| **Who is your floodplain administrator? (department/position)** | Public Works/Senior Civil Engineer |
| **Are any certified floodplain managers on staff in your jurisdiction?** | Yes |
| **What is the date of adoption of your flood damage prevention ordinance?** | 2006 |
| **When was the most recent Community Assistance Visit or Community Assistance Contact?** | September 10, 2014. |
| **Does your jurisdiction have any outstanding National Flood Insurance Program compliance violations that need to be addressed?** | No |
| **Do your flood hazard maps adequately address the flood risk within your jurisdiction?** | Yes |
| **Does your floodplain management staff need any assistance or training to support its floodplain management program?** | The City's floodplain management is staff is always seeking ways to expand its nationally recognized subject matter expertise in the field of floodplain management. |
| • **If so, what type of assistance/training is needed?** ....................................................... | For this planning performance period, the training will focus on fundamental changes to the NFIP and CRS driven by flood insurance reform. |
| **Does your jurisdiction participate in the Community Rating System?** | Yes |

**Table 4-14.** Education and Outreach

| Criteria | Response |
|---|---|
| **Do you have a Public Information Officer or Communications Office?** | Yes – multiple communications specialists in multiple departments. The Public Works and Fire communications specialists are heavily involved in developing and distributing mitigation-specific information. |
| **Do you have personnel skilled or trained in website development?** | Yes |
| **Do you have hazard mitigation information available on your website?** | Yes |
| • **If yes, please briefly describe.** | Fire Department City website contains the maintained mitigation webpage. This page includes information on the Plan, meetings, and progress reports |
| **Do you utilize social media for hazard mitigation education and outreach?** | Yes |
| • **If yes, please briefly describe.** | Facebook, Twitter, Nextdoor |
| **Do you have any citizen boards or commissions that address issues related to hazard mitigation?** | Yes – the Roseville Coalition of Neighborhood Associations is an active neighborhood association that participated in the 2016 Plan Steering Committee. |
| **Do you have any other programs already in place that could be used to communicate hazard-related information?** | Yes |
| • **If yes, please briefly describe.** | Email distribution lists, annual events (e.g. Earth Day), Neighborhood Fire Station Tours |
| **Do you have any established warning systems for hazard events?** | Yes – Alert Roseville |

**Table 4-15.** Community Classifications

| | Participating? | Classification | Date Classified |
|---|---|---|---|
| **Community Rating System** | Yes | 1 | 10/01/06 |
| **Building Code Effectiveness Grading Schedule** | Yes | 2/2 | 11/28/2011 |
| **Public Protection** | Yes | 2 | May 2015 |
| **Storm Ready** | Yes | Blue | N/A |
| **Firewise** | No | N/A | N/A |

# Part 2. Risk Assessment

# 5. IDENTIFIED HAZARDS OF CONCERN AND RISK ASSESSMENT METHODOLOGY

Risk assessment is the process of measuring the potential loss of life, personal injury, economic injury, and property damage resulting from natural hazards. It allows emergency management personnel to establish early response priorities by identifying potential hazards and vulnerable assets. The process focuses on the following elements:

- **Hazard identification**—Use all available information to determine what types of disasters may affect a jurisdiction, how often they can occur, and their potential severity.
- **Vulnerability identification**—Determine the impact of natural hazard events on the people, property, environment, economy and lands of the region.
- **Cost evaluation**—Estimate the cost of potential damage or cost that can be avoided by mitigation.

The risk assessment for this hazard mitigation plan update evaluates the risk of natural hazards prevalent in the planning area and meets requirements of the DMA (44 CFR, Section 201.6(c)(2)).

## 5.1 IDENTIFIED HAZARDS OF CONCERN

The Steering Committee considered the full range of natural and human-caused hazards that could impact the area, and then identified and ranked the hazards that present the greatest concern. The selection of hazards of concern was based on the following criteria:

- The California State Hazard Mitigation Plan identified Placer County as being susceptible to the hazard.
- Historical occurrence of the hazard within the City of Roseville has caused fatalities, injury, or property damage.
- There is local knowledge and perception that the hazard could significantly impact the planning area, regardless of past occurrence.

Based on review of all available resources, the following hazards of concern were identified for the 2016 Plan:

- Climate change
- Dam failure
- Drought
- Earthquake
- Flooding
- Landslide
- Severe weather
- Wildfire
- Health hazards
- Human-caused hazards.

The Steering Committee did not omit any hazard commonly recognized to affect the City of Roseville.

## 5.2 METHODOLOGY

The risk assessments in Chapters 6 through 15 describe the risks associated with each identified hazard of concern. Each chapter describes the hazard, the planning area's vulnerabilities, and probable event scenarios. The following steps were used to define the risk of each hazard:

- **Identify and profile each hazard**—The following information is given for each hazard:
  - Geographic areas most affected by the hazard
  - Event frequency estimates
  - Severity estimates
  - Warning time likely to be available for response.
- **Determine exposure to each hazard**—Exposure was determined by overlaying hazard maps with an inventory of structures, facilities, and systems to determine which of them are within the area affected by the hazard.
- **Assess the vulnerability of exposed facilities**—Vulnerability of exposed structures and infrastructure was determined by interpreting the probability of occurrence of each event and assessing structures, facilities, and systems that are exposed to each hazard. Tools such as geographic information systems (GIS) and FEMA's hazard-modeling program called Hazus-MH were used to perform this assessment for the flood, dam failure and earthquake hazards. Outputs similar to those from Hazus-MH were generated for other hazards, using maps generated by the Hazus program.

## 5.3 RISK ASSESSMENT TOOLS

### 5.3.1 Dam Failure, Earthquake and Flood—Hazus-MH

#### Overview

In 1997, FEMA developed the standardized Hazards U.S., or Hazus, model to estimate losses caused by earthquakes and identify areas that face the highest risk and potential for loss. Hazus was later expanded into a multi-hazard methodology, Hazus-MH, with new models for estimating potential losses from hurricanes and floods.

Hazus-MH is a GIS-based software program used to support risk assessments, mitigation planning, and emergency planning and response. It provides a wide range of inventory data, such as demographics, building stock, critical facility, transportation and utility lifeline, and multiple models to estimate potential losses from natural disasters. The program maps and displays hazard data and the results of damage and economic loss estimates for buildings and infrastructure. Its advantages include the following:

- Provides a consistent methodology for assessing risk across geographic and political entities.
- Provides a way to save data so that it can readily be updated as population, inventory, and other factors change and as mitigation planning efforts evolve.
- Facilitates the review of mitigation plans because it helps to ensure that FEMA methodologies are incorporated.
- Supports grant applications by calculating benefits using FEMA definitions and terminology.
- Produces hazard data and loss estimates that can be used in communication with local stakeholders.
- Is administered by the local government and can be used to manage and update a hazard mitigation plan throughout its implementation.

### Levels of Detail for Evaluation

Hazus-MH provides default data for inventory, vulnerability and hazards; this default data can be supplemented with local data to provide a more refined analysis. The model can carry out three levels of analysis, depending on the format and level of detail of information about the planning area:

- **Level 1**—All of the information needed to produce an estimate of losses is included in the software's default data. This data is derived from national databases and describes in general terms the characteristic parameters of the planning area.
- **Level 2**—More accurate estimates of losses require more detailed information about the planning area. To produce Level 2 estimates of losses, detailed information is required about local geology, hydrology, hydraulics and building inventory, as well as data about utilities and critical facilities. This information is needed in a GIS format.
- **Level 3**—This level of analysis generates the most accurate estimate of losses. It requires detailed engineering and geotechnical information to customize it for the planning area.

### Application for This Plan

The following hazards were evaluated using Hazus-MH:

- **Flood**—A Level 2, user-defined analysis was performed for general building stock in flood zones and for critical facilities and infrastructure. Preliminary planning area flood mapping was used to delineate flood hazard areas and estimate potential losses from the 10-, 100- and 500-year flood events. To estimate damage that would result from a flood, Hazus uses pre-defined relationships between flood depth at a structure and resulting damage, with damage given as a percent of total replacement value. Curves defining these relationships have been developed for damage to structures and for damage to typical contents within a structure. By inputting flood depth data and known property replacement cost values, dollar-value estimates of damage were generated.
- **Dam Failure**—A Level 2 analysis was run for Folsom Dam using the flood methodology described above.
- **Earthquake**—A Level 2 analysis was performed to assess earthquake exposure and vulnerability for two scenario events and one probabilistic event:
    - A Magnitude-6.8 event on the Concord-Green Valley Fault with an epicenter 56 miles southwest of Roseville
    - A Magnitude-7.1 event on the Great Valley Fault with an epicenter 58 miles west northwest of Roseville
    - The standard Hazus-MH 100-year probabilistic event.

## 5.3.2 Landslide, Severe Weather, and Wildfire

For most of the hazards of concern, historical data was not adequate to model future losses. However, areas and inventory susceptible to some of the hazards of concern were mapped, and exposure was evaluated. For other hazards, a qualitative analysis was conducted using the best available data and professional judgment.

## 5.3.3 Drought

The risk assessment methodologies used for the 2016 Plan focus on damage to structures. Because drought does not impact structures, the risk assessment for drought was more limited and qualitative than the assessment for the other hazards of concern.

### 5.3.4 Climate Change

Climate change was addressed to different standards than the above natural hazards for the following reasons:

- Specific data needed to assess risk, such as maps of extent and location and applied damage functions, are not readily available for climate change.
- Standardized climate change models based on greenhouse gas emissions do not currently exist, resulting in a high variation of scenarios that result in differing projections. Until a standardized model is identified, climate change assessment will remain subjective.

### 5.3.5 Health Hazards and Human-Caused Hazards

The non-natural hazards of concern were assessed to different standards than the natural hazards for the following reasons:

- The assessment of non-natural hazards is optional under federal hazard mitigation planning requirements (44 CFR Section 201.6).
- The data needed to assess risk, such as maps of extent and location and applied damage functions, are not readily available for these types of hazards.
- A key element of risk is the probability of occurrence. Probabilities are usually assigned based on past historical occurrences. While human-caused and human health hazards have had significant impacts on our nation as a whole, they have not impacted regions of the country uniformly as do natural hazard events. The lack of record of past occurrences within a planning area makes it difficult to assign probability of occurrence.

## 5.4 MAPPING

A review of national, state and county databases was performed to locate available spatially based data relevant to this planning effort. Maps were produced using GIS software to show the spatial extent and location of identified hazards when such data was available. These maps are included in the hazard profile chapters of this document. Information regarding the data sources and methodologies employed in these mapping efforts is provided in the sections below.

### 5.4.1 Building and Cost Data

Replacement cost values and detailed structure information derived from parcel and tax assessor data provided by the City of Roseville were loaded into Hazus-MH. When available, an updated inventory was used in place of the Hazus-MH defaults for critical facilities and infrastructure.

Replacement cost is the cost to replace the entire structure with one of equal quality and utility. Replacement cost is based on industry-standard cost-estimation models published in *RS Means Square Foot Costs* (RS Means, 2015). It is calculated using the RS Means square foot cost for a structure, which is based on the Hazus-MH occupancy class (e.g., multi-family residential, commercial retail trade), multiplied by the square footage of the structure from the tax assessor data. For single-family residential, the construction class and number of stories also factor into determining the square foot costs.

### 5.4.2 Hazus-MH Data Inputs

The following hazard data were used for the Hazus-MH Level 2 analysis conducted for the risk assessment:

- **Flood**—The preliminary Digital Flood Insurance Rate Map (DFIRM) for the planning area – dated December 28, 2015 – was used to delineate flood hazard areas and estimate potential losses from the

100-year, 500-year and 10-year flood events. Using the DFIRM floodplain boundaries and base flood elevation information, and the Central Valley Flood Delineation Project 3-foot digital elevation model data, flood depth grids were generated and integrated into the Hazus-MH model.

- **Dam Failure**—Inundation area data from the Folsom Dam Containment Dike Failure Risk Assessment Project, provided by the City of Roseville, and the 3-foot digital elevation model were used to develop depth grids that were integrated into the Hazus-MH model.
- **Earthquake**—Earthquake shake maps and probabilistic data prepared by the U.S. Geological Survey (USGS) were used for the analysis of this hazard. A National Earthquake Hazard Reduction Program (NEHRP) soils map from the California Department of Conservation was also integrated into the Hazus-MH model.

## 5.4.3 Other Local Hazard Data

Locally relevant information on hazards was gathered from a variety of sources. Frequency and severity indicators include past events and the expert opinions of geologists, emergency management specialists and others. Data sources for specific hazards were as follows:

- **Landslide**—A dataset for landslide probability was created by intersecting slope data with NEHRP soils data. Three landslide probability classifications were created: high (greater than 30 percent slope, D soils), moderate (15 to 30 percent slope, D type soils), and low (0 to 15 percent slope, D type soils). The slope data were generated from the 3-foot digital elevation model. The NEHRP soils data were provided by the California Department of Conservation.
- **Severe Storm**—No GIS format severe storm area data were identified for the City of Roseville.
- **Wildfire**—California Department of Forestry and Fire Protection (CAL FIRE) fire severity data was downloaded from the CAL FIRE website.

## 5.4.4 Data Source Summary

Table 5-1 summarizes the data sources used for the risk assessment for this project.

## 5.4.5 Limitations

Loss estimates, exposure assessments and hazard-specific vulnerability evaluations rely on the best available data and methodologies. Uncertainties are inherent in any loss estimation methodology and arise in part from incomplete scientific knowledge concerning hazards and their effects on the built environment. Uncertainties also result from the following:

- Approximations and simplifications necessary to conduct a study
- Incomplete or outdated inventory, demographic, or economic parameter data
- The unique nature, geographic extent and severity of each hazard
- Mitigation measures already employed
- The amount of advance notice residents have to prepare for a specific hazard event.

These factors can result in a range of uncertainty in loss estimates, possibly by a factor of two or more. Therefore, exposure and loss estimates are approximate. These results do not predict precise results and should be used only to understand relative risk. Over the long term, the City of Roseville will collect additional data to assist in estimating potential losses associated with other hazards.

**Table 5-1.** Hazus-MH Model Data Documentation

| Data | Source | Date | Format |
|---|---|---|---|
| **Property parcel data** | City of Roseville | 2016 | Digital (GIS) format |
| **Address points** | City of Roseville | 2016 | Digital (GIS) format |
| **Building footprints** | City of Roseville | 2016 | Digital (GIS) format |
| **Building information**[a] | City of Roseville | 2016 | Digital (GIS) format |
| **Building replacement cost** | RS Means | 2015 | Printed. Updated RS Means values |
| **Population data** | Hazus-MH v2.2 | 2010 | Digital (GIS and tabular) format |
| **Flood hazard data** | FEMA | 2015 | Digital (GIS) format |
| **First floor elevation data** | City of Roseville | 2011 | Digital (tabular) format |
| **Earthquake shake maps** | USGS Earthquake Hazards Program website | 2012 | Digital (GIS) format |
| **NEHRP Soils** | California Department of Conservation | 2008 | Digital (GIS) format |
| **Dam inundation area** | City of Roseville | 2010 | Digital (GIS) format |
| **Landslide** | Tetra Tech Inc. | 2016 | Digital (GIS) format |
| **Wildfire** | CAL FIRE | 2008 | Digital (GIS) format |
| **Digital Elevation Model** | City of Roseville | 2015 | Digital (GIS) format |
| **CRITICAL FACILITIES AND ASSETS** | | | |
| **Landmarks**[b] | City of Roseville | 2015 | Digital (GIS) format |
| **State and local bridges** | Caltrans | 2015 | Digital (GIS) forma |
| **Rail facilities** | Caltrans | 2015 | Digital (GIS) format |
| **Telecommunications facilities** | City or Roseville | 2015 | Digital (GIS) format |
| **Consolidated communications facilities** | Consolidated Communications (from 2011 Hazard Mitigation Plan) | 2011 | Digital (GIS) format |
| **Hazardous material facilities** | U.S. EPA Toxic Release Inventory | 2016 | Digital (GIS) format |
| **Potable water facilities** | City of Roseville | 2015 | Digital (GIS) format |
| **Sewer facilities** | City of Roseville | 2015 | Digital (GIS) format |

a. Building information includes area, occupancy, date of construction, and stories
b. Landmarks include fire stations, police stations, schools, medical care facilities, helipads, rail facilities, electric power facilities, potable water facilities, sewer facilities, and various government facilities

# 6. Climate Change Considerations for Hazard Mitigation

## 6.1 CALIFORNIA SENATE BILL NO. 379

California Senate Bill 379, adopted October 8, 2015, requires that local hazard mitigation plans adopted on or after January 1, 2017 include all of the following:

- A vulnerability assessment that identifies the risks that climate change poses to the local jurisdiction and the geographic areas at risk from climate change impacts, including but not limited to flood and fire hazards. Information available from federal, state, regional and local agencies should be used in the development of this assessment, including the following:
  - Information from the Internet-based Cal-Adapt tool
  - Information from the most recent version of the California Adaptation Planning Guide
  - Information from local agencies on the types of assets, resources, and populations that will be sensitive to various climate change exposures
  - Information from local agencies on their current ability to deal with the impacts of climate change
  - Historical data on natural events and hazards, including locally prepared maps of areas subject to previous risk, areas that are vulnerable, and sites that have been repeatedly damaged
  - Existing and planned development in identified at-risk areas, including structures, roads, utilities, and essential public facilities
  - Federal, state, regional, and local agencies with responsibility for the protection of public health and safety and the environment, including special districts and local offices of emergency services
- A set of adaptation and resilience goals, policies, and objectives based on the available information
- A set of feasible implementation measures designed to carry out the goals, policies, and objectives including, but not limited to, all of the following:
  - Feasible ways to avoid or minimize climate change impacts associated with new uses of land
  - Siting new essential public facilities outside of at-risk areas when feasible (including, but not limited to, hospitals and health care facilities, emergency shelters, emergency command centers, and emergency communications facilities) or, if these facilities are located in at-risk areas, using construction or other methods to minimize damage
  - The designation of adequate and feasible infrastructure in an at-risk area
  - Guidelines for working cooperatively with relevant local, regional, state, and federal agencies.
  - The identification of natural infrastructure that may be used in adaptation projects, where feasible. Where feasible, the plan shall use existing natural features and ecosystem processes or restore natural features and ecosystem processes, when developing alternatives for consideration.

At the time of the development of this hazard mitigation plan, guidelines and resources are still being developed to assist local governments in meeting the intent of Senate Bill No. 379. Information in this chapter addresses the issues presented and the intent of the requirements using the best currently available information. It focuses on the vulnerability assessment of climate change as it relates to the natural hazards of concern selected by the steering committee. Goals, policies, objectives and implementation measures for climate change are incorporated into this Plan's overall mitigation goals, objectives, and actions presented in Part 3.

## 6.2 WHAT IS CLIMATE CHANGE?

Climate, consisting of patterns of temperature, precipitation, humidity, wind and seasons, plays a fundamental role in shaping natural ecosystems and the human economies and cultures that depend on them. "Climate change" refers to changes over a long period of time. Worldwide, average temperatures have increased 1.4ºF since 1880 (NASA, 2015). Although this change may seem small, it can lead to large changes in climate and weather.

The warming trend and its related impacts are caused by increasing concentrations of carbon dioxide and other greenhouse gases in the earth's atmosphere. Greenhouse gases are gases that trap heat in the atmosphere, resulting in a warming effect. Carbon dioxide is the most commonly known greenhouse gas; however, methane, nitrous oxide and fluorinated gases also contribute to warming. Emissions of these gases come from a variety of sources, such as the combustion of fossil fuels, agricultural production, changes in land use and volcanic eruptions. According to the U.S. Environmental Protection Agency (EPA), carbon dioxide concentrations measured about 280 parts per million (ppm) before the industrial era began in the late 1700s and have risen 43 percent since then, reaching 399 ppm in 2014 (see Figure 6-1). Scientists are able to place this rise in carbon dioxide in a longer historical context through the measurement of carbon dioxide in ice cores. According to these records, carbon dioxide concentrations in the atmosphere are the highest that they have been in 800,000 years (NASA, 2016).

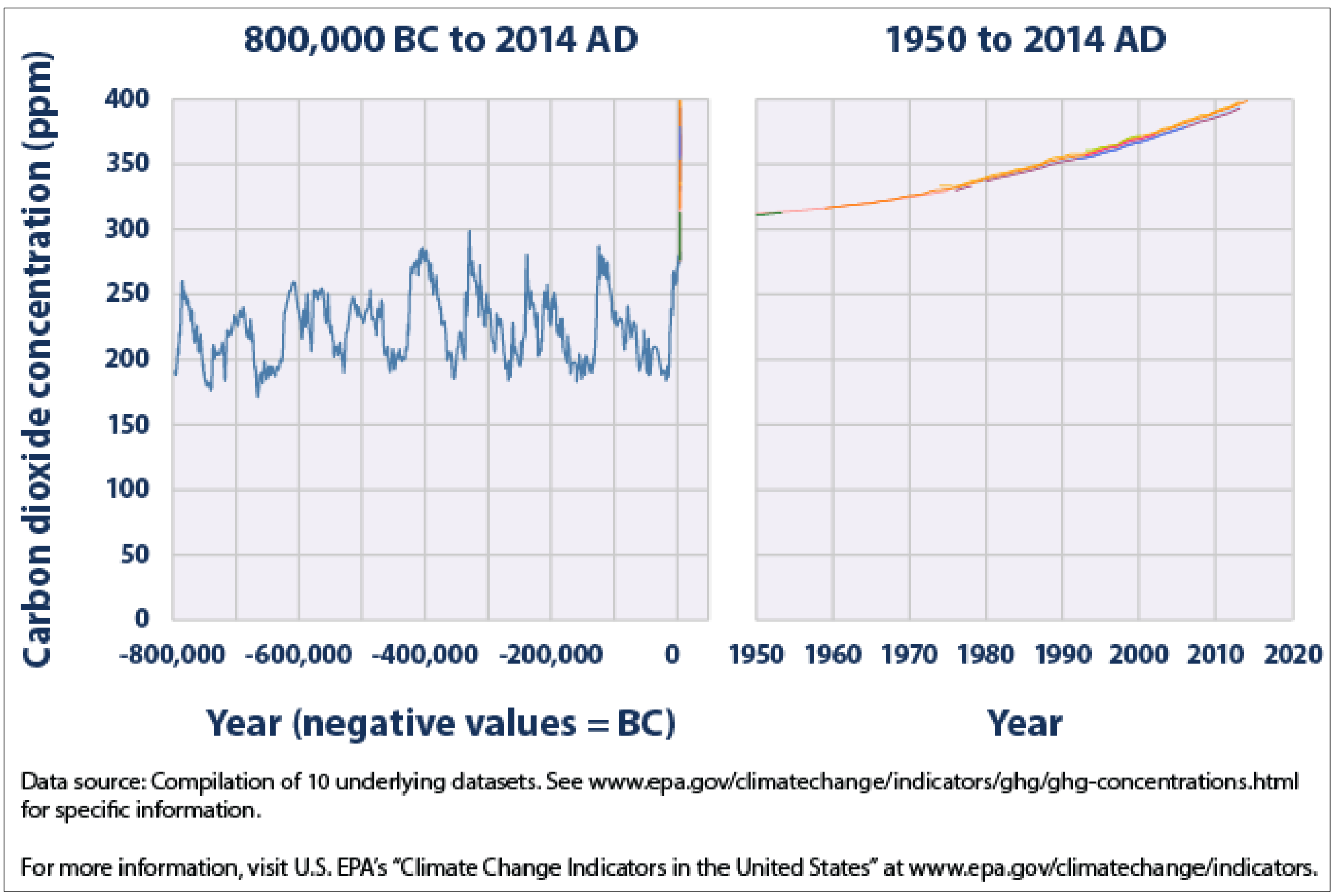


**Figure 6-1.** Global Carbon Dioxide Concentrations Over Time

According to NASA, most of this trend is very likely human-induced, and the rate of change has not been matched in the past 1,300 years (NASA, 2016). There is broad scientific consensus (97 percent of scientists) that climate-warming trends are very likely due to human activities (NASA, 2016). Unless emissions of greenhouse gases are substantially reduced, this warming trend and its associated impacts are expected to continue.

Climate change will affect the people, property, economy and ecosystems of the City of Roseville in a variety of ways. Climate change impacts are most frequently associated with negative consequences, such as increased flood vulnerability or increased heat-related illnesses and other public health concerns; however, other changes may present opportunities. The most important effect for the development of this Plan is that climate change will have a measurable impact on the occurrence and severity of natural hazards.

## 6.3 HOW CLIMATE CHANGE AFFECTS HAZARD MITIGATION

An essential aspect of hazard mitigation is predicting the likelihood of hazard events in a planning area. Typically, predictions are based on statistical projections from records of past events. This approach assumes that the likelihood of hazard events remains essentially unchanged over time. Thus, averages based on the past frequencies of, for example, floods are used to estimate future frequencies: if a river has flooded an average of once every 5 years for the past 100 years, then it can be expected to continue to flood an average of once every 5 years.

For hazards that are affected by climate conditions, the assumption that future behavior will be equivalent to past behavior is not valid if climate conditions are changing. As flooding is generally associated with precipitation frequency and quantity, for example, the frequency of flooding will not remain constant if broad precipitation patterns change over time. The risks of, landslide, severe storms, extreme heat and wildfire are all affected by climate patterns as well. For this reason, an understanding of climate change is pertinent to efforts to mitigate natural hazards. Information about how climate patterns are changing provides insight on the reliability of future hazard projections used in mitigation analysis. This chapter summarizes current understandings about climate change in order to provide a context for the recommendation and implementation of hazard mitigation measures.

## 6.4 CURRENT INDICATIONS OF CLIMATE CHANGE

The major scientific agencies of the United States and the world—including the National Aeronautics and Space Administration (NASA), the National Oceanic and Atmospheric Administration (NOAA) and the Intergovernmental Panel of Climate Change (IPCC)—agree that climate change is occurring. Multiple temperature records from all over the world have shown a warming trend, and the IPCC has stated that the warming of the climate system is unequivocal (IPCC, 2014). Of the 10 warmest years in the 134-year record, all but one (1998) occurred since 2000, and 2015 was the warmest year on record (NASA, 2016).

Rising global temperatures have been accompanied by other changes in weather and climate. Many places have experienced changes in rainfall resulting in more intense rain, as well as more frequent and severe heat waves (IPCC, 2014). The planet's oceans and glaciers have also experienced changes: oceans are warming and becoming more acidic, ice caps are melting, and sea levels are rising (NASA, 2016). Global sea level has risen 6.7 inches, on average, in the last 100 years (NASA, 2016). This has already put some coastal homes, beaches, roads, bridges, and wildlife at risk (USGCRP, 2009).

NASA currently maintains information on the vital signs of the planet and has identified the following trends as of the time of the development of this Plan (NASA, 2016):

- Carbon Dioxide—Increasing trend, currently at 403.28 parts per million
- Global Temperature—Increasing trend, increase of 1.4ºF since 1880
- Arctic Ice Minimum—Decreasing trend, 13.4 percent per decade

- Land Ice—Decreasing trend, 287.0 billion metric tons per year
- Sea Level—Increasing trend, 3.4 mm per year.

## 6.5 PROJECTED FUTURE IMPACTS

Climate change projections contain inherent uncertainty because they are dependent on future greenhouse gas emission scenarios. Different climate change models may assume different scenarios, resulting in differing projections. Generally, the uncertainty is addressed by developing projections for a range of scenarios: in low-emissions scenarios, greenhouse gas emissions are assumed to be reduced substantially from current levels; in high-emissions scenarios, they are assumed to increase or continue at current levels. Despite these uncertainties, climate change projections present valuable information to help guide decision-making for the future.

The Third National Climate Assessment Report for the United States indicates that impacts resulting from climate change will continue through the 21st century and beyond. Although not all changes are understood at this time and the impacts of those changes will depend on global emissions of greenhouse gases and sensitivity in human and natural systems, the following impacts are expected in the United States (NASA, 2016):

- Temperatures will continue to rise
- Growing seasons will lengthen
- Precipitation patterns will change
- Droughts and heat waves will increase
- Hurricanes will become stronger and more intense
- Sea level will rise 1 to 4 feet by 2100
- The Arctic may become ice free.

The California Climate Adaptation Planning Guide outlines the following climate change impact concerns for the North Sierra Region communities (Cal EMA et al., 2012):

- Increased temperature
- Decreased precipitation
- Reduced snowpack
- Reduced tourism
- Ecosystem change
- Sensitive species stress
- Increased wildfire.

Cal-Adapt, a publicly available resource, offers information on how climate change might impact local communities. It presents visualization tools that present the most current data available whenever possible. The following sections summarize projections by Cal-Adapt for the Roseville area’s local climate.

### 6.5.1 Precipitation

According to Cal-Adapt, precipitation projections for California remain uncertain. Models show differing impacts from slightly wetter winters to slightly drier winters, with potential for a 10- to 20-percent decrease in total annual precipitation (Cal-Adapt, 2016). Changes in precipitation patterns, coupled with warmer temperatures, may lead to significant changes in hydrology. In high-emissions scenarios, more precipitation may fall as rain rather than snow, and snow may melt earlier in the season, impacting the timing of stream flow changes and floods (Cal-Adapt, 2016).

## 6.5.2 Temperature

The historical average (1961-1990) temperature in the Roseville area is 61.7ºF. By 2090, the average temperature in the City is expected to increase above this baseline in the low- and high-emissions scenarios by 3.8ºF and 6.5ºF, respectively, as shown in Figure 6-2.

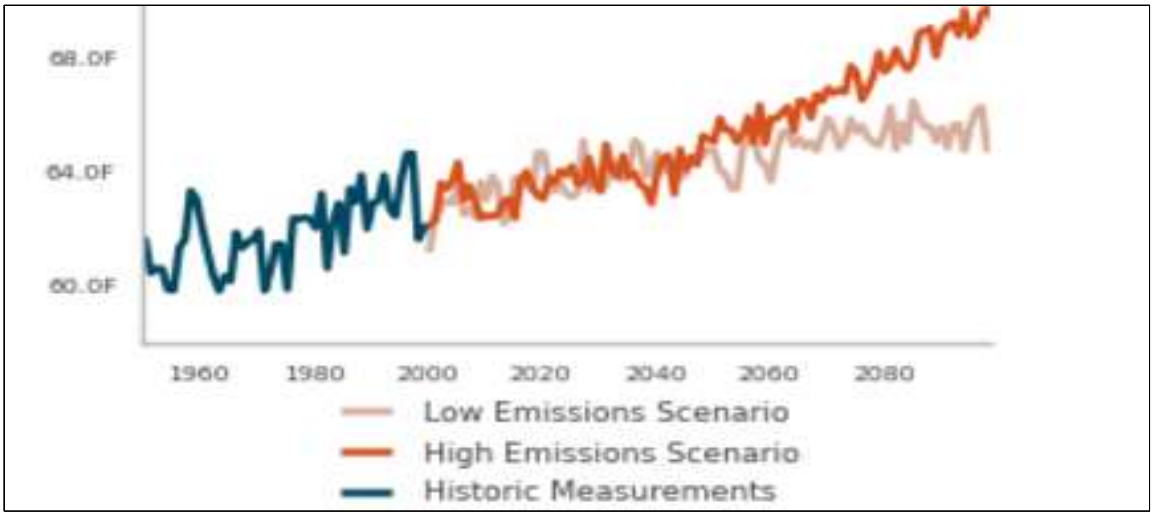


**Figure 6-2.** Observed and Projected Average Temperatures in the Roseville Area

## 6.5.3 Snow Pack

While there are no snow-water equivalency measurements for the Roseville area, Cal-Adapt indicates that some parts of California should expect snow pack levels to be reduced by up to 25 inches from the baseline (1961-1990) by 2090.

## 6.5.4 Wildfire

Wildfire risk is expected to change in the coming decades. Under the high-emissions scenario, the fire risk in Placer County may increase by 1.86 times the current risk by 2085, while the risk may be 1.31 times the current risk for the low-emissions scenario (see Figure 6-3).

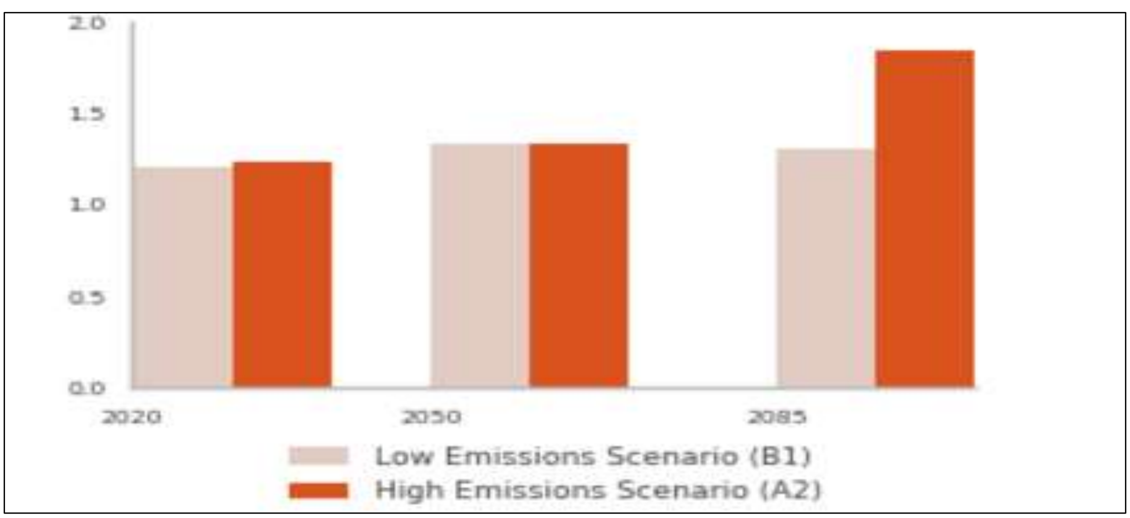


**Figure 6-3.** Projected Future Fire Risk in Placer County Relative to 2010 Levels

## 6.6 RESPONSES TO CLIMATE CHANGE

Communities and governments worldwide are working to address, evaluate and prepare for climate changes that are likely to impact communities in coming decades. Societies across the world are facing the need to adapt to changing conditions associated with natural disasters and climate change. Farmers are altering crops and agricultural methods to deal with changing rainfall and rising temperature; architects and engineers are redesigning buildings; planners are looking at managing water supplies to deal with droughts or flooding.

### 6.6.1 Mitigation and Adaptation

Generally, climate change discussions encompass two separate but inter-related considerations: mitigation and adaptation. The term "mitigation" can be confusing, because it's meaning changes across disciplines:

- Mitigation in climate change discussions is defined as "a human intervention to reduce the impact on the climate system." It includes strategies to reduce greenhouse gas sources and emissions and enhance greenhouse gas sinks (EPA, 2013).
- Mitigation in emergency management is typically defined as the effort to reduce loss of life and property by lessening the impact of disasters (FEMA, 2016a).
- Mitigation in restoration ecology and related fields generally refers to policies, programs or actions that are intended to reduce or to offset the negative impacts of human activities on natural systems. Generally, mitigation can be understood as avoiding, minimizing, rectifying, reducing or eliminating, or compensating for known impacts (U.S. DOT, n.d.).

In this chapter, mitigation is used as defined by the climate change community. In the other chapters of this Plan, mitigation is primarily used in an emergency management context.

Adaptation is defined by the IPCC as adjusting to actual or expected climate and its effects. It includes efforts to moderate or avoid harm to human systems or take advantage of beneficial opportunities. It also includes human intervention to help natural systems adjust to expected climate change (IPCC, 2014).

Mitigation and adaptation are related, as the world's ability to mitigate greenhouse gas emissions will affect the degree of adaptation that will be necessary. Some initiatives and actions can both reduce greenhouse gas emissions and support adaptation to likely future conditions.

### 6.6.2 Ecosystem-Based Adaptation

Ecosystem-based adaptation is the use of biodiversity and ecosystem services as part of an overall strategy to help people adapt to the adverse effects of climate change. This includes the sustainable management, conservation and restoration of specific ecosystems that provide key services. Most ecosystems show a remarkable ability to adapt to change and to buffer surrounding areas from the impacts of change. Forests can bind soils and hold large volumes of water during times of plenty, releasing it through the year; floodplains can absorb vast volumes of water during peak flows; coastal ecosystems can hold out against storms, attenuating waves and reducing erosion. Other ecosystem services—such as food provision, timber, materials, medicines and recreation—can provide a buffer to societies in the face of changing conditions.

### 6.6.3 City of Roseville Sustainability Efforts

The City of Roseville has taken steps to reduce the impacts of climate change through greenhouse gas mitigation and community sustainability efforts:

- The City of Roseville’s general plan highlights existing policies and programs that either reduce greenhouse gas emissions or assist in protecting residents from the potential adverse impacts of climate change (City of Roseville, 2016).
- In 2009, the City Council adopted the City-operations Climate Action Plan, which set a greenhouse gas emission reduction goal of 22.8 percent (City of Roseville, n.d.).
- In 2010 the Community-wide Sustainability Action Plan was developed, recommending 11 steps to reach the greenhouse gas emission targets. (City of Roseville, 2010a).

## 6.7 CLIMATE CHANGE IMPACTS ON HAZARDS

The following sections provide information on how each identified hazard of concern for this planning process may be impacted by climate change. They describe how these impacts may alter current exposure and vulnerability to these hazards of the people, property, critical facilities and environment in the City of Roseville. Detailed hazard profiles and risk assessment information on each hazard of concern are presented in Chapters 7 through 15.

### 6.7.1 Drought

#### Impacts on Hazard

The long-term effects of climate change on regional water resources are unknown, but global water resources are already experiencing the following stresses without climate change:

- Growing populations
- Increased competition for available water
- Poor water quality
- Environmental claims
- Uncertain reserved water rights
- Groundwater overdraft
- Aging urban water infrastructure.

With a warmer climate, droughts could become more frequent, more severe, and longer-lasting. According to the National Climate Assessment Report, higher surface temperatures caused by global warming increase the potential for drought. Evaporation and the higher rate at which plants lose moisture through their leaves both increase with temperature. Unless higher evapotranspiration rates are matched by increases in precipitation, areas become more dry, promoting drought conditions (Globalchange.gov, 2014).

Because expected changes in precipitation patterns are still uncertain, the potential impacts and likelihood of drought are uncertain. California DWR has already noted the impact of climate change on statewide water resources by charting changes in snowpack, sea level, and river flow. As temperatures rise and more precipitation comes in the form of rain instead of snow, these changes will likely continue or grow even more significant. DWR estimates that the Sierra Nevada snowpack, which supplies water for the City of Roseville and other parts of the state, will experience a 48- to 65-percent loss by the end of the century, based on historical April 1 averages (CA DWR 2016). Increasing temperatures may also increase net evaporation from reservoirs by 15 to 37 percent (CA DWR 2013).

#### Population

Population exposure and vulnerability to drought are unlikely to increase as a result of climate change. While greater numbers of people may need to engage in behavior change, such as water saving efforts, significant life or health impacts are unlikely.

### Property

Property exposure and vulnerability may increase as a result of increased drought resulting from climate change, although this would most likely occur in non-structural property such as landscaping. It is unlikely that structure exposure or vulnerability would increase as a direct result of drought, although secondary impacts of drought, such as wildfire, may increase and threaten structures.

### Critical Facilities

Critical facility exposure and vulnerability are unlikely to increase as a result of increased drought resulting from climate change; however, critical facility operators may need to alter standard management practices and actively manage resources, particularly in water-related service sectors.

### Environment

The vulnerability of the environment may increase as a result of increased drought resulting from climate change. Ecosystems and biodiversity in the Roseville area are already under stress from development and water diversion. Prolonged or more frequent drought resulting from climate change may further stress the ecosystems in the region, which include many special status species (Cal EMA et al., 2012).

## 6.7.2 Earthquake

### Impacts on Hazard

The impacts of global climate change on earthquake probability are unknown. Some scientists say that melting glaciers could induce tectonic activity. As ice melts and water runs off, tremendous amounts of weight are shifted on the earth's crust. As newly freed crust returns to its original, pre-glacier shape, it could cause seismic plates to slip and stimulate volcanic activity, according to research into prehistoric earthquakes and volcanic activity. NASA and USGS scientists found that retreating glaciers in southern Alaska may be opening the way for future earthquakes (NASA, 2004).

Secondary impacts of earthquakes could be magnified by climate change. Soils saturated by repetitive storms or heavy precipitation could experience liquefaction or an increased propensity for slides during seismic activity due to the increased saturation. Dams storing increased volumes of water due to changes in the hydrograph could fail during seismic events.

### Population, Property, Critical Facilities and the Environment

Because impacts of climate change on the earthquake hazard are not well understood, increases in exposure and vulnerability of the local resources are not able to be determined.

## 6.7.3 Flood

### Impacts on Hazard

Use of historical hydrologic data has long been the standard of practice for designing and operating water supply and flood protection projects. For example, historical data are used for flood forecasting models and to forecast snowmelt runoff for water supply. This method of forecasting assumes that the climate of the future will be similar to that of the period of historical record. However, the hydrologic record cannot be used to predict changes in frequency and severity of extreme climate events such as floods. Going forward, model calibration or statistical relation development must happen more frequently, new forecast-based tools must be developed, and a standard of practice that explicitly considers climate change must be adopted. Climate change is already impacting water resources, and resource managers have observed the following:

- Historical hydrologic patterns can no longer be solely relied upon to forecast the water future.
- Precipitation and runoff patterns are changing, increasing the uncertainty for water supply and quality, flood management and ecosystem functions.
- Extreme climatic events will become more frequent, necessitating improvement in flood protection, drought preparedness and emergency response.

The amount of snow is critical for water supply and environmental needs, but so is the timing of snowmelt runoff into rivers and streams. Rising snowlines caused by climate change will allow more mountain areas, such as the Sierra Nevada watersheds, to contribute to peak storm runoff. High frequency flood events (e.g. 10-year floods) in particular will likely increase with a changing climate. Along with reductions in the amount of the snowpack and accelerated snowmelt, scientists project greater storm intensity, resulting in more direct runoff and flooding. Changes in watershed vegetation and soil moisture conditions will likewise change runoff and recharge patterns. As stream flows and velocities change, erosion patterns will also change, altering channel shapes and depths, possibly increasing sedimentation behind dams, and affecting habitat and water quality. With potential increases in the frequency and intensity of wildfires due to climate change, there is potential for more floods following fire, which increase sediment loads and water quality impacts.

As hydrology changes, what is currently considered a 1-percent-annual-chance (100-year) flood may strike more often, leaving many communities at greater risk. Planners will need to factor a new level of safety into the design, operation, and regulation of flood protection facilities such as dams, bypass channels and levees, as well as the design of local sewers and storm drains.

### Population and Property

Population and property exposure and vulnerability may increase as a result of climate change impacts on the flood hazard. Runoff patterns may change, resulting in flooding in areas where it has not previously occurred.

### Critical Facilities

Critical facility exposure and vulnerability may increase as a result of climate change impacts on the flood hazard. Runoff patterns may change, resulting in risk to facilities that have not historically been at risk from flooding. Additionally, changes in the management and design of flood protection critical facilities may be needed as additional stress is placed on these systems.

### Environment

The exposure and vulnerability of the environment may increase as a result of climate change impacts on the flood hazard. Changes in the timing and frequency of flood events may have broader ecosystem impacts that alter the ability of already stressed species to survive.

## 6.7.4 Landslide

### Impacts on Hazard

Climate change may impact storm patterns, increasing the probability of more frequent, intense storms with varying duration. Increase in global temperature is likely to affect the snowpack and its ability to hold and store water. Warming temperatures also could increase the occurrence and duration of droughts, which would increase the probability of wildfire, reducing the vegetation that helps to support steep slopes. All of these factors would increase the probability for landslide occurrences.

### Population and Property

Population and property exposure and vulnerability would be unlikely to increase as a result of climate change impacts on the landslide hazard. Landslide events may occur more frequently, but the extent and location should be contained within mapped hazard areas.

### Critical Facilities

Critical facility exposure and vulnerability would be unlikely to increase as a result of climate change impacts on the landslide hazard; however, critical facility owners and operators may experience more frequent disruption to service provision as a result of landslide hazards. For example, transportation systems may experience more frequent delays if slides blocking these systems occur more frequently.

### Environment

Exposure and vulnerability of the environment would be unlikely to increase as a result of climate change, but more frequent slides in riverine systems may impact water quality and have negative impacts on already stressed species.

## 6.7.5 Severe Weather

### Impacts on Hazard

Climate change presents a challenge for risk management associated with severe weather. The frequency of severe weather events has increased steadily over the last century. The number of weather-related disasters during the 1990s was four times that of the 1950s, and cost 14 times as much in economic losses. Historical data shows that the probability of severe weather events increases in a warmer climate.

An increase in average surface temperatures can also lead to more intense heat waves that can be exacerbated in urbanized areas by what is known as urban heat island effect. Evidence suggests that heat waves are already increasing, especially in western states. According to information on Cal-Adapt, extreme heat days in Roseville (103ºF is the extreme heat day threshold) are likely to increase from a historical average for four days annually. This increase would be coupled with an increase in heat waves and warm nights (67ºF threshold).

### Population and Property

For the most part, population and property exposure and vulnerability would be unlikely to substantially increase as a direct result of climate change impacts on the severe weather hazard. Severe weather events may occur more frequently. Disproportionately impacted populations such as the elderly or disadvantaged communities that have substandard living arrangements (homeless populations, etc.) would have a potential for increased exposure and vulnerability from severe weather. Secondary impacts, such as the extent of localized flooding, may increase, thus impacting greater numbers of people and structures.

### Critical Facilities

Critical facility exposure and vulnerability would be unlikely to increase as a result of climate change impacts on the severe weather hazard; however, critical facility owners and operators may experience more frequent disruption to service provision. For example, more frequent and intense storms may cause more frequent disruptions in power service.

### Environment

Exposure and vulnerability of the environment would be unlikely to increase as a result of climate change impacts on the severe weather hazard; however, more frequent storms and heat events and more intense rainfall may place additional stressors on already stressed systems.

## 6.7.6 Wildfire

### Impacts on Hazard

Wildfire is determined by climate variability, local topography, and human intervention. Climate change has the potential to affect multiple elements of the wildfire system: fire behavior, ignitions, fire management, and vegetation fuels. Hot dry spells create the highest fire risk. Increased temperatures may intensify wildfire danger by warming and drying out vegetation. Additionally, changes in climate patterns may impact the distribution and perseverance of insect outbreaks that create dead trees (increase fuel). When climate alters fuel loads and fuel moisture, forest susceptibility to wildfires changes. Climate change also may increase winds that spread fires. Faster fires are harder to contain, and thus are more likely to expand into residential neighborhoods.

### Population, Property and Critical Facilities

According to the Cal-Adapt projections, wildfire risk in the areas surrounding the City of Roseville is expected to increase by 2085. Larger, more frequent fires may impact people, property and critical facilities by increasing the risk of ignition from nearby fire sources. Additionally, secondary impacts such as air quality issues may increase.

### Environment

It is possible that the exposure and vulnerability of the environment will be impacted by impacts on wildfire risk from climate change. Natural fire regimes may change, resulting in more frequent or higher intensity burns. These impacts may alter the composition of the ecosystems in areas in and around Roseville.

# 7. DAM FAILURE

## 7.1 GENERAL BACKGROUND

### 7.1.1 Causes of Dam Failure

Dam failures can be catastrophic to human life and property downstream. Dam failures in the United States typically occur in one of four primary ways:

- Overtopping of the primary dam structure, which accounts for 34 percent of all dam failures, can occur due to inadequate spillway design, settlement of the dam crest, blockage of spillways, and other factors.
- Foundation defects due to differential settlement, slides, slope instability, uplift pressures, and foundation seepage can also cause dam failure. These account for 30 percent of all dam failures.
- Failure due to piping and seepage accounts for 20 percent of all failures. These are caused by internal erosion due to piping and seepage, erosion along hydraulic structures such as spillways, erosion due to animal burrows, and cracks in the dam structure.
- Failure due to problems with conduits and valves, typically caused by the piping of embankment material into conduits through joints or cracks, constitutes 10 percent of all failures.

The remaining 6 percent are due to other miscellaneous causes. Many of the historical dam failures in the United States have been secondary results of other disasters. The prominent causes are earthquakes, landslides, extreme storms, massive snowmelt, equipment malfunction, structural damage and foundation failures.

The most likely disaster-related causes of dam failure in Placer County and the Roseville vicinity are earthquakes, excessive rainfall, and landslides. Poor construction, lack of maintenance and repair, and deficient operational procedures are preventable or correctable by a program of regular inspections. Terrorism and vandalism are serious concerns that all operators of public facilities must plan for; these threats are under continuous review by public safety agencies.

**DEFINITIONS**

**Dam—**Any artificial barrier, together with appurtenant works, that does or may impound or divert water, and that either (a) is 25 feet or more in height from the natural bed of the stream or watercourse at the downstream toe of the barrier (or from the lowest elevation of the outside limit of the barrier if it is not across a stream channel or watercourse) to the maximum possible water storage elevation; or (b) has an impounding capacity of 50 acre-feet or more. (CA Water Code, Division 3.)

**Dam Failure—**An uncontrolled release of impounded water due to structural deficiencies in dam.

**Emergency Action Plan—**A formal document that identifies potential emergency conditions at a dam and specifies actions to be followed to minimize property damage and loss of life. The plan specifies actions the dam owner should take to alleviate problems at a dam. It contains procedures and information to assist the dam owner in issuing early warning and notification messages to responsible downstream emergency management authorities of the emergency situation. It also contains inundation maps to show emergency management authorities the critical areas for action in case of an emergency. (FEMA 2013)

**High Hazard Dam**—Dams where failure or improper operation will probably cause loss of human life. (FEMA 2004)

**Significant Hazard Dam**—Dams where failure or improper operation will result in no probable loss of human life but can cause economic loss, environmental damage or disruption of lifeline facilities, or can impact other concerns. Significant hazard dams are often located in rural or agricultural areas but could be located in areas with population and significant infrastructure. (FEMA 2004)

## 7.1.2 Regulatory Oversight

The potential for catastrophic flooding due to dam failures led to passage of the National Dam Safety Act (Public Law 92-367). The National Dam Safety Program requires a periodic engineering analysis of every major dam in the country. The goal of this FEMA-monitored effort is to identify and mitigate the risk of dam failure so as to protect the lives and property of the public.

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### California Division of Safety of Dams

California's Division of Safety of Dams (a division of the Department of Water Resources) monitors dam safety at the state level. When a new dam is proposed, Division engineers and geologists inspect the site and the subsurface. Upon submittal of an application, the Division reviews the plans and specifications prepared by the owner to ensure that the dam is designed to meet minimum requirements and that the design is appropriate for the known geologic conditions. After approval of the application, the Division inspects all aspects of the construction to ensure that the work is done in accordance with the approved plans and specifications. After construction, the Division inspects each dam on an annual basis to ensure that it is performing as intended and is not developing problems. Roughly a third of these inspections include in-depth instrumentation reviews. The Division periodically reviews the stability of dams and their major appurtenances in light of improved design approaches and requirements, as well as new findings regarding earthquake hazards and hydrologic estimates in California (CA DWR, 2016a).

### U.S. Army Corps of Engineers Dam Safety Program

The U.S. Army Corps of Engineers is responsible for safety inspections of some federal and non-federal dams in the United States that meet the size and storage limitations specified in the National Dam Safety Act. The Corps has inventoried dams; surveyed each state and federal agency's capabilities, practices and regulations regarding design, construction, operation and maintenance of the dams; and developed guidelines for inspection and evaluation of dam safety (U.S. Army Corps of Engineers, 2011).

### Federal Energy Regulatory Commission Dam Safety Program

The Federal Energy Regulatory Commission (FERC) has the largest dam safety program in the United States. The FERC cooperates with a large number of federal and state agencies to ensure and promote dam safety and, more recently, homeland security. Approximately 3,000 dams that are part of regulated hydroelectric projects are in the FERC program. Two-thirds of these dams are more than 50 years old. As dams age, concern about their safety and integrity grows, and oversight and a regular inspection program are extremely important. FERC staff inspects hydroelectric projects on an unscheduled basis to investigate the following:

- Potential dam safety problems
- Complaints about constructing and operating a project

- Safety concerns related to natural disasters
- Issues concerning compliance with the terms and conditions of a license.

Every five years, an independent consulting engineer, approved by the FERC, must inspect and evaluate projects with dams higher than 32.8 feet, or with a total storage capacity of more than 2,000 acre-feet.

FERC staff monitors and evaluates seismic research in geographic areas such as California where there are concerns about possible seismic activity. This information is applied in investigating and performing structural analyses of hydroelectric projects in these areas. FERC staff also evaluates the effects of potential and actual large floods on the safety of dams. During and following floods, FERC staff visits dams and licensed projects, determines the extent of damage, if any, and directs any necessary studies or remedial measures the licensee must undertake. The FERC publication *Engineering Guidelines for the Evaluation of Hydropower Projects* guides the FERC engineering staff and licensees in evaluating dam safety. The publication is frequently revised to reflect current information and methodologies.

The FERC requires licensees to prepare emergency action plans and conducts training sessions on how to develop and test these plans. The plans outline an early warning system if there is an actual or potential sudden release of water from a dam due to failure or accident. The plans include operational procedures that may be used, such as reducing reservoir levels and reducing downstream flows, as well as procedures for notifying affected residents and agencies responsible for emergency management. These plans are frequently updated and tested to ensure that everyone knows what to do in emergency situations.

## 7.2 HAZARD PROFILE

### 7.2.1 Past Events

According to the Placer County Multi-Hazard Mitigation Plan, there have been five dam failures in Placer County (none are known to have impacted the Roseville planning area):

- **Hell Hole Dam Failure**—In 1964, construction of the Hell Hole Dam was underway and the contractor had stopped operations for the winter. A major storm event in December caused the Hell Hole Reservoir to fill, and since the dam was not completed, it failed, sending a considerable amount of water toward Auburn. The water washed out a bridge on Highway 49 over the American River at the confluence of the North and Middle Forks and flooded a quarry. Due to the way the construction contract was worded, the contractor had to rebuild the dam at his own expense. As a result, Placer County incurred no costs related to this event. No claims for damage were filed against the Placer County Water Agency (PCWA) by either the quarry owner or the state.
- **1986 Auburn Coffer Dam Failure**—As a result of area flooding, the Coffer Dam at Auburn breached and partially washed away. The U.S. Bureau of Reclamation had designed the Coffer Dam for a controlled failure by building a soft earthen plug into the dam for this purpose. It appears the dam failed as designed.
- **August 2004 Ralston Dam Release Gate Break—**A broken release gate on Ralston Dam in the Middle Fork of the American River prompted the National Weather Service to issue a flash flood warning in Placer County. According to the PCWA, the gate near the Ralston Powerhouse malfunctioned, and the sudden release of water from Ralston Reservoir south of Auburn sent a wall of water 3 to 4 feet high down the river. The volume of water released was 800 to 1,000 acre-feet. Sheriff's deputies and California Highway Patrol officers alerted campers in the Auburn State Recreation Area to move to higher ground. The CHP monitored the muddy water as it approached Highway 49. There were no reports of injuries or damage along the river, which is popular with rafters, kayakers and residents during summer.

- **August 2009 Cottonwood Dam**—A privately owned and constructed dam on Miners Ravine in the Hidden Valley Estates subdivision (the Auburn Folsom Road and Twin Rocks Road area of Granite Bay), failed and leached flows and sediment into Miners Ravine. NOAA Fisheries quickly became involved because of the impacts on critical fish species. A temporary fix—a notch in the concrete portion of the dam—was approved and made while the homeowners association and interested agencies determined next steps. A dam removal project with creek restoration is now being proposed.
- **January 2016 Folsom Dam**—Seepage occurred at the Folsom cofferdam during final construction of the new Folsom Dam Auxiliary Spillway on January 20, 2016. The seepage was in the spillway basin. At no time was there a threat of a dam failure.

## 7.2.2 Location

According to the California Division of Safety of Dams, as of 2014 there are 45 dams in Placer County. Of these, the western levees along Folsom Lake, which is a reservoir lined by a series of containment dikes, have the potential to significantly impact the City of Roseville in the event of a failure. Another dam, the Miners Ravine Detention Facility located near Roseville's eastern boundary, has the potential to adversely impact Roseville should it fail. Table 7-1 provides summary information about these two facilities.

**Table 7-1.** Dams in Placer and Sacramento Counties With Potential to impact Roseville

| Name | Hazard Class[a] | Water Course | Owner | Year Built | Dam Type | Crest Length (feet) | Height (feet) | Storage Capacity (acre-feet) | Drainage area (sq. mi.) |
|---|---|---|---|---|---|---|---|---|---|
| **Folsom** | 1A | American River | US Bureau of Reclamation | 1956 | Gravity | 102,000 | 275 | 975,000 | 1,885 |
| **Miners Ravine Detention Facility** | 1B | Dry Creek | Placer County Flood & Water Conservation District | 2007 | Earthen | 2000 | 22.5 | 120 | 14 |

a. Downstream Hazard Class 1A: > 300 lives at risk, 1B: 31 to 300 lives at risk, 1C: 7 to 30 lives at risk

## 7.2.3 Frequency

Dam failure events are infrequent and usually coincide with the events that cause them, such as earthquakes, landslides and excessive rainfall and snowmelt. There is a "residual risk" associated with dams; residual risk is the risk that remains after safeguards have been implemented. For dams, the residual risk is associated with events beyond those that the facility was designed to withstand. However, the probability of occurrence of any type of dam failure event is considered to be low in today's regulatory and dam safety oversight environment.

## 7.2.4 Severity

Dam failure can be catastrophic to all life and property downstream. The U.S. Army Corps of Engineers developed the classification system shown in Table 7-2 for the hazard potential of dam failures.

## 7.2.5 Warning Time

Warning time for dam failure varies depending on the cause of the failure. In events of extreme precipitation or massive snowmelt, evacuations can be planned with sufficient time. In the event of a structural failure due to earthquake, it is possible that there would be no warning time.

**Table 7-2.** Hazard Potential Classification

| Hazard Category[a] | Direct Loss of Life[b] | Lifeline Losses[c] | Property Losses[d] | Environmental Losses[e] |
|---|---|---|---|---|
| **Low** | None (rural location, no permanent structures for human habitation) | No disruption of services (cosmetic or rapidly repairable damage) | Private agricultural lands, equipment, and isolated buildings | Minimal incremental damage |
| **Significant** | Rural location, only transient or day-use facilities | Disruption of essential facilities and access | Major public and private facilities | Major mitigation required |
| **High** | Certain (one or more) extensive residential, commercial, or industrial development | Disruption of essential facilities and access | Extensive public and private facilities | Extensive mitigation cost or impossible to mitigate |

a. Categories are assigned to overall projects, not individual structures at a project.
b. Loss of life potential based on inundation mapping of area downstream of the project. Analyses of loss of life potential should take into account the population at risk, time of flood wave travel, and warning time.
c. Indirect threats to life caused by the interruption of lifeline services due to project failure or operational disruption; for example, loss of critical medical facilities or access to them.
d. Damage to project facilities and downstream property and indirect impact due to loss of project services, such as impact due to loss of a dam and navigation pool, or impact due to loss of water or power supply.
e. Environmental impact downstream caused by the incremental flood wave produced by the project failure, beyond what would normally be expected for the magnitude flood event under which the failure occurs.

*Source: U.S. Army Corps of Engineers, 1995*

A dam's structural type also affects warning time. Earthen dams do not tend to fail completely or instantaneously. Once a breach is initiated, discharging water erodes the breach until either the reservoir water is depleted or the breach resists further erosion. Concrete gravity dams also tend to have a partial breach as one or more monolith sections formed during dam construction are forced apart by the escaping water. The time for breach formation ranges from a few minutes to a few hours (U.S. Army Corps of Engineers, 2011).

The City has established protocols for flood warning and response to imminent dam failure in the flood warning portion of its adopted emergency operations plan.

## 7.2.6 Folsom Dam Containment Dike Failure Risk Assessment

During the 2005 review of the initial Roseville Hazard Mitigation Plan, FEMA Region IX plan reviewers indicated that there was sufficient risk of dam failure of the western dikes on Folsom Lake (see Figure 7-1) to warrant treating dam failure as a stand-alone hazard in the City's next hazard mitigation plan update. Six dikes, increasing in size and numeric designation (from 1 to 6) from north to south, fill gaps along the western edge of Folsom Lake.

Because there was insufficient data to assess risk to the standards established for the other hazards in the hazard mitigation plan, the City developed a comprehensive, scenario-based risk assessment of the western dikes on the Folsom Dam complex during the 2011 Plan update. Detailed inundation modeling and mapping performed as part of this assessment are available to inform the City's preparedness and response to a dam breach of the Folsom Lake containment dike system. The maps are not presented in this Plan for security purposes. Figure 7-2 shows mapping that has been created by the City to inform citizens of the direction of flow and possible routes for evacuation during a dam failure event.

*Source: United States Army Corps of Engineers, Michael Nevins [Public domain], via Wikimedia Commons*

**Figure 7-1.** Folsom Dam and Folsom Lake on the American River, Looking Northeast

The study provided inundation mapping to determine the probable impact of flooding in Roseville if any of the western dikes were to fail. It addressed the relative risk of failure of each dike based on the frequency with which the dikes impound water, the potential for overtopping, the recent and in-progress work to upgrade the dikes to reduce the risk of failure due to piping, and a new reservoir spillway that is under construction. Models were prepared to simulate dike failures and resulting inundation. These simulations provide the basis for inundation area mapping and other emergency management tools such as maps that illustrate the time from failure to flooding.

The northernmost dikes are relatively low height embankments above the normal operating range of the lake. Though the occurrence of inundation due to dam failure is based on extremely remote conditions, failure of these facilities has the potential to cause significant property damage and loss of life in the City. The degree of impact would be affected by the water level of the lake at the time of failure, which could be just above the top of the dikes in the case of failure by overtopping. The study mapped the maximum depth of flooding and the timing of the flood wave from the time of failure for various scenarios. The study found that flood depths could reach as much as 58 feet in parts of the City.

## 7.3 SECONDARY HAZARDS

Dam failure can cause severe downstream flooding depending on the magnitude of the failure. Other potential secondary hazards of dam failure include landslides around the reservoir perimeter, bank erosion on the rivers, and destruction of downstream habitat.

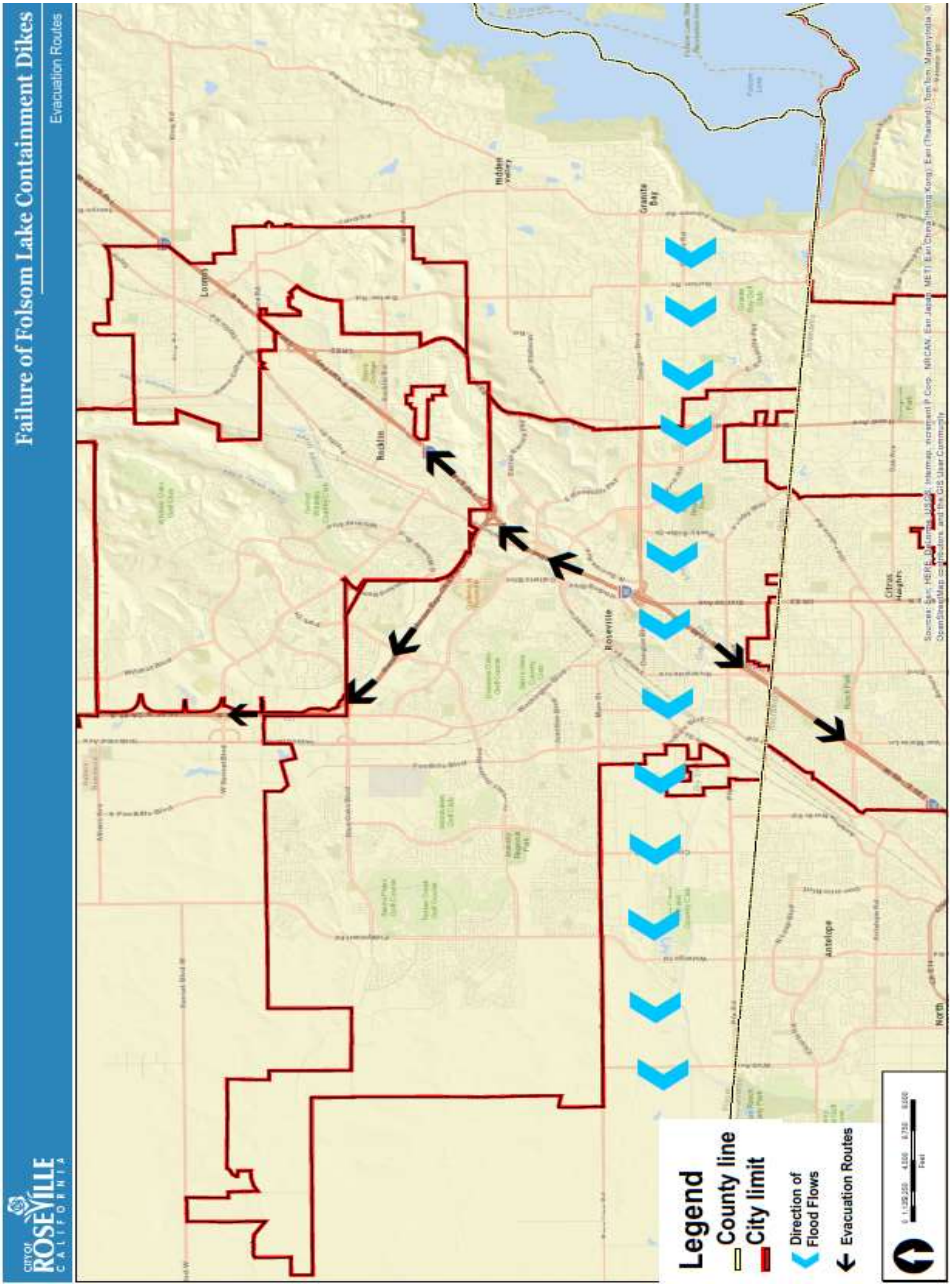



**Figure 7-2.** Folsom Dam Containment Dike Failure Flow Direction and Evacuation Routes

# 7.4 EXPOSURE

The flood module of HAZUS-MH was used for a Level 2 assessment of dam failure risk exposure and vulnerability for facilities in Roseville with sufficient data to support modeling. HAZUS-MH uses census data at the block level and FEMA floodplain data, which has a level of accuracy acceptable for planning purposes. Where possible, the HAZUS-MH data for this risk assessment was enhanced using GIS data from county, state and federal sources. The exposure and vulnerability analyses focused on inundation data from the Folsom Dam Containment Dike Failure Risk Assessment.

## 7.4.1 Population

All populations located in a dam failure inundation zone would be exposed to the risk of a dam failure. The estimated population living in the Folsom Dam failure inundation area is 55,858, or 43.4 percent of the City's population.

## 7.4.2 Property

The HAZUS-MH model estimated that there are 20,303 structures within the Folsom Dam failure inundation areas. It is estimated that 18,746 or 92 percent, of these structures are residential. The value of exposed buildings in the planning area was generated using HAZUS-MH and is summarized in Table 7-3. This methodology estimated $11 billion worth of building-and-contents exposure to Folsom Dam failure inundation, representing 37.1 percent of the total assessed value of the planning area.

**Table 7-3.** Value of Property Exposed to Dam Failure

| Type | Number of Buildings Exposed | Value Exposed | | | % of Total Assessed Value |
|---|---|---|---|---|---|
| | | Building | Contents | Total | |
| **Residential** | 18,746 | $4,877,113,351 | $2,438,892,264 | $7,316,005,614 | 39.13% |
| **Commercial** | 1,017 | $1,197,859,838 | $1,253,661,717 | $2,451,521,555 | 29.63% |
| **Industrial** | 260 | $210,792,151 | $239,393,311 | $450,185,463 | 38.79% |
| **Religion** | 53 | $86,626,396 | $86,626,396 | $173,252,792 | 69.13% |
| **Government** | 18 | $19,135,549 | $19,135,549 | $38,271,098 | 22.66% |
| **Education** | 209 | $284,707,447 | $284,707,447 | $569,414,895 | 52.17% |
| **Total** | **20,303** | **$6,676,234,732** | **$4,322,416,685** | **$10,998,651,417** | **37.11%** |

## 7.4.3 Critical Facilities

GIS analysis was used to determine the number of critical facilities in the mapped dam failure inundation areas. As Table 7-4 shows, 96 of the planning area's critical facilities (55.8 percent) are in the inundation areas.

**Table 7-4.** Critical Facilities in Dam Failure Inundation Areas in Roseville

| Medical & Health Services | Government Function | Protective Function | Schools | Hazmat | Other Critical Function | Total |
|---|---|---|---|---|---|---|
| 0 | 17 | 8 | 25 | 0 | 46 | **96** |

## 7.4.4 Environment

Reservoirs held behind dams affect many ecological aspects of a river. River topography and dynamics depend on a wide range of flows, but rivers below dams often experience long periods of very stable flow conditions or sawtooth flow patterns caused by releases followed by no releases. Water releases from a reservoir, including those exiting a turbine, usually contain very little suspended sediment; this can lead to scouring of river beds and loss of riverbanks.

The environment would be exposed to a number of risks in the event of dam failure. The inundation could introduce many foreign elements into local waterways. This could result in destruction of downstream habitat and could have detrimental effects on many species of animals, especially endangered species such as salmon.

## 7.5 VULNERABILITY

### 7.5.1 Population

Vulnerable populations are all populations downstream from dam failures that are incapable of escaping the area within the allowable time frame. This population includes the elderly and young who may be unable to get themselves out of the inundation area. The vulnerable population also includes those who would not have adequate warning from a television or radio emergency warning system. The potential for loss of life is affected by the capacity and number of evacuation routes available to populations living in areas of potential inundation.

### 7.5.2 Property

Vulnerable properties are those closest to the dam failure inundation area. These properties would experience the largest, most destructive surge of water. Low-lying areas are also vulnerable since they are where the dam waters would collect. Transportation routes are vulnerable to dam failure inundation and have the potential to be wiped out, creating isolation issues. This includes all roads, railroads and bridges in the path of the dam failure inundation. Those that are most vulnerable are those that are already in poor condition and would not be able to withstand a large water surge. Utilities such as overhead power lines, cable and phone lines could also be vulnerable. Loss of these utilities could create additional isolation issues for the inundation areas.

It is estimated that there could be up to $4.46 billion of loss from a dam failure affecting the planning area. This represents 40.5 percent of the total exposure within the inundation area, or 15.0 percent of the total assessed value of the planning area. Table 7-5 summarizes the loss estimates for dam failure.

**Table 7-5.** Loss Estimates for Dam Failure

| | Value Exposed | | | % of |
|---|---|---|---|---|
| | Building Loss | Contents Loss | **Total Loss** | Total Assessed Value |
| **Residential** | $1,550,424,727 | $933,258,844 | $2,483,683,571 | 13.28% |
| **Commercial** | $456,285,740 | $844,987,114 | $1,301,272,854 | 15.73% |
| **Industrial** | $84,633,925 | $203,408,629 | $288,042,554 | 24.82% |
| **Religion** | $34,364,944 | $72,524,654 | $106,889,598 | 42.65% |
| **Government** | $11,072,696 | $16,609,362 | $27,682,057 | 16.39% |
| **Education** | $82,091,723 | $166,677,363 | $248,769,086 | 22.79% |
| **Total** | **$2,218,873,754** | **$2,237,465,967** | **$4,456,339,721** | **15.03%** |

### 7.5.3 Critical Facilities

HAZUS estimated that critical facilities would receive an average of 40 percent damage to the structure and an average 70 percent damage to the contents during a dam failure event. The estimated functional down-time to restore these facilities to 100 percent of their functionality is 700 days.

### 7.5.4 Environment

The environment would be vulnerable to a number of risks in the event of dam failure. The inundation could introduce foreign elements into local waterways, resulting in destruction of downstream habitat and detrimental effects on many species of animals, especially endangered species such as coho salmon. The extent of the vulnerability of the environment is the same as the exposure of the environment.

## 7.6 FUTURE TRENDS IN DEVELOPMENT

All land use decision-making is guided by the goals, policies and implementation measures contained in the Land Use Element of Roseville's General Plan. The Safety Element of the General Plan establishes standards and plans for the protection of the community from hazards. Dam failure is currently not addressed as a stand-alone hazard in the Safety Element, but flooding is. The City has established comprehensive policies regarding sound land use in identified flood hazard areas. Most of the areas vulnerable to the more severe impacts from the bank-full Folsom Dam failure scenario intersect the City's flood hazard areas. Flood-related policies in the General Plan will help to reduce the risk associated with the dam failure hazard for all future development within the City.

The dam failure risk exposure with in the planning area increased by 22% at an increase in value of over $2 billion dollars. This increase in risk exposure can be attributed to the vast extent and location of the dam failure hazard, and a population growth rate of 14.5% over the performance period of the prior plan. The planning area also saw in increase in assessed valuation of real property of over 34%. This increase in value can be attributed to the continued economic recovery from the 2008 economic down turn that had a significant impact on the State of California as well as the City of Roseville. Any increase in asset value will increase risk quotient when risk is being measured by looking at assets exposed as is with this plan.

While the exposure went up within the dam failure inundation area, the loss estimation from Hazus decreased by over 28%. This decrease in vulnerability could be attributed to 2 factors. The first factor is that the new construction that has occurred during the performance period for the plan was built to high code standards that reduce the risk. While the City of Roseville does not have specific standards adopted specifically for the dam failure inundation area, their adopted improvements standards applied city-wide do include several higher standards that would reduce flood risk within a dam failure inundation area. The second factor could be due to the increased accuracy of the Hazus model. For this update, the digital elevation model used in Hazus was developed using LiDAR data available to the City. The accuracy of the Digital Elevation Model (DEM) for this update should be cons9dered more accurate than the DEM from the last update. It is logical to assume that both of these factors plan a role in the reduced vulnerability for the planning area.

## 7.7 REVIEW OF EXISTING ORDINANCES, PROGRAMS AND PLANS

Since most of the dam failure inundation areas overlay the regulated floodplain within the planning area, ordinances and programs in Chapter 4 are applicable to this hazard. The extent of dam failure inundation as well as the estimated flood depths significantly exceed those projected for flooding. Future revisions to the flood programs may want to consider the potential impacts of dam failure in their scope, even though the statistical probability of such an event is low.

## 7.8 SCENARIO

According to the 2011Folsom Dam Containment Dike Failure Risk Assessment Project, the worst-case scenario would be a bank-full failure of Dikes 4, 5 and 6 due to overtopping. Overtopping flows may quickly erode the top and downstream portions of the dikes, causing failure. Therefore, there is a possibility of simultaneous failure due to overtopping. However, the likelihood of reservoir inflows that could cause overtopping is extremely low. The completion of the new Folsom Dam spillway in early 2016 decreased the likelihood even further. Failure from piping could occur at any water surface elevation within the reservoir.

An earthquake within the region could lead to liquefaction of soils around the dams. This could occur without warning during any time of the day. A human-caused failure such as a terrorist attack also could trigger a catastrophic failure of a dam that impacts the planning area.

## 7.9 ISSUES

The most significant issue associated with dam failure involves the properties and populations in the inundation zones. Flooding as a result of a dam failure would significantly impact these areas. There is often limited warning time for dam failure. These events are frequently associated with other natural hazard events such as earthquakes, landslides or severe weather, which limits their predictability and compounds the hazard. Another significant issue is the loss of the City’s primary potable water supply source if the dam were to fail (not overtop). The City would have to rely on significant water demand reductions, interties with other water agencies not dependent on Folsom and groundwater wells to provide some level of water supply to the community. Other important issues associated with dam failure include the following:

- Federally regulated dams have an adequate level of oversight and sophistication in the development of emergency action plans for public notification in the unlikely event of failure. However, the protocol for notification of downstream citizens of imminent failure needs to be tied to local emergency response planning.
- Mapping for federally regulated dams is already required and available; however, mapping that estimates inundation depths is needed for dams that are not federally regulated, in order to better assess the risk associated with failure of these facilities.
- Most dam failure mapping required at federal levels requires determination of the probable maximum flood. While the probable maximum flood represents a worst-case scenario, it is generally the event with the lowest probability of occurrence. For dams that are not federally regulated, mapping of failure scenarios that are less extreme than the probable maximum flood but have a higher probability of occurrence can be valuable to downstream community officials and emergency managers. This type of mapping can illustrate areas potentially impacted by more frequent events to support emergency response and preparedness actions.
- The concept of residual risk associated with structural flood control projects should be considered in the design of capital projects and the application of land use regulations.
- Addressing security concerns and the need to inform the public of the risk associated with dam failure is a challenge for public officials.

# 8. DROUGHT

## 8.1 GENERAL BACKGROUND

> **DEFINITIONS**
>
> **Drought—**The cumulative impacts of several dry years on water users. It can include deficiencies in surface and subsurface water supplies and generally impacts health, well being, and quality of life.
>
> **Hydrological Drought—**Deficiencies in surface and subsurface water supplies.

Most of California's precipitation comes from storms moving across the Pacific Ocean. The path followed by the storms is determined by the position of an atmospheric high pressure belt that normally shifts southward during the winter, allowing low-pressure systems to move into the state. On average, 75 percent of California's annual precipitation occurs between November and March, with 50 percent occurring between December and February. If a persistent Pacific high-pressure zone takes hold over California mid-winter, there is a tendency for the water year to be dry.

A typical water year produces about 100 inches of rainfall over the North Coast, 50 inches of precipitation (combination of rain and snow) over the Northern Sierra, 18 inches in the Sacramento area, and 15 inches in the Los Angeles area. In extremely dry years, these annual totals can fall to as little as half, or even one-third of these amounts.

Rain and snowfall in the American River watershed eventually flow into Folsom Lake, a reservoir within the U.S. Central Valley Project. These flows directly affect water availability for Roseville water users. The City of Roseville owns the Roseville water system and water treatment plant and has negotiated contracts with the U.S. Bureau of Reclamation, the Placer County Water Agency (PCWA), and the San Juan Water District (SJWD) to ensure that water needs are met for existing and future growth.

Roseville is largely urbanized with little agricultural interests remaining. Lack of sufficient water supply would affect residents and businesses that rely on water for their daily household, employee, and industrial needs.

### 8.1.1 Water Supply Strategy

The water supply strategy for the City of Roseville uses a comprehensive approach to ensure water reliability for customers. The City has a diverse set of water supply options—including surface water contracts, recycled water, and groundwater wells—to ensure that even following a period of dry years, a combination of available water supplies and water conservation measures will meet the community's water needs. The City has contracts for surface water with three agencies (see Table 8-1):

- The primary water contract is with the U.S. Bureau of Reclamation (USBR) for 32,000 acre-feet per year of surface water from Folsom Lake.
- The City also has a contract with PCWA for 30,000 acre-feet of water from PCWA's American River Middle Fork Project. The City has a long-term agreement with the USBR to wheel PCWA water supplies through Folsom Reservoir for delivery to the City's water treatment plant.

**Table 8-1.** City of Roseville Water Supply Contracts and Resources

| Source | Contract Amount (acre-feet per year) [a] | Supply Projections [b] | | | | |
|---|---|---|---|---|---|---|
| | | 2020 | 2025 | 2030 | 2035 | 2040 |
| U.S. Bureau of Reclamation | 32,000 | 32,000 | 32,000 | 32,000 | 32,000 | 32,000 |
| San Juan Water District | 4,000 | 4,000 | 4,000 | 4,000 | 4,000 | 4,000 |
| Placer County Water Agency | | 20,000 | 30,000 | 30,000 | 30,000 | 30,000 |
| Treated Water (Additional Future Purchase) | N/A | 0 | 0 | 1,500 | 1,500 | 1,500 |
| Exercised | 10,000 | | | | | |
| Two additional options | 20,000 | | | | | |
| ***Placer County Water Agency Total*** | ***30,000*** | | | | | |
| Recycled Water | N/A | *4,421* | *4,791* | *5,259* | *5,643* | *5,958* |
| **Total** | **66,000** | **60,421** | **70,791** | **72,759** | **73,143** | **73,458** |

a. N/A = Not Applicable based on future contract or existing recycled resources
b. Based on reasonable available volume.

- The third source of surface water for the City of Roseville is an additional 4,000 acre-feet of PCWA water transferred through SJWD. SJWD is a water district in Sacramento and Placer Counties that draws water from Folsom Lake. SJWD also wholesales water to Citrus Heights Water District, Fair Oaks Water District and Orangevale Water Company in Sacramento County. The City of Roseville has entered into a reallocation agreement with SJWD for this 4,000 acre-feet per year, which is a normal-year water supply only—it is not available for use during drought conditions.
- With the approval of the Amoruso Ranch Specific Plan, the City is pursuing an additional contract through PCWA, through its planned Ophir Water Treatment Plant facility. This new source and supply of water will not be dependent on Folsom Lake deliveries and will increase water reliability citywide. It is not subject to cutbacks during dry or driest years, and is estimated to provide 1,500 acre-feet of additional supply once the plant is on line.
- The City maintains six groundwater wells for emergency and dry-year supply, with plans to install 10 more in coming years as new development progresses. All wells are equipped for aquifer storage and recovery.

## 8.1.2 Water Supply Infrastructure

The City of Roseville Water Treatment Plant is on Barton Road east of Roseville. Constructed in 1971, the plant treats water from Folsom Lake to Environmental Protection Agency (EPA) domestic drinking water standards. The City owns a water system network consisting of water mains ranging from 4 to 66 inches in diameter. The system is designed to deliver an adequate supply of water throughout the community at an acceptable pressure level for domestic and fire flow purposes. A booster pump station near East Roseville Parkway and North Sunrise Boulevard is designed to provide sufficient water pressure to the higher elevations of the City and to fill and manage reservoirs in the system. Some areas within the Roseville city limits are served by PCWA, SJWD, or the City of Citrus Heights where topography and facility locations make it beneficial to do so.

The City maintains the capability to supplement its water supply in drought conditions with groundwater wells. These wells are planned to be used primarily to offset surface water cutbacks in times of drought or other emergencies. The City's groundwater wells are equipped to implement aquifer storage and recovery, in which potable water can be injected into the underground aquifers in wet years and recovered in dry years for public use. In addition, the City operates a recycled water system to lessen the use of potable water for irrigating landscaped areas.

## 8.1.3 The Water Forum

The Water Forum is a group of business and agricultural leaders, citizens groups, environmentalists, water managers, and local governments originally formed in Sacramento County. Water managers in Placer and El Dorado Counties joined the group in 1995. The City of Roseville is a member of the Water Forum and a signatory to the January 2000 Water Forum Agreement. The agreement provides a framework for how future surface water and groundwater supplies will be used in the region through 2040.

Although Roseville's water contract entitlements total 66,000 acre-feet per year, the City's diversions from the American River are limited by the Water Forum Agreement. In normal/wet years, the City has agreed to limit diversions from the American River to 58,900 acre-feet per year. In driest years (also called critically dry years), the maximum diversion from the American River is 39,800 acre-feet. In drier years, the City may divert between 39,800 and 54,900 acre-feet, depending on the unimpaired flow into Folsom Lake.

During the drier and driest years, the City agreed to have PCWA release an additional 20,000 acre-feet per year of water down the American River on the City's behalf through re-operation of PCWA's American River Middle Fork Project. This is not part of the City's contracted supply of 66,000 acre-feet per year. The intent of Middle Fork Project re-operational releases during drier and driest years is to mitigate environmental impacts resulting from increased diversions above 1995 baseline levels.

Roseville's water supply contracts, in combination with future planned supply sources, base level conservation measures, and groundwater resources, ensure that the City is well positioned to meet projected water needs.

## 8.1.4 Local Water Contracts—Definition of Drought

Roseville's drought levels are defined by the 2000 Water Forum agreement. The definition is based on the type of hydrologic year for inflow to Folsom Lake, as defined by 70 years of hydrologic data into the lake. The hydrological year types are as follows:

- **Baseline**—Baseline means the maximum amount of water that suppliers diverted from the American River in any one year through 1995 or, in certain instances, other amounts specified in a Purveyor Specific Agreement. For the City of Roseville, the baseline amount is 19,800 acre-feet per year.
- **Normal/Wet Years**—When the projected unimpaired flow into Folsom Reservoir is greater than or equal to 950,000 acre-feet
- **Drier Years**—When the projected unimpaired flow into Folsom Reservoir is between 400,00 acre-feet and 950,000 acre-feet
- **Driest Years**—When the projected unimpaired flow into Folsom Reservoir is less than 400,000 acre-feet.

Dry years over the 85-year hydrologic record are listed in Table 8-2, excluding the driest years. The driest years for American River flows in the Folsom Lake vicinity were 1924, with 379,000 acre-feet of unimpaired inflow to Folsom Lake, 1977, with 332,000 acre-feet, and 2015, with 321,000 acre-feet.

**Table 8-2.** Dry Year Flows into Folsom Lake

| Year | Unimpaired Inflow to Folsom Lake (acre-feet) | Year | Unimpaired Inflow to Folsom Lake (acre-feet) |
|---|---|---|---|
| 1931 | 571,000 | 1987 | 705,000 |
| 1934 | 690,000 | 1988 | 545,000 |
| 1939 | 873,000 | 1990 | 873,000 |
| 1959 | 872,000 | 1992 | 631,000 |
| 1961 | 854,000 | 1994 | 649,000 |
| 1976 | 518,000 | 2013 | 778,000 |
| 1981 | 881,000 | 2014 | 682,000 |

## 8.2 HAZARD PROFILE

Droughts originate from a deficiency of precipitation resulting from an unusual weather pattern. If the weather pattern lasts a short time (a few weeks or a couple months), the drought is considered short-term. If the weather pattern becomes entrenched and the precipitation deficits last for several months or years, the drought is considered long-term. It is possible for a region to experience a long-term pattern that produces drought, and to have short-term changes that result in wet spells within the long-term pattern. Likewise, it is possible for a long-term wet pattern to be interrupted by weather spells that result in short-term drought. Droughts typically occur after two or three years of below-average rainfall for the period from November to March.

### 8.2.1 Past Events

#### State of California

The California Department of Water Resources has state hydrologic data back to the early 1900s (http://watersupplyconditions.water.ca.gov). The hydrologic data show multi-year droughts from 1912 to 1913, 1918 to 1920 and 1922 to 1924. Since then, three prolonged periods of drought occurred in California:

- **1929 to 1934 Drought**—The 1929 to 1934 drought established the criteria for designing the supply and yield of many large Northern California reservoirs. The Sacramento Valley runoff was 55 percent of average for the time period from 1901 to 1996, with only 9.8 million acre-feet received.
- **1975 to 1977 Drought**—California had one of its most severe droughts due to lack of rainfall during the winters of 1976 and 1977. 1977 was the driest period on record in California, with the previous winter recorded as the fourth driest in California's hydrological history. The cumulative impact led to widespread water shortages and severe water conservation measures throughout the state. Only 37 percent of the average Sacramento Valley runoff was received, with just 6.6 million acre-feet recorded. Over $2.6 billion in crop damage was recorded in 31 counties. A federal disaster declaration was declared in Placer County and surrounding counties.
- **1987 to 1992 Drought**—California received precipitation well below average levels for four consecutive years. While the Central Coast was most affected by the lack of rainfall and low runoff, the Sierra Nevada range in Northern California and Central Valley counties including Placer County were also affected. During this drought, only 56 percent of average runoff for the Sacramento Valley was received, totaling just 10 million acre-feet. By February 1991, all 58 counties in California were suffering from drought conditions. Urban areas as well as rural and agricultural areas were impacted.
- **2012 to 2016 (Ongoing) Drought**—California's current drought has set several records for the state:
  - The period from 2012 to 2014 ranked as the driest three consecutive years for statewide precipitation.
  - 2014 set new climate records for statewide average temperatures and for record-low water allocations in the State Water Project and federal Central Valley Project.
  - 2013 set minimum annual precipitation records for many communities.

  On January 17, 2014 the governor declared a state of emergency for drought throughout California. This declaration followed release of a report that stated that California had had the least amount of rainfall in its 163-year history. Californians were asked to voluntarily reduce their water consumption by 20 percent. Drought conditions worsened into 2015. On April 1, 2015, following the lowest snowpack ever recorded, the governor announced actions to save water, increase enforcement to prevent wasteful water use, streamline the state's drought response, and invest in new technologies to make California more drought-resilient. The governor directed the State Water Resources Control Board to implement mandatory water reductions in cities and towns across California to reduce water usage by 25 percent on average. The City of Roseville was assigned a 28-percent water conservation target by the State Water Resources Control

Board. The City exceed its water conservation goal. Total impacts of the drought cannot be determined until after its conclusion.

## Placer County

The following additional drought impacts have affected Placer County:

- **1977**—A federal disaster declaration was made as a result of a drought affecting Placer and surrounding counties. The PCWA declared a water shortage and restricted water use for both irrigation and treated water users. The restrictions included a 50-percent reduction in water usage by customers and rate increases. This shortage lasted until January 1978 when the PCWA terminated its restrictions.
- **1988**—Again the PCWA declared a water emergency. All customers had their water use reduced by 25 percent, and rates were again increased for excessive usage. The countywide emergency prohibited washing of sidewalks, driveways, parking lots and other hard surfaces, restricted the washing of vehicles, airplanes, and trailers to 3 gallons of water, prohibited fire hydrant flushing and drills, prohibited filling of pools, and prohibited new agricultural land irrigation.
- **1991—**Raw water customers had their water usage reduced by 50 percent annually and by 25 percent seasonally. Treated water users were given most of the same restrictions and prohibitions as in 1988. Due to a very late storm season, the emergency was lifted by April 1991.
- **2008—**The Governor of California declared a drought on June 4, 2008. In July 2009, PCWA reported the implementation of normal ongoing conservation measures.
- **2014—**On February 6, 2014, PCWA adopted a resolution declaring a water shortage emergency. This is the most recent declaration from PCWA. It was rescinded in February 2016.

## Roseville Drought History

Roseville’s drought history parallels the water shortages for the State of California and Placer County. The Roseville City Council has declared official drought alerts three times:

- From April 1991 to March 1993 when Stage 2 drought water restrictions were in effect and enforced through full-time water patrols
- In May 2008 when the City of Roseville’s Environmental Utilities Department activated a Stage 1 drought alert
- In 2014, when the City enacted a Stage 3 drought alert asking residents to reduce water demand by 28 percent compared to 2013 water use.

In response to the 2014 drought, the City of Roseville took a proactive approach to water conservation. The City enacted water waste patrols, limited watering for residential and non-residential customers to specific days of the week depending on the time of year, and enacted funding for utility support. With a 2015 reduction target of 278 gallons per capital per day, Roseville’s conservation efforts resulted in an actual accomplishment of 165 gallons per capital per day, far exceeding goals and expectations (Roseville, 2015a).

# 8.2.2 Location

The National Oceanic and Atmospheric Administration (NOAA) has developed several indices to measure drought impacts and severity and to map their extent and locations:

- The ***Palmer Crop Moisture Index*** measures short-term drought on a weekly scale and is used to quantify drought’s impacts on agriculture during the growing season. Figure 8-1 shows this index for the week ending January 30, 2016.
- The ***Palmer Z Index*** measures short-term drought on a monthly scale. Figure 8-2 shows this index for December 2015.

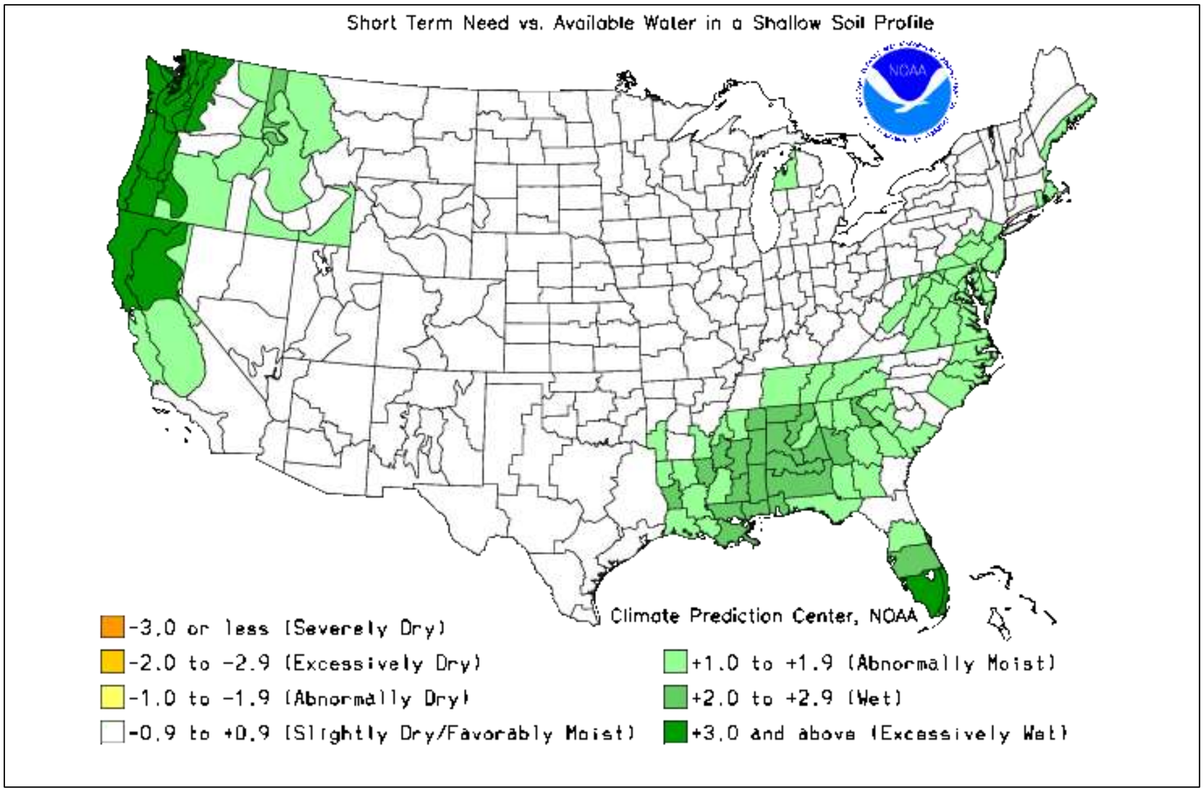



**Figure 8-1.** Palmer Crop Moisture Index for Week Ending January 30, 2016

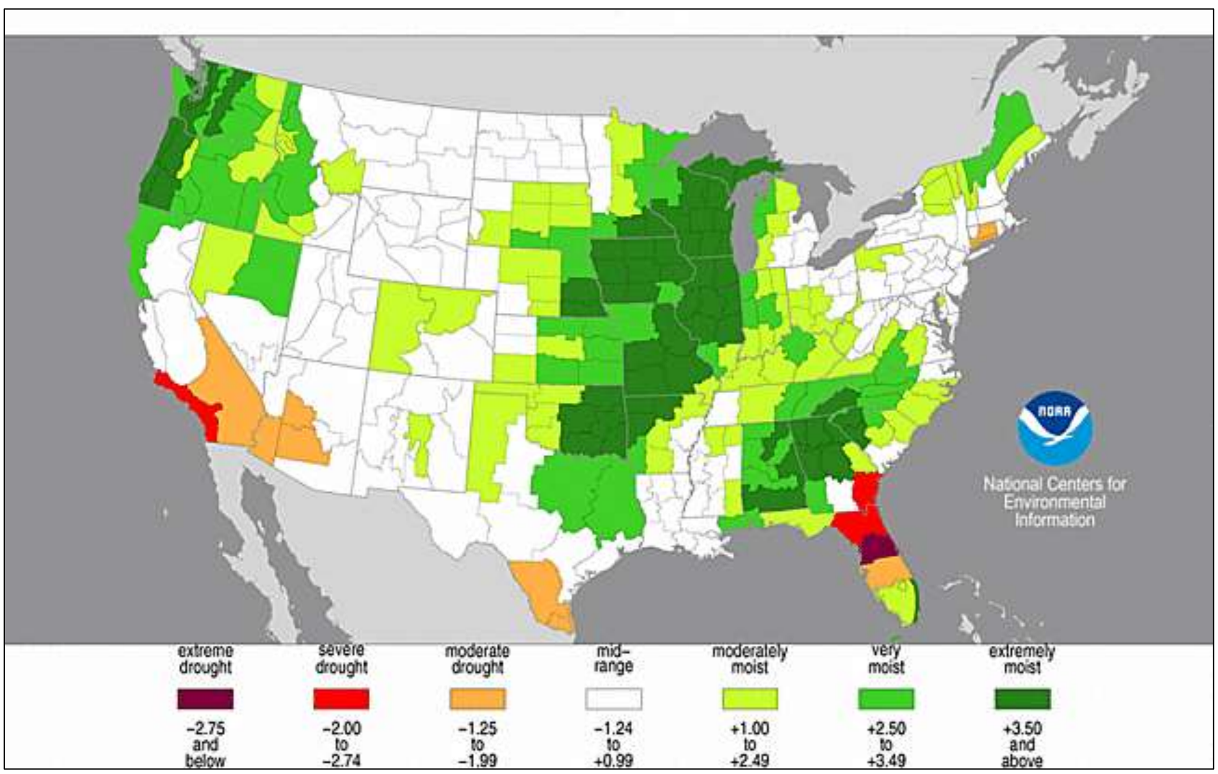



**Figure 8-2.** Palmer Z Index Short-Term Drought Conditions (December 2015)

- The ***Palmer Drought Index*** measures the duration and intensity of long-term drought-inducing circulation patterns. Long-term drought is cumulative, so the intensity of drought during a given month is dependent on the current weather patterns plus the cumulative patterns of previous months. Weather patterns can change quickly from a long-term drought pattern to a long-term wet pattern, and the Palmer Drought Index can respond fairly rapidly. Figure 8-3 shows this index for January 2016.
- The hydrological impacts of drought (e.g., reservoir levels, groundwater levels, etc.) take longer to develop and it takes longer to recover from them. The ***Palmer Hydrological Drought Index***, another long-term index, was developed to quantify hydrological effects. The Palmer Hydrological Drought Index responds more slowly to changing conditions than the Palmer Drought Index. Figure 8-4 shows this index for January 2013.
- While the Palmer indices consider precipitation, evapotranspiration and runoff, the ***Standardized Precipitation Index*** considers only precipitation. In the Standardized Precipitation Index, an index of zero indicates the median precipitation amount; the index is negative for drought and positive for wet conditions. The Standardized Precipitation Index is computed for time scales ranging from one month to 24 months. Figure 8-5 shows the 24-month Standardized Precipitation Index map for February 2011 through January 2013.

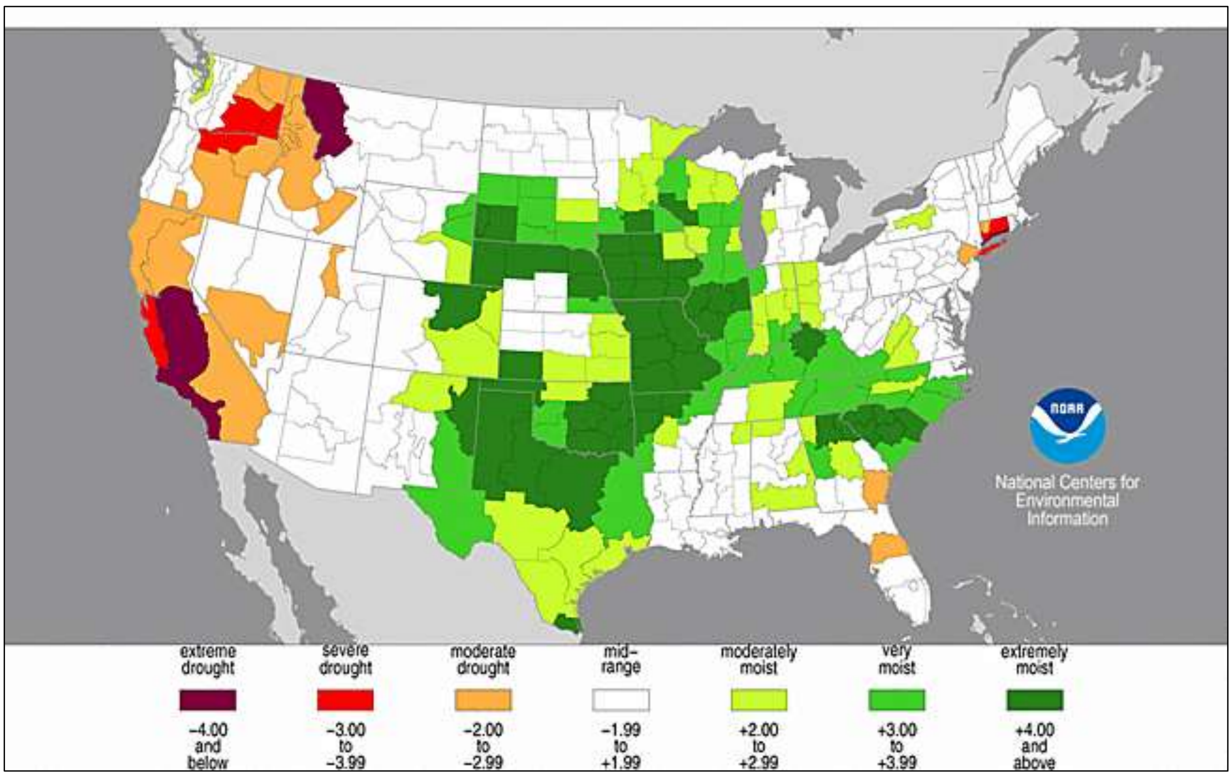



**Figure 8-3.** Palmer Drought Severity Index (December 2015)

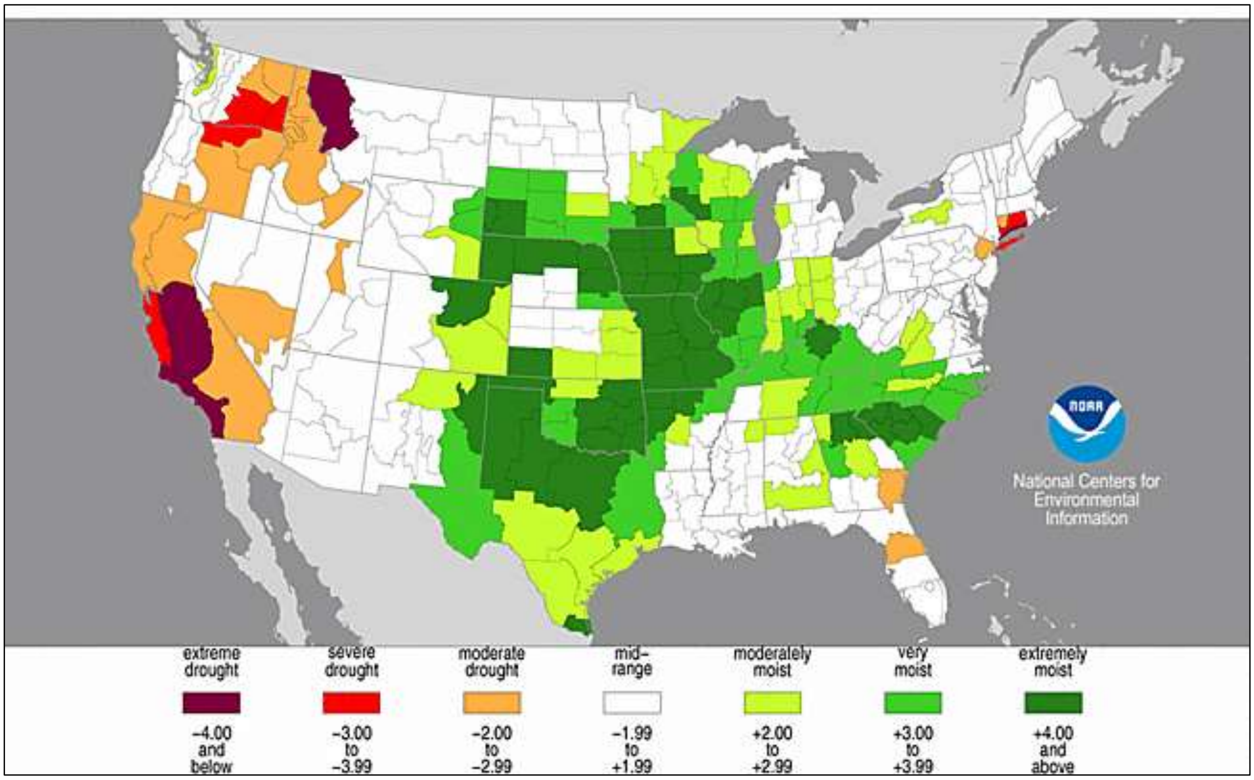



**Figure 8-4.** Palmer Hydrological Drought Index Long-Term Hydrologic Conditions (December 2015)

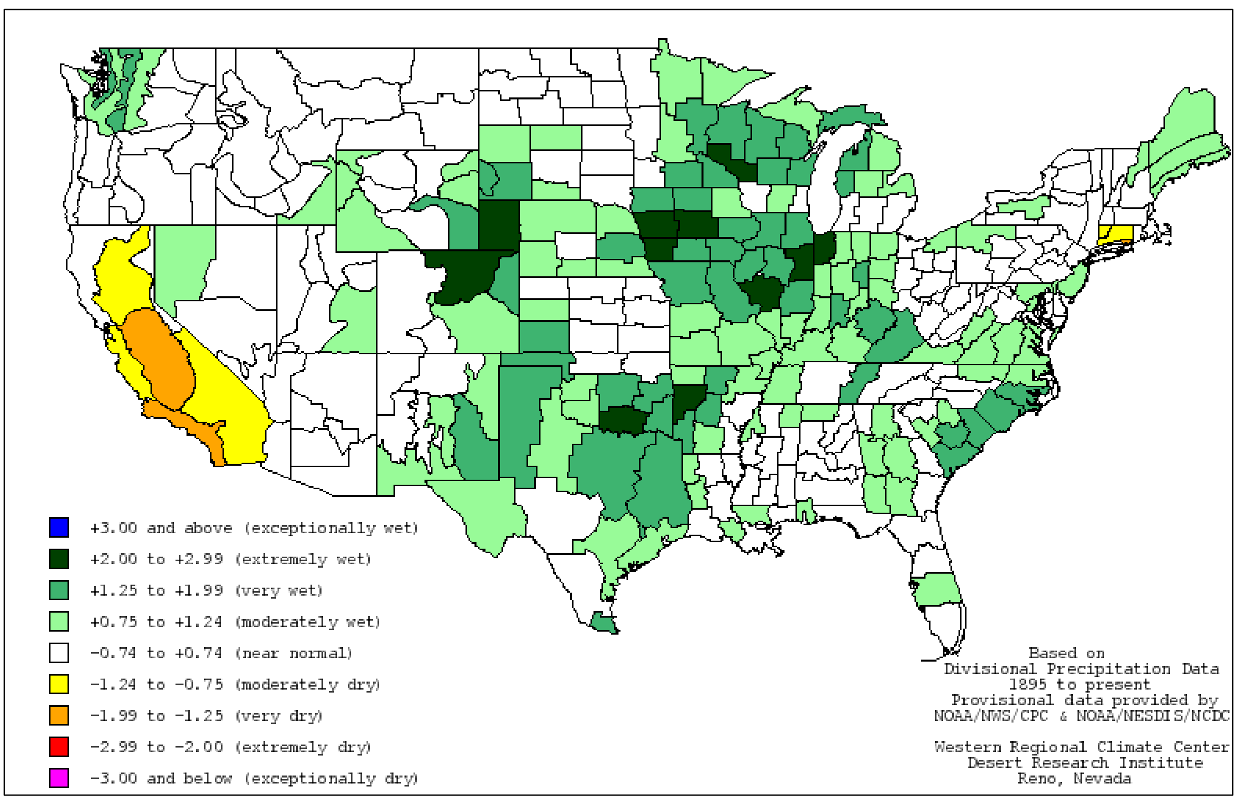



**Figure 8-5.** 24-Month Standardized Precipitation Index (January 2013 – December 2015)

## 8.2.3 Frequency

Historical drought data for the Placer County region indicate that, in the 88 years from 1929 through 2016, four multi-year droughts have spanned a total of 20 years. This averages to a five-year drought every 22 years, or a 22 percent chance of a drought in any given year.

## 8.2.4 Severity

Drought can have a widespread impact on the environment and the economy, although it typically does not result in loss of life or damage to property, as do other natural disasters. Nationwide, the impacts of drought occur primarily in the agriculture, transportation, recreation and tourism, forestry, and energy sectors. Social and environmental impacts are also significant, although it is difficult to put a precise cost on these impacts. The National Drought Mitigation Center uses three categories to describe likely drought impacts:

- Water supply—Drought threatens supplies of water for irrigated crops and for communities.
- Fire hazard—Drought increases the threat of wildfires from dry conditions in forest and rangelands.

The severity of a drought depends on the degree of moisture deficiency, the duration, and the size and location of the affected area. The longer the duration of the drought and the larger the area impacted, the more severe the potential impacts. When measuring the severity of droughts, analysts typically look at economic impacts. All people could pay more for water if utilities increase their rates due to shortages. Other water- or electricity-dependent industries are commonly forced to shut down all or a portion of their facilities, resulting in further layoffs. A drought can harm recreational companies that use water (e.g., swimming pools, water parks, and river rafting companies) as well as landscape and nursery businesses.

Drought generally does not affect groundwater sources as quickly as surface water supplies, but groundwater supplies generally take longer to recover. Reduced precipitation during a drought means that groundwater supplies are not replenished at a normal rate. This can lead to a reduction in groundwater levels and problems such as reduced pumping capacity or wells going dry. Shallow wells are more susceptible than deep wells. Reduced replenishment of groundwater affects streams. Much of the flow in streams comes from groundwater, especially during the summer when there is less precipitation and after snowmelt ends. Reduced groundwater levels mean that even less water will enter streams when steam flows are lowest.

## 8.2.5 Warning Time

Droughts are climatic patterns that occur over long periods of time. Only generalized warning can take place due to the numerous variables that scientists have not pieced together well enough to make accurate and precise predictions.

Empirical studies conducted over the past century have shown that meteorological drought is never the result of a single cause. It is the result of many causes, often synergistic in nature; these include global weather patterns that produce persistent, upper-level high-pressure systems along the West Coast with warm, dry air resulting in less precipitation.

Scientists at this time do not know how to predict drought more than a month in advance for most locations. Predicting drought depends on the ability to forecast precipitation and temperature. Anomalies of precipitation and temperature may last from several months to several decades. How long they last depends on interactions between the atmosphere and the oceans, soil moisture and land surface processes, topography, internal dynamics, and the accumulated influence of weather systems on the global scale.

## 8.3 SECONDARY HAZARDS

The secondary hazard most commonly associated with drought is wildfire. A prolonged lack of precipitation dries out vegetation, which becomes increasingly susceptible to ignition as the duration of the drought extends. Millions of board feet of timber have been lost, and in many cases erosion occurred, which caused serious damage to aquatic life, irrigation, and power production by heavy silting of streams, reservoirs, and rivers.

Drought also is often accompanied by extreme heat, exposing people to the risk of sunstroke, heat cramps and heat exhaustion. Pets and livestock are also vulnerable to heat-related injuries.

## 8.4 EXPOSURE

All people, property and environments within the City of Roseville would be exposed to some degree to the impacts of moderate to extreme drought conditions.

## 8.5 VULNERABILITY

Based on hydrologic data for the American River, there is a probability that rainfall will be insufficient once every 17 years to supply Folsom Lake and guarantee the City of Roseville its existing contract amounts. In these years, the City by agreement is required to find alternate sources of supply.

Having the flexibility to use both the USBR and PCWA contractual supplies during a drier year or driest year enables the City to provide a reliable surface water supply for municipal and industrial uses. Any shortages can easily be compensated for by water use reductions through conservation (implementation of drought stages as outlined in the Roseville Municipal Code). By incorporating emergency groundwater reserves into the water supply strategy, the City's reliability is increased further still.

The City's 2015 Urban Water Management Plan outlines the potable water supply reliability for normal and dry years, as well as for a three-year drought. Water would be supplied by the American River through Folsom Lake, with conservation measures and groundwater reserves implemented as needed. Roseville's recycled water utility is expected to provide an offset to demand for irrigation supply, thereby reducing the demand for potable water. A summary of the water supply reliability until 2040 for multiple dry water years is provided in Table 8-3.

### 8.5.1 Population

The City of Roseville, regional water purveyors, members of the Water Forum, and the USBR have spent considerable time and effort to protect life, safety and health should several consecutive dry years occur. Provisions and measures have been taken to analyze and account for anticipated water shortages. The City has the ability to minimize any impacts on residents and water consumers in Roseville. No significant life or health impacts are anticipated as a result of drought in Roseville.

### 8.5.2 Property

No structures will be directly affected by drought conditions in Roseville, though some structures may become vulnerable to wildfires, which are more likely following years of drought.

### 8.5.3 Critical Facilities

Critical facilities as defined for this Plan will continue to be operational during a drought. Critical facility elements such as landscaping may not be maintained due to limited resources, but the risk to the City's critical facilities inventory will be largely aesthetic. These aesthetic impacts are not considered significant.

**Table 8-3.** Water Supply Reliability by 2040

| | Normal Water Year | Single Dry Water Year | Multiple Dry Water Years | | |
|---|---|---|---|---|---|
| | | | Year 1 | Year 2 | Year 3 |
| **Surface Water (acre-feet)** | 60,400[a] | 39,500[b] | 52,894[b] | 55,500 | 46,926[c] |
| **Groundwater (acre-feet)** | 0 | 6569 | 0 | 0 | 0 |
| **Recycled Water (acre-feet)** | 4,838 | 4,838 | 4,838 | 4,838 | 4,838 |
| **Projected Demand (acre-feet)** | 50,907[d] | 50,907[d] | 50,907 [d] | 50,907 [d] | 50,907 [d] |
| **Surplus or (Deficit) (acre-feet)[e]** | 4,655 | 0 | 6,826 | 8,931 | 857 |

a. Although additional water is under contract, surface water supplies are available based on Water Forum agreement diversion commitments. This projection includes anticipated PCWA supply from the future Ophir Water Treatment Plant project.
b. Although contracts are in place for normal water year supplies of 67,500 acre-feet, the supply shown is consistent with Water Forum agreement diversion limits and the limitation that 4,000 acre-feet of SJWD supplies are only available for use in normal years.
c. Surface supply reduction is consistent with Water Forum supply agreement anticipating worst case shortage (driest years).
d. No conservation measures are assumed for any year type.
e. Assume full use of available recycled water to offset potable demand for landscape irrigation.

*Source: Roseville, 2015a*

### 8.5.4 Environment

Environmental losses are the result of damage to plants, animals, habitat, and air and water quality; wildfires; degradation of landscape; loss of biodiversity; and soil erosion. Some of the effects are short-term and conditions quickly return to normal following the end of the drought. Other environmental effects linger for some time or may even become permanent. Wildlife habitat, for example, may be degraded through the loss of wetlands, lakes, and vegetation. However, many species will eventually recover from this temporary aberration. The degradation of landscape quality, including increased soil erosion, may lead to a more permanent loss of biological productivity. Although environmental losses are difficult to quantify, growing public awareness and concern for environmental quality has forced public officials to focus greater attention and resources on these effects.

### 8.5.5 Economic Impact

Economic impact will be largely associated with industries that use water or depend on water for their business. For example, landscaping businesses were affected in the droughts of the past as the demand for service significantly declined because landscaping was not watered. The City’s Environmental Utilities Department, through the water conservation programs, works to ensure that businesses that rely on water receive allotments to continue operating.

There is always the possibility of some financial exposure for the City as a result of drought conditions. The Environmental Utilities Department plans proactively for this possibility in order to mitigate these impacts to the greatest extent possible.

## 8.6 FUTURE TRENDS IN DEVELOPMENT

Table 8-4 lists past, current, and projected water use from 2010 to 2040. Water use projections for 2020 through 2040 are based on land use-based water demand projections documented in the City’s General Plan.

The general building stock within the planning area increased by 17.7% with an increase in valuation from $21.967 billion to $29.641 billion (34.9%). This increase in valuation of the planning area was impacted by the areas recovery from the economic downturn of 2008. Since the entire planning area would be considered susceptible to drought, it would be perceived that there was an increase in drought exposure over the performance period of the 2011 plan. However, since droughts typically do not kill or injure people or damage structures, there would be no increase in vulnerability to drought from this increased exposure.

**Table 8-4.** City of Roseville Past, Current, and Projected Water Use

| | Water Use (acre-feet/year) | | | | | | |
|---|---|---|---|---|---|---|---|
| | 2010 | 2015 | 2020 | 2025 | 2030 | 2035 | 2040 |
| **Single family residential** | 15,836 | 11,680 | 21,262 | 22,425 | 23,862 | 25,254 | 26,365 |
| **Multi-Family residential** | 2,196 | 1,464 | 2,399 | 2,530 | 2,692 | 2,849 | 2,974 |
| **Commercial** | 2,042 | 1,930 | 3,402 | 3,588 | 3,818 | 4,041 | 4,219 |
| **Industrial** | 891 | 934 | 1,699 | 1,792 | 1,907 | 2,018 | 2,107 |
| **Institutional and Governmental** | 667 | 561 | 1,001 | 1,056 | 1,123 | 1,189 | 1,241 |
| **Landscape** | 5,534 | 4,152 | 7,559 | 7,973 | 8,483 | 8,978 | 9,373 |
| **Losses[a]** | 1,195 | 2,160 | 3,732 | 3,936 | 4,189 | 4,433 | 4,628 |
| **Total** | **28,361** | **22,881** | **41,054** | **43,300** | **46,074** | **48,762** | **50,907** |

a. Losses include unbilled/unmetered losses for 2010 and 2015

*Source: Roseville, 2015a*

## 8.7 REVIEW OF EXISTING ORDINANCES, PROGRAMS AND PLANS

Since California’s 1975 to 1977 drought, Roseville has had a policy of no water waste supported by City ordinances. The City adopted a “No Waste” ordinance in 1989 and updated the Water Conservation Ordinance (Roseville Municipal Code Chapter 14.09—Water Conservation) to include drought mitigation measures in April 1991. The ordinance provides conservation measures for shortages in water supply due to drought. Drought mitigation is achieved through a tiered approach that is based on the surface water available to Roseville. As water supplies decrease, additional restrictions are imposed. Conservation measures (water use restrictions) have been established to address conditions from adequate water supplies to conditions in which surface water supplies are capable of meeting only 50 percent of Roseville’s water needs.

A significant portion of Roseville’s water is used for landscape irrigation. Landscape irrigation also accounts for a large portion of water wasted in Roseville. Conservation patrols are used to enforce City ordinances restricting water waste. These patrols generally consist of existing service workers that identify and document water waste during daily travels or when responding to complaints. Evening calls are made in response to resident complaints.

In times of reduced water availability, higher drought stages are implemented. In summer 1991, Roseville hired temporary employees to serve as the first dedicated water patrol. This patrol supplemented existing service crew coverage and provided 24-hour-per-day capability. These patrols led to the issuance of over 500 water waste citations that greatly decreased water wasted through malfunctioning irrigation systems and/or excessive watering. In response to the current drought, Roseville instituted these water patrols once more.

Roseville has a number of programs and policies that are implemented as early as possible to reduce water use in the event of a prolonged water shortage. As a USBR contractor, Roseville is required to develop and maintain a water conservation plan consistent with the requirements of the Central Valley Project Improvement Act of 1992. In addition, Roseville is a member and signatory to the American River Water Forum, which also includes requirements for water conservation programs.

To proactively promote water conservation and to be prepared in the event of a water shortage, the City implements demand management (conservation) measures, is developing supplemental water supplies, and has a water shortage contingency plan. These are summarized in the City of Roseville 2010 Urban Water Management Plan Update and detailed in the work programs for the Environmental Utilities Department Water Division.

Given recent legislation and state oversight of the City's water conservation efforts, the Roseville City Council adopted a revised Water Efficient Landscape Ordinance on March 16, 2016. The revised ordinance, effective on April 16, 2016, responds to state legislation mandating stricter requirements for reducing landscape irrigation, water consumption and waste. The revised ordinance addresses the objectives of the Department of Water Resources model ordinance by incorporating the new water efficient landscape requirements into Chapter 14.18 of the Roseville Municipal Code.

## 8.8 SCENARIO

An extreme multi-year drought can impact the region with little warning. Combinations of low precipitation and unusually high temperatures could occur over several consecutive years. Intensified by such conditions, extreme wildfires could break out throughout Placer County, increasing the need for water. Surrounding communities, also in drought conditions, could increase their demand for water supplies relied upon in the City of Roseville, causing social and political conflicts. If such conditions persisted for several years, the economy of Placer County and Roseville could experience setbacks, especially in water dependent industries.

## 8.9 ISSUES

The planning team has identified the following drought-related issues:

- Identification and development of alternative water supplies
- Utilization of groundwater recharge techniques to stabilize the groundwater supply
- The probability of increased drought frequencies and durations due to climate change
- The promotion of active water conservation even during non-drought periods.

# 9. EARTHQUAKE

## 9.1 GENERAL BACKGROUND

California is seismically active because of movement of the North American Plate, on which everything east of the San Andreas Fault sits, and the Pacific Plate, which includes coast communities west of the fault. The Pacific Plate is constantly moving northwest past the North American Plate, at a relative rate of movement of about 2 inches per year (SHMP 2013). The movement of the tectonic plates creates stress released as energy that moves through the earth as waves called earthquakes.

**DEFINITIONS**

**Earthquake**—The shaking of the ground caused by an abrupt shift of rock along a fracture in the earth or a contact zone between tectonic plates. Earthquakes are typically measured in both magnitude and intensity.

**Liquefaction**—A condition in which water-saturated sands, silts or gravelly soils are shaken so violently that the individual grains lose contact with one another and "float" freely in the water, turning the ground into a pudding-like liquid.

### 9.1.1 Damage from Earthquakes

Earthquakes can last from a few seconds to over 5 minutes; they may also occur as a series of tremors over a period of several days. The actual movement of the ground in an earthquake is seldom the direct cause of injury or death. Casualties generally result from falling objects and debris, because the shocks shake, damage or demolish buildings and other structures. Disruption of communications, electrical power supplies and gas, sewer and water lines should be expected. Earthquakes may trigger fires, dam failures, landslides or releases of hazardous material, compounding their disastrous effects.

### 9.1.2 Earthquake Classifications

Earthquakes are typically classified in one of two ways: By the amount of energy released, measured as magnitude; or by the impact on people and structures, measured as intensity.

- Magnitude represents the amount of seismic energy released at the hypocenter of the earthquake. It is based on the amplitude of the earthquake waves recorded on instruments. Magnitude is thus represented by a single, instrumentally determined value.
- Intensity represents the observed effects of ground shaking at any specified location. The intensity of earthquake shaking lessens with distance from the earthquake epicenter. Tabulated peak ground accelerations for a listed "maximum credible earthquake" are a measure of how a site will be affected by seismic events on distant faults.

#### Magnitude

An earthquake's magnitude is a measure of the energy released at the source of the earthquake. It is commonly expressed by ratings on either of two scales (Michigan Tech University 2016):

- The Richter scale measures magnitude of earthquakes based on the amplitude of the largest energy wave released by the earthquake. Richter scale readings are suitable for smaller earthquakes; however, because it is a logarithmic scale, the scale does not distinguish clearly the magnitude of large earthquakes above a certain level. Table 9-1 presents the Richter scale magnitudes and corresponding earthquake effects.

- A more commonly used magnitude scale today is the moment magnitude ($M_W$) scale, with classifications as shown in Table 9-2. The moment magnitude scale is based on the total moment release of the earthquake (the product of the distance a fault moved and the force required to move it). Moment magnitude roughly matches the Richter scale but provides more accuracy for larger magnitude earthquakes.

**Table 9-1.** Richter Magnitude Scale

| Richter Magnitude | Earthquake Effects |
|---|---|
| 2.5 or less | Usually not felt, but can be recorded by seismograph |
| 2.5 to 5.4 | Often felt, but causes only minor damage |
| 5.5 to 6.0 | Slight damage to buildings and other structures |
| 6.1 to 6.9 | May cause a lot of damage in very populated areas |
| 7.0 to 7.9 | Major earthquake; serious damage |
| 8.0 or greater | Great earthquake; can totally destroy communities near the epicenter |

*Source: Michigan Tech University n.d.*

**Table 9-2.** Moment Magnitude Scale

| Magnitude Class | Magnitude Range |
|---|---|
| Great | $M_W \geq 8$ |
| Major | $M_W$ =7.0 - 7.9 |
| Strong | $M_W$ =6.0 - 6.9 |
| Moderate | $M_W$ =5.0 - 5.9 |
| Light | $M_W$ =4.0 - 4.9 |
| Minor | $M_W$ =3.0 - 3.9 |
| Micro | $M_W$ =< 3 |

## Intensity

Currently the most commonly used intensity scale is the modified Mercalli intensity scale, with ratings defined as follows (USGS, 1989):

I. Not felt except by a very few under especially favorable conditions
II. Felt only by a few persons at rest, especially on upper floors of buildings.
III. Felt quite noticeably by persons indoors, especially on upper floors of buildings. Many people do not recognize it is an earthquake. Standing cars may rock slightly. Vibrations similar to the passing of a truck.
IV. Felt indoors by many, outdoors by few during the day. At night, some awakened. Dishes, windows, doors disturbed; walls make cracking sound. Sensation like a heavy truck striking building. Standing cars rocked noticeably.
V. Felt by nearly everyone; many awakened. Some dishes, windows broken. Unstable objects overturned. Pendulum clocks may stop.
VI. Felt by all; many frightened. Some heavy furniture moved; a few instances of fallen plaster. Damage slight.
VII. Damage negligible in buildings of good design and construction; slight in well-built ordinary structures; considerable in poorly built or badly designed structures. Some chimneys broken.

VIII. Damage slight in specially designed structures; considerable damage in ordinary buildings with partial collapse. Damage great in poorly built structures. Fall of chimneys, factory stacks, columns, monuments, walls. Heavy furniture overturned.

IX. Damage considerable in specially designed structures; well-designed frame structures thrown out of plumb. Damage great in substantial buildings, with partial collapse. Buildings shifted off foundations.

X. Some well-built wooden structures destroyed; most masonry and frame structures destroyed with foundations. Rails bent.

XI. Few, if any (masonry) structures remain standing. Bridges destroyed. Rails bent greatly.

XII. Damage total. Lines of sight and level are distorted. Objects thrown into the air.

## 9.1.3 Ground Motion

Earthquake hazard assessment is also based on expected ground motion. This involves determining the annual probability that certain ground motion accelerations will be exceeded, then summing the annual probabilities over the time period of interest. The most commonly mapped ground motion parameters are the horizontal and vertical peak ground accelerations (PGA) for a given soil or rock type. Instruments called accelerographs record levels of ground motion due to earthquakes at stations throughout a region. These readings are recorded by state and federal agencies that monitor and predict seismic activity.

Maps of PGA values form the basis of seismic zone maps that are included in building codes such as the International Building Code. Building codes that include seismic provisions specify the horizontal force due to lateral acceleration that a building should be able to withstand during an earthquake. PGA values are directly related to these lateral forces that could damage “short period structures” (e.g. single-family dwellings). Longer period response components determine the lateral forces that damage larger structures with longer natural periods (apartment buildings, factories, high-rises, bridges). Table 9-3 lists damage potential and perceived shaking by PGA factors, compared to the Mercalli scale.

**Table 9-3.** Mercalli Scale and Peak Ground Acceleration Comparison

| Modified Mercalli Scale | Perceived Shaking | Potential Structure Damage | | Estimated PGA[a] (%g) |
|---|---|---|---|---|
| | | Resistant Buildings | Vulnerable Buildings | |
| I | Not Felt | None | None | <0.17% |
| II-III | Weak | None | None | 0.17% - 1.4% |
| IV | Light | None | None | 1.4% - 3.9% |
| V | Moderate | Very Light | Light | 3.9% - 9.2% |
| VI | Strong | Light | Moderate | 9.2% - 18% |
| VII | Very Strong | Moderate | Moderate/Heavy | 18% - 34% |
| VIII | Severe | Moderate/Heavy | Heavy | 34% - 65% |
| IX | Violent | Heavy | Very Heavy | 65% - 124% |
| X - XII | Extreme | Very Heavy | Very Heavy | >124% |

a. PGA measured in percent of g, where g is the acceleration of gravity

*Sources: USGS, 2008; USGS, 2010*

## 9.1.4 Effect of Soil Types

The impact of an earthquake on structures and infrastructure is largely a function of ground shaking, distance from the source of the quake, and liquefaction, a secondary effect of an earthquake in which soils lose their shear strength and flow or behave as liquid, thereby damaging structures that derive their support from the soil. Liquefaction generally occurs in soft, unconsolidated sedimentary soils. A program called the National Earthquake Hazard Reduction Program (NEHRP) creates maps based on soil characteristics to help identify locations subject to liquefaction. Table 9-4 summarizes NEHRP soil classifications. NEHRP Soils B and C typically can sustain ground shaking without much effect, dependent on the earthquake magnitude. The areas that are commonly most affected by ground shaking have NEHRP Soils D, E and F. In general, these areas are also most susceptible to liquefaction.

**Table 9-4.** NEHRP Soil Classification System

| NEHRP Soil Type | Description | Mean Shear Velocity to 30 m (m/s) |
|---|---|---|
| A | Hard Rock | 1,500 |
| B | Firm to Hard Rock | 760-1,500 |
| C | Dense Soil/Soft Rock | 360-760 |
| D | Stiff Soil | 180-360 |
| E | Soft Clays | < 180 |
| F | Special Study Soils (liquefiable soils, sensitive clays, organic soils, soft clays >36 m thick) | |

## 9.2 HAZARD PROFILE

### 9.2.1 Past Events

The last seismic event recorded in the Roseville vicinity measuring at least 4.0 on the Richter scale occurred between Placerville and Roseville in 1908 on a north-south fault line between Folsom and Auburn. No significant seismic events in the Roseville vicinity have been recorded since then. Significant recent earthquakes in California include the 1906 earthquake in San Francisco, the 1971 San Fernando Earthquake, the 1989 Loma Prieta Earthquake, and the 1994 Northridge earthquake. Table 9-5 lists recent earthquakes with a magnitude of 5.0 or greater within a 100-mile radius of Roseville. Figure 9-1 shows the location of the most recent four events in relation to Roseville.

**Table 9-5.** Recent Earthquakes Magnitude 5.0 or Larger Within 100-mile radius

| Date | Magnitude | Epicenter Location |
|---|---|---|
| 8/24/2014 | 6.0 | 6 miles southwest of Napa, CA |
| 5/24/2013 | 5.7 | 12 miles southeast of Chester, CA |
| 4/26/2008 | 5.1 | 6 miles west of Reno, NV |
| 10/31/2007 | 5.6 | 10 miles northeast of San Jose, CA |
| 8/10/2001 | 5.5 | 9 miles west of Portola, CA |
| 9/3/2000 | 5.17 | 8 miles northwest of Napa, CA |
| 10/30/1998 | 5.35 | 4 miles south-southeast of Truckee, CA |
| 12/28/1995 | 5.33 | 7 miles east-northeast of Markleeville, CA |
| 12/23/1995 | 5.08 | 8 miles east of Markleeville, CA |
| 9/12/1994 | 5.95 | 7 miles north-northeast of Markleeville, CA |
| 9/12/1994 | 5.12 | 7 miles north-northeast of Markleeville, CA |
| 3/31/1986 | 5.70 | 12 miles east-northeast of Milpitas, CA |

*Source: Earthquake Catalogs, Northern California Earthquake Data Center, USGS*

*Source: NCEDC, 2014; Google Earth*

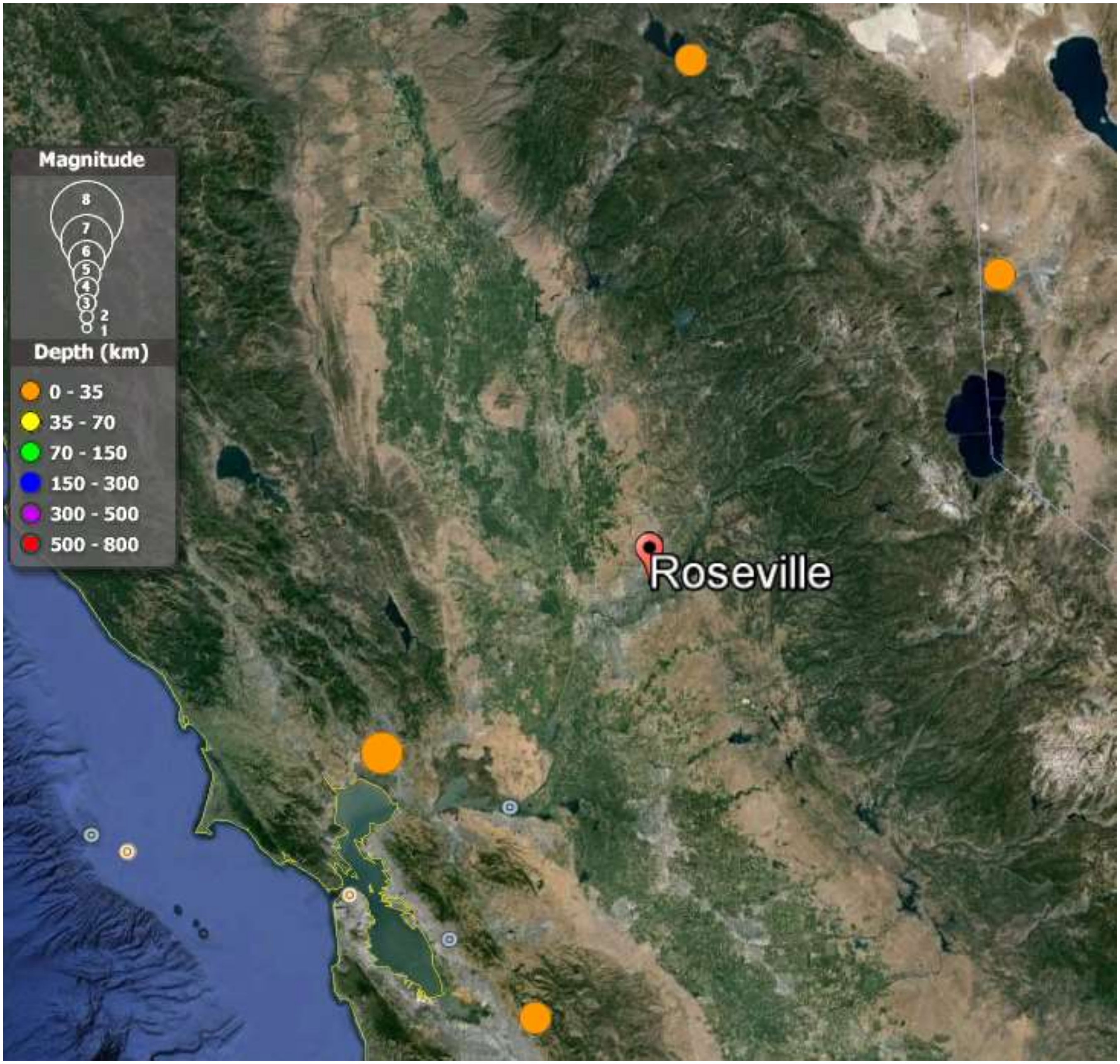



**Figure 9-1.** Location of Recent Earthquakes in Roseville Vicinity

## 9.2.2 Location

A direct relationship exists between a fault's length and location and its ability to generate damaging ground motion at a given site. Small, local faults produce lower magnitude quakes, but ground shaking can be strong and damage can be significant in areas close to the fault. Large regional faults can generate earthquakes of great magnitudes but, because of their distance and depth, they may result in only moderate shaking in an area. The City of Roseville is in a region of moderate seismicity between the seismically active Coast Ranges and the historically seismic Foothills Fault Zone in the Sierra Nevada. The primary seismic hazard for the City is potential ground shaking from distant large faults.

## East of Roseville

The Great Valley Fault Zone is the geomorphic boundary of the Coast Ranges and the Central Valley. It is underlain by a 300-mile long seismically active fold-and-thrust belt that has been the source of recent earthquakes, such as the 1983 Magnitude-6.5 Coalinga and the 1985 Magnitude-6.1 Kettleman Hills earthquakes. Nearly the entire thrust system is concealed (Krazan & Associates, 2011). The Great Valley fault system consists of 14 segments, named numerically based on location along the fault system from north (1) to south (14).

The Foothill Fault Zone, a complex series of northwest trending-faults that are related to the Sierra Nevada uplift, runs from about Oroville in the north to east of Fresno in the south. This was the source of Oroville's 1975 earthquake and an event in the 1940s. Subsequent research of these events led to the identification and naming of the zone. Earthquakes on fault segments in the zone could be a source of ground shaking in Placer County.

The closest potentially active faults in the near vicinity of Roseville are the Bear Mountain and Melones Faults. The closest recently active fault in the western Sierra Nevada foothills is the Cleveland Hills Fault, about 36 miles northwest of Auburn.

Eastern Placer County borders the Basin and Range geological province, which includes most of Nevada and western Utah. This area is riddled with active faults that form the boundary between each basin or valley and the neighboring mountain range.

The Lake Tahoe Basin is seismically active with earthquakes greater than 7.0 that have occurred beneath Lake Tahoe. According to the Placer County Multi-Hazard Mitigation Plan, a series of small earthquakes also occurred in late 2003 and early 2004 due to volcanic magma (molten rock) moving 20 miles below the Sierra Nevada Mountains. The earthquakes reflect the movement of the Sierra Nevada range to the northwest at a rate of about half an inch per year.

## West of Roseville

Tectonic stresses associated with the North American-Pacific Plate boundary can generate damaging earthquakes along faults 30 to 100 miles west of Placer County. Both the San Andreas fault (source of the estimated 8.0-Richter magnitude San Francisco earthquake that caused damage in Sacramento in 1906) and the closer Hayward fault have the potential for experiencing major to great events. Another potential earthquake source is the Midland Fault Zone on the western side of the Sacramento Valley. This was the source of the 1892 Vacaville-Winters earthquake.

The Petrolia (coastal Humboldt County) earthquake increased concern about how amplified long-period motions from much closer major events, such as on the San Andreas Fault or the Hayward Fault, might reach damaging levels and affect Sacramento.

Other potential earthquake sources are the faults associated with the western edge of the Central Valley, recently defined as the Coast Range Central Valley Boundary Thrust Fault System. Various documents define portions of this little known system as the Midland Fault Zone or the Dunnigan Hills fault, where the 1892 Vacaville-Winters earthquake occurred. A southern part of the system may have been the source of the 1983 Coalinga earthquake.

## Inactive Faults

Active faults are those that have experienced displacement in historical time. However, inactive faults, for which no such displacements have been recorded, also have the potential to reactivate or experience displacement along a branch sometime in the future. An example of a fault zone that has been reactivated is the Foothills Fault Zone. The zone was considered inactive until evidence of an earthquake (approximately 1.6 million years ago) was found near Spenceville, California. Then, in 1975, an earthquake occurred on another branch of the zone near Oroville, California (now known as the Cleveland Hills Fault). The State Division of Mines and Geology indicates that increased earthquake activity throughout California may cause tectonic movement along currently inactive fault systems.

No active faults are known to exist in Placer County. The following inactive faults have been identified within the city limits:

- The Volcano Hill fault extends northwest from Volcano Hill for a distance of 1 mile, terminating near Eureka Road. No activity has been recorded along this fault; therefore, it is considered inactive.
- Identified in 1973, the Linda Creek fault is located along Linda Creek in Roseville and Sacramento County. No activity has been recorded along this fault.
- The Willows Fault and Stockton Fault are in the Roseville vicinity and are considered inactive as displacement occurred greater than 1.8 million years ago.
- An unnamed fault extends east to west between Folsom Lake and the City of Rocklin. Segments of the fault are concealed and therefore unmapped. However, the east/west alignment suggests that the fault could connect to the Bear Mountain Fault, branches of which are located beneath Folsom Lake. The Bear Mountain Fault is a fault that could be undergoing reactivation as a result of continental tectonic activity. However, no evidence has been identified along the unnamed fault alignment of such reactivation.

## Maps of Earthquake Impact in Roseville

A probabilistic seismic hazard map shows the hazard from earthquakes that seismologists agree could occur. It is probabilistic in the sense that the analysis takes into consideration the uncertainties in the size and location of earthquakes and the resulting ground motions that can affect a particular site. The maps are expressed in terms of probability of exceeding a certain ground motion, such as the 10-percent probability of exceedance in 50 years. This level of ground shaking has been used for designing buildings in high seismic areas. Figure 9-2 shows the estimated ground motion for a 100-year probabilistic earthquake.

Earthquake scenarios describe the expected ground motions and effects of specific hypothetical large earthquakes for a region. Maps of these scenarios can be used to support all phases of emergency management. Two such scenarios were evaluated for this Plan:

- A Magnitude-6.8 event on the Concord-Green Valley Fault with an epicenter 56 miles southwest of Roseville near Vallejo, California (see Figure 9-3)
- A Magnitude-7.1 event on the Great Valley Fault with an epicenter 58 miles west northwest of Roseville (see Figure 9-4)

## NEHRP Soil Maps

NEHRP soil types define locations that will be significantly impacted by an earthquake. NEHRP Soils B and C typically can sustain low-magnitude ground shaking without much effect. Areas with NEHRP Soils D, E and F are most commonly affected by ground shaking. Figure 9-5 shows NEHRP soil classifications in the county.

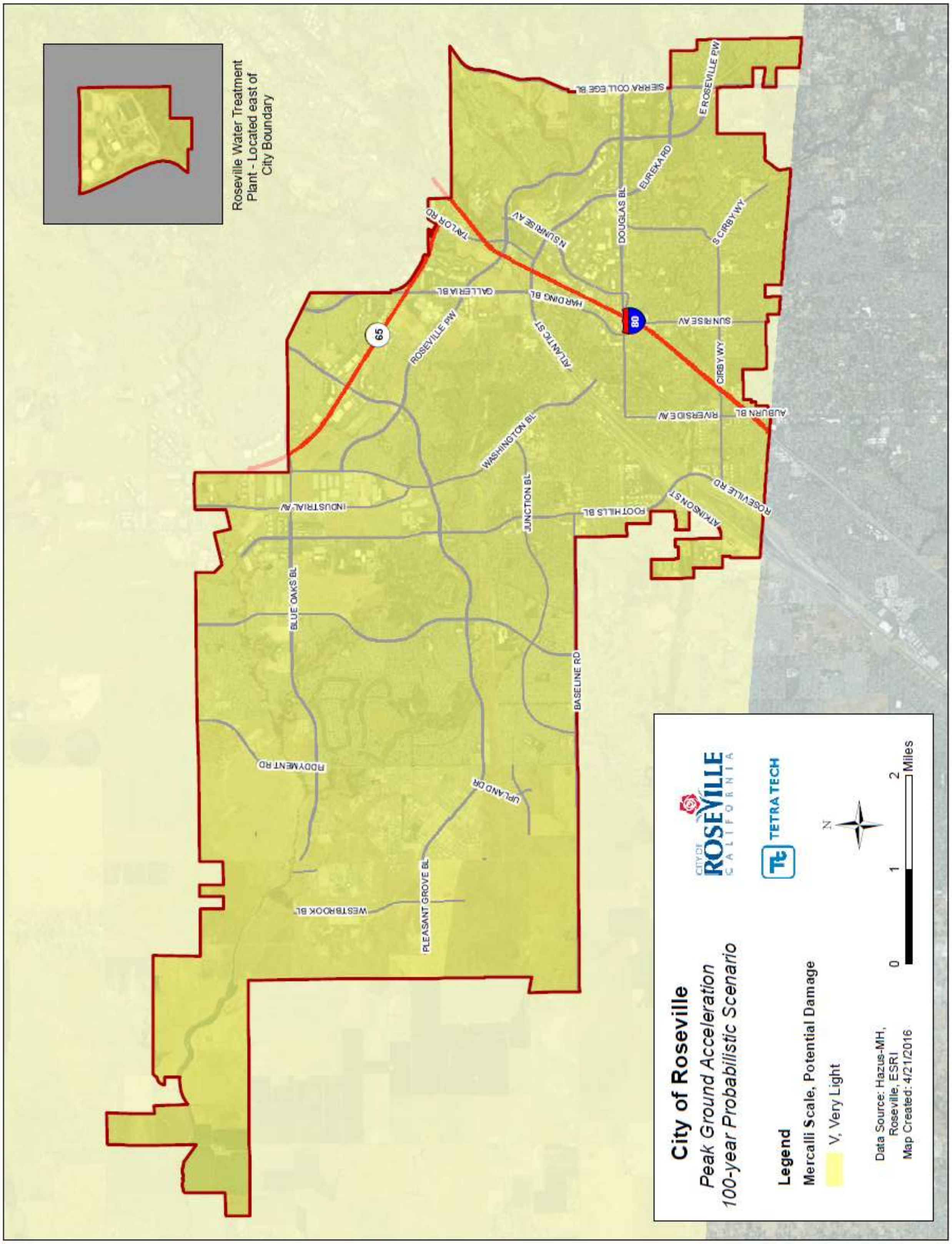



**Figure 9-2.** 100-Year Probabilistic PGA

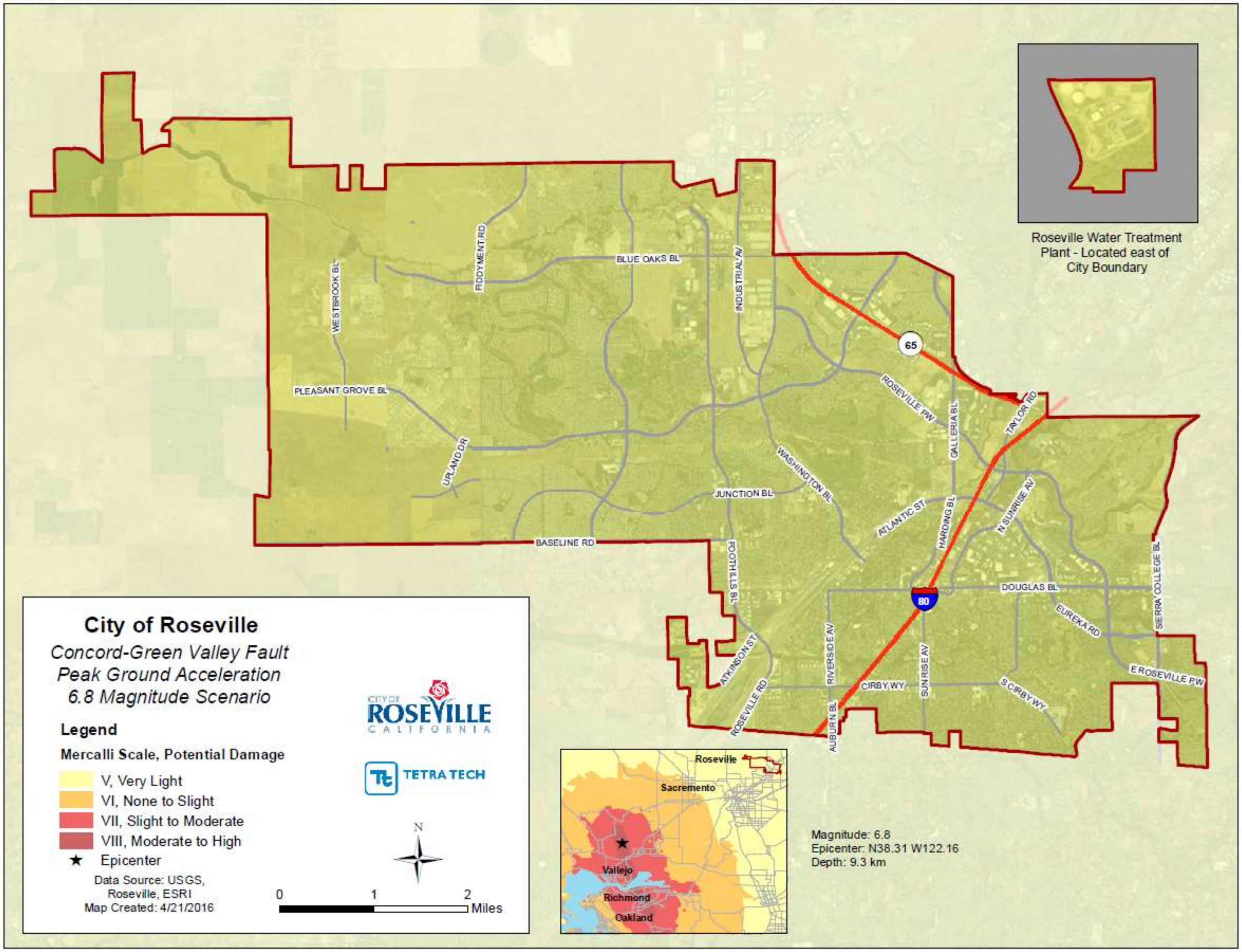



**Figure 9-3.** Concord-Green Valley Fault Scenario PGA

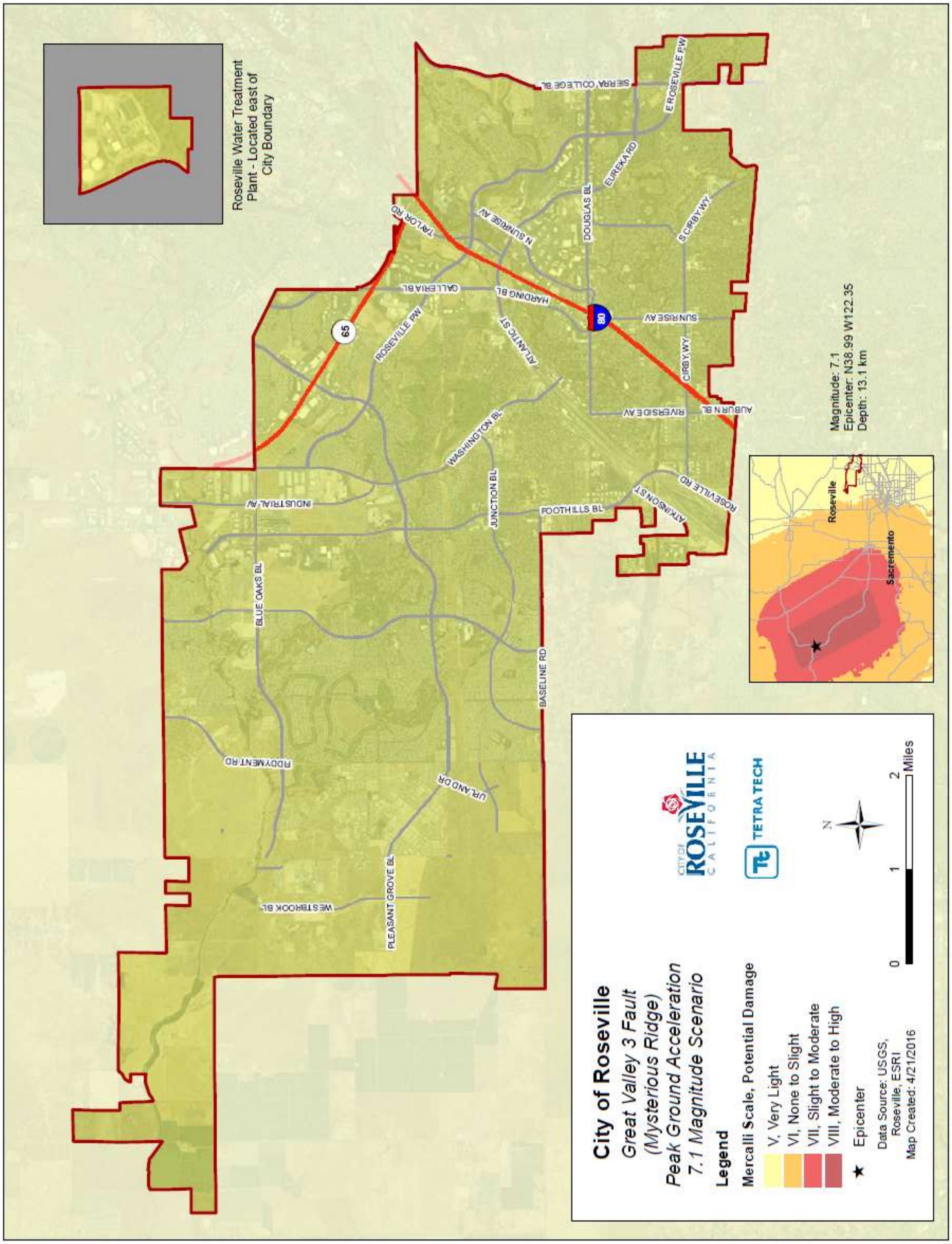



**Figure 9-4.** Great Valley 3 Fault Scenario PGA

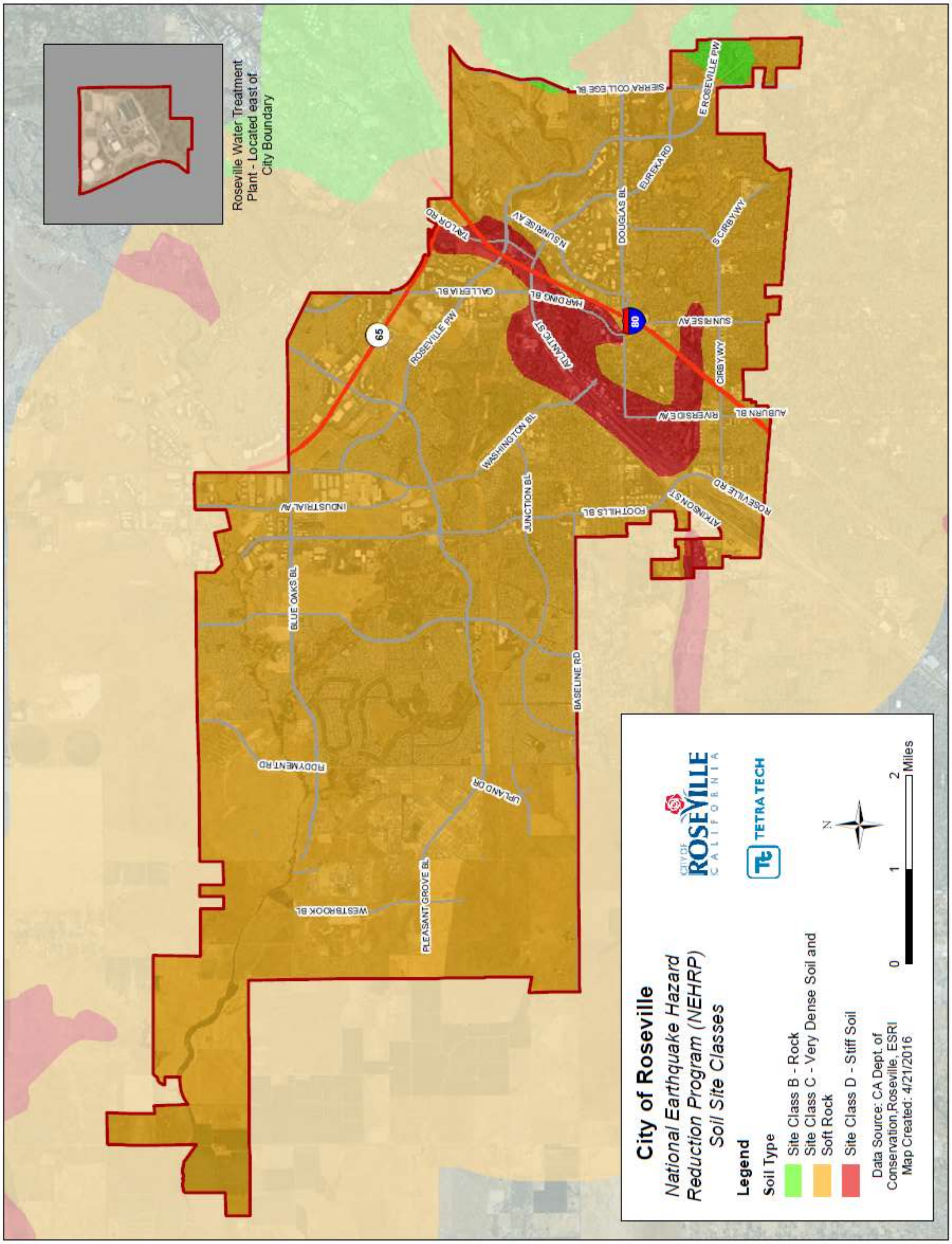



**Figure 9-5.** National Earthquake Hazard Reduction Program Soil Classification

## 9.2.3 Frequency

California experiences hundreds of earthquakes each year, most with minimal damage and magnitudes below 3.0 on the Richter Scale. Earthquakes that cause moderate damage to structures occur several times a year. According to the USGS, a strong earthquake measuring greater than 5.0 on the Richter Scale occurs every two to three years and major earthquakes of more than 7.0 on the Richter Scale occur once a decade. Both the San Andreas Fault and the closer Hayward Fault have the potential for experiencing major to great events. The State Hazard Mitigation Plan indicates that in the next 30 years in California there is over a 99-percent probability of a magnitude 6.7 earthquake and a 94-percent probability of a magnitude 7.0 earthquake.

## 9.2.4 Severity

Placer County and Roseville are identified as a low-severity zone. While there are several faults with the potential for large-magnitude earthquakes in the vicinity, the distance between those faults and the City of Roseville would result in very low, peak-ground accelerations in the City. The biggest contributor to potential intensity of shaking in Roseville is the Foothills Fault Zone.

### Liquefaction

Liquefaction of loose sandy soil with a high water content during an earthquake undermines the ground’s ability to solidly support building structures. Foundations supported on liquefiable soils can lose their ability to support load, and can experience settlement on the order of several inches or more. Differential settlement can cause significant damage to buildings, lifelines, and transportation structures, with partial or total collapse.

The City of Roseville is not specifically addressed in currently available State Division of Mines and Geology liquefaction risk data. No determination has been made as to whether liquefaction potential exists in Roseville. Based on project-specific analysis that has been done for many of Roseville’s development projects, liquefaction has not been identified as a significant problem in Roseville.

The prevailing water table in the vicinity of Roseville is approximately 80 feet below grade. Without water to saturate the soil, liquefaction is not possible. The liquefaction potential in Roseville is, therefore, considered to be very low. The most likely location for liquefaction would be along the City’s creek beds. The City’s policy of protecting floodplain areas has avoided development in many of the most susceptible areas.

### Ground Failure

Roseville’s geographic location, soil conditions, and surface terrain combine to minimize risk of major damage from landslides, subsidence (gradual shrinking of the earth’s surface due to underground resource extraction), or other geologic hazards resulting from seismic activity and related natural forces.

### Slopes

Roseville is located on relatively level terrain, with slopes that gradually increases to the north and east. Recent development in the Stoneridge Specific Plan and Northeast Roseville Specific Plan is adjacent to ravine areas and developed property would be more susceptible in the event of seismic activity due to steep slopes in some areas.

## 9.2.5 Warning Time

There is no current reliable way to predict the day or month that an earthquake will occur at any given location. Research is being done with warning systems that use the low energy waves that precede major earthquakes. These potential warning systems would give approximately 40 seconds notice that a major earthquake is about to occur. The warning time is very short but it could allow for someone to get under a desk, step away from a hazardous material they are working with or shut down a computer system.

## 9.3 SECONDARY HAZARDS

Earthquakes can cause large and sometimes disastrous landslides and mudslides. River valleys are vulnerable to slope failure, often as a result of loss of cohesion in clay-rich soils. When soil liquefaction occurs, building and road foundations can lose load-bearing strength and may sink quicksand-like into what was previously solid ground. Unless properly secured, hazardous materials can be released during earthquakes, causing significant damage to the environment and people. Earthen dams and levees are highly susceptible to seismic events and the impacts of their eventual failures can be considered secondary earthquake hazards.

The City of Roseville faces potential social impacts in the wake of mass evacuations should a large seismic event occur in the San Francisco Bay area. As the first major metropolitan city along Interstate 80 east of Sacramento, the City's services and infrastructure could be strained as evacuating populations seek shelter close to home. Evacuees could need shelter for long periods, depending on the magnitude of the event. This could significantly tax hospitals, schools and services in the City, causing significant economic impacts.

## 9.4 EXPOSURE

### 9.4.1 Population

All of the population of Roseville, both residents and visitors, would be directly or indirectly exposed to the potential impacts of an earthquake.

### 9.4.2 Property

All structures within Roseville are exposed to the potential impacts of an earthquake.

### 9.4.3 Critical Facilities

Since the entire planning area has exposure to the earthquake hazard, all critical facilities and infrastructure components are exposed to the earthquake hazard, as summarized in Table 9-6 and Table 9-7.

**Table 9-6.** Critical Facilities Exposed to the Earthquake Hazard

| Facility Type | Number in Planning Area |
|---|---|
| Medical and Health | 2 |
| Government Functions | 27 |
| Protective Functions | 10 |
| Schools | 49 |
| Hazmat | 6 |
| Other Critical Functions | 78 |
| **Total** | **172** |

**Table 9-7.** Critical Infrastructure Exposed to the Earthquake Hazard

| Facility Type | Number in Planning Area |
|---|---|
| Bridges | 68 |
| Water Supply | 11 |
| Wastewater | 23 |
| Power | 18 |
| Communications | 98 |
| Other | 6 |
| **Total** | **224** |

The City's Water Treatment Plant on Barton Road is the only critical facility located near an identified local inactive fault. All other City facilities are within Roseville and are not located near an inactive local fault. However, all are considered to be exposed to the same earthquake risk as the general building stock.

Most of the City's critical facilities have been built since the Uniform Building Code (UBC) was amended to include provisions for seismic safety. For example, the two major hospitals—Sutter Roseville Medical Center and Kaiser Permanente—were both constructed in the 1990s, as were the Roseville Police Department and Roseville Civic Center. The movement of the California Building Code to the International Building Code standard in 2013 has upheld seismic standards previously established by the UBC.

Critical industrial facilities are of concern because of potential hazardous materials spills or the potential for critical employment centers to continue operating. Many forms of hazardous materials are present in Roseville at private businesses, in permanent storage locations, along the Union Pacific Railroad, and on Interstate 80 and Highway 65.

### Hazardous Materials

Hazardous material releases from fixed facilities and transportation-related releases can occur during an earthquake event. Roseville's location at the junction of two major rail lines with two freeways increases the potential for a hazardous materials event should a major earthquake occur. Facilities holding hazardous materials are of particular concern because of possible isolation of surrounding populations.

### Roads

Roads have the potential to be significantly damaged during an earthquake. Access to major roads is crucial to life and safety after a disaster event as well as to response and recovery operations.

### Bridges

Earthquake events can significantly impact bridges, which often provide the only access to some neighborhoods. Since soft soil regions generally follow floodplain boundaries, bridges that cross water courses are considered vulnerable. Since most of the City's bridges provide access across water courses, most are at least somewhat vulnerable to earthquakes. Key factors in the degree of vulnerability are the facility's age and type of construction, which indicate the standards to which the facility was built.

### Water and Sewer Infrastructure

Water and sewer infrastructure would likely suffer considerable damage in the event of an earthquake. This is hard to analyze due to the amount of infrastructure and the fact that water and sewer infrastructure are usually linear easements. Without further analysis of individual system components, it should be assumed that these systems are exposed to breakage and failure.

## 9.4.4 Environment

Environmental problems as a result of an earthquake can be numerous. Secondary hazards will likely have some of the most damaging effects on the environment. Earthquake-induced landslides in landslide prone areas can significantly impact surrounding habitat. It is also possible for streams to be rerouted after an earthquake. This can change the water quality, possibly damaging habitat and feeding areas. There is a possibility of streams fed by groundwater wells drying up because of changes in underlying geology.

# 9.5 VULNERABILITY

The data in this section was generated using the HAZUS-MH program for earthquakes. Once the location and size of a hypothetical earthquake are identified, HAZUS-MH estimates the intensity of the ground shaking, the number of buildings damaged, the number of casualties, the amount of damage to transportation systems and utilities, the number of people displaced from their homes, and the estimated cost of repair and clean up.

Although Roseville is in California and has three faults documented in the City's General Plan, the seismic hazard is not considered to be a serious risk to life or property. Studies have not identified the Sierra Foothills, including Placer County, as a likely location for a significant seismic event. Roseville is fortunate in that more than three-quarters of the development in the City has occurred in the past two decades and all applicable seismic building codes have been enforced through the planning and development process.

## 9.5.1 Population

The measurable impact of earthquake on loss of life is minimal in Roseville and has not been estimated for this Plan. The life-safety exposure to earthquake in Roseville is low and would most likely occur in buildings as a result of damage to structures. To prevent damage to structures that could lead to loss of life, the City has a strict code enforcement policy to prevent improper alterations to original buildings. The City has funded façade grants to renovate older commercial structures, and has established an infill development team to work with property owners to upgrade and add value to older properties.

The City encourages residents to be prepared through public education and training via the Roseville Fire Department and local non-profits. Local employers such as Union Pacific, Sutter Roseville Medical Center, Kaiser Hospital, HP and NEC maintain emergency response plans that include earthquake preparedness and response training to protect life and property. Earthquake preparedness and response training prepares employees to continue service to the community in the event of a seismic event.

The vulnerable populations are those living in economically disadvantaged households, those over 65 and those under 16.

## 9.5.2 Property

### Loss Potential

An earthquake would cause property damage in a small percentage of the City's buildings built prior to 1933 and structures such as manufactured homes and older homes that have not been well maintained. Loss estimates for the planning area were generated for the 100-year earthquake event as well as the Concord-Green Valley Fault scenario event and the Great Valley 3 Fault scenario event, through a Level 2 analysis using HAZUS-MH. A summary of results is as follows:

- For a 100-year earthquake, the estimated damage potential is $43.37 million, or 0.15 percent of the total assessed value for the planning area.
- For a 6.8-magnitude event on the Concord-Green Valley Fault, the estimated damage potential is $1.7 million, or 0.01 percent of the total assessed value for the planning area.
- For a 7.1-magnitude event on the Great Valley 3 Fault, the estimated damage potential is $21.3 million, or 0.07 percent of the total assessed value for the planning area.

### Age of Structures

The City of Roseville is a relatively new community, with most of its development occurring since 1976. The California Multi-Hazard Mitigation Plan identifies significant milestones in building and seismic code requirements that affect the structural integrity of development in California. Table 9-8 lists the City's structures by the time period in which they were built, based on age-of-structure data from the City's land inventory database. The number of structures is approximate and is based on best available data currently entered into Roseville and Placer County databases. The number of structures does not reflect the number of total housing units, as many multi-family units and attached housing units are reported as one structure.

**Table 9-8.** Age of Structures in the City of Roseville

| Time Period | Number of Structures in Roseville | Significance of Time Period |
|---|---|---|
| Pre-1933 | 540 | Before 1933, there were no explicit requirements for earthquakes in building codes. State law did not require local governments to have building officials or issue building permits. |
| 1933-1940 | 608 | In 1940, the first strong motion recording was made in El Centro. |
| 1941-1960 | 2,526 | In 1960, the Structural Engineers Association of California reached the first statewide consensus on recommended earthquake provisions and published the guidelines. |
| 1961-1975 | 3,029 | In 1975, significant improvements were made to lateral force requirements that were then enforced throughout the state. |
| 1976-1994 | 12,932 | In 1994, the Uniform Building Code was amended to include provisions for seismic safety. |
| 1994 to present | 26,423 | Seismic code is currently enforced. |
| **Total** | **46,058** | |

Just over 57 percent of the City's structures were constructed since the UBC was amended in 1994 to include seismic safety provisions. Approximately 1 percent of the City's structures were built before 1933 when there were no building permits, inspections, or seismic standards. Figure 9-6 shows the distribution of structures across the City by age.

## Construction Materials

The type of construction is a factor in a building's ability to withstand shaking and liquefaction should an earthquake occur. Developers in Roseville have built primarily wood frame structures. The tallest building in Roseville is currently three stories. HAZUS-MH generated the percentages of each building type in Roseville as shown in Table 9-9.

**Table 9-9.** Building Type

| Building Type | Percent of Total |
|---|---|
| **Wood** | 96.67% |
| **Reinforced Masonry** | <1% |
| **Manufactured Homes** | <1% |
| **Concrete** | 1.2% |
| **Un-reinforced Masonry** | <1% |
| **Steel** | <1% |
| **Total** | **100%** |

*Sources: HAZUS – MH (Occupancy Class Data)*

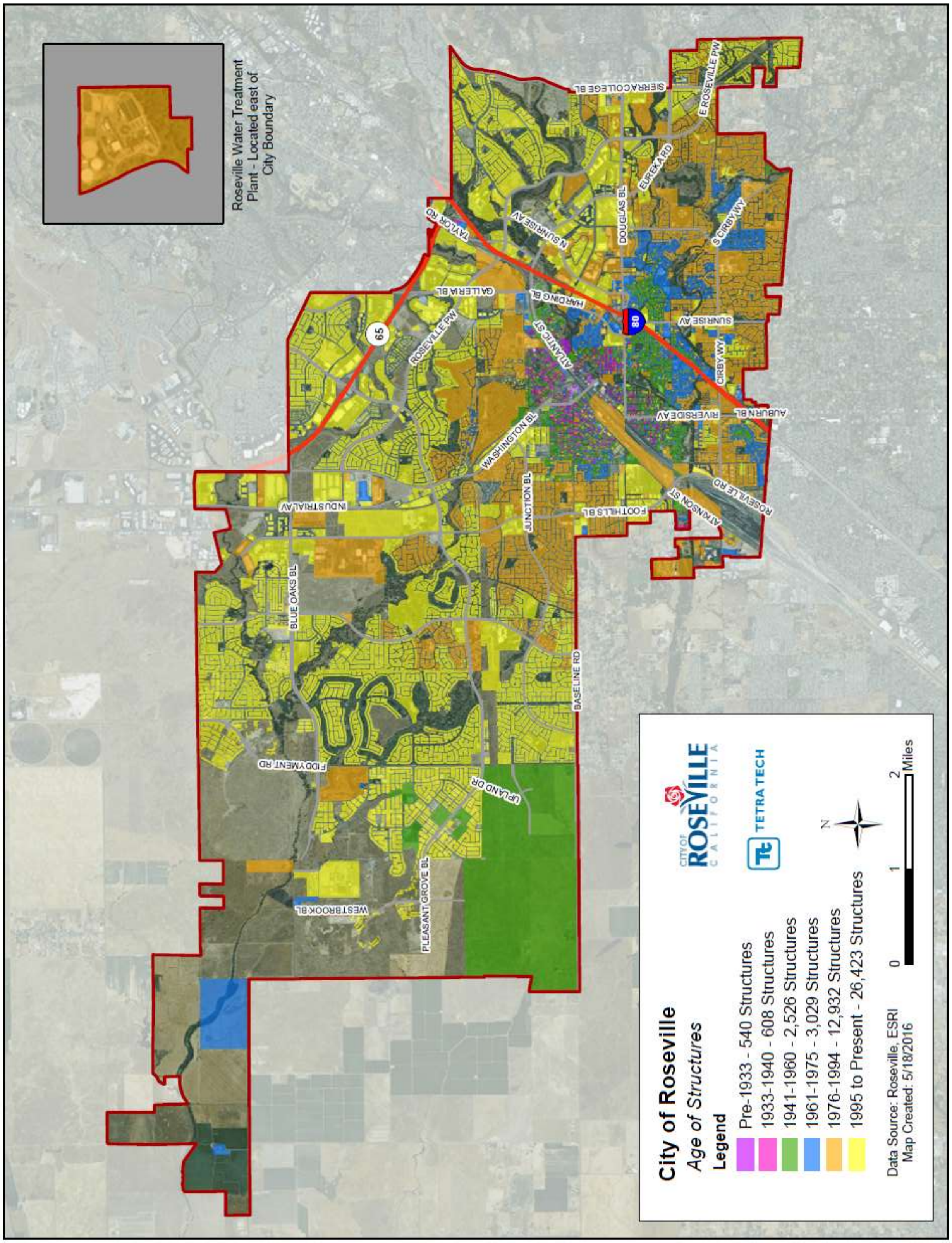



**Figure 9-6.** Age of Construction of Structures in Roseville

## 9.5.3 Critical Facilities

Roseville's utilities all have funded rehabilitation programs that identify and replace worn infrastructure to ensure continuous service. The latest technologies, including computerized alarms, video inspections, and mapping of all of the City's water, wastewater, recycled water and electric systems, would identify damaged sections in the event of a seismic event. Private utilities in Roseville also use modern technology to monitor their infrastructure in Roseville and respond quickly to service interruptions.

### Level of Damage

The inventory of critical facilities was entered into HAZUS-MH to determine the vulnerability of these facilities to earthquake damage. Critical facilities were categorized into the following levels of damage probability: no damage, slight damage, moderate damage, extensive damage, or complete damage. HAZUS-MH calculated the probability of damage under each of these categories for the 100-year event and the Great Valley 3 Fault Scenario. The results are summarized in Table 9-10 and Table 9-11. The impact on critical facilities for the Concord-Green Valley Fault scenario was not run due to the limited impacts of this event identified by the general building stock analysis.

**Table 9-10.** Damage Probability (Vulnerability) of Critical Facilities from a 100-Year Earthquake Event

| Category | No Damage | Slight Damage | Moderate Damage | Extensive Damage | Complete Damage |
|---|---|---|---|---|---|
| **Medical and Health** | 99.8 | 0.2 | 0 | 0 | 0 |
| **Government Functions** | 93.4 | 5.0 | 1.5 | 0.1 | 0 |
| **Protective Functions** | 97.4 | 2.4 | 0.2 | 0 | 0 |
| **Schools** | 97.3 | 2.5 | 0.2 | 0 | 0 |
| **Other Critical Functions** | 95.4 | 4.0 | 0.6 | 0 | 0 |
| **Average** | **96.7** | **2.8** | **0.5** | **0** | **0** |

**Table 9-11.** Damage Probability (Vulnerability) of Critical Facilities from the Great Valley 3 Scenario

| Category | No Damage | Slight Damage | Moderate Damage | Extensive Damage | Complete Damage |
|---|---|---|---|---|---|
| **Medical and Health** | 100 | 0 | 0 | 0 | 0 |
| **Government Functions** | 99.3 | 0.7 | 0 | 0 | 0 |
| **Protective Functions** | 99.7 | 0.3 | 0 | 0 | 0 |
| **Schools** | 99.8 | 0.2 | 0 | 0 | 0 |
| **Other Critical Functions** | 99.6 | 0.4 | 0 | 0 | 0 |
| **Average** | **99.7** | **0.3** | **0** | **0** | **0** |

### Time to Return to Functionality

HAZUS-MH estimates the expected time required to restore critical facilities to full functional use, in the form of percent probability of being functional at specified time increments post-event: 1, 3, 7, 14, 30 and 90 days after the event occurs. For example, HAZUS-MH may estimate that a facility has 5-percent chance of being fully functional at Day 3, and a 95-percent chance of being fully functional at Day 90. The functionality analysis was performed for all critical facilities and infrastructure components in the planning area for both the 100-year event and the Great Valley 3 Scenario. Results are summarized in Table 9-12 and Table 9-13.

## 9.5.4 Environment

The environment vulnerable to earthquake hazard is the same as the environment exposed to the hazard.

**Table 9-12.** Functionality of Critical Facilities, 100-Year Earthquake

| Planning Unit | # of Critical Facilities | Probability of Being Fully Functional (%) | | | | | |
|---|---|---|---|---|---|---|---|
| | | at Day 1 | at Day 3 | at Day 7 | at Day 14 | at Day 30 | at Day 90 |
| **Medical and Health** | 2 | 99.7 | 99.7 | 99.9 | 99.9 | 99.9 | 99.9 |
| **Government Functions** | 27 | 93.4 | 93.6 | 98.3 | 98.3 | 99.8 | 99.9 |
| **Protective Functions** | 10 | 97.3 | 97.3 | 99.7 | 99.8 | 99.9 | 99.9 |
| **Schools** | 49 | 97.2 | 97.2 | 99.7 | 99.8 | 99.9 | 99.9 |
| **Other Critical functions** | 78 | 95.3 | 95.5 | 99.3 | 99.3 | 99.9 | 99.9 |
| **Total/Average** | **166** | **96.6** | **96.7** | **99.4** | **99.4** | **99.9** | **99.9** |

**Table 9-13.** Functionality of Critical Facilities, Great Valley 3 Scenario

| Planning Unit | # of Critical Facilities | Probability of Being Fully Functional (%) | | | | | |
|---|---|---|---|---|---|---|---|
| | | at Day 1 | at Day 3 | at Day 7 | at Day 14 | at Day 30 | at Day 90 |
| **Medical and Health** | 2 | 100 | 100 | 100 | 100 | 100 | 100 |
| **Government Functions** | 27 | 99.2 | 99.2 | 99.9 | 99.9 | 99.9 | 99.9 |
| **Protective Functions** | 10 | 99.7 | 99.7 | 99.9 | 99.9 | 99.9 | 99.9 |
| **Schools** | 49 | 99.8 | 99.8 | 99.9 | 99.9 | 99.9 | 99.9 |
| **Other Critical functions** | 78 | 99.5 | 99.5 | 99.9 | 99.9 | 99.9 | 99.9 |
| **Total/Average** | **166** | **99.6** | **99.6** | **99.9** | **99.9** | **99.9** | **99.9** |

## 9.6 FUTURE TRENDS IN DEVELOPMENT

The general building stock within the planning area increased by 17.7% with an increase in valuation from $21.967 billion to $29.641 billion (34.9%). This increase in valuation of the planning area was impacted by the areas recovery from the economic downturn of 2008. Since the entire planning area would be considered susceptible to earthquake, there was an increase in earthquake exposure over the performance period of the 2011 plan. However, the vulnerability of this new exposure should be considered to be low due to the application of strong seismic building code standards that are contained within the International Building Code.

Roseville is expected to grow considerably in the next 10 years. The moderate potential for earthquake in Roseville is not likely to lessen or prohibit development in the City.

The City’s development departments will strictly enforce all seismic building codes and design standards to prevent loss of life and property due to earthquake. Public education, cooperation with the development community, and individual preparedness are essential as Roseville welcomes thousands of new residents and hundreds of new businesses to the City each year.

## 9.7 REVIEW OF EXISTING ORDINANCES, PROGRAMS AND PLANS

### 9.7.1 International Building Codes

The State of California provides minimum standards for structural design and site development through the California Building Standards Code (California Code of Regulations (CCR), Title 24). The California Building Code (CBC) is based on the International Building Code (IBC), which is widely used throughout the United States and has been modified for California conditions with numerous more detailed and stringent regulations.

Chapter 18 of the IBC/CBC regulates the excavation of foundations and retaining walls and regulates grading activities, including drainage and erosion control, and construction on expansive soils (soils that expand when water is added, and shrink when they dry out). Specific minimum seismic safety and structural design requirements are set forth in Chapter 16 of the IBC/CBC. The IBC/CBC requires a site-specific geotechnical study to address seismic issues and identifies seismic factors that must be considered in structural design.

The following uniform codes have been adopted in Chapter 16 of the Roseville Zoning Ordinance to ensure that buildings are designed and sited properly to protect against seismic and unstable soil conditions: CBC (2013), California Plumbing Code (2013), California Green Building Standards (2013), and the California Mechanical Code (2013).

To reduce the risk of seismic-related safety hazards and structural damage to pipelines, roads, and residential homes to an acceptable level, the City of Roseville conditions of approval for development projects require that at the time of tentative map approval, construction be in accordance with the IBC and local building standards, as administered by the Roseville Building Division. Regular monitoring and enforcement through the building permit and plan check process ensures that new development and construction meet all seismic and geologic safety standards, reducing the risk of building damage.

### 9.7.2 Improvement Standards

The City of Roseville Improvement Standards require the development of a grading plan, an erosion and sedimentation control plan, and mitigation monitoring requirements to reduce the exposure of people and structures to seismic hazards.

### 9.7.3 Geotechnical Studies

The City of Roseville requires the preparation of site-specific geotechnical studies as part of the building permit process. The technical information that must be compiled for these studies, which address both seismic hazards and soil conditions, is specified in Chapters 16 and 18 of the CBC. The studies provide recommendations to address slope and foundation instability, stream bank protection, and slope evaluation, as well an evaluation of expansive soils and differential settlement. Implementation of recommendations minimizes impacts associated with the exposure of people and structures to seismic hazards, the development of structures on expansive soils, grading that increases slope instability, increased erosion along stream channels, and soil erosion from grading.

## 9.8 SCENARIO

Inactive faults in the region could significantly impact the City of Roseville should they reactivate, but modeling such impact is difficult due to the lack of data. The direct earthquake risk in Roseville is considered to be low to moderate, but indirect impacts from a significant event in the region could be significant. The City would most likely experience impacts from a large seismic event in the Bay Area. As a large metropolitan center with easy access to transportation corridors, the City would likely become a major evacuation center in response to such an event. This could significantly tax City resources.

## 9.9 ISSUES

Important issues associated with an earthquake in Roseville include but are not limited to the following:

- Planning is required for mass evacuations into the City of Roseville.
- There is enough older building stock in the City featuring un-reinforced masonry construction to warrant structural and non-structural mitigation.
- There is a need for better comprehensive soils data to better identify the probable earthquake risks in the City.

- A large seismic event in the Sacramento Region could trigger a dam failure on Folsom Lake, causing significant impacts.
- The perceived lack of risk can lead to complacency. Earthquakes provide a significant risk to all populations in California, whether the impacts are direct or indirect.
- There is still much to learn about the impacts of climate change on seismic activity.

# 10. FLOODING

## 10.1 GENERAL BACKGROUND

A floodplain is the area adjacent to a river, creek or lake that becomes inundated during a flood. Floodplains may be broad, as when a river crosses an extensive flat landscape, or narrow, as when a river is confined in a canyon.

### 10.1.1 Measuring Floods and Floodplains

The frequency and severity of flooding are measured using a discharge probability, which represents the probability that a certain discharge level will be equaled or exceeded in a given year. Discharge is the volume of water flowing in a stream or river and over its banks during a given time. Flood studies use historical records to determine the probability of occurrence for different discharge levels. The flood frequency equals 100 divided by the discharge probability. For example, the 100-year discharge has a 1 percent chance of being equaled or exceeded in any given year. The “annual flood” is the greatest flood event expected to occur in a typical year.

The extent of flooding associated with a 1-percent annual probability of occurrence (the base flood or 100-year flood) is commonly used as the regulatory boundary. This boundary is also referred to as the special flood hazard area (SFHA). Many communities have maps that show the extent and likely depth of flooding for the base flood. The base flood elevation is computed using discharge probabilities. The corresponding water-surface elevations describe the exact elevation of water that will result from a given discharge level, which is one of the most important factors used in estimating the potential flood damage in a given area.

### 10.1.2 Effects of Human Activities

Throughout history, humans have developed settlements in floodplains to take advantage of the benefits of being near the water bodies, but such settlements have always been susceptible to damage from flooding. Human activities concentrate in floodplains for a number of reasons: water is readily available; land is fertile; transportation by water is easily accessible; and land is flatter and easier to develop. But human activity in floodplains frequently interferes with natural processes. It can affect the distribution and timing of drainage, thereby increasing flood problems. Human development creates local flooding problems by altering or confining drainage channels. This increases flood potential in two ways: it reduces the stream’s capacity to contain flows, and it increases flow rates or velocities downstream during all stages of a flood event.

### 10.1.3 Floodplain Ecosystems

Floodplains can support ecosystems that are rich in biological quantity and diversity. Wetting of the floodplain soil releases a surge of nutrients: those left over from the last flood, and those that result from the rapid decomposition of organic matter that has accumulated since then. Microscopic organisms thrive and larger species enter a rapid breeding cycle. Opportunistic feeders—particularly birds—move in to take advantage. The production of nutrients peaks and falls away quickly, but the surge of new growth endures for some time. This makes floodplains particularly valuable for agriculture. Riparian zone species have significant differences from those outside of floodplains. For instance, riparian trees tend to be very tolerant of root disturbance and tend to be very quick-growing compared to non-riparian trees.

## 10.1.4 Federal Flood Programs

### National Flood Insurance Program

The NFIP makes federally backed flood insurance available to homeowners, renters, and business owners in participating communities. For most communities participating in the NFIP, FEMA has prepared a detailed Flood Insurance Study. The study presents water surface elevations for floods of various magnitudes, including the 1-percent annual chance flood and the 0.2-percent annual chance flood (the 500-year flood). Base flood elevations and the boundaries of the 100- and 500-year floodplains are shown on Flood Insurance Rate Maps (FIRMs).

Roseville entered the NFIP on December 15, 1983. The date of the City's current effective FIRM is November 21, 2001. As a participant in the NFIP, the City must, at a minimum, regulate development in its floodplain areas in accordance with NFIP criteria. Before a permit to build in a floodplain area is issued, the City must ensure that two basic criteria are met:

- All new buildings and developments undergoing substantial improvements must, at a minimum, be elevated to protect against damage by the 100-year flood.
- New floodplain development must not worsen existing flood problems or increase damage to other properties.

Properties constructed after a FIRM has been adopted are eligible for reduced flood insurance rates. Such structures are less vulnerable to flooding since they were constructed after regulations and codes were adopted to decrease vulnerability. Properties built before the FIRM was adopted may be more vulnerable to flooding and related damage because they do not meet code or are located in hazardous areas. The first FIRMs for Roseville were available at the end of 1983. According to Placer County Assessor records, 131 of the 154 structures located in the City's regulated floodplain were constructed prior to January 1984 and are therefore considered pre-FIRM under the NFIP. The number of post-FIRM structures in the regulatory floodplain is extremely low because of the City's proactive floodplain management policy of not allowing new development in the floodplain.

### The Community Rating System

The Community Rating System (CRS) is a voluntary incentive program within the NFIP. The CRS encourages floodplain management activities that exceed the minimum NFIP requirements (FEMA 2002). Flood insurance premium rates are discounted to reflect the reduced flood risk resulting from community actions meeting the following three goals of the CRS:

- Reduce flood losses.
- Facilitate accurate insurance rating.
- Promote awareness of flood insurance.

For participating communities, flood insurance premium rates are discounted in increments of 5 percent. For example, a Class 1 community would receive a 45 percent premium discount, and a Class 9 community would receive a 5 percent discount. (Class 10 communities are those that do not participate in the CRS; they receive no discount.) The CRS classes for local communities are based on 18 creditable activities in the following categories:

- Public Information
- Mapping and Regulations
- Flood Damage Reduction
- Flood Preparedness

Figure 10-1 shows the nationwide number of CRS communities by class as of May 1, 2016, when there were 1,391 communities receiving flood insurance premium discounts under the CRS program. Although insurance premium discounts are one benefit of participation in the CRS, more important benefits result from activities that save lives and reduce property damage. Communities participating in the CRS represent a significant portion of the nation's flood risk as evidenced by the fact that over 68 percent of the NFIP's policy base is located in these communities. Communities receiving premium discounts through the CRS range from small to large and represent a broad mixture of flood risks, including both coastal and riverine flood risks.

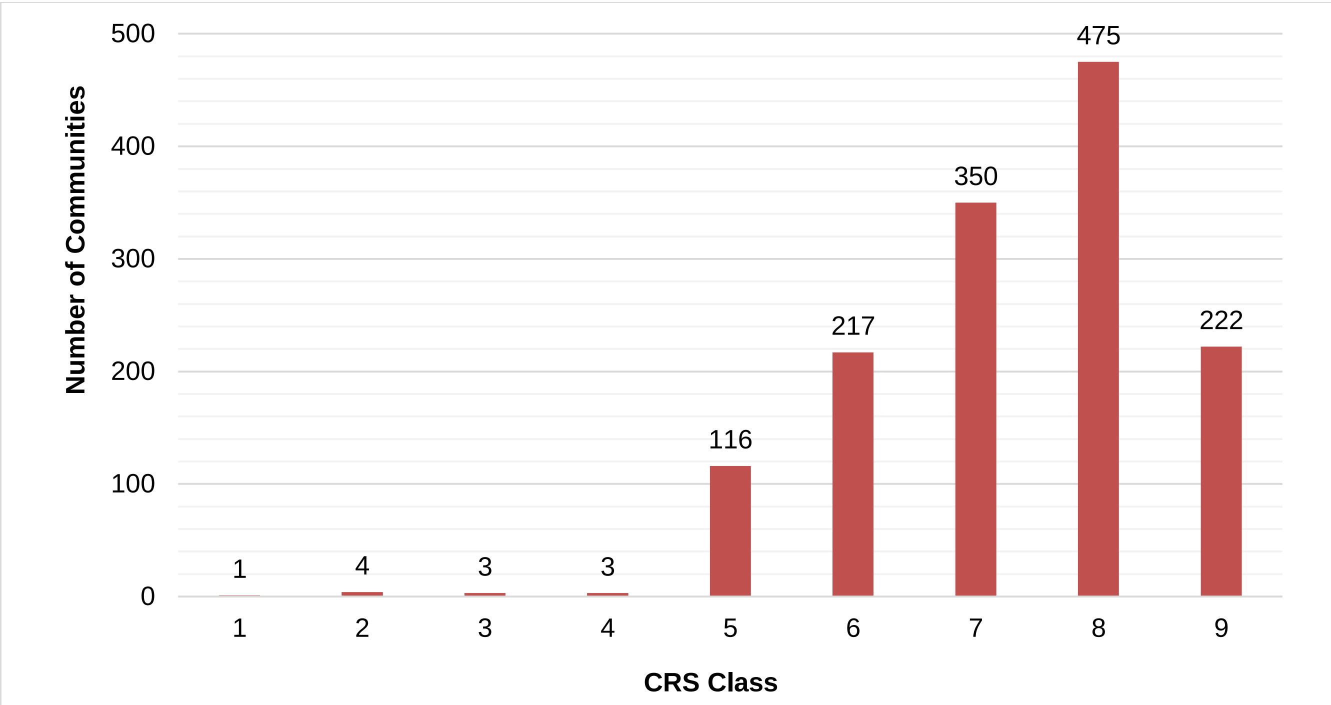



**Figure 10-1.** CRS Communities by Class as of May 1, 2016

The City of Roseville participated as a pilot-test community during CRS development in the late 1980s. The City began its official participation in the CRS program in 1991 and became the nation's first and only Class 1 community on October 1, 2006. This classification provides flood insurance policy holders in Roseville up to a 45-percent reduction in flood insurance premiums and represents an annual savings of $101,858 in flood insurance premiums; an average of $172 per year for each policy in force.

## 10.2 HAZARD PROFILE

### 10.2.1 Flooding Types

Flooding in Roseville is typically caused by high-intensity storms of relatively short duration (1 to 3 hours) concentrated on a stream reach with already saturated soil. In Roseville, two types of flooding typically occur:

- Flash floods that occur suddenly after a brief but intense and concentrated downpour. They move rapidly, end suddenly, and can occur in areas not generally associated with flooding (such as subdivisions not adjacent to a water body and areas serviced by underground drainage systems). Although the duration of these events is usually brief, the damage they cause can be severe. Flash floods cannot be predicted accurately and happen whenever there are heavy storms.

- Riverine floods, which are described in terms of their extent (including the horizontal area affected and the vertical depth of floodwater) and the related probability of occurrence (expressed as the percentage chance that a flood of a specific extent will occur in any given year).

Some localized flooding not associated with creek or stream overflow occurs in Roseville when rainfall runoff volumes exceed the design capacity of drainage facilities or when there are no drainage facilities to control flows. The City has attempted to address this type of flooding with regulations that require an "overland release" of stormwater generated at a site to a recognized stormwater facility. The City also requires mitigation of any increase in runoff generated from new development. However, some developments and facilities in the City were put in place before these policies were adopted.

## 10.2.2 Past Events

Correspondence from the 1930s between the U.S. Army Corps of Engineers and the City of Roseville indicated a need for establishing flood control measures along Dry, Cirby, and Linda Creeks. The flood of February 1986 was the largest flood on record at its time. This flood caused substantial property damage and was considered to be a 70- to 100-year event, depending on location. In January 1995, the City was subject to flooding that exceeded the 1986 flood event in most streams in Roseville, and that flood is now considered to be the flood of record.

Based on data from the National Climactic Data Center and the University of South Carolina's Spatial Hazard Events and Losses Database for the United States, 16 major flood events were reported in Placer County between January 1950 and December 2009, with an estimated $49,115,460 in property damage. Table 10-1 shows the estimated damage from flooding in Placer County that impacted Roseville from 1973 to 2009.

**Table 10-1.** Reported Damage from Major Flooding in Roseville (1973 to 2009)

| Date | Reported Damage (not adjusted for inflation) |
|---|---|
| **January 1973** | $86,207 |
| **March 1983** | Not Available |
| **February 1986** | $5,000,000 (Roseville only) |
| **January 1995** | $8,000,000 Total ($4.4 million structural) |
| **January 26,1997** | $43,600 (structural) |
| **February 1998** | $20,000 (structural) |
| **December 17, 2005** | $2,000,000 (county-wide) |

Significant flood events impacting the City of Roseville are discussed below with respect to damage, frequency, injuries and fatalities. Unreported injury or illness may be associated with each event. In addition to the events discussed below, flooding occurred during other storms in 1950, 1952 and 1963. However, little information is available to define the extent and impacts of these flooding events.

### December 1955

Flooding occurred primarily along Dry Creek. Homes in the Douglas Boulevard area were surrounded by floodwater, and one family was evacuated. Douglas Boulevard was impassable, and pavement was damaged. Royer Park was inundated, and floodwater extended across Park Drive. No injuries or fatalities were reported.

### April 1958

This flood, which continued for at least 12 hours, was the second largest event on record at the time. Flooding was most severe on Sunrise Avenue in the southeast portion of the City, on Douglas Boulevard, in the Royer Park area, and on Riverside Avenue at Dry Creek. Agricultural damage occurred along Dry Creek immediately west of the City. Many homes and businesses were surrounded by floodwater. Several families were evacuated by boat from homes in the Columbia Street and Douglas Boulevard areas. At Royer Park, floodwater covered the ball field and extended across Park Drive. Part of the sewage treatment plant was flooded, but the plant remained operational. No injuries or fatalities were reported.

### October 1962

This flood was considered the flood of record at the time. Over 9 inches of rain fell. Creeks overflowed their banks throughout the City, but the areas most affected were along Linda Creek in the Sierra Gardens Subdivision and along Dry Creek. A number of families were evacuated from their homes on Lee Way and Douglas Boulevard. Royer Park was completely inundated for a time, and one deer in the zoo was drowned before animals could be evacuated. Other flood losses in the park included bank erosion, destruction of fencing, damage to a footbridge, and damage to a recreation building and the park office. Restoration of the park required two weeks. Water mains were damaged in the Cresthaven and Atlantic Street areas. The Dry Creek Bridge on Riverside Avenue and the Antelope Creek Bridge on Atlantic Street were damaged. No injuries or fatalities were reported.

### December 1964

During this flood event, the fire and police departments evacuated four families when floodwater from Linda Creek surrounded their homes on Champion Oaks Drive and Lee Way. Dry Creek overflowed its banks in several locations, and flood-borne debris was removed in an effort to keep the stream flowing at Booth Road and the Southern Pacific railroad tracks. Floodwater at this location was deep enough to submerge a car stalled in the underpass. Stream-bank erosion occurred along the east bank of Dry Creek behind the Campfire Girls lodge on Sutter Avenue. No injuries or fatalities were reported.

### January 1969

A series of downpours beginning on January 16, 1969 caused flooding along Dry Creek, affecting Royer Park, the Champion Oaks area, and the intersection of Cirby Way and Old Auburn Road. Rising water from Linda Creek crested at the doorsteps of five homes along Champion Oaks Drive. City crews prepared to load belongings into vehicles if floodwater entered the homes. A second storm during the week of January 25, caused rising water in Linda Creek that led to the evacuation of five homes on Champion Oaks Drive. Dry Creek Bridge on Douglas Boulevard at Royer Park was closed when Dry Creek washed out fill placed by City crews in response to an earlier washout. No injuries or fatalities were reported.

### January 1970

Heavy rains and severe winds caused flooding in Roseville and throughout northern California. High water levels were reported on Champion Oaks Way, Subway Road, and Royer Park. No injuries or fatalities were reported.

### January 1973

Heavy rain and high winds impacted northern California border during the week of January 16, 1973. City crews kept watch on Linda Creek at Champion Oaks Drive and closed Subway Road because of flooding. Royer Park flooded after Dry Creek overflowed its banks. No injuries or fatalities were reported.

### March 1983

This flood damaged approximately 25 residences along Linda and Cirby Creeks. Portions of Royer Park and areas in the Sierra Lakes Mobile Home Park were inundated. Dry Creek overflowed the Darling Way and Riverside Avenue bridges and flooded six businesses along Riverside Avenue. No injuries or fatalities were reported.

## February 1986

This flood caused widespread damage in most of the Dry Creek basin. Nearly all bridges and culverts were overtopped, with 30 sustaining embankment damage. The crossing at Rocky Ridge Drive washed out. Two bridges over Dry Creek were damaged, and street cave-ins occurred at a number of locations. Approximately 209 homes along Dry, Linda, and Cirby Creeks reported flood damage, with water levels up to 5 feet above finished floor levels. The Roseville City Library was closed due to flooding. Floodwaters reached the foundation of the Public Safety Building but did not cause any damage. One fatality associated with this flood event was reported.

## January 1995

The January 1995 flood event (Figure 10-2) exceeded the flood event of 1986 on Cirby and Linda Creeks. This event is now considered the flood of record for Dry Creek based on flood heights. The flood was calculated to be a 100-year event. This flood resulted in 358 structures in the Dry Creek Basin being inundated by floodwaters. No injuries or fatalities were reported.

**Figure 10-2.** Dry Creek Flooding, January 1995

## January 1997

Flood events in 1997 were some of the most severe on record for the region. An isolated storm event typical for the Roseville area occurred on soils saturated from repetitive storm events, causing a flash flood. This flooding resulted in 21 structures being inundated with floodwater. The impact of this event was significantly reduced by the partially completed Cirby, Linda, and Dry Creek flood control project. No injuries or fatalities were reported.

### February 1998

A small flood occurred on February 3, 1998, resulting in eight structures being inundated by floodwater in the Dry Creek Basin (Figure 10-3). This event was caused by an isolated storm event centered over the basin. No injuries or fatalities were reported.


**Figure 10-3.** Business Flooding, February 1998

## 10.2.3 Location

### Primary Flood Sources

Upstream flows generated in Placer County enter the City of Roseville's creeks and tributaries from the east and north. Picking up additional stormwater runoff, the creek systems flow west-southwest through Roseville. These flows continue to move west-southwest, passing through Placer, Sacramento, and Sutter Counties to their ultimate destination, the Sacramento and American Rivers.

Roseville is located in portions of two major drainage basins: the Pleasant Grove Creek Basin and the Dry Creek Basin. Pleasant Grove Creek and its tributaries drain most of the western and central areas of the City, and the Dry Creek Basin and its tributaries drain the rest of the City.

The Dry Creek system has year-round flow in its major water courses, and the Pleasant Grove system is intermittent, with only seasonal flow. Since 1950, there have been no reports of structural flood damage along Pleasant Grove Creek. Due to the City's floodplain management policies, no structures in the Pleasant Grove Creek Basin are presently subject to flooding. The focus of flood hazard management is the Dry Creek Basin.

Seven creeks and streams that drain the 80-square-mile Upper Dry Creek Basin pass through and join within the city limits of Roseville. Three of these creeks have primary flooding impacts on the City: Cirby, Dry, and Linda Creeks.

### Regulatory Floodplain

The science available at the time that most of the City of Roseville was developed did not accurately project flood heights that could occur from typical rainfall events in the region. Development therefore occurred in areas needed for stormwater conveyance, with insufficient levels of flood protection. Development now exists in low-lying areas adjacent to creek or stream systems needed to convey the over-bank flooding that can occur during storm events.

The City eventually modeled flooding using the best available hydrologic and hydraulic science to better reflect actual rainfall events that can impact the City. This modeling generated a projection of flood heights and areas of inundation that is well supported by conditions observed during the 1986 flood. The City has since used this information to create and enhance its floodplain management program to minimize flood risk to all new developments. Based on the detailed modeling, the City identified a regulatory floodplain that exceeds the SFHA mapped by FEMA. Figure 10-4 shows FEMA's mapped floodplain and the City's regulatory floodplain, as authorized by the Roseville City Code. The City has mapped and regulates 2,372 acres as floodplain, which includes the 1,529 acres of floodplain identified by FEMA on the current effective FIRM for the City. The regulatory floodplain is the area susceptible to risk from flooding based on City-approved studies. These areas are based on detailed hydrologic and hydraulic floodplain modeling that meets or exceeds FEMA criteria for mapping and modeling floodplains. The flood event used to delineate these boundaries is referred to as "the regulatory flood" to differentiate it from the "base flood" used by FEMA.

In many portions of the City, the Nolte Future Floodplain has been used to designate floodplain boundaries. The Nolte Future Floodplain defines floodway and floodway fringe boundaries within the floodplain. The floodway fringe is an area along the boundary of the floodplain that, if totally obstructed, would not result in more than a 1-foot rise in the water surface elevation. The floodway constitutes the remainder of the floodplain area and is typically where floodwaters have the most velocity.

## 10.2.4 Frequency

Flood magnitude measurements reflect statistical averages only; it is possible for two or more rare floods (with a 100-year or higher recurrence interval) to occur within a short time period. Assigning recurrence intervals to historical floods on different streams can help indicate the intensity of a storm over a large area. For example, the 1995 flood event was determined to be a 100-year flood on Dry Creek and a 50-year flood on Linda Creek.

Recent history has shown that Roseville can expect an average of one episode of minor river flooding each winter. Recent flooding resulting in property damage has occurred about every 3 to 5 years since 1950, except for the period from 1973 to 1981, when no significant flooding occurred. The frequency of flood events that cause significant damage has decreased significantly over the past 10 years due to City efforts to mitigate flood risk. Exposure to events that could cause significant flooding can be expected every 5 to 10 years. Additionally, the City can expect what is often referred to as "nuisance" flooding annually in the historic core due to urban drainage issues.

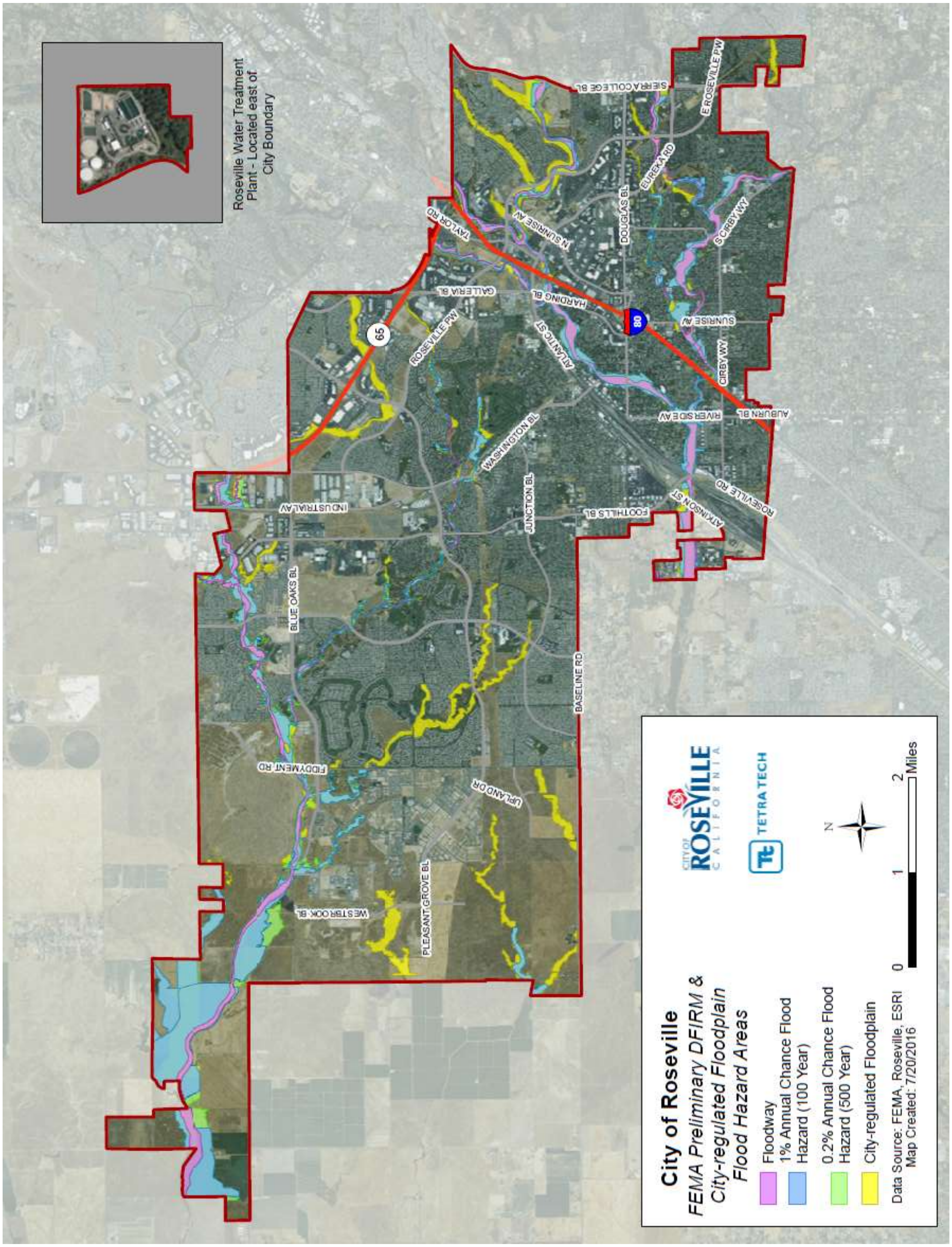



**Figure 10-4.** Floodplains

## 10.2.5 Severity

Table 10-2 shows observed flooding characteristics for the Pleasant Grove and Dry Creek basins, based on measurements made during past flood events.

**Table 10-2.** Observed Characteristics of Flooding

| | Pleasant Grove Creek Basin | Dry Creek Basin |
|---|---|---|
| **Approximate Base Flood Velocity (feet/second)[a]** | 0.5 to 8.0 | 2.0 to 14.0 |
| **Flow Rate (cubic feet per second)[b]** | 1,100 to 5,000 | 900 to 15,000 |
| **Base Flood Elevation (feet, National Geodetic Vertical Datum)** | | |
| **Downstream limit** | 89.7 | 79.7 |
| **Upstream limit** | 150.0 | 210.0 |
| **Approximate Depth of Overbank Flooding (feet above existing grade)** | 0 to 2 | 0 to 3 |
| **Approximate Warning Time (hours)** | 3 | 3 |

a. Higher velocities were observed in the channel; lower velocities were observed in the overbank area
b. 1 cubic foot is about 7.5 gallons

The City recently completed five phases of the seven-phase “Cirby-Linda-Dry Creek Flood Control Project.” The purpose of this project is to reduce stormwater backup at constrictions and increase the overall capacity of the floodplain during storm conditions. Project structures were designed to provide 1 foot of freeboard above the projected 500-year flood elevation. This project significantly reduced the flood risk exposure for this area, but did not eliminate it.

## 10.2.6 Warning Time

Due to the extended precipitation needed to cause serious flooding, it is unusual for a flood to occur without warning. Flash flooding can be less predictable, but hazard areas can be warned in advanced of potential flash flooding. Typical warning times for Roseville range from 1 to 3 hours. The City’s flood warning system has four ways to warn the public of potential flooding:

- A comprehensive graphical display of stream levels, broadcast on Channel 14 or 73, with the status of the warning
- The “Stream Level” link on the City of Roseville home web page (www.roseville.ca.us)
- An automatic telephone dialing system to problem areas
- Flooding status broadcasted on radio station 530 AM.

Numerous stream flow and rain gauges form the City’s stream monitoring system for the Upper Dry Creek Drainage Basin. These stations are placed at strategic locations throughout the drainage basin. For example, one is mounted on the floodwall just upstream from the pedestrian bridge that crosses between Tina Way and Marlin Drive and another is on Dry Creek at the Vernon Street Bridge. Each station transmits information via radio antenna to a central computer. Stream level information from five of the most critical stream level gauges is broadcasted on cable Channel 14/73 and on the City’s web page during significant storm events. City staff uses this information in deciding whether to advise residents to evacuate. The goal is to provide up to 3 hours of advance warning. The continuously changing variables of precipitation, stream levels, and forecasts have a major effect on meeting this goal. The display shown on Channel 14/73 consists of a set of basic graphics shown in 15-second intervals:

- The first, which is shown only once for every complete cycle, is a City of Roseville map that includes major roadways (Vernon Street, Douglas Boulevard, Cirby Way, etc.), the three major streams (Dry Creek, Linda Creek, and Cirby Creek) and the five stream level gauge locations. Residents living in a designated floodplain can determine which of the five stream gauges best represents their neighborhood. Once this is established, it is important to focus on how the streams are reacting to the weather conditions.

- Following this display, a more specific map identifies a single stream gauge's location in relation to nearby roadways and streams.
- Transmitted information from the gauges is presented in visual formats that include the current stream depth and the stream depth over the past six hours.

The stream level graph is divided into four colored categories of flood depth stages (see Figure 10-5):

- Blue (Normal Stage)—Stream level conditions are normal and safe.
- Green (Advisory Stage)—City staff is continuously monitoring creek levels and weather conditions. Residents should be closely watching for further information about flooding in their area.
- Yellow (Warning Stage)—There is a possibility of flooding in this area. Necessary precautions need to be taken to secure personal property and safety.
- Red (Critical Stage)—Flooding appears imminent in this area. Residents should evacuate their homes.

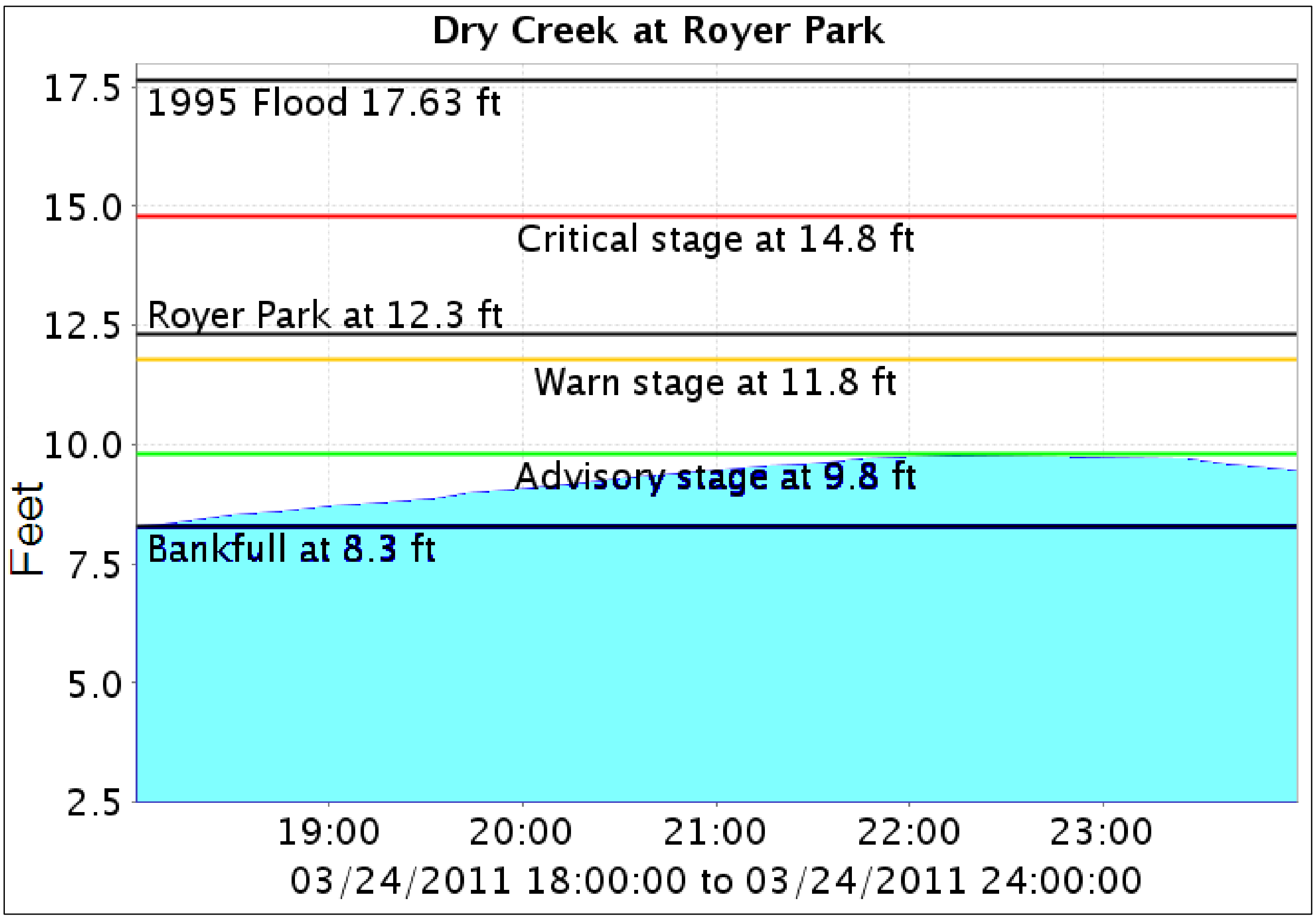



**Figure 10-5.** Example of Stream Gauge Graphic Display

The numeric values of the stream depths associated with the flood depth stages are shown on the vertical bar graph for all five of the stream level gauges, and reference stream levels are identified for each gauge. For example, the stream level during the 1995 flood is marked for each location. Also identified are other reference points such as roadway surface, bridge and/or top of berm levels. This enables viewers to identify and understand the present stage of the stream in relation to known benchmarks.

The City of Roseville also has an automated telephone dialing system. During significant storm events, this system is used to phone residents and businesses in the floodplain and provide recorded messages containing important information. The message to be played will depend on the flood threat in the area at that time.

## 10.3 SECONDARY HAZARDS

The most significant secondary hazard for flooding in Roseville is bank erosion. The dangers of bank erosion often are greater than those of flooding. Flooding is responsible for landslides when high flows over-saturate soils on steep slopes, causing them to fail. Hazardous materials spills are also a secondary hazard of flooding if storage tanks rupture and spill into streams, rivers or drainage sewers.

## 10.4 EXPOSURE

The Level 2 HAZUS-MH protocol was used to assess the risk and vulnerability to flooding in the planning area. HAZUS-MH uses census data at the block level, FEMA floodplain data, and GIS data for the City's regulatory floodplain. Where possible, the HAZUS-MH data for this risk assessment was enhanced using GIS data from the City and from county, state and federal sources. The following sections describe risk exposure and vulnerability of the general building stock, critical facilities and infrastructure, land use, and environment within the City's mapped regulatory floodplain.

### 10.4.1 Population

Estimates of the population living in the floodplain in the planning area were generated by analyzing census blocks that intersect with the City's regulatory floodplain. Census blocks do not follow the same boundaries as the floodplain. Therefore, the methodology used to generate these estimates counted census block groups whose centers are in the floodplain or where the majority of the population most likely lives in or near the floodplain. HAZUS-MH estimated the number of buildings within the floodplain in each block, and then estimated the total population by multiplying the number of residential structures by the City average of 2.54 persons per household. Using this approach, the exposed population within the regulatory floodplain was estimated to be 330 (0.25 percent of the total City population). This is only slightly greater than the estimated 322 people exposed in the SFHA.

### 10.4.2 Property

#### Structures in the Floodplain

Table 10-3 summarizes the number and type of structures in the floodplain, as calculated from the Level 2 HAZUS-MH analysis. There are 210 structures in the City of Roseville regulatory floodplain. This represents less than 1 percent of the total structures in the City. It includes the 200 buildings identified within FEMA's SFHA.

**Table 10-3.** Structures Within the SFHA and the Roseville Regulatory Floodplain

| | # of Structures in Mapped Floodplain | | | | | | |
|---|---|---|---|---|---|---|---|
| | Residential | Commercial | Industrial | Religion | Government | Education | Total |
| **FEMA-Preliminary Mapped SFHA** | 157 | 34 | 7 | 1 | 0 | 1 | **200** |
| **Roseville Regulatory Floodplain** | 156 | 38 | 11 | 2 | 2 | 1 | 210 |

## Exposed Value

The value of exposed buildings within the City's regulated floodplain area and the SFHA was generated using HAZUS-MH and is summarized in Table 10-4 and Table 10-5. This methodology estimated $289 million worth of building-and-contents exposure, representing 0.97 percent of the total building-and-contents value in the City.

**Table 10-4.** Value of Exposed Buildings Within the FEMA SFHA

| | Value of Exposed Property in the Mapped Floodplain | | | % of Total Value in the City |
|---|---|---|---|---|
| | Buildings | Contents | **Total** | |
| **Residential** | $24,700,000 | $12,400,000 | $37,000,000 | 0.2% |
| **Commercial** | $75,600,000 | $77,000,000 | $152,600,000 | 1.8% |
| **Industrial** | $2,400,000 | $2,600,000 | $5,000,000 | 0.4% |
| **Religion** | $0 | $0 | $0 | 0.00% |
| **Government** | $0 | $0 | $0 | 0.00% |
| **Education** | $1,200,000 | $1,200,000 | $2,500,000 | 0.2% |
| **Total** | **$103,900,000** | **$93,200,000** | **$197,100,000** | **0.7%** |

**Table 10-5.** Value of Exposed Buildings Within the Roseville Regulatory Floodplain

| | Value of Exposed Property in the Mapped Floodplain | | | % of Total Value in the City |
|---|---|---|---|---|
| | Buildings | Contents | **Total** | |
| **Residential** | $39,719,211 | $19,859,606 | $59,578,817 | 0.32% |
| **Commercial** | $84,278,680 | $87,860,805 | $172,139,485 | 2.08% |
| **Industrial** | $24,855,494 | $25,109,167 | $49,964,662 | 4.30% |
| **Religion** | $1,337,875 | $1,337,875 | $2,675,749 | 1.07% |
| **Government** | $1,032,368 | $1,032,368 | $2,064,736 | 1.22% |
| **Education** | $1,231,683 | $1,231,683 | $2,463,365 | 0.23% |
| **Total** | $152,455,311 | $136,431,504 | $288,886,814 | 0.97% |

## Land Use in the Floodplain

To preserve the natural and beneficial functions of open space resource areas adjacent to the floodplain areas of Roseville, the City has adopted policies under the Open Space and Conservation Element of its General Plan that include the following:

- Preserve and rehabilitate continuous riparian corridors and adjacent habitat along the City's creeks and waterways.
- Require dedication of the 100-year floodplain or comparable mechanism to protect habitat and wildlife values in perpetuity.
- Restrict development within the 200-year floodplain subject to the State of California Urban Level of Flood Protection Criteria.
- Require preservation of contiguous areas outside the 100-year floodplain as merited by special resources or circumstances, which may include, but are not limited to, sensitive wildlife or vegetation, wetland habitat, oak woodland areas, grassland connections in association with other habitat areas, slope or topographical considerations, recreation opportunities, and maintenance access requirements.
- Limit recreation activities within the 100-year floodplain and require additional setback areas for trails and other recreation uses so that natural resource areas are not adversely impacted.
- Provide protection and enhancement of fishery resources, including continued coordination with the California Department of Fish and Wildlife to release water to Linda Creek.

Because of these policies, a large portion of the floodplains within Roseville is held for open space use, much of it in a natural or beneficial state. Currently, 1,491.4 acres (97 percent) of the regulatory floodplain within Roseville is designated for open space use, as defined in the Open Space and Conservation Element of the General Plan.

## 10.4.3 Critical Facilities and Infrastructure

Flooding poses numerous risks to critical facilities and infrastructure:

- Roads or railroads that are blocked or damaged can prevent access throughout the area and can isolate residents and emergency service providers needing to get to vulnerable populations or to make repairs.
- Bridges washed out or blocked by floods or debris from floods also can cause isolation.
- Creek or river floodwaters can back up drainage systems, causing localized flooding.
- Culverts can be blocked by debris from flood events, also causing localized urban flooding.
- Floodwaters can get into drinking water supplies, causing contamination.
- Sewer systems can be backed up, causing waste to spill into homes, neighborhoods, rivers and streams.
- Underground utilities can also be damaged.

The inventory of critical facilities in Roseville's SFHA and regulatory floodplain is shown in Table 10-6 and Table 10-7.

**Table 10-6.** Critical Facilities in Flood Area

| | Critical Facilities within the SFHA | Critical Facilities within the City of Roseville Regulated Floodplain |
|---|---|---|
| Medical & Health Services | 0 | 0 |
| Government Function | 0 | 0 |
| Protective Function | 0 | 0 |
| Schools | 0 | 0 |
| Societal Function | 2 | 2 |
| Hazmat | 0 | 0 |
| Other Critical Function | 17 | 1 |
| **Total** | **19** | **3** |

**Table 10-7.** Critical Infrastructure in Flood Areas

| | Critical Infrastructure within the SFHA | Critical Infrastructure within the City of Roseville Regulated Floodplain |
|---|---|---|
| Water Supply | 0 | 4 |
| Wastewater | 5 | 4 |
| Power | 0 | 0 |
| Fuel Storage | 0 | 0 |
| Communications | 1 | 2 |
| Bridges | 11 | 27 |
| **Total** | **17** | **18** |

The City of Roseville has determined that the following major roadways and stream crossings (bridges or culverts) would be impassable during a 100-year flood event:

- Dry Creek Road Crossings
- Cirby Creek Road Crossings

- Vernon Street
- Riverside Avenue
- Darling Way
- Douglas Boulevard
- Folsom Road
- Sunrise Avenue
- Coloma Way
- Oakridge Road
- Sierra Gardens Drive
- Huntington Drive

- Linda Creek Road Crossings
  - Rocky Ridge Drive
  - Champion Oaks Drive
  - Sierra College Boulevard
- Miners Ravine
  - Sierra College Boulevard

### 10.4.4 Environment

Flooding is a natural event, and floodplains provide many natural and beneficial functions. Nonetheless, with human development factored in, flooding can impact the environment in negative ways:

- Migrating fish can wash into roads or over dikes into flooded fields, with no possibility of escape.
- Pollution from roads, such as oil, and hazardous materials can wash into rivers and streams.
- Pollutants carried by floodwaters can settle onto normally dry soils, polluting them for agricultural uses.
- Human development, such as bridge abutments and levees, and logjams from timber harvesting can increase streambank erosion, causing rivers and streams to migrate into non-natural courses.

With much of Roseville's regulatory floodplain zoned for open space use, the City has taken significant steps to preserve the natural and beneficial functions of the floodplain, while at the same time reducing the risk exposure to the built environment. Still, all vegetation and wildlife resources and corridors in the floodplain open space system—grasslands, oak woodlands, riparian areas, and seasonal wetlands—are exposed to the flood risk.

## 10.5 VULNERABILITY

### 10.5.1 Population

Flooding can be a deadly hazard. Roads running through low-lying areas prone to sudden and frequent flooding are a serious threat. Motorists often attempt to drive through barricaded or flooded roadways. Because as little as 18 to 24 inches of water moving across a roadway can carry away most vehicles, floods can present significant potential safety risks. The second largest potential for injuries from flooding results from people walking or playing in or near flooded areas. Generally, floods kill people in one of two situations: when people ignore basic safety precautions (such as evacuations and warnings), and when a flash flood hits an area with no warning.

Although it is possible to analyze life and safety impacts resulting from the flood hazard, injuries and casualties were not estimated for this hazard. One flood-related fatality in Roseville has been recorded, but the flood hazard is not generally considered to pose a serious risk to life in this area, for the following reasons:

- Flooding in Roseville tends to be rapid in terms of the rise and fall of floodwaters. Because of the City's geographical location in the watershed, floods tend to come and go quickly as they move toward their drainage endpoints, thereby decreasing the threat that people become trapped by floodwaters.
- The City has made it a priority to warn and educate its citizens on the dangers and impacts of flooding. The City implements public outreach programs that provide information on flood warnings, property protection, flood safety, and flood insurance. The City also has developed a comprehensive flood warning program that can deliver real-time data to citizens and emergency management personnel through cable

television and the Internet. The program can provide a warning up to 3 hours before a flood event occurs in the 100-year floodplain. The City's approach has resulted in an educated and well-informed constituency.

The June 2004 City of Roseville Emergency Operations Plan, most recently updated in 2010, directs the City of Roseville Emergency Management Organization, coordinates the actions of emergency operations center staff, establishes operational priorities, ensures development and implementation of strategies to meet the needs of the emergency, works with local elected officials on issues related to emergency response and recovery, identifies procedures for evacuation, communicates with the media, coordinates response with outside agencies, and ensures the safety of responders. The Emergency Operations Plan follows California's Standardized Emergency Management System (SEMS) format (see Section 4.9.2).

Regarding health concerns, one of Roseville's sewage treatment facilities is located on the downstream end of Dry Creek. This facility is located above the 100-year floodplain but has overflow ponds within the floodplain. When plant influent loads exceed the plant capacity, untreated sewage is discharged to the overflow ponds. If this scenario occurred simultaneously with a 100-year flood, floodwaters could be contaminated. This situation has not occurred during past flood events, and its probability of occurrence is low. Therefore, its potential impacts on health were not estimated as part of this assessment.

## 10.5.2 Property

### Flood Insurance

Flood insurance statistics help identify vulnerability by showing where there is claim activity, where there is a high rate of flood insurance in force, and where flooding may be occurring in areas not identified as flood-prone. Table 10-8 lists flood insurance statistics for the City of Roseville. The total of $9.9 million paid on 292 claims through July 31, 2010 represents an average of $33,923 per claim.

**Table 10-8.** Flood Insurance Statistics for the City of Roseville

| | |
|---|---|
| **Date of Entry Initial FIRM Effective Date** | December 15, 1983 |
| **Current FIRM Effective Date** | November 21, 2001 |
| **Number of flood insurance policies in force as of 3/31/2016** | 591 |
| **Total annual premium** | $311,643 |
| **Average policy cost** | $527 (national average = $412) |
| **Total insurance coverage** | $176,339,200 |
| **Total claims filed (1978 to 11/30/2009)** | 292 |
| **Value of claims paid** | $9,905,478 |
| **Average claim paid** | $33,923 |
| **Number of flood insurance policies in force within the SFHA** | 111 |
| **X Standard/AR/A99 policies** | 18 |
| **Preferred Risk Policies** | 462 |

Flood insurance statistics relevant to reducing flood hazard are as follows:

- Approximately 76 percent of the insurable structures in the SFHA are currently covered by a flood insurance policy. This is well above the national average. According to a study conducted for the NFIP, about 49 percent of single-family homes in special flood hazard areas nationwide are covered by flood insurance.
- 81.2 percent of the current policies in force are for properties outside the SFHA.

- The high percentage of policies outside the SFHA is probably due to the impact of the Cirby-Linda-Dry Creek Flood Control Project and resulting remapping.

## Flood Loss Potential of Structures

The HAZUS-MH program calculates losses to structures from flooding by looking at depth of flooding and type of structure. Using historical flood insurance claim data, HAZUS-MH estimates the percentage of damage to structures and their contents by applying established damage functions to an inventory. This inventory comes pre-loaded within the HAZUS-MH model and is based on data from the U.S. Census, state databases, the U.S. Highway Administration, and other sources. Default values can be overridden with locally generated data if available. For this analysis, local data on facilities was used to assess flood risk in the City of Roseville. The City has created a flood inventory database of site-specific information for each property in the regulatory floodplain. This database includes information for the following basic categories:

- Buildings in the regulatory floodplain
- Building use
- Building area
- Building value
- Permit history
- Flood loss history
- Regulatory flood elevation
- Base flood elevation
- Pre- and post-FIRM structures
- Elevation of lowest adjacent grade
- Finished floor elevation

The HAZUS-MH analysis is summarized in Table 10-9 through Table 10-11. It is estimated that there would be up to $2.16 million of flood loss from a 10-year flood event. This represents less than 0.01 percent of the total assessed value of the City. It is estimated that there would be up to $7.04 million of flood loss from a 100-year flood event. This represents 3.6 percent of the total value exposed to the flood hazard in the regulatory floodplain and 0.02 percent of the total assessed value of the City. It is estimated that there would be $7.14 million of flood loss from a 500-year flood event, representing 3.4 percent of the total value exposed to the flood hazard in the regulatory floodplain and 0.02 percent of the total assessed value for the City.

**Table 10-9.** Estimated Flood Loss for the 10-Year Flood Event (Preliminary FIRM)

| | Estimated Flood Loss | | | % of Total Assessed Value |
|---|---|---|---|---|
| | Buildings | Contents | **Total** | |
| **Residential** | $1,275,990 | $609,637 | $1,885,627 | <0.01% |
| **Commercial** | $70,143 | $172,585 | $242,727 | <0.01% |
| **Industrial** | $16,759 | $21,065 | $37,825 | <0.01% |
| **Agricultural** | $0 | $0 | $0 | 0.00% |
| **Religion** | $0 | $0 | $0 | 0.00% |
| **Government** | $0 | $0 | $0 | 0.00% |
| **Education** | $0 | $0 | $0 | 0.00% |
| **Total** | **$1,362,892** | **$803,287** | **$2,166,179** | **<0.01%** |

**Table 10-10.** Estimated Flood Loss for the 100-Year and 500-Year Flood Events (Preliminary FIRM)

| | Estimated Flood Loss | | | | | | % of Total Assessed Value | |
|---|---|---|---|---|---|---|---|---|
| | Buildings | | Contents | | **Total** | | | |
| | 100-year | 500-year | 100-year | 500-year | **100-year** | **500-year** | 100-year | 500-year |
| **Residential** | $2,253,989 | $2,253,989 | $1,257,030 | $1,257,030 | $3,511,019 | $3,511,019 | 0.02% | 0.02% |
| **Commercial** | $686,896 | $704,051 | $2,366,376 | $2,452,152 | $3,053,271 | $3,156,203 | 0.04% | 0.04% |
| **Industrial** | $107,228 | $107,228 | $375,139 | $375,139 | $482,368 | $482,368 | 0.04% | 0.04% |
| **Agricultural** | $0 | $0 | $0 | $0 | $0 | $0 | 0.00% | 0.00% |
| **Religion** | $0 | $0 | $0 | $0 | $0 | $0 | 0.00% | 0.00% |
| **Government** | $0 | $0 | $0 | $0 | $0 | $0 | 0.00% | 0.00% |
| **Education** | $0 | $0 | $0 | $0 | $0 | $0 | 0.00% | 0.00% |
| **Total** | **$3,048,113** | **$3,065,269** | **$3,998,545** | **$4,084,321** | **$7,046,658** | **$7,149,590** | **0.02%** | **0.02%** |

**Table 10-11.** Estimated Flood Loss for the Regulatory Floodplain

| | Estimated Flood Loss | | | % of Total Assessed Value |
|---|---|---|---|---|
| | Buildings | Contents | **Total** | |
| **Residential** | $2,096,568 | $944,975 | $3,041,544 | 0.02% |
| **Commercial** | $1,322,410 | $3,044,262 | $4,366,672 | 0.05% |
| **Industrial** | $87,710 | $254,384 | $342,094 | 0.03% |
| **Agricultural** | $33,023 | $240,436 | $273,459 | 0.11% |
| **Religion** | $1,603 | $9,617 | $11,220 | 0.01% |
| **Government** | $0 | $0 | $0 | 0.00% |
| **Education** | $3,541,314 | $4,493,675 | $8,034,988 | 0.03% |
| **Total** | **$2,096,568** | **$944,975** | **$3,041,544** | **0.02%** |

## Repetitive Loss

Several federal government programs encourage communities to identify and mitigate "repetitive loss" properties. Nationwide, repetitive loss properties make up only 1 to 2 percent of the flood insurance policies currently in force, yet they account for 40 percent of the flood insurance claim payments. A report on repetitive loss structures by the National Wildlife Federation found that 20 percent of these structures are listed as outside the 100-year floodplain. In 1998, FEMA reported that the NFIP's 75,000 repetitive loss structures had already cost $2.8 billion in flood insurance payments.

FEMA identifies repetitive loss structures based on flood insurance payments. A repetitive loss area is the portion of the floodplain where numerous buildings have been subject to repetitive flooding. The purpose of identifying repetitive loss areas is to identify structures that are subject to the same risk but are not on FEMA's list because a flood insurance policy was not in force at the time of loss.

The list of repetitive loss properties maintained by FEMA identifies one commerical repetitive loss property within the City's regulatory floodplain. When Roseville first began its participation in the CRS program in 1991, the list of repetitive loss properties totaled 27 locations. Since then, flood protection and mitigation projects (including purchase and relocation of structures) have occurred at 23 repetitive loss locations and all 23 locations are no longer subject to repetitive flood losses. This represents an 85 percent reduction in exposure of insured properties to repetitive flood losses. This reduction is a prime example of how the City of Roseville's proactive flood mitigation practices have decreased the exposure of its citizens to the flood hazard, reduced the number of repetitive loss properties, and minimized reliance on post-disaster assistance provided by the federal government and the nation's taxpayers.

Figure 10-6 shows the location of Roseville's single remaining repetitive loss area. The City is required to address its repetitive loss area as a condition of its participation in the CRS program. This hazard mitigation plan meets this CRS requirement.

### 10.5.3 Critical Facilities and Infrastructure

HAZUS-MH was used to estimate the flood loss potential of critical facilities exposed to the flood risk. The model uses depth/damage function curves to estimate the percent of damage to a building and its contents and correlates that with an estimate of functional downtime (the time it will take to restore a facility to 100 percent of its functionality). The findings were as follows:

- On average, critical facilities would receive 5 percent damage to the structure and 19 percent damage to the contents during a 100-year flood event, and the estimated time to restore these facilities to full functionality would be 90 days.
- On average, critical facilities would receive 8 percent damage to the structure and 31 percent damage to the contents during a 500-year flood event, and the estimated time to restore these facilities to full functionality would be 160 days.

Six critical facilities are exposed and vulnerable to flooding in Roseville. A detailed vulnerability analysis of all critical facilities is on file with appropriate City staff and will not be published for public review. Of these six critical facilities, two have sufficient vulnerability to flooding to warrant mitigation strategies. Flood protection has been provided to the two churches identified, although it is not 100-year flood protection. The estimated depth of flooding for these two facilities is minimal and there have been no reports of flood damage. The County courthouse has been elevated to above the 100-year flood level. Mitigation strategies outlined in this Plan will mitigate the impact of flooding on the remaining facilities, including retrofitting the floodwall that protects the library and public safety building.

Of Roseville's two wastewater treatment plants, only the Dry Creek Plant is partially located in the floodplain. The storm sewer system is separate from the sanitary sewer system, so the sanitary sewers are not significantly affected by storm events.

### 10.5.4 Environment

The environment vulnerable to the flood hazard is the same as the environment exposed to the hazard. While flood events have historically caused significant damage to the environment, estimating damage can be difficult. Loss estimation platforms such as HAZUS-MH are not currently equipped to measure environmental impacts of flood hazards. The best gauge of vulnerability of the environment would be a review of damage from past flood events. Loss data that segregates damage to the environment were not available at the time of this Plan. Capturing this data from future events could be beneficial in measuring the vulnerability of the environment for future updates to this Plan.

## 10.6 FUTURE TRENDS IN DEVELOPMENT

Increased urbanization of western Placer County within the Pleasant Grove and Dry Creek Basins has resulted in the potential for increased flooding problems in Roseville. Land development typically results in increased hard surfaces and decreased vegetation, conditions that limit infiltration opportunities and, without adequate mitigation, can increase stormwater runoff rates and volumes and decrease the time required to reach peak discharge.

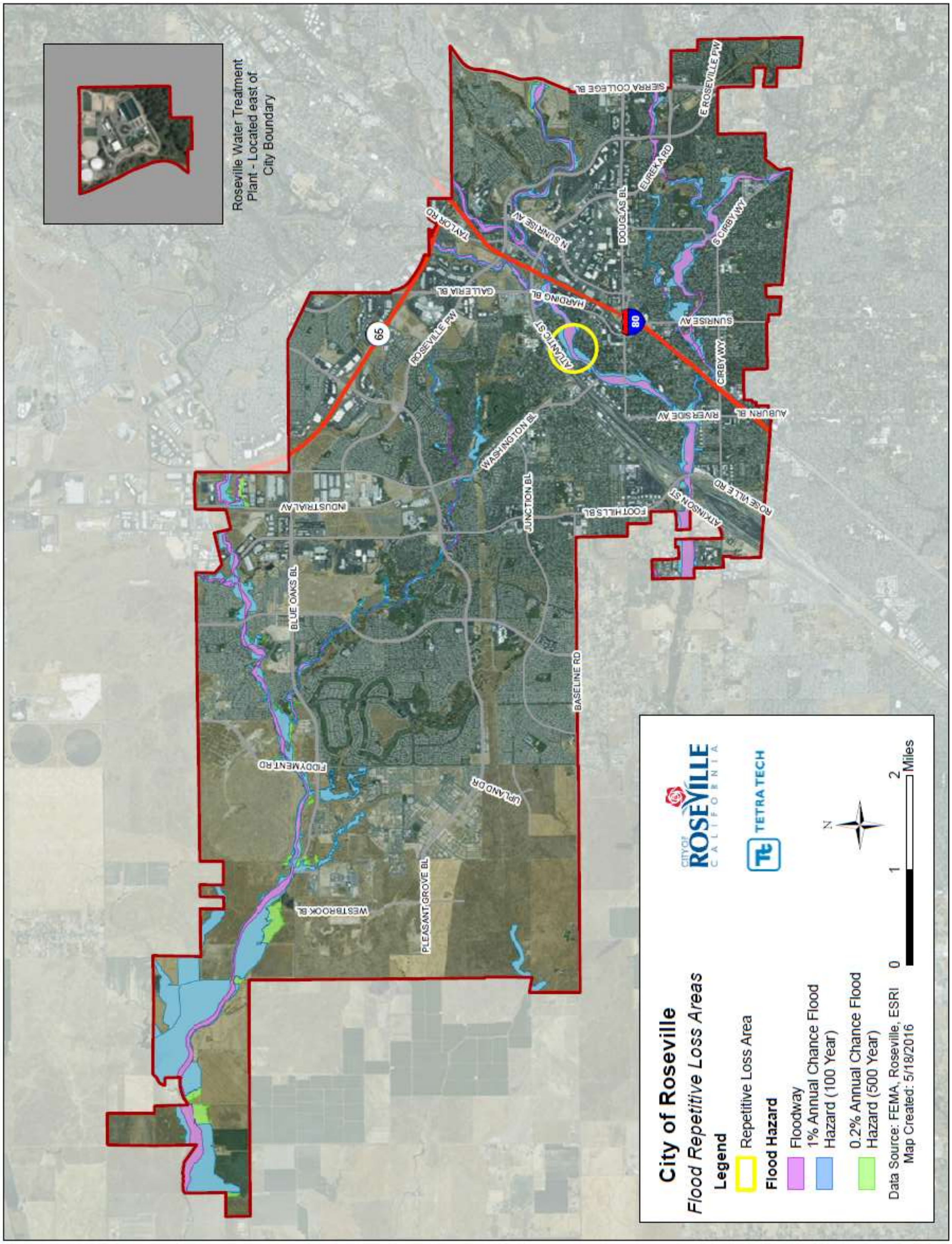



**Figure 10-6.** Repetitive Loss Area

Recognizing that typical growth patterns in California would impact and exacerbate the flood hazard problem, the City of Roseville took an aggressive, proactive approach to managing its floodplains through the development of its General Plan in 1992. Land-use categories are defined in the General Plan, with information on general uses, development, intensity, siting, and compatibility standards in relation to the flood hazard. City actions, such as land-use allocation, annexations, zoning, subdivision and design review, redevelopment and capital improvements, must be consistent with the General Plan.

Only three parcels in Roseville's regulatory floodplain are in the current buildable lands inventory. These parcels were all created before the City's flood-protection policies were enacted. Any new development on these parcels would be subject to strict regulations.

Because of policies, activities and mitigation measures in place in Roseville, it can be concluded that future land development trends will not impact or be impacted by flooding in Roseville as long as existing policies remain in force.

## 10.7 REVIEW OF EXISTING ORDINANCES, PROGRAMS, AND PLANS

The City of Roseville has a long-standing policy to proactively manage its floodplains. Under the guidance of the General Plan and its Safety Element, Roseville has been able to decrease the exposure of its citizens to flooding with a comprehensive approach that includes the following measures:

- Structural mitigation (flood control)
- Non-structural mitigation (elevation or acquisition)
- Regulations
- Stormwater management
- Flood warning
- Outreach and public education.

This section discusses each element except flood warning, which is discussed in Section 10.2.6).

### 10.7.1 Structural Mitigation

The following major flood control improvements have been accomplished by the City of Roseville since the January 1995 flood event:

- **Tina Way/Elisa Way Area—**Completed in 1996 at the cost of $3 million (100 percent City-funded), this project included channel excavation and construction of berms and floodwalls. The project removed 40 structures from the floodplain. Based on the pre-project location and construction of these structures, the entire area would have flooded during the 1997 flood if the improvements had not been implemented.
- **Riverside Avenue/Vernon Street Area—**Completed in 1996 at the cost of $2 million (90 percent funded by the Union Pacific Railroad and 10 percent funded by the City), the construction project included replacing culverts with a new bridge over Dry Creek. The net effect of this project lowered flood elevations for the reach by 5 to 7 feet and removed 150 structures from the floodplain.
- **Sunrise Avenue/Oakridge Drive and Champion Oaks Areas—**Completed in 2001 at the cost of $16.1 million ($8.7 million from FEMA and $7.4 million from the City), this project replaced culverts with a new bridge over Linda Creek at Sunrise Avenue. Twin 9-foot-diameter bypass pipes were installed in the Oakridge Drive area. The project included channel excavation and berm and floodwall construction. The project removed 233 structures from the floodplain; 44 structures remained in the floodplain, but these structures were less likely to be flooded. Features included maintaining a channel in

as natural a state as possible; planting over 500 oak trees; assigning biologists, ornithologists, and arborists to minimize environmental impacts; and monitoring fish passage and plantings for 5 years.

The City has spent more than $22 million on flood mitigation since the January 1995 flood event and has eliminated 445 flood-prone structures from the floodplain.

## 10.7.2 Non-Structural Mitigation

Structural mitigation projects reduced the flood exposure of property by 91 percent. Roseville offered mitigation through acquisition or home elevation to the remaining 9 percent of properties exposed to flooding. Completed in 2001 at the cost of $1 million (50 percent funded by FEMA, 40 percent funded by the property owners, and 10 percent funded by the City), the project included elevating 27 homes and acquiring (buying out) 4 homes. This effort resulted in 22 flood-prone homes with post-project floor levels higher than the floodplain level.

## 10.7.3 Regulations

The City of Roseville regulates its floodplain areas through land use, zoning, and other development restrictions, including a policy that prohibits most development within the 100-year floodplain area. Development in floodplain areas in Roseville is restricted by the following:

- 2035 General Plan, Safety Element, Flood Protection Component
- Improvement Standards
- Flood Damage Prevention Ordinance (Roseville Municipal Code [RMC] Chapter 9.80)
- Zoning Ordinance (RMC Chapter 19.18)
- State of California Urban Level of Flood Protection Legislation.

### 2035 General Plan, Safety Element, Flood Protection Component

The Safety Element of Roseville's General Plan sets forth goals and policies to address community safety concerns. The flood protection component identifies nine policies and 12 measures to achieve the following goals:

- Minimize the potential for loss of life and property due to flooding.
- Pursue flood control solutions that are cost-effective and minimize environmental impacts.

The policies and implementation measures are incorporated into the City's area-specific plans and are legally enforceable. Key to the City's flood-protection effort is the clear definition and application of floodplain boundaries. The flood protection component of the Safety Element establishes policies prohibiting new development in an identified floodplain or requiring an appropriate level of flood protection in design and construction for any development that does occur in the floodplain:

- **Infill Areas**—No development is permitted in the future floodway. Development may be permitted within the future floodway fringe. In accordance with the Nolte Future Floodplain definition, such development is limited to areas within the assumed cumulative 1-foot rise in water surface elevation, if it can be demonstrated that the development will not impact flood levels (see Figure 10-7).
- **Remainder of the City (specific plans and north industrial area)**—No development is permitted within the future floodplain (floodway and floodway fringe). Exceptions may be considered by the City on a case-by-case basis if encroachment is limited to only the future floodway fringe and would not result in any off-site increase in the water surface elevation (see Figure 10-8).

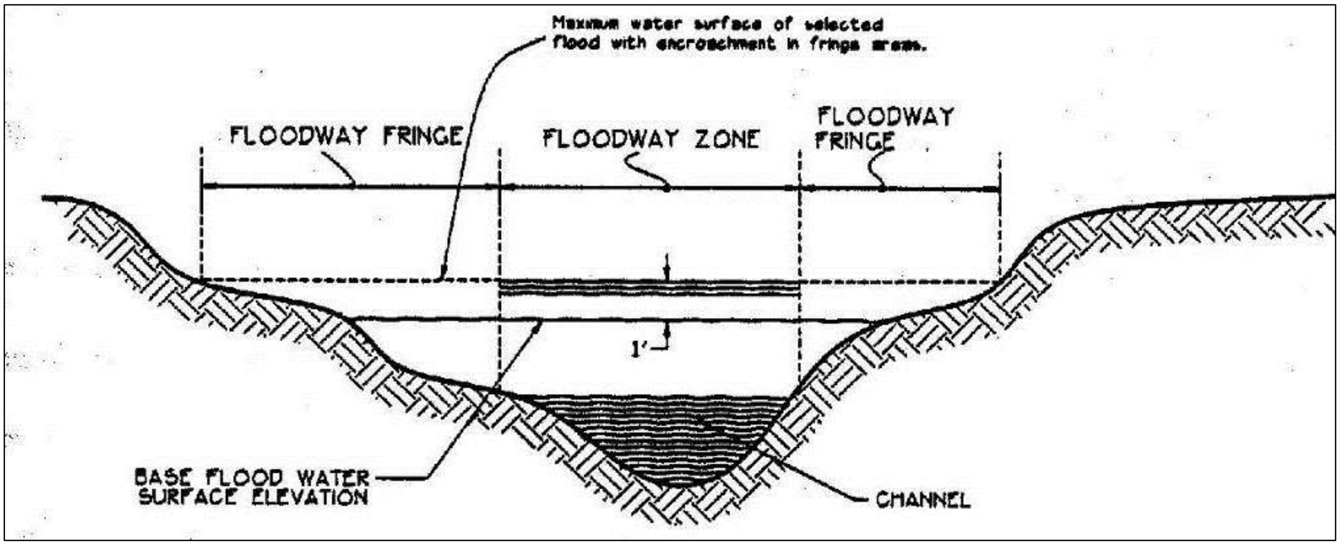



**Figure 10-7.** Floodplain Designation Cross-Sections for Infill Areas

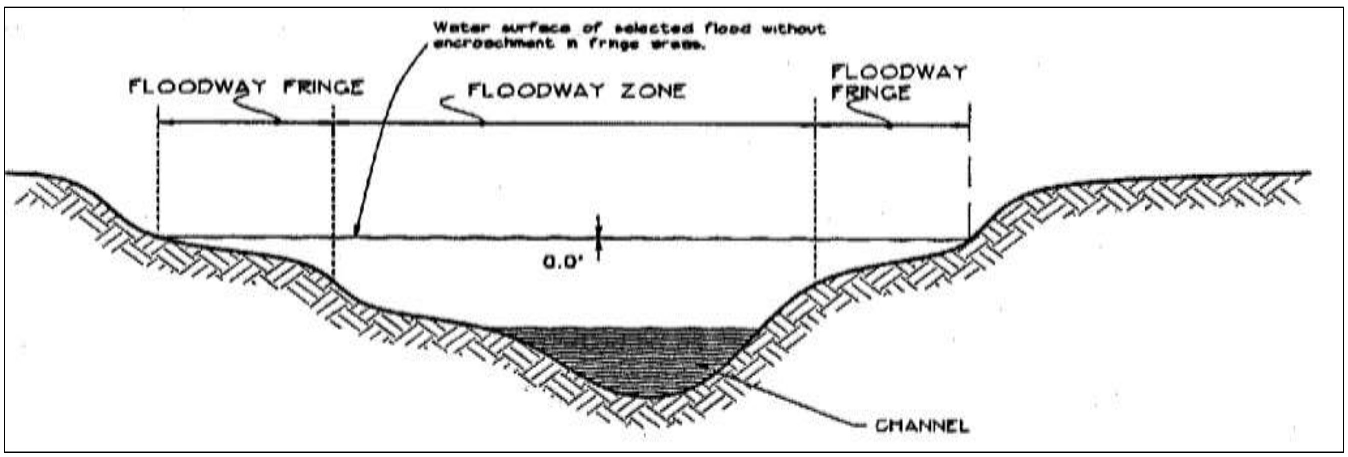



**Figure 10-8.** Floodplain Designation Cross-Sections for Areas Other Than Infill Areas

The City is committed to exploring environmentally sensitive flood control solutions, so this component is intended to be used in combination with the goals, policies, and implementation measures contained in the Open Space and Conservation Element of the General Plan. Emphasis is placed on protecting floodplain areas and on pursuing regional cooperation on flooding issues.

## Improvement Standards

Roseville's improvement standards provide minimum standards for the following:

- Improvements dedicated to the public and accepted by the City for maintenance or operation
- Certain private works
- Improvements to be installed within existing rights-of-way and easements.

Improvement standards provide coordinated development of required facilities used by and for the protection of the public. They apply to, regulate, and guide preparation of traffic impact studies and the design and preparation of plans for construction of streets, highways, alleys, drainage systems, sewage systems, traffic signals, site access structures, water supply facilities and related public improvements. The standards also set guidelines for private works that involve drainage, grading, tree removal, and related improvements. Section 10 of the improvement standards deals with drainage as follows:

- Requires residential lots developed in and adjacent to a designated floodplain to have a pad elevation a minimum of 2 feet above the regulatory flood elevation.
- Establishes stormwater management provisions that require mitigation of the increase in runoff generated by new development.
- Establishes provisions that require the building pads of structures built outside the regulatory floodplain to be a minimum of 1 foot above the 100-year water surface elevation for the site, assuming total blockage of drainage facilities.

### Flood Damage Prevention Ordinance (RMC Chapter 9.80)

The flood damage prevention ordinance provides regulatory provisions for the floodplains of Roseville and is a requirement for participation in the NFIP. Chapter 9.80 of the RMC meets the NFIP requirements (44 CFR, Section 60.3) and includes the following standards that exceed those requirements:

- Adoption of a regulatory floodplain that includes areas not mapped by FEMA for application
- Requirement for elevation to 2 feet above the regulatory flood elevation for all structures within the flood hazard area
- Provisions to track substantial improvements to structures over a period of 10 years.

### Zoning Ordinance (RMC Chapter 19.18)

Updated in September 2010, the zoning ordinance implements the City's general and specific plans and establishes regulations governing the use, placement, spacing and size of land and buildings. The zoning ordinance describes permits available through the Planning Division, when permits are needed, and the process for obtaining permits. This ordinance includes policy that prohibits most development within the 100-year floodplain. Exceptions to this policy exist primarily within the infill area and for the maintenance of essential services. Where encroachments may be permitted, improvements are required to minimize cumulative upstream and downstream effects.

The zoning ordinance identifies floodway and floodway fringe zoning districts. The floodway zoning district is not synonymous with FEMA's defined floodway. Development is generally prohibited in the floodway zone, with some level of development allowed in the floodway fringe zones with restrictions. The floodway fringe and floodway zone boundaries are based on previous hydraulic modeling conducted by the U.S. Army Corps of Engineers. The floodplain boundaries have changed over time since this modeling, but the zone district boundaries have not changed. The zone boundaries are updated on a parcel-by-parcel basis at a landowner's request using best available data.

### State of California Urban Level of Flood Protection Legislation

The Central Valley Flood Protection Act of 2008 (SB 5) and its subsequent amendments (SB 1278, AB 1965 and AB 1259) include requirements and standards for flood protection that relate to land use planning. The legislation defines the Urban Level of Flood Protection (ULOP) as the level of protection necessary to withstand flooding that has a 1-in-200 (0.5-percent) chance of occurring in any given year (also referred to as the 200-year flood). This legislation directed local agencies to revise their general plans no later than July 2, 2015 to address flood risk for affected land use decisions based on an ULOP. It also required local agencies to revise their zoning codes to reflect the new standard within one year after the adoption of their revised general plans. In areas not subject to the ULOP standards, the 100-year floodplain standards will continue to apply.

The legislation defines five locational criteria that determine whether the ULOP applies. All areas of the City of Roseville meet two of the criteria (the City is an urban area of more than 10,000 people and the City is within the Sacramento-San Joaquin Valley), but only certain areas of the City meet the remaining three criteria:

- Areas mapped as either a special hazard area or an area of moderate hazard on FEMA's official (i.e., effective) Flood Insurance Rate Map
- Areas with a potential flood depth above 3 feet from sources other than localized conditions
- Areas within a watershed with a contributing area of more than 10 square miles.

As required by SB 5 as amended, the City of Roseville will implement the following:

- Updating the General Plan to define the City's regulatory floodplain as the combination of the City's mapped 100-year floodplain, the ULOP floodplain, and the FEMA floodplain.
- Amendment of the Land Use Element to include a reference to the Safety Element map identifying existing and planned development areas within the regulated floodplain as defined above.
- Amendment of the Open Space and Conservation Element setting and background to reflect the current regulatory environment.
- Amendment of the Safety Element to identify and revise flood hazard information and policies which protect communities from flooding risks as follows:
    - Revise the setting, outlook, and floodplain designations portions of the flood protection section to reflect the updated regulatory environment and to identify sources of floodplain mapping and hazard data.
    - Revise the floodplain designation policy and the implementation measures sections to include definitions and floodplain development regulations and implementation for the ULOP floodplain.
    - Provide new floodplain maps showing the extent of the FEMA 100-year, City's regulatory 100-year, and ULOP floodplains.

As required by adopted State law, the various City regulations requiring preservation of the floodplain and elevation of structures above the floodplain will include the ULOP floodplain, which is shown on Figure 10-9. After the modeling analysis was completed by the City, staff examined the data to determine the effect on land uses. Both the ULOP and the 100-year floodplains along Pleasant Grove Creek are almost entirely contained within existing or planned open space and recreation areas. This is generally because these areas of Roseville were planned or developed relatively recently in the City's history, and in compliance with the City's current General Plan goals and objectives restricting development in the floodplain.

The areas where the ULOP floodplain extends into residential or commercial areas are older areas of the City along Dry Creek, where development was planned and implemented prior to Roseville's initial participation in the NFIP in 1983 and prior to adoption of the City's current General Plan. These infill areas are already affected by the FEMA 100-year floodplain, and a few areas will now also be affected by the ULOP.

According to the City's GIS database, 4 of 11 vacant parcels affected by the ULOP are privately owned. The remaining 7 parcels are City-owned. In the future, any new habitable structure along streams affected by the ULOP floodplain will need to be elevated slightly higher (less than 1 foot) than would have been required prior to the legislation. For existing structures, additional elevation would only be required if the owner undertook a "substantial improvement" to the structure (defined within the City's Flood Damage Prevention Ordinance as any work in a 10-year period that is worth 50 percent or more of the value of the structure).

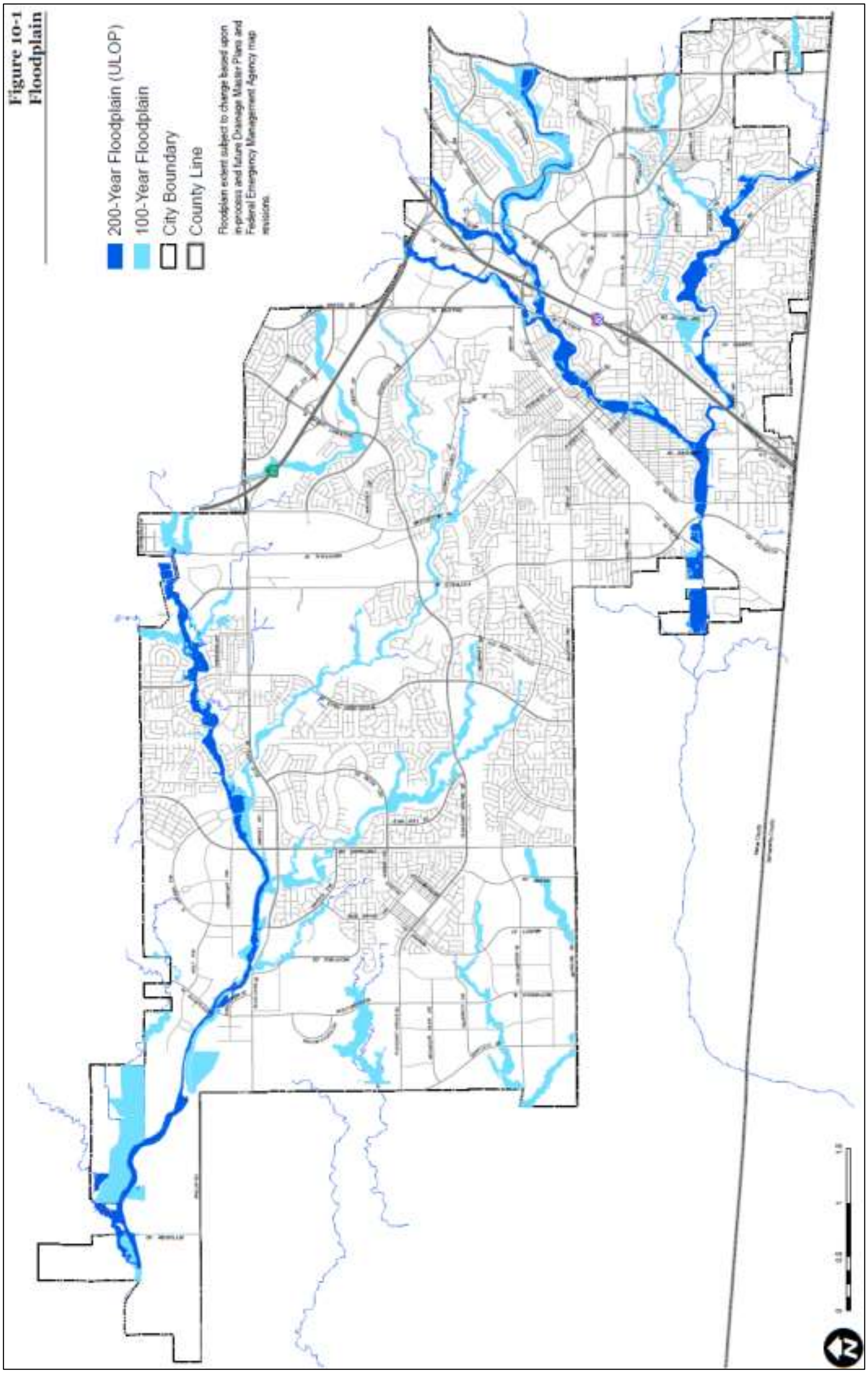



**Figure 10-9.** Updated Floodplain Mapping

## 10.7.4 Stormwater Management

Stormwater management in the City of Roseville is accomplished through a multi-tiered approach. The City uses a combination of regional development impact studies, sub-regional impact studies, the City of Roseville improvement standards, the City of Roseville grading ordinance, and the Placer County stormwater management manual. All of these tools manage the City's stormwater system at different levels. The Roseville General Plan is the principal planning document that lays out goals for managing the flooding hazard. Each update to the General Plan reviews these goals to determine their effectiveness in managing watershed characteristics. Regional master planning, sub-regional master planning, and project drainage design are discussed below.

### Regional Master Planning

City ordinances establish developer fees to pay for mitigation projects that will reduce development impacts on flooding on major streams in the Dry Creek and Pleasant Grove Creek basins. Regional master planning for each basin has been conducted through the Placer County Flood Control District (PCFCD). Seven communities, including the City of Roseville, are members of this district.

The Dry Creek and Pleasant Grove Creek basins each have a detailed hydrology report that calculates the 5-, 10-, 50-, and 100-year storm frequencies based on total buildout of the basin:

- **Dry Creek Basin Report—**The *Final Report for the Dry Creek Flood Control Plan*, adopted by the Roseville City Council in April 1992, was co-sponsored, supported, and approved by the PCFCD and the Sacramento County flood control agency that oversees floodplains downstream of Placer County.
- **Pleasant Grove Creek Basin Report—**Pleasant Grove Creek Basin hydrology is included in the *Cross Canal Study*. Pleasant Grove Creek is one of several major streams that flow to a reclamation district canal; overflow is stored behind levees during Sacramento River flooding. Except for the PCFCD, this report was supported, sponsored, and approved by all agencies within the basin, in particular Sutter County and State Reclamation Board Districts 1001 and 1000.

Each report defines development impacts on the basin and specifies mitigation procedures and improvements to developers' mitigation. Both reports indicate a strategy for mitigation of floods resulting from new development on a regional scale. The reports indicate that most of Roseville is in the part of the watershed where detention is not recommended. These studies have been submitted to FEMA for approval, and FEMA is currently using the hydrology and hydraulics information provided in the reports to update FIRMs for the region.

### Sub-Regional Master Planning

The City requires each sub-region to develop a master plan and mitigation strategy in a specific plan. Specific plans currently exist for Amoruso Ranch, Creekview, Del Webb, Downtown, Highland Reserve North, North Central Roseville, Northeast Roseville, North Industrial, North Roseville, Northwest Roseville, Riverside Gateway, Sierra Vista, Southeast Roseville, Stoneridge, West Roseville, and the Infill Area. Before zoning and development rights are issued for these newly developing areas, a detailed hydrology and hydraulic study dealing with that sub-region's concerns is required, in order to examine local drainage problems, define flood levels based on total buildout of the watershed, and set aside floodplain areas as open space. Floodplains are defined on swales with drainage areas greater than 300 acres. The City of Roseville and PCFCD review and approve each specific plan.

Major drainage infrastructure in the specific plans is designed as part of the infrastructure of the sub-regions and is constructed prior to development in the area; this eliminates the need for on-site detention requirements because regional detention, if required, is built into the infrastructure for the entire specific plan and not on a project-by-project basis. This approach allows for more control of the design and easier maintenance of the facility. In addition, in newly developing areas, hydraulic requirements used to define floodplains assume well-vegetated swales and creeks, which reduces the need to provide constant cleaning of these streams by maintenance crews.

**Project Drainage Design**

As each project in the specific plan is developed, the City requires the project to meet drainage improvement standards. The standards require storm drain systems that support more than one parcel to be dedicated to the City for maintenance or that project owners maintain the system. In both cases, the storm drain system is reviewed by the City's Public Works Department to meet the same hydraulic standards. Project owners must demonstrate that in the case of total system failure, surface water would be able to exit the project area without causing damage. For example, if drain inlets are not maintained on a commercial site and water ponds, surface water should be able to discharge into the public drainage system without entering any on- or off-site buildings. This requirement eliminates the need for the City to monitor private storm drain systems to verify that they are adequately maintained.

### 10.7.5 Outreach and Public Education

The City of Roseville makes a concerted effort to educate and inform its citizens on the impacts of flooding and how to prepare for flooding impacts. The ongoing outreach and public education program uses multiple media:

- Floodplain information is published in "Roseville Reflections," a City-sponsored newsletter sent to all citizens.
- Flood information is published on the City's website and includes real-time flood warning and flood threat recognition information. The website is www.roseville.ca.us/flood/alert/floodalert.html.
- On-line surveying is used to identify public perception of flood risk and support of mitigation.
- An informational brochure, "Weathering the Storm," is available to the public.
- Literature on flood warning, property protection, and flood safety is mailed annually to Roseville residents.

## 10.8 SCENARIO

The City of Roseville has made great strides to reduce the risk from flooding. Events like those that caused past flooding will continue to occur, but impacts will be significantly less than in the past. Intense isolated rainstorms over the region will cause creeks and streams to overflow their banks, causing road closures and power outages. However, structure damage to personal property will be limited to the few properties that have exposure to significant depths of flooding. Flash flooding caused by rainfall runoff exceeding the capacity of stormwater systems will also continue to occur. However, potential personal property damage will be limited to structures constructed prior to building and stormwater standards adopted by the City to remediate these impacts.

## 10.9 ISSUES

Important issues associated with flood hazard in Roseville include but are not limited to the following:

- The boundaries of the 100-year floodplain could be as specified in the floodplain designations section of the flood-protection component of the City's General Plan. Floodplain areas shall be preserved as specified in the Open Space and Conservation Element. Preservation may include required dedication to the City. If needed, the City's ordinances can be modified to include floodplain use regulations consistent with the goals, policies, and implementation measures of the Safety Element, Land Use Element, Open Space and Conservation Element, and Parks and Recreation Element of the City's General Plan. This effort would be overseen by the Planning Division and would require no special funding.

- The development, implementation, and expansion of the Flood Alert and Early Warning Program systems should be continued, and the systems should be integrated with other local jurisdictions to form a regional warning program. This effort is overseen by the Public Works Department. Annual funding is provided through the City's general fund and is about $100,000 per year.
- By remaining actively involved in the PCFCD, the City of Roseville should continue to pursue a regional approach to flood issues. Involvement includes cooperation in the development of a comprehensive regional database. Regional drainage planning and design for all individual developments in the Placer County Flood Control District should be encouraged to address cumulative flooding impacts. The City should also continue to participate in regional flooding studies, including the Auburn Creek/Coon Creek/Pleasant Grove Creek flood mitigation plan and the Dry Creek Basin flood control plan. Efforts would be overseen by the Public Works Department. Annual funding for membership to the PCFCD is currently provided by the City's General Fund and is about $90,000 per year.
- The City should continue coordination with other agencies on issues of flood control. Coordination between the City and adjacent jurisdictions occurs through several mechanisms, including the distribution of development proposals for review and comment. The City should also continue its cooperation with federal, state, and local agencies, including the U.S. Army Corps of Engineers, California Reclamation Board, FEMA, California Department of Fish and Wildlife, Placer County Resource Conservation District, and PCFCD. This effort would be overseen by the Community Development Department, Planning Division, and Public Works Department as appropriate and should not require special funding.
- The final two phases of the Cirby-Linda-Dry Creek Flood Control Project should be completed. Five of the seven phases of this project have been completed at a cost of about $18,000,000. This project is overseen by the Public Works Department. The cost for the last two phases would be about $3,000,000. Funding could be from City, state, federal, or private developer sources.
- Alternative improvements to the Cirby-Linda-Dry Creek Flood Control Project could be analyzed. These improvements may be cost-effective in the following flood-prone areas of Roseville:

  - Dry Creek from Darling Way to Riverside Avenue
  - The area on Dry Creek upstream of Folsom Road in the Columbia Avenue, Marilyn Avenue, Bonita Street area
  - The Linda Creek area near Champion Oaks Drive, Samoa Way, and Hurst Way
  - Cirby Creek in the Trimble Way and Zien Court area.

- The existing wood flood wall along Dry Creek that is protecting the City's Main Library and Public Safety Building could be replaced. The wood wall allows floodwater to leak through, and constant pumping is required. This effort would be overseen by the Public Works Department and cost about $300,000. Funding could be from City, state, federal, private developer, property owner sources.
- How will the potential impacts of climate change impact flood conditions in the City of Roseville?

# 11. LANDSLIDE

## 11.1 GENERAL BACKGROUND

According to the U.S. Geological Survey (USGS), the term landslide includes a wide range of ground movement, such as rock falls, deep failure of slopes, and shallow debris flows. Although gravity acting on an over-steepened slope is the primary reason for a landslide, there are other contributing factors (USGS, n.d.).

Landslides and mudslides can be initiated by storms, earthquakes, fires, volcanic eruptions or human modification of the land. They can move rapidly down slopes or through channels, and can strike with little or no warning at avalanche speeds.

Landslides can pose a serious hazard to properties on or below hillsides. When landslides occur—in response to such changes as increased water content, earthquake shaking, addition of load, or removal of downslope support—they deform and tilt the ground surface. The result can be destruction of foundations, offset of roads, breaking of underground pipes, or overriding of downslope property and structures.

**DEFINITIONS**

**Landslide**—The movement of masses of loosened rock and soil down a hillside or slope. Slope failures occur when the strength of the soils forming the slope is exceeded by the pressure, such as weight or saturation, acting upon them.

**Mass Movement—**A collective term for landslides and mudslides.

**Mudslide (or Debris Flow)**—A river of rock, earth, organic matter and other materials saturated with water. Mudslides develop in the soil overlying bedrock on sloping surfaces when water rapidly accumulates in the ground, such as during heavy rainfall or rapid snowmelt. Water pressure in the pore spaces of the material increases to the point that the internal strength of the soil is drastically weakened. The soil's reduced resistance can then easily be overcome by gravity, changing the earth into a flowing river of mud or "slurry."

### 11.1.1 Landslide Types

Landslides are commonly categorized by the type of initial ground failure. Common types of slides are shown on Figure 11-1 through Figure 11-4 (Ecology 2014). The most common is the shallow colluvial slide, occurring particularly in response to intense, short-duration storms. The largest and most destructive are deep-seated slides, although they are less common than other types.

Mudslides (or debris flows) are rivers of rock, earth, organic matter and other soil materials saturated with water. They develop in the soil overlying bedrock on sloping surfaces when water rapidly accumulates in the ground, such as during heavy rainfall or rapid snowmelt. Water pressure in the pore spaces of the material increases to the point that the internal strength of the soil is drastically weakened. The soil's reduced resistance can then easily be overcome by gravity, changing the earth into a flowing river of mud.

A debris avalanche (Figure 11-5) is a fast-moving debris flow that travels faster than about 10 miles per hour (mph). Speeds in excess of 20 mph are not uncommon, and speeds in excess of 100 mph, although rare, can occur. The slurry can travel miles from its source, growing as it descends, picking up trees, boulders, cars, and anything else in its path. Although these slides behave as fluids, they pack many times the hydraulic force of water due to the mass of material included in them. They can be among the most destructive events in nature.

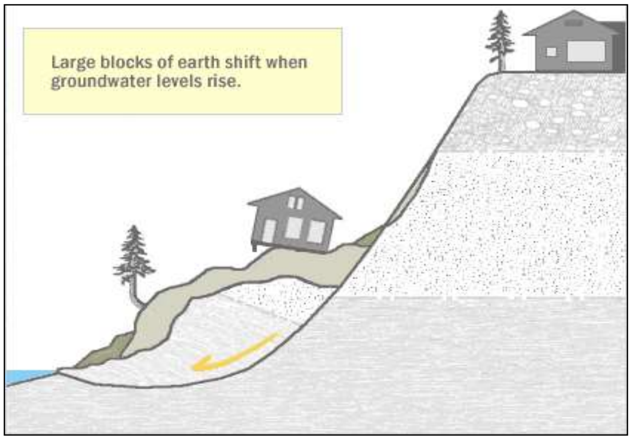



**Figure 11-1.** Deep Seated Slide

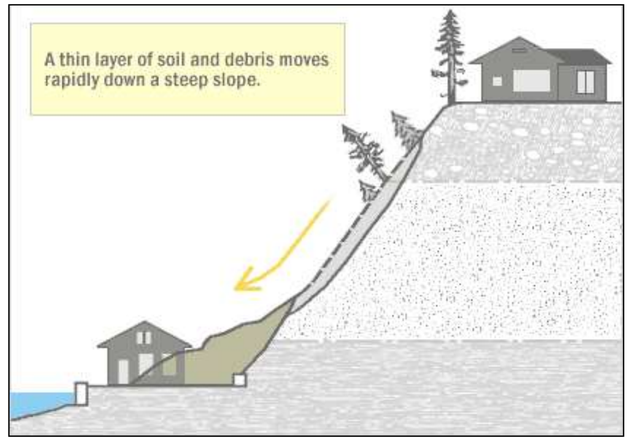



**Figure 11-2.** Shallow Colluvial Slide

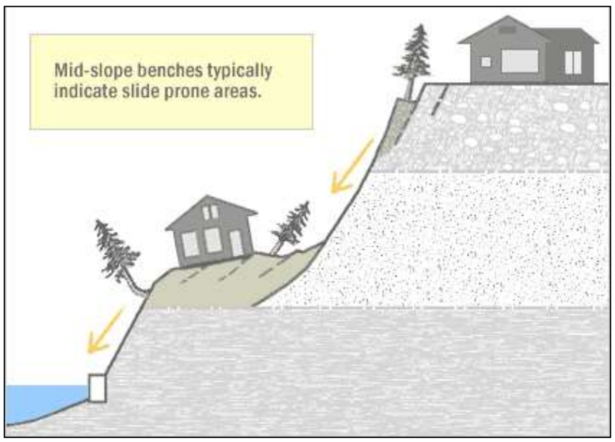



**Figure 11-3.** Bench Slide

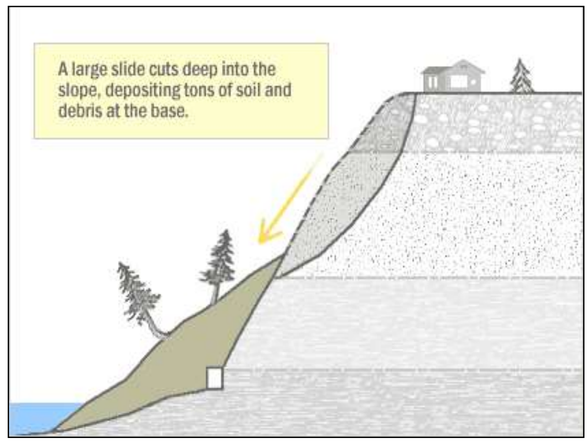



**Figure 11-4.** Large Slide

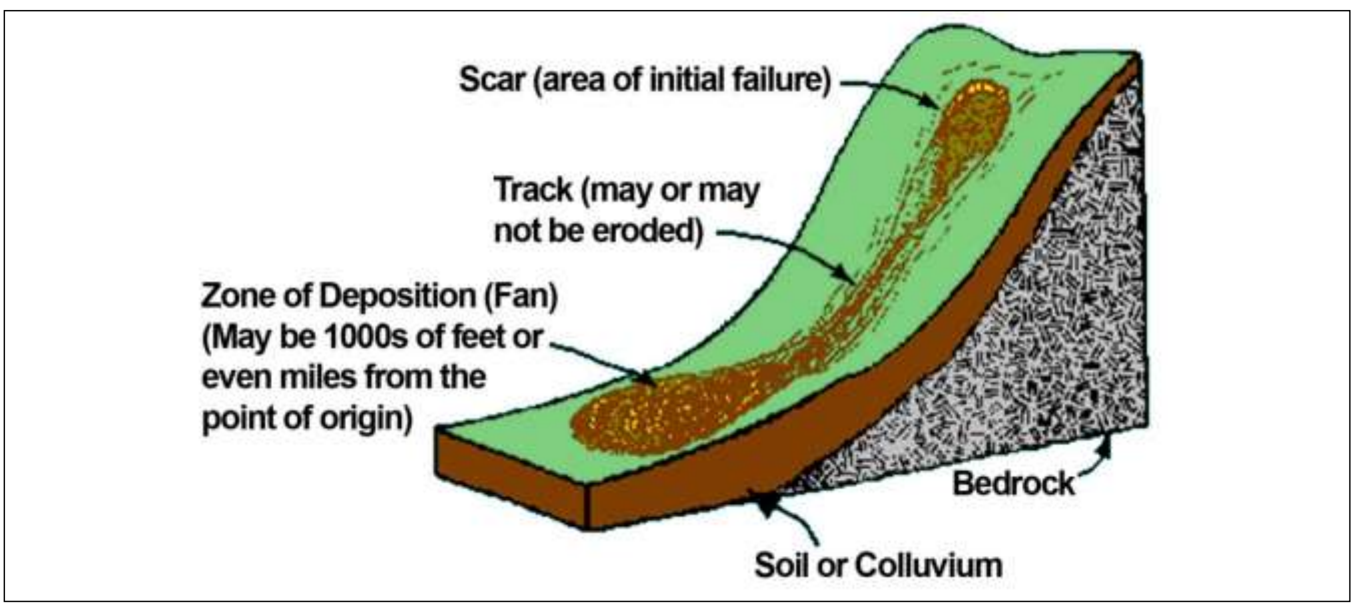



**Figure 11-5.** Typical Debris Avalanche Scar and Track

Landslides also include the following:

- Rock Falls—blocks of rock that fall away from a bedrock unit without a rotational component
- Rock Topples—blocks of rock that fall away from a bedrock unit with a rotational component
- Rotational Slumps—blocks of fine-grained sediment that rotate and move down slope
- Transitional Slides—sediments that move along a flat surface without a rotational component
- Earth Flows—fine-grained sediments that flow downhill and typically form a fan structure
- Creep—a slow-moving landslide often only noticed through crooked trees and disturbed structures
- Block Slides—blocks of rock that slide along a slip plane as a unit down a slope

### 11.1.2 Landslide Modeling

Two characteristics are essential to conducting an accurate risk assessment of the landslide hazard:

- The type of initial ground failure that occurs, as described above
- The post-failure movement of the loosened material (“run-out”), including travel distance and velocity.

All current landslide models—those in practical applications and those more recently developed—use simplified hypothetical descriptions of mass movement to simulate the complex behavior of actual flow. The models attempt to reproduce the general features of the moving mass of material through measurable factors, such as base shear, that define a system and determine its behavior. Due to the lack of experimental data and the limited current knowledge about the behavior of the moving flows, landslide models use simplified parameters to account for complex aspects that may not be defined. These simplified parameters are not related to specific physical processes that can be directly measured, and there is a great deal of uncertainty in their definition. Some, but not all, models provide estimates of the level of uncertainty associated with the modeling approach.

Run-out modeling is complicated because the movement of materials may change over the course of a landslide event, depending on the initial composition, the extent of saturation by water, the ground shape of the path traveled and whether there is additional material incorporated during the event (Savage and Hutter 1991; Rickenmann & Weber 2000; Iverson 2004).

## 11.2 HAZARD PROFILE

### 11.2.1 Past Events

There is little or no record of landslides occurring in Roseville that caused damage to property. Three notable landslide events have been recorded in Placer County, according to the Placer County Hazard Mitigation Plan. These events occurred in the eastern portion of the county, which is significantly different from Roseville in geologic terms. Therefore, no parallel can be drawn from these events for Roseville.

### 11.2.2 Location

Landslide hazard areas are areas where characteristics such as the following indicate a landslide risk:

- A slope greater than 15 percent
- A history of landslide activity during the last 10,000 years
- Stream or wave activity that has caused erosion or cut into a bank to cause the surrounding land to be unstable
- The presence of an alluvial fan, which indicates vulnerability to the flow of debris or sediments
- The presence of impermeable soils, such as silt or clay, mixed with granular soils such as sand and gravel.

The California Landslide Hazard Identification Act directs the State Geologist to identify and map hazardous landslide areas for use by municipalities in planning and decision-making on grading and building permits. Three factors that characterize landslide hazard areas include significant slope, weak rocks, and heavy rains. This program focuses on urban areas and growth areas that exhibit these characteristics.

Roseville and the surrounding Sacramento region are not identified as areas prone to landslide hazards. The City’s geographic location, soil conditions, and surface terrain combine to minimize risk of major damage from landslides, subsidence (gradual shrinking of the earth’s surface due to underground resource extraction), or other geologic hazards resulting from seismic activity and related natural forces. Therefore, the region has not been included as a part of the state’s study program. The USGS, in its identification of geologic hazard areas and their susceptibility and rate of incidence, has classified Placer County and the Roseville vicinity as a low rate of incidence, with less than 1.5 percent of the area susceptible to landslides.

Little scientific analysis is available about landslide hazards in Roseville. Assessment of the risk from this hazard is based on past occurrences, observed conditions, and guidance from state and federal agencies. However, with slopes steeper than 15 percent and the frequent occurrence of multiple intense storms that can saturate the soil, there is an exposure to landslides. Future risk assessment of landslides could be enhanced with better data specific to the hazard.

While Roseville is located on relatively level terrain, the slope gradually increases to the east and north. The most significant slopes are along creeks and ravines. The soil in ravine areas is a Mehrten soil typically associated with post-volcanic activity. It is very dense and not considered to be erosion prone.

Areas with slopes greater than 15 percent in the Stoneridge Specific Plan Area exhibit characteristics of potential landslide hazard areas. Landsliding in these areas has likely occurred numerous times in the past, as evidenced by past deposits exposed in erosion gullies. The timeframe for these past occurrences is probably over the last several hundred years, if not thousands.

Due to the lack of available data on this hazard, the extent and location of the hazard has been estimated with an emphasis on steepness of slopes. Figure 11-6 shows the estimated landslide hazard areas in Roseville, based on slopes of 15 to 30 percent (moderate risk) and 30 percent and higher (high risk). The map represents a general assessment of citywide exposure; it does not apply on a site-specific basis and should be used with caution.

## 11.2.3 Frequency

Landslides are often triggered by other natural hazards such as earthquakes, heavy rain, floods or wildfires, so the frequency of landslides is related to the frequency of these other hazards. In the Roseville vicinity, landslides are most likely to occur during and after major storms. Due to the soil types in the steep slope areas of Roseville and the lack of historical occurrence of significant landslide events, the frequency of occurrence of landslide events in Roseville is considered to be low.

## 11.2.4 Severity

Landslides destroy property and infrastructure and can take the lives of people. Slope failures in the United States result in an average of 25 lives lost per year and an annual cost of about $1.5 billion. Due to the lack of exposure to this hazard in Roseville, the severity of the impacts of landslides on the people, property and economy of Roseville is considered to be low.

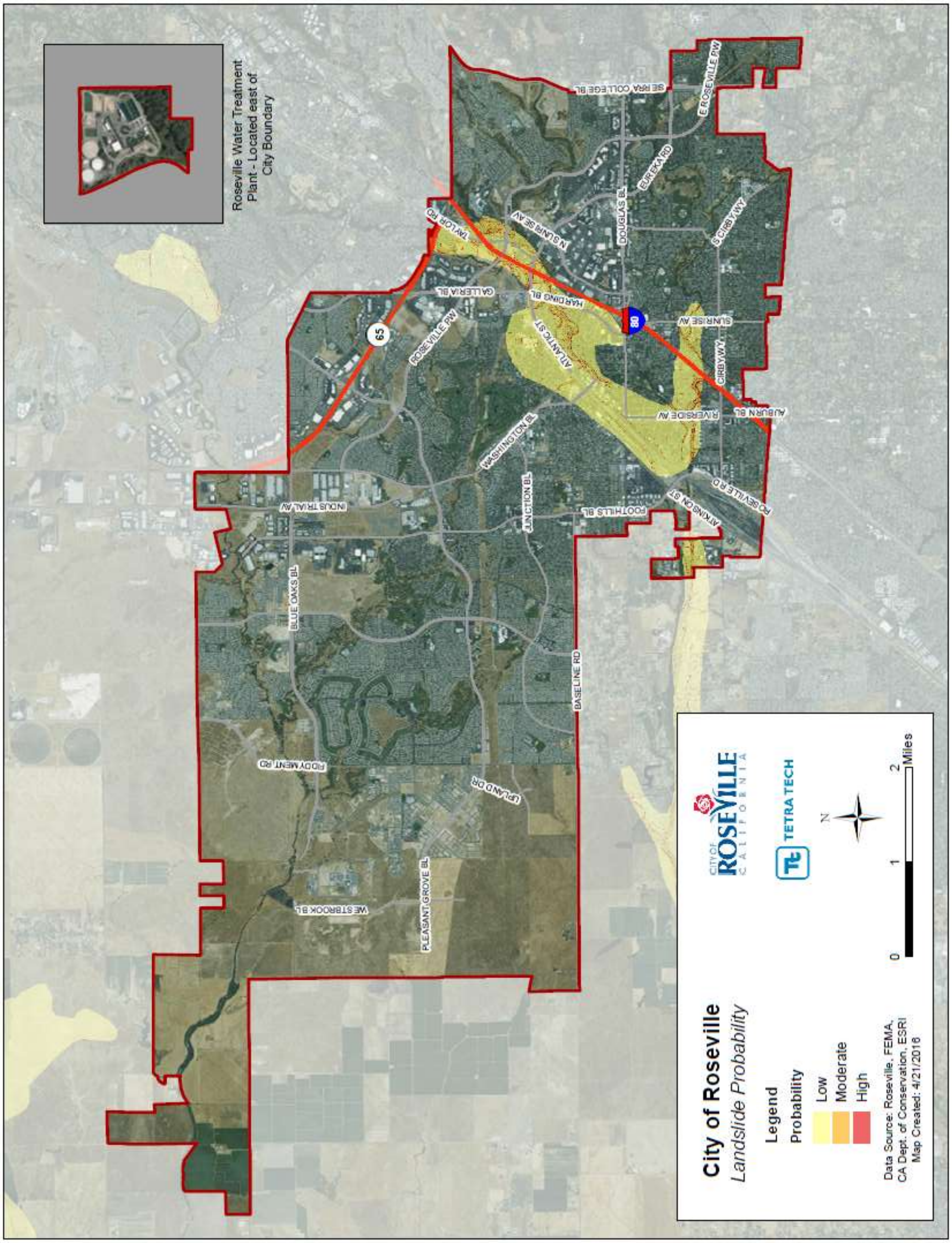



**Figure 11-6.** Roseville Area Landslide Hazard Map

### 11.2.5 Warning Time

Mass movements can occur suddenly or slowly. Some methods used to monitor mass movements can provide an idea of the type of movement and the amount of time prior to failure. It is also possible to determine what areas are at risk during general time periods. Assessing the geology, vegetation, and amount of predicted precipitation for an area can help in these predictions. However, there is no practical warning system for individual landslides. Correlations can be made based on soil type, slope and rainfall amount. No known correlations have been made for the Roseville planning area. The current procedure is to monitor situations on a case-by-case basis, and respond after an event has occurred. Generally accepted warning signs for landslide activity include the following:

- Springs, seeps, or saturated ground in areas that have not typically been wet before
- New cracks or unusual bulges in the ground, street pavements or sidewalks
- Soil moving away from foundations
- Ancillary structures such as decks and patios tilting and/or moving relative to the main house
- Tilting or cracking of concrete floors and foundations
- Broken water lines and other underground utilities
- Leaning telephone poles, trees, retaining walls or fences
- Offset fence lines
- Sunken or down-dropped road beds
- Rapid increase in creek water levels, possibly accompanied by increased turbidity (soil content)
- Sudden decrease in creek water levels though rain is still falling or just recently stopped
- Sticking doors and windows, and visible open spaces indicating jambs and frames out of plumb
- Unusual sounds, such as trees cracking or boulders knocking together
- A faint rumbling sound that increases in volume as a landslide nears.

## 11.3 SECONDARY HAZARDS

Landslides can cause several types of secondary effects, such as blocking access to roads, which can isolate residents and businesses and delay emergency response or commercial, public and private transportation. This could result in economic losses for businesses. Other potential problems resulting from landslides are power and communication failures. Utility poles on slopes can be knocked over, resulting in losses to power and communication lines. Landslides also have the potential of destabilizing the foundation of structures, which may result in monetary loss for residents. They also can damage rivers or streams, potentially harming water quality, fisheries and spawning habitat.

## 11.4 EXPOSURE

Figure 11-6 was used to estimate the exposure of population and structures to the landslide hazard.

### 11.4.1 Population

Using the percent of residential buildings exposed, multiplied by the estimated per-household population in 2014, it is estimated that there are 36 persons living in households exposed to the high landslide risk hazard and 140 persons exposed to the moderate landslide risk hazard. This represents 0.03 percent and 0.11 percent of the total population of the City, respectively.

### 11.4.2 Property

An estimated 12 structures are exposed to high landslide risk and 57 structures to moderate landslide risk. These high landslide risk structures have a total replacement cost value of $3,691,741, or 0.01 percent of the total replacement cost value of the City. The moderate landslide risk structures have a total value of $49,714,043, or 0.17 percent of the total value of the City. These are residential, commercial and educational structures. These results are based on a spatial GIS exercise identifying all structure locations that intersect the high and moderate risk hazard zones.

### 11.4.3 Critical Facilities and Infrastructure

#### Facilities

An analysis of critical facilities inventory to determine exposure to the landslide hazard determined that two of the City's critical facilities are exposed to the landslide hazard.

#### Infrastructure

##### *Roads and Bridges*

A significant amount of infrastructure (roads, bridges and utilities) can be exposed to mass movements. Access to major roads is crucial to life-safety after a disaster event and can help to provide resilience during response and recovery operations. Landslides have the potential to block roads, causing isolation of all or part of the City. Roadway blockages caused by landslides can create traffic problems resulting in delays for emergency vehicles and public and private transportation. This could result in economic losses for businesses.

Landslide events can significantly impact bridges. They can knock out bridge abutments or significantly weaken the soil supporting a bridge, obstructing the bridge or making it hazardous for use. Bridges in areas of high landslide risk often provide the only ingress and egress to large areas and in some cases to isolated areas. None of the City bridges are considered to have exposure to the landslide hazard. However, bridges outside the City within the County are susceptible to landslides. Damage to one of these facilities could close off an access route to the City. These facilities have not been inventoried for this assessment.

##### *Power Lines*

Other potential problems resulting from landslides are power and communication failures creating problems for vulnerable populations or businesses and potential loss of life in emergency situations. Power lines are generally elevated above steep slopes, but the towers supporting them can be subject to landslides. A landslide could cause the soil underneath a tower to fail, causing it to collapse, and ripping down the lines. An inventory of these types of facilities was not available for this assessment.

### 11.4.4 Environment

Environmental problems as a result of mass movements can be numerous. Landslides fall into streams and significantly impact fish and wildlife habitat, as well as affecting water quality.

## 11.5 VULNERABILITY

### 11.5.1 Population

Due to the nature of census block group data, it is difficult to determine demographics of populations vulnerable to mass movements. In general, all persons exposed to landslides hazards are considered to be vulnerable.

### 11.5.2 Property

Loss estimates for the landslide hazard are not based on modeling using damage functions, because no such damage functions have been generated. Instead, loss estimates were developed representing 10 percent, 30 percent and 50 percent of the assessed value of exposed structures. This allows emergency managers to evaluate a range of potential economic impacts based on an estimate of the percent of damage to the building stock. Damage in excess of 50 percent is considered to be substantial by most building codes and typically requires total reconstruction of the structure. Table 11-1 and Table 11-2 list loss estimates to the general building stock in moderate and high landslide hazard areas.

**Table 11-1.** Loss Estimates for Buildings Vulnerable to High Landslide Hazard

| Building Count | Assessed Value | 10% Damage | 30% Damage | 50% Damage |
|---|---|---|---|---|
| 12 | $3,691,741 | $369,174 | $1,107,522 | $1,845,871 |

**Table 11-2.** Loss Estimates for Buildings Vulnerable to Moderate Landslide Risk Hazard

| Building Count | Replacement Cost | 10% Damage | 30% Damage | 50% Damage |
|---|---|---|---|---|
| 57 | $49,714,043 | $4,971,404 | $14,914,212 | $24,857,022 |

### 11.5.3 Critical Facilities and Infrastructure

Two identified critical facilities are exposed to the landslide hazard, based on the best available data. Several types of infrastructure are exposed to mass movements, including transportation, water and sewer and power infrastructure. At this time, all infrastructure and transportation corridors identified as exposed to the landslide hazard are considered vulnerable until more information becomes available.

### 11.5.4 Environment

The environment vulnerable to landslide hazard is the same as the environment exposed to the hazard.

## 11.6 FUTURE TRENDS IN DEVELOPMENT

The areas that are most vulnerable to the landslide hazard make up a small portion of the City of Roseville. Because these ravine areas in the southeastern portion of the City are considered to be non-developable and the probability of occurrence of this type of hazard is low due to the soil type in this region, this hazard should have little or no impact on future development and redevelopment trends. The City’s current land use policies should also ensure that no future development or re-development would be impacted by this hazard.

The landslide risk exposure with in the planning did not increase over the performance period of the 2011 Plan. The value of the properties exposed to steep slope hazards increased by 12% which can be attributed to normal appreciation in property values observed for the Roseville planning area. Since there are currently no nationally recognized damage functions for landslide risk modeling, a comparative analysis of vulnerability was not performed. However, since there was no increase in risk exposure, the increase in vulnerability should coincide with the increase in value of the assets at risk.

## 11.7 REVIEW OF EXISTING ORDINANCES, PROGRAMS, AND PLANS

Since 1975, state law has required that a safety element be included as part of all general plans. In 1984, the state consolidated the safety and seismic elements into one element that includes seismic safety, geologic hazards, fire safety, and flooding. The seismic and geologic hazards component includes goals and policies to protect the

City's residents from danger associated with active faults, liquefaction, ground failure (landslides), and steep slopes.

The Safety Element of the Roseville General Plan includes components that address geologic hazards such as landslides. While the potential for geologic hazards such as landslides in Roseville is not high, the soil and geologic characteristics of the City continue to play an important role in determining safety procedures. Current policies and ordinances reflect the City's ongoing obligations to protect lives and property and include ongoing monitoring of seismic activity and periodic updating of plans for emergency events. Continued implementation of these polices and enforcement of City ordinances and General Plan policies will ensure that efforts are maximized for protecting the safety of Roseville's citizens from potential geologic safety hazards. The following policies identified in the Seismic and Geologic component of the Safety Element will mitigate the potential exposure to geologic hazards within Roseville:

- Continue to mitigate the potential impacts of geologic hazards through building plan review.
- Minimize soil erosion and sedimentation by maintaining compatible land uses, suitable to the existing environment.
- Develop appropriate building designs and implement appropriate construction techniques to decrease the impact of a landslide.
- Create and adopt slope development standards prior to or as part of the planning process for any area identified as having significant slope.
- Require contour grading, where feasible, and re-vegetation to mitigate the appearance of engineered slopes and to control erosion.

These policies are implemented through existing, ongoing programs that include the following:

- **California Building Code**—Through the Building Division of the Development Services Department, continue to enforce and keep abreast of the most recent updates to the CBC that include construction standards for seismic and geologic safety.
- **Development Review Process**—Refer any development proposal that may be impacted by grading, soil, or geologic issues to the Public Works Department. Consider the comments of the Public Works Department in the development review process. The environmental review for projects shall include a full inventory of potential grading impacts and any potential soil or geologic concerns, assessment of potential project impacts, and identification of mitigation and monitoring measures. Issues relating to slopes, liquefaction, ground failure and erosion shall be addressed. Project design, grading, and building construction techniques shall be used to minimize impacts. Sites that are determined to have significant slope shall be identified, and appropriate design restrictions shall be implemented to avoid the risk of erosion or landslide. Graded slopes shall be limited to 2:1 where feasible. Slopes that are less than 2:1 should be encouraged. The use of retaining walls or stepped building designs should be pursued as an alternative to high or steep slopes where feasible and desirable.
- **Grading Ordinance**—Enforce and regularly evaluate the Grading Ordinance. The Grading Ordinance includes standards for project construction and erosion control. This ordinance requires prompt re-vegetation of disturbed areas, avoidance of grading activities during wet weather, avoidance of disturbance in drainage ways, and other erosion control measures.
- **Specific Plans**—Ensure that specific plans are consistent with the goals and policies of the General Plan. Specific plans shall identify potential geologic, soil, and seismic hazards in the planning area and shall include measures to reduce the risk of such hazards. Proposed specific plans shall identify criteria for development on steep slope areas, as applicable, in order to ensure public safety and minimize environmental and aesthetic impacts.

- **Land Use Designation**—In areas where potentially significant soil and erosion impacts are identified, the City should consider open space or other appropriate land use designations, as specified in the Land Use Element, to minimize potential impacts.

## 11.8 SCENARIO

Due to the lack of significant exposure to this hazard, a scenario where a landslide would have a significant impact on the City of Roseville is currently unlikely. Mass movements are becoming more of a concern as development moves outside of city centers and into areas less developed in terms of infrastructure. Major mass movements in Placer County and areas surrounding Roseville occur as a result of soil conditions that have been affected by severe storms, groundwater or human development activities. After heavy rains, soils become saturated with water. As water seeps downward through upper soils that may consist of permeable sands and gravels and accumulates on impermeable silt, it will cause weakness and destabilization in the slope. As rains continue, the groundwater table rises, adding to the weakening of the slope. Gravity, poor drainage, a rising groundwater table and poor soil exacerbate hazardous conditions.

Roseville's most likely risk exposure to landslides is as a secondary risk associated with an earthquake or wildfire. The ground shaking that could occur during an earthquake could trigger landslides in the steep slope areas. This scenario could be further enhanced should an earthquake occur during a time when the soils are saturated due to repeated storm events. After a wildfire, the landscape becomes denatured and unable to absorb the impacts of repeated intense rainfall. This can cause the soil to become saturated and vulnerable to sliding.

## 11.9 ISSUES

Important issues associated with landslide hazards in Roseville include but are not limited to the following:

- The data and science regarding the mapping and assessment of landslide hazards is constantly evolving. As new data and science become available, assessments of landslide risk should be re-evaluated.
- The impact of climate change on landslides is uncertain. If climate change impacts atmospheric conditions, the exposure to landslide risks in Roseville could increase.

# 12. SEVERE WEATHER

## 12.1 GENERAL BACKGROUND

Most of the federal and state disaster declarations for the Roseville area and Placer County are related to severe weather conditions. Severe weather conditions vary greatly from the western portion of Placer County to the eastern portion, primarily due to variation in topography and elevation across the county. Heavy rainfall and snowfall result when humid air masses blow in from the ocean and move up the mountain ranges. Moist air, traveling inland on prevailing westerly winds, pushes up against the Sierra Nevada mountains, which wrings moisture out of the air as it rises, cools and condenses.

Roseville's location in the western, low-lying portion of the county helps explain why, at well below the 4,000 foot snowfall region, the City avoids the harshest of winter conditions that occur in eastern Placer County. Figure 12-1 shows Roseville's elevation of approximately 165 feet above sea level. Although the climate of Roseville is relatively mild, with an average of 257 sunny days each year, the City is near the foothills of the Sierra Nevada range and can experience severe weather resulting from rapid changes in topography.

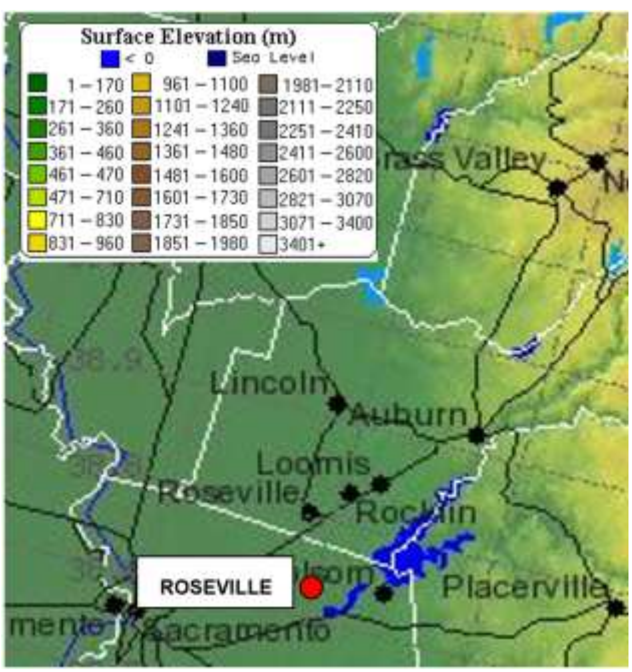



**Figure 12-1.** Roseville Regional Surface Elevation

**DEFINITIONS**

**Thunderstorm**—Typically 15 miles in diameter and lasting about 30 minutes, thunderstorms are underrated hazards. Lightning, which occurs with all thunderstorms, is a serious threat to human life. Heavy rains over a small area in a short time can lead to flash flooding. Strong winds, hail and tornadoes are also dangers associated with thunderstorms.

**Tornado**—Tornadoes are funnel clouds of varying sizes that generate winds more than 300 miles per hour. A tornado is formed by the turbulent mixing of layers of air with contrasting temperature, moisture, density and wind flow. The mixing layers of air account for most of the tornadoes occurring in April, May and June, when cold, dry air meets warm, moister air moving up from the south. They can affect an area up to a mile wide, with a path of varying length. Tornadoes can come from lines of cumulonimbus clouds or from a single storm cloud. They are measured using the Fujita Scale ranging from F0 to F6.

**Windstorm**—A storm featuring violent winds. Southwesterly winds are associated with strong storms moving onto the coast from the Pacific Ocean. Southern winds parallel to the coastal mountains are the strongest and most destructive winds. Windstorms tend to damage ridgelines that face into the winds.

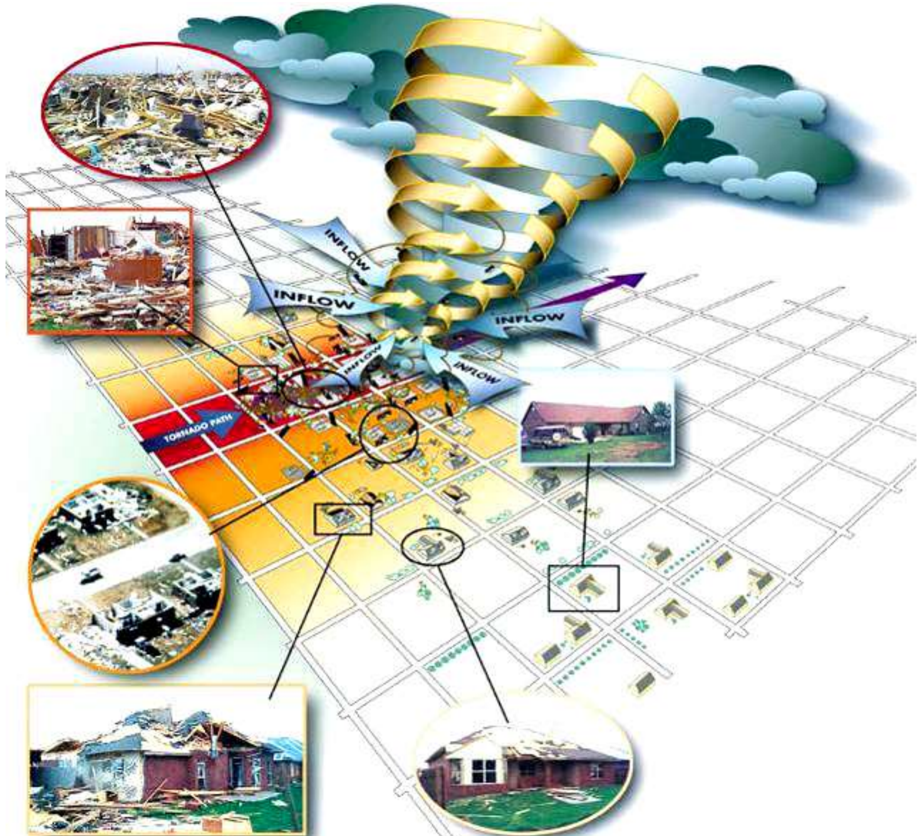
## 12.1.1 Tornadoes

A tornado is a violently rotating column of air extending between, and in contact with, a cloud and the surface of the earth. Tornadoes are often (but not always) visible as a funnel cloud. On a local-scale, tornadoes are the most intense of all atmospheric circulations and wind can reach destructive speeds of more than 300 mph. A tornado's vortex is typically a few hundred meters in diameter, and damage paths can be up to 1 mile wide and 50 miles long. Figure 12-2, adapted from FEMA, illustrates the potential impacts and damage from tornadoes of different magnitude. Tornadoes can occur throughout the year at any time of day but are most frequent in the spring during the late afternoon. As shown in Figure 12-3, California has a relatively low risk compared to states in the Midwestern and Southern U.S.

## 12.1.2 Windstorms

Windstorms are generally short-duration events involving straight-line winds or gusts of over 50 mph, strong enough to cause property damage. Windstorms are especially dangerous in areas with significant tree stands and areas with exposed property, poorly constructed buildings, mobile homes (manufactured housing units), major infrastructure, and above-ground utility lines. A windstorm can topple trees and power lines, cause damage to residential, commercial and critical facilities, and leave tons of debris in its wake. There are seven types of damaging winds:

- **Straight-line winds—**Any thunderstorm wind that is not associated with rotation; this term is used mainly to differentiate from tornado winds. Most thunderstorms produce some straight-line winds as a result of outflow generated by the thunderstorm downdraft.
- **Downdrafts—**A small-scale column of air that rapidly sinks toward the ground.
- **Downbursts—**A strong downdraft with horizontal dimensions larger than 2.5 miles resulting in an outward burst or damaging winds on or near the ground. Downburst winds may begin as a microburst and spread out over a wider area, sometimes producing damage similar to a strong tornado. Although usually associated with thunderstorms, downbursts can occur with showers too weak to produce thunder.
- **Microbursts—**A small concentrated downburst that produces an outward burst of damaging winds at the surface. Microbursts are generally less than 2.5 miles across and short-lived, lasting only 5 to 10 minutes, with maximum wind speeds up to 168 mph. There are two kinds of microbursts: wet and dry. A wet microburst is accompanied by heavy precipitation at the surface. Dry microbursts, common in places like the high plains and the intermountain west, occur with little or no precipitation reaching the ground.
- **Gust front—**A gust front is the leading edge of rain-cooled air that clashes with warmer thunderstorm inflow. Gust fronts are characterized by a wind shift, temperature drop, and gusty winds out ahead of a thunderstorm. Sometimes the winds push up air above them, forming a shelf cloud or detached roll cloud.
- **Derecho—**A derecho is a widespread thunderstorm wind caused when new thunderstorms form along the leading edge of an outflow boundary (the boundary formed by horizontal spreading of thunderstorm-cooled air). The word "derecho" is of Spanish origin and means "straight ahead." Thunderstorms feed on the boundary and continue to reproduce. Derechos typically occur in summer when complexes of thunderstorms form over plains, producing heavy rain and severe wind. The damaging winds can last a long time and cover a large area.
- **Bow Echo—**A bow echo is a linear wind front bent outward in a bow shape. Damaging straight-line winds often occur near the center of a bow echo. Bow echoes can be 200 miles long, last for several hours, and produce extensive wind damage at the ground.




| Managing Risk | Damage Color Code | Description of Damage |
|---|---|---|
| The Threat to Property and Personal Safety Can Be Minimized Through Compliance With Up-To-Date Model Building Codes and Engineering Standards | | Some damage can be seen to poorly maintained roofs. Unsecured light-weight objects, such as trash cans, are displaced. |
| | | Minor damage to roofs and broken windows occur. Larger and heavier objects become displaced. Minor damage to trees and landscaping can be observed. |
| Property and Personal Protection Can Be Improved Through Wind Hazard Mitigation Techniques Not Normally Required by Current Building Codes | | Roofs are damaged, including the loss of shingles and some sheathing. Manufactured homes, on nonpermanent foundations can be shifted off their foundations. Trees and landscaping either snap or are blown over. Medium-sized debris becomes airborne, damaging other structures. |
| | | Roofs and some walls, especially unreinforced masonry, are torn from structures. Small ancillary buildings are often destroyed. Manufactured homes on nonpermanent foundations can be overturned. Some trees are uprooted. |
| Personal Protection Can Only Be Achieved Through Use of a Specially Designed Extreme Wind Refuge Area, Shelter, or Safe Room | | Well constructed homes, as well as manufactured homes, are destroyed, and some structures are lifted off their foundations. Automobile-sized debris is displaced and often tumbles. Trees are often uprooted and blown over. |
| | | Strong frame houses and engineered buildings are lifted from their foundations or are significantly damaged or destroyed. Automobile-sized debris is moved significant distances. Trees are uprooted and splintered. |

**Figure 12-2.** Potential Impact and Damage from a Tornado

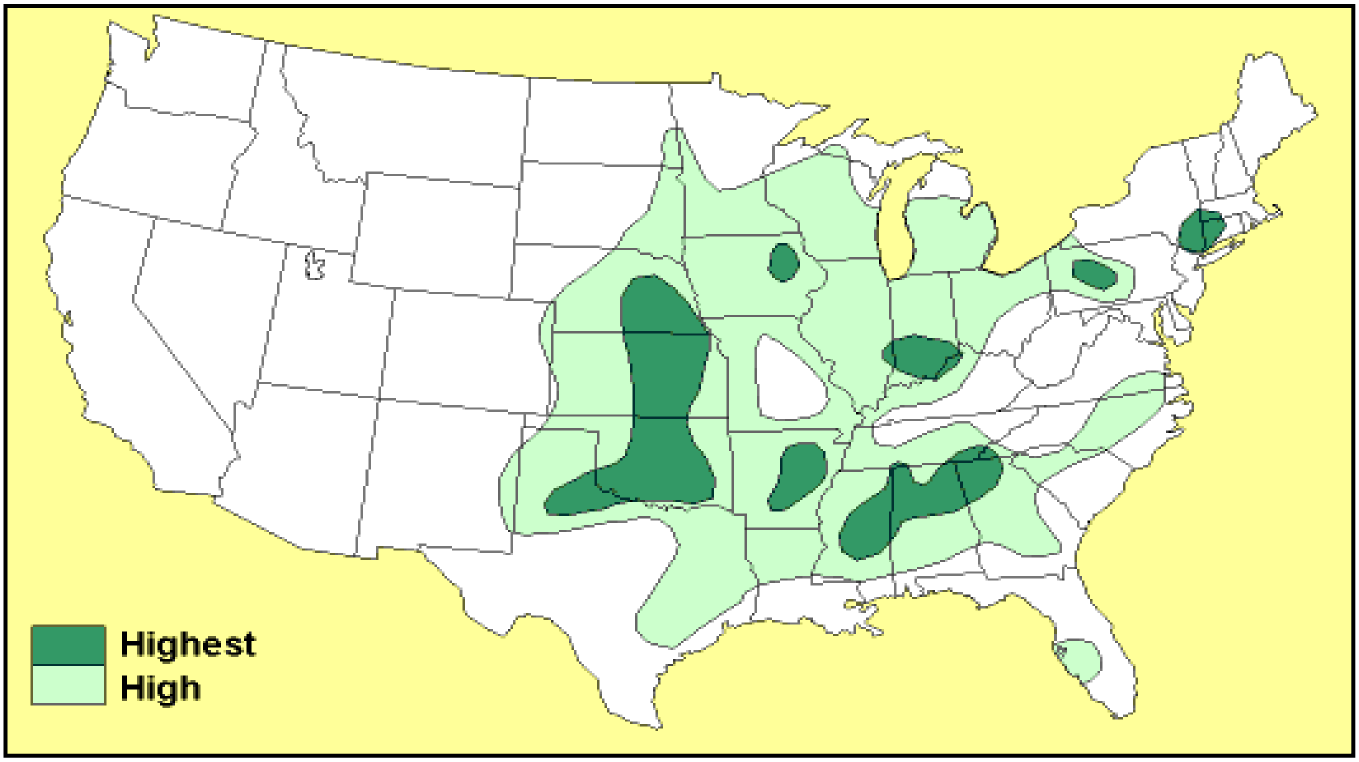



**Figure 12-3.** Tornado Risk Areas in the Coterminous United States

Windstorms can result in collapsed or damaged buildings, damaged or blocked roads and bridges, damaged traffic signals, streetlights and parks, and other damage. Wind speeds as low as 32 mph can cause structural damage, and winds of 100 mph can actually destroy wood-frame structures (Seattle Office of Emergency Management 2014). High winds can also cause direct losses to buildings, people, and vital equipment. There are direct consequences to the local economy resulting from windstorms related to both physical damage and interrupted services.

Wind pressure can create a direct and frontal assault on a structure, pushing walls, doors, and windows inward. Conversely, passing winds can create lift and suction forces that act to pull building components and surfaces outward. As positive and negative forces impact a building’s doors, windows and walls, the result can be roof or building component failures and considerable structural damage. The effects of winds are magnified in the upper levels of multi-story structures.

Debris carried along by extreme winds can contribute directly to loss of life and indirectly to the failure of protective building envelopes. Falling trees and branches can damage buildings, power lines, and other property and infrastructure. Tree limbs breaking in winds of only 45 mph can be thrown over 75 feet, so overhead power lines can be damaged even in relatively minor windstorm events. During wet winters, saturated soils cause trees to become less stable and more vulnerable to uprooting from high winds. Utility lines brought down by summer thunderstorms have also been known to cause fires, which start in dry roadside vegetation. Electric power lines falling down to the pavement create the possibility of lethal electric shock.

Downed trees and power lines, and damaged property also can be major hindrances to emergency response and disaster recovery. Emergency response operations can be complicated when roads are blocked or when power supplies are interrupted. Industry and commerce can suffer losses from interruptions in electric service and from extended road closures.

Windstorms in Placer County are more probable during the fall through early spring. Because of the shape and orientation of the Sacramento Valley, prevailing winds are southerly. When atmospheric conditions are favorable, usually in conjunction with a significant storm tracking along the coast, these winds may combine and become strong enough to cause property damage and personal injury. The most significant windstorm in Northern California was the Columbus Day storm of 1962. Significant damage occurred along the coast and in the far northern part of the Sacramento Valley. Because Roseville lies far enough south in the valley, windstorms such as those during the 1962 Columbus Day Storm, typically do not intensify to damaging levels. It is rare for southwesterly winds flowing parallel to the Sierra Nevada Mountains to reach sustained gusts above 60 mph in the valley floor. The predicted wind speed given in wind warnings issued by the National Weather Service is for a one-minute average; gusts may be 25 to 30 percent higher.

Site-specific data on windstorms in Roseville are incomplete. Regionally, a few windstorm events have resulted in significant damage. The impacts of these events were felt to the north and east of Roseville. There have been a couple of instances of unusual wind bursts that resulted in some property damage. December 1993 saw a downburst of wind that did significant damage to a sound wall that was under construction. Another event occurred on January 1, 1995, when a wind gust through northwest Roseville snapped several power poles. Table 12-1 shows monthly wind records for Sacramento.

**Table 12-1.** Monthly Wind Records for Sacramento, California

| Month | Year of Record | Fastest Wind Speed (miles per hour) | Month | Year of Record | Fastest Wind Speed (miles per hour) |
|---|---|---|---|---|---|
| January | 1954 | 60 | July | 1956 | 36 |
| February | 1938 | 58 | August | 1954 | 38 |
| March | 1952 | 66 | September | 1965 | 42 |
| April | 1955 | 45 | October | 1950 | 68 |
| May | 1912 | 40 | November | 1953 | 70 |
| June | 1950 | 47 | December | 1952 | 70 |

*Source: Masters-Bevan 2001.*

## 12.1.3 Fog

Fog is a cloud near the ground that forms when air close to the ground can no longer hold all the moisture it contains. This occurs either when air is cooled to its dew point or the amount of moisture in the air increases. Heavy fog is hazardous because it can restrict surface visibility. Severe fog incidents can close roads, cause vehicle accidents, cause airport delays, and impair the effectiveness of emergency response. Financial losses associated with transportation delays caused by fog have not been calculated in the United States, but they are known to be substantial. Fog can occur almost anywhere during any season and is classified based on how it forms, which is related to where it forms. Certain seasons are more likely to have foggy days or nights based on a number of factors, including topography.

In Placer County, heavy fog occurs mostly during the midwinter. A low-lying, early morning “tule fog” can occur anytime during the wet, cold season. Tule fog or radiation (ground) fog is common on clear nights with little or no wind. It is caused by the rapid cooling of the Earth and corresponding drop in air temperature to the dew point. This type of fog is known as “valley fog” when it persists throughout the day and is thick. Table 12-2 summarizes dense fog events in the southern Sacramento valley. Given the nature of fog in the Roseville area, future severe or dense fog events are expected to happen on an annual basis, but are not expected to occur frequently.

**Table 12-2.** Monthly Dense Fog Occurrence

| Month | Year of Record | Mean Number of Days | Maximum Number of Days |
|---|---|---|---|
| January | 1961 | 9.9 | 23 |
| February | 1963[a] | 5.3 | 13 |
| March | 1986 | 1.7 | 6 |
| October | 1962 | 1.4 | 11 |
| November | 1982 | 5.3 | 11 |
| December | 1989* | 9.5 | 22 |
| Annual | 1962 | 33.8 | 64 |

a. Also occurred in previous years.
*Source: Masters-Bevan 2001.*

## 12.1.4 Heavy Rains, Thunderstorms and Lightning

Severe weather in the City of Roseville generally includes heavy rains and is periodically accompanied by strong winds, lightning, or hail. Heavy rains coupled with low temperatures or other severe weather conditions can result in increases in traffic accidents, disruptions in transportation, commerce, government, and education. Severe weather incidents can also cause utility outages due to falling trees or other debris, as well as injuries.

Roseville's Mediterranean type of climate is typified by nearly 90 percent of the annual precipitation occurring during a window of about 16 weeks. The most severe storms occur during the late fall to early spring. The climate pattern, coupled with the onshore flow of warm, moist Pacific air during the winter, can generate severe and prolonged periods of heavy rain.

Roseville experiences heavy rains every year. Some of these events may include thunderstorms. Thunderstorms are typically few in number and are more likely to appear in spring or late fall. Table 12-3 shows the average and record occurrence of thunderstorms in Sacramento between 1948 and 2008.

**Table 12-3.** Frequency of Thunderstorms in Sacramento, California, 1948 – 2008

| Month | Year of Record | Number of Days with Thunderstorms | |
|---|---|---|---|
| | | Average | Maximum |
| January | 1970 | 0.4 | 3 |
| February | 1970 | 0.5 | 4 |
| March | 1992 | 0.8 | 4 |
| April | 1983 | 0.7 | 3 |
| May | 1967 | 0.3 | 3 |
| June | 1956 | 0.2 | 2 |
| July | 1989 | 0.2 | 2 |
| August | 1991[a] | 0.2 | 2 |
| September | 1989[a] | 0.5 | 2 |
| October | 1989[a] | 0.3 | 2 |
| November | 1979* | 0.3 | 3 |
| December | 1970 | 0.2 | 2 |
| **Annual** | **1970** | **4.7** | **10** |

a. Also occurred in previous years between January 1948 and December 2000.
*Source: Masters-Bevan 2008.*

NOAA classifies a thunderstorm as a storm with lightning and thunder produced by cumulonimbus clouds, usually producing gusty winds, heavy rain, and sometimes hail. Thunderstorms are usually short in duration (seldom more than 2 hours). Heavy rains associated with thunderstorms can lead to flash flooding during the wet or dry season.

According to the American Meteorological Society *Glossary of Meteorology*, thunderstorms are reported as light, medium, or heavy according to the following characteristics:

- Nature of the lightning and thunder
- Type and intensity of the precipitation, if any
- Speed and gustiness of the wind
- Appearance of the clouds
- Effect on surface temperature.

Lightning is an electrical discharge that results from the buildup of positive and negative charges within a thunderstorm. When the buildup becomes strong enough, lightning appears as a "bolt." This flash of light usually occurs within the clouds or between the clouds and the ground. A bolt of lightning reaches temperatures approaching 50,000ºF instantaneously. The rapid heating and cooling of air near the lightning causes thunder. Lightning is a major threat during a thunderstorm. In the United States, between 75 and 100 Americans are killed by lightning each year.

### 12.1.5 Ice and Freezing Rain

Ice and freezing rain are not part of the climate pattern in southern Sacramento valley. Periods have occurred where the daily minimum temperature has been at or below 32°F for several days. Yet the low temperatures reflect diurnal variations with clear skies, not part of a synoptic feature generating any precipitation. The bitterest cold snap on record, occurring December 9 to 15, 1935, was ended by the onset of a Pacific storm bringing warmer air. Although ice storms and freezing rains are a significant natural hazard, the extremely remote possibility of their occurrence in Roseville precludes any further discussion in this analysis.

## 12.2 HAZARD PROFILE

### 12.2.1 Past Events

Table 12-4 summarizes past severe weather events in Roseville and Placer County as recorded by the National Oceanic and Atmospheric Administration since 1958.

### 12.2.2 Location

Severe weather events have the potential to happen anywhere in Placer County. Communities in low-lying areas next to streams or lakes are more susceptible to flooding. Mountainous regions experience heavier snowfall and a greater risk of road closures. Wind events are most damaging to areas that are heavily wooded.

### 12.2.3 Frequency

The planning area can expect to experience exposure to some type of severe weather event at least annually.

**Table 12-4.** Severe Weather Events in Placer County since 1958 (NOAA 2015)

| Location | Date | Type | Magnitude | Deaths or Injuries | Property Damage |
|---|---|---|---|---|---|
| **Placer County** | 01/13/1957 | Tornado | F0 | 0 | 0 |
| **Placer County** | 04/22/1967 | Hail | 0.00 Inches | 0 | 0 |
| **Placer County** | 10/15/1972 | Tornado | F0 | 0 | 0 |
| **Placer County** | 03/03/1983 | Tornado | F0 | 0 | 0 |
| **Placer County** | 03/22/1983 | Tornado | F1 | 0 | $250,000 |
| **Placer County** | 04/23/1990 | Tornado | F0 | 0 | $2,500 |
| **Placer County** | 12/30/1992 | Hail | 0.50 inches | 0 | 0 |
| ***Description:*** *Severe thunderstorms produced golf ball-sized hail. Damage occurred at several auto dealers in Roseville.* | | | | | |
| **Roseville** | 12/22/1996 | Thunder Storm/Wind | 0 | 0 | 0 |
| ***Description:*** *Downburst winds snapped five 75-foot-high power poles into several pieces.* | | | | | |
| **Roseville** | 01/22/1997 | Flash Flood | 0 | 0 | 0 |
| ***Description:*** *Heavy rains on saturated soil caused flooding on Dry Creek and Linda Creek, damaging 21 homes.* | | | | | |
| **Roseville** | 01/26/1997 | Flash Flood | 0 | 0 | 0 |
| ***Description:*** *Heavy rain caused flooding on Dry Creek and Linda Creek, damaging 21 buildings.* | | | | | |
| **Placer County** | 01/12/1998 | Heavy Rain | N/A | 0 | 0 |
| ***Description:*** *Heavy rains caused widespread but minor flooding across the Sacramento Valley and nearby foothills.* | | | | | |
| **Placer County** | 01/18/1998 | Heavy Rain | N/A | 2 | 0 |
| ***Description:*** *A Pacific storm brought brief but heavy rain to the Sacramento Valley and surrounding foothills. 27,000 customers lost power at some time during the storm. Two teens were drowned when their car flipped into a flooded ditch near Loomis.* | | | | | |
| **Roseville** | 01/22/2000 | Heavy Rain | N/A | 0 | 0 |
| ***Description:*** *Rainfall totaling 5.43 inches fell in just over 48 hours.* | | | | | |
| **Roseville** | 02/11/2000 | Heavy Rain | N/A | 0 | $10,000 |
| ***Description:*** *Heavy rain that persisted for nearly 72 hours was responsible for the closure of Granite Bay High School. The school lost power and phone service. Local businesses were affected by the flooding and closed as well.* | | | | | |
| **Placer County** | 12/17/2005 | Heavy Rain | N/A | 0 | 0 |
| ***Description: A series of storms brought heavy rainfall to Northern California. Five-day rainfall for Roseville was 2.99 inches.*** | | | | | |
| **Placer County** | 01/01/2006 | Severe Storm/Flood | N/A | 0 | $2,000,000 |
| ***Description:*** *Storms brought heavy rain, mudslides, flooding, and high winds to Northern California. Levee overtopping, breaching, and river flooding occurred along numerous rivers, creeks, and streams. Several urban areas had significant street flooding. The Sacramento weir was opened for the first time since 1997. Airports were closed due to high winds and major road closures resulted from flooding and mudslides. Interstate 80 between Sacramento and Reno, NV, was closed for more than a day due to a mudslide, as were both directions of U.S. Highway 50 between Sacramento and South Lake Tahoe. Place County was among the counties declared in need of federal disaster assistance.* | | | | | |
| **Placer County** | 07/25/2013 | Hail | N/A | 0 | 0 |
| ***Description:*** *Strong to severe thunderstorms affected the Sierra and northeast California.* | | | | | |
| **Roseville** | 03/36/2014 | Tornado | EF0 | 0 | 0 |
| ***Description:*** *EF0 tornado began in a field southwest of Roseville, but did not cause damage until it reached the Pleasant Grove Blvd housing developments in West Roseville. The winds were estimated to be 75 to 85 mph. Several windows were blown out from houses, 25 to 30 feet of fence was blown down, projectile damage to stucco occurred. The tornado lasted 5 to 10 minutes.* | | | | | |
| **Roseville** | 05/14/2015 | Heavy Rain | N/A | 0 | 0 |
| ***Description:*** *Thunderstorms brought local heavy rain and minor flooding. Unusually late winter snow fell in the Sierra, causing travel delays and chain controls over passes. Funnel clouds were reported with thunderstorms, but no touchdowns were confirmed. Street flooding was reported at Martin Road and East Roseville Parkway from a thunderstorm.* | | | | | |

### 12.2.4 Severity

Severe weather disaster declarations for Placer County, as shown in Table 12-4, are often related to heavy rains, thunderstorms, and freezing temperatures. The most common problems associated with severe storms are immobility and loss of utilities. Fatalities are uncommon, but can occur. Roads may become impassable due to flooding, downed trees, or a landslide. Power lines may be downed due to high winds, and services such as water or phone may not be able to operate without power. Lightning can cause severe damage and injury. Windstorms have been known to cause damage to utilities.

Tornadoes are potentially the most dangerous of local storms, but they are not common in the Roseville vicinity. If a major tornado were to strike a populated area such as Roseville, damage could be widespread. Businesses could be forced to close for an extended period or permanently, fatalities could be high, many people could be homeless for an extended period, and routine services such as telephone or power could be disrupted. Buildings may be damaged or destroyed. Compared with other states, California ranks 32nd for frequency of tornadoes, last for number of deaths, 36th for injuries, and 31st for cost of damage. California ranks 44th for the frequency of tornados per square mile.

### 12.2.5 Warning Time

A meteorologist can often predict the likelihood of a severe storm. This can give several days of warning time. However, meteorologists cannot predict the exact time of onset or the severity of the storm. Some storms come on more quickly and have only a few hours of warning time.

## 12.3 SECONDARY HAZARDS

The most significant secondary hazards associated with severe weather are floods, falling and downed trees, landslides and downed power lines. Rapidly melting mountain snow combined with heavy rain can overwhelm natural and man-made drainage systems, causing overflow and property destruction. Landslides occur when the soil on slopes becomes oversaturated and fails.

## 12.4 EXPOSURE

### 12.4.1 Population

A lack of data separating severe weather damage from flooding and landslide damage prevented a detailed analysis for exposure and vulnerability. However, it can be assumed that the entire Roseville planning area is exposed to severe weather events. Certain areas are more exposed due to geographic location and localized weather patterns. Populations living at higher elevations with large stands of trees or power lines may be more susceptible to wind damage and black out, while populations living in low lying areas are at risk for flooding.

### 12.4.2 Property

All structures within Roseville are exposed to the potential impacts of severe weather.

### 12.4.3 Critical Facilities and Infrastructure

All critical facilities exposed to flooding are also likely exposed to severe weather. Additional facilities on higher ground may also be exposed to wind damage or damage from falling trees. The most common problem associated with severe weather is the loss of utilities. Downed power lines can cause blackouts, leaving large areas isolated. Phone, water and sewer systems may not function. Roads may become impassable due to ice or snow or from a secondary hazard such as landslides.

### 12.4.4 Environment

Severe storm events can drastically affect the physical environment, changing natural landscapes. Natural habitats such as streams and trees risk major damage and destruction during a severe storm. Prolonged rains can saturate soils and lead to slope failure. Flooding caused by severe weather can cause stream channel migration.

## 12.5 VULNERABILITY

There are currently no loss estimation tools with uniform damage functions for severe weather events. This can be attributed to the variety of impacts that severe weather events generate. Also, the severity of severe weather events varies by location. Since secondary effects of severe weather events include flooding, landslides or even wildfires in drier climates, the vulnerability assessments under those hazards can provide emergency managers a gage of the economic impact of severe weather events. For this section, the vulnerability to severe weather events is discussed qualitatively. Where possible, damage estimates are made using reasonable assumptions and best available data.

### 12.5.1 Population

Particularly vulnerable populations are the elderly, low income or linguistically isolated populations, people with life-threatening illnesses, and residents living in areas that are isolated from major roads. Power outages can be life threatening to those dependent on electricity for life support. These populations face isolation and exposure during severe weather events and could suffer more secondary effects of the hazard.

### 12.5.2 Property

All property is vulnerable during severe weather events, but structures in poor condition or constructed to low building code standards risk the most damage. The frequency and degree of damage will depend on specific locations. Those in higher elevations and on ridges may be more prone to wind damage. Those that are located under or near overhead lines or near large trees may be damaged in the event of a collapse.

Estimates of potential loss for the severe weather hazard are not based on damage functions, because no such damage functions have been generated. Instead, estimates were developed representing 10 percent, 30 percent and 50 percent of the assessed value of exposed structures. This allows emergency managers to select a range of potential economic impact based on an estimate of the percent of damage to the general building stock. Damage in excess of 50 percent is considered to be substantial by most building codes and typically requires total reconstruction of the structure. Table 12-5 lists the potential loss estimates to the general building stock.

**Table 12-5.** Loss Potential for Roseville Buildings Vulnerable to Severe Weather Hazard

| | Building Count | Assessed Value | 10% Damage | 30% Damage | 50% Damage |
|---|---|---|---|---|---|
| **Residential** | 43,163 | $18,695,442,494 | $1,869,544,249 | $5,608,632,748 | $9,347,721,247 |
| **Commercial** | 1,811 | $8,274,963,659 | $827,496,366 | $2,482,489,098 | $4,137,481,830 |
| **Industrial** | 475 | $1,160,642,905 | $116,064,290 | $348,192,871 | $580,321,452 |
| **Agricultural** | 1 | $28,530 | $2,853 | $8,559 | $14,265 |
| **Religion** | 71 | $250,600,927 | $25,060,093 | $75,180,278 | $125,300,463 |
| **Government** | 92 | $168,856,266 | $16,885,627 | $50,656,880 | $84,428,133 |
| **Education** | 445 | $1,091,399,472 | $109,139,947 | $327,419,842 | $545,699,736 |
| **Total** | **46,058** | **$29,641,934,254** | **$2,964,193,425** | **$8,892,580,276** | **$14,820,967,127** |

### 12.5.3 Critical Facilities and Infrastructure

Incapacity and loss of roads are the primary transportation failures, most of which are associated with secondary hazards. Landslides that block roads are caused by heavy prolonged rains. High winds can cause significant damage to trees and power lines, with obstructing debris blocking roads, incapacitating transportation, isolating population, and disrupting ingress and egress. Of particular concern are roads providing access to isolated areas and to the elderly.

Prolonged obstruction of major routes due to landslides, debris, or floodwaters can disrupt the shipment of goods and other commerce. Large and prolonged storms can have negative economic impacts for an entire region.

Severe windstorms and downed trees or power lines can create serious impacts on power and above-ground communication lines. Broken power and communication lines would result in isolation because some residents would be unable to call for assistance.

### 12.5.4 Environment

The environment vulnerable to the severe weather hazard is the same as the environment exposed to the hazard.

## 12.6 FUTURE TRENDS IN DEVELOPMENT

The general building stock within the planning area increased by 17.7% with an increase in valuation from $21.967 billion to $29.641 billion (34.9%). This increase in valuation of the planning area was impacted by the areas recovery from the economic downturn of 2008. Since the entire planning area would be considered susceptible to earthquake, there was an increase in earthquake exposure over the performance period of the 2011 plan. However, the vulnerability of this new exposure should be considered to be low due to the application of strong building code standards that are contained within the International Building Code.

Many of the impacts associated with severe weather hazards can be addressed through proactive planning and the use of best available information in making land use decisions. Roseville has and will achieve this goal through the implementation of its General Plan. The General Plan serves as a long-term policy guide for the physical, economic, and environmental growth of the City. It includes a statement of the community’s vision of its ultimate physical growth. Implementation of the General Plan, along with other programs such as Building Code enforcement, public information and early warning, will help Roseville to manage the probable impacts of severe weather hazards as the City grows in the future.

## 12.7 REVIEW OF EXISTING ORDINANCES, PROGRAMS, AND POLICIES

Roseville implements numerous programs and policies that can impact severe whether hazards. Like most programs and policies sited in this Plan, these are tied to the City’s general plan. Maintenance of these existing programs is included in the action plan for this hazard mitigation plan.

## 12.8 SCENARIO

A worst-case event would involve prolonged high winds during an extreme rainstorm. Such an event would have both short-term and long-term effects. Initially, schools and roads would be closed due to flooding, downed tree obstructions, and downed power lines. Power outages would be common throughout the City. Some subdivisions in the City could experience limitations on ingress and egress. Continuing rains could produce flooding, overtopped culverts with ponded water on roads, and landslides on steep slopes. Flooding and landslides could further obstruct roads and bridges, further isolating residents.

## 12.9 ISSUES

In general, every household and resident in the City is likely to be exposed to severe weather, but some are more likely than others to experience isolation as a result. Those residing in higher elevations with limited transportation routes may have the greatest vulnerability to isolation from storms. Another group at risk is the portion of the population that is over the age of 65.

# 13. WILDFIRE

## 13.1 GENERAL BACKGROUND

### 13.1.1 Contributing Factors

A wildfire is any uncontrolled fire occurring on undeveloped land that requires fire suppression. Wildfires can be ignited by lightning or by human activity such as smoking, campfires, equipment use, and arson. The potential for wildfire is primarily influenced by the following factors:

- Fuel, which may include living and dead vegetation on the ground, along the surface as brush and small trees, and above the ground in tree canopies.
- Topography, which includes both slope and elevation.
- Air conditions, including temperature, relative humidity, wind speed and direction, cloud cover, precipitation amount and duration, and the stability of the atmosphere.

**DEFINITIONS**

**Wildland-Urban Interface Area**—An area susceptible to wildfires where wildland vegetation and urban or suburban development occur together. Examples include dispersed rural housing in forested areas.

**Wildfire**—A fire that causes uncontrolled destruction of forests, brush, field crops, grasslands, and real and personal property in non-urban areas.

How a fire behaves primarily depends on the following:

- Fuel—Lighter fuels such as grasses, leaves and needles quickly expel moisture and burn rapidly, while heavier fuels such as tree branches, logs and trunks take longer to warm and ignite. Trees killed or defoliated by forest insects and diseases are more susceptible to wildfire.
- Weather—Strong, dry winds produce extreme fire conditions. Such winds generally reach peak velocities during the night and early morning hours.
- Thunderstorm activity—The thunderstorm season typically begins in June with wet storms, and turns dry with little or no precipitation reaching the ground as the season progresses into July and August.
- Terrain—The topography of a region influences the amount and moisture of fuel; the impact of weather conditions such as temperature and wind; potential barriers to fire spread, such as highways and lakes; and elevation and slope of land forms (fire spreads more easily uphill than downhill).
- Time of Day—A fire's peak burning period generally is between 1 p.m. and 6 p.m.

Short-term loss caused by a wildfire can include the destruction of timber, wildlife habitat, scenic vistas, and watersheds. Long-term effects include smaller timber harvests, reduced access to affected recreational areas, and destruction of cultural and economic resources and community infrastructure. Vulnerability to flooding increases due to the destruction of watersheds. The potential for significant damage to life and property exists in areas designated as "wildland-urban interface areas," where development is adjacent to densely vegetated areas.

### 13.1.2 Local Conditions Related to Wildfire Hazard

**Vegetation**

The vegetation in Roseville can be broadly classified in three categories:

- There are large tracts of self-sustaining grasslands in the northern and western undeveloped edges of Roseville. Less extensive areas of grassland can be found in smaller, undeveloped areas scattered throughout the City. Most of the grasslands are non-native, following the effects of grazing and clearing for agricultural uses.
- Oak woodland, riparian and creek areas are found in proximity to Roseville’s major stream channels where microclimates and alluvial soils provide ideal conditions for the deeper rooting shrubs and trees found in these habitats. Most woodland areas are relatively open, with little shrub growth.
- Seasonal wetlands in Roseville include intermittent drainages and vernal pools. Intermittent drainages are wet only in winter and dry during the summer, with scattered ponds; they may contain water from adjacent urban runoff. Vernal pools represent a significant seasonal wetland resource in Roseville.

## Undeveloped Areas

The U.S. Army Corps of Engineers has required developers in Roseville to preserve areas of vernal pools that are dedicated to the City and maintained in perpetuity. These areas are to be left undisturbed and are typically open grassy areas during the hot summer months when the vernal pools are dry.

Preservation of open space, wetlands, natural parkways, riparian corridors along the City’s watersheds, vernal pools and endangered species habitat have added to the inventory of vegetation susceptible to wildfire. The City of Roseville has 2,600 acres of dedicated open space within the city limits. Nearly 740 acres will be added on dedication of properties in the West Roseville Specific Plan. The City recently acquired the Reason Farms property in unincorporated Placer County, which will be the site for a retention basin projected to have water only eight days per year. The property will be preserved in perpetuity as open space with passive recreational uses planned, including biking, hiking, camping, and boating on a man-made lake. The Roseville Fire Department will assume fire protection duties for this significant piece of open space at a future date.

## Fire-Fighting and Fire Prevention

Federal, state, county, city, and private agencies provide fire protection and firefighting services in California. Wildfires usually are extinguished while smaller than 1 acre, but they can spread to more than 100,000 acres and may require thousands of firefighters and several months to extinguish.

### *Roseville Fire Protection Services*

The Roseville Fire Department is a fully functional agency that primarily provides fire suppression and emergency medical services for the urban environment of the City. The department operates eight stations. The department has eight paramedic engine companies, with a minimum staffing of three, two paramedic truck companies with a minimum staffing of four, and one battalion chief. The department also operates a hazardous materials response unit (cross-staffed the truck company); five grass/wildland units, and one technical rescue unit (cross-staffed by engine companies). The department maintains four reserve engines and one reserve truck.

### *Regional Services*

Regional fire protection is provided by municipal fire departments and those assigned to specially designated lands outside city boundaries. The Placer County Fire Department provides fire protection to much of Placer County including west of the Roseville city limits. The South Placer Fire District serves unincorporated Placer County east of Roseville. The City of Rocklin Fire Department provides services within the City of Rocklin to the north and east of Roseville. The Sacramento Metropolitan Fire District provides fire protection to the City of Citrus Heights and the unincorporated Sacramento County areas to the south of Roseville.

### *State of California*

The California Department of Forestry and Fire Protection (CAL FIRE) is charged with both assessing the threat of fire in California and suppressing fires on state and federal lands, while providing mutual aid if needed to communities that do not include public lands. The California Fire Plan formalizes much of the work that has been done to assess the threat of wildfire statewide. CAL FIRE's Fire and Resource Assessment Program (FRAP) assesses the amount and extent of California's forests and rangelands, analyzes their conditions and identifies alternative management and policy guidelines.

### *Firewise Communities*

The national Firewise Communities program is a multi-agency effort involving homeowners, community leaders, planners, developers, and others to protect people, property and natural resources from the risk of wildfire before a fire starts. The program emphasizes community responsibility for planning a safe community and effective emergency response, and individual responsibility for safer home construction and design, landscaping and maintenance. Firewise Communities is directed and sponsored by the National Wildfire Coordinating Group, a consortium of organizations and federal agencies responsible for wildfire management in the U.S.

# 13.2 HAZARD PROFILE

## 13.2.1 Past Events

Fire history shows multiple wildfires in or near Roseville since the 1950s:

- In the 1950s, one fire occurred just east of the current location of Interstate 80 on the Roseville/Rocklin border, including parts of the Stoneridge area. A second fire occurred south of Douglas Boulevard where Roseville Parkway is now located.
- In the 1970s, a significant fire occurred in undeveloped grasslands along what is now Galleria Boulevard and Harding Boulevard in north central Roseville. Another fire occurred just outside the city limits on both sides of Cavitt-Stallman in the Loomis area.
- In the 1980s, five wildfires were mapped, including one in the grasslands of the North Central Roseville Specific Plan just north of Highway 65, where Pleasant Grove Boulevard is now located. Three grassland fires occurred west of Roseville, one just west of Fiddyment Road and two west of Fiddyment Road and south of Athens Road. A major fire occurred in 1983 where Baseline Road and Country Club Drive now intersect. The fire scorched 1,500 acres north past the current Blue Oaks Boulevard, stopping at Pleasant Grove Creek. The area is now developed with urban uses.
- The 2002 Sierra Fire in Loomis and Granite Bay was the largest in recent history near Roseville. The fire charred 900 acres of grass, brush and oaks in the area between Interstate 80 and Cavitt-Stallman Road. The fire destroyed six structures and threatened two schools. One hundred homes were evacuated, and more than 1,000 homes in both communities were threatened.
- On May 17, 2016, a grass fire broke out near Highway 65 north of Roseville. The fire, located at Athens Avenue and Industrial Boulevard, south of Lincoln in Placer County stretched to 169 acres.

Statewide, California experiences frequent significant wildfires. Most recently, the following two fires occurred:

- The 2003 Cedar fire in San Diego County burned 273,246 acres, destroyed 2,820 structures and directly resulted in 15 deaths. The fire was caused by human ignition.
- The 2015 Valley Fire in Lake County is considered the third worst fire in history, based on the number of structures damaged or destroyed. The fire consumed 75,781 acres and killed four people.

CAL FIRE maintains a website (http://www.calfire.ca.gov/general/firemaps/) with interactive maps that detail the fire history in California since 2011.

## 13.2.2 Location

### State

CAL FIRE also developed an estimate of fire risk in designated wildland-urban interface areas, based on a variety of factors affecting fire frequency and fire behavior. The results are combined into a single assessment called fire threat. A significant fire threat is found throughout California, with 48 percent of the state's wildland area ranked as high, very high or extremely high. About 37 percent of the state has a moderate fire threat. Large areas of high threat are found in Southern California, the central coast, the lower elevations of the Sierra Nevada and much of the interior of northern California. Much of the fire threat is near densely populated areas and new development.

### Regional

Wildfire safety is an increasing concern in the western Sierra foothills and valley as development continues in rural areas while grasslands and open space border urban areas. The potential for wildfire and urban wildfire is always present, with fire conditions from a combination of hot weather, an accumulation of vegetation, and low moisture content typically present in the warm fire season within the Central Valley and Sierra Nevada foothills. Wildfire risk in Placer County is primarily in the wildland-urban interface areas. A majority of Placer County is deemed to be a high or very high fire threat risk based on analysis by CAL FIRE, as shown on Figure 13-1. These are areas with dense vegetation, increasing elevation, and steep slopes in the foothills and the mountains of the Sierra Nevada Mountain Range.

CAL FIRE's FRAP website (http://frap.cdf.ca.gov/) includes maps of the communities most at risk for wildfire that are within 1.5 miles of a high or very high wildfire threat on federal or non-federal lands. The threat is based on the FRAP fuels and hazard data. The map identifies seven communities in Placer County not adjacent to federal lands that are at risk for wildfire, including the City of Roseville and communities adjacent to or within the Tahoe National Forest.

### Local

The City of Roseville does not include any designated wildland-urban interface areas. A significant portion of the area around the City is developed. State maps show that the City has a moderate fire threat. While the City rarely has critical fire weather conditions, a combination of dry grasslands, the topography in northeast Roseville, and hot temperatures with limited rainfall could result in a risk of wildfire on occasion. The following are the most likely wildfire hazards in Roseville:

- Grassland fires on undeveloped properties in the West Roseville Specific Plan Area or west or north of Roseville
- Fires in northeast Roseville where significant slopes are adjacent to ravines and residential development
- Fires in open space and preserve areas within the developed sections of Roseville.

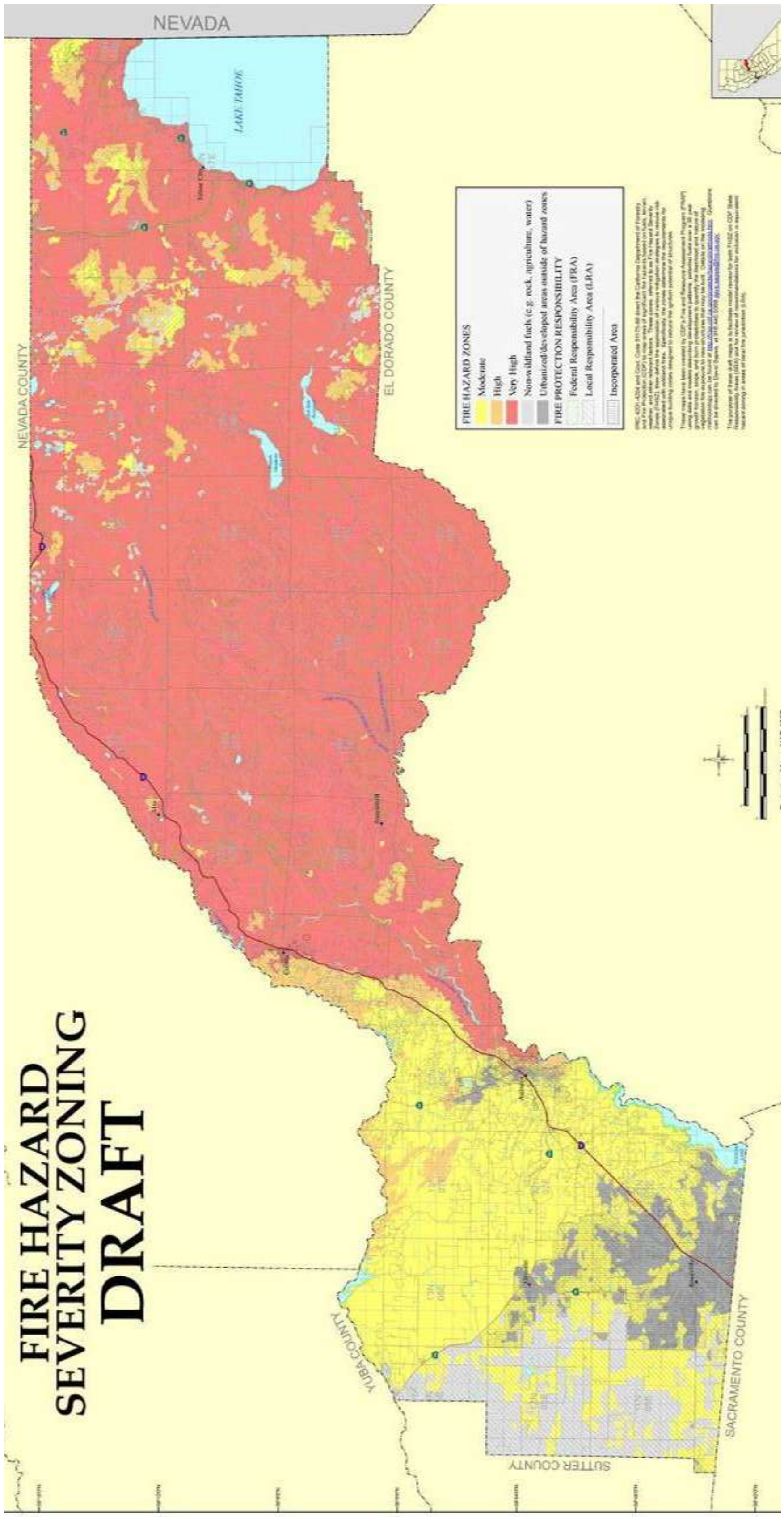



**Figure 13-1.** CAL FIRE FRAP Map for Placer County

### *Grassland Fires*

Prior to August 2004, Roseville's northwestern boundary was Fiddyment Road. Since the annexation of 3,200 acres in West Roseville, the City now includes a significant amount of undeveloped non-native annual grassland with some riparian and oak woodland along Pleasant Grove Creek and Kaseberg Creek. The property to the west of Roseville along this border is also non-native annual grassland. The 2004 West Roseville Specific Plan Open Space Preserve Operations and Management Plan has provisions for reducing fire hazard if the preserve becomes a fire hazard. The preserve manager will work with the U.S. Army Corps of Engineers, the U.S. Fish and Wildlife Service and the Roseville Fire Department to decide the best way to reduce the hazard. Fire breaks are allowed within the 50-foot buffer around the preserve. Fire breaks in other locations would require U.S. Army Corps of Engineers and U.S. Fish and Wildlife Service approval.

The Sierra Vista Specific Plan Area, annexed in January 2012, consists of largely nonnative, annual grasslands. The Sierra Vista Specific Plan Area will develop as urban uses, but will also contain 267 acres of preserve areas. A 50-foot wide open space buffer area is maintained at the perimeter of all open space preserves for fuel modification and fire management, among other uses. The Roseville Fire Department's Fire Station #5 serves as the primary responding area for this area.

### *Ravine Fires*

The Stoneridge Specific Plan includes 1,089 acres of land that will include 2,882 dwelling units, along with office and commercial uses, schools, parks, and open space. Approximately 252 acres will be set aside as open space with an extensive network of bike trails. The main ingress and egress to the area is Secret Ravine Parkway, which will link Sierra College Boulevard with East Roseville Parkway. The ravines also border the Northeast Roseville Specific Plan Area, which is largely developed, with some construction continuing along the ravine edges.

The key topographic features in Stoneridge are the three ravines: Secret Ravine, False Ravine, and Miners Ravine. The creek at the base of Miner's Ravine flows year-round. The elevation of the property is among the highest in the City, ranging from 225 feet to 375 feet above sea level. Slopes in Miner's Ravine range from a 5-percent grade to a 26-percent grade.

Vegetation in the Stoneridge Specific Plan Area is primarily annual grasslands, oak woodlands, and oak riparian landscapes (see Figure 13-2). Annual grasses with scattered downed trees and limbs cover the ground. The overstory includes scattered oaks and a few other broad leaf trees. The riparian vegetation includes Blue Oak, Valley Oak and Interior Live Oak, along with willows, cottonwood, and ash trees. The vegetation on the plateaus between the three main ravines is primarily annual grasses. The ravines do not have a continuous fuel ladder from the ground vegetation to the overstory trees.

**Figure 13-2.** View of Ravine, Tree Canopy and Stoneridge Development

The 1999 Stoneridge Specific Plan Wildfire Safety Plan outlined the following risks resulting from development of the Plan Area (see Figure 13-3):

- Fire in the grass of the open space area was identified as the most serious wildfire threat for the Stoneridge Specific Plan. Extensive grass fuels in the open space areas will quickly ignite and fire will spread rapidly, especially in summer. The plan cites a fire history that has demonstrated that grass and other light fuels are a threat to fire risk for other vegetation types as well as people.
- Wildfire rate of spread can increase with steep slopes. The three ravines in the project area have moderate slopes that can cause a fast rate of wildfire spread.
- Risk of fire starts will increase with development. The greatest risk from fire ignitions will be in the open space areas as use of these areas by future residents and other members of the public increases. Bike trails, for example, will make open space areas more accessible than when the Plan Area was undeveloped.
- Initial work by the developer to reduce the amount of fuel in the area must be maintained over the long-term to keep fire risk in check.
- Home design and siting often do not adequately mitigate wildfire risk. Measures specific to development within the Plan Area have been adopted by the City and are being enforced at the building permit stage. Owners will be required to maintain a clearing of flammable vegetation around the structures, use only fire resistant materials for roofs and fences, and ensure adequate water for fire suppression.

The Stoneridge Wildfire Safety Plan outlines short and long-term mitigation measures to prevent or minimize the impact of wildfire in this area of Roseville. These are included in the mitigation section of this 2016 Plan.

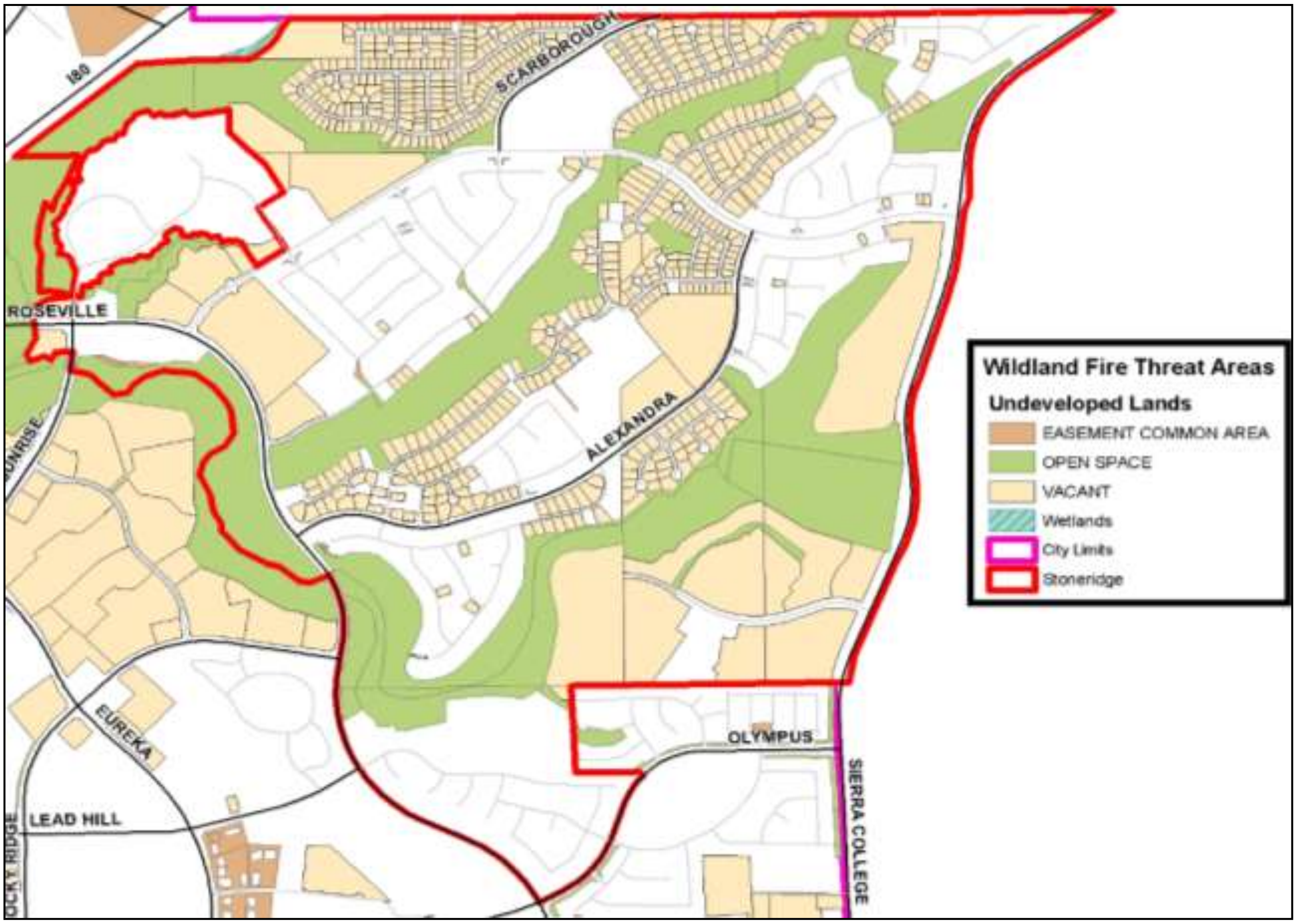



**Figure 13-3.** Stoneridge Specific Plan Wildfire Threat Areas

### *Open Space Fires*

The City is adding new open space areas through dedication as part of the specific plan process. This will result in construction of new developments immediately adjacent to open space areas, which poses moderate risk to such developments. The Fire Department reviews these during the planning process, and fire safety provisions are accounted for in Specific Plan design guidelines and development agreements.

## 13.2.3 Frequency

The Roseville Fire Department maintains a database of every incident type responded to by Roseville fire personnel. Wildfires are tracked in four categories: natural or vegetation fire; forest, woods, or wildfire; brush or brush and grass fire; and grass fire. Table 13-1 provides the number of wildfire incidents recorded from 2011 to 2015. Placer County has had nearly 150 significant wildfires since 1908. In California, vegetation fires occur daily. Most are controlled and contained early, with limited damage.

**Table 13-1.** Wildfire Incident Counts—2011 to 2015

| Incident Type | 2011 | 2012 | 2013 | 2014 | 2015 |
|---|---|---|---|---|---|
| **Cultivated vegetation, crop fire** | **–** | **1** | **3** | **3** | **2** |
| Cultivated trees or nursery stock fire | – | – | – | 2 | 1 |
| Cultivated vegetation, crop fire, other | – | 1 | 3 | 1 | 1 |
| **Fire in mobile property used as fixed structure** | **1** | **–** | **1** | **–** | **–** |

| | | | | | |
|---|---|---|---|---|---|
| Fire in mobile home used as fixed residence | – | – | 1 | – | – |
| Fire in portable building, fixed location | 1 | – | – | – | – |
| **Natural Vegetation Fire** | **47** | **54** | **70** | **62** | **53** |
| Brush, or brush and grass mixture fire | 11 | 16 | 20 | 14 | 29 |
| Forest, woods or wildland fire | – | 1 | 2 | 1 | – |
| Grass fire | 24 | 23 | 26 | 29 | 18 |
| Natural vegetation fire, other | 12 | 14 | 22 | 18 | 6 |
| **Outside Rubbish Fire** | **67** | **61** | **92** | **70** | **76** |
| Dumpster or other outside trash receptacle fire | 16 | 8 | 9 | 12 | 17 |
| Outside rubbish fire, other | 18 | 19 | 39 | 34 | 27 |
| Outside rubbish, trash or waste fire | 32 | 34 | 44 | 23 | 32 |
| Outside stationary compactor/compacted trash fire | 1 | – | – | 1 | – |
| **Total** | 115 | 116 | 166 | 135 | 131 |

*Source: City of Roseville Fire Department Incident Type Count Reports 2010-2015*

## 13.2.4 Severity

Wildfires have never resulted in loss of life in Roseville, though some property damage has resulted from wildfire incidents, including some fences on occasion. CAL FIRE maps areas of significant fire hazard based on fuel, terrain, weather, and other relevant factors. The mapped fire hazard severity zones define the application of mitigation strategies to reduce risk associated with wildfires. Figure 13-4 shows fire hazard severity zones for the Roseville planning area. The City’s wildfire hazard is rated as moderate. While the City is also a Community at Risk from Wildfire as designated on the State of California map, the Roseville Fire Department assessment in the General Plan concurs that wildfires in open space areas represent a moderate hazard. Most fires of this type are small and localized. The open space areas are typically easily accessible for fire suppression apparatus, and the response time is such that fires are suppressed rapidly.

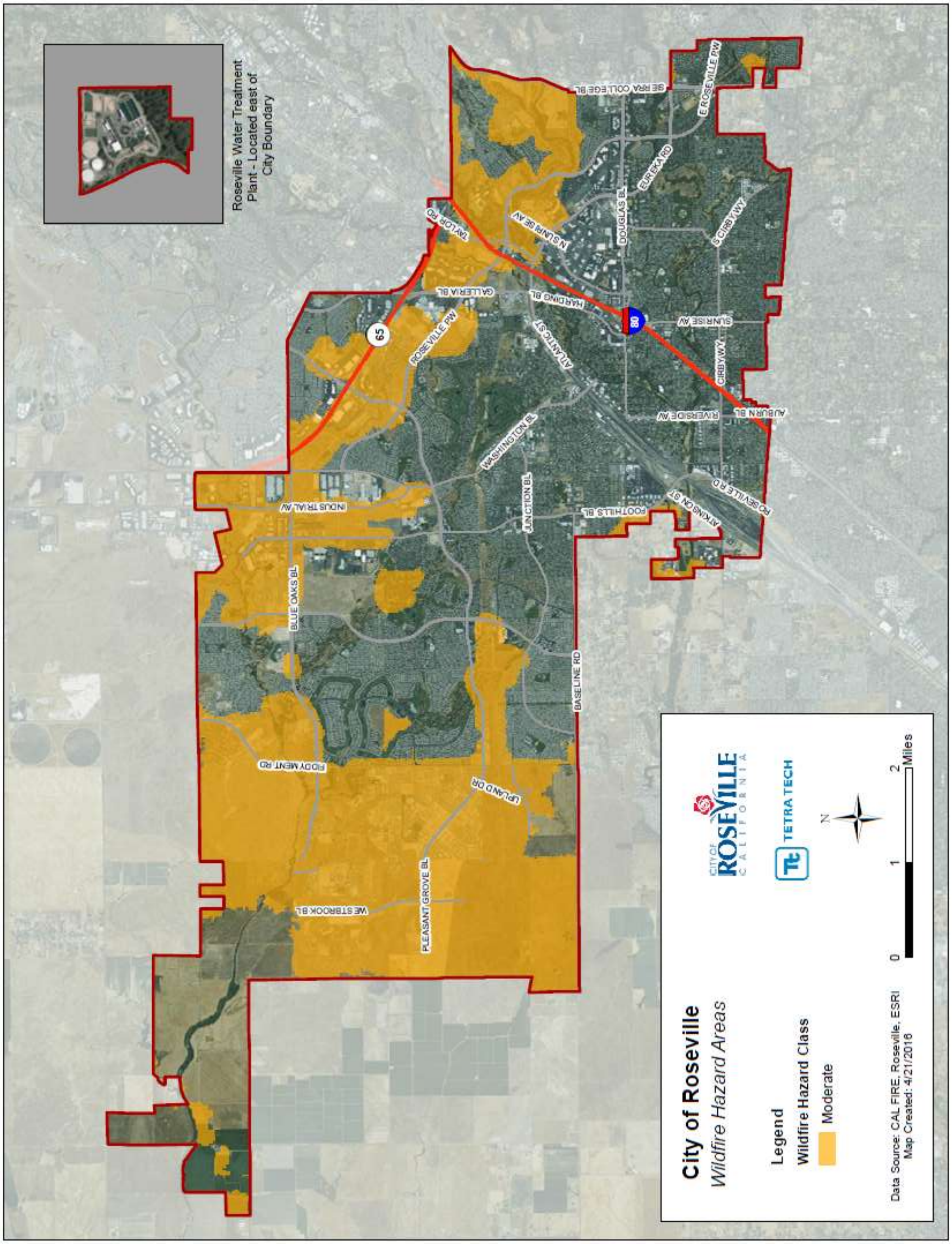



**Figure 13-4.** Fire Hazard Severity Zones in the Planning Area

### 13.2.5 Warning Time

Wildfires are typically caused intentionally or accidentally by humans. There is no way to predict when one might break out. Dry seasons and droughts greatly increase fire likelihood. If a fire breaks out and spreads rapidly, residents may need to evacuate within days or even hours. Once a fire has started, fire alerting is reasonably rapid in most cases. The spread of cellular and two-way radio communications has contributed to a significant improvement in warning time.

Since fireworks often cause brush fires, extra diligence can be taken around the Fourth of July when the use of fireworks is highest. Dry lightning may also trigger wildfires, so special attention can be paid during weather events that may trigger wildfires. Reliable National Weather Service lightning warnings are available on average 24 to 48 hours prior to a significant electrical storm. National Weather Service fire weather forecasts for the country (http://www.spc.noaa.gov/products/fire_wx) are monitored by local fire departments, including the City of Roseville Fire Department, to assess the risk for wildfire at any given time and enhance preparedness.

## 13.3 SECONDARY HAZARDS

Wildfires can generate a range of secondary effects, which in some cases may cause more widespread and prolonged damage than the fire itself. Fires can cause direct economic losses in the reduction of harvestable timber and indirect economic losses in reduced tourism. Wildfires cause the contamination of reservoirs, destroy transmission lines and contribute to flooding. They strip slopes of vegetation, exposing them to greater amounts of runoff. This in turn can weaken soils and cause major landslides several years after the wildfire. Most wildfires burn hot and for long durations that can bake soils, especially those high in clay content, thus increasing the imperviousness of the ground. This increases runoff generated by storm events, increasing the chance of flooding.

## 13.4 EXPOSURE

### 13.4.1 Population

Population could not be examined by fire hazard severity zone because census block group areas do not coincide with the fire risk areas. However, the planning team was able to create a population estimate using the structure count of buildings located within the highest-risk fire hazard severity zone for Roseville (moderate), and applying the census value for persons per household for Roseville (2.54). Using this approach, it is estimated that the population living within the moderate fire hazard severity zones is 29,178. This represents 22.7 percent of the total population for the City.

### 13.4.2 Property

Using the base mapping created to support the HAZUS-MH analyses, the planning team determined that there are 10,338 structures within the moderate fire hazard severity zones within the planning area, with the predominant use being residential. The total assessed value of these structures and their contents is $7.76 billion. This represents 26.2 percent of the total assessed value for the City.

### 13.4.3 Critical Facilities and Infrastructure

Critical facilities are public and private structures where vital community functions are conducted. If the facility is damaged or destroyed by wildfire, there could be severe consequences to public health and safety. The Roseville Fire Department, all first responders and mutual aid agencies would work to protect those facilities in areas where wildfire is a potential. Table 13-2 provides a list of critical facilities that are in potential wildfire areas.

**Table 13-2.** Critical Facilities and Infrastructure Adjacent to Potential Wildfire Areas

| Facility Type | Number |
|---|---|
| Communications Facilities | 29 |
| Utilities | 16 |
| Fire Stations | 4 |
| Hazardous Materials Facilities | 2 |
| Bridges | 21 |
| Medical | 1 |
| Government | 4 |
| Religious | 2 |
| Schools | 5 |

### 13.4.4 Environment

It can take decades or even centuries for ecosystems to recover from a wildfire, which can cause severe environmental impacts:

- **Damaged Fisheries**—Critical trout, salmon and steelhead fisheries can suffer from increased water temperatures, sedimentation, and changes in water quality.
- **Soil Erosion**—The protective covering provided by foliage and dead organic matter is removed, leaving the soil fully exposed to wind and water erosion. Accelerated soil erosion occurs, causing landslides and threatening aquatic habitats.
- **Spread of Invasive Plant Species**—Non-native woody plant species frequently invade burned areas. When weeds become established, they can dominate the plant cover over broad landscapes and become difficult and costly to control.
- **Disease and Insect Infestations**—Unless diseased or insect-infested trees are swiftly removed, infestations and disease can spread to healthy forests and private lands. Timely active management actions are needed to remove diseased or infested trees.
- **Destroyed Endangered Species Habitat**—Catastrophic fires can have devastating consequences for endangered species. For instance, the Biscuit Fire in Oregon destroyed 125,000 to 150,000 acres of spotted owl habitat.
- **Soil Sterilization**—Topsoil exposed to extreme heat can become water repellant, and soil nutrients may be lost. Some fires burn so hot that they can sterilize the soil.

## 13.5 VULNERABILITY

Structures, above-ground infrastructure, critical facilities and natural environments are all vulnerable to the wildfire hazard. There is currently no validated damage function available to support wildfire mitigation planning. Except as discussed in this section, vulnerable populations, property, infrastructure and environment are assumed to be the same as described in the section on exposure.

### 13.5.1 Population

There are no recorded incidents of loss of life from wildfires in Roseville, and the risk from wildfire has been deemed moderate by the State and the Roseville Fire Department. Given the immediate response times to reported fires, the likelihood of injuries and casualties is minimal; therefore, injuries and casualties were not estimated for the wildfire hazard.

Air pollution from wildfires can be a severe health hazard, especially for sensitive populations, including children, the elderly and those with respiratory and cardiovascular diseases. Smoke generated by wildfire consists of visible and invisible emissions that contain particulate matter (soot, tar and minerals), gases (carbon monoxide, carbon dioxide, nitrogen oxides), and toxics (formaldehyde, benzene). Emissions from wildfires depend on the type of fuel, the moisture content of the fuel, the efficiency of combustion, and the weather. Public health impacts associated with wildfire include difficulty in breathing, odor, and reduction in visibility.

Wildfire may also threaten the health and safety of those fighting the fires. First responders are exposed to the dangers from the initial incident and after-effects from smoke inhalation and heat stroke.

### 13.5.2 Property

Loss estimations for the wildfire hazard are not based on modeling utilizing damage functions, because no such damage functions have been generated. Instead, loss estimates were developed representing 10 percent, 30 percent and 50 percent of the assessed value of exposed structures. This allows emergency managers to select a range of economic impact based on an estimate of the percent of damage to the general building stock. Damage in excess of 50 percent is considered to be substantial by most building codes and typically requires total reconstruction of the structure. Table 13-3 lists the loss estimates for the exposed building stock.

**Table 13-3.** Potential Loss Estimates for the Wildfire Hazard

| | Building Count | Assessed Value | 10% Damage | 30% Damage | 50% Damage |
|---|---|---|---|---|---|
| **Residential** | 9,792 | $4,811,813,630 | $481,181,363 | $1,443,544,089 | $2,405,906,815 |
| **Commercial** | 322 | $2,309,864,426 | $230,986,443 | $692,959,328 | $1,154,932,213 |
| **Industrial** | 108 | $365,734,419 | $36,573,442 | $109,720,326 | $182,867,209 |
| **Agricultural** | 0 | $0 | $0 | $0 | $0 |
| **Religion** | 5 | $33,408,645 | $3,340,865 | $10,022,594 | $16,704,323 |
| **Government** | 52 | $79,624,825 | $7,962,482 | $23,887,447 | $39,812,412 |
| **Education** | 59 | $175,116,040 | $17,511,604 | $52,534,812 | $87,558,020 |
| **Total** | **10,338** | **$7,775,561,985** | **$777,556,198** | **$2,332,668,595** | **$3,887,780,992** |

### 13.5.3 Critical Facilities and Infrastructure

Critical facilities of wood frame construction are especially vulnerable during wildfire events. A detailed vulnerability analysis for all critical facilities is on file with City staff and will not be published for review due to security reasons.

In the event of wildfire, there would likely be little damage to most infrastructure. Most roads and railroads would be without damage except in the worst scenarios. Power lines are the most at risk from wildfire because most poles are made of wood and susceptible to burning. Fires can create conditions that block or prevent access and can isolate residents and emergency service providers. Wildfire typically does not have a major direct impact on bridges, but it can create conditions in which bridges are obstructed. Many bridges in areas of high to moderate fire risk are important because they provide the only ingress and egress to large areas and in some cases to isolated neighborhoods.

## 13.6 FUTURE TRENDS IN DEVELOPMENT

Roseville is expected to grow considerably in the next 10 years. The moderate potential for wildfire in Roseville is not likely to lessen or prohibit development in Roseville.

The wildfire risk exposure with in the planning area increased by 54% at an increase in value of over $3 billion dollars. This increase in risk exposure can be attributed to the vast extent and location of the moderate fire severity zone within Roseville, and a population growth rate of 14.5% over the performance period of the prior plan. The planning area also saw in increase in assessed valuation of real property of over 34%. This increase in value can be attributed to the continued economic recovery from the 2008 economic down turn that had a significant impact on the State of California as well as the City of Roseville. Any increase in asset value will increase risk quotient when risk is being measured by looking at assets exposed as is with this Plan. However, the vulnerability of this new exposure should be considered to be low due to the application of strong building code standards that are contained within the California Fire Code.

## 13.7 REVIEW OF EXISTING PROGRAMS, PLANS AND ORDINANCES

The City of Roseville and Roseville Fire Department have adopted a number of policies, programs, plans and ordinances to meet the following fire protection goals detailed in the Roseville General Plan:

- Protect against the loss of life, property, and the environment by appropriate prevention and suppression measures.
- Provide emergency services in a well-planned, cost-effective, and professional manner through the best use of equipment, facilities and training available.

### 13.7.1 Fire Prevention Programs and Standards

#### Roseville Fire Prevention

Roseville fire prevention includes the fire marshal, hazardous materials officer, two senior fire inspectors, four fire inspectors and one public safety community relations coordinator (shared with the Police Department). The key role of these staff members is improving the safety and quality of life of the citizens of Roseville.

The Roseville Fire Department has an extensive work program to promote and implement fire prevention in developed and undeveloped areas of the City. These programs promote or provide the following services:

- Regular inspection and code enforcement
- Fire-safe roofing requirements
- Adequate access to and fire breaks adjoining open space areas
- Early warning devices such as automatic detection and reporting devices and smoke detectors
- Automatic fire suppression systems such as fire sprinkler systems
- Public education and information
- Code and ordinance development and updates
- Training and planning
- Fire investigation and data analysis
- Hazardous materials process and inspection.

#### Development Review Process

Section 16.16.050 of the Roseville Municipal Code specifies that all development plans be reviewed and approved by the Roseville Fire Department prior to construction. The code section states the following:

> "…complete plans, specifications, and information for new construction, remodeling, tenant improvements, or additions to buildings shall be submitted for review and approval prior to construction to the Chief or his/her designated representative having jurisdiction. Plan approval shall be required prior to the issuance of a Fire Department Inspection Record Card for those instances where such card may be

required. In addition to the submittal of hard copy plan sets, a digitized copy of the approved drawings for new buildings shall be submitted to the Fire Department for pre-fire documentation purposes. Said copy shall be submitted in an approved format."

The Roseville Fire Department is an integral part of the development planning and review process, with specific emphasis on the provision of access to lands for firefighting purposes, street access to all structures, fire prevention programs, and the enforcement of building and fire codes and City ordinances. The Fire Department also evaluates water supply for firefighting and fire suppression systems.

#### California Building Code

Roseville Municipal Code Title 16 has been adopted to enforce the 2013 California Building Code for all construction in the City. Roofing and building materials, construction techniques, wiring standards, and fire detection/warning devices are defined and enforced to minimize the risk of structural fire damage.

#### California Fire Code

Chapter 16.16 of the Roseville Municipal Code includes adoption of, reference to and amendments to the Uniform Fire Code. Last amended in 2013, the code provides specifications and standards for fire safety. Early warning devices such as automatic sprinkler systems, automatic detection and reporting devices, and smoke detectors are required as preventative measures to reduce the risk of fire. The code also states the amount of water needed for fire protection.

#### Weed Abatement Ordinance

Chapter 9.20 of the Roseville Municipal Code includes provisions for the abatement of weeds, dirt, rubbish, and rank growths. The ordinance specifies that weeds be eradicated by property owners to prevent the presence of fire fuels. Properly implemented, the ordinance ensures accessibility of firefighters to open space areas and creation of firebreaks that slow the spread of fire.

### 13.7.2 Adopted Service Levels for Response Time

#### Specific Plans

Roseville's specific plan process is used by the Fire Department to plan future fire station locations and response times based on the circulation systems, and to ensure that revenues from the Fire Service Construction Tax and General Fund are sufficient to provide fire protection services to the area and cumulatively city-wide. The Fire Department is involved in every specific plan process from the initial planning process to adoption, construction, and ongoing inspections.

Should there be significant fire-related concerns, the Fire Department may require supplemental analysis as a condition of the specific plan. For example, a mitigation measure for adoption of the Stoneridge Specific Plan required the preparation of the Stoneridge Plan Wildfire Safety Plan. The Safety Plan analyzes the factors contributing to the risk of wildfire in Stoneridge and mitigation measures to enhance fire prevention.

#### Capital Improvement Program

The Capital Improvement Program is a five-year plan updated annually with the City's fiscal year budget that includes all public projects under construction and planned within the five-year time frame. The Capital Improvement Program allocates funds from each of the revenue sources collected to pay for City facilities, services, and programs. Fire Department stations and apparatus are included in the Capital Improvement Program along with the status of the Fire Service Construction Tax current and projected revenues to ensure that fire stations are built and apparatus is procured to keep pace with development.

### Fire Service Construction Tax

The Fire Service Construction Tax, approved by Roseville voters in 1984, requires that 1/2 percent of the value of any new construction be collected as part of the building permit fee and designated for fire suppression and protection. The funds must be spent on capital improvements such as fire stations, fire apparatus, and other Fire Department equipment. The funds may not be allocated to expenses such as salaries or training. The City's newer Specific Plan Areas include provisions that extend this tax collection to the buildout of each Plan Area.

### Dedications, Fees, and Exactions

The City of Roseville, through the specific plan process, and if necessary as part of individual project approvals, requires the dedication of property and payment of fees or exactions. The Fire Department reviews the project proposals and may require dedication of land or payment of appropriate fees and exactions to help offset municipal costs for fire-related facilities and services. The City of Roseville requires the dedication of fire station sites through the specific plan process. Should revenues be deemed insufficient to fully support fire services, additional assessments may be required to ensure adequate protection in the future. For example, recent specific plans through development agreements require owners to pay a special assessment for public safety, including fire protection, as part of their annual property tax bills.

### Water System Master Plan

The City of Roseville Environmental Utilities Department maintains and updates a distribution system model to ensure adequate water sources, quantities and water pressure, along with emergency backup systems to ensure maximum firefighting capacity.

### Interagency Agreements

The City of Roseville Fire Department participates in the statewide mutual aid agreement, whereby the Fire Department will respond to any other department or district should the need arise. In addition, the Department maintains mutual aid agreements with other agencies, including agreements through Cal OES Mutual Aid Region IV and the Placer County Operational Area.

## 13.7.3 Annual Monitoring of Fire Department Service Levels

### Program Performance Measures

The Roseville Fire Department compiles program performance measures as part of the City's annual budget to monitor service levels and address deficiencies before they become serious. The annual evaluation includes establishment of goals and objectives, formulation of key indicators relating to activities, and efficiencies that can be monitored throughout the year, along with a line item cost for the programs and objectives. The Fire Department budget and program performance measures include a review of fire service levels and department goals.

### National Fire Incident Reporting System

The National Fire Incident Reporting System requires local fire departments to report fire service data. Performance indicators are routinely reviewed to evaluate capability and coverage, demand for service and trends. Key components of the system include GIS and mapping, fire incident reporting, emergency medical management, personnel and training management, inspection management, and equipment and supplies inventory management. Fire Department incident data are input into a computer database and submitted to the State Fire Marshal's Office per state standards. The data are also used by the City of Roseville to evaluate operations and track trends in fire service within the City.

## 13.7.4 Personnel Training

The Roseville Fire Department Training program includes dedicated staff and facilities to ensure that personnel are properly trained and updated as new techniques and equipment become available. The Fire Training staff provides training for all firefighters within the department at the City's state of the art training center (Figure 13-5). This training is the most important ingredient to the readiness of Roseville firefighters and emergency responders to fulfill their assigned mission. The Training Center is also used by other fire departments and local agencies on a fee-for-use basis. The training staff consists of one fire training officer.

**Figure 13-5.** City of Roseville Fire Training Center

## 13.7.5 Fire Investigation

Fires in the City of Roseville are investigated by Roseville Fire Department investigators. The program ensures proper investigation of the cause, origin, and circumstances of each fire; collects and preserves evidence; coordinates with authorities in detection, apprehension and prosecution of arsonists; and pursues each investigation to conclusion. Information is reported to the State Fire Marshal for inclusion in annual state reports.

### 13.7.6 Comprehensive Emergency Medical Services

The state requires a Multi-Hazard Function Plan that details response strategies for all types of emergencies. The plan addresses interagency cooperation, emergency functions, continuity of government, and public awareness. In addition, the plan provides for the operation of police, fire and health services, as well as transportation alternatives in the event of a multi-hazard emergency. The City's Emergency Plan conforms with the Standardized Emergency Management System and is approved by the City Council and Cal OES.

### 13.7.7 Accreditation Recommendation

The Commission on Fire Accreditation International provides a comprehensive system of fire and emergency service evaluation that helps local governments determine their risks and fire safety needs, evaluate the performance of the organizations involved and provide a method for continuous improvement. The self-assessment process covers 10 categories: governance and administration; assessment and planning; goals and objectives; financial resources; programs; physical resources; human resources; training and competency; essential resources; and external systems relations. Within these categories are several related performance indicators and core competencies that the agency must address. In completing the self-assessment process, agencies must develop a strategic or master plan as well as a standard of response coverage document.

The Roseville Fire Department staff spent more than four years on the self-assessment and preparing the materials for the accreditation. In June 2005 the Commission on Fire Accreditation International recommended accreditation for the Roseville Fire Department. Reaccreditation was obtained in 2010. Only 220 departments in the world are accredited, and only 16 in California.

## 13.8 SCENARIO

As the future growth of Roseville expands into wildland-urban interface areas, a wildfire in Roseville has the potential to cause significant damage to exposed areas. A major wildfire might begin with a wet spring, adding to fuels already present on the forest floor. Flashy fuels would build throughout the spring. The summer could see the onset of insect infestation. A dry summer could follow the wet spring, exacerbated by dry hot winds. Carelessness with combustible materials or a tossed lit cigarette, or a lighting storm could trigger a multitude of small isolated fires.

The embers from these smaller fires could be carried miles by hot, dry winds. The deposition zone for these embers would be deep in the forests and wildland-urban interface zones. Fires that start in flat areas move more slowly, but wind still pushes them. It is not unusual for a wild fire pushed by wind to burn the ground fuel and later climb into the crown and reverse its track. This is one of many ways that fires can escape containment, typically during periods when response capabilities are overwhelmed. These new small fires would likely merge. Suppression resources would be redirected from protecting the natural resources to saving remote subdivisions.

The worst-case scenario would include an active fire season throughout the American west, spreading resources thin. Firefighting teams would be exhausted or unavailable. Many federal assets would be responding to other fires that started earlier in the season. While local fire districts would be useful in the wildland-urban interface areas, they have limited wildfire capabilities or experience, and they would have a difficult time responding to the ignition zones. Even though the existence and spread of the fire is known, it may not be possible to respond to it adequately, so an initially manageable fire can become out of control before resources are dispatched.

To further complicate the problem, heavy rains could follow, causing flooding and landslides and releasing tons of sediment into rivers, permanently changing floodplains and damaging sensitive habitat and riparian areas. Such a fire followed by rain could release millions of cubic yards of sediment into streams for years, creating new floodplains and changing existing ones. With forests removed from the watershed, stream flows could double.

Floods that had been expected every 50 years may occur every couple of years. With streambeds unable to carry the increased discharge because of increased sediment, floodplain elevations would increase.

## 13.9 ISSUES

The major issues for wildfire are as follows:

- Public education and outreach to people living in or near the fire hazard zones should include information about and assistance with mitigation activities such as defensible space, and advance identification of evacuation routes and safe zones.
- Wildfires could cause landslides as a secondary natural hazard.
- Climate change could affect the wildfire hazard.
- Future growth into wildland-urban interface areas should continue to be managed.
- The Fire Department needs to continue to train on wildland-urban interface type events.
- Expand the City's vegetation management activities. This would include enhancement through expansion of the target areas as well as additional resources.
- Expand certifications and qualifications for Fire Department personnel. Ensure that all firefighters are trained in basic wildfire behavior, basic fire weather, and that all company officer and chief level officers are trained in the wildland command and strike team leader level.

# 14. HUMAN HEALTH HAZARDS

## 14.1 GENERAL BACKGROUND

Human health hazards include transmittable diseases and environmental hazards such as extreme weather. The following sections describe commonly recognized human health hazards.

### 14.1.1 Influenza

Influenza, commonly called flu, is a viral infection that attacks the respiratory system. Epidemics of the flu typically occur in the fall and winter. The U.S. Centers for Disease Control and Prevention (CDC) estimates that the 2014-2015 flu season for California was moderately severe, with high levels of outpatient illness and influenza-associated hospitalizations, particularly among adults 65 and older. The California Department of Public Health received 42,812 reports of cases tested positive for influenza.

Laboratory-confirmed influenza-associated deaths among patients under 65 have been reportable in California since the 2009 influenza pandemic. For the 2014-2015 flu season, there were 78 fatal cases of influenza-related illness statewide among those under 65. This number is significantly down from the 404 fatal cases during the 2013-2014 influenza season.

#### H1N1

In April 2009, the World Health Organization (WHO) issued a health advisory on an outbreak of influenza-like illness caused by a new subtype of influenza A (A/H1N1) in Mexico and the United States.

The disease spread rapidly, with the number of confirmed cases rising to 2,099 by May 7, despite aggressive measures taken against the disease by the Mexican government. On June 11, the WHO declared an H1N1 pandemic, marking the first global pandemic since the 1968 Hong Kong flu. On October 25, the U.S. declared H1N1 a national emergency. On August 10,

**DEFINITIONS**

**Anthrax**—A disease caused by the bacteria *Bacillus anthracis*. Most forms of the disease are lethal, and it affects both humans and other animals. There are effective vaccines against anthrax, and some forms of the disease respond well to antibiotic treatment.

**Epidemic**—The spread of an infectious disease beyond a local population, reaching people in a wider geographical area. Several factors determine whether an outbreak will become an epidemic: the ease with which the disease spreads from vectors, such as animals, to people and the ease with which it spreads from person to person.

**Influenza**—A viral infection that attacks the respiratory system; commonly called flu.

**H1N1 "Swine Flu"—**A subtype of the Influenza A virus that has mutated into various strains including the Spanish Flu strain, mild human flu strains, endemic pig strains, and various strains found in birds.

**H5N1/H7N9 "Bird Flu"—**A subtype of the Influenza A virus that causes the flu commonly known as "avian influenza" or "bird flu.

**Pandemic**—A worldwide epidemic.

**Vector—**An organism (such as an insect or rodent) that transmits pathogens that cause disease

**Vector-Borne Illness**—Diseases transmitted to people from insects and other animals. These include, but are not limited to, Hanta Virus, Plague, Tularemia, Lyme Disease, West Nile Virus and the Zika Virus.

**Viral Hemorrhagic Fever (VHF)-—**A group of illnesses caused by a viral infection (usually restricted to a specific geographic area) resulting in fever and gastrointestinal symptoms followed by capillary hemorrhage. These include, but are not limited to, Ebola, Dengue Fever and Yellow Fever.

**Severe Acute Respiratory Syndrome (SARS)**-—An infectious respiratory illness characterized by fever, dry cough, and breathing difficulties, often accompanied by headache and body aches; believed to be caused by a coronavirus.

**Smallpox**—An infection caused by the variola virus, a member of the poxvirus family. Throughout history, smallpox has been responsible for epidemics that resulted in large numbers of deaths. The last outbreak was in 1977. The disease was declared eradicated in 1980.

2010, the WHO International Health Regulations Emergency Committee declared an end to the 2009 H1N1 pandemic globally.

H1N1 viruses and seasonal influenza viruses are co-circulating in many parts of the world. It is likely that the 2009 H1N1 virus will continue to spread for years to come, like a regular seasonal influenza virus.

## H5N1/H7N9

The highly pathogenic H5N1avian influenza virus is an influenza A subtype that occurs mainly in birds, causing high mortality among birds and domestic poultry. Outbreaks of highly pathogenic H5N1 among poultry and wild birds are ongoing in a number of countries.

H5N1 virus infections of humans are rare and most cases have been associated with direct poultry contact during poultry outbreaks. Rare cases of limited human-to-human spread of H5N1 virus may have occurred, but there is no evidence of sustained human-to-human transmission. Nonetheless, because all influenza viruses have the ability to change and mutate, scientists are concerned that H5N1 viruses one day could be able to infect humans more easily and spread more easily from one person to another, potentially causing another pandemic.

While the H5N1 virus does not now infect people easily, infection in humans is much more serious when it occurs than is infection with H1N1. More than half of people reported infected with H5N1 have died. Figure 14-1 summarizes human cases of the virus through 2013.

*Source: World Health Organization*

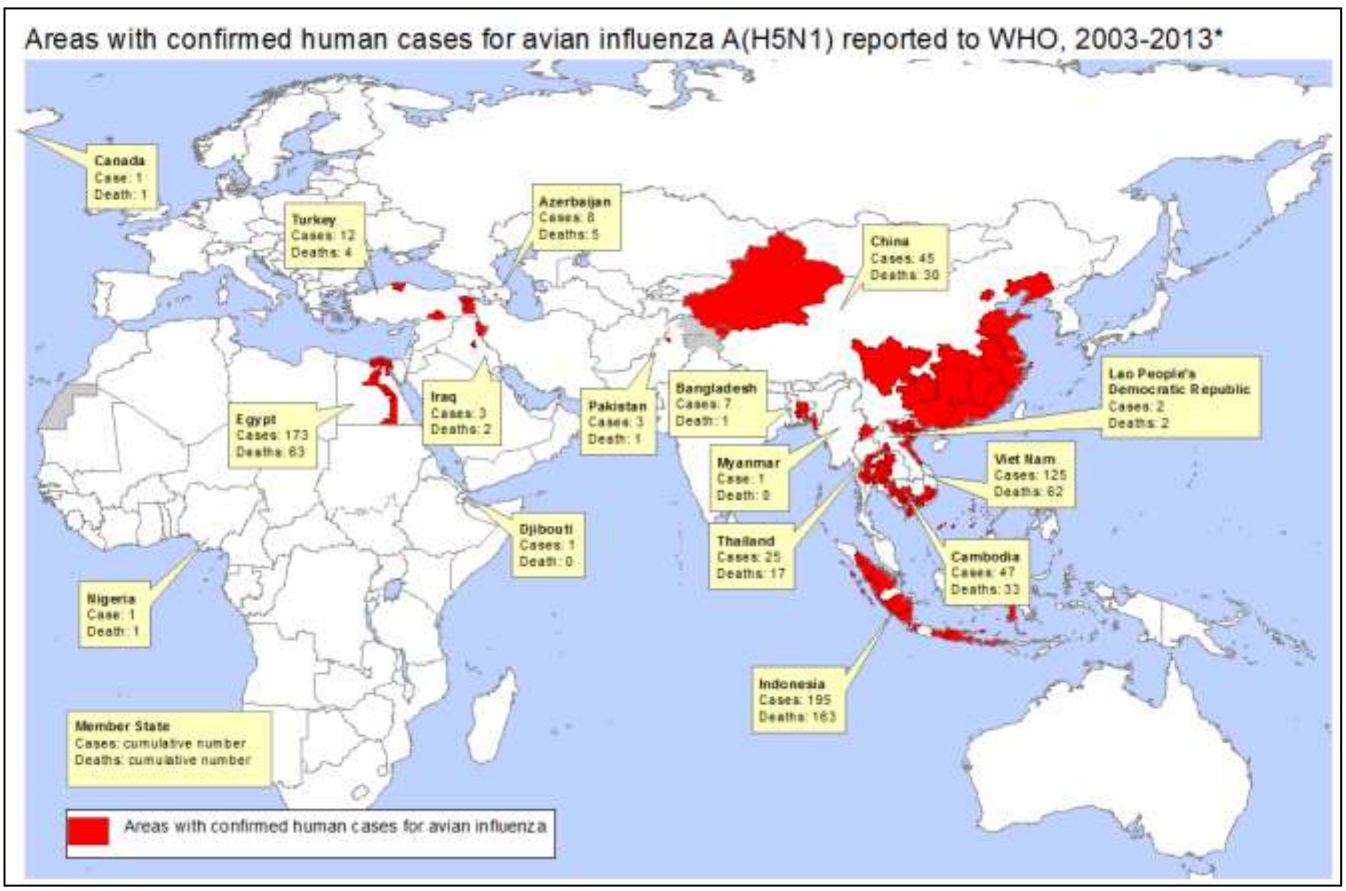



**Figure 14-1.** Areas with Confirmed H5N1 2003-2013

Infections in humans and poultry by a new avian influenza A virus (H7N9) continue to be reported in China. While mild illness in human cases has been seen, most patients have had severe respiratory illness and some have died. The only case identified outside of China was recently reported in Malaysia.

Source investigation by Chinese authorities is ongoing. Many of the people infected with H7N9 are reported to have had contact with poultry. However some cases reportedly have not had such contact. Close contacts of confirmed H7N9 patients are being followed to determine whether any human-to-human spread of H7N9 is occurring. No sustained person-to-person spread of the H7N9 virus has been found at this time. However, based on previous experience with avian flu viruses, some limited human-to-human spread of this the virus would not be surprising.

As of the publication of this document, H5N1 and the new H7N9 virus have not been detected in people or birds in the United States

## 14.1.2 Smallpox

Smallpox is a sometimes fatal infectious disease. There is no specific treatment, and the only prevention is vaccination. Symptoms include raised bumps on the face and body of an infected person. The oldest evidence of smallpox was found on the body of Pharaoh Ramses V of Egypt who died in 1157 BC.

Outbreaks have occurred from time to time for thousands of years, but the disease is now eradicated after a successful worldwide vaccination program. The last case of smallpox in the United States was in 1949. The last naturally occurring case in the world was in Somalia in 1977. As of the publication of this document, there are no cases of smallpox in the world. Currently only two locations in the world have samples of smallpox: the CDC in Atlanta and the Ivanovsky Institute of Virology in Russia.

After the disease was eliminated, routine vaccination among the general public was stopped. Therefore, any cases of smallpox in the world would be considered an immediate international emergency. In 2003, the Wisconsin Division of Public Health conducted an investigation of state residents who became ill after having contact with prairie dogs. The cases appeared in May and June of 2003, and symptoms in the human cases included fever, cough, pox-like rash and swollen lymph nodes. CDC laboratory test results indicated that the cause of the human illness was Monkeypox, an orthopox virus that could be transmitted by prairie dogs. This outbreak, and the potential use of smallpox as a weapon of bioterrorism, brought the fear of smallpox back to the forefront of the population. A detailed nationwide smallpox response plan created at the end of 2002 is designed to quickly contain a potential outbreak and vaccinate the population.

## 14.1.3 Viral Hemorrhagic Fevers

Viral hemorrhagic fevers (VHFs) are a group of illnesses caused by several distinct families of viruses. VHF describes a multisystem syndrome (multiple systems in the body are affected). Characteristically, the overall vascular system is damaged and the body’s ability to regulate itself is impaired. These symptoms are often accompanied by hemorrhage (bleeding); however, the bleeding itself is rarely life-threatening. While some types of hemorrhagic fever viruses can cause relatively mild illnesses, many cause severe, life-threatening disease.

The viruses that cause VHFs are distributed over much of the globe. However, because each virus is associated with one or more particular host species, the virus and the disease it causes are usually seen only where the host species live. Some hosts, such as the rodent species carrying several of the New World arenaviruses, live in geographically restricted areas. Therefore, the risk of getting VHFs caused by these viruses is restricted to those areas. Other hosts range over continents, such as the rodents that carry viruses that cause the hantavirus pulmonary syndrome in North and South America, or the rodents that carry viruses that cause hemorrhagic fever with renal syndrome in Europe and Asia.

## Ebola

The 2014 Ebola virus outbreak was unprecedented in geographical reach and impact on health care systems across the globe. This was the largest and deadliest Ebola virus outbreak ever recorded. It was the first time the West African countries of Guinea, Liberia, Sierra Leone, Nigeria, Mali, and Senegal saw the virus. Ebola is more common in Central African countries, such as the Democratic Republic of Congo and Sudan, where it was first discovered in 1976. It was also the first time that Ebola made it to the United States and Europe, prompting world-wide preparedness and response efforts. Figure 14-2 shows areas that ultimately were affected. The outbreak was closely monitored and traveler screenings were developed for those returning from West Africa.

*Source: World Health Organization*

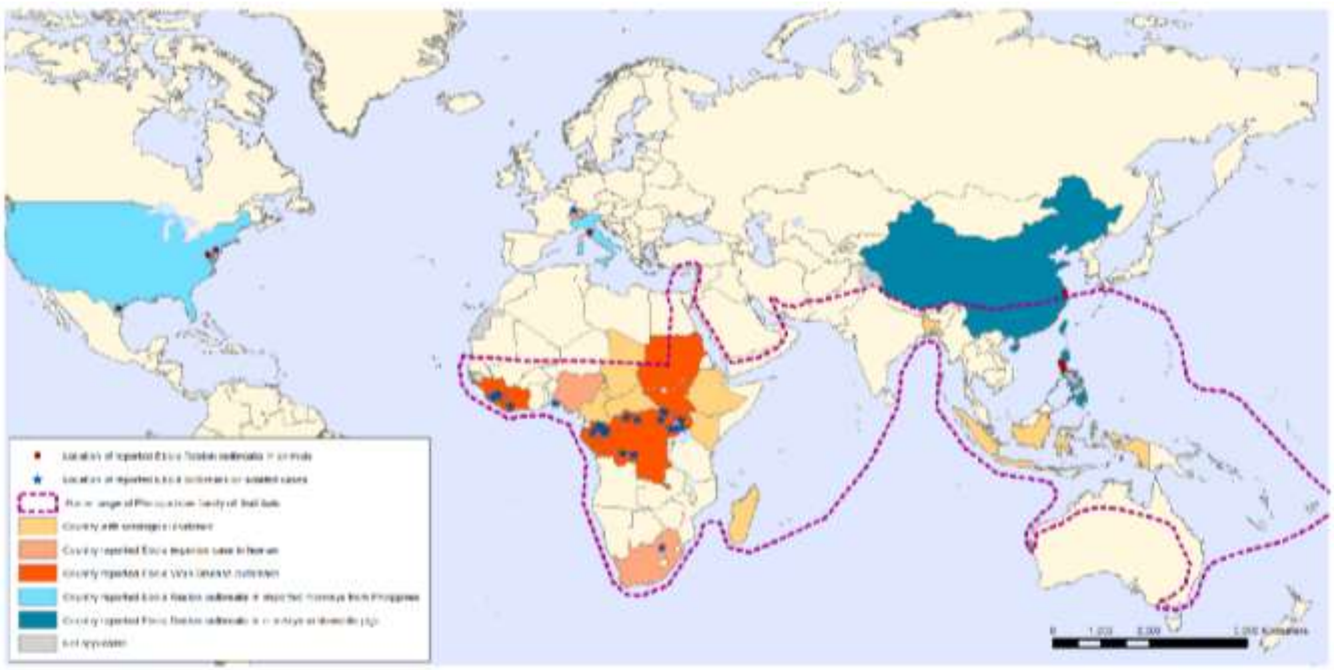


**Figure 14-2.** 2014 Distribution of Ebola Virus Outbreaks in Humans and Animals

In August 2014 two U.S. healthcare workers returned to the United States for treatment for Ebola. The case that most impacted the health care system in the United States was a patient diagnosed with Ebola in Dallas, Texas who died due to Ebola in October 2014. The nurse who provided care for him later tested positive for Ebola. This caused responses across the country from hospitals, emergency medical teams, fire departments and public health agencies to enhance isolation precautions, develop emergency policies, train with personal protective equipment and conduct multi-agency emergency exercises in case the spread of Ebola became a pandemic.

Before the 2014 outbreak, only 2,200 cases of Ebola had been recorded and 68 percent were fatal. Twenty percent of new Ebola infections were linked to burial traditions in which family and community members wash and touch dead bodies before burial. In Guinea, 60 percent of Ebola infections were linked to traditional burial practices. From 2014 to the publishing of this document, there have been no confirmed cases of Ebola in California.

## Hantavirus

Hantavirus is a rodent-borne disease and one of the most important in California. It was discovered in 1993 in the southwestern U.S., and it has determined that the disease had been present, but unrecognized, at least as early as 1959. It has now been identified in over half of the states of the U.S. In 2013, seven cases of Hantavirus occurred in Yosemite National Park. Hantavirus has also been detected in the local Sierra Nevada region.

The hantavirus spreads when individuals touch or eat something contaminated with infected rodent urine, droppings or saliva. It can also be transmitted through aerosolization, which occurs when dried materials contaminated by infected rodent droppings or saliva are disturbed and brought up into the air and inhaled. Infected persons first develop symptoms one to two weeks, and up to five weeks, after exposure. Early symptoms include fever, headache, and muscle aches, especially in the thighs, hips, back, and shoulders. Other early symptoms include dizziness, chills, nausea, vomiting, diarrhea, and abdominal pain. After two to seven days of these symptoms, patients develop breathing difficulties that range from cough and shortness of breath to severe respiratory failure. Approximately 40 percent of hantavirus patients die from the disease.

From 2011 to the publishing of this document there have been 16 cases of hantavirus in California, including one case in Placer County.

## 14.1.4 Plague

Plague is a potentially fatal infectious disease of animals and humans caused by the *Yersinia pestis* bacterium. People usually get plague from being bitten by a flea that is carrying the plague bacterium or by handling an infected animal. Today, modern antibiotics are effective against plague, but if an infected person is not treated promptly, the disease is likely to cause illness or death.

Plague is an ancient disease but outbreaks throughout the world continue. Major plague epidemics occurred in the middle of the sixth century in Egypt, Europe and Asia; during the 14th century in Europe, following caravan routes; in the 18th century in Austria and the Balkans; and in the late 19th century worldwide (but mostly in China and India). Manchuria in 1910–1911 witnessed about 60,000 deaths due to pneumonic plague with a repeat in 1920–1921. A minor outbreak occurred as recently as the summer of 1994 in Surat, India, closely following an earthquake in September 1993. Globally, the WHO reports 1,000 to 3,000 cases of plague every year. Monitoring of mammals routinely occurs in California to mitigate potential plague (see Figure 14-3).

In North America, plague is found in certain animals and their fleas from the Pacific Coast to the Great Plains, and from southwestern Canada to Mexico. The last urban plague epidemic in the United States occurred in Los Angeles in 1924-25. Since then, human plague in the U.S. has occurred as mostly scattered cases in rural areas (an average of 10 to 15 persons each year per the CDC). Most human cases in the United States occur in northern New Mexico, northern Arizona, southern Colorado, California, southern Oregon, and far western Nevada.

From 2011 to the publishing of this document, there has been one case of plague in California, which occurred in Yosemite National Park.

## 14.1.5 Tick-Borne Disease

Ticks are small, insect-like creatures most often found in naturally vegetated areas. They feed by attaching to animals and humans, sticking their mouthparts into the skin, and sucking blood for up to several days. Ticks do not fall from trees, jump or fly. Most species are found on wild grasses and low plants. Adult ticks wait at the ends of grass or other foliage for a host to brush by so they may attach. Sometimes ticks carry bacteria or viruses that can be transmitted to a person while the tick is attached and feeding. There are 47 species of ticks in California, but only eight are known to commonly bite humans:

- Western blacklegged tick (*Ixodes pacificus*)
- American dog tick (*Dermacentor variabilis*)
- Pacific Coast tick (*Dermacentor occidentalis*)
- Wood tick (*Dermacentor andersoni*)
- Brown dog tick (*Rhipicephalus sanguineus*)
- *Ornithodoros hermsi*
- *Ornithodoros parkeri*
- *Ornithodoros coriaceus.*

*Source: California Department of Public Health*

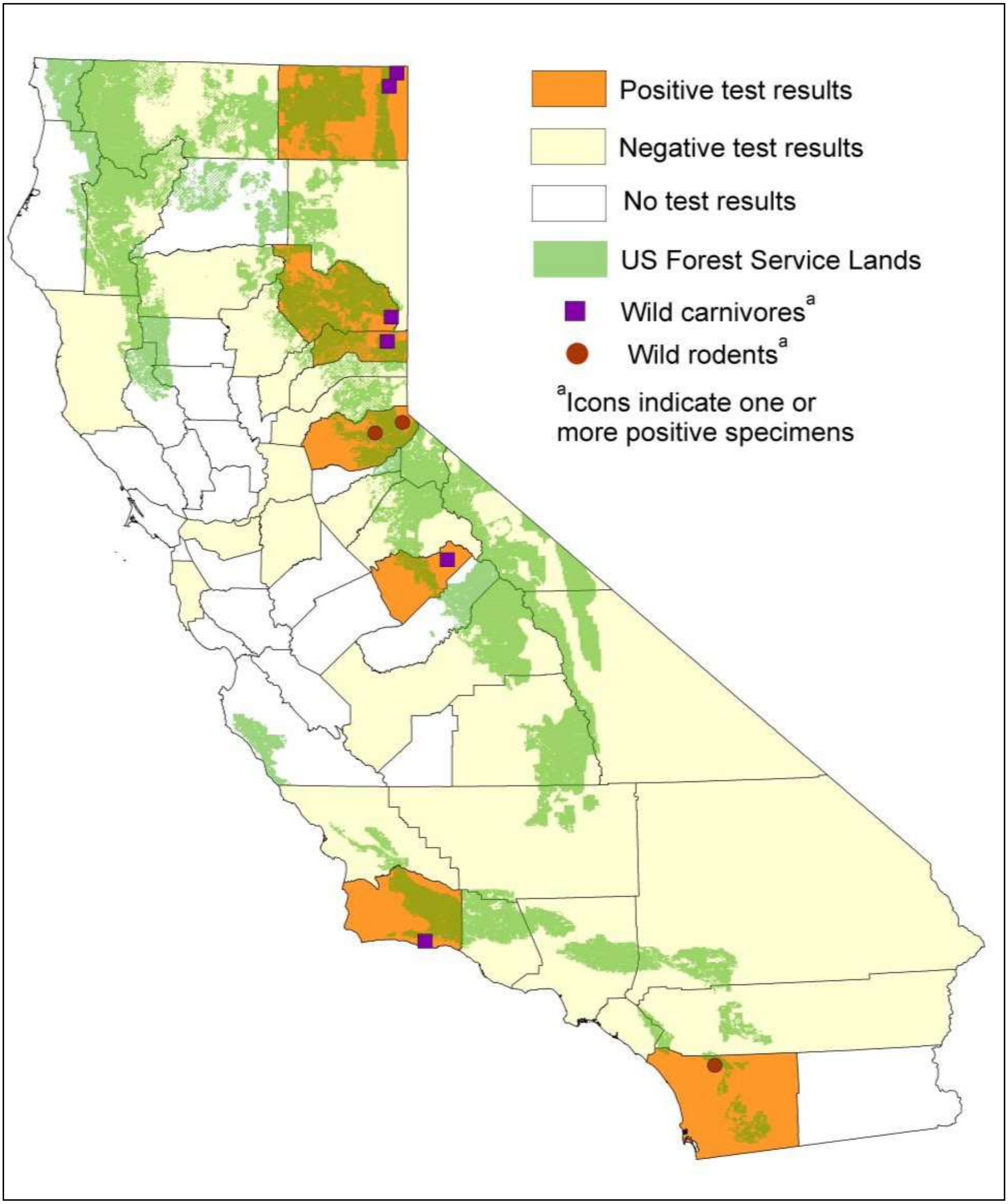



**Figure 14-3.** California 2014 *Yersinia Pestis* Results in Tested Mammals by County

### Tularemia

Tularemia, named after Tulare County in California where it was first described in 1911, is a tick-borne disease of animals and humans caused by the bacterium *Francisella tularensis*. Tularemia is similar to plague, but is typically spread differently. While plague is usually spread to humans by fleas, humans usually become infected with Tularemia by tick and deer fly bites, skin contact with infected animals, ingestion of contaminated water or meat, or inhalation of contaminated dusts or aerosols. Symptoms vary depending upon the route of infection.

Rabbits, hares, and rodents are especially susceptible and often die in large numbers during outbreaks. Although Tularemia can be life-threatening, most infections can be treated successfully with antibiotics. Steps to prevent Tularemia include use of insect repellent, wearing gloves when handling sick or dead animals, and not mowing over dead animals. In the United States, naturally occurring infections have been reported from all states except Hawaii. From 2011to the publishing of this document there have been 11 cases of Tularemia in California.

### Lyme Disease

Lyme disease, named after the city in Connecticut where it was first identified in 1975, is a tick-borne disease caused by the bacterium *Borrelia burgdorferi*, which normally lives in mice, squirrels and other small animals. It is transmitted among these animals and to humans through the bites of certain species of ticks. In the northeastern and north-central United States, the black-legged tick (or deer tick, *Ixodes scapularis*) transmits Lyme disease. In the Pacific coastal United States, the disease is spread by the western black-legged tick (*Ixodes pacificus*). Other major tick species found in the United States have not been shown to transmit the disease.

Typical symptoms include fever, headache, fatigue, and a skin rash. If left untreated, infection can spread to joints, the heart, and the nervous system. Lyme disease is diagnosed based on symptoms, physical findings (e.g., rash), and the possibility of exposure to infected ticks. Laboratory testing is helpful in later stages of the disease. Most cases of Lyme disease can be treated successfully with a few weeks of antibiotics. Steps to prevent Lyme disease include using insect repellent, removing ticks promptly, landscaping, and integrated pest management. The ticks that transmit Lyme disease can occasionally transmit other tick-borne diseases as well. From 2011 to the publishing of this document, there have been 458 cases of Lyme disease in California.

### Rocky Mountain Spotted Fever

Rocky Mountain spotted fever is a potentially fatal tick-borne disease caused by the bacterium *Rickettsia rickettsii*. It is transmitted to humans by the bite of an infected American dog tick (*Dermacentor variabilis*), Rocky Mountain wood tick (*Dermacentor andersoni*), or brown dog tick (*Rhipicephalus sanguineus)*.

Typical symptoms include fever, headache, abdominal pain, vomiting, and muscle pain. A rash may also develop, but is often absent in the first few days, and in some patients, never develops. Rocky Mountain spotted fever can be a severe or even fatal illness if not treated in the first few days of symptoms. It can be treated successfully with a few weeks of antibiotics. Steps to prevent the disease include using insect repellent, removing ticks promptly, landscaping, and integrated pest management. The ticks that transmit Rocky Mountain spotted fever can occasionally transmit other tick-borne diseases as well. From 2011to the publishing of this document there have been 44 cases of Rocky Mountain spotted fever in California.

## 14.1.6 Mosquito-Borne Disease

Many of the 48 species of mosquitoes in California can carry disease. The City of Roseville actively supports the Placer County public outreach campaign and task force about the potential for mosquito-borne disease.

## Malaria

Malaria is a sometimes fatal mosquito-borne disease caused by a parasite that commonly infects the *Anopheles* mosquito, which feeds on humans. People who contract malaria are typically very sick with high fevers, chills, and flu-like illness. Although malaria can be fatal, illness and death can usually be prevented.

On average 1,500 cases of malaria are diagnosed in the United States each year. The vast majority are in travelers and immigrants returning from countries where malaria transmission occurs, many from sub-Saharan Africa and South Asia. Although rare, cases of malaria have been reported in California. In many temperate areas, such as western Europe and the United States, economic development and public health measures have succeeded in eliminating malaria. However, most of these areas have *Anopheles* mosquitoes that can transmit malaria, and reintroduction of the disease is a constant risk.

Individuals in areas with malaria need to reduce their likelihood of being bitten by mosquitoes. Screens on windows and doors should be examined to confirm that they are in good repair. Repellents containing 20 to 30 percent DEET should be applied to exposed skin and clothing to keep mosquitoes from biting. From 2011to the publishing of this document there have been 44 cases of malaria in California.

## West Nile Virus

West Nile virus (WNV) is a potentially serious mosquito-borne that may affect residents in the planning area. Experts believe WNV is established as a seasonal epidemic in North America that flares up in the summer and continues into the fall. WNV is a recent disease to affect California. Mosquitoes transmit the virus to birds, livestock and humans. As of January 2016, human-infection cases of the virus had been reported in all states of the continental U.S. except West Virginia, New Hampshire and Vermont, and those states had reported non-human infections. The Placer County West Nile Virus Task Force has had a strong and active role in the community since WNV arrived in 2004.

According to the CDC, approximately 80 percent of people who are infected with WNV will show no symptoms. Up to 20 percent have symptoms such as fever, headache, and body aches, nausea, vomiting, and sometimes swollen lymph glands or a skin rash on the chest, stomach and back. Symptoms can last for as short as a few days, though even healthy people have become sick for several weeks. About 1 percent of people infected with WNV will develop severe illness, with symptoms that can include high fever, headache, neck stiffness, stupor, disorientation, coma, tremors, convulsions, muscle weakness, vision loss, numbness and paralysis. These symptoms may last several weeks, and neurological effects may become permanent. There is no specific treatment for WNV infection. In more severe cases, people may need to go to the hospital where they can receive supportive treatment including intravenous fluids, help with breathing and nursing care.

Individuals in areas with WNV need to reduce their likelihood of being bitten by mosquitoes. Screens on windows and doors should be examined to confirm that they are in good repair. Repellents containing 20 to 30 percent DEET should be applied to exposed skin and clothing to keep mosquitoes from biting.

From 2011 to the publishing of this document there have been 2,811 cases of WNV in California. Of those, 36 were from Placer County. Between 2005 and 2015, there were 5,205 cases of WNV in California, and Placer County had 82 cases, an average of 7.45 cases per year. Due to proactive mitigation of the hazard with mosquito abatement and education efforts, the number of confirmed cases has trended down. The first year the tracking began, there were 35 human cases of WNV in Placer County. In 2015, there were none. The agricultural nature of Placer County, with the potential for standing water to be present throughout the County, continues to put the planning area at risk from WNV and other mosquito-borne illnesses.

## Dengue Fever

Dengue is a mosquito-borne disease caused by any of four closely related dengue viruses (DENV-1, DENV-2, DENV-3 and DENV-4). People get dengue from the bite of an infected mosquito. The mosquito becomes infected when it bites a person who has dengue virus in their blood. It takes a week or more for the dengue virus to replicate in the mosquito; then the mosquito can transmit the virus to another person when it bites. Dengue is transmitted by yellow fever mosquito (*Aedes aegypti )* and the Asian tiger mosquito *(Aedes albopictus)*. These mosquitoes are not native to California, but infestations have been reported in multiple counties in California. Dengue virus cannot be transmitted from person to person.

The main symptoms of dengue are high fever, severe headache, severe pain behind the eyes, joint pain, muscle and bone pain, rash, bruising, and sometimes mild bleeding from the nose or mouth. Generally, younger children and those with their first dengue infection have a milder illness than older children and adults. Severe dengue typically begins with signs and symptoms similar to dengue. Rather than recover, severe dengue patients proceed to experience more bleeding, severe pain in the abdomen, respiratory distress, and fluid accumulation in the abdomen and around the lungs as the smallest blood vessels (capillaries) begin to leak. If not treated, severe dengue can result in death. There is no specific treatment for dengue infection. Rest and fluids are generally sufficient for persons with dengue. Severe dengue may require hospitalization and intensive medical care.

Individuals in areas with dengue need to reduce their likelihood of being bitten by mosquitoes. Screens on windows and doors should be examined to confirm that they are in good repair. Repellents containing 20 to 30 percent DEET should be applied to exposed skin and clothing to keep mosquitoes from biting. From 2011 to the publishing of this document there have been 483 cases of dengue fever in California, with three of the cases in Placer County.

## Zika Virus

Zika is a mosquito-borne disease. The most common symptoms of Zika are fever, rash, joint pain, and conjunctivitis (red eyes). The illness is usually mild, with symptoms lasting for several days to a week after being bitten by an infected mosquito. People usually do not get sick enough to go to the hospital, and they rarely die of Zika. For this reason, many people might not realize they have been infected. However, Zika virus infection during pregnancy can cause a serious birth defect called microcephaly, as well as other severe fetal brain defects. Once a person has been infected, he or she is likely to be protected from future infections.

Zika virus is transmitted by yellow fever mosquito (*Aedes aegypti )* and the Asian tiger mosquito *(Aedes albopictus)*. These mosquitoes are not native to California, but infestations have been reported in multiple counties in California. An *Aedes* mosquito can only transmit Zika virus after it bites a person who has this virus in their blood. Thus far in California, Zika virus infections have been documented only in people who were infected while traveling outside the United States or through sexual contact with an infected traveler. Zika virus is not spread through casual contact, but can be spread by infected men to their sexual partners. There is a growing association between Zika and microcephaly (abnormally small head and brain) in newborns, as well as Zika and Guillain-Barré Syndrome, a disease affecting the nervous system. Studies are ongoing to further evaluate these associations. From 2015 to the publishing of this document there has been no local mosquito-borne transmission of Zika virus in California.

## Chikungunya

Chikungunya (pronounced chik-en-gun-ye) is an infectious mosquito-borne disease with symptoms that typically include fever and severe joint pain. It is caused by the chikungunya virus, which is transmitted by yellow fever mosquito (*Aedes aegypti )* and the Asian tiger mosquito *(Aedes albopictus)*. These mosquitoes are not native to California, but infestations have been reported in multiple counties in California. An *Aedes* mosquito can only transmit chikungunya virus after it bites a person who has this virus in their blood. A person with chikungunya is not contagious. As of the publication of this document, chikungunya infections have been documented only in persons who were infected while traveling outside the United States.

## 14.1.7 Anthrax

Anthrax is a disease caused by *Bacillus anthracis*, a bacterium that forms spores (a spore is a cell that is dormant but may come to life with the right conditions). There are three forms of anthrax:

- **Cutaneous**—The first symptom is a small sore that develops into a blister. The blister then develops into a skin ulcer with a black area in the center. The sore, blister and ulcer do not hurt.
- **Gastrointestinal**—The first symptoms are nausea, loss of appetite, bloody diarrhea, and fever, followed by bad stomach pain.
- **Inhalation—**The first symptoms of inhalation anthrax are like cold or flu symptoms and can include a sore throat, mild fever and muscle aches. Later symptoms include cough, chest discomfort, shortness of breath, tiredness and muscle aches.

Anthrax is a naturally occurring illness and isolated cases occur all over the world yearly. Humans can become infected with anthrax by handling products from infected animals or by breathing in anthrax spores from infected animal products (such as wool). People can become infected with gastrointestinal anthrax by eating undercooked meat from infected animals. Anthrax does occur in California, and animals have tested positive; however, there have been no positive human cases of anthrax in California in the last 10 years. Anthrax can be treated successfully with antibiotics.

Anthrax can be used as a weapon, as happened in the United States in 2001, when anthrax was spread through the postal system by sending letters with powder containing anthrax spores. This caused 22 cases of anthrax infection and brought anthrax back into the public eye. From 2011 to the publishing of this document there have no cases of anthrax in California.

## 14.1.8 Severe Acute Respiratory Syndrome

Severe Acute Respiratory Syndrome (SARS) is a viral respiratory illness caused by a coronavirus (SARS-CoV). SARS was first reported in Asia in February 2003. Over the next few months, the illness spread to more than two dozen countries in North America, South America, Europe, and Asia before the global outbreak was contained. According to the WHO, 8,098 people worldwide became sick with SARS during the 2003 outbreak and 774 died. In the United States, only eight people had laboratory evidence of SARS-CoV infection. All of these people had traveled to parts of the world where SARS was present. SARS did not spread more widely in the United States.

In general, SARS begins with a high fever, headache, an overall feeling of discomfort and body aches. Some people also have mild respiratory symptoms at the outset. About 10 percent to 20 percent of patients have diarrhea. After two to seven days, SARS patients may develop a dry cough. Most patients develop pneumonia.

The main way that SARS seems to spread is by close person-to-person contact. The virus that causes SARS is thought to be transmitted most readily by respiratory droplets produced when an infected person coughs or sneezes. Droplet spread can happen when droplets from the cough or sneeze of an infected person are propelled a short distance (generally up to 3 feet) through the air and deposited on the mucous membranes of the mouth, nose, or eyes of persons nearby. The virus also can spread when a person touches a surface or object contaminated with infectious droplets and then touches his or her mouth, nose, or eyes. It is also possible that the SARS virus might spread more broadly through the air or by other ways that are not now known.

As of May 2005, according to the CDC, there was no remaining sustained SARS transmission anywhere in the world. However, CDC has developed recommendations and guidelines to help public health and healthcare officials plan for and respond quickly to the reappearance of SARS if it occurs again. Lessons learned from the SARS outbreak helped healthcare facilities and communities successfully plan and respond to the 2009 H1N1 pandemic. The California Health and Safety Code lists SARS among the communicable diseases that must be reported to health authorities. Placer County is authorized to collect records and data, initiate disease control measures, control property and manage persons (including isolation and quarantine) for containment of communicable disease. From 2011 to the publishing of this document there have no cases of SARS in California.

## 14.1.9 Extreme Weather

From 2006 to 2010, more people in the U.S. died from extreme heat or extreme cold than from hurricanes, tornadoes, floods and earthquakes combined.The western United States is subject to many weather extremes. Severe spring storms can lead to risk of traumatic injuries, mudslides, flooding and property damage. Extreme heat can lead to dehydration and heat-related illness. Severe winter weather can lead to risk of traumatic injuries, hypothermia and icy conditions.

### Severe Spring Storms

Thunderstorms cause most of the severe spring weather. Tornados are rare in California but can occur. Since 2011, a total of 44 tornadoes have occurred in California, one of them in Placer County. When these events occur unexpectedly, the risk of injury and death increases. Advance planning can decrease the risks. Citizens should pay close attention to changing weather conditions when there is a severe thunderstorm watch or warning.

Lightning strikes are a danger during thunderstorms. A lightning bolt is 6 to 8 centimeters in diameter, carrying between 10 and 100 million volts in 20 to 50 thousand amps of direct current. The duration is approximately one millisecond. Volts of 2 billion and 500 thousand amps have been measured. A lightning strike can cause death or injury to one or several persons. Long-term injuries from lightning strike can include memory and attention loss, chronic numbness, muscle spasm, stiffness, depression, hearing loss and sleep disturbance. Seventy percent of all lightning injuries and fatalities occur in the afternoon; 85 percent of victims are children and young men (age 10 to 35) engaged in outdoor recreation and work activities. Hikers, campers, backpackers, skiers, fishermen, and hunters are especially vulnerable.

### Extreme Heat

California, Nevada and Arizona experience very high temperatures during the summer. Those susceptible to extreme heat may suffer heat-related illnesses:

- **Heat Exhaustion—**Heat exhaustion is a mild form of heat-related illness that can develop after several days of exposure to high temperatures and inadequate or unbalanced replacement of fluids. It is the body’s response to an excessive loss of the water and salt contained in sweat. Those most prone to heat exhaustion are elderly people, people with high blood pressure, and people working or exercising in a hot environment.
- **Heat Cramps—**Heat cramps usually affect people who sweat a lot during strenuous activity. This sweating depletes the body’s salt and moisture. The low salt level in the muscles may be the cause of heat cramps. Heat cramps may also be a symptom of heat exhaustion.
- **Heat Stroke—**Heat stroke is a severe, dangerous form of heat-related illness. It occurs when the body’s temperature rises rapidly, the sweating mechanism fails, and the body is unable to cool down. Body temperature may rise to 106°F or higher within 10 to 15 minutes. Heat stroke can cause death or permanent disability if emergency treatment is not provided. This is a medical emergency.

Heat has caused 9,000 deaths in the United States from 1979 to 2013. Air-conditioning is the number one protective factor against heat-related illness and death. If a home is not air-conditioned, people can reduce their risk for heat-related illness by spending time in public facilities that are air-conditioned.

The California Office of Emergency Services has a comprehensive contingency plan for excessive heat emergencies. The plan describes state operations during heat-related emergencies and provides guidance for state agencies, local government, and non-governmental organizations in the preparation of heat emergency response plans and related activities. Placer County has an emergency contingency plan and participates in the opening of local cooling centers if extreme heat continues for an extended period of time.

### Severe Winter Weather

When winter temperatures drop significantly below normal, staying warm and safe can become a challenge. Extremely cold temperatures often accompany a winter storm, which may also cause power failures and icy roads. Staying indoors as much as possible can help reduce the risk of car crashes and falls on the ice, but cold weather also can present hazards indoors. Many homes will be too cold, either due to a power failure or because the heating system is not adequate for the weather. When people must use space heaters and fireplaces to stay warm, the risk of residential fires increases, as well as the risk of carbon monoxide poisoning.

Extreme cold can bring on health emergencies in susceptible people, such as those without shelter or who are stranded, or who live in a home that is poorly insulated or without heat:

- **Hypothermia**—When exposed to cold temperatures, the body begins to lose heat faster than it can be produced. Prolonged exposure to cold will eventually use up the body's stored energy. The result is hypothermia, or abnormally low body temperature. Body temperature that is too low affects the brain, making the victim unable to think clearly or move well. This makes hypothermia particularly dangerous because a person may not know it is happening and will not be able to do anything about it. Warning signs of hypothermia include shivering, exhaustion, confusion, fumbling hands, memory loss, slurred speech, drowsiness, bright red cold skin, and very low energy.
- **Frostbite**—Frostbite is an injury to the body caused by freezing of the tissues. Frostbite causes a loss of feeling and color in affected areas. It most often affects the nose, ears, cheeks, chin, fingers, or toes. Frostbite can permanently damage the body, and severe cases can lead to amputation. The risk of frostbite is increased in people with reduced blood circulation and among people who are not dressed properly for extremely cold temperatures. A victim is often unaware of frostbite until someone else points it out because the frozen tissues are numb. Signs of frostbite may be a white or grayish-yellow skin area, skin that feels unusually firm or waxy and numbness.

Infants and the elderly are particularly at risk to cold temperatures, but anyone can be affected. If extreme winter weather conditions are expected for an extended period, Placer County has an emergency contingency plan to provide shelter and care areas to provide heating centers for those in need. Preventive action is the best defense against having to deal with extreme cold-weather conditions. Preparing homes and cars in advance for winter emergencies, and observing safety precautions during times of extremely cold weather can reduce the risk of weather-related health problems.

## 14.2 HAZARD PROFILE

The severity of human health hazards is dependent upon the hazard and the population exposed to it. As the population increases, so does the risk of exposure to hazards. The key to reducing the disease hazard is isolation so that the exposed population does not continue to spread the hazard to the uninfected population. For disease and weather-related human health hazards, promoting education and personal preparedness will help to mitigate and reduce the severity of the hazard.

## 14.2.1 Past Events

### Communicable Diseases

The following is a summary of recent disease outbreak events:

- In the United States during the 2009 H1N1 influenza pandemic, there were 59,979,608 confirmed cases of the disease, 270,435 people hospitalized due to the illness and 12,271 deaths. In California, there were 4,134 people hospitalized due to the illness and 596 deaths. In Placer County, there were 45 confirmed cases, with 5 deaths due to the illness. The pandemic was mild compared to the Spanish Flu pandemic of 1918, which caused 100 million deaths worldwide—a total of 3 percent of the world's total population.
- West Nile Virus arrived in Placer County in July 2004. The first case was diagnosed in September 2004. The 56-year old patient was recovering from meningitis in the hospital when the test came back positive for WNV. From 2011 to the publishing of this document there have been 2,811 cases of WNV in California, 36 of them in Placer County
- There were two confirmed cases of SARS in California during the worldwide outbreak in 2002-2003, none of them in Placer County.
- From 2011 to the publishing of this document there have been 458 cases of Lyme disease in California, 4 of them in Placer County.
- From 2011 to the publishing of this document there have been 16 cases of hantavirus in California, including one in Placer County.
- As of the publishing of this document, no cases of tularemia or plague have been reported in Placer County, but cases of these diseases have been reported in California and nearby counties. Even though these hazards may not be endemic to the area, they can be brought into the planning region and are still considered to be a risk.

### Extreme Weather

The following is a summary of recent extreme weather events that threatened human health:

- From 2006 to 2010, excessive heat exposure caused 3,332 deaths in the United States.
- In July 2006, California experienced a heat wave impacting the entire state. Coroners attributed 140 deaths to hyperthermia, and it has been estimated from other data that more than 600 heat-related deaths may have occurred over a 17-day period.
- From 2006 to 2010, hypothermia caused 6,660 deaths in the United States.
- From 2006 to 2010, lightning strikes caused 657 deaths in the United States.

## 14.2.2 Location

It is difficult to map the extent of human-health hazards compared to others, such as floods, wildfires and dam failures. All of the City of Roseville Planning Area is susceptible to the human health hazards discussed in this chapter. While some hazards, such as the West Nile Virus and Lyme disease, can have a geographic presence within the planning area, other diseases can cause exposure to the planning area from outside the local region. Roseville residents who travel can become exposed to diseases while abroad and bring the diseases back with them, potentially placing the region at risk for exposure. Extreme weather poses an equal human health hazard across the City.

### 14.2.3 Frequency

**Communicable Disease**

Due to increased air travel, the growing population and the country's aging population, the probability of a communicable disease epidemic or pandemic is a growing threat. Certain human health hazards, such as influenza, can be expected seasonably, with variations on specific strains year to year. Additionally, tick-borne diseases are likely to increase during spring and fall, when people participate in outdoor activities such as hiking. The frequency of other health hazards is difficult to establish and depends largely on the unique circumstances surrounding a localized outbreak and its subsequent expansion into epidemics and eventually pandemics.

**Extreme Weather**

Trauma due to injuries directly due to storms (such as motor vehicle collisions and falls), heat related illness and hypothermia are a factor of the weather and in some cases a technological hazard.

### 14.2.4 Severity

The severity of the human health hazard varies from individual to individual. Typically, young children and older adults are more susceptible to acquiring communicable diseases due to developing or diminishing immune systems or experiencing adverse effects to extreme weather conditions. These populations often experience the most severe of symptoms, as their immune systems are not capable of fighting off infection or efficiently regulating temperature. In general, severity varies depending on the pathology of the disease, the health of the infected, and the availability of treatments for alleviating symptoms or curing the disease.

## 14.3 SECONDARY HAZARDS

Human health hazards are not like natural hazards that have measurable secondary impacts, such as earthquakes, floods or wildfires. The largest secondary impact caused by human health hazards would be economic. Large outbreaks of any human health hazard could reduce the work force significantly, causing businesses and agencies to close or be greatly impacted.

Another secondary impact could be stigmatization. The fear of the human health hazard and fear of the unknown could lead to isolation, violence and self-inflicted injury. Hospitals and health care providers could be overwhelmed with the "worried well" seeking care and comfort. Providing key and critical information can reduce and mitigate this secondary risk.

## 14.4 EXPOSURE AND VULNERABILITY

### 14.4.1 Population

All citizens in the Roseville planning area could be susceptible to the human health hazards discussed in this chapter. A large outbreak or epidemic, a pandemic or a use of biological agents as a weapon of mass destruction could have devastating effects on the population of Roseville.

West Nile Virus and other mosquito-borne illnesses are a significant concern in the local wetlands and west of Roseville in the flooded rice fields. A concentrated at-risk population is on the western border of the city limits near the rice fields where the mosquitoes breed.

While all of the population in the planning area is considered at risk to the human health hazards discussed in this chapter, the young and the elderly, those with compromised immune systems, and those with special needs are considered the most vulnerable. The City has a large elderly community with a concentration of older residents in areas such as Sun City Roseville. The introduction of a disease such as the plague or influenza could rapidly impact those at risk.

### 14.4.2 Property

None of the health hazards discussed in this chapter would have significant measurable impact on the structural environment or property of the planning area.

### 14.4.3 Critical Facilities and Infrastructure

None of the health hazards discussed in this chapter would have significant measurable impact on the critical facilities or infrastructure of the planning area. However, health care facilities (including long-term care and clinics and even veterinary offices) have adopted the recommended “all-hazards” approach to preparedness and have prepared for the health hazards addressed in this chapter.

The acute care hospitals in Roseville have collaborated, trained and planned on a local, regional, state and national level to provide immediate and comprehensive medical care to the citizens of Roseville and the greater western Placer County population. Emergency management and preparedness planning incorporates all response disciplines (fire, law, first responder ground and air ambulance agencies, public health, mental and spiritual health). Planning includes identifying shelters, alternate treatment facilities, isolation capacity and methods to immediately expand physical and human resources.

### 14.4.4 Environment

None of the health hazards discussed in this chapter would have significant measurable impact on the environment of the planning area. While many of the vectors of the health hazards discussed in this chapter (mosquitoes, rodents, fleas, ticks and deer flies) rely on local or regional environments for their survival, the human health hazard that they carry or potentially transmit would have no significant measurable impact on the environment.

### 14.4.5 Economy

The economic impact of a human health hazard could be localized to a single region or population, or could be widespread. The impact could be significant, depending on the hazard, number of cases and the availability of resources to care for those affected by the hazard. Other financial impacts could be absorbed or managed by the organization affected.

## 14.5 FUTURE TRENDS IN DEVELOPMENT

The potential for communicable diseases, vector-borne diseases or extreme weather in Roseville and the planning area is not likely to lessen or prohibit growth or development in Roseville.

## 14.6 REVIEW OF EXISTING ORDINANCES, PROGRAMS AND PLANS

### 14.6.1 Hospital Expansions to Care for Growing Populations

Kaiser Permanente operates medical facilities in Roseville as follows:

- In October 1998, Kaiser Permanente opened a 116-bed hospital on Eureka Road adjacent to its medical offices. Since then, the hospital increased the number of beds to 166 (not including the Women’s and

Children's Center). In addition to the hospital, comprehensive outpatient, primary, and specialty care services are offered, as well as education, pharmacy, laboratory, radiology, optical, EKG, and physical therapy services at three sites in Roseville.
- Kaiser opened a 75,000 square-foot medical office building in Lincoln in October 2006.
- In December 2008, a $52 million expansion project was completed that quadrupled the size of the Kaiser Roseville emergency room and doubled the number of beds. The radiology department was tripled in size and provided with high tech rooms with advanced diagnostic tools.
- Kaiser Roseville's Women's and Children's Center opened in January 2009 and includes 174 beds, neonatal and pediatric intensive care units, and a second medical office building.
- Kaiser Roseville is a certified Stroke and STEMI (heart attack) Receiving Center.
- Kaiser's Roseville Medical Center was named as a "Top Hospital" on the 2015 Leapfrog Top Hospitals listing—a voluntary program recognizing hospitals that demonstrate success in minimizing mortality rates for high-risk procedures and preventing medical errors.

Sutter Roseville Medical Center operates medical facilities in Roseville as follows:

- The current Sutter Roseville Medical Center campus opened in 1997 and provides comprehensive community health and trauma care for more than seven counties.
- Sutter Roseville Medical Center provides critical care, cardiology, neurology, pulmonary and orthopedic services, a dedicated cancer center, a Family Birth Center, a Neo Natal Intensive Care Unit, wound care, a 24-hour emergency department and the Sutter Rehabilitation Institute, a 55-bed acute rehabilitation center with accreditation from the Commission on Accreditation of Rehabilitation Facilities
- Sutter Roseville Medical Center is an accredited regional Level II trauma center and designated disaster/medical control facility, as well as a certified Stroke Receiving Center, STEMI (heart attack) Receiving Center and National Disaster Medical Systems hospital.
- Sutter Roseville is in the process of expanding its emergency department, intensive care and trauma neuro intensive care units and inpatient and outpatient surgery programs.
- In 2015, Truven Health Analytics named Sutter Health and Sutter Health's Valley Area, which includes Sutter Roseville Medical Center, as two of the nation's top five performers among large health care systems in its 15 Top Health Systems study.

Past and future expansion of these medical centers will enhance the capacity and services offered to treat illness and injury in Roseville and the surrounding region.

## 14.6.2 Memorandums of Agreement

The following memorandums of agreement enhance Roseville's ability to respond to the human health hazard:

- Sutter Roseville Medical Center has a memorandum of agreement with the Department of Quarantine, a division of the CDC, to provide isolation treatment in the event of a highly contagious and virulent disease.
- Sutter Roseville Medical Center has cooperative memorandums of agreement with Beale Air Force Base and the Placer County Department of Health and Human Services to provide assistance and care in disaster and mass casualty incidents.
- Since 2013 Sutter Roseville Medical Center has been a designated one of the nation's 1,500 National Disaster Medical Systems Hospital by the Department of Defense, Department of Health and Human Services and the Department of Veteran's affairs. This designation can provide the facility and the region more rapid care and assistance if a catastrophe strikes.

- Kaiser Roseville and Sutter Roseville Medical Center are coalition members with Placer County Public Health in the Healthcare Emergency Coalition to prepare, train and exercise to provide services in mass casualty situations.

### 14.6.3 Integrated Emergency Response

FEMA and the Joint Commission for Accreditation of Healthcare Organizations (JCAHO) expect acute care facilities to provide planning for an "all hazard" disaster response and care for mass casualties, whether the incidents and events are naturally occurring, human caused, or a combination of both. JCAHO requires the integration of emergency response planning with local response agencies, ensuring that the community will receive the highest level of integrated response and protection available. These planning efforts are supported by local, regional, state and federal grant funding.

## 14.7 SCENARIO

A human health worst-case scenario for the planning area would be an epidemic or large-scale incident of any of the human health hazards discussed in this chapter. Medical treatment facilities in the planning area would be overwhelmed and taxed beyond their capabilities as the numbers of patients escalates. The impacts on the workforce within the planning area could have acute and long-term economic impacts on the primary employers in the planning area. First responders would be exposed to the human health hazards, which could deplete the medical workforce and could have profound impact on the potential escalation of the scenario.

## 14.8 ISSUES

Important issues associated with the human health hazards include but are not limited to the following:

- Prevention through vaccination and personal emergency and disaster preparation will help to reduce the impacts of human health hazards.
- Medical and response personnel need to be integrated in a unified command to provide care when needed in response to human health hazards.
- Medical and response personnel must be adequately trained and supplied.
- Up-to-date and functional all-hazard contingency planning should be carried out.
- A system needs to be in place for informing the public with a unified message about the human health hazard.
- Health agencies and facilities require surge capacity management and adaptation to the rising number and needs of the region.

# 15. HUMAN-CAUSED HAZARDS

## 15.1 GENERAL BACKGROUND

Although the DMA does not require an assessment of human-caused hazards, The City of Roseville is including human-caused hazards in this hazard mitigation plan for the following reasons:

- The City takes a proactive approach to disaster preparedness, especially in an effort to protect the public safety of all citizens.
- Preparation for and response to a human-caused disaster will involve many of the same staff training, critical decisions, and commitment of resources as for a natural hazard.
- The multi-hazard mitigation planning effort is an opportunity to inform the public about all hazards, including human-caused hazards.
- The likelihood of a human-caused hazard in Roseville is greater than several of the identified natural hazards in this Plan.
- The City has a Terrorism Contingency Plan (June 2004) and a Hazardous Materials Contingency Plan (September 2004) already in place with instructions for a response by City of Roseville first responders and staff of the emergency operations center.

Human-caused hazards fall into the following categories:

- Man-made hazards include acts of terrorism and cyber threats. These hazards are intentional, criminal, malicious acts.
- Technological hazards are incidents that arise from human activities such as the manufacture, transportation, storage and use of hazardous materials. These are accidental incidents with unintended consequences.

This report does not address human-caused hazards to the Roseville water treatment facilities, because the City evaluated those facilities in a separate report per EPA requirements. Information on that evaluation is available from the Roseville City Manager's office. In 2003, with input from the City of Roseville, Placer County conducted a State Homeland Security Assessment Survey to review terrorism vulnerabilities, personnel available to respond, and equipment needed. The resulting information is classified and available only to first responders at the time of an emergency (per state and federal laws).

**DEFINITIONS**

**Acts of Terrorism**—The unlawful use or threatened use of force or violence against people or property with the intention of intimidating or coercing societies or governments. Terrorism is either foreign or domestic, depending on the origin, base, and objectives of the terrorist or organization.

**Technological Hazards**—Hazards from accidents associated with human activities such as the manufacture, transportation, storage and use of hazardous materials.

**Weapons of Mass Destruction**—Chemical, biological, radiological, nuclear, and explosive weapons associated with terrorism.

**Hazardous Material**—A substance or combination of substances that, because of quantity, concentration, physical, chemical, or infectious characteristics, may cause or contribute to an increase in mortality or an increase in serious irreversible or incapacitating reversible illness, or pose a present or potential hazard to human life, property, or the environment. Hazardous waste is included in the City's working definition.

## 15.1.1 Man-Made Hazards

### Terrorism and Weapons of Mass Destruction

The Federal Bureau of Investigation (FBI) categorizes terrorism in the United States as one of two types:

- Domestic terrorism involves groups or individuals whose terrorist activities are directed at elements of our government or population without foreign direction. The 1995 bombing of the Alfred P. Murrah federal building in Oklahoma City is an example of domestic terrorism. The FBI is the primary response agency for domestic terrorism. The FBI coordinates domestic preparedness programs and activities of the United States to limit acts posed by terrorists including the use of weapons of mass destruction (WMDs).
- International terrorism involves groups or individuals whose terrorist activities are foreign-based and/or directed by countries or groups outside the United States, or whose activities transcend national boundaries. Examples include the 1997 bombing of Mobil Oil's headquarters, the 1983 bombing of the U.S. Capitol, the 1993 bombing of the World Trade Center, and the September 11, 2001 attacks at the World Trade Center and the Pentagon.

The three key elements to defining a terrorist event are as follows:

- Activities involve the use of illegal force.
- Actions are intended to intimidate or coerce.
- Actions are committed in support of political or social objectives.

As detailed in the City's Terrorism Contingency Plan, at least three important considerations distinguish terrorism hazards from other types of hazards:

- In the case of chemical, biological and radioactive agents, their presence may not be immediately obvious, making it difficult to determine when and where they may have been released, who has been exposed, and what danger is present for first responders and emergency medical technicians.
- There is limited scientific understanding of how these agents affect the population at large.
- Terrorism evokes strong emotional reactions, ranging from anxiety to fear to anger to depression.

Those involved with terrorism response, including public health and public information staff, are trained to deal with the public's emotional reaction swiftly as response to the event occurs. The area of the event must be clearly identified in all emergency alert messages to prevent those not affected by the incident from overwhelming local emergency rooms and response resources, thereby reducing service to those actually affected. The public will be informed clearly and frequently about what government agencies are doing to mitigate the impacts of the event. The public will also be given clear directions on how to protect the health of individuals and families.

FEMA defines terrorism as the use of weapons of mass destruction, including biological, chemical, nuclear and radiological weapons; arson, incendiary, explosive and armed attacks; industrial sabotage and intentional hazardous materials releases; agro-terrorism; and cyber-terrorism (FEMA 386-7). The following are potential methods used by terrorists that could affect the City of Roseville as a direct target or collaterally:

- Conventional bomb
- Biological agent
- Chemical agent
- Nuclear bomb
- Radiological agent
- Arson/incendiary attack
- Armed attack
- Cyber-terrorism (see the cyber threats section of this profile)
- Agro-terrorism
- Intentional hazardous material release.

Table 15-1 provides a hazard profile summary for terrorism-related hazards. Most terrorist events in the United States have been bombing attacks, involving detonated or undetonated explosive devices, tear gas, pipe bombs, and firebombs.

**Table 15-1.** Event Profiles for Terrorism

| Hazard | Application Mode[a] | Hazard Duration[b] | Static/Dynamic Characteristics[c] | Mitigating and Exacerbating Conditions[d] |
|---|---|---|---|---|
| **Conventional Bomb** | Detonation of explosive device on or near target; delivery via person, vehicle, or projectile. | Instantaneous; additional secondary devices, or diversionary activities may be used, lengthening the duration of the hazard until the attack site is determined to be clear. | Extent of damage is determined by type and quantity of explosive. Effects generally static other than cascading consequences, incremental structural failure, etc. | Overpressure at a given standoff is inversely proportional to the cube of the distance from the blast; thus, each additional increment of standoff provides progressively more protection. Terrain, forestation, structures, etc. can provide shielding by absorbing and/or deflecting energy and debris. Exacerbating conditions include ease of access to target; lack of barriers and shielding; poor construction; and ease of concealment of device. |
| **Chemical Agent** | Liquid/aerosol contaminants dispersed using sprayers or other aerosol generators; liquids vaporizing from puddles/ containers; or munitions. | Hours to weeks, depending on the agent and the conditions in which it exists. | Contamination can be carried out of the initial target area by persons, vehicles, water, and wind. Chemicals may be corrosive or otherwise damaging over time if not remediated. | Air temperature can affect evaporation of aerosols. Ground temperature affects evaporation of liquids. Humidity can enlarge aerosol particles, reducing inhalation hazard. Precipitation can dilute and disperse agents but can spread contamination. Wind can disperse vapors but also cause target area to be dynamic. The micro-meteorological effects of buildings and terrain can alter travel and duration of agents. Shielding in the form of sheltering in place can protect people and property from harmful effects. |
| **Arson/ Incendiary Attack** | Initiation of fire or explosion on or near target via direct contact or remotely via projectile. | Generally minutes to hours. | Extent of damage is determined by type and quantity of device, accelerant, and materials present at or near target. Effects generally static other than cascading consequences, incremental structural failure, etc. | Mitigation factors include built-in fire detection and protection systems and fire-resistive construction techniques. Inadequate security can allow easy access to target, easy concealment of an incendiary device, and undetected initiation of a fire. Non-compliance with fire and building codes, as well as failure to maintain existing fire protection systems, can substantially increase the effectiveness of a fire weapon. |
| **Armed Attack** | Tactical assault or sniping from remote location, or random attack based on fear, emotion, or mental instability. | Generally minutes to days. | Varies based on the perpetrators' intent and capabilities. | Inadequate security can allow easy access to target, easy concealment of weapons, and undetected initiation of an attack. |
| **Biological Agent** | Liquid or solid contaminants dispersed using sprayers/ aerosol generators or by point or line sources such as munitions, covert deposits, and moving sprayers. | Hours to years, depending on the agent and the conditions in which it exists. | Depending on the agent used and the effectiveness with which it is deployed, contamination can be spread via wind and water. Infection can spread via humans or animals. | Altitude of release above ground can affect dispersion; sunlight is destructive to many bacteria and viruses; light to moderate wind will disperse agents but higher winds can break up aerosol clouds; the micro-meteorological effects of buildings and terrain can influence aerosolization and travel of agents. |

| Hazard | Application Mode[a] | Hazard Duration[b] | Static/Dynamic Characteristics[c] | Mitigating and Exacerbating Conditions[d] |
|---|---|---|---|---|
| **Agro-terrorism** | Direct, generally covert contamination of food supplies or introduction of pests and/or disease agents to crops and livestock. | Days to months. | Varies by type of incident. Food contamination events may be limited to specific distribution sites, whereas pests and diseases may spread widely. Generally no effects on built environment. | Inadequate security can facilitate adulteration of food and introduction of pests and disease agents to crops and livestock. |
| **Radiological Agent** | Radioactive contaminants dispersed using sprayers/ aerosol generators, or by point or line sources such as munitions. | Seconds to years, depending on material used. | Initial effects will be localized to site of attack; depending on meteorological conditions, subsequent behavior of radioactive contaminants may be dynamic. | Duration of exposure, distance from source of radiation, and the amount of shielding between source and target determine exposure to radiation. |
| **Nuclear Bomb** | Detonation of nuclear device underground, at the surface, in the air, or at high altitude. | Light/heat flash and blast/shock wave last for seconds; nuclear radiation and fallout hazards can persist for years. Electromagnetic pulse from a high-altitude detonation lasts for seconds and affects only unprotected electronic systems. | Initial light, heat, and blast effects of a subsurface, ground or air burst are static and determined by the device's characteristics and employment; fallout of radioactive contaminants may be dynamic, depending on meteorological conditions. | Harmful effects of radiation can be reduced by minimizing the time of exposure. Light, heat, and blast energy decrease logarithmically as a function of distance from seat of blast. Terrain, forestation, structures, etc. can provide shielding by absorbing and/or deflecting radiation and radioactive contaminants. |
| **Intentional Hazardous Material Release (fixed facility or transportation)** | Solid, liquid, and/or gaseous contaminants released from fixed or mobile containers | Hours to days. | Chemicals may be corrosive or otherwise damaging over time. Explosion and/or fire may be subsequent. Contamination may be carried out of the incident area by persons, vehicles, water and wind. | Weather conditions directly affect how the hazard develops. The micro-meteorological effects of buildings and terrain can alter travel and duration of agents. Shielding in the form of sheltering in place can protect people and property from harmful effects. Non-compliance with fire and building codes, as well as failure to maintain existing fire protection and containment features, can substantially increase the damage from a hazardous materials release. |

a. **Application Mode**—Application mode describes the human acts or unintended events necessary to cause the hazard to occur.
b. **Duration**—Duration is the length of time the hazard is present. For example, a chemical warfare agent such as mustard gas, if un-remediated, can persist for hours or weeks under the right conditions.
c. **Dynamic or Static Characteristics**—These characteristics of a hazard describe its tendency, or that of its effects, to either expand, contract, or remain confined in time, magnitude, and space. For example, the physical destruction caused by an earthquake is generally confined to the place in which it occurs, and it does not usually get worse unless aftershocks or other cascading failures occur; in contrast, a cloud of chlorine gas leaking from a storage tank can change location by drifting with the wind and can diminish in danger by dissipating over time.
d. **Mitigation and Exacerbating Conditions**—Mitigating conditions are characteristics of the target and its physical environment that can reduce the effects of a hazard. For example, earthen berms can provide protection from bombs; exposure to sunlight can render some biological agents ineffective; and effective perimeter lighting and surveillance can minimize the likelihood of someone approaching a target unseen. In contrast, exacerbating conditions are characteristics that can enhance or magnify the effects of a hazard. For example, depressions or low areas in terrain can trap heavy vapors, and a proliferation of street furniture (trash receptacles, newspaper vending machines, mail boxes, etc.) can provide hiding places for explosive devices.

*Source:* FEMA 386-7

The effects of terrorism can vary from loss of life and injuries to property damage and disruptions in services such as electricity, water supplies, transportation, or communications. Terrorist acts may have an immediate effect or a delayed effect. Terrorists often choose targets that offer limited danger to themselves and areas with relatively easy public access. Foreign terrorists look for visible targets where they can avoid detection before and after an attack such as international airports, large cities, major special events, and high-profile landmarks.

In dealing with intentional human-caused hazards, the unpredictability of human beings must be considered. People with a desire to perform criminal acts may seek out targets of opportunity that may not fall into established lists of critical areas or facilities. The City of Roseville first responders train not only to respond to organized terrorism events, but also to respond to random acts by individuals who, for a variety of reasons ranging from fear to emotional trauma to mental instability, may choose to harm others and destroy property.

While education, heightened awareness, and early warning of unusual circumstances may deter crime and terrorism, intentional acts that harm people and property are possible at any time. Public safety entities must react to the incident, locate, isolate and neutralize further damage, and conduct investigate to bring criminals to justice.

## Cyber Threats

A cyber threat is an intentional and malicious crime that compromises the digital infrastructure of a person or organization, often for financial or terror-related reasons. Such attacks vary in nature and are perpetrated using digital mediums or sometimes social engineering to target human operators. Generally, attacks last minutes to days, but large-scale events and their impacts can last much longer. As information technology continues to grow in capability and interconnectivity, cyber threats become increasingly frequent and destructive. In 2014, internet security teams at Symantec and Verizon indicated that nearly 1 million new pieces of malware—malicious code designed to steal or destroy information—were created every day (Harrison 2015).

Cyber threats differ by motive, attack type and perpetrator profile. Motives range from the pursuit of financial gain to political or social aims. Cyber threats are difficult to identify and comprehend. Types of threats include using viruses to erase entire systems, breaking into systems and altering files, using someone’s personal computer to attack others, or stealing confidential information. The spectrum of cyber risks is limitless, with threats having a wide-range of effects on the individual, community, organizational, and national threat (FEMA 2013).

This risk assessment includes cyber attacks and cyberterrorism under the inclusive hazard of cyber threats. The terms often are used interchangeably, though they are not the same. While all cyberterrorism is a form of cyber attack, not all cyber attacks are cyberterrorism.

### *Cyber Attacks*

Public and private computer systems are likely to experience a variety of cyber attacks, from blanket malware infection to targeted attacks on system capabilities. Cyber attacks specifically seek to breach IT security measures designed to protect an individual or organization. The initial attack is followed by more severe attacks for the purpose of causing harm, stealing data, or financial gain. Organizations are prone to different types of attacks that can be either automated or targeted in nature. Table 15-2 describes the most common cyber attack mechanisms faced by organizations today.

Since 2013, a new type of cyber-attack is becoming increasingly common against individuals and small- and medium-sized organizations. This attack is called cyber ransom. Cyber ransom occurs when an individual downloads ransom malware, or ransomware, often through phishing or drive-by download, and the subsequent execution of code results in encryption of all data and personal files stored on the system. The victim then receives a message that demands a fee in the form of electronic currency or cryptocurrency, such as Bitcoin, for the decryption code (Figure 15-1).

**Table 15-2.** Common Mechanisms for Cyber Attacks

| Type | Description |
|---|---|
| **Socially Engineered Trojans** | Programs designed to mimic legitimate processes (e.g. updating software, running fake antivirus software) with the end goal of human-interaction caused infection. When the victim runs the fake process, the Trojan is installed on the system. |
| **Unpatched Software** | Nearly all software has weak points that may be exploited by malware. Most common software exploitations occur with Java, Adobe Reader, and Adobe Flash. These vulnerabilities are often exploited as small amounts of malicious code are often downloaded via drive-by download. |
| **Phishing** | Malicious email messages that ask users to click a link or download a program. Phishing attacks may appear as legitimate emails from trusted third parties. |
| **Password Attacks** | Third party attempts to crack a user's password and subsequently gain access to a system. Password attacks do not typically require malware, but rather stem from software applications on the attacker's system. These applications may use a variety of methods to gain access, including generating large numbers of generated guesses, or dictionary attacks, in which passwords are systematically tested against all of the words in a dictionary. |
| **Drive-by Downloads** | Malware is downloaded unknowingly by the victims when they visit an infected site. |
| **Denial of Service Attacks** | Attacks that focus on disrupting service to a network in which attackers send high volumes of data until the network becomes overloaded and can no longer function. |
| **Man in the Middle** | Man-in-the-Middle attacks mirror victims and endpoints for online information exchange. In this type of attack, the attacker communicates with the victims, who believe they are interacting with a legitimate endpoint website. The attacker is also communicating with the actual endpoint website by impersonating the victim. As the process goes through, the attacker obtains entered and received information from both the victim and endpoint. |
| **Malvertising** | Malware downloaded to a system when the victim clicks on an affected ad. |
| **Advanced Persistent Threat (APT)** | An attack in which the attacker gains access to a network and remains undetected. APT attacks are designed to steal data instead of cause damage. |

*Source: Danielson 2015*


**Figure 15-1.** Pop-Up Message Indicating Ransomware Infection

With millions of threats created each day, the importance of protection against cyber attacks becomes a necessary function of everyday operations for individuals, government facilities, and businesses. The increasing dependency on technology for vital information storage and the often automated method of infection means higher stakes for the success of measurable protection and education.

### *Cyberterrorism*

Cyberterrorism is the use of computers and information, particularly over the Internet, to recruit others to an organization's cause, cause physical or financial harm, or cause a severe disruption of infrastructure service. Such disruptions can be driven by religious, political, or other motives. Like traditional terrorism tactics, cyberterrorism seeks to evoke very strong emotional reactions, but it does so through information technology rather than a physically violent or disruptive action. Cyberterrorism has three main types of objectives (Kostadinov 2012):

- **Organizational**—Cyberterrorism with an organizational objective includes specific functions outside of or in addition to a typical cyber attack. Terrorist groups today use the internet on a daily basis. This daily use may include recruitment, training, fundraising, communication, or planning. Organizational cyberterrorism can use platforms such as social media as a tool to spread a message beyond country borders and instigate physical forms of terrorism. Additionally, organizational goals may use systematic attacks as a tool for training new members of a faction in cyber warfare.
- **Undermining**—Cyberterrorism with undermining as an objective seeks to hinder the normal functioning of computer systems, services, or websites. Such methods include defacing, denying, and exposing information. While undermining tactics are typically used due to high dependence on online structures to support vital operational functions, they typically do not result in grave consequences unless undertaken as part of a larger attack. Undermining attacks on computers include the following (Waldron 2011):
    - Directing conventional kinetic weapons against computer equipment, a computer facility, or transmission lines to create a physical attack that disrupts the reliability of equipment.
    - Using electromagnetic energy, most commonly in the form of an electromagnetic pulse, to create an electronic attack against computer equipment or data transmissions. By overheating circuitry or jamming communications, an electronic attack disrupts the reliability of equipment and the integrity of data.
    - Using malicious code directed against computer processing code, instruction logic, or data. The code can generate a stream of malicious network packets that disrupt data or logic by exploiting vulnerability in computer software, or a weakness in computer security practices. This type of cyber attack can disrupt the reliability of equipment, the integrity of data, and the confidentiality of communications (Wilson 2008)
- **Destructive**—The destructive objective for cyberterrorism is what organizations fear most. Through the use of computer technology and the Internet, the terrorists seek to inflict destruction or damage on tangible property or assets, and even death or injury to individuals. There are no cases of pure cyberterrorism as of the date of this Plan.

## 15.1.2 Technological Hazards

Technological hazards are associated with human activities such as the manufacture, transportation, storage and the use of hazardous materials. Incidents related to these hazards are assumed to be accidental, with unintended consequences. Technological hazards in Roseville can be categorized as follows:

- Hazardous materials incidents
- Power utility losses
- Data and telecommunications disruptions

- Water and wastewater disruption
- Air and transportation accidents
- Infrastructure threats.

## Hazardous Materials Incidents

Hazardous materials are present in nearly every city and county in the United States in facilities that produce, store, or use them. For example, water treatment plants use chlorine on-site to eliminate bacterial contaminants. Hazardous materials are transported along interstate highways and railways daily. Even the natural gas used in every home and business is a dangerous substance when a leak occurs. Except for severe weather and flooding, hazardous materials incidents are the hazards most likely to affect the City of Roseville.

Title 49 of the CFR lists thousands of hazardous materials, including gasoline, insecticides, household cleaning products, and radioactive materials. State regulated substances that have the greatest probability of adversely impacting the community are listed in the CCR, Title 19. The following are the most common type of hazardous material incidents:

- **Fixed-Facility Hazardous Materials Incident**—This is the uncontrolled release of materials from a fixed site capable of posing a risk to health, safety and property. It is possible to identify and prepare for a fixed-site incident because federal and state laws require those facilities to notify state and local authorities about what is being used or produced at the site.
- **Hazardous Materials Transportation Incident**—A hazardous materials transportation incident is any event resulting in uncontrolled release of materials during transport that can pose a risk to health, safety, and property. Transportation incidents are difficult to prepare for because there is little if any notice about what materials could be involved should an accident happen. Hazardous materials transportation incidents can occur anywhere, although most occur on major federal or state highways or major rail lines. In addition to materials such as chlorine that are shipped throughout the country by rail, thousands of shipments of radiological materials, mostly medical materials and low-level radioactive waste, travel by ground transportation across the United States. Many incidents occur in sparsely populated areas and affect very few people. There are occasions, however, of accidents in areas with much higher population densities, such as the January 6, 2005 train accident in Graniteville, South Carolina, that released chlorine gas killing nine, injuring 500, and causing the evacuation of 5,400 residents.
- **Interstate Pipeline Hazardous Materials Incident**—There are a significant number of interstate natural gas, heating oil, and petroleum pipelines running through California. These are used to provide natural gas to utilities in California and to transport these materials from production facilities to end users.

## Power Utility Losses

A power failure is any interruption or loss of electrical service due to disruption of power generation or transmission caused by an accident, sabotage, natural hazards, equipment failure, or fuel shortage. These interruptions can last anywhere from a few seconds to several days. Power failures are considered significant only if the local emergency management organization is required to coordinate basic services such as the provision of food, water, and heating as a result. Power failures are common with severe weather and winter storm activity. However, for medically dependent residents, a power failure can present a life-threatening situation.

The City of Roseville Electric Utility is responsible for operating and maintaining the electrical transmission and distribution system in Roseville. The City supplies electricity to about 56,000 residential and business customers within the service area according to the 2014 Roseville Electric Annual Report. The distribution lines and substations deliver 324 megawatts during peak demand period from June through September.

Roseville Electric has the highest reliability in the country for municipal utilities of its size, due in large part to a redundant system with sophisticated interconnection between the facilities and immediate notification should failure occur along the distribution system. Through its load management program and load shedding agreements with large, local electric users, the City of Roseville avoided any outages during electric crises and brownouts that affected some parts of California in 2000 and 2001.

Roseville has taken a proactive approach to maintaining its reliability standards by building a local generation source—the Roseville Energy Park. The Roseville Energy Park is a natural-gas-fired, combined-cycle electrical generating facility located on an 8.9-acre site adjacent to the Pleasant Grove Wastewater Treatment Plant. Since operations began in 2007, the state-of-the-art, 160-megawatt power generation facility generates enough energy to meet 40 percent of the community's electricity needs.

## Data and Telecommunications Disruptions

The loss of data and/or telecommunications is often a secondary hazard to natural and other human-caused hazards. Data and telecommunications provide a primary method for service to the community by the government and the private sector. A loss of data and telecommunications could result in loss of emergency dispatch capabilities, emergency planning services, infrastructure monitoring capabilities, access to statistical data, and loss of financial and personnel records. Losing the primary method of communication for emergency responders (radio) would severely disable their ability to respond in a timely and effective manner.

## Water and Wastewater Disruption

Water or wastewater disruption is a secondary impact from a natural disaster or intentional act. The City of Roseville receives surface water from the Folsom Reservoir, a 1 million-acre-foot multi-purpose facility east of the City. A breach in the dam or the pipelines that carry water to the City's Water Treatment Plant on Barton Road in Granite Bay would have significant temporary impacts on the City until alternative water sources, including water from other regional purveyors and groundwater, are pumped and treated. Long-term disruption of the water source from Folsom Lake would have significant impacts on residences and businesses in Roseville should demand exceed secondary supplies and water conservation measures not provide enough relief to reduce demand to equal the secondary supplies.

Disruption of the City's wastewater collection and regional wastewater treatment plants at Dry Creek and Pleasant Grove Creek would also have significant citywide and regional impacts. Such disruption could result if the system were to be overwhelmed by a significant storm or discharge of materials in such quantities that the treatment plant could not adequately treat the waste. Natural hazards such as earthquake or flood, major power outages, or terrorism directed at the facilities and systems could disrupt the process of collecting and treating millions of gallons of waste. Wastewater treatment plants may also have emergencies internal to the plant such as oxygen deficiencies that render them incapable of treating waste. The disruption of service may also have significant environmental impacts on the waterways adjacent to the treatment plants.

## Air and Transportation Accidents

Air and transportation accidents are incidents involving air or rail passengers resulting in death or serious injury. The region has a number of airports, including the Sacramento International Airport, as well as several smaller county or municipal airports and private air strips that enhance the potential for an air disaster.

Roseville features several major transportation routes, including Interstate 80 and Highway 65, both of which run through portions of the City. The potential for transportation accidents that block ingress, egress, and movement through the City is significant, as is the likelihood of hazardous material incidents resulting from a traffic accident.

### 15.1.3 Civil Disorder

Civil disorder refers to incidents that disrupt a community to the degree that law enforcement intervention is required to maintain public safety. These incidents are generally associated with controversial political, judicial, or economic issues and may occur at any time of the year, although statistics indicate that they are more frequent during summer. While Roseville has no history of civil disorder, large public gatherings associated with concerts or sports events have overburdened local law enforcement and fire protection resources in the past.

The effects of civil disorder vary with the type, severity, scope, and duration of event. Essential services (e.g., electricity, water, public transportation, communications) may be disrupted or property damage, injury and loss of life may occur. Facilities most at risk are government buildings, schools, utilities and correctional facilities.

## 15.2 HAZARD PROFILE

### 15.2.1 Past Events

#### State of California

##### *Terrorism Events*

According to the Governor's Office of Emergency Services Terrorism Response Plan, California has had a long history of defending the public against domestic and foreign terrorists. Domestic terrorist groups in California have been focused on political or social issues, while the limited internationally based incidents have targeted the state's immigrant communities due to foreign disputes. Advanced technologies and communication have allowed these groups to become more sophisticated and better organized, with remote members linked electronically.

##### *Technological Hazard Incidents*

No comprehensive source exists for technological hazard incidents in California. Given the complex system of transportation networks, the large population, and the number of businesses in California, incidents occur on a regular basis throughout the state, as reported by the news media.

#### Region

##### *Terrorism Events*

In 2005, development projects in Placer County were the subject of arson activity by an individual who claimed to be from the Earth Liberation Front or ELF, a splinter group of Earth First!, a radical environmental activist movement. ELF is a somewhat active domestic terrorism group that says it uses eco-sabotage to protect the Earth and to seek revenge on "those who are destroying the Earth and its inhabitants."

On December 3, 1999, the FBI arrested two anti-government militia members who planned a bomb attack at the Suburban Propane facility in Elk Grove, CA. The alleged plot involved a plan to blow up the Suburban Propane site, which stores about 24 million gallons of liquefied propane and is located one mile from residential homes. According to the Sacramento Bee, the plot resulted in heightened on-site security and a year-long investigation resulting in the two arrests.

##### *Technological Hazard Incidents*

Placer County and its incorporated cities have experienced many accidental hazardous materials incidents. Accidents involving high pressure gas lines in the County have caused injury and property damage. An underground Kinder Morgan pipeline failed in 2002, causing a significant spill of diesel fuel within a Rocklin neighborhood adjacent to where the breach occurred (Former Roseville Fire Department Battalion Chief Jeff Carman, pers. com).

### *Air and Transportation Accidents*

The Sacramento region was once the location of three large military installations: the Sacramento Army Depot, Mather Air Force Base and McClellan Air Force Base. All three have been decommissioned and transferred to civilian uses. The only active military installation is Beale Air Force Base, located to the north near Yuba City, California. A review of McClellan Fire Department history prior to the base closure identifies several responses to accidents near Roseville (see Table 15-3).

**Table 15-3.** Accidents Responded to by McClellan Fire Department, 1950-1980s

| Timeframe | Incident |
|---|---|
| **Early 1950s** | Apparatus responded to Code 3 alarm at Travis Air Force Base for B-29 crash that involved a nuclear weapon |
| **October 29, 1951** | B-29 making an emergency landing crashed and caught fire on Runway 16 injuring 11 crewmen. One firefighter died. |
| **Mid-1950s** | EC-121 crashed near Watt Avenue and U Street in Sacramento |
| **Mid-1960s** | F-104 crashed next to Haggin Oaks Golf Course. |
| **April 28, 1973** | McClellan Fire Department responded to mutual aid at Roseville Rail Yard fire |
| **1982** | Multiple alarm fire including a chemical warehouse. Toxic smoke column closed Interstate 80 for several hours |
| **Early 1980s** | HH-53 helicopter crashed near PFE Road during an air show at McClellan Air Force Base. The helicopter was attempting a refueling operation with a C-130 refueler when the hose became entangled in the rotor. |
| **Early 1980s** | F-111 crashed near Woodland |

*Source:* McClellan Fire Department History

While the risk of military aircraft accidents in the area has been reduced with the closure of McClellan Air Force Base, which was the closest military base to the City of Roseville, the region is not immune to air transportation accidents. On February 16, 2000, an aircraft crashed after take-off from the Sacramento Mather Airport in Rancho Cordova, California. The cargo flight was bound for Dayton, Ohio and all three crewmembers were killed. The cause of the accident was a mechanical failure. The aircraft crashed into an automobile salvage yard.

## Local

### *Air and Transportation Accidents*

On February 12, 2006, a Glasair II-S FT kit plane crashed into a home at 1302 Longfellow Drive in Roseville (see Figure 15-2). The pilot was reported to be performing aerial acrobatics when he lost control of the plane and it crashed. The pilot, his passenger, and a resident in the house were killed, and the home was determined to be a total loss. The fire spread to an adjacent home and caused significant damage, however the residents escaped injury.

**Figure 15-2.** February 12, 2006 Aircraft Crash into Residence

### *Arson Events*

On October 21, 2010, an arsonist set fire to the Roseville Galleria Mall that caused an estimated $55 million in property damage (see Figure 15-3). Police responded to the mall after a call from the tenant at GameSpot. They said a young male had entered, said he had a gun, and told them to get out. When police arrived, the male, who did not have a gun, had locked himself in the store. Once barricaded, he started a fire. The blaze destroyed an entire section of the mall, which is a core of the Sacramento economy. With over 240 stores operated by Westfield, the mall – built in 2000 and renovated in 2008 for $270 million – has generated $3.2 million in annual sales tax for the region. Reasons for the arson are unknown. The suspect suffered from mental illness.

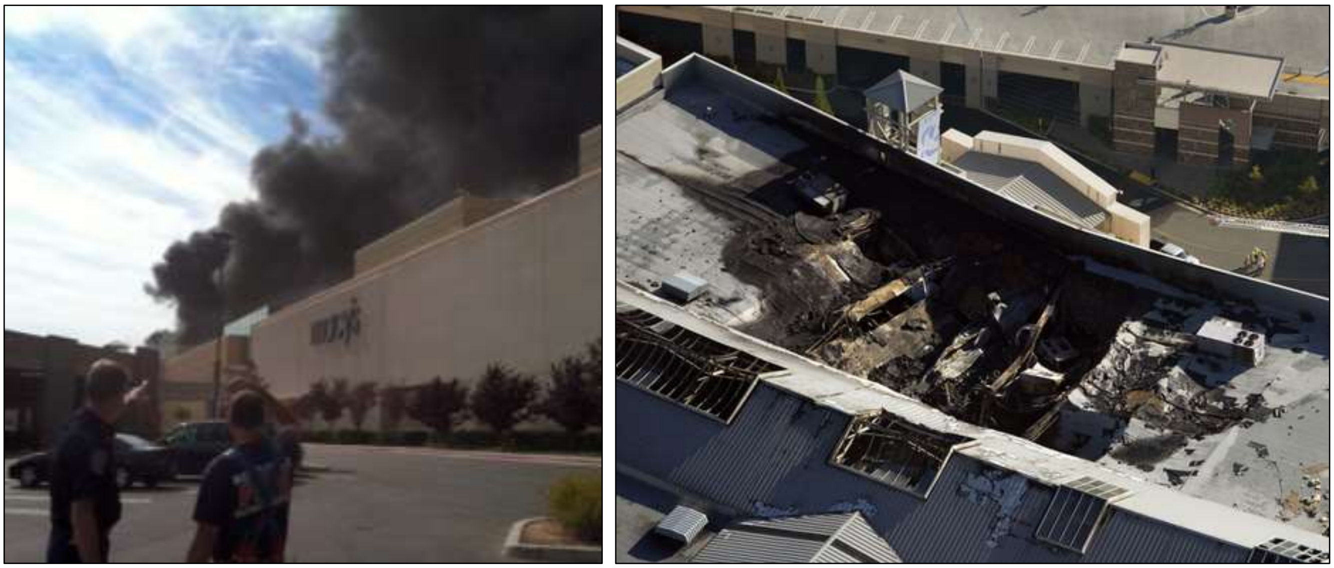


**Figure 15-3.** October 21, 2010 Arson Fire at Galleria Mall

### *Terrorism Events*

Terrorism incidents in Roseville have been limited to individuals seeking to cause damage at Roseville schools. Pipe bombs have been left at a school facility in one past occurrence. No WMDs have been used in a terrorist attack in Roseville.

### *Technological Hazard Incidents*

The City of Roseville has had a number of accidental incidents at the Roseville Rail Yard, private businesses and City facilities. The Fire Department has been called to both the Oakmont High School pool and the Roseville Aquatics Center for chlorine leaks. Sewage spills have occurred on occasion and overflowed into the City's creeks. Roseville Rail Yard accidents have included derailments and leaks of toxic chemicals from transporting hazardous materials in the wrong type of railcars.

The worst human-caused disaster in Roseville's history occurred on April 28, 1973 when a train loaded with munitions bound for Vietnam caught fire in the Roseville Yard (see Figure 15-4). No lives were lost, but significant damage to property in Roseville and jurisdictions in Sacramento County occurred during the 18 hours of explosions. In 1997, a number of unexploded bombs were discovered at the yard during construction of a modernization project (see Figure 15-5).

Roseville's history parallels that of the transcontinental railroad. The federal government passed the act to build the transcontinental railroad in 1862 and shortly thereafter the Central Pacific Railroad was started in Sacramento in 1863. A northern route for the first transcontinental rail line was selected when the South seceded from the Union during the Civil War, and Trustees Charles Crocker, Mark Hopkins, Collis P. Huntington and Leland Stanford started construction on this northern line. The line extended from Sacramento to Rocklin by May 1864 and then construction across the Sierra Nevada Mountains began.

The first structure in Roseville was built in 1864 to serve as a freight and passenger depot for the fledgling railroad. In December 1905, a decision by the Central Pacific Railroad to move the division headquarters from Rocklin to Roseville meant a development boom for Roseville. The junction of the Central Pacific Railroad and the California Central, a north-south line became Roseville, where the largest artificial ice plant in the world operated to keep California's fruit and vegetables fresh as they were transported by rail car to the East. The Pacific Fruit Exchange Ice Plant operated from 1908 to 1974 when all of Southern Pacific's 21,000 rail cars were self-refrigerating.

During wartime, Roseville was a hub of activity as troops and war materials moved through the Roseville rail yards. Thousands of munitions shipments moved through Roseville during World Wars I and II, the Korean and Vietnam conflicts, and Desert Storm.

The largest human-caused disaster in the local area occurred on April 28, 1973 when a wooden floor in a munitions boxcar caught fire from brake shoe sparks. A train engine pulling 103 cars, including 21 Department of Defense freight cars with 7,056 Mark 81 bombs, was loaded at the Navy's ammunition depot in Hawthorne, Nevada on their way to western ports and the Vietnam War.

As the train pulled in to the Roseville yard just west of the Roseville city limits, one of the cars caught fire and the flames spread, igniting other freight cars on the tracks, which were 21 rails wide. Nearly every car was loaded with cargo including paint, lumber, and fertilizer. The most dramatic explosions occurred when cars carrying liquid propane caught fire resulting in explosions that blew out windows five miles away and could be heard 100 miles away. Metal and wood was thrown 3,000 feet into the air.

The result was a series of explosions that caused damages of more than $5.6 million in Roseville and the neighboring communities of Citrus Heights, Antelope, and North Highlands. No lives were lost, but over 100 people were treated for assorted cuts and bruises caused by broken glass and flying debris.

After 18 hours of explosions, Army munitions teams recovered 1,200 unexploded bombs scattered around the area and collected another 300 from rail cars. Aerial photographs from that time show a railroad smoldering and piled with twisted track, shattered cars, and scraps of metal from bomb casings. Much of the debris was buried in the 10-foot-deep craters left by the blast.

*Milestones & Memories: the Story of Roseville, California, 1850-2000 by Leonard "Duke" Davis*

**Figure 15-4.** 1973 Roseville Rail Yard Disaster

In 1997, Union Pacific Railroad began work on a $130 million project to modernize the Roseville train yard, including significant automation improvements and the replacement of 86 miles of track with 136 miles of new track.

During project grading, backhoe operators uncovered a Mark 81 bomb intact. Bomb disposal experts from Moffett Field in Mountain View, California were flown in by the Sacramento Sheriff's Department to dispose of the bomb, which they do by digging a pit and exploding the ordnance. When another eight bombs were discovered at the western end of the yard in Antelope, California unexploded ordnance experts from Moffett Field were called back and made the decision to place the bombs in pits and build berms around them. The Sacramento County Sheriff evacuated 300 to 400 homes near the rail yard, and at 2 a.m. blew up the bombs. The explosions shattered windows, cracked walls, and rained shrapnel through the roofs of nearby homes

In all, recovered materials included 16 unexploded MK 81 bombs; 11 partial fragments containing explosive residue; 8,625 pounds (4.31 tons) of bomb fragments; and 131,560 pounds (65.78 tons) of ferrous material. Experts found the bombs were not fused (armed), making them less likely to accidentally detonate. The bombs not destroyed on-site were packaged and transported to a facility in Colfax, Louisiana for detonation.

**Figure 15-5.** 1997 Bomb Discovery

With growth in the region and in trips through the region to tourist destinations such as the ski resorts at Lake Tahoe, the number of traffic accidents has been steadily increasing. Fatal traffic accidents since 2009 are shown in Table 15-4. Truck with trailer accidents account for a small percentage of the City's reported traffic accidents, but they represent the highest potential for hazardous materials incidents on roadways in the City of Roseville.

**Table 15-4.** Traffic Accident Counts—2009 to 2014

| | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 |
|---|---|---|---|---|---|---|
| **Vehicles Involved in Fatal Accidents** | 10 | 8 | 8 | 12 | 10 | 1 |
| **Fatalities** | 6 | 6 | 5 | 6 | 2 | 1 |

*Source: http://www.city-data.com/accidents/acc-Roseville-California.html*

## 15.2.2 Location

Large population centers, high visibility tourist attractions, and critical infrastructure accessible to the public present security challenges of an ongoing nature in California. The network of highways, railways, ports and airports used to transport significant amounts of hazardous materials poses a significant technological hazards threat. Hazardous materials incidents may occur anywhere in Placer County. Multiple incidents may happen simultaneously, and all typically require a multi-agency, multi-jurisdictional response. The following sections describe the local areas with the greatest likelihood of hazardous materials incidents, as identified in the *Roseville Hazardous Materials Contingency Plan*.

### Transportation Routes

The following transportation facilities have the potential to be affected by human-caused hazards:

- Interstate 80 and State Route 65 bisect the City.
- The J.R. Davis Yard in Roseville, the largest train yard west of the Mississippi, is a major Union Pacific switching center built in 1907 (see Figure 15-6). The 850-acre yard includes 136 miles of track. The site includes a former railcar rebuilding facility, the Antelope Yard, fueling areas, and diesel servicing facilities. The site has been designated as contaminated by the federal government, with substances including volatile organics, chlorinated solvents, polynuclear aromatic hydrocarbons, and heavy metals present due to decades of continuous use as a railroad repair and switching facility. Remediation is ongoing at the site.
- Sacramento International Airport in northwestern Sacramento County operates continuously with two major runways and thousands of passengers traveling via commercial and private airlines. Several major airlines operate out of Sacramento International Airport, with most flying light- to medium-weight passenger jets. Approach and takeoff patterns are usually over rural farmland; however, occasionally patterns are adjusted over more populated locations including Roseville. The City is more than 20 miles from Sacramento International Airport and is not in the direct flight path for the airport, although planes do cross Roseville continuously at high altitudes.
- Additional airports within a 20-mile radius of Roseville include the Lincoln and Auburn Airports in Placer County, Beale Air Force Base (34 miles to the north and the closest active military installation), McClellan Airfield, and the Yuba County airport. The instrument-landing approach to Runway 16 at McClellan crosses a portion of the western edge of the Sierra Vista Specific Plan Area. Aircraft on approach fly as low as 1,600 feet at Baseline Road (approximately 4 miles from the runway threshold). Aircraft using McClellan Airpark include aircraft as large as Boeing 747 and 707 aircraft, in addition to Coast Guard C-130s. Additionally, the National Guard flies T-38 aircraft and Blackhawk helicopters out of Mather Air Force Base.
- Sutter Roseville Medical Center maintains a helistop for critically injured patients flown to the hospital. At one time, the facility was limited to accepting one helicopter. If another patient was being transported

to the medical center, the Roseville Fire Department had to respond to the helipad and emergency medical personnel were on standby should anything occur with more than one helicopter using the helipad. The landing area has been expanded and now the helistop has the capacity to accept more than one helicopter at any one time.

- Emergency and public safety helicopter traffic as well as media aircraft and small commercial aircraft frequently fly over the interstates to respond to emergencies and provide public information via local news media.
- Roseville has a number of established truck routes with a higher potential for hazardous material incidents to occur as a result of traffic incidents, as shown in Figure 15-7.

**Figure 15-6.** The J.R. Davis Yard in Roseville, the Largest Train Yard West of the Mississippi

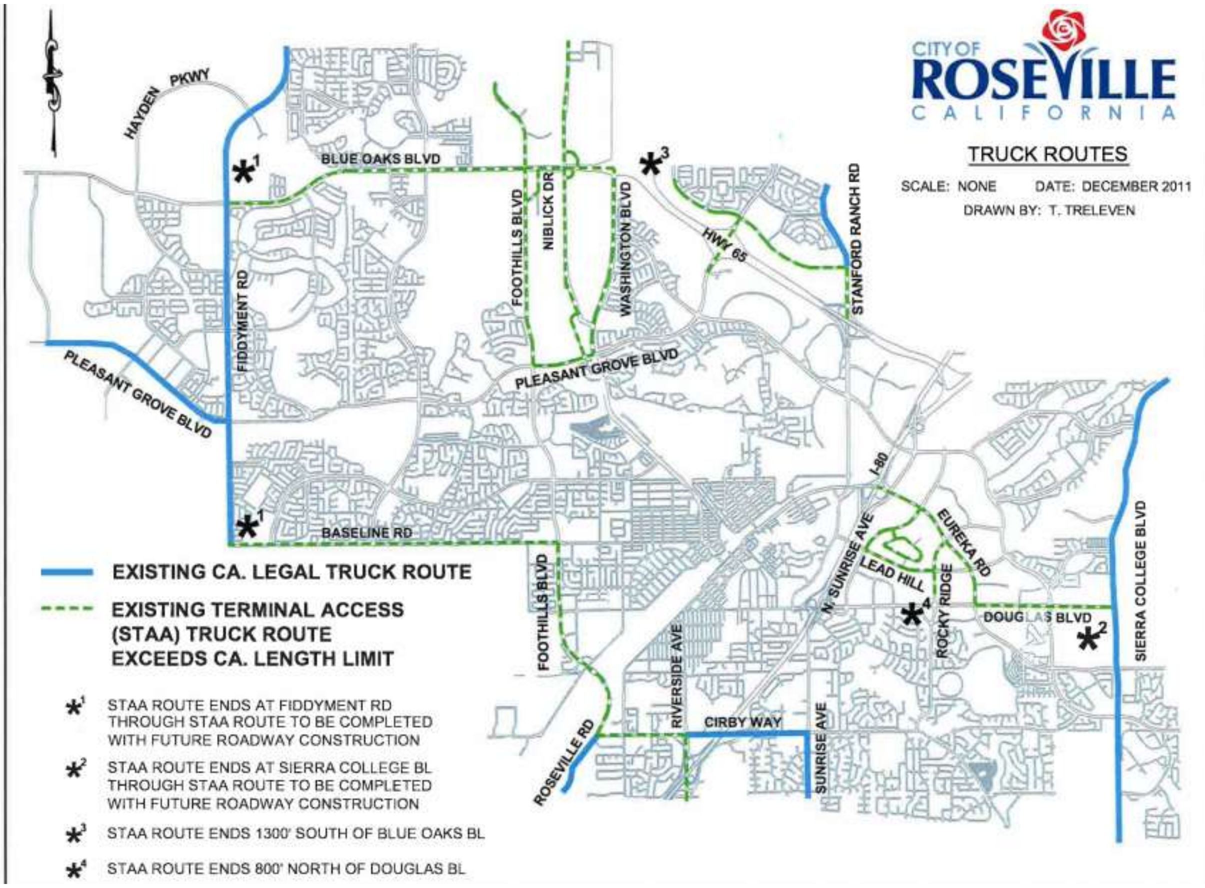



**Figure 15-7.** Roseville Truck Routes with High Potential for Hazardous Materials Incidents

## Pipelines

The Kinder Morgan company owns 3 miles of pipelines generally parallel to the Union Pacific railroad tracks in Roseville that transport high volumes of natural gas through the City (Figure 15-8 shows the company's national pipelines). Other natural gas pipelines run along Interstate 80 with connections between Roseville and Chico. The route to Chico travels through residential areas from the tank farm in Rocklin. The trans-Sierra route from the tank farm in Rocklin to Reno roughly follows the same track as Interstate 80. Pacific Gas and Electric maintains natural gas pipelines in and through Roseville as well.

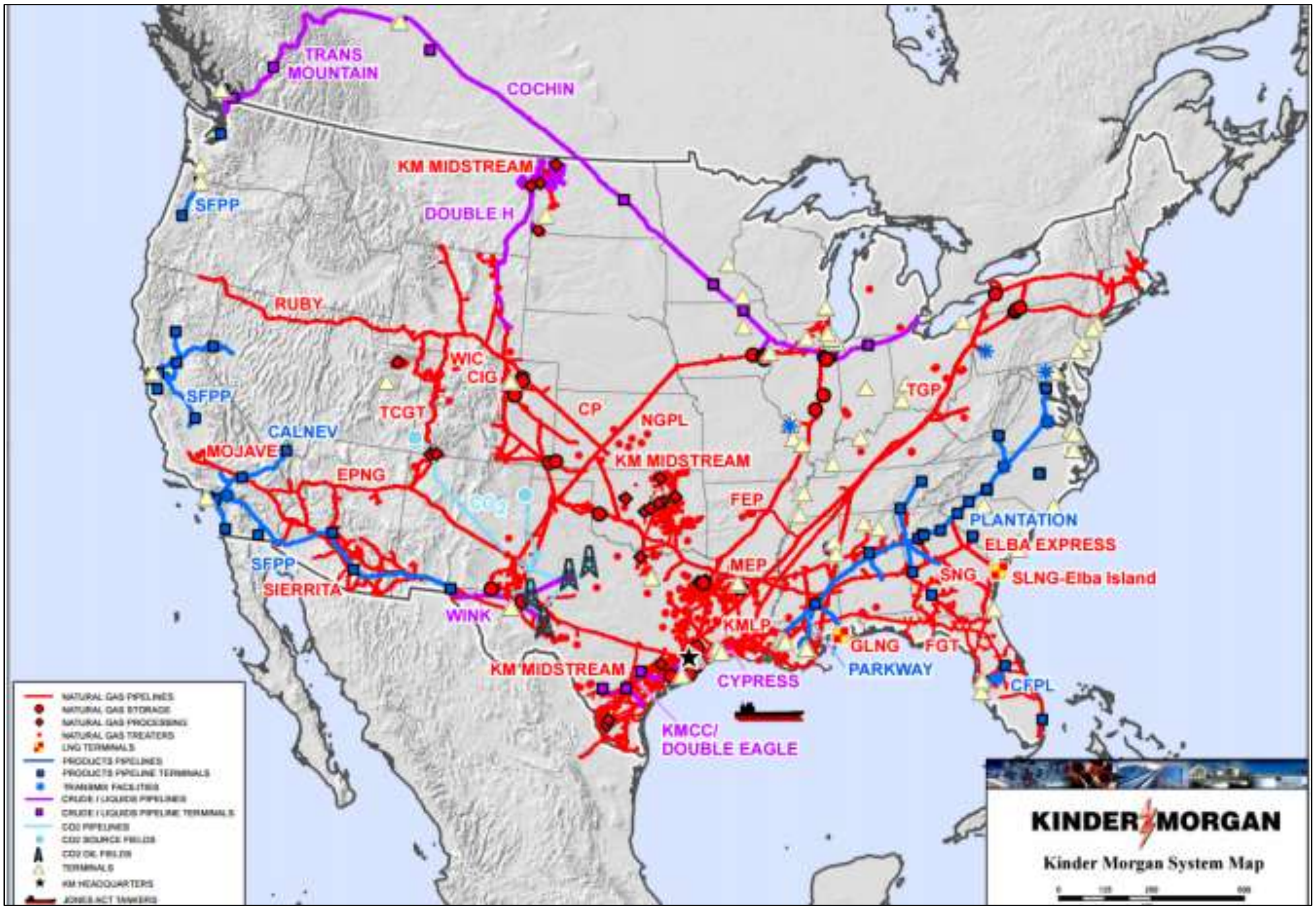



**Figure 15-8.** Kinder Morgan National Pipeline Map

## Business and Industrial Areas

Retail, manufacturing and light industrial firms near State Route 65 (northeastern Roseville and the Sunset Industrial Area of Rocklin) are areas of concern. These facilities have the highest concentration of hazardous materials at fixed facilities in Roseville due to their manufacturing operations. Each business is required to file a detailed, confidential plan with the Roseville Fire Department regarding materials on-site and safety measures taken to protect the public.

## Agricultural

Accidental releases of pesticides, fertilizers, and other agricultural chemicals may be harmful to both humans and the environment. Agricultural pesticides are transported daily in and around Roseville en route to their destination in rural areas of Placer County.

## Illegal Drug Operations

Illegal operations such as laboratories for methamphetamine pose a significant hazard. Laboratory residues are often dumped along roadways or left in rented hotel rooms, creating a serious health hazard to unsuspecting individuals and to the environment.

### Illegal Dumping Sites

Hazardous wastes such as used motor oil, solvents, or paint are occasionally dumped in remote areas of Placer County and Roseville or along roadways, creating a potential health hazard to unsuspecting individuals and to the environment.

### Radioactive Materials

Licensed carriers transport radioactive materials along several transportation routes (Interstate 80 and the railroads) through the City of Roseville. The City is notified in advance of these shipments and commits resources as a standby measure should an accident occur.

## 15.2.3 Frequency

### Terrorism

As of 2014, California's economy was the largest of any state in the U.S. Placer County's proximity to the state capitol presents unique conditions for terrorist attacks. The transportation, energy, and communications systems that cross the county have impacts on the local, regional, and even national economy. In general, the risks of a terrorist event involving a WMD are as follows:

- **Chemical**—The risk of a chemical event is present in the City of Roseville. The agricultural community in Placer County uses and stores significant amounts of chemicals for peaceful and productive means that could be used in destructive ways.
- **Explosives**—Pipe bomb and suspicious package events have occurred in Placer County and Roseville in the past. While none of the events has been identified as a WMD, the elements necessary to construct a WMD are readily available. Additionally, the agricultural communities maintain sufficient products and quantities for use in explosive events.
- **Radiological/Nuclear**—The major transportation arteries for vehicles or rail that cross through or near the City of Roseville contribute to the risk of a radiological event. Such products can pass unknown through any one of the regional transportation corridors.
- **Biological**—Anthrax incidents that occurred in the U.S. in October 2001 demonstrate the potential for spreading terror through biological WMDs. The introduction of Newcastle disease in the United States demonstrates how an agent can be introduced to livestock, causing harm to public health and the economy.
- **Combined Hazards**—WMD agents can be combined to have a greater total effect. When combined, the impacts of the event can be immediate and longer-term. Casualties will likely suffer from both immediate and long-term burns and contamination. Given the risks associated with chemical agents in Placer County and the City of Roseville, the possibility exists for such a combined event to occur.

### Technological

Hazardous material incidents may occur at any time in the City of Roseville, given the presence of transportation routes bisecting the City, the location of businesses and industry that use hazardous materials, the presence of scattered illegitimate businesses such as clandestine drug laboratories at any given time, and the improper disposal of hazardous waste.

## 15.2.4 Severity

The severity of human-caused hazards could range from a minor transportation accident or power outage to a full-scale terrorist attack.

The term mass casualty incident (MCI) is often applied to transportation accidents involving air and rail travel, as well as multi-vehicle highway accidents. However, MCIs may also result from hazardous materials incidents or acts of violence, such as shootings or hostage situations. Effects may include serious injuries, loss of life, and associated property damage.

Because large numbers of patients may be involved, significant MCIs may tax local emergency medical and hospital resources, and therefore require a regional response. MCIs may occur throughout the City, day or night, at any time of the year: Interstate 80, State Route 65, and State Route 49 offer the potential for MCIs because of the heavy volume of traffic, although no highway or surface street in the City is exempt from this hazard.

The railroad tracks traversing Placer County, carrying Amtrak passengers as well as freight, also face the risk of an MCI, as do the air corridors above the county. Adverse weather may play a role in roadway, air, or rail accidents. MCIs may also result from acts of violence or terrorism, which could include a chemical, biological or radiological incident, contaminating persons and requiring mass decontamination.

In Placer County, an MCI is defined as any incident with three or more fatalities or critically injured. The first responders, including Roseville Fire, Roseville Police, and emergency room staffs at the local hospitals, follow the same protocol for an MCI whether the number of dead and injured is three, 30 or 300. Mutual aid is requested should Roseville be unable to respond appropriately with available personnel and equipment.

### 15.2.5 Warning Time

According to the Roseville Terrorism Contingency Plan, only 5 percent of all terrorism incidents are preceded by a warning. In the case of a technological hazard, accidents occur without predictability under circumstances that give responders little time to prepare.

## 15.3 SECONDARY HAZARDS

The largest secondary impact caused by human-caused hazards would be economic. Economic impacts from human-caused hazards are described in Section 15.5.5.

## 15.4 EXPOSURE

The risk assessment for this hazard is based on a facility's criticality and physical vulnerability:

- Criticality is a measure of the potential consequence of an accidental or terrorist event as well as the attractiveness of the facility to a potential adversary or threat. The criticality for each critical facility is based on the factors shown in Table 15-5.
- Vulnerability is a measure of the physical opportunity for an accident or an adversarial attack. This assessment takes into consideration physical design, existing countermeasures, and site layout. The vulnerability for each critical facility is based on the criteria shown in Table 15-6.

**Table 15-5.** Criticality Factors

| Criterion | Low Criticality | Medium Criticality | High Criticality |
|---|---|---|---|
| **Awareness**[a] | Not known/Neighborhood | City/Region/County | State/National |
| **Hazardous Materials**[b] | None / limited and secure | Moderate to large and secure | Large, minimum or no security |
| **Collateral Damage Potential**[c] | None or low | Moderate/immediate area or within 1 mile radius | High/immediate area or within 1 mile radius |

| | | | |
|---|---|---|---|
| **Site Population[d]** | 0 – 300 | 301 – 1,000 | 1,001 or greater |
| **Public/ Emergency Function[e]** | No emergency function, or could be used for emergency function in the future | Support emergency function—redundant site | Emergency function—critical service with or without redundancy |

a. Awareness—How aware is the public of the existence of the facility, site, system, or location?
b. Hazardous Materials—Are flammable, explosive, biological, chemical and/or radiological materials present on site?
c. Collateral Damage Potential—What are the potential consequences for the surrounding area if the asset is attacked or damaged?
d. Site Population—What is the potential for mass causalities, based on the capacity of the facility.
e. Public or Emergency Functions—Does the facility perform a function during an emergency? Is this facility or function capable of being replicated elsewhere?

**Table 15-6.** Vulnerability Criteria

| Criterion | Low Vulnerability | Medium Vulnerability | High Vulnerability |
|---|---|---|---|
| **Accessibility[a]** | Remote location, secure perimeter, tightly controlled access | Controlled access, protected or unprotected entry | Open access, unrestricted, patrolling security, sign restrictions |
| **Automobile Proximity[b]** | Not within 75' – 100' | Not within 25' – 50' | Adjacent or not within 10' |
| **Asset Mobility[c]** | Moves or is relocated frequently | Moves or is relocated occasionally | Permanent/Fixed |
| **Proximity to other Critical Facilities[d]** | Greater than 1.5 – 2 miles | Greater than 3/4 - 1 mile | Within 1/2 – 3/4 mile |
| **Secure Design[e]** | No areas for concealment of packages, air intakes are on roof, access ways are not under the structure. | Area of concealment present, greater than 25' from the structure; Air intakes located at least 10' above ground, may have under structure access drives. | Areas of concealment within 25', air intakes at ground level, under structure access drives. |

a. Accessibility—How accessible is the facility or site to the public?
b. Automobile Proximity—How close can an automobile get to the facility? How vulnerable is the facility to a car bomb attack?
c. Asset Mobility—Is the facility or asset's location fixed or mobile? If mobile, how often is it moved, relocated, or repositioned?
d. Proximity to other critical facilities—If the facility is close to other critical facilities then there could be an increased probability of the facility receiving collateral damage.
e. Secure design—General evaluation of areas of obstruction, air intake locations, parking lot and road design and locations and other site design aspects.

## 15.4.1 Population

A human-caused hazard event could range from an isolated accident to a coordinated attack by multiple agents upon multiple targets. Large-scale incidents have the potential to kill or injure many citizens in the immediate vicinity, and may also affect people a relative distance from the initial event. Variables affecting exposure for a WMD attack and a hazardous material accident include the physical and chemical properties of the WMD, the ambient temperature, wind speed, wind direction, barometric pressure, and humidity.

Computer models are used by Roseville's Hazardous Materials teams to provide general data to first responders to advise evacuations or sheltering in place. With so many variables to determine "toxic endpoints" as defined by the California Environmental Protection Agency, distances are difficult to forecast. In general, those close to the City's transportation corridors or businesses with acutely hazardous materials are more at risk for some sort of effect. Each chemical incident will be different and the scenarios are too numerous to describe in this Plan.

Hazardous materials pose a significant risk to emergency response personnel. All potential first responders and follow-on emergency personnel in the City of Roseville currently are and will be properly trained to the level of emergency response actions required of their individual position at the response scene. Hazardous materials also pose a serious long-term threat to public health and safety, property and the environment.

## 15.4.2 Property

According to the City of Roseville's 2035 General Plan, there were 49,998 housing units in the City as of 2010. Single-family detached residential units account for 75.7 percent of the total developed residential units in Roseville according to the City's current General Plan. The total number of units by type of dwelling unit is shown in Table 15-7.

**Table 15-7.** Residential Dwelling Units in the City of Roseville as of 2012

| Type of Unit | Existing Citywide Units |
|---|---|
| **Single Family** | 35,809 |
| **Mobile Home** | 491 |
| **Multi-Family (>=3 units attached)** | 10,988 |
| **Total** | **47,288** |

*Source: City of Roseville 2035 General Plan, Housing Element*

Roseville has over 27 million square feet of developed non-residential land uses covering over 3,000 acres city-wide. A majority of this development has occurred since the mid-1980s when the specific plan process was established and large tracts of land were entitled for development. Roseville and Placer County are among the fastest growing communities in California, making them a higher profile target for terrorism. New development has been the target of arson fires and eco-terrorism in the County.

## 15.4.3 Critical Facilities and Infrastructure

There are no high profile federal or state buildings in Roseville. Critical facilities are limited to City facilities, Placer County facilities, and other government facilities such as the U.S. Post Office, private utility infrastructure and administrative offices, and medical facilities. Roseville's civic facilities are designed to welcome the public, with convenient parking and customer service areas. Except for the Roseville Police Facility, there are limited secure areas that are restricted to the public. Based on the criticality factors and vulnerability criteria described above, these facilities are all at risk because of their accessibility, automobile accessibility, and lack of a secure or hardened design.

Several of Roseville's critical emergency response facilities are located adjacent to the Roseville Rail Yard and pressurized underground pipelines, including the Roseville Civic Center, a primary location for City staff and services (see Figure 15-9), the Roseville Fire Department, which houses administration functions in Fire Station No. 1, and the City's emergency operations center. Significant regional critical facilities such as the Placer County courts and the main office for the U.S. Post Office are also close to the rail yard.


**Figure 15-9.** Roseville Civic Center

Several factors make gathering places such as the Roseville Civic Center vulnerable to human-caused hazards:

- All are accessible to the general public, to benefit aesthetically pleasing design and customer service.
- Design features, including types of building materials, and screened enclosures for mechanical equipment and solid waste, limit visibility and may contribute to the damage incurred should an intentional or accidental event occur.
- Automobile access is required in the design of most buildings in Roseville, with disabled access parking and easily accessible parking a valued feature.
- Most high population centers do not feature any limitations to access by the public or vehicles, although restricted access to large employment center sites with acutely hazardous materials is built into the design at these facilities.

## 15.4.4 Environment

The risk of human-caused hazards to the environment is considerable. Hazardous materials spilled along roads or railways could easily pollute rivers, streams, wetlands, riparian areas and adjoining fields. Other hazardous materials released into the air could severely impact plant and animal species. The City of Roseville recognizes this risk and has taken steps to reduce the risk exposure to the natural environment. By reducing the risk exposure to the built environment, the City will also mitigate potential losses to the natural environment.

# 15.5 VULNERABILITY

## 15.5.1 Population

Although human-caused hazards have not resulted in a large number of deaths in this area, this type of hazard can be deadly and widespread. Injuries and casualties were not estimated for this hazard. Any individuals exposed to human-caused hazards are considered to be at risk, particularly those working as first responder professionals.

## 15.5.2 Property

All structures in Roseville are physically vulnerable to a human-caused hazard. The emphasis on accessibility, the opportunity for roof access, driveways underneath some structures, unmonitored areas, the proximity of many structures to transportation corridors and underground pipelines, and the potential for a terrorist to strike any structure randomly all have an impact on the vulnerability of structures. Specific vulnerabilities are on file with the Roseville Fire Department as part of a State Homeland Security Assessment Survey and surveys conducted to complete this mitigation plan.

## 15.5.3 Critical Facilities and Infrastructure

Most critical facilities and infrastructure in Roseville would be vulnerable to human-caused hazards, including utilities, data and telecommunications systems, and transportation facilities.

## 15.5.4 Environment

The environment vulnerable to a human-caused hazard is the same as the environment exposed to the hazard. While human-caused disasters have caused significant damage to the environment, estimating damage can be difficult. Loss estimation platforms such as HAZUS-MH are not equipped to measure environmental impacts of these types of hazards. The best gauge of vulnerability of the environment would be a review of damage from past human-caused hazard events. Loss data for damage to the environment were not available at the time of this Plan update. Capturing this data from future events could be beneficial in measuring the vulnerability of the environment for future updates.

## 15.5.5 Economic impacts

Economic impacts from human-caused hazards could be significant. The cost of a terrorist act would be felt in terms of loss of life and property, disruption of business activity and long-term emotional impacts. Recovery would take significant resources at the local level.

Utility losses could cause a reduction in employment, wholesale and retail sales, utility repairs, and increased medical risks. The City may lose sales tax and property taxes, and the finances of private utility companies and the businesses that rely on them would be disrupted.

The economic impact of data and telecommunications losses can be great, as computer security breaches, crime conducted via the world wide web such as identify theft, and many more forms of human-caused economic losses occur daily. Millions of dollars are lost each year as criminals and cyberterrorists steal sensitive information and funds from individuals and organizations.

The economic impacts would be significant if a transportation facility were rendered impassable. The loss of a roadway or railway would have serious effects on the City's economy and ability to provide services. Loss of travel routes on Interstate 80 or State Route 65 would result in loss of commerce, and may impact the City's ability to provide emergency services to its citizens by delaying response times or limiting routes for equipment such as fire apparatus, police vehicles, and ambulances. Fuel deliveries would also be impacted.

The effects of re-routed traffic could also have a serious impact on local roadways. For example, the closure of the roadway at Folsom Dam has resulted in severe local traffic and the closure of businesses in downtown Folsom due to lack of traffic along the Dam Road route. Heavy traffic on routes through central Roseville already occur at peak commute times when Interstate 80 is congested. Traffic control may burden the City's Public Works Department. Mass transit services would be impacted as routes may be delayed or forced to be detoured, causing economic impacts on Roseville transit and on those who ride buses in Roseville.

## 15.6 FUTURE TRENDS IN DEVELOPMENT

The potential for human-caused hazards in Roseville is not likely to lessen or prohibit development in Roseville. The threat of human-caused hazards and the availability of Homeland Security Funds will influence future development of the City's critical facilities. Multi-purpose facilities such as the Mahany Library (which also includes a community center and the public access studio) can be used as both an emergency response command center on the west side of Roseville and an information center to inform the public through the internet and broadcast facilities that will be on site.

## 15.7 REVIEW OF EXISTING ORDINANCES, PROGRAMS, AND PLANS

### 15.7.1 City of Roseville Emergency Response Plan

Adopted on July 21, 2004 and updated in 2010, the Roseville Emergency Operations Plan addresses the planned response to emergency situations associated with natural disasters, technological (human-caused) emergencies, and war emergency operations in or affecting the City of Roseville. The plan is an operational plan as well as a reference document for pre-emergency planning and emergency operations. It establishes the following:

- An emergency management organization to mitigate any significant emergency or disaster affecting the City of Roseville
- Policies, responsibilities and procedures to protect the health and safety of citizens, public and private property, and the environment from the effects of natural and human-caused emergencies and disasters
- Operational concepts and procedures associated with field response to emergencies, emergency operations center activities, and the recovery process
- A framework for implementing the Standardized Emergency Management System in Roseville.

The Emergency Operations Plan outlines the natural and human-caused hazards most likely to occur in Roseville. It provides significant detail for each responding section assigned to City staff and mutual aid agencies prior to an emergency—management, operations, planning, logistics and finance. Roseville's Emergency Preparedness Manager conducts periodic tabletop and simulated exercises in conjunction with the Placer County Office of Emergency Services and affiliated agencies such as Sutter Roseville Medical Center and Kaiser Permanente Medical Center to ensure that staff is prepared and adequate resources are in place prior to any incident.

City of Roseville departments and other agencies providing emergency response within the City will review this plan at least annually in association with the Multi-Hazard Mitigation Steering Committee. A comprehensive review and subsequent gap analysis report was conducted on the Roseville Emergency Operations Plan in conjunction with the 2016 hazard mitigation planning process. Prioritized recommendations for revisions were provided to the City of Roseville.

### 15.7.2 City of Roseville Terrorism Contingency Plan

The City of Roseville Terrorism Contingency Plan was prepared in 2004 with grant funds provided through Cal OES by the U.S. Department of Homeland Security. The plan was prepared in collaboration with the Placer

County Office of Emergency Services, Placer County staff and representatives of the six incorporated cities in the Placer County Operational Area. The Terrorism Plan provides an overview of how the Emergency Operations Plan will be activated, how resources will be organized, and how staff will respond with state and federal resources. Specifically, the Terrorism Plan has the following provisions:

- Identifies how local, state, and federal response resources are integrated.
- Establishes a common response protocol to terrorist threats and events.
- Implements existing mutual aid programs.
- Outlines a unified strategic plan for all responders.

The Terrorism Plan is on file with the City of Roseville Fire Department. The City's Emergency Response Manager conducts training for all those assigned responsibilities as part of the plan in addition to coordinating with the Placer County Office of Emergency Services and other agencies charged with protecting the public in the event of a terrorist attack.

## 15.7.3 City of Roseville Hazardous Materials Contingency Plan

The Hazardous Materials Contingency Plan, completed in September 2004, identifies non-terrorist related hazardous materials responsibilities in order for the City to prepare, respond and recover from an event. The objectives of the Hazardous Materials Plan are as follows:

- Establish policies and responsibilities for protecting the health and safety of the general population and visitors in the City of Roseville and surrounding communities, the environment, and public and private property from the effects of accidental hazardous materials incidents.
- Identify the emergency response organizations that are responsible for managing hazardous materials incidents in or near the City of Roseville.
- Establish operational concepts for staffing, training, operating and supporting the City of Roseville hazardous materials team. The Hazardous Materials Plan is coordinated with the Placer Operational Interagency Response Team Hazard Plan.
- Direct all individuals, agencies, and departments referenced in the Hazardous Materials Plan to develop standard operating procedures and emergency response checklists that are consistent with the Hazardous Materials Plan and the City's Emergency Operations Plan.

## 15.7.4 State of California Certified Unified Program Agency

The City of Roseville is a State of California Certified Unified Program Agency. This designation identifies the City as a licensing agency for six hazardous-material-related programs. It enables the City of Roseville to implement its own hazardous materials emergency response program. Mutual aid agreements are also in place for incident response. Each business that responds yes to any of the following questions must submit a Unified Program Consolidated Form with facility information to the Roseville Fire Department:

- **Hazardous Materials**—Do you have on-site hazardous materials at or above 55 gallons for liquids, 500 pounds for solids, or 200 cubic feet for compressed gases, or the applicable threshold for an extremely hazardous substance specified in federal law; or do you handle radiological materials in quantities for which an emergency plan is required pursuant to applicable law?
- **Underground Storage Tank**—Do you have on-site underground storage tanks?
- **Above-Ground Storage Tank**—Do you have on-site above-ground storage tanks for storage of petroleum?
- **Hazardous Waste**—Do you operate a facility that generates, recycles, or treats hazardous waste, among other activities?

The Fire Department requires existing and proposed businesses to submit lists of hazardous materials they use. The list is maintained by the Fire Department Life Safety/Hazardous Materials Officer and updated periodically.

## 15.7.5 Roseville Police Department

Following the provisions and emergency response, mitigation, and recovery structure of the State Emergency Management System, the federally mandated National Incident Management System, and the National Response Plan, the Roseville Police Department is prepared to meet the challenge of intentional criminal acts, including acts of terrorism, as well as technological, accidental, or natural hazards in the following ways:

- Activation of local emergency response plans using multi-disciplinary resources, including but not limited to regional municipal and county law enforcement, the Joint Terrorism Task Force overseen by the FBI, the Department of Justice Anti-Terrorism Information Center, state and federal military personnel, and private resource agencies
- Deployment of local tactical resources to mitigate human-caused acts of terrorism or intentional business disruption, including SWAT, hostage negotiators, rapid containment team, the tactical communications team, and explosive ordnance personnel as necessary
- Use of the Crime Scene Investigations Unit for post-incident evidence collection and investigation
- Intake, processing, analysis, and investigation of all incidents with the potential for large-scale impact in a professional, timely manner.

## 15.7.6 Roseville Public Safety Communications

Communications personnel are prepared to take the following actions:

- Appropriately recognize and document citizens’ reports of suspicious activity.
- Deploy appropriate resources to prevent, investigate, mitigate, and provide recovery services following incidents of human caused hazards, as well as natural and technological disasters.
- Coordinate resource management of personnel, equipment, and facilities during established crisis incidents.
- Work within the framework of the State Emergency Management System to provide emergency communications to field units and emergency operations personnel during emergency events.
- Deploy mutual aid assistance in support of local, state, and national entities during crisis incidents.
- Provide life-saving pre-arrival instructions on emergency medical incidents, both large-scale and of an individual nature.

## 15.7.7 Roseville Fire Department

### Training

Roseville Fire Department personnel are highly trained to handle all aspects of emergency service. All first response personnel are trained in incident command, advanced firefighting skills, basic life support, essential rescue skills, and basic hazardous materials response. All first response personnel are trained to meet or exceed the following state training certification levels: Firefighter I & II, CPR, Emergency Medical Technician I, Hazmat First Responder Operations Decon and ICS 200.

To support these first responders, specialized teams of personnel are trained and certified in tower rescue, above/below grade rescue, confined space rescue, trench rescue, technical rescue, swift water rescue, dive rescue, specialized hazardous materials response, hazardous materials railcar and tank truck response, terrorism response, multi-casualty management, and advanced life support.

The department's staffing includes a full-time training officer who oversees the Fire Training Division. In addition to the training officer, the department draws from a cadre of state certified ICS, fire, EMS, hazmat and technical rescue instructors to conduct regular training exercises to maintain and enhance competency of personnel in all aspects of emergency response. The department also sends personnel to the National Fire Academy, California Specialized Training Institute, Hazmat Continuing Challenge and other off site programs for advanced certifications and training.

The Fire Department maintains a state-of-the-art training facility within the city limits. The Fire Training Center includes two classrooms, a six-story burn tower, command center and other specialized training props such as above- and below-grade vaults, tanks, cargo tanks and a rail tank car. The Roseville Fire Training Center has been state certified as a regional fire academy and for Hazardous Materials Technician / Specialist, Urban Search and Rescue Systems and Confined Space training.

In addition to training in-service response personnel, the Roseville Fire Training Center hosts a regional fire academy in cooperation with Sierra College. The Roseville Fire Training Center also provides regional training to other fire agencies, some of which are under contract with the Department of Homeland Security. Regular regional training includes the Hazardous Materials Technician / Specialist series, Low Angle Rope Rescue, Trench Rescue, Confined Space Rescue, and Urban Search and Rescue Systems I.

## Response Time and Mutual Aid

The Roseville Fire Department is a fully functional agency that primarily provides fire suppression and emergency medical services for the urban environment of the City. The department operates eight stations. The department has eight paramedic engine companies, with a minimum staffing of three, two paramedic truck companies with a minimum staffing of four, and one battalion chief. The department also operates a hazardous materials response unit (cross-staffed the truck company); five grass/wildland units, and one technical rescue unit (cross-staffed by engine companies). The department maintains four reserve engines and one reserve truck.

The Fire Department has established a Standards of Response Coverage Plan that includes a travel time standard of 4 minutes from the time the apparatus leaves the station to the arrival of the first engine on scene. Due to significant growth in the City, additional fire stations are needed to achieve this response time. Fire Station 9 opened in May 2013 to serve the new development anticipated in West Roseville.

The City of Roseville has mutual aid agreements with local fire departments and districts in surrounding Placer County and Sacramento County. These personnel cooperate in the same training program as the City firefighters to ensure a high level of competency even with borrowed resources. The department participates in the statewide mutual aid system to bring additional resources from anywhere in California or the nation if this level of aid does not meet the incident needs.

## Hazardous Materials Response

### *Hazardous Materials Listing*

All hazardous materials handlers that store in excess of 55 gallons of liquid, 500 pounds of solids, or 200 cubic feet of gas are required to submit Hazardous Materials Management Business Plans to the Roseville Fire Department. These plans provide emergency contact information, site-specific chemical inventories, and vicinity and facility maps. Facilities storing materials that are "acutely" hazardous and in excess of the quantities in CCR, Title 19, Tables I, II or III must submit a more comprehensive Risk Management Plan, which includes off-site consequences analysis, maintenance, and training programs, and an executive summary. Owners/operators of above-ground tanks containing in excess of 660 gallons of petroleum hydrocarbons (or an aggregate quantity of 1,320 gallons) must comply with the California Aboveground Petroleum Storage Act, which requires the preparation of a spill prevention, control, and countermeasure plan.

### *Development Review Process*

The Fire Department reviews any development proposal that may be impacted by or cause an impact related to the storage, handling, or disposal of hazardous materials. A Hazardous Materials Management Plan and, if necessary, a Risk Management Prevention Plan are required as part of the development process per state law. When considering any use, the City analyses the use of toxic or hazardous materials requiring the filing of a business plan for emergency response pursuant to Section 25503.5 of the California Health and Safety Code or materials identified in Section 5194, Title 8 of the CCR. All users must submit a list of hazardous and toxic materials with a qualified discussion of potential chronic and acute long-term health effects, including effects on children, and effects from acute short-term or chronic long-term exposure.

In addition, a plan must be submitted specifying procedures for mitigating the emissions of toxic substances and groundwater monitoring and for identifying methods of hazardous waste disposal. All projects must be reviewed for compliance with the Placer County Hazardous Waste Management Plan.

### *Intergovernmental Coordination*

The Roseville Fire Department works cooperatively with other local and state agencies in a coordinated effort to inform and educate the public regarding the storage, handling, and disposal of household hazardous materials. This includes continued coordination with the Placer County Hazardous Materials Response Teams.

### *Hazardous Waste Drop-off*

The City of Roseville partners with public and private entities to remove household hazardous waste from Roseville’s waste stream. The disposals include the following:

- **Household Hazardous Waste Collection**—The Western Placer Waste Management Authority provides a collection service for household hazardous waste. Residents can transport waste to the Authority’s facility north of Roseville or schedule a pickup through the Roseville Solid Waste Division.
- **Used Electronic Equipment**—The Materials Recovery Facility accepts old televisions and other electronic waste.
- **Used Motor Oil Recycling**—There are six locations in Roseville designated for used motor oil recycling drop-off.
- **Sharps (or Needles)**—Roseville residents who use medical needles for in-home care are encouraged to purchase sharps containers, which hold 100 needles, at a nominal cost from several drug stores in the City. Residents are asked to dispose of all medical needles and containers properly so they do not enter the waste stream.

### *Interagency Cooperation for Emergency Response*

The City of Roseville Fire Department responds in accordance with the City of Roseville Hazardous Materials Emergency Response Plan to hazardous materials emergencies. Both the California Highway Patrol and the City of Roseville have developed a Hazardous Materials Emergency Plan that discusses the participants’ responsibilities, organization and operation to be complied with in the event of a hazardous materials emergency, including clean-up and decontamination procedures.

### *Hazardous Materials Truck Route*

The City of Roseville does not have specific truck routes for hazardous materials. The City does have established truck routes in the city limits, and in the event hazardous materials are to be transported within the city limits, a permit is required from the Roseville Police Department. Typically, trucks with bulk deliveries of hazardous materials use State Route 65 to Blue Oaks Boulevard and then access any of the north-south corridors, including

Washington Boulevard, Industrial Avenue, and Foothills Boulevard where local businesses use hazardous materials in their business activities.

Routes for hazardous materials are coordinated with the California Department of Transportation (Caltrans), the California Highway Patrol, and the Roseville Police, Fire, and Public Works Departments.

Since Blue Oaks Boulevard remains incomplete, there is a risk of hazardous material being transported on bulk trucks through residential areas to reach the Pleasant Grove Wastewater Treatment Plant and the Energy Park. The same is true for transportation of hazardous material to the Booth Road plant, but chlorine gas is no longer used for disinfection there (nor at other water plants serving Roseville).

### *Hazardous Materials Fee Program*

The Roseville Fire Department has adopted a fee schedule for hazardous material permitting, storage, use, handling, and generation. The department also charges for fire and life safety inspections, plan review, and miscellaneous activities such as a Hazardous Materials Business Plan Review.

## 15.8 SCENARIO

Two human-caused hazard scenarios could have a significant impact on the City of Roseville:

- The first scenario would involve hazardous materials being transported via rail or highway (Interstate 80) across the planning area. The release of hazardous materials via intentional or unintentional means could impact large population centers within the City. Advance knowledge of these shipments and their contents would play a role in preparedness for this scenario, thus reducing its potential impact. The biggest issue in response to hazardous material is material identification and containment.
- The second scenario would be a terrorist event at a large gathering place such as a mall or event center. Terrorist events happen with little or no warning. With a population in excess of 120,000 people, Roseville does possess potential targets for terrorist activities. The City has taken steps to assess these sites as well as probable scenarios in its Terrorism Contingency Plan.

## 15.9 ISSUES

Future actions needed at the local level to address human-caused hazards include but are not limited to the following:

- Continue all facets of emergency preparedness training for police, fire, public works, and city manager/public information staff in order to respond quickly in the event of a human-caused disaster. Enhance awareness training for all City employees to recognize threats or suspicious activity in order to prevent an incident from occurring.
- Continue all facets of the City's hazardous materials team training and response through commitment of resources from the Fire Department budget and the addition of funding through the Sacramento Regional Homeland Security budget.
- Continue to improve response times for public safety throughout the City so as to reduce exposure to human-caused incidents. The City will maintain appropriate staffing levels of public safety personnel to address vulnerabilities identified in this chapter.
- Train first responders and all appropriate City staff to implement protocols contained in the City of Roseville Terrorism Response Plan.
- Continue to implement the City of Roseville Hazardous Materials Contingency Plan with enhancements as warranted by the type of uses in the City and new technologies in preventing hazardous materials incidents.

- Continue to work proactively with Union Pacific Railroad regarding the following:
    - Placards and labeling of containers
    - Emergency plans and coordination
    - Standardized response procedures
    - Notification of the types of materials being transported through Roseville on at least an annual basis
    - Random inspections of transporters as allowed by Union Pacific
    - Installation of mitigating techniques along the rail yard at critical locations
    - Routine hazard communication initiatives
    - Enhancing security along the rail corridor should the alert system go higher than Orange
    - Continuously looking to the use of safer alternative products to conduct rail transport operations.
- Continue regular testing of the alarm system along the Union Pacific railroad tracks in Central Roseville.
- Utilize Crime Prevention Through Environmental Design (CPTED) in future planning efforts as well as enhancing existing infrastructure and buildings to prevent or mitigate human-cause incidents. CPTED is an urban planning design process that integrates crime prevention with neighborhood design and community development. CPTED is based on the theory that the proper design and effective use of the built environment can reduce crime and the fear of crime and improve the quality of life. CPTED creates an environment where the physical characteristics, building layout, and site planning allow inhabitants to become key agents in ensuring their own security.
- Work with the private sector to enhance and create Business Continuity Plans in the event of an emergency.
- Relocate or construct a redundant Emergency Operations Center farther from the Roseville Rail Yard and floodplain.
- Maintain an emergency services information line that the public can contact 24 hours a day during an emergency incident to ask questions of emergency staff.
- Coordinate with all Roseville school districts to ensure that their emergency preparedness plans include preparation for human-caused incidents.
- Encourage local businesses to adopt Information Technology and telecommunications recovery plans.
- Promote 72-hour self-sufficiency through the Emergency Preparedness Manager’s efforts, the Roseville website, Roseville Coalition of Neighborhood Associations, and other media.
- Continue to share the human-caused hazard risk and preparedness presentation given at the public meetings and City Council workshop as part of this preparedness effort.
- Maintain the on-line Citizens Advisory Panel of 2,400 households and periodically e-mail emergency preparedness information including human-caused hazard preparedness instructions and reminders.

Future actions needed at the regional level to address human-caused hazards include but are not limited to the following:

- Participate in regional, state and federal efforts to gather terrorism information at all levels and keep public safety officials briefed at all times regarding any local threats. Staff will then further develop response capabilities based on emerging threats.
- Participate in the Cal OES Disaster Resistant California annual conference and other training sessions sponsored by regional, state and federal agencies.
- Participate in regional training exercises per the requirements of Homeland Security Presidential Directive #8 in support of national preparedness. These training exercises, sponsored by the Sacramento Regional Office of Homeland Security, will test and evaluate the ability to coordinate the activities of city, county and state government first responders, volunteer organizations and the private sector in responding to terrorism and technological hazards. The trainings will enhance interagency coordination,

provide training to staff, test response and recovery capabilities, and activate the National Incident Management System and the mutual aid system.

- Review existing automatic/mutual aid agreements with other public safety agencies to identify opportunities for enhancement.

# 16. PLANNING AREA RISK RANKING

A risk ranking was performed for the hazards of concern described in this Plan. This risk ranking assesses the probability of each hazard's occurrence as well as its likely impact on the people, property, and economy of the planning area. When available, estimates of risk were generated with data from Hazus-MH or GIS analysis using methodologies promoted by FEMA. For hazards of concern with less robust datasets, qualitative assessments were used. The results are used in establishing mitigation priorities.

The climate change hazard was not ranked because its impacts are factored into each individual hazard and thus are peripherally included in this assessment. The human-health and human-caused hazards were not ranked because they are not considered natural hazards.

## 16.1 PROBABILITY OF OCCURRENCE

The probability of occurrence of a hazard is indicated by a probability factor based on likelihood of annual occurrence:

- High—Hazard event is likely to occur within 25 years (Probability Factor = 3)
- Medium—Hazard event is likely to occur within 100 years (Probability Factor =2)
- Low—Hazard event is not likely to occur within 100 years (Probability Factor =1)
- No exposure—There is no probability of occurrence (Probability Factor = 0)

The assessment of hazard frequency is generally based on past hazard events in the area. Table 16-1 summarizes the probability assessment for each hazard of concern for this Plan.

**Table 16-1.** Probability of Hazards

| Hazard Event | Probability (high, medium, low) | Probability Factor |
|---|---|---|
| **Dam Failure** | Low | 1 |
| **Drought** | High | 3 |
| **Earthquake** | High | 3 |
| **Flooding** | Medium | 2 |
| **Landslide** | Low | 1 |
| **Severe Weather** | High | 3 |
| **Wildfire** | High | 3 |

## 16.2 IMPACT

Hazard impacts were assessed in three categories: impacts on people, impacts on property and impacts on the local economy. Numerical impact factors were assigned as follows:

- **People**—Values were assigned based on the percentage of the total ***population exposed*** to the hazard event. The degree of impact on individuals will vary and is not measurable, so the calculation assumes for simplicity and consistency that all people exposed to a hazard because they live in a hazard zone will be equally impacted when a hazard event occurs. An element of subjectivity can be used in assigning values for impacts on people. Impact factors were assigned as follows:

- High—50 percent or more of the population is exposed to a hazard (Impact Factor = 3)
- Medium—25 percent to 49 percent of the population is exposed to a hazard (Impact Factor = 2)
- Low—25 percent or less of the population is exposed to the hazard (Impact Factor = 1)
- No impact—None of the population is exposed to a hazard (Impact Factor = 0)

- **Property**—Values were assigned based on the percentage of the total ***property value exposed*** to the hazard event:

  - High—30 percent or more of the total assessed property value is exposed to a hazard (Impact Factor = 3)
  - Medium—15 percent to 29 percent of the total assessed property value is exposed to a hazard (Impact Factor = 2)
  - Low—14 percent or less of the total assessed property value is exposed to the hazard (Impact Factor = 1)
  - No impact—None of the total assessed property value is exposed to a hazard (Impact Factor = 0)

- **Economy**—Values were assigned based on the percentage of the total ***property value vulnerable*** to the hazard event. Values represent estimates of the loss from a major event of each hazard in comparison to the total assessed value of the property exposed to the hazard. For some hazards, such as wildfire, landslide and severe weather, vulnerability was considered to be the same as exposure due to the lack of loss estimation tools specific to those hazards. Loss estimates separate from the exposure estimates were generated for the earthquake and flood hazards using Hazus-MH.

  - High—Estimated loss from the hazard is 20 percent or more of the total exposed property value (Impact Factor = 3)
  - Medium—Estimated loss from the hazard is 10 percent to 19 percent of the total exposed property value (Impact Factor = 2)
  - Low—Estimated loss from the hazard is 9 percent or less of the total exposed property value (Impact Factor = 1)
  - No impact—No loss is estimated from the hazard (Impact Factor = 0)

Each category of impact was assigned a weighting factor to reflect its significance: impact on people was given a weighting factor of 3; impact on property was given a weighting factor of 2; and impact on the economy was given a weighting factor of 1. Table 16-2, Table 16-3 and Table 16-4 summarize the impacts for each hazard.

**Table 16-2.** Impact on People from Hazards

| Hazard Event | Impact (high, medium, low) | Impact Factor | Multiplied by Weighting Factor (3) |
|---|---|---|---|
| **Dam Failure** | High | 3 | 9 |
| **Drought**[a] | None | 0 | 0 |
| **Earthquake** | High | 3 | 9 |
| **Flooding** | Low | 1 | 3 |
| **Landslide** | Low | 1 | 3 |
| **Severe Weather** | High | 3 | 9 |
| **Wildfire** | Medium | 2 | 6 |

a. All people in the planning area would be exposed to drought, but the impact on the safety of individuals is expected to be minimal.

**Table 16-3.** Impact on Property from Hazards

| Hazard Event | Impact (high, medium, low) | Impact Factor | Multiplied by Weighting Factor (2) |
|---|---|---|---|
| **Dam Failure** | High | 3 | 6 |
| **Drought**[a] | None | 0 | 0 |
| **Earthquake** | High | 3 | 6 |
| **Flooding** | Low | 1 | 2 |
| **Landslide**[b] | Low | 0 | 0 |
| **Severe Weather** | High | 3 | 6 |
| **Wildfire** | High | 3 | 6 |

a. All properties in the planning area would be exposed to drought, but the impact on properties is expected to be minimal.
b. Impact on property is less than 0.5% and thus registers as 0.

**Table 16-4.** Impact on Economy from Hazards

| Hazard Event | Impact (high, medium, low) | Impact Factor | Multiplied by Weighting Factor (1) |
|---|---|---|---|
| **Dam Failure** | High | 3 | 3 |
| **Drought** | Low | 1 | 1 |
| **Earthquake** | Low | 1 | 1 |
| **Flooding** | Low | 1 | 1 |
| **Landslide** | Low | 1 | 1 |
| **Severe Weather** | Low | 1 | 1 |
| **Wildfire** | Low | 0 | 0 |

## 16.3 RISK RATING AND RANKING

The risk rating for each hazard was determined by multiplying the probability factor by the sum of the weighted impact factors for people, property and operations, as summarized in Table 16-5.

Based on these ratings, a priority of high, medium or low was assigned to each hazard. The hazards ranked as being of highest concern are earthquake, severe weather, and wildfire. Hazards ranked as being of medium concern are flood and dam failure. The hazards ranked as being of lowest concern are drought and landslide. Table 16-6 shows the hazard risk ranking.

**Table 16-5.** Hazard Risk Rating

| Hazard Event | Probability Factor | Sum of Weighted Impact Factors | Total (Probability x Impact) |
|---|---|---|---|
| **Dam Failure** | 1 | 18 | 18 |
| **Drought** | 3 | 1 | 3 |
| **Earthquake** | 3 | 16 | 48 |
| **Flooding** | 2 | 6 | 12 |
| **Landslide** | 1 | 4 | 4 |
| **Severe Weather** | 3 | 16 | 48 |
| **Wildfire** | 3 | 12 | 36 |

**Table 16-6.** Hazard Risk Ranking

| Hazard Ranking | Hazard Event | Category |
|---|---|---|
| 1 | Severe Weather | High |
| 2 | Earthquake | High |
| 3 | Wildfire | High |
| 4 | Dam Failure | Medium |
| 5 | Flood | Medium |
| 6 | Landslide | Low |
| 7 | Drought | Low |

# Part 3. Mitigation Strategy

# 17. GUIDING PRINCIPLE, GOALS, OBJECTIVES, AND PREVIOUS ACTION STATUS

Hazard mitigation plans must identify goals for reducing long-term vulnerabilities to identified hazards (44 CFR Section 201.6(c)(3)(i)). For the purposes of this Plan, goals and objectives are defined as follows:

- **Goals** are general guidelines that explain what is to be achieved. They are usually broad-based, policy-type statements, long-term, and represent global visions. Goals help define the benefits that the Plan is trying to achieve. The success of the hazard mitigation plan should be measured by the degree to which its goals have been met (that is, by the actual benefits in terms of hazard mitigation).
- **Objectives** are short-term aims which, when combined, form a strategy or course of action to meet a goal. Unlike goals, objectives are specific and measurable.

After establishing a guiding principle for this hazard mitigation plan, the City of Roseville developed goals and objectives for the initial plan through discussions, research, and meetings of the Steering Committee and based on input from stakeholders and the public. Information for this process was garnered from the public involvement strategy, the risk assessment, and review of the California and Placer County hazard mitigation plans.

The Steering Committee identified seven goals, working from a catalog of goal statements created through review of other similar plans and FEMA planning guidance. Once the goals were established, objectives that meet multiple goals were selected through a similar exercise.

For the 2016 Plan, the Steering Committee reviewed the goals and objectives established for the previous plan to determine if they still fulfill the vision of reducing risk in the planning area. It was determined that the goals and objectives are still relevant to the vision.

## 17.1 GUIDING PRINCIPLE

A guiding principle or a mission statement for a plan is a written declaration of the plan's core purpose and focus. It normally remains unchanged over time, regardless of a change to the plan's goals or objectives. Though not required for DMA compliance, the incorporation of a guiding principle provides a clear, singular message that can be a focal point throughout all facets of the planning process. The City of Roseville developed the following guiding principle for 2016 to be carried through to subsequent updates to the hazard mitigation plan:

> *Through community partnerships, establish a plan to reduce vulnerability to hazards in order to protect the health, safety, welfare, and economy of the City.*

## 17.2 GOALS

The goals for the 2016 Plan, consistent with the hazards identified in this plan, are as follows:

- G-1: Protect lives and reduce injury.
- G-2: Promote hazard mitigation as an integrated policy.

- G-3: Protect the continuity of local government to ensure no significant disruption of services during or due to a disaster.
- G-4: Improve community emergency management preparedness, collaboration and outreach.
- G-5: Minimize or reduce damage to property, including critical facilities.
- G-6: Develop and implement mitigation strategies that optimize public funds in an efficient and cost-effective way.
- G-7: Monitor and support the natural environment's capacity to deal with the impacts of natural hazards, taking into account the potential impacts of global climate change.

## 17.3 OBJECTIVES

The Steering Committee selected the objectives listed in Table 17-1 to meet multiple goals. The objectives serve as a stand-alone measurement of a mitigation action rather than as a subset of a goal. Achievement of the objectives is a measure of the effectiveness of a mitigation strategy. The objectives are also used to help establish priorities.

**Table 17-1.** Objectives for 2011 Multi-Hazard Mitigation Plan

| Objective Number | Objective Statement | Goals for which it can be applied |
|---|---|---|
| **O-1** | Consider the impacts of hazards on future land uses in the City of Roseville by coordinating with other planning mechanisms such as the General Plan and land-use code development. | 1, 2, 5, 7 |
| **O-2** | Protect and sustain reliable local emergency operations and communication facilities during and after disasters. | 1, 3, 4 |
| **O-3** | Develop new or enhance existing early warning response systems and plans. | 1, 3, 4, 5 |
| **O-4** | Seek to enhance emergency response capabilities through improvements to infrastructure and City programs. | 1, 4, 5 |
| **O-5** | Enhance the understanding of all present and future hazards that impact the City of Roseville and the risk they pose. | 1, 3, 4, 5, 7 |
| **O-6** | Seek mitigation projects that provide the highest degree of hazard protection at the least cost. | 1, 5, 6 |
| **O-7** | Seek to update information on natural, environmental, and human-caused hazards, vulnerabilities, and mitigation measures by coordinating planning efforts and creating partnerships with appropriate local, private, county, state, and federal agencies. | 1, 2, 3, 4, 5, 7 |
| **O-8** | Seek to implement codes, standards, and policies that will protect life and property, including natural habitat, from the impacts of hazards within the City of Roseville. | 1, 2, 3, 5, 6 |
| **O-9** | Educate the public on preparedness for and mitigation of potential impacts of hazards on the City of Roseville. | 1, 2, 4 |
| **O-10** | Support efforts to retrofit, purchase, or relocate structures in high hazard areas, including those known to be repetitively damaged. | 3, 5, 6 |

## 17.4 STATUS OF PREVIOUS ACTIONS

The City of Roseville develops an annual Progress Report which includes the status of previous actions. This Progress Report details completed actions as well as those actions added outside of the 5-year update cycle. A copy of the 2015 Progress Report is located in Appendix B.

# 18. MITIGATION ALTERNATIVES

Catalogs of hazard mitigation alternatives were developed that present a broad range of alternatives to be considered for use in the planning area, in compliance with 44 CFR (Section 201.6(c)(3)(ii)). One catalog was developed for each hazard of concern evaluated in this Plan. The catalogs present alternatives that are categorized in two ways:

- By who would have responsibility for implementation:
  - Individuals (personal scale)
  - Businesses (corporate scale)
  - Government (government scale).
- By what the alternative would do:
  - Manipulate the hazard
  - Reduce exposure to the hazard
  - Reduce vulnerability to the hazard
  - Increase the ability to respond to or be prepared for the hazard.

Hazard mitigation actions recommended in this Plan were selected from among the alternatives presented in the catalogs. The catalogs provide a baseline of mitigation alternatives that are backed by a planning process, are consistent with the established goals and objectives, and are within the capabilities of the City of Roseville to implement. Some of these actions may not be feasible based on the selection criteria identified for this Plan. The purpose of the catalog was to provide a list of what could be considered to reduce risk of the flood hazard within the planning area. Actions in the catalog that are not included for the action plan were not selected for one or more of the following reasons:

- The action is not feasible.
- The action is already being implemented.
- There is an apparently more cost-effective alternative.
- The action does not have public or political support.

The catalogs for each hazard are presented in Table 18-1 through Table 18-9.

**Table 18-1.** Alternatives to Mitigate the Dam Failure Hazard

| Personal-Scale | Corporate-Scale | Government-Scale |
|---|---|---|
| • **Manipulate the hazard:**<br>○ **None**<br>• **Reduce exposure to the hazard:**<br>○ **Relocate out of dam failure inundation areas.**<br>• **Reduce vulnerability to the hazard:**<br>○ **Elevate home to appropriate levels.**<br>• **Increase the ability to respond to or be prepared for the hazard:**<br>○ **Learn about risk reduction for the dam failure hazard.**<br>○ **Learn the evacuation routes for a dam failure event.**<br>○ **Educate yourself on early warning systems and the dissemination of warnings.** | • **Manipulate the hazard:**<br>○ Remove dams.<br>○ Remove levees.<br>○ Harden dams.<br>• **Reduce exposure to the hazard:**<br>○ Replace earthen dams with hardened structures.<br>• **Reduce vulnerability to the hazard:**<br>○ Flood-proof facilities within dam failure inundation areas.<br>• **Increase the ability to respond to or be prepared for the hazard:**<br>○ Educate employees on the probable impacts of a dam failure.<br>○ Develop a continuity of operations plan. | • **Manipulate the hazard:**<br>○ Remove dams.<br>○ Remove levees.<br>○ Harden dams.<br>• **Reduce exposure to the hazard:**<br>○ Replace earthen dams with hardened structures<br>○ Relocate critical facilities out of dam failure inundation areas.<br>○ Consider open space land use in designated dam failure inundation areas.<br>• **Reduce vulnerability to the hazard:**<br>○ Adopt higher regulatory floodplain standards in mapped dam failure inundation areas.<br>○ Retrofit critical facilities within dam failure inundation areas.<br>• **Increase the ability to respond to or be prepared for the hazard:**<br>○ Map dam failure inundation areas.<br>○ Enhance emergency operations plan to include a dam failure component.<br>○ Institute monthly communications checks with dam operators.<br>○ Inform the public on risk reduction techniques<br>○ Adopt real-estate disclosure requirements for the re-sale of property located within dam failure inundation areas.<br>○ Consider the probable impacts of climate in assessing the risk associated with the dam failure hazard.<br>○ Establish early warning capability downstream of listed high hazard dams.<br>○ Consider the residual risk associated with protection provided by dams in future land use decisions. |

**Table 18-2.** Alternatives to Mitigate the Drought Hazard

| Personal-Scale | Corporate-Scale | Government-Scale |
|---|---|---|
| • **Manipulate the hazard:**<br>○ None<br>• **Reduce exposure to the hazard:**<br>○ None<br>• **Reduce vulnerability to the hazard:**<br>○ Drought-resistant landscapes<br>○ Reduce water system losses<br>○ Modify plumbing systems (through water saving kits)<br>• **Increase the ability to respond to or be prepared for the hazard:**<br>○ Practice active water conservation | • **Manipulate the hazard:**<br>○ None<br>• **Reduce exposure to the hazard:**<br>○ None<br>• **Reduce vulnerability to the hazard:**<br>○ Drought-resistant landscapes<br>○ Reduce private water system losses<br>• **Increase the ability to respond to or be prepared for the hazard:**<br>○ Practice active water conservation | • **Manipulate the hazard:**<br>○ Groundwater recharge through stormwater management<br>• **Reduce exposure to the hazard:**<br>○ Identify and create groundwater backup sources<br>• **Reduce vulnerability to the hazard:**<br>○ Reduce water system losses<br>○ Distribute water saving kits<br>○ Increase use of recycled water<br>○ Diversify water supply diversion points<br>• **Increase the ability to respond to or be prepared for the hazard:**<br>○ Public education on drought resistance<br>○ Identify alternative water supplies for times of drought; mutual aid agreements with alternative suppliers<br>○ Implement drought contingency plan<br>○ Develop criteria "triggers" for drought-related actions<br>○ Improve accuracy of water supply forecasts |

**Table 18-3.** Alternatives to Mitigate the Earthquake Hazard

| Personal-Scale | Corporate-Scale | Government-Scale |
|---|---|---|
| • **Manipulate the hazard:**<br>○ None<br>• **Reduce exposure to the hazard:**<br>○ Locate outside of hazard area (off soft soils)<br>• **Reduce vulnerability to the hazard:**<br>○ Retrofit structure (anchor house structure to foundation)<br>○ Secure household items that can cause injury or damage (such as water heaters, bookcases, and other appliances)<br>○ Build to higher design<br>• **Increase the ability to respond to or be prepared for the hazard:**<br>○ Practice "drop, cover, and hold"<br>○ Develop household mitigation plan, such as creating a retrofit savings account, communication capability with outside, 72-hour self-sufficiency during an event<br>○ Keep cash reserves for reconstruction<br>○ Become informed on the hazard and risk reduction alternatives available.<br>○ Develop a post-disaster action plan for your household | • **Manipulate the hazard:**<br>○ None<br>• **Reduce exposure to the hazard:**<br>○ Locate or relocate mission-critical functions outside hazard area where possible<br>• **Reduce vulnerability to the hazard:**<br>○ Build redundancy for critical functions and facilities<br>○ Retrofit critical buildings and areas housing mission-critical functions<br>• **Increase the ability to respond to or be prepared for the hazard:**<br>○ Adopt higher standard for new construction; consider "performance-based design" when building new structures<br>○ Keep cash reserves for reconstruction<br>○ Inform your employees on the possible impacts of earthquake and how to deal with them at your work facility.<br>○ Develop a continuity of operations plan | • **Manipulate the hazard:**<br>○ None<br>• **Reduce exposure to the hazard:**<br>○ Locate critical facilities or functions outside hazard area where possible<br>• **Reduce vulnerability to the hazard:**<br>○ Harden infrastructure<br>○ Provide redundancy for critical functions<br>○ Adopt higher regulatory standards<br>• **Increase the ability to respond to or be prepared for the hazard:**<br>○ Provide better hazard maps<br>○ Provide technical information and guidance<br>○ Enact tools to help manage development in hazard areas (e.g., tax incentives, information)<br>○ Include retrofitting and replacement of critical system elements in capital improvement plan<br>○ Develop strategy to take advantage of post-disaster opportunities<br>○ Warehouse critical infrastructure components such as pipe, power line, and road repair materials<br>○ Develop and adopt a continuity of operations plan<br>○ Initiate triggers guiding improvements (such as <50% substantial damage or improvements)<br>○ Further enhance seismic risk assessment to target high hazard buildings for mitigation opportunities.<br>○ Develop a post-disaster action plan that includes grant funding and debris removal components. |

**Table 18-4.** Alternatives to Mitigate the Flooding Hazard

| Personal-Scale | Corporate-Scale | Government-Scale |
| --- | --- | --- |
| • **Manipulate the hazard:**<br>○ Clear storm drains and culverts<br>○ Use low-impact development techniques<br>• **Reduce exposure to the hazard:**<br>○ Locate outside of hazard area<br>○ Elevate utilities above base flood elevation<br>○ Use low-impact development techniques<br>• **Reduce vulnerability to the hazard:**<br>○ Raise structures above base flood elevation<br>○ Elevate items within house above base flood elevation<br>○ Build new homes above base flood elevation<br>○ Flood-proof structures<br>• **Increase the ability to respond to or be prepared for the hazard:**<br>○ Buy flood insurance<br>○ Develop household plan, such as retrofit savings, communication with outside, 72-hour self-sufficiency during and after an event | • **Manipulate the hazard:**<br>○ Clear storm drains and culverts<br>○ Use low-impact development techniques<br>• **Reduce exposure to the hazard:**<br>○ Locate critical facilities or functions outside hazard area<br>○ Use low-impact development techniques<br>• **Reduce vulnerability to the hazard:**<br>○ Build redundancy for critical functions or retrofit critical buildings<br>○ Provide flood-proofing when new critical infrastructure must be located in floodplains<br>• **Increase the ability to respond to or be prepared for the hazard:**<br>○ Keep cash reserves for reconstruction<br>○ Support and implement hazard disclosure for sale of property in risk zones.<br>○ Solicit cost-sharing through partnerships with others on projects with multiple benefits. | • **Manipulate the hazard:**<br>○ Maintain drainage system<br>○ Institute low-impact development techniques on property<br>○ Dredging, levee construction, and providing regional retention areas<br>○ Structural flood control, levees, channelization, or revetments.<br>○ Stormwater management regulations and master planning<br>○ Acquire vacant land or promote open space uses in developing watersheds to control increases in runoff<br>• **Reduce exposure to the hazard:**<br>○ Locate or relocate critical facilities outside of hazard area<br>○ Acquire or relocate identified repetitive loss properties<br>○ Promote open space uses in identified high hazard areas via techniques such as: planned unit developments, easements, setbacks, greenways, sensitive area tracks.<br>○ Adopt land development criteria such as planned unit developments, density transfers, clustering<br>○ Institute low impact development techniques on property<br>○ Acquire vacant land or promote open space uses in developing watersheds to control increases in runoff<br>• **Reduce vulnerability to the hazard:**<br>○ Harden infrastructure, bridge replacement program<br>○ Provide redundancy for critical functions and infrastructure<br>○ Adopt regulatory standards such as freeboard standards, cumulative substantial improvement or damage, lower substantial damage threshold; compensatory storage, non-conversion deed restrictions.<br>○ Stormwater management regulations and master planning.<br>○ Adopt "no-adverse impact" floodplain management policies that strive to not increase the flood risk on downstream communities.<br>• **Increase the ability to respond to or be prepared for the hazard:**<br>○ Produce better hazard maps<br>○ Provide technical information and guidance<br>○ Enact tools to help manage development in hazard areas (stronger controls, tax incentives, and information)<br>○ Incorporate retrofitting or replacement of critical system elements in capital improvement plan<br>○ Develop strategy to take advantage of post-disaster opportunities<br>○ Warehouse critical infrastructure components<br>○ Develop and adopt a continuity of operations plan<br>○ Consider participation in the Community Rating System<br>○ Maintain and collect data to define risks and vulnerability<br>○ Train emergency responders<br>○ Create an elevation inventory of structures in the floodplain<br>○ Develop and implement a public information strategy<br>○ Charge a hazard mitigation fee<br>○ Integrate floodplain management policies into other planning mechanisms within the planning area.<br>○ Consider the probable impacts of climate change on the risk associated with the flood hazard<br>○ Consider the residual risk associated with structural flood control in future land use decisions<br>○ Enforce National Flood Insurance Program<br>○ Adopt a Stormwater Management Master Plan |

**Table 18-5.** Alternatives to Mitigate the Landslide Hazard

| Personal-Scale | Corporate-Scale | Government-Scale |
|---|---|---|
| • **Manipulate the hazard:**<br>○ **Stabilize slope (dewater, armor toe)**<br>○ **Reduce weight on top of slope**<br>○ **Minimize vegetation removal and the addition of impervious surfaces.**<br>• **Reduce exposure to the hazard:**<br>○ **Locate structures outside of hazard area (off unstable land and away from slide-run out area)**<br>• **Reduce vulnerability to the hazard:**<br>○ **Retrofit home**<br>• **Increase the ability to respond to or be prepared for the hazard:**<br>○ **Institute warning system, and develop evacuation plan**<br>○ **Keep cash reserves for reconstruction**<br>○ **Educate yourself on risk reduction techniques for landslide hazards** | • **Manipulate the hazard:**<br>○ Stabilize slope (dewater, armor toe)<br>○ Reduce weight on top of slope<br>• **Reduce exposure to the hazard:**<br>○ Locate structures outside of hazard area (off unstable land and away from slide-run out area)<br>• **Reduce vulnerability to the hazard:**<br>○ Retrofit at-risk facilities<br>• **Increase the ability to respond to or be prepared for the hazard:**<br>○ Institute warning system, and develop evacuation plan<br>○ Keep cash reserves for reconstruction<br>○ Develop a continuity of operations plan<br>○ Educate employees on the potential exposure to landslide hazards and emergency response protocol. | • **Manipulate the hazard:**<br>○ Stabilize slope (dewater, armor toe)<br>○ Reduce weight on top of slope<br>• **Reduce exposure to the hazard:**<br>○ Acquire properties in high-risk landslide areas.<br>○ Adopt land use policies that prohibit the placement of habitable structures in high-risk landslide areas.<br>• **Reduce vulnerability to the hazard:**<br>○ Adopt higher regulatory standards for new development within unstable slope areas.<br>○ Armor/retrofit critical infrastructure against the impact of landslides.<br>• **Increase the ability to respond to or be prepared for the hazard:**<br>○ Produce better hazard maps<br>○ Provide technical information and guidance<br>○ Enact tools to help manage development in hazard areas: better land controls, tax incentives, information<br>○ Develop strategy to take advantage of post-disaster opportunities<br>○ Warehouse critical infrastructure components<br>○ Develop and adopt a continuity of operations plan<br>○ Educate the public on the landslide hazard and appropriate risk reduction alternatives. |

**Table 18-6.** Alternatives to Mitigate the Severe Weather Hazard

| Personal-Scale | Corporate-Scale | Government-Scale |
|---|---|---|
| • **Manipulate the hazard:**<br>○ **None**<br>• **Reduce exposure to the hazard:**<br>○ **None**<br>• **Reduce vulnerability to the hazard:**<br>○ **Insulate house**<br>○ **Provide redundant heat and power**<br>○ **Insulate structure**<br>○ **Plant appropriate trees near home and power lines ("Right tree, right place" National Arbor Day Foundation Program)**<br>• **Increase the ability to respond to or be prepared for the hazard:**<br>○ **Trim or remove trees that could affect power lines**<br>○ **Promote 72-hour self-sufficiency**<br>○ **Obtain a NOAA weather radio.**<br>○ **Obtain an emergency generator.** | • **Manipulate the hazard:**<br>○ None<br>• **Reduce exposure to the hazard:**<br>○ None<br>• **Reduce vulnerability to the hazard:**<br>○ Relocate critical infrastructure (such as power lines) underground<br>○ Reinforce or relocate critical infrastructure such as power lines to meet performance expectations<br>○ Install tree wire<br>• **Increase the ability to respond to or be prepared for the hazard:**<br>○ Trim or remove trees that could affect power lines<br>○ Create redundancy<br>○ Equip facilities with a NOAA weather radio<br>○ Equip vital facilities with emergency power sources. | • **Manipulate the hazard:**<br>○ None<br>• **Reduce exposure to the hazard:**<br>○ None<br>• **Reduce vulnerability to the hazard:**<br>○ Harden infrastructure such as locating utilities underground<br>○ Trim trees back from power lines<br>○ Designate snow routes and strengthen critical road sections and bridges<br>• **Increase the ability to respond to or be prepared for the hazard:**<br>○ Support programs such as "Tree Watch" that proactively manage problem areas through use of selective removal of hazardous trees, tree replacement, etc.<br>○ Establish and enforce building codes that require all roofs to withstand snow loads<br>○ Increase communication alternatives<br>○ Modify land use and environmental regulations to support vegetation management activities that improve reliability in utility corridors.<br>○ Modify landscape and other ordinances to encourage appropriate planting near overhead power, cable, and phone lines<br>○ Provide NOAA weather radios to the public |

**Table 18-7.** Alternatives to Mitigate the Wildfire Hazard

| Personal-Scale | Corporate-Scale | Government-Scale |
|---|---|---|
| • **Manipulate the hazard:**<br>○ **Clear potential fuels on property such as dry overgrown underbrush and diseased trees**<br>• **Reduce exposure to the hazard:**<br>○ **Create and maintain defensible space around structures**<br>○ **Locate outside of hazard area**<br>○ **Mow regularly**<br>• **Reduce vulnerability to the hazard:**<br>○ **Create and maintain defensible space around structures and provide water on site**<br>○ **Use fire-retardant building materials**<br>○ **Create defensible spaces around home**<br>• **Increase the ability to respond to or be prepared for the hazard:**<br>○ **Employ techniques from the National Fire Protection Association's Firewise Communities program to safeguard home**<br>○ **Identify alternative water supplies for fire fighting**<br>○ **Install/replace roofing material with non-combustible roofing materials.** | • **Manipulate the hazard:**<br>○ Clear potential fuels on property such as dry underbrush and diseased trees<br>• **Reduce exposure to the hazard:**<br>○ Create and maintain defensible space around structures and infrastructure<br>○ Locate outside of hazard area<br>• **Reduce vulnerability to the hazard:**<br>○ Create and maintain defensible space around structures and infrastructure and provide water on site<br>○ Use fire-retardant building materials<br>○ Use fire-resistant plantings in buffer areas of high wildfire threat.<br>• **Increase the ability to respond to or be prepared for the hazard:**<br>○ Support Firewise community initiatives.<br>○ Create /establish stored water supplies to be used for firefighting. | • **Manipulate the hazard:**<br>○ Clear potential fuels on property such as dry underbrush and diseased trees<br>○ Implement best management practices on public lands.<br>• **Reduce exposure to the hazard:**<br>○ Create and maintain defensible space around structures and infrastructure<br>○ Locate outside of hazard area<br>○ Enhance building code to include use of fire resistant materials in high hazard area.<br>• **Reduce vulnerability to the hazard:**<br>○ Create and maintain defensible space around structures and infrastructure<br>○ Use fire-retardant building materials<br>○ Use fire-resistant plantings in buffer areas of high wildfire threat.<br>○ Consider higher regulatory standards (such as Class A roofing)<br>○ Establish biomass reclamation initiatives<br>• **Increase the ability to respond to or be prepared for the hazard:**<br>○ More public outreach and education efforts, including an active Firewise program<br>○ Possible weapons of mass destruction funds available to enhance fire capability in high-risk areas<br>○ Identify fire response and alternative evacuation routes<br>○ Seek alternative water supplies<br>○ Become a Firewise community<br>○ Use academia to study impacts/solutions to wildfire risk<br>○ Establish/maintain mutual aid agreements between fire service agencies.<br>○ Create/implement fire plans<br>○ Consider the probable impacts of climate change on the risk associated with the wildfire hazard in future land use decisions |

**Table 18-8.** Alternatives to Mitigate Health Hazards

| Personal-Scale | Corporate-Scale | Government-Scale |
|---|---|---|
| • **Manipulate the hazard:**<br>○ None<br>• **Reduce exposure to the hazard:**<br>○ Eliminate or reduce environments on private property that favor mosquito infestation<br>• **Reduce vulnerability to the hazard:**<br>○ Immunization<br>• **Increase the ability to respond to or be prepared for the hazard:**<br>○ Get informed | • **Manipulate the hazard:**<br>○ None<br>• **Reduce exposure to the hazard:**<br>○ Eliminate or reduce environments on private property that favor mosquito infestation<br>• **Reduce vulnerability to the hazard:**<br>○ Immunize employees<br>• **Increase the ability to respond to or be prepared for the hazard:**<br>○ Inform employees on human health hazards | • **Manipulate the hazard:**<br>○ Mosquito abatement<br>• **Reduce exposure to the hazard:**<br>○ Eliminate or reduce environments on public property that favor mosquito infestation<br>• **Reduce vulnerability to the hazard:**<br>○ Immunize employees<br>• **Increase the ability to respond to or be prepared for the hazard:**<br>○ Collaborate with the Placer County Health Department to ensure the health and welfare of the community<br>○ Public education on mosquito abatement and general human health issues |

**Table 18-9.** Alternatives to Mitigate Human-Cause Hazards

| Personal-Scale | Corporate-Scale | Government-Scale |
|---|---|---|
| • **Manipulate the hazard:**<br>○ None<br>• **Reduce exposure to the hazard:**<br>○ None<br>• **Reduce vulnerability to the hazard:**<br>○ None<br>• **Increase the ability to respond to or be prepared for the hazard:**<br>○ Increase awareness of vulnerability to threats<br>○ Neighborhood watch program<br>○ Keep informed<br>○ Develop an emergency response plan<br>○ Report suspicious activities | • **Manipulate the hazard:**<br>○ None<br>• **Reduce exposure to the hazard:**<br>○ Incorporate anti-terrorism and security mitigation measures in site and layout design of facilities<br>○ Consider site security in landscape design of facilities<br>• **Reduce vulnerability to the hazard:**<br>○ Restrict access by implementing controlled access zones<br>○ Increase security measures<br>○ Install physical barriers around critical facilities<br>○ Employ parking restrictions as a means to reduce vulnerability<br>• **Increase the ability to respond to or be prepared for the hazard:**<br>○ Become a partner (stakeholder) in mitigation and prevention<br>○ Educate employees<br>○ Develop an emergency response plan<br>○ Develop a Continuity of Operations Plan<br>○ Use liberal signage techniques to inform and increase capability of users of facilities | • **Manipulate the hazard:**<br>○ None<br>• **Reduce exposure to the hazard:**<br>○ Construct new critical facilities with clear zones.<br>○ Retrofit existing critical facilities<br>• **Reduce vulnerability to the hazard:**<br>○ Restrict access by implementing controlled access zones<br>○ Reduce single-point vulnerabilities such as: redundancy for critical lifelines and infrastructure<br>○ Install physical barriers around critical facilities<br>○ Provide regular education to personnel regarding cyber attacks<br>• **Increase the ability to respond to or be prepared for the hazard:**<br>○ Educate public on threats and vulnerability<br>○ Enhance emergency response capability by contingency planning for specific events based on identified vulnerabilities<br>○ Consider performance-based zoning as a land use alternative to mitigate impacts of human-caused hazards<br>○ Employ Crime Prevention Through Environmental Design (CPTED techniques in design of public facilities<br>○ Consider providing incentives for mitigation<br>○ Develop a City THIRA<br>○ Establish secure communications between multiple entities to communicate sensitive information. |

# 19. ACTION PLAN AND IMPLEMENTATION

## 19.1 HAZARD MITIGATION ACTION PLAN

The Steering Committee reviewed the catalogs of hazard mitigation alternatives and selected actions to be included in a hazard mitigation action plan. The selection of actions was based on the risk assessment of identified hazards of concern and the defined Roseville hazard mitigation goals and objectives. Table 19-1 lists the recommended hazard mitigation actions that make up the action plan. The timeframe indicated in the table is defined as follows:

- Short Term = to be completed in 1 to 5 years
- Long Term = to be completed in greater than 5 years
- Ongoing = currently being funded and implemented under existing programs.

**Table 19-1.** Action Plan

| Hazards Addressed | Funding Options | Timeframe | Objectives Met | In Previous Plan? (# from previous plan) |
|---|---|---|---|---|
| Lead Agency: Central Services Department | | | | |
| Action #F-20— Retrofit the City's Downtown library by sealing the exterior and installing a flood door to protect against flood damage should Dry Creek overspill the existing floodwall. | | | | |
| Flood | Grant funding (PDM, HMGP, and FEMA) based on benefits exceeding costs | Long term | 6, 10 | Yes (F-21) |
| Lead Agency: City Council | | | | |
| Action #HC-3—Seek to establish appropriate staffing levels of public safety personnel to address vulnerabilities identified through an incremental targeted study that provides immediate needs as well as anticipated needs in 1 year, 5 years, and 10 years. | | | | |
| Human-Caused | General Fund | Short term | 2, 4 | Yes (HC-3) |
| Lead Agency: City Manager's Office | | | | |
| Action #HH-3—Collaborate with the Placer County Mosquito Abatement District to review resource protection policies that conflict with human health protection in the City of Roseville and work to resolve these policy issues | | | | |
| Human Health | Currently budgeted for under the General Fun | Short term | 5, 6, 7, 9 | Yes (HH-3) |
| Lead Agency: Public Affairs & Communications Department | | | | |
| Action #HH-2—Support the public education efforts of the Placer County Health Department and the Placer Mosquito Abatement District | | | | |
| Human Health | Currently budgeted for under the General Fund | Short term | 5, 6, 7, 9 | Yes (HH-2) |
| Action #MH-2—Continue to maintain the hazard mitigation page on City website that provides following types of information:<br>• The Hazard Management Plan and its progress reports<br>• Hazard-specific information<br>• Mitigation information by hazard, with specific emphasis on private property<br>• Emergency response and warning information<br>• Links to county, state, and federal related agencies | | | | |
| | General Fund; PDM grant funding | Short term | 2, 3, 5, 6, 9 | Yes (MH-2) |
| Lead Agency: Development Services Department | | | | |
| Action #EQ-1—Perform building-specific, structural seismic vulnerability assessment of City-owned critical facilities constructed prior to 1980 (including infrastructure). Included in this assessment will be recommended mitigation alternatives that meet goals and objectives of this Plan. | | | | |
| Earthquake | General Fund; Possible grant funding under PDM program | Long term | 5, 10 | Yes (EQ-1) |
| Action #EQ-2—Incorporate earthquake mitigation measures for private property into existing City-sponsored outreach programs such as printed media and the City's website. | | | | |
| Earthquake | City General fund | Short term | 1, 9, 10, 11 | Yes (EQ-2) |
| Action #EQ-3—Reassess the overall vulnerability to the earthquake hazard using the best available science and technology as it becomes available. State-sponsored programs, Seismic Hazards Mapping Act, and future FEMA- sponsored initiatives are anticipated to create a wealth of knowledge regarding this hazard that did not exist during the preparation of this Plan. | | | | |
| Earthquake | General Fund; Possible grant funding under PDM program | Short term | 1, 5, 7, 9 | Yes (EQ-3) |
| Action #F-1—The City shall designate all areas identified as the 100-year floodplain. The boundaries of the 100-year floodplain shall be as specified in the floodplain designations section of this component of the City's General Plan. Floodplain areas shall be preserved as specified in the open space and conservation element. Such preservation may include required dedication to the City. If needed, modify the City's ordinances to include floodplain use regulations consistent with the goals, policies, and implementation measures of the safety, land use, open space and conservation, and parks and recreation elements of the City's General Plan. | | | | |
| Flood | Currently funded by General Fund allocation | Long term | 1, 6, 7 | Yes (F-1) |

| Hazards Addressed | Funding Options | Timeframe | Objectives Met | In Previous Plan? (# from previous plan) |
|---|---|---|---|---|
| Action #F-2—Refer any development proposal that has a direct or indirect impact on flood protection to Public Works for comment. In addition, forward such proposals to other agencies as applicable, including the U.S. Army Corps of Engineers, California Central Valley Flood Protection Board, FEMA, California Department of Fish and Wildlife, Placer County Resource Conservation District, and Placer County Flood Control District. Consider the comments of the agencies during the development review process. | | | | |
| Flood | Currently funded by General Fund allocation | Short term | 1, 5, 7 | Yes (F-2) |
| Action #F-9—Ensure that future specific plans and specific plan amendments are consistent with the goals and policies of the General Plan. The specific plans shall include the designation and preservation of floodplain areas and adjacent habitat. Provisions shall be incorporated to ensure that public infrastructure, utilities, and emergency services remain functional during flood conditions. Such infrastructure and facilities include water, sewer and gas mains, telephone and electric lines, streets and bridges, hospitals, and fire and police stations. Financing mechanisms shall be explored to fund necessary flood protection improvements and maintenance. Development agreements may be used to secure implementation and funding provisions. (Specific plans have 100% cost recovery by developers). | | | | |
| Flood | Specific plans have 100% cost recovery by developers | Long term | 1, 6, 7, 8 | Yes (F-9) |
| Action #F-11—Require a master drainage plan as part of the approval process for all specific plans and large development projects as determined by the Public Works director. The master drainage plan should consider cumulative regional drainage and flooding mitigation. The plan's intent is to ensure that the overall rate of runoff from a project does not exceed predevelopment levels. If necessary, this objective shall be achieved by incorporating run-off control measures to minimize peak flows and/or assistance in financing or otherwise implementing comprehensive drainage plans. | | | | |
| Flood | General Fund; Developer-based funding under specific plan requirements | Long term | 1, 6, 8 | Yes (F-11) |
| Action #LS-2— Continue to implement policies adopted by the General Plan that promote open space land uses within identified steep slope areas of Roseville. The City of Roseville Northeast Roseville Specific Plan and Stoneridge Specific Plans include the identified steep slope areas within Roseville. Both Plan Areas have continuing development. | | | | |
| Landslide | General Fund; Developer-based funding and specific plan requirements | Short term | 1, 6, 8 | Yes (LS-2) |
| Action #MH-1—Continue to maintain Office of Emergency Services certification of all City inspectors for post-disaster damage assessment. | | | | |
| Multi-Hazard | General Fund | Short term | 2, 7 | Yes (MH-1) |
| Lead Agency: Environmental Utilities Department (EUD) | | | | |
| Action #D-1—Perform a groundwater recharge feasibility study to determine the most cost-effective way to replenish groundwater resources within Roseville. | | | | |
| Drought | Water utility funds; General fund; Developer-based funding under specific plan requirements | Long term | 5, 6 | Yes (D-1) |
| Action #D-2—Implement aquifer storage and recovery program that uses direct injection technique in areas identified as appropriate. | | | | |
| Drought | Water Construction Fund | Long term | 6, 8 | Yes (D-2) |
| Action #D-3—Continue to implement the Environmental Utility Department's recycled water program and seek all opportunities to expand its coverage, currently focusing on urban growth areas. The City pumps recycled water through a system of purple pipes completely separate from potable (drinking water) pipes. The City pumps the recycled water to customers such as streetscapes, golf courses and parks, where it irrigates turf and shrubs. Using recycled water for uses such as landscape irrigation reduces demand on the potable water system, creating a more reliable water supply for the entire City. Recycled water is not subject to the effects of drought. | | | | |
| Drought | Water utility rates, developer-based fees under specific plan requirements | Short term | 6, 8 | Yes (D-3) |
| Action #D-4—Promote active water conservation techniques and strategies to private property owners through Roseville-sponsored outreach projects such as printed media and the City's website. | | | | |
| Drought | Currently funded by General Fund allocation | Short term | 5, 9 | Yes (D-4) |
| Action #HC-5—Address vulnerabilities identified in vulnerability assessment of water facilities performed by the Environmental Utilities Department in response to EPA initiative. | | | | |
| Human-Caused | EUD CIP, and EPA grant funding | Long term | 5, 7 | Yes (HC-5) |

| Hazards Addressed | Funding Options | Timeframe | Objectives Met | In Previous Plan? (# from previous plan) |
|---|---|---|---|---|
| Action #SW-4—Enhance and implement strategies for debris management and removal during severe weather events. | | | | |
| | General Fund | Short term | 6, 8 | Yes (SW-5) |
| Lead Agency: Information Technology Division | | | | |
| Action #HC-9—Protect the City's data, technology infrastructure and staff against malicious cyber-attacks and Cyber terrorism, such as but not limited to:<br>• Identity Theft<br>• Virus/Malware/Ransomware/Spyware/Spam/Phishing<br>• Network and system attacks<br>• Web site hacking<br>• Denial-of-service attacks | | | | |
| Human-Caused | General Fund | Short term | 2, 5, 7 | Yes (HC-9) |
| Action #MH-7—Strive to maintain high availability of essential communication services | | | | |
| Multi-Hazard | EUD CIP, General Fund | Ongoing | 2, 3, 4, 7 | Yes (MH-7) |
| Action #MH-8—Secure the City's physical locations that contain technology infrastructure | | | | |
| Multi-Hazard | EUD CIP, General Fund | Ongoing | 2, 3, 4, 7 | Yes (MH-8) |
| Lead Agency: Parks, Recreation & Libraries Department: Open Space Division | | | | |
| Action #F-12—Continue the Parks, Recreation & Libraries Department's regular creek maintenance program within the City's creeks and floodplain areas. This program clears and removes debris that could contribute to blockage and flooding and may include the removal of silt. This is only done in areas of high risk to flood damage or where property or facilities are threatened by flooding. | | | | |
| Flood | Currently funded by General Fund allocation | Ongoing | 8 | Yes (F-12) |
| Action #F-21—Continue the Tree Mitigation Fund program administered by the Open Space Division in conjunction with non-profit organizations. The planting of oak trees in the open spaces adjacent to riparian zones increases infiltration and slows storm water surges. | | | | |
| Flood | General Fund | Ongoing | 1, 5, 7, 9 | Yes (F-22) |
| Action #F-22—Manage beaver dam sites for flood control protection and habitat restoration after dam removal. One primary issue is impacts to floodwater capacity of creeks. Part of the desired comprehensive approach to beaver management includes establishment of quantitative and qualitative "carrying capacity," including acre-feet of flood capacity lost. Implement a standard monitoring and reporting process to track beaver dam locations, population, and impacts. Gain regulatory approval for beaver management techniques such as biological control and habitat manipulation using the most benign options first. | | | | |
| Flood | Currently funded by General Fund allocation | Ongoing | 1, 6, 8 | Yes (F-23) |
| Action #WF-1—Continue "Goat Grazing" program for removal of grassland in areas of Roseville potentially vulnerable to wildfire. Implement goat grazing in City open space and preserve areas for fire and invasive plant species management and native plant restoration. | | | | |
| Wildfire | General Fund; Community Facilities District funding; PDM grant funding | Ongoing | 6, 9 | Yes (WF-2) |
| Action #MH-4—Implement an "Adopt an Open Space" program in coordination with the open space management program. Develop "adoption contracts" with neighborhoods, organizations, businesses, etc., describing the level of stewardship and the terms of the "adoption." Publicize these activities through online resource directory and other media to encourage participation. | | | | |
| Multi-Hazard | General Fund; Community Facilities District funding; PDM grant funding | Short term | 1, 5, 7, 9 | Yes (MH-4) |
| Action #MH-5—Develop and disseminate best practices information to private property owners whose land is adjacent to open space areas describing stewardship opportunities and owners' role in preserving beneficial uses of open space areas (including vernal pool grassland and creek or riparian uses). Offer classes to provide in-depth information, such as demonstration projects, techniques for ecologically friendly weed abatement and vegetation control, and creating a backyard habitat compatible with open space areas. | | | | |
| Multi-Hazard | General Fund; PDM grant funding | Short term | 1, 5, 7, 9 | Yes (MH-5) |
| Action #MH-6—Work with the Roseville City School District, local high school districts, and non-profit organizations to promote ecology-oriented curricula and stewardship activities. Identify resource and administrative barriers that may be limiting schools' abilities to more actively participate in stewardship, and work collaboratively to identify solutions. | | | | |
| Multi-Hazard | General Fund; PDM grant funding | Long term | 1, 5, 7, 9 | Yes (MH-6) |

| Hazards Addressed | Funding Options | Timeframe | Objectives Met | In Previous Plan? (# from previous plan) |
|---|---|---|---|---|
| Lead Agency: Police and Fire Department | | | | |
| Action #DF-1—Create a dam failure element for the City's emergency response plan that includes a phased warning protocol in response to the findings of the Folsom Dam Containment Dike Risk Assessment. | | | | |
| Dam Failure | General Fund; Department of Homeland Security (DHS) grant funding | Short term | 2, 3, 4, 9 | Yes (DF-1) |
| Action #F-19—Implement recommendation of Downtown Roseville Specific Plan to relocate the Public safety Building | | | | |
| Flood | Grant funding (PDM, HMGP, and FEMA) based on benefits exceeding costs | Short term | 6, 10 | Yes (F-20) |
| Action #HC-1—Commit support to initiatives within the Sacramento-Roseville-Arden-Arcade Metropolitan Statistical Area; continue to seek funding from other federal sources to fund its initiatives | | | | |
| Human-Caused | General Fund | Short term | 2, 7 | Yes (HC-1) |
| Action #HC-2—Enhance emergency response capability of City by contingency planning for specific events based on identified vulnerabilities. | | | | |
| Human-Caused | General Fund; DHS grant funding | Short term | 2, 3, 4, 9 | Yes (HC-2) |
| Action #HC-4—Prepare a site-specific vulnerability assessment of City- owned critical facilities that use the best available science and technology with regards to human-caused hazards. | | | | |
| Human-Caused | General Fund; DHS grant funding | Short term | 2, 5, 7 | Yes (HC-4) |
| Action #HH-1—Continue to collaborate with the Placer County Health Department to ensure the health and welfare of the community | | | | |
| Human Health | Currently budgeted for under the General Fund | Short term | 5, 6, 7, 9 | Yes (HH-1) |
| Action #SW-3—Continue education/outreach programs to improve winter preparedness and minimize loss of life or injury. | | | | |
| | General Fund | Short term | 6, 9 | Yes (SW-4) |
| Action #WF-2—Enhance existing City public outreach programs to include information on fire safety, defensible spaces, and areas of concern. | | | | |
| Wildfire | General Fund; Grant funding under PDM program and HMGP | Short term | 6, 9 | Yes (WF-3) |
| Action #MH-3—Establish/maintain a post-disaster action plan to be part of the City Emergency operations plan that will include following elements:<br>• Procedures for public information<br>• Post-disaster damage assessment<br>• Grant writing<br>• Code enforcement<br>• Redundant operations | | | | |
| Multi-Hazard | General Fund; PDM Grant Funding | Short term | 2, 3, 4, 7 | Yes (MH-3) |
| Lead Agency: Public Works Department | | | | |
| Action #F-3—Continue City participation in the National Flood Insurance Program and the Community Rating System (CRS). Seek CRS classification improvements within capabilities of City programs, including adoption and administration of FEMA-approved ordinances and flood insurance rate maps (FIRM). | | | | |
| Flood | Currently funded by General Fund allocation | Short term | 1, 5, 9 | Yes (F-3) |
| Action #F-4—Maintain Roseville's compliance and good standing under the National Flood Insurance program. | | | | |
| | General Fund | Short term | 2, 3, 4, 5, 10 | Yes (F-4) |
| Action #F-5—Continue the City's outreach program to flood-prone property owners and the citizens of Roseville, to help make them aware of the flood threat and how best to deal with them. | | | | |
| Flood | Currently funded by General Fund allocation | Short term | 5, 9 | Yes (F-5) |

| Hazards Addressed | Funding Options | Timeframe | Objectives Met | In Previous Plan? (# from previous plan) |
|---|---|---|---|---|
| Action #F-6—Continue to pursue a regional approach to flood issues by remaining actively involved in the Placer County Flood Control District. This involvement includes cooperation in the development of a comprehensive regional database. Continue to participate in regional flooding studies, including the Auburn Creek/Coon Creek/Pleasant Grove Creek flood mitigation plan and the Dry Creek watershed flood control plan. | | | | |
| Flood | Currently funded by General Fund allocation | Long term | 1, 5, 7 | Yes (F-6) |
| Action #F-7—Continue City coordination with other agencies on issues of flood control. Coordination between the City and adjacent jurisdictions occurs through several mechanisms, including distribution of development proposals for review and comment. Continue City cooperation with federal, state, and local agencies, including the U.S. Army Corps of Engineers, California Central Valley Flood Protection Board, FEMA, California Department of Fish and Wildlife, Placer County Resource Conservation District, and the Placer County Flood Control District. | | | | |
| Flood | Currently funded by General Fund allocation | Short term | 1, 5, 7 | Yes (F-7) |
| Action #F-8—Continue to develop, implement, and expand the Flood Alert and Early Warning Program systems and integrate the systems with other local jurisdictions to form a regional warning program. | | | | |
| Flood | General Fund; Possible grant funding (PDM, HMGP, and Flood Mitigation Assistance) | Long term | 2, 3 | Yes (F-8) |
| Action #F-10—Monitor and regularly update City flood studies, modeling, and associated land use, zoning, and other development regulations at a minimum of every 5 years or whenever information becomes available that would significantly modify previous data. New information could include new studies, change in City policy, consideration of a major development project or specific plan, or implementation of a flood control project. | | | | |
| Flood | General Fund; FEMA map modernization; Developer-based funding and specific plan requirements | Long term | 1, 5, 7 | Yes (F-10) |
| Action #F-13—Continue annual inspection and maintenance program of City storm drain systems. Review after every major storm system function and performance. This program removes debris that could contribute to blockage of the storm drain system. | | | | |
| Flood | Currently funded by General Fund allocation and; gas tax | Short term | 8 | Yes (F-13) |
| Action #F-14—Complete the final two phases of the Cirby/Linda/Dry Creek flood control project (Phase 1 and 2). Five of the seven phases of this project have been completed at a cost of about $18,000,000. The basis for determining viability of this project will be a benefit /cost analysis to determine if project meets federal grant eligibility requirements. | | | | |
| Flood | General Fund; Impact fees; Grant funding (PDM and HMGP) based on benefits exceeding costs | Long term | 6, 8, 10 | Yes (F-14) |
| Action #F-15—Analyze alternative improvements to the Cirby/Linda/Dry Creek flood control project that may be cost effective in the flood-prone areas of Roseville:<br>• Dry Creek from Darling Way to Riverside Avenue<br>• Area on Dry Creek upstream of Folsom Road in the Columbia Avenue/Marilyn Avenue/Bonita Street area<br>• Linda Creek near Champion Oaks Drive/Samoa Way/Hurst Way area<br>• Cirby Creek in the Trimble Way/Zien Court area | | | | |
| Flood | General Funds; Developer-based funds, grant funding (PDM, HMGP, and FEMA) based on benefits exceeding costs | Long term | 6, 8, 10 | Yes (F-15) |
| Action #F-16—Replace the Huntington Drive/Cirby Creek culvert with a bridge to protect Queens Court/Huntington Drive area. The Public Works Department oversees this project. | | | | |
| Flood | General Fund; CIP, developer-based funds, grant funding (PDM, HMGP, and FEMA) based on benefits exceeding costs | Long term | 6, 10 | Yes (F-16) |
| Action #F-17—Divert the main drainage storm drain system down Crestmont Avenue to Cirby Way and then into Dry Creek so that the existing system will not exceed capacity. If system capacity is exceeded, the intersection on Cirby Way and Crestmont Avenue and nearby homes will flood during major flood events. | | | | |
| Flood | General Fund; CIP, developer-based funds, grant funding (PDM, HMGP, and FEMA) based on benefits exceeding costs | Short term | 6, 10 | Yes (F-17) |

| Hazards Addressed | Funding Options | Timeframe | Objectives Met | In Previous Plan? (# from previous plan) |
|---|---|---|---|---|
| Action #F-18—Continue to promote and sponsor programs to buy out, relocate, and flood-proof existing flood-prone structures within Roseville. | | | | |
| Flood | Grant funding (PDM, HMGP, and FEMA) based on benefits exceeding costs | Short term | 6, 10 | Yes (F-18) |
| Action #F-23 – Develop the City's multi-use, multi-benefit stormwater retention project within the Pleasant Grove Creek Watershed, the Reason Farms Stormwater Retention Project. | | | | |
| Flood | Developer-based funds, grant funding (PDM, HMGP, and FEMA) based on benefits exceeding costs | Long term | 6, 10 | No |
| Action #HC-10 – Improve evacuation transportation routes within the City of Roseville by removing traffic constrictions. | | | | |
| Human Caused | Developer-based funds, grant funding (PDM, HMGP, and FEMA) based on benefits exceeding costs | Long term | 6, 10 | No |
| Action #LS-1—Once California Geological Survey completes soils mapping for the Roseville vicinity under the Seismic Hazards Mapping Act, reassess landslide hazard using best available data to gauge the true vulnerability to this hazard. | | | | |
| Landslide | General Fund; Developer-based funding and specific plan requirements; Possible grant funding under PDM program | Long term | 1, 5, 7 | Yes (LS-1) |
| Lead Agency: Roseville Electric | | | | |
| Action #HC-6—Maintain compliance with California Energy Commission ("CEC") license conditions for the operations of the Roseville Energy Park ("REP") with respect to Hazardous Material Management | | | | |
| Human-Caused | EUD CIP, General Fund | Short term | 5, 7 | Yes (HC-6) |
| Action #HC-7—Maintain compliance with state and local laws and regulations for the operation of the Roseville Power Plant #2. | | | | |
| Human-Caused | EUD CIP, General Fund | Long term | 2, 5, 7 | Yes (HC-7) |
| Action #HC-8—Maintain compliance with North American Electric Reliability Corporation mandatory reliability standards related to plant operation, sabotage reporting and critical infrastructure protection (cyber security. | | | | |
| Human-Caused | EUD CIP, General Fund | Short term | 2, 5, 7 | Yes (HC-8) |
| Action #SW-1—Continue the Shade Tree Program, an energy conservation rebate program provided by Roseville Electric | | | | |
| Severe Weather | Roseville Electric operational budget | Short term | 7, 9 | Yes (SW-2) |
| Action #SW-2—Continue ongoing line clearing and weed abatement of electrical utility facilities in order to reduce public exposure to vegetation hazards and maintain higher reliability during severe weather conditions. | | | | |
| Severe Weather | CIP | Short term | 2 | Yes (SW-3) |
| Action #SW-5—Continue to operate the Roseville Energy Park to support the City's electrical requirements and maintain service continuity during severe weather events. | | | | |
| Severe Weather | EUD CIP, General Fund | Short term | 5, 7 | Yes (SW-6) |
| Action #SW-6— Continue to operate Roseville Power Plant #2 to support the City's electrical requirements and maintain service continuity during severe weather events. | | | | |
| Severe Weather | General Fund | Short term | 5, 7 | Yes (SW-7) |

## 19.1.1 Benefit-Cost Review

The action plan must be prioritized according to a benefit/cost analysis of the proposed projects and their associated costs (44 CFR, Section 201.6(c)(3)(iii)). The benefits of proposed projects were weighed against estimated costs as part of the project prioritization process. The benefit/cost analysis was not of the detailed variety required by FEMA for project grant eligibility under the Hazard Mitigation Grant Program (HMGP) and Pre-Disaster Mitigation (PDM) grant program. A less formal approach was used because some projects may not be implemented for up to 10 years, and associated costs and benefits could change dramatically in that time. Therefore, a review was performed of the apparent benefits versus the apparent cost of each project. Parameters were established for assigning subjective ratings (high, medium, and low) to the costs and benefits of these projects.

Cost ratings were defined as follows:

- **High**—Existing funding will not cover the cost of the project; implementation would require new revenue through an alternative source (for example, bonds, grants, and fee increases).
- **Medium**—The project could be implemented with existing funding but would require a re-apportionment of the budget or a budget amendment, or the cost of the project would have to be spread over multiple years.
- **Low**—The project could be funded under the existing budget. The project is part of or can be part of an ongoing existing program.

Benefit ratings were defined as follows:

- **High—**Project will provide an immediate reduction of risk exposure for life and property.
- **Medium—**Project will have a long-term impact on the reduction of risk exposure for life and property, or project will provide an immediate reduction in the risk exposure for property.
- **Low—**Long-term benefits of the project are difficult to quantify in the short term.

Using this approach, projects with positive benefit versus cost ratios (such as high over high, high over medium, medium over low, etc.) are considered cost-beneficial and are prioritized accordingly.

For many of the strategies identified in this action plan, the City may seek financial assistance under the HMGP or PDM programs, both of which require detailed benefit/cost analyses. These analyses will be performed on projects at the time of application using the FEMA benefit-cost model. For projects not seeking financial assistance from grant programs that require detailed analysis, the City reserves the right to define "benefits" according to parameters that meet the goals and objectives of this Plan.

### 19.1.2 Action Plan Prioritization

Table 19-2 lists the priority of each action, based on the qualitative benefit-cost review, the number of plan objectives achieved, and the availability of funding:

### 19.1.3 Analysis of Mitigation Actions

Each recommended action was classified based on the hazard it addresses and the type of mitigation it involves. Table 19-3 shows the classification based on this analysis.

## 19.2 ADOPTION

A hazard mitigation plan must include documentation of formal adoption by the governing body of the jurisdiction requesting federal approval of the plan (44 CFR Section 201.6.c.5). This Plan will be submitted to Cal OES and the ISO prior to adoption for a pre-adoption review. Once the Plan has been determined to comply with the criteria specified under the DMA, Cal OES will forward it to FEMA Region IX for review and approval.

ISO is responsible for determining compliance for the CRS program. Since this Plan will be a key element in the City meeting the prescribed requirements for a CRS rating of Class 1, ISO will be asked to review the Plan for CRS Activity 510 compliance. Once pre-adoption approval has been granted by Cal OES, FEMA Region IX and the ISO, the City will initiate its process to formally adopt the Plan.

**Table 19-2.** Prioritization of Mitigation Actions

| Action # | # of Objectives Met | Benefits | Costs | Do Benefits Equal or Exceed Costs? | Is project Grant Eligible? | Can Project be Funded under Existing Programs/ Budgets? | Priority (High, Med., Low)[a] |
|---|---|---|---|---|---|---|---|
| DF-1 | 4 | High | Low | Yes | Yes | Yes | High |
| D-1 | 2 | Medium | Low | Yes | No | Yes | Medium |
| D-2 | 2 | Medium | Medium | Yes | No | Yes | Medium |
| D-3 | 2 | High | Low | Yes | No | Yes | High |
| D-4 | 2 | High | Low | Yes | No | Yes | High |
| EQ-1 | 2 | Medium | Medium | Yes | Yes | Yes | Medium |
| EQ-2 | 4 | High | Low | Yes | No | Yes | High |
| EQ-3 | 4 | Medium | Low | Yes | Yes | Yes | Medium |
| F-1 | 3 | High | Low | Yes | No | Yes | High |
| F-2 | 3 | High | Low | Yes | No | Yes | High |
| F-3 | 3 | High | Low | Yes | No | Yes | High |
| F-4 | 5 | High | Low | Yes | No | Yes | High |
| F-5 | 2 | High | Low | Yes | No | Yes | High |
| F-6 | 3 | High | Low | Yes | No | Yes | High |
| F-7 | 3 | High | Low | Yes | No | Yes | High |
| F-8 | 2 | High | Medium | Yes | Yes | Yes | Medium |
| F-9 | 3 | High | Low | Yes | No | Yes | High |
| F-10 | 3 | High | Medium | Yes | Yes | Yes | Medium |
| F-11 | 3 | Medium | Medium | Yes | No | Yes | Medium |
| F-12 | 1 | High | Medium | Yes | Yes | Yes | Medium |
| F-13 | 3 | Medium | Low | Yes | No | Yes | Medium |
| F-14 | 3 | High | High | Yes | Yes | No | Low |
| F-15 | 3 | Medium | Medium | Yes | Yes | Yes | Medium |
| F-16 | 2 | High | High | Yes | Yes | No | Low |
| F-17 | 2 | High | Medium | Yes | Yes | No | Medium |
| F-18 | 2 | High | Medium | Yes | Yes | No | Medium |
| F-19 | 2 | Medium | High | No | Yes | No | Low |
| F-20 | 2 | High | High | Yes | Yes | No | Low |
| F-21 | 4 | High | Low | Yes | No | Yes | High |
| F-22 | 3 | High | Low | Yes | No | Yes | High |
| F-23 | 2 | High | High | Yes | Yes | No | Medium |
| LS-1 | 3 | Low | Low | Yes | Yes | Yes | Low |
| LS-2 | 3 | High | Low | Yes | No | Yes | High |
| SW-1 | 2 | High | Low | Yes | No | Yes | High |
| SW-2 | 1 | High | Low | Yes | No | Yes | High |
| SW-3 | 2 | Medium | Low | Yes | No | Yes | Medium |
| SW-4 | 2 | Medium | Medium | Yes | No | Yes | Medium |
| SW-5 | 2 | High | Low | Yes | No | Yes | High |
| SW-6 | 2 | High | Low | Yes | No | Yes | High |
| WF-1 | 2 | High | Low | Yes | No | Yes | High |
| WF-2 | 2 | Medium | Low | Yes | No | Yes | Medium |
| MH-1 | 2 | Medium | Low | Yes | No | Yes | Medium |

| Action # | # of Objectives Met | Benefits | Costs | Do Benefits Equal or Exceed Costs? | Is project Grant Eligible? | Can Project be Funded under Existing Programs/ Budgets? | Priority (High, Med., Low)[a] |
|---|---|---|---|---|---|---|---|
| MH-2 | 5 | High | Low | Yes | No | Yes | High |
| MH-3 | 4 | Medium | Low | Yes | Yes | Yes | Medium |
| MH-4 | 4 | Medium | Low | Yes | Yes | Yes | Medium |
| MH-5 | 4 | Medium | Low | Yes | Yes | Yes | Medium |
| MH-6 | 4 | Medium | Low | Yes | Yes | Yes | Medium |
| MH-7 | 4 | High | Low | Yes | No | Yes | High |
| MH-8 | 4 | High | Low | Yes | No | Yes | High |
| HC-1 | 2 | Medium | Low | Yes | No | Yes | Medium |
| HC-2 | 4 | Medium | Low | Yes | No | Yes | Medium |
| HC-3 | 2 | High | Low | Yes | No | Yes | High |
| HC-4 | 3 | Medium | Medium | Yes | Yes | Yes | Medium |
| HC-5 | 2 | High | High | Yes | Yes | Yes | Low |
| HC-6 | 2 | High | Low | Yes | Yes | Yes | High |
| HC-7 | 3 | High | Low | Yes | No | Yes | High |
| HC-8 | 3 | High | Low | Yes | No | Yes | High |
| HC-9 | 3 | High | Low | Yes | No | Yes | High |
| HC-10 | 2 | High | High | Yes | Yes | No | Medium |
| HH-1 | 4 | Medium | Low | Yes | No | Yes | Medium |
| HH-2 | 2 | High | Low | Yes | No | Yes | High |
| HH-3 | 4 | High | Low | Yes | No | Yes | High |

a. Priorities defined as follows:

- High Priority—A project that meets multiple objectives, has benefits that exceed cost, has funding secured or is an ongoing project and meets eligibility requirements for the HMGP or PDM grant program. High priority projects can be completed in the short term (1 to 5 years).
- Medium Priority—A project that meets goals and objectives, that has benefits that exceed costs, and for which funding has not been secured but that is grant eligible under HMGP, PDM or other grant programs. Project can be completed in the short term, once funding is secured. Medium priority projects will become high priority projects once funding is secured.
- Low Priority—A project that will mitigate the risk of a hazard, that has benefits that do not exceed the costs or are difficult to quantify, for which funding has not been secured, that is not eligible for HMGP or PDM grant funding, and for which the time line for completion is long term (1 to 10 years). Low priority projects may be eligible for other sources of grant funding from other programs.

**Table 19-3.** Analysis of Mitigation Actions

| Hazard | Actions That Address the Hazard, by Mitigation Type[a] | | | | | |
|---|---|---|---|---|---|---|
| | Prevention[a] | Property Protection[b] | Public Education and Awareness[c] | Natural Resource Protection [d] | Emergency Services[e] | Structural Projects[f] |
| **Dam Failure** | | | | | DF-1 | |
| **Drought** | D-1, D-2, D-3, D-4 | | | | | |
| **Earthquake** | EQ-3 | EQ-1 | EQ-2 | | | |
| **Flooding** | F-1, F-2, F-3, F-4, F-6, F-7, F-9, F-10, F-11, F-21, F-22 | F-13, F-18, F-19, F-20 | F-5 | F-1, F-21, F-22, F-23 | F-8, F-12 | F-14, F-15, F-16, F-17, F-23 |
| **Landslide** | LS-1, LS-2 | | | | | |
| **Severe Weather** | SW-1, SW-6 | SW-2, SW-4 | SW-3 | | SW-5 | |
| **Wildfire** | WF-1 | | WF-2 | | | |
| **Multiple Hazards** | MH-2, MH-3, MH-4 | MH-8 | MH-5, MH-6 | MH-4 | MH-1, MH-7 | |
| **Health Hazards** | HH-1, HH-2 | | HH-2 | | | |
| **Human-Caused Hazards** | HC-3, HC-5, HC-6, HC-7, HC-8, HC-9 | HC-4 | | | HC-1, HC-2, HC-3, HC-8, HC-10 | |

a. **Prevention**—Government, administrative or regulatory actions that influence the way land and buildings are developed to reduce hazard losses. Includes planning and zoning, floodplain laws, capital improvement programs, open space preservation, and stormwater management regulations.
b. **Property Protection**—Modification of buildings or structures to protect them from a hazard or removal of structures from a hazard area. Includes acquisition, elevation, relocation, structural retrofit, storm shutters, and shatter-resistant glass.
c. **Public Education and Awareness**—Actions to inform citizens and elected officials about hazards and ways to mitigate them. Includes outreach projects, real estate disclosure, hazard information centers, and school-age and adult education.
d. **Natural Resource Protection**—Actions that minimize hazard loss and preserve or restore the functions of natural systems. Includes sediment and erosion control, stream corridor restoration, watershed management, forest and vegetation management, and wetland restoration and preservation.
e. **Emergency Services**—Actions that protect people and property during and immediately after a hazard event. Includes warning systems, emergency response services, and the protection of essential facilities.
f. **Structural Projects**—Actions that involve the construction of structures to reduce the impact of a hazard. Includes dams, setback levees, floodwalls, retaining walls, and safe rooms.

Simultaneous with this process, the draft action plan will be sent to the following agencies with a request for review and comment:

- Placer County Office of Emergency Services
- City of Rocklin
- Sacramento County Department of Water Resources
- California Department of Water Resources
- City of Citrus Heights
- Placer County Flood Control District.

Final FEMA approval was granted on __________, 2016. The Roseville City Council adopted the Plan through Resolution ##-## on __________, 2016. A copy of the resolution is provided in Figure 19-1. The City of Roseville is considered eligible for the benefits afforded under the Disaster Mitigation Act as of this date.

Insert When Available

**Figure 19-1.** Resolution Adopting the Roseville Hazard Mitigation Plan

## 19.3 PLAN MAINTENANCE STRATEGY

A hazard mitigation plan must present a plan maintenance process that includes the following (44 CFR Section 201.6(c)(4)):

- A method and schedule for monitoring, evaluating, and updating the mitigation plan
- A process for incorporating the requirements of the mitigation plan into other planning mechanisms, such as comprehensive or capital improvement plans, when appropriate
- A strategy for continuing public participation through the plan maintenance process.

This section details the formal process that will ensure that the hazard mitigation plan remains an active and relevant document and that the City of Roseville maintains its eligibility for applicable funding sources. The plan maintenance process includes a schedule for monitoring and evaluating the Plan annually and producing an updated plan every five years. This section also describes how public participation will be integrated throughout the plan maintenance and implementation process. It explains how the mitigation strategies outlined in this Plan will be incorporated into existing planning mechanisms and programs, such as comprehensive land-use planning processes, capital improvement planning, and building code enforcement and implementation. The Plan's format allows sections to be reviewed and updated when new data become available, resulting in a plan that will remain current and relevant.

Pursuant to 44CFR 201.6(c)(4)(i), the following matrix provides a synopsis of responsibilities for plan monitoring, evaluation, and update which are discussed in further detail in sections 19.3.1 to 19.3.4 of this Plan:

| Task | Approach | Timeline | Lead Responsibility | Support Responsibility |
|---|---|---|---|---|
| **Monitoring** | Preparation of status updates and action implementation tracking as part of submission to the Steering Committee for annual progress report. Deputy City Manager or Designee is responsible for initiating status updates with identified secondary responsibility departments. | Annual (July-September) | Deputy City Manager or Designee | • Central Service Dept.<br>• City Council<br>• City Manager's Office<br>• Public Affairs/Communication Dept.<br>• Development Services Dept.<br>• Environmental Utilities Dept.<br>• Information Technology Div.<br>• Parks/Rec/Libraries: Open Space Div.<br>• Police and Fire Dept.<br>• Public Works Dept.<br>• Roseville Electric |
| **Evaluation** | Review the status of previous actions as submitted by the monitoring task lead and support entities noted above to assess the effectiveness of the plan; complete and finalize the Annual Progress Report. | Annual (September) – prior to CRS recertification process on October 1 | Planning Team<br>• City Manager's Office<br>• Public Works<br>• Fire Dept.<br>• Development Svcs<br>• Technical Consultant | Steering Committee<br>• City Manager's Office<br>• Public Works<br>• Fire Dept.<br>• Development Svcs<br>• Communications<br>• Public Volunteers<br>• Local businesses/organizations |

| Task | Approach | Timeline | Lead Responsibility | Support Responsibility |
|---|---|---|---|---|
| **Update** | The Planning Team will call the Steering Committee to reconvene, at a minimum, every 5 years to guide a comprehensive update to review and revise the Plan. | Every 5 years or upon comprehensive update to General Plan or major disaster | Planning Team<br>• City Manager's Office<br>• Public Works<br>• Fire Dept.<br>• Development Svcs<br>• Technical Consultant | Steering Committee<br>• City Manager's Office<br>• Public Works<br>• Fire Dept.<br>• Development Svcs<br>• Communications<br>• Public Volunteers<br>• Local businesses/organizations |

## 19.3.1 Plan Implementation

The hazard mitigation plan includes a range of action items to reduce losses from hazard events. Together, the action items provide a framework for activities that the City can choose to implement over the next five years. The effectiveness of the Plan depends on the incorporation of the action items into existing City plans, policies, and programs.

The Roseville City Manager's Office and the Development Services Department will be jointly responsible for monitoring the Plan's implementation and maintenance through existing City programs. The Deputy City Manager or designated appointee will assume lead responsibility for facilitating plan implementation and maintenance meetings. Although the City Manager's Office will have primary department responsibility for review, coordination, and promotion, plan implementation and evaluation will be a shared responsibility among all departments and agencies identified as lead agencies in the mitigation action plan (see Chapter ).

## 19.3.2 Steering Committee

The Steering Committee is a volunteer body that contributed greatly to the development of the initial and updated plans. The initial committee oversaw the development of the initial plan and made recommendations on key elements of the Plan, including a maintenance strategy. An oversight committee with representation similar to the initial Steering Committee then took an active role in the maintenance strategy. By maintaining progress reports, and keeping the Plan dynamic, Roseville was able to successfully complete many of the actions identified in the initial action plan. A reactivated Steering Committee then oversaw development of the 2011 and 2016 Plan updates.

A Steering Committee of not more than 14 members, as determined by the Roseville City Manager's Office, should remain involved in key elements of the proposed maintenance strategy. The Steering Committee will convene annually to perform annual reviews of the updated plan and its implementation. The make-up of this Steering Committee will strive for no less than 50 percent representation from citizens, citizen groups, and stakeholders within the planning area. Previous and existing members will be given the option to remain involved in the process.

A technical subcommittee with a make-up similar to the subcommittee used for initial plan development could be used in the plan maintenance strategy, at the discretion of the planning team and the Steering Committee.

### 19.3.3 Annual Progress Report

The minimum task of the annual Steering Committee meetings will be the evaluation of the progress of the 2016 Plan. This review will include the following:

- Summary of any hazard events that occurred during the prior year and their impact on the planning area
- Review of successful mitigation actions identified in the 2016 Plan
- Brief discussion about why targeted strategies were not completed
- Re-evaluation of the action plan to determine if the timeline for identified projects needs to be amended (such as changing a long-term project to a short-term project because of funding availability)
- Recommendations for new projects
- Changes in or potential for new funding options (grant opportunities)
- Impacts of any other planning programs or actions in the City that involve hazard mitigation

The planning team created a template to guide the Steering Committee in preparing a progress report during the previous planning process. The Steering Committee will provide feedback to the planning team on items included in the template. The planning team will continue to use this progress report template to prepare a formal annual report on the progress of the 2016 Plan. This report will be used as follows:

- Posted on the City website on the page dedicated to the hazard mitigation plan
- Announced on multiple social media platforms
- Provided to the local media through a press release
- Presented to the Roseville City Council
- Provided as part of the CRS annual re-certification package.

The CRS program requires an annual recertification to be submitted by October 1 of every calendar year for which the community has not received a formal audit. To meet this recertification timeline, the planning team will strive to complete the progress report process between June and September every year.

### 19.3.4 Plan Update

Section 201.6.d.3 of 44 CFR requires that local hazard mitigation plans be reviewed, revised if appropriate, and resubmitted for approval in order to remain eligible for benefits awarded under the DMA. The City of Roseville intends to update its hazard mitigation plan on a 5-year cycle. This cycle may be accelerated to less than 5 years based on the following triggers:

- A Presidential Disaster Declaration that impacts the City of Roseville
- A hazard event that causes loss of life
- A comprehensive update of the City of Roseville General Plan

It will not be the intent of this update process to start from scratch and develop a complete new hazard mitigation plan. Based on needs identified by the planning team, this update will, at a minimum, include the following elements:

- The update process will be convened through a Steering Committee.
- The hazard risk assessment will be reviewed and updated using best available information and technologies.
- The action plan will be reviewed and revised to account for any actions completed, dropped, or changed and to account for changes in the risk assessment or new City policies identified under other planning mechanisms, as appropriate (such as the General Plan).
- The draft update will be sent to appropriate agencies and organizations for comment.

- The public will be given an opportunity to comment on the update prior to adoption.
- The Roseville City Council will adopt the updated Plan.

## 19.3.5 Continuing Public Involvement

The public will continue to be apprised of hazard mitigation actions through the City website and by providing copies of the annual progress reports to the media. Copies of the 2016 Plan will be distributed to the Roseville City Library System. Upon initiation of the update process, a new public involvement strategy will be initiated based on guidance from the Steering Committee. This strategy will be based on the needs and capabilities of the City at the time of the update. At a minimum, this strategy will include the use of local media outlets within the planning area.

## 19.3.6 Incorporation into Other Planning Mechanisms

The City began planning for the impacts of hazards through the Safety Element of its 1992 General Plan. The hazard mitigation plan update process provided the City with an opportunity to review and expand on policies contained in the General Plan. The City views the General Plan and the hazard mitigation plan as complementary documents that work together to reduce risk exposure to the citizens of Roseville. A comprehensive update to the General Plan will trigger an update to the hazard mitigation plan. Many of the ongoing recommendations identified in the 2016 Plan are programs recommended by the General Plan. Processes and programs that the City will coordinate with the hazard mitigation plan recommendations include the following:

- City emergency response plan
- Capital improvement programs
- Roseville municipal code
- Community design guidelines
- Stormwater management program

Some action items do not need to be implemented through regulation. Instead, these items can be implemented through the creation of new educational programs, continued interagency coordination, or improved public participation.

### Plan Integration During the 2011 RMHMP Performance Period

The 2011 RMHMP identified 24 actions related to plan integration. Due to the nature of plan integration, these actions were identified as ongoing initiatives and were carried over into the 2016 Plan update. Plan integration actions remain ongoing, as they serve as a benchmark for annual progress reporting and encourage the use of the Plan as a living document. During the performance period of the 2011 plan, 23 of the identified actions resulted in measurable plan integration of 2011 RMHMP goals, risk assessment, or recommendations into the following plans and programs:

- Specific Plans and Specific Plan Amendments
- Master Drainage Plan requirements for Specific Plans
- Groundwater Environmental Impact Report
- Water Recycling Master Plan
- Debris Management Plan (Completed in conjunction with the 2016 planning process)

Specific information regarding how each of these plans and programs integrated 2011 RMHMP information is available in the 2015 Progress Report located in Appendix B.

## Plan Integration for the 2016 Mitigation Action Plan

Implementation of the 2016 mitigation action plan has and will continue to enhance and expand the integration efforts of the 2011 Plan. Inter-agency coordination occurred through involvement by local, regional, state and federal stakeholders involved in and consulted with during the planning process. This coordination is expected to continue through Steering Committee activities, annual progress reporting, implementation coordination, and the continued public engagement.

As the plan is implemented, all City agencies will use information from this updated plan as the best available science and data on natural hazards impacting the City of Roseville. 24 actions related to plan integration have been recommended for continued implementation in this Plan.

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# GLOSSARY

## ACRONYMS

Cal EMA—California Emergency Management Agency

CAL FIRE—California Department of Forestry and Fire Protection

Cal OES— California Office of Emergency Services

CBC—California Building Code

CCR—California Code of Regulations

CDBG-DR—Community Development Block Grant Disaster Recovery grants

CEQA—California Environmental Quality Act

CIP—Capital Improvements Plan

CFR—Code of Federal Regulations

CPTED—Crime Prevention Through Environmental Design

CRS—Community Rating System

DFIRM—Digital Flood Insurance Rate Map

DHS—Department of Homeland Security

DMA —Disaster Mitigation Act

DWR—Department of Water Resources

EOP—Emergency Operations Plan

EPA—U.S. Environmental Protection Agency

ESA—Endangered Species Act

EUD—Environmental Utilities Department

FEMA—Federal Emergency Management Agency

FIRM—Flood Insurance Rate Map

FRAP—Fire and Resource Assessment Program

GIS—Geographic Information System

HAZUS-MH—Hazards, United States-Multi Hazard

HMGP—Hazard Mitigation Grant Program

IBC—International Building Code

MCI—Multi-Casualty Incident

MM—Modified Mercalli Scale

MND— Mitigated Negative Declaration

NEHRP—National Earthquake Hazards Reduction Program

NFIP—National Flood Insurance Program

NIMS—National Incident Management System

NOAA—National Oceanic and Atmospheric Administration

OES—Office of Emergency Services

OSPOMP—Open Space Preserve Overarching Management Plan

PCFCD—Placer County Flood Control District

PCWA—Placer County Water Agency

PDM—Pre-Disaster Mitigation Grant Program

PGA—Peak Ground Acceleration

RMC—Roseville Municipal Code

SARS—Severe acute respiratory syndrome

SEMS—Standardized Emergency Management System

SFHA—Special Flood Hazard Area

SJWD—San Juan Water District

SPI—Standardized Precipitation Index

STEMI—ST-elevation myocardial infarction

UBC—Uniform Building Code

ULOP—Urban Level of Flood Protection

USBR—U.S. Bureau of Reclamation

USGS—United States Geological Survey

VHF— Viral Hemorrhagic Fevers

WMD—Weapon of Mass Destruction

WNV—West Nile Virus

## DEFINITIONS

**100-Year Flood**: The term “100-year flood” can be misleading. The 100-year flood does not necessarily occur once every 100 years. Rather, it is the flood that has a 1 percent chance of being equaled or exceeded in any given year.. Thus, the 100-year flood could occur more than once in a relatively short period of time. The Federal Emergency Management Agency (FEMA) defines it as the 1 percent annual chance flood, which is now the standard definition used by most federal and state agencies and by the National Flood Insurance Program (NFIP).

**Acre-Foot**: An acre-foot is the amount of water it takes to cover 1 acre to a depth of 1 foot. This measure is used to describe the quantity of storage in a water reservoir. An acre-foot is a unit of volume. One acre foot equals 7,758 barrels; 325,829 gallons; or 43,560 cubic feet. An average household of four will use approximately 1 acre-foot of water per year.

**Act of Terrorism**: According to the Federal Bureau of Investigation (FBI), an act of terrorism is “a violent act or an act dangerous to human life, in violation of the criminal laws of the United States or of any state, to intimidate or coerce a government, the civilian population, or any segment thereof, in furtherance of political or social goals.” Acts of terrorism are intentional, criminal, and malicious and can be foreign or domestic, depending on the origin, base, and objectives of the terrorist or organization. Acts of terrorism can involve the use of weapons of mass destruction, arson, and incendiary, explosive, and armed attacks; industrial sabotage and intentional hazardous materials releases; agro-terrorism; and cyber-terrorism.

**Asset**: An asset is any man-made or natural feature that has value, including, but not limited to, people; buildings; infrastructure, such as bridges, roads, sewers, and water systems; lifelines, such as electricity and communication resources; and environmental, cultural, or recreational features such as parks, wetlands, and landmarks.

**Base Flood:** The flood having a 1% chance of being equaled or exceeded in any given year, also known as the "100-year" or "1% chance" flood. The base flood is a statistical concept used to ensure that all properties subject to the National Flood Insurance Program (NFIP) are protected to the same degree against flooding.

**Basin**: A basin is the area within which all surface water – whether from rainfall, snowmelt, springs, or other sources – flows to a single water body or watercourse. The boundary of a river basin is defined by natural topography, such as hills, mountains, and ridges. Basins are also referred to as "watersheds" and "drainage basins."

**Benefit**: A benefit is a net project outcome and is usually defined in monetary terms. Benefits may include direct and indirect effects. For the purposes of benefit-cost analysis of proposed mitigation measures, benefits are limited to specific, measurable, risk reduction factors, including reduction in expected property losses (buildings, contents, and functions) and protection of human life.

**Benefit/Cost Analysis**: A benefit/cost analysis is a systematic, quantitative method of comparing projected benefits to projected costs of a project or policy. It is used as a measure of cost effectiveness.

**Benioff Earthquake**: Sometimes called "deep quakes," these occur in the Pacific Northwest when the Juan de Fuca plate breaks up underneath the continental plate, approximately 30 miles beneath the earth's surface.

**Building**: A building is defined as a structure that is walled and roofed, principally aboveground, and permanently fixed to a site. The term includes manufactured homes on permanent foundations on which the wheels and axles carry no weight.

**Capability Assessment**: A capability assessment provides a description and analysis of a community's current capacity to address threats associated with hazards. The assessment includes two components: an inventory of an agency's mission, programs, and policies, and an analysis of its capacity to carry them out. A capability assessment is an integral part of the planning process in which a community's actions to reduce losses are identified, reviewed, and analyzed, and the framework for implementation is identified. The following capabilities were reviewed under this assessment:

- Legal and regulatory capability
- Administrative and technical capability
- Fiscal capability

**Certified Unified Program Agency**: An agency (such as the City of Roseville) certified to act as a licensing agency for six hazardous materials-related programs. The Certified Unified Program Agency enables the City of Roseville to implement its own hazardous materials emergency response program. Mutual aid agreements are also in place for incident response. Each business that deals with hazardous materials generally must submit a Unified Program Consolidated Form with facility information to the Roseville Fire Department.

**Civil Disorder**: Civil disorder results from incidents intended to disrupt a community to the degree that law enforcement intervention is required to maintain public safety. Civil disorder is generally associated with controversial political, judicial, or economic issues and events and may occur at any time, although statistics indicate that civil disorder is more frequent during the summer months. Although the City of Roseville does not have a history of civil disorder or rioting, large public gatherings, often associated with concerts or sports events, have overburdened local law enforcement and fire protection resources in the past. The effects of civil disorder and riots vary and depend on the type of event and its severity, scope, and duration. Essential services (such as electricity, water, public transportation, and communications) may be disrupted, and property damage, injuries, and loss of life may occur.

**Communicable Disease**: For the purposes of this Plan, communicable diseases include severe acute respiratory syndrome (SARS), flu, small pox, and diseases carried by insects. Diseases carried by insects include plague (fleas), encephalitis, malaria, West Nile virus (mosquitoes), and Lyme disease (ticks).

**Community Rating System (CRS)**: The CRS is a voluntary program under the NFIP that rewards participating communities (provides incentives) for exceeding the minimum requirements of the NFIP and completing activities that reduce flood hazard risk by providing flood insurance premium discounts.

**Critical Facility**: A critical facility is vital to the City's ability to provide essential services and protect life and property. Loss of a critical facility would result in a severe economic or catastrophic impact. Under the Roseville hazard mitigation plan definition, critical facilities include the following:

- Police stations, fire stations, vehicle and equipment storage facilities, and emergency operations centers needed for disaster response before, during, and after hazard events
- Public and private utilities and infrastructure vital to maintaining or restoring normal services to areas damaged by hazard events
- Hospitals, nursing homes, and housing likely to contain occupants who may not be sufficiently mobile to avoid death or injury during a hazard event
- Structures or facilities that produce, use, or store highly volatile, flammable, explosive, toxic, and/or water-reactive materials

**Crustal Earthquake**: Crustal quakes occur at a depth of 5 to 10 miles beneath the earth's surface and are associated with fault movement within a surface plate.

**Dam**: A dam is any artificial barrier or controlling mechanism that can or does impound 10 acre-feet or more of water.

**Dam Failure**: Dam failure refers to a partial or complete breach in a dam (or levee) that impacts its integrity. Dam failures occur for a number of reasons, such as flash flooding, inadequate spillway size, mechanical failure of valves or other equipment, freezing and thawing cycles, earthquakes, and intentional destruction.

**Debris Avalanche:** Volcanoes are prone to debris and mountain rock avalanches that can approach speeds of 100 mph.

**Debris Flow:** Dense mixtures of water-saturated debris that move down-valley; looking and behaving much like flowing concrete. They form when loose masses of unconsolidated material are saturated, become unstable, and move down slope. The source of water varies but includes rainfall, melting snow or ice, and glacial outburst floods.

**Debris Slide:** Debris slides consist of unconsolidated rock or soil that has moved rapidly down slope. They occur on slopes greater than 65 percent.

**Depth of Flooding**: The depth of flooding is difference between regulatory flood elevation and the elevation of the lowest grade adjacent to a structure.

**Disaster Mitigation Act of 2000 (DMA);** The DMA is Public Law 106-390 and is the latest federal legislation enacted to encourage and promote proactive, pre-disaster planning as a condition of receiving financial assistance under the Robert T. Stafford Act. The DMA emphasizes planning for disasters before they occur. Under the DMA, a pre-disaster hazard mitigation program and new requirements for the national post-disaster hazard mitigation grant program (HMGP) were established.

**Drainage Basin**: A basin is the area within which all surface water (whether from rainfall, snowmelt, springs, or other sources) flows to a single water body or watercourse. The boundary of a river basin is defined by natural topography, such as hills, mountains, and ridges. Drainage basins are also referred to as "watersheds" and "basins." The City of Roseville is located within portions of two major drainage basins: the Pleasant Grove Creek Basin and the Dry Creek Basin. Pleasant Grove Creek and its tributaries drain most of the western and central areas of the City, and the Dry Creek Basin and its tributaries drain the remainder of the City. The Dry Creek system has year-round flows in its major watercourses, and the Pleasant Grove Creek system is intermittent, with only seasonal flows. As a result, portions of the City lie within a flood hazard area. However, since 1950, there have been no reports of structural flood damage along Pleasant Grove Creek and there are presently no structures subject to flooding within the Pleasant Grove Creek Basin.

**Drought**: Drought is a period of time without substantial rainfall or snowfall from one year to the next. Drought can also be defined as the cumulative impacts of several dry years or a deficiency of precipitation over an extended period of time, which in turn results in water shortages for some activity, group, or environmental function. A hydrological drought is caused by deficiencies in surface and subsurface water supplies. A socioeconomic drought impacts the health, well being, and quality of life or starts to have an adverse impact on a region. Drought is a normal, recurrent feature of climate and occurs almost everywhere.

**Duration**: For the purposes of this Plan, duration is defined as the length of time that a hazard occurs. For example, the duration of a tornado can be minutes, but release of a chemical warfare agent such as mustard gas can persist for hours or weeks if not remediated.

**Earthquake**: An earthquake is defined as a sudden slip on a fault, volcanic or magmatic activity, and sudden stress changes in the earth that result in ground shaking and radiated seismic energy. Earthquakes can last from a few seconds to over 5 minutes, and have been known to occur as a series of tremors over a period of several days. The actual movement of the ground in an earthquake is seldom the direct cause of injury or death. Casualties may result from falling objects and debris as shocks shake, damage, or demolish buildings and other structures.

**Exposure**: Exposure is defined as the number and dollar value of assets considered to be at risk during the occurrence of a specific hazard.

**Extent**: The extent is the size of an area affected by a hazard.

**Fire Behavior**: Fire behavior refers to the physical characteristics of a fire and is a function of the interaction between the fuel characteristics (such as type of vegetation and structures that could burn), topography, and weather. Variables that affect fire behavior include the rate of spread, intensity, fuel consumption, and fire type (such as underbrush versus crown fire).

**Fire Frequency**: Fire frequency is the broad measure of the rate of fire occurrence in a particular area. An estimate of the areas most likely to burn is based on past fire history or fire rotation in the area, fuel conditions, weather, ignition sources (such as human or lightning), fire suppression response, and other factors.

**Flash Flood**: A flash flood occurs with little or no warning when water levels rise at an extremely fast rate

**Flood Insurance Rate Map (FIRM):** FIRMs are the official maps on which the Federal Emergency Management Agency (FEMA) has delineated the Special Flood Hazard Area (SFHA).

**Flood Insurance Study:** A report published by the Federal Insurance and Mitigation Administration for a community in conjunction with the community's Flood Insurance rate Map. The study contains such background data as the base flood discharges and water surface elevations that were used to prepare the FIRM. In most cases, a community FIRM with detailed mapping will have a corresponding flood insurance study.

**Floodplain**: Any land area susceptible to being inundated by flood waters from any source. A flood insurance rate map identifies most, but not necessarily all, of a community's floodplain as the Special Flood Hazard Area (SFHA).

**Floodway:** Floodways are areas within a floodplain that are reserved for the purpose of conveying flood discharge without increasing the base flood elevation more than 1 foot. Generally speaking, no development is allowed in floodways, as any structures located there would block the flow of floodwaters.

**Floodway Fringe**: Floodway fringe areas are located in the floodplain but outside of the floodway. Some development is generally allowed in these areas, with a variety of restrictions. On maps that have identified and delineated a floodway, this would be the area beyond the floodway boundary that can be subject to different regulations.

**Fog**: Fog refers to a cloud (or condensed water droplets) near the ground. Fog forms when air close to the ground can no longer hold all the moisture it contains. Fog occurs either when air is cooled to its dew point or the amount of moisture in the air increases. Heavy fog is particularly hazardous because it can restrict surface visibility. Severe fog incidents can close roads, cause vehicle accidents, cause airport delays, and impair the effectiveness of emergency response. Financial losses associated with transportation delays caused by fog have not been calculated in the United States but are known to be substantial.

**Freeboard**: Freeboard is the margin of safety added to the base flood elevation.

**Frequency**: For the purposes of this Plan, frequency refers to how often a hazard of specific magnitude, duration, and/or extent is expected to occur on average. Statistically, a hazard with a 100-year frequency is expected to occur about once every 100 years on average and has a 1 percent chance of occurring any given year. Frequency reliability varies depending on the type of hazard considered.

**Fujita Scale of Tornado Intensity**: Tornado wind speeds are sometimes estimated on the basis of wind speed and damage sustained using the Fujita Scale. The scale rates the intensity or severity of tornado events using numeric values from F0 to F5 based on tornado wind speed and damage. An F0 tornado (wind speed less than 73 miles per hour [mph]) indicates minimal damage (such as broken tree limbs), and an F5 tornado (wind speeds of 261 to 318 mph) indicates severe damage.

**General Plan**: California state law requires that every county and city prepare and adopt a comprehensive long-range plan to serve as a guide for community development. The plan must consist of an integrated and internally consistent set of goals, policies, and implementation measures. In addition, the plan must focus on issues of the greatest concern to the community and be written in a clear and concise manner. City actions, such as those relating to land-use allocation, annexations, zoning, subdivision and design review, redevelopment, and capital improvements, must be consistent with such a plan. The City of Roseville's general plan serves these purposes. As the principle planning document that directs the City's growth and land use, the general plan is as an integral part of the Roseville hazard mitigation plan. A technical update to Roseville's general plan was completed in January 2003.

**Goal**: A goal is a general guideline that explains what is to be achieved. Goals are usually broad-based, long-term, policy-type statements and represent global visions. Goals help define the benefits that a plan is trying to achieve.

The success of the Roseville hazard mitigation plan, once implemented, should be measured by the degree to which its goals have been met (that is, by the actual benefits in terms of actual hazard mitigation).

**Geographic Information System (GIS)**: GIS is a computer software application that relates data regarding physical and other features on the earth to a database for mapping and analysis.

**Hazard**: A hazard is a source of potential danger or adverse condition that could harm people and/or cause property damage. Natural hazards include floods, winds, and earthquakes. Man-made hazards include acts of terrorism and hazardous material spills.

**Hazardous Material**: A hazardous material is a substance or combination of substances that (1) can cause or contribute to an increase in mortality or serious irreversible or incapacitating reversible illnesses, or (2) pose a present or potential hazard to human life, property, or the environment. Hazardous materials could cause these effects because of their quantity, concentration, or physical, chemical, or infectious characteristics. Hazardous waste is included in the City's working definition of hazardous material.

**Hazardous Material Incident**: This type of incident involves the accidental or intentional release of hazardous materials to the environment. Such incidents typically occur as fixed facility incidents or transportation incidents. It is possible to identify and prepare for a fixed facility incident because federal and state laws require facilities to notify state and local authorities about hazardous materials used or produced at the facility. Transportation incidents are more difficult to prepare for because there is little (if any) notice about the materials involved. Except for severe weather and flooding, hazardous materials incidents are the most likely hazards to affect the City of Roseville.

**Hazard Mitigation Grant Program (HMGP)**: Authorized under Section 202 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act, the HMGP is administered by FEMA and provides grants to states, tribes, and local governments to implement hazard mitigation actions after a major disaster declaration. The purpose of the program is to reduce the loss of life and property due to disasters and to enable mitigation activities to be implemented as a community recovers from a disaster

**Hazards U.S. Hazard (HAZUS-MH) Loss Estimation Program**: HAZUS-MH is a GIS-based program used to support the development of risk assessments as required under the DMA. The HAZUS-MH software program assesses risk in a quantitative manner to estimate damages and losses associated with natural hazards. HAZUS-MH is FEMA's nationally applicable, standardized methodology and software program and contains modules for estimating potential losses from earthquakes, floods, and wind hazards. HAZUS-MH has also been used to assess vulnerability (exposure) for other hazards facing Roseville.

**Hydraulics**: Hydraulics is the branch of science or engineering that addresses fluids (especially water) in motion in rivers or canals, works and machinery for conducting or raising water, the use of water as a prime mover, and other fluid-related areas.

**Hydrology**: Hydrology is the analysis of waters of the earth. For example, a flood discharge estimate is developed by conducting a hydrologic study.

**Intensity**: For the purposes of this Plan, intensity refers to the measure of the effects of a hazard.

**Inventory**: The assets identified in a study region comprise an inventory. Inventories include assets that could be lost when a disaster occurs and community resources are at risk. Assets include people, buildings, transportation, and other valued community resources.

**Landslide:** Landslides can be described as the sliding movement of masses of loosened rock and soil down a hillside or slope. Fundamentally, slope failures occur when the strength of the soils forming the slope exceeds the pressure, such as weight or saturation, acting upon them.

**Large Gathering Places**: For the purposes of this Plan, such places are defined as follows:

- Any facility listed as a Type A-2.1 in the California Uniform Building Code (UBC) because it has an assembly room with an occupant load of 300 or more without a stage (34 locations in Roseville)
- Any buildings listed as E-1 used for educational purposes through the 12th grade by 50 or more persons for more than 12 hours per week or 4 hours any 1 day (29 buildings in Roseville)
- Any facility likely to have an occupancy of greater than 300, such as a large employment centers, retail centers, cultural centers, and places of worship

**Lightning**: Lightning is an electrical discharge resulting from the buildup of positive and negative charges within a thunderstorm. When the buildup becomes strong enough, lightning appears as a “bolt,” usually within or between clouds and the ground. A bolt of lightning instantaneously reaches temperatures approaching 50,000ºF. The rapid heating and cooling of air near lightning causes thunder. Lightning is a major threat during thunderstorms. In the United States, 75 to 100 Americans are struck and killed by lightning each year (see http://www.fema.gov/hazard/thunderstorms/thunder.shtm).

**Liquefaction**: Liquefaction is the complete failure of soils, occurring when soils lose shear strength and flow horizontally. It is most likely to occur in fine grain sands and silts, which behave like viscous fluids when liquefaction occurs. This situation is extremely hazardous to development on the soils that liquefy, and generally results in extreme property damage and threats to life and safety.

**Local Government:** Any county, municipality, city, town, township, public authority, school district, special district, intrastate district, council of governments (regardless of whether the council of governments is incorporated as a nonprofit corporation under State law), regional or interstate government entity, or agency or instrumentality of a local government; any Indian tribe or authorized tribal organization, or Alaska Native village or organization; and any rural community, unincorporated town or village, or other public entity.

**Magnitude:** Magnitude is the measure of the strength of an earthquake, and is typically measured by the Richter scale. As an estimate of energy, each whole number step in the magnitude scale corresponds to the release of about 31 times more energy than the amount associated with the preceding whole number value.

**Mass movement:** A collective term for landslides, mudflows, debris flows, sinkholes and lahars.

**Mitigation**: A preventive action that can be taken in advance of an event that will reduce or eliminate the risk to life or property.

**Mitigation Actions**: Mitigation actions are specific actions to achieve goals and objectives that minimize the effects from a disaster and reduce the loss of life and property.

**Nolte Future Floodplain**: The Nolte Future Floodplain is the portion of the regulatory floodplain based on the Roseville City of Roseville Floodplain Analysis published by Nolte and Associates in August 1986. This analysis used hydrologic parameters that better represented the observed flooding scenarios that caused flooding in Roseville. The study also used hydrologic parameters based on projected growth for the region assuming total development of the watershed instead of existing conditions used by FEMA. This approach generated a floodplain area greater than that reflected of on the FIRM for portions of Roseville. Although this study was never formally adopted, it is used by the City as the best available information for regulatory and land- use programs such as the specific plan program and improvement standards.

**Objective**: For the purposes of this Plan, an objective is defined as a short-term aim that, when combined with other objectives, forms a strategy or course of action to meet a goal. Unlike goals, objectives are specific and measurable.

**Peak Ground Acceleration**: Peak Ground Acceleration (PGA) is a measure of the highest amplitude of ground shaking that accompanies an earthquake, based on a percentage of the force of gravity.

**Preparedness**: Preparedness refers to actions that strengthen the capability of government, citizens, and communities to respond to disasters.

**Presidential Disaster Declaration**: These declarations are typically made for events that cause more damage than state and local governments and resources can handle without federal government assistance. Generally, no specific dollar loss threshold has been established for such declarations. A Presidential Disaster Declaration puts into motion long-term federal recovery programs, some of which are matched by state programs, designed to help disaster victims, businesses, and public entities.

**Probability of Occurrence**: The probability of occurrence is a statistical measure or estimate of the likelihood that a hazard will occur. This probability is generally based on past hazard events in the area and a forecast of events that could occur in the future. A probability factor based on yearly values of occurrence is used to estimate probability of occurrence.

**Regulatory Floodplain**: This term refers to an area regulated by the City of Roseville as floodplain through its land-use regulations and improvement standards. It includes areas identified by FEMA and published on FIRMs and additional areas identified by Roseville as being susceptible to flooding. These areas are delineated based on detailed hydrologic and hydraulic floodplain modeling that meets or exceeds FEMA criteria for mapping and modeling floodplains. The flood event used to delineate these boundaries is referred to as “the regulatory flood” in this Plan to differentiate it from the “base flood” used by FEMA. The City of Roseville designates the 100-year floodplain area on its land-use map in accordance with best available floodplain information as determined by the Public Works Director. In many portions of the City, the Nolte Future Floodplain (May 1987) has been used to designate floodplain boundaries. When Nolte Future Floodplain information does not exist or does not represent the best available information, new floodplain information is generated by the project proponent. New floodplain information is generally developed (1) consistent with build-out development assumptions used by the Nolte Future Floodplain analysis, and (2) in compliance with the most recent Placer County floodplain manual. Floodplain boundaries can normally be terminated where the 100-year floodplain narrows to a width of 200 feet or less and where the associated drainage area is less than 300 acres. Precise termination of boundaries must be approved by the Public Works Director.

**Repetitive Loss Property**: Any NFIP-insured property that, since 1978 and regardless of any changes of ownership during that period, has experienced:

- Four or more paid flood losses in excess of $1000.00; or
- Two paid flood losses in excess of $1000.00 within any 10-year period since 1978 or
- Three or more paid losses that equal or exceed the current value of the insured property.

**Return Period (or Mean Return Period)**: This term refers to the average period of time in years between occurrences of a particular hazard (equal to the inverse of the annual frequency of occurrence).

**Riverine:** Of or produced by a river. Riverine floodplains have readily identifiable channels. Floodway maps can only be prepared for riverine floodplains.

**Risk**: Risk is the estimated impact that a hazard would have on people, services, facilities, and structures in a community. Risk measures the likelihood of a hazard occurring and resulting in an adverse condition that causes injury or damage. Risk is often expressed in relative terms such as a high, moderate, or low likelihood of sustaining damage above a particular threshold due to occurrence of a specific type of hazard. Risk also can be expressed in terms of potential monetary losses associated with the intensity of the hazard.

**Risk Assessment**: Risk assessment is the process of measuring potential loss of life, personal injury, economic injury, and property damage resulting from hazards. This process assesses the vulnerability of people, buildings, and infrastructure to hazards and focuses on (1) hazard identification; (2) impacts of hazards on physical, social, and economic assets; (3) vulnerability identification; and (4) estimates of the cost of damage or costs that could be avoided through mitigation.

**Risk Ranking**: This ranking serves two purposes, first to describe the probability that a hazard will occur, and second to describe the impact a hazard will have on the people, property, and economy of Roseville. Risk estimates for the City are based on the methodology that the City used to prepare the risk assessment for this Plan. The following equation shows the risk ranking calculation:

Risk Ranking = Probability + Impact (people + property + economy)

**Robert T. Stafford Act**: The Robert T. Stafford Disaster Relief and Emergency Assistance Act, Public Law 100-107, was signed into law on November 23, 1988. This law amended the Disaster Relief Act of 1974, Public Law 93-288. The Stafford Act is the statutory authority for most federal disaster response activities, especially as they pertain to FEMA and its programs.

**Sinkhole:** A collapse depression in the ground with no visible outlet. Its drainage is subterranean. It is commonly vertical-sided or funnel-shaped.

**Slab**: This refers to one or more layers of snow in which the grains are bonded together. A slab initially fails over a large area instead of at a single point.

**Special Flood Hazard Area:** The base floodplain delineated on a Flood Insurance Rate Map. The SFHA is mapped as a Zone A in riverine situations and zone V in coastal situations. The SFHA may or may not encompass all of a community's flood problems

**Stakeholder:** Business leaders, civic groups, academia, non-profit organizations, major employers, managers of critical facilities, farmers, developers, special purpose districts, and others whose actions could impact hazard mitigation.

**Steering Committee**: The Steering Committee is the Roseville City Council-approved group that oversaw all phases of the hazard mitigation plan's development. The members of this committee included key city personnel, citizens, and other stakeholders from within the planning area.

**Stream Bank Erosion**: Stream bank erosion is common along rivers, streams and drains where banks have been eroded, sloughed or undercut. However, it is important to remember that a stream is a dynamic and constantly changing system. It is natural for a stream to want to meander, so not all eroding banks are "bad" and in need of repair. Generally, stream bank erosion becomes a problem where development has limited the meandering nature of streams, where streams have been channelized, or where stream bank structures (like bridges, culverts, etc.) are located in places where they can actually cause damage to downstream areas. Stabilizing these areas can help protect watercourses from continued sedimentation, damage to adjacent land uses, control unwanted meander, and improvement of habitat for fish and wildlife.

**Steep Slope:** Different communities and agencies define it differently, depending on what it is being applied to, but generally a steep slope is a slope in which the percent slope equals or exceeds 25%. For this study, steep slope is defined as slopes greater than 33%.

**Subduction Zone Earthquake:** This type of quake occurs along two converging plates, attached to one another along their interface. When the interface between these two plates slips, a sudden, dramatic release of energy results, propagated along the entire fault line.

**Sustainable Hazard Mitigation:** This concept includes the sound management of natural resources, local economic and social resiliency, and the recognition that hazards and mitigation must be understood in the largest possible social and economic context.

**Technical Subcommittee**: This City of Roseville group convened to provide guidance, support, and feedback to the planning team during all phases of Roseville hazard mitigation plan development. The technical subcommittee consisted of key staff from City departments integral to implementing City programs pertinent to hazard mitigation.

**Technological Hazard**: A technological hazard arises from human activities such as the manufacture, transportation, storage, and use of hazardous materials. Technological hazards are assumed to be accidental in nature, with unintended consequences.

**Thunderstorm**: A thunderstorm is a storm with lightning and thunder produced by cumulonimbus clouds. Thunderstorms usually produce gusty winds, heavy rains, and sometimes hail. Thunderstorms are usually short in duration (seldom more than 2 hours). Heavy rains associated with thunderstorms can lead to flash flooding during the wet or dry seasons.

**Tornado**: A tornado is a violently rotating column of air extending between and in contact with a cloud and the surface of the earth. Tornadoes are often (but not always) visible as funnel clouds. On a local scale, tornadoes are the most intense of all atmospheric circulations, and winds can reach destructive speeds of more than 300 mph. A tornado's vortex is typically a few hundred meters in diameter, and damage paths can be up to 1 mile wide and 50 miles long.

**Vulnerability**: Vulnerability describes how exposed or susceptible an asset is to damage. Vulnerability depends on an asset's construction, contents, and the economic value of its functions. Like indirect damages, the vulnerability of one element of the community is often related to the vulnerability of another. For example, many businesses depend on uninterrupted electrical power. Flooding of an electric substation would affect not only the substation itself but businesses as well. Often, indirect effects can be much more widespread and damaging than direct effects.

**Water Supply Strategy**: A water supply strategy is a comprehensive approach to ensure water reliability for Roseville's customers. The City has a diverse set of water supply options, including surface water contracts, recycled water, and groundwater wells to ensure that even after a period of dry years, a combination of available water supplies and water conservation measures will ensure that the community has adequate water. The City has contracts for surface water with three agencies

**Watershed**: A watershed is an area that drains downgradient from areas of higher land to areas of lower land to the lowest point, a common drainage basin.

**Weapon of Mass Destruction (WMD)**: WMDs include chemical, biological, radiological, nuclear, and explosive weapons associated with terrorism.

**West Nile Virus**: West Nile virus is a recent natural hazard affecting California. Mosquitoes transmit this potentially deadly disease to livestock and humans alike. West Nile virus first struck the northern hemisphere in Queens, New York, in 1999 and killed four people. In 2003, all 50 states warned of an outbreak from any of the 30 mosquito species known to carry it. From 62 severe cases in 1999, confirmed human cases of the virus spread to 39 states in 2002 and killed 284 people. Less than 1 percent of those infected develop severe illness. People over 50 years of age appear to be at high risk for the severe aspects of the disease.

**Wildfire**: These terms refer to any uncontrolled fire occurring on undeveloped land that requires fire suppression. The potential for wildfire is influenced by three factors: the presence of fuel, topography, and air mass. Fuel can include living and dead vegetation on the ground, along the surface as brush and small trees, and in the air such as tree canopies. Topography includes both slope and elevation. Air mass includes temperature, relative humidity, wind speed and direction, cloud cover, precipitation amount, duration, and the stability of the atmosphere at the time of the fire. Wildfires can be ignited by lightning and, most frequently, by human activity including smoking, campfires, equipment use, and arson.

**Windstorm**: Windstorms are generally short-duration events involving straight-line winds or gusts exceeding 50 mph. These gusts can produce winds of sufficient strength to cause property damage. Windstorms are especially dangerous in areas with significant tree stands, exposed property, poorly constructed buildings, mobile homes (manufactured housing units), major infrastructure, and aboveground utility lines. A windstorm can topple trees and power lines; cause damage to residential, commercial, critical facilities; and leave tons of debris in its wake.

**Zoning Ordinance**: The zoning ordinance designates allowable land use and intensities for a local jurisdiction. Zoning ordinances consist of two components: a zoning text and a zoning map.

**City of Roseville 2016** Multi-Hazard Mitigation Plan

# Appendix A. Public Outreach Materials

# City of Roseville Survey: 2016 Hazard Mitigation Plan Update Questionnaire

## 1. Survey Introduction

**City of Roseville Hazard Mitigation Questionnaire**

**A range of natural and man-made disasters can affect any community. The City of Roseville works diligently to mitigate threats and prepare for disasters, and has been recognized nationally for its level of excellence in the area of hazard mitigation. This ensures our community minimizes the impact of adversity and can recover as quickly as possible.**

**To remain at this high level of preparedness, we need your help to identify and plan for future disasters. Data collected through this survey will help the City of Roseville Multi-Hazard Mitigation Committee:**

- **Assess our residents' level of awareness regarding disasters;**
- **Determine areas vulnerable to various types of disasters;**
- **Coordinate activities to reduce the risk of injury or property damage in the future; and,**
- **Update the City of Roseville Hazard Mitigation Plan.**

**The City of Roseville Hazard Mitigation Plan is required to be updated every five years by the federal Disaster Mitigation Act of 2000.**

**The Plan details the risks of both natural and manmade hazards in Roseville and includes programs and projects that can help reduce the exposure of City residents and businesses should an event occur in Roseville. The Plan also makes the City eligible for federal pre-disaster and post-disaster assistance. The City has been very successful to date in securing funds for projects in Roseville to lessen the risks associated with natural hazards in Roseville.**

**This survey consists of three sets of questions: The first section consists of demographic information that will be used in evaluating the responses to the questionnaire. The second section is about the potential hazards near you and whether your knowledge of potential hazards influenced your decision to choose where you live. The last section is about your experience and knowledge of natural and manmade hazards in general, and steps your household has taken to prepare for disasters.**

**Thank you for taking the time to participate in the 2016 Hazard Mitigation Questionnaire!**


# City of Roseville Survey: 2016 Hazard Mitigation Plan Update Questionnaire


## 2. About You

**First, please tell us about yourself. This information will aid the City's Multi-Hazard Mitigation Plan Steering Committee in evaluating the responses to this questionnaire. The answers will be used only for the preparation of this Plan and will not be provided to any other group or interest.**

1. How much is your gross household income?

- ◯ $20,000 or less
- ◯ $20,001 to $49,999
- ◯ $50,000 to $74,999
- ◯ $75,000 to $99,999
- ◯ $100,000 or More

2. Do you work in Roseville?

- ◯ Yes
- ◯ No

3. Please indicate the primary language spoken in your household.

- ◯ English
- ◯ Spanish
- ◯ Other (please specify)
- ◯ Other Indo-European Language
- ◯ Asian and Pacific Island Languages

4. Which of the following digital media outlets do you subscribe to receive news and information about the City of Roseville?

Select all that apply.

- ☐ Facebook
- ☐ Twitter
- ☐ Nextdoor
- ☐ Other (please specify)
- ☐ E-mail and/or text messages
- ☐ Alert Roseville

## City of Roseville Survey: 2016 Hazard Mitigation Plan Update Questionnaire

### 3. Location

**Please tell us about where you live and if the potential impacts of natural or manmade hazards influenced your decision.:**

* 5. Do you live in Roseville?

- Yes
- No

6. Do you own or rent your place of residence?

- Own
- Rent

7. How long have you lived in at your current residence?

- Less than a year
- 1 – 2 years
- 3 – 5 years
- 6 – 10 years
- 11 – 15 years
- 16 – 20 years
- More than 20 years
- I don’t live in Roseville

* 8. When you moved into your home, did you consider the impact a natural or human-caused disaster could have on your home?

- Yes
- No

* 9. Was the presence of a natural hazard risk zone (e.g., dam failure zone, flood zone, landslide hazard area, high fire risk area) disclosed to you by a real estate agent, seller, or landlord before you purchased or moved into your home?

- Yes
- No

* 10. Is your residence located in or near a FEMA designated floodplain?

- Yes
- No
- Not Sure

11. Is your residence located in a dam failure zone?

- Yes
- No
- Not sure

* 12. Do you have flood insurance?

- Yes
- No
- Not Sure

* 13. Is your residence located near an earthquake fault?

- Yes
- No
- Not Sure

* 14. Do you have earthquake insurance?

- ◯ Yes
- ◯ No
- ◯ Not Sure

* 15. Is your property located in an area at risk for wildfires?

- ◯ Yes
- ◯ No
- ◯ Not Sure

16. Have you ever had problems securing homeowners or renters insurance due to risks from hazards?

- ◯ Yes
- ◯ No

If "yes," what hazard was the cause of the difficulty?

17. Do you support policies to restrict or prohibit development in designated hazard zones?

- ◯ Yes
- ◯ No

* indicates a question that requires an answer.

## City of Roseville Survey: 2016 Hazard Mitigation Plan Update Questionnaire

### 4. Hazard Knowledge

**The next set of questions is about your experience and knowledge of natural and manmade hazards and steps your household has taken to prepare for disasters:**

18. Which of the following natural hazard events have you or has anyone in your household experienced within the past 20 years in Roseville? (Check all that apply)

- ☐ Dam Failure
- ☐ Drought
- ☐ Earthquake
- ☐ Epidemic/Pandemic (flu, avian flu, H1N1, West Nile)
- ☐ Extreme Heat
- ☐ Flood
- ☐ Freeze
- ☐ Landslide & Other Earth Movements (non-seismic induced landslides and earth movements;subsidence;sinkholes;geologic hazard)
- ☐ Severe Weather (wind, lightning, winter storm, etc.)
- ☐ Wildfire
- ☐ None
- ☐ Other (please specify)

* 19. How concerned are you about the following natural hazards in Roseville? (Please check one for each hazard)

| | Not concerned | Somewhat concerned | Concerned | Very concerned | Extremely concerned |
|---|---|---|---|---|---|
| Dam Failure | ○ | ○ | ○ | ○ | ○ |
| Drought | ○ | ○ | ○ | ○ | ○ |
| Earthquake | ○ | ○ | ○ | ○ | ○ |
| Epidemic/Pandemic (flu, avian flu, H1N1, West Nile, Ebola) | ○ | ○ | ○ | ○ | ○ |
| Extreme Heat | ○ | ○ | ○ | ○ | ○ |
| Flood | ○ | ○ | ○ | ○ | ○ |
| Freeze | ○ | ○ | ○ | ○ | ○ |
| Landslide & Other Earth Movements (non-seismic induced landslides and earth movements;subsidence;sinkholes;geologic hazard) | ○ | ○ | ○ | ○ | ○ |
| Severe Weather (wind, lightning, winter storm, etc.) | ○ | ○ | ○ | ○ | ○ |
| Wildfire | ○ | ○ | ○ | ○ | ○ |
| Other Natural Hazard | ○ | ○ | ○ | ○ | ○ |

If you are concerned about a natural hazard not listed above, please specify.

* 20. How concerned are you with the following manmade hazards in Roseville? (Check all that apply)

| | Not concerned | Somewhat concerned | Concerned | Very concerned | Extremely concerned |
|---|---|---|---|---|---|
| Energy Shortage | ○ | ○ | ○ | ○ | ○ |
| Act of Terrorism | ○ | ○ | ○ | ○ | ○ |
| Hazardous Materials Release | ○ | ○ | ○ | ○ | ○ |
| Cyber Threats | ○ | ○ | ○ | ○ | ○ |
| Other Human-Caused Hazard | ○ | ○ | ○ | ○ | ○ |

If you are concerned about a human-caused hazard not listed above, please specify.

* 21. The FEMA website - Ready.gov - provides important information on how to prepare you and your family in the event of a disaster.

How prepared is your household for a natural or human-caused hazard event? (Check one)

- ◯ Not at all Prepared
- ◯ Somewhat Prepared
- ◯ Adequately Prepared
- ◯ Well Prepared
- ◯ Very Well Prepared

* 22. How would you expect to be notified in case of an immediate threat caused by a natural or human-caused hazard.

Select all that apply.

- ☐ Television
- ☐ Radio
- ☐ Other (please specify)
- ☐ Facebook
- ☐ Twitter
- ☐ Nextdoor
- ☐ Alert Roseville

23. FEMA suggests that households have at least 3 days of food, water, and vital supplies (e.g. medications) in hand in the event of a disaster. How many days of food, water, and vital supplies does your family have on hand in the event of a disaster?

◯ 1 ◯ 2 ◯ 3 ◯ 4 ◯ 5 ◯ 6 ◯ 7 ◯ 8 ◯ 9 ◯ 10 ◯ None

24. How prepared are you to get along without electricity or natural gas for one to five days?

- ◯ Not at all prepared
- ◯ Somewhat prepared
- ◯ Very prepared

25. Where would you expect to find useful information to help you be prepared?

Select all that apply.

- ☐ Television
- ☐ Internet
- ☐ Social Media
- ☐ Newspaper/magazine
- ☐ Other (please specify)
- ☐ City of Roseville Public Library
- ☐ Public government meetings
- ☐ Schools/academic institutions

26. Which of the following steps has your household already undertaken to prepare for a natural or manmade disaster?

Select all that apply.

- ☐ Received first aid/CPR training
- ☐ Made a fire escape plan
- ☐ Designated a meeting place
- ☐ Identified utility shutoffs
- ☐ Community Emergency Response Training (CERT)
- ☐ Prepared a disaster supply kit
- ☐ Installed smoke detectors on each level of the house
- ☐ Stored food and water
- ☐ Stored flashlights and batteries
- ☐ Stored a battery-powered radio
- ☐ Stored a fire extinguisher
- ☐ Stored medical supplies (first aid kit, medications)
- ☐ Other (please specify)

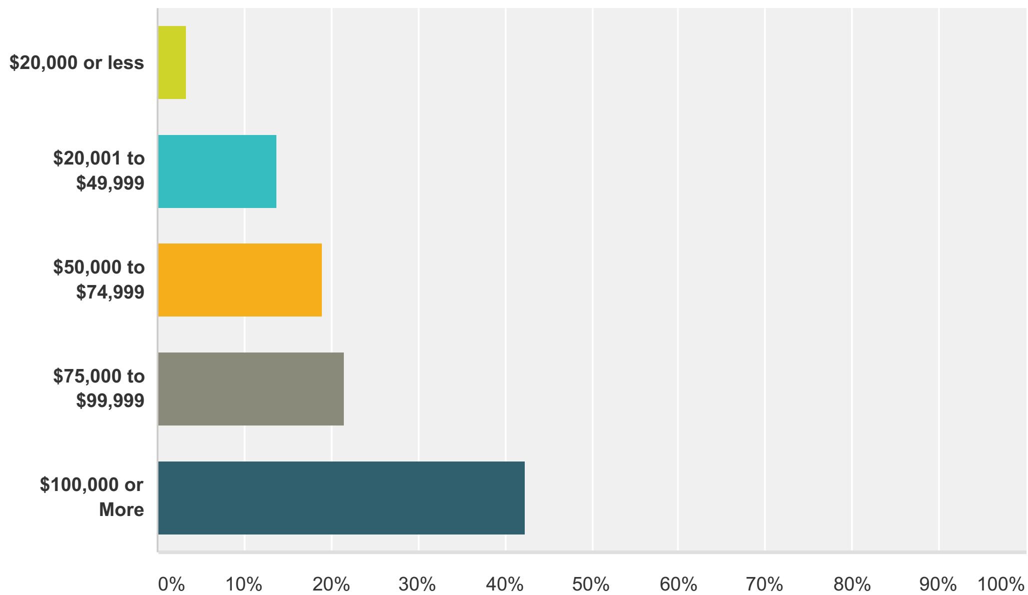
27. Please provide any additional comments you would like to share with the City of Roseville Planning Team.

* indicates a question that requires an answer.

28. If you would like to receive information regarding upcoming public events and other participatory opportunities regarding hazard mitigation, please provide your email address below.

## Q1 How much is your gross household income?

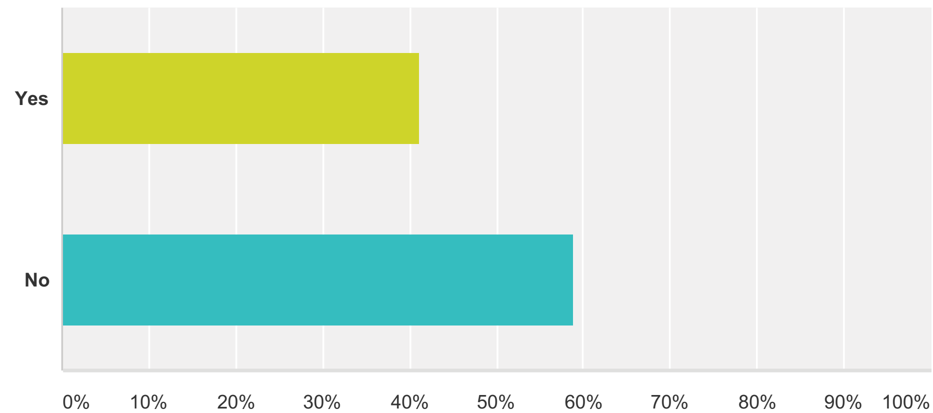
Answered: 641 Skipped: 30




| Answer Choices | Responses | |
|---|---|---|
| $20,000 or less | **3.28%** | 21 |
| $20,001 to $49,999 | **13.73%** | 88 |
| $50,000 to $74,999 | **19.03%** | 122 |
| $75,000 to $99,999 | **21.53%** | 138 |
| $100,000 or More | **42.43%** | 272 |
| **Total** | | **641** |

## Q2 Do you work in Roseville?

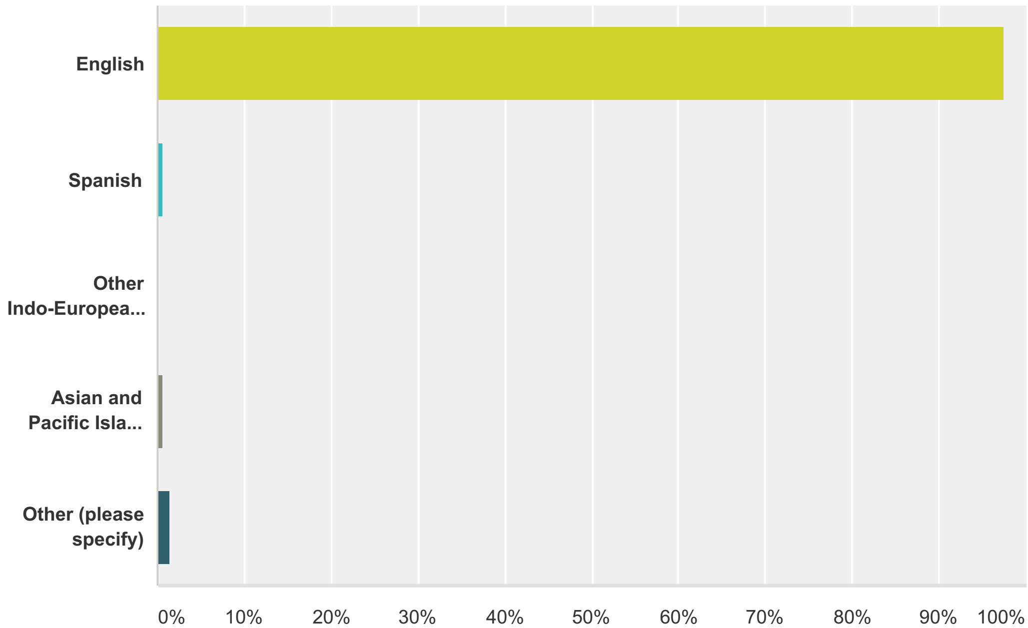
Answered: 650 Skipped: 21




| Answer Choices | Responses | |
|---|---|---|
| Yes | **41.23%** | 268 |
| No | **58.77%** | 382 |
| **Total** | | **650** |

## Q3 Please indicate the primary language spoken in your household.

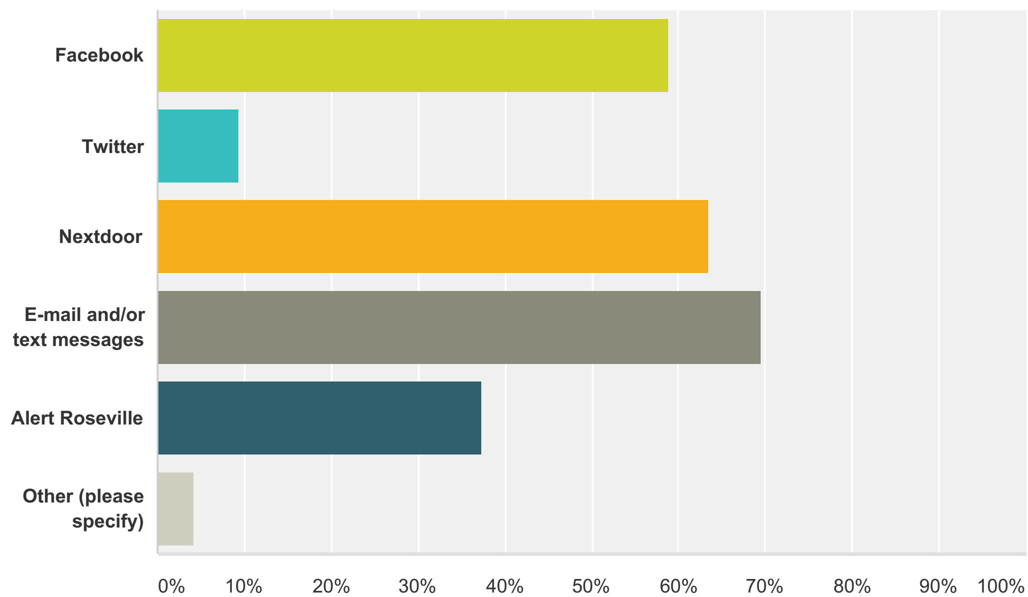
Answered: 662 Skipped: 9




| Answer Choices | Responses | |
|---|---|---|
| English | **97.43%** | 645 |
| Spanish | **0.60%** | 4 |
| Other Indo-European Language | **0.00%** | 0 |
| Asian and Pacific Island Languages | **0.60%** | 4 |
| Other (please specify) | **1.36%** | 9 |
| **Total** | | **662** |

## Q4 Which of the following digital media outlets do you subscribe to receive news and information about the City of Roseville? Select all that apply.

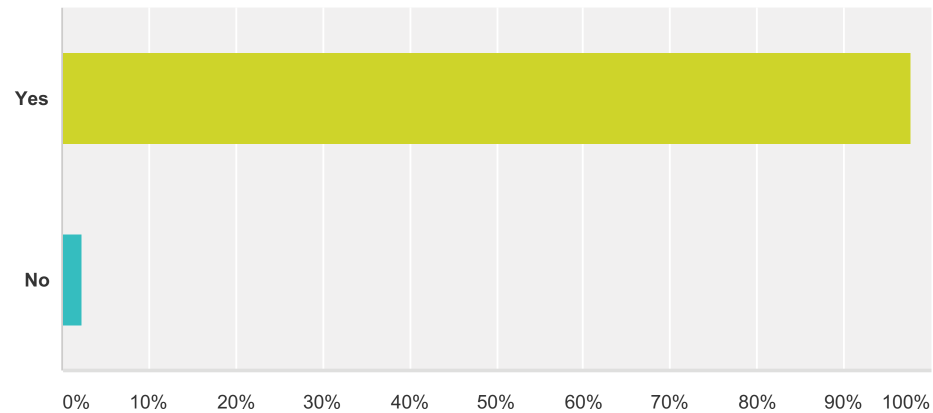
Answered: 658 Skipped: 13




| Answer Choices | Responses | |
|---|---|---|
| Facebook | **58.97%** | 388 |
| Twitter | **9.42%** | 62 |
| Nextdoor | **63.37%** | 417 |
| E-mail and/or text messages | **69.45%** | 457 |
| Alert Roseville | **37.39%** | 246 |
| Other (please specify) | **4.10%** | 27 |
| **Total Respondents: 658** | | |

## Q5 Do you live in Roseville?

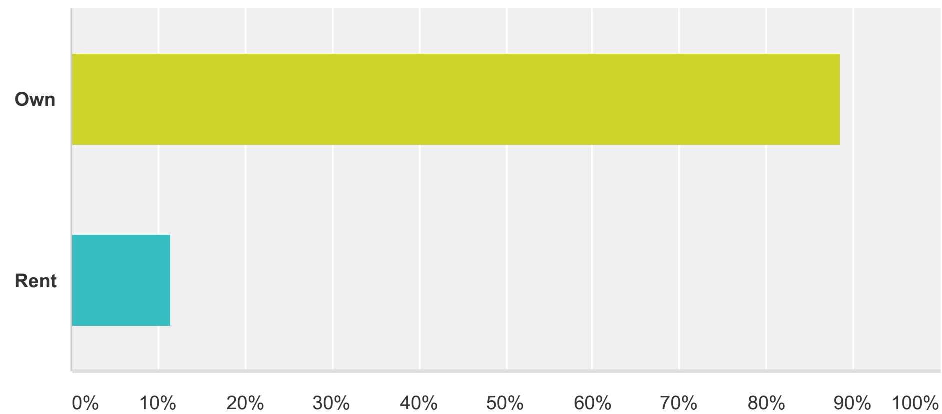
Answered: 646 Skipped: 25




| Answer Choices | Responses | |
|---|---|---|
| Yes | **97.68%** | 631 |
| No | **2.32%** | 15 |
| **Total** | | **646** |

## Q6 Do you own or rent your place of residence?

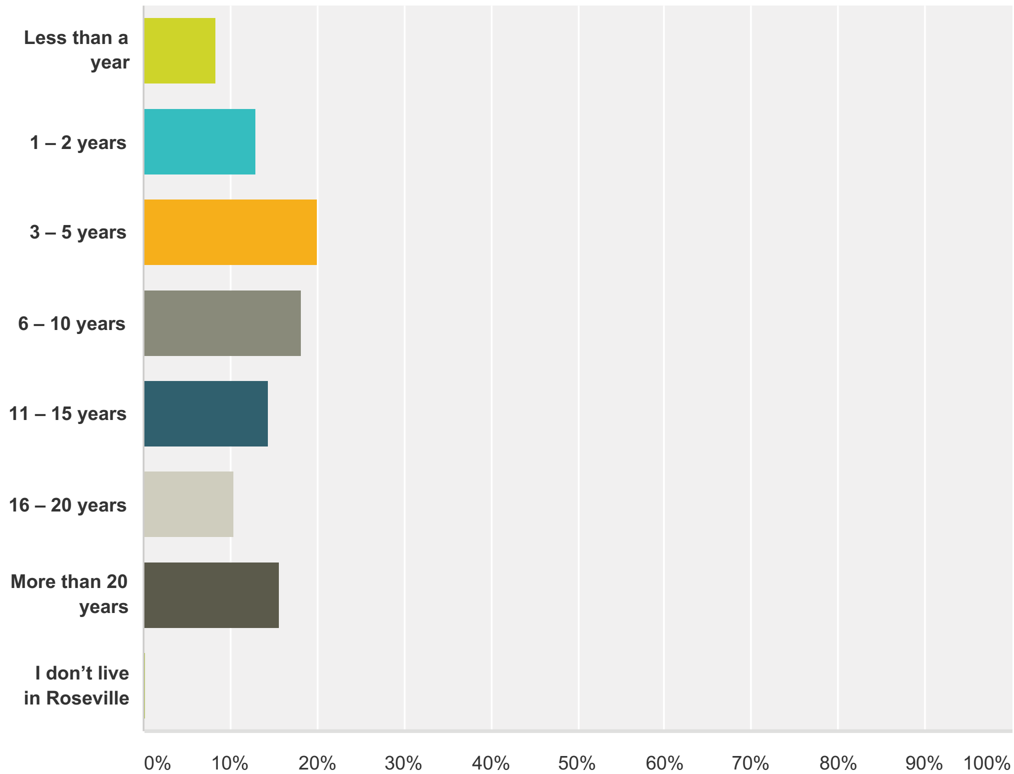
Answered: 641 Skipped: 30




| Answer Choices | Responses | |
|---|---|---|
| Own | **88.46%** | 567 |
| Rent | **11.54%** | 74 |
| **Total** | | **641** |

## Q7 How long have you lived in at your current residence?

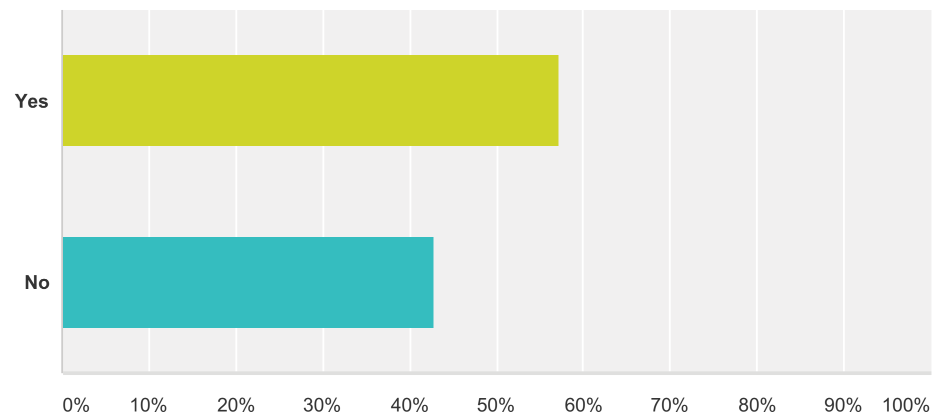
Answered: 642    Skipped: 29




| Answer Choices | Responses | |
|---|---|---|
| Less than a year | **8.41%** | 54 |
| 1 – 2 years | **12.93%** | 83 |
| 3 – 5 years | **19.94%** | 128 |
| 6 – 10 years | **18.22%** | 117 |
| 11 – 15 years | **14.33%** | 92 |
| 16 – 20 years | **10.44%** | 67 |
| More than 20 years | **15.58%** | 100 |
| I don’t live in Roseville | **0.16%** | 1 |
| **Total** | | **642** |

## Q8 When you moved into your home, did you consider the impact a natural or human-caused disaster could have on your home?

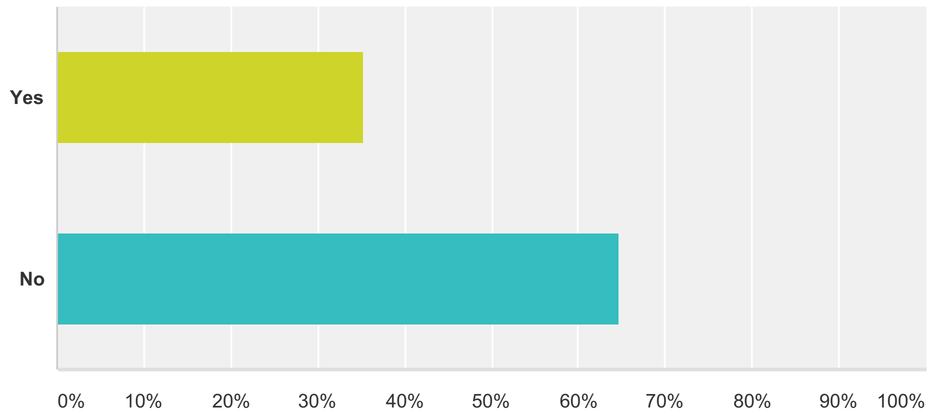
Answered: 646 Skipped: 25




| Answer Choices | Responses | |
|---|---|---|
| Yes | **57.12%** | 369 |
| No | **42.88%** | 277 |
| **Total** | | **646** |

## Q9 Was the presence of a natural hazard risk zone (e.g., dam failure zone, flood zone, landslide hazard area, high fire risk area) disclosed to you by a real estate agent, seller, or landlord before you purchased or moved into your home?

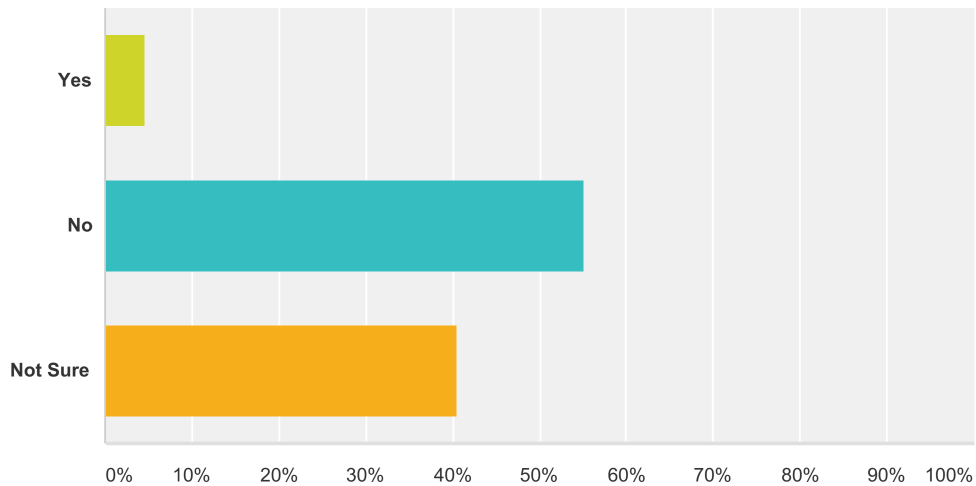
Answered: 646 Skipped: 25




| Answer Choices | Responses | |
|---|---|---|
| Yes | **35.29%** | 228 |
| No | **64.71%** | 418 |
| **Total** | | **646** |

## Q10 Is your residence located in or near a FEMA designated floodplain?

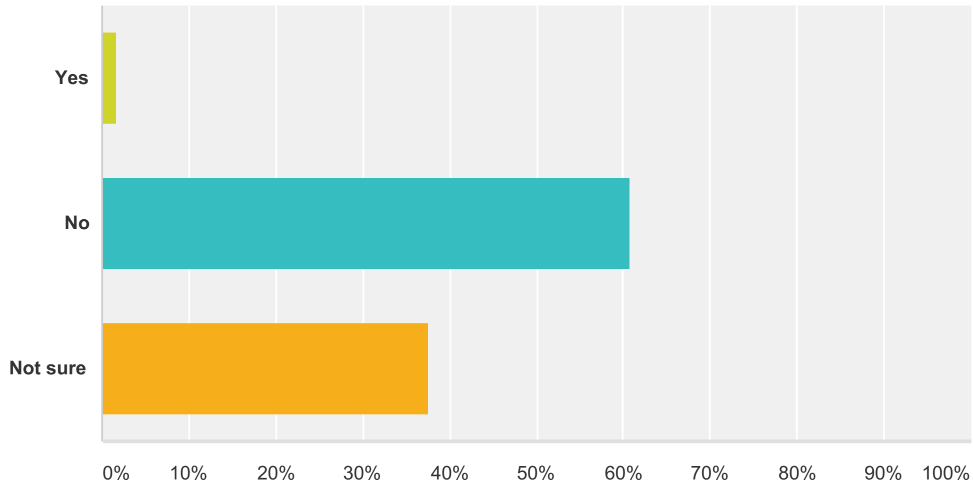
Answered: 646 Skipped: 25




| Answer Choices | Responses | |
|---|---|---|
| Yes | **4.49%** | 29 |
| No | **55.11%** | 356 |
| Not Sure | **40.40%** | 261 |
| **Total** | | **646** |

## Q11 Is your residence located in a dam failure zone?

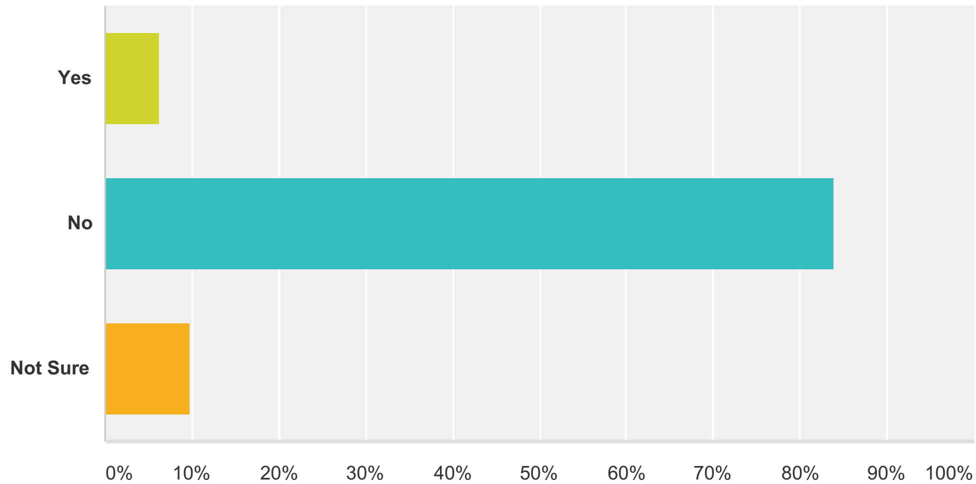
Answered: 642 Skipped: 29




| Answer Choices | Responses | |
|---|---|---|
| Yes | **1.71%** | 11 |
| No | **60.75%** | 390 |
| Not sure | **37.54%** | 241 |
| **Total** | | **642** |

## Q12 Do you have flood insurance?

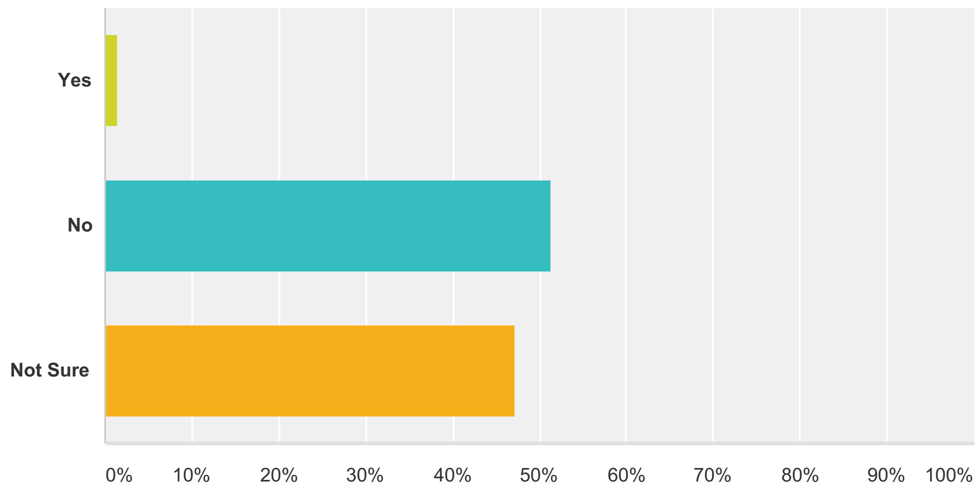
Answered: 646 Skipped: 25




| Answer Choices | Responses | |
|---|---|---|
| Yes | **6.19%** | 40 |
| No | **83.90%** | 542 |
| Not Sure | **9.91%** | 64 |
| **Total** | | **646** |

## Q13 Is your residence located near an earthquake fault?

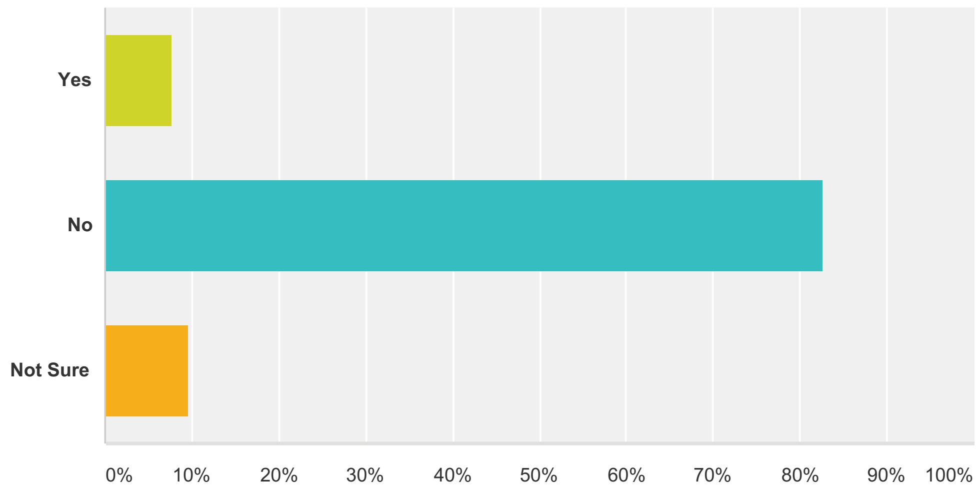
Answered: 646 Skipped: 25




| Answer Choices | Responses | |
|---|---|---|
| Yes | **1.39%** | 9 |
| No | **51.39%** | 332 |
| Not Sure | **47.21%** | 305 |
| **Total** | | **646** |

## Q14 Do you have earthquake insurance?

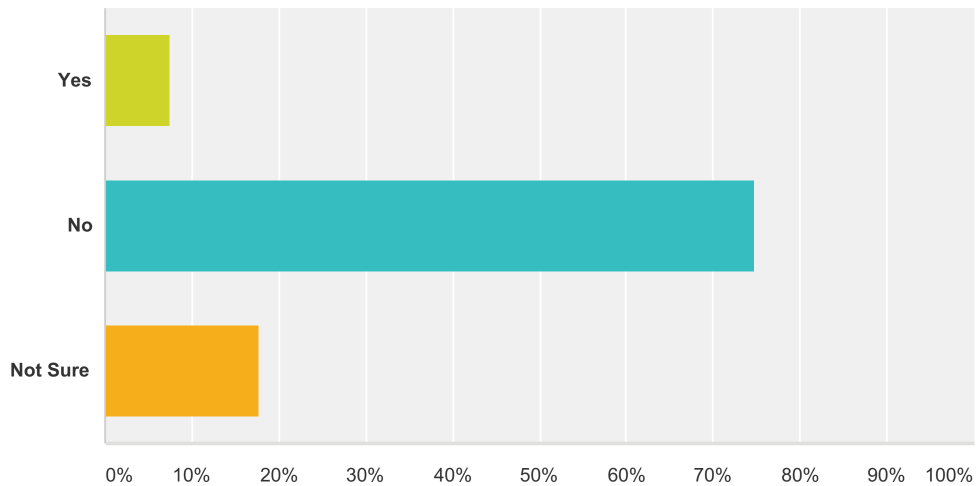
Answered: 646 Skipped: 25




| Answer Choices | Responses | |
|---|---|---|
| Yes | **7.74%** | 50 |
| No | **82.66%** | 534 |
| Not Sure | **9.60%** | 62 |
| **Total** | | **646** |

## Q15 Is your property located in an area at risk for wildfires?

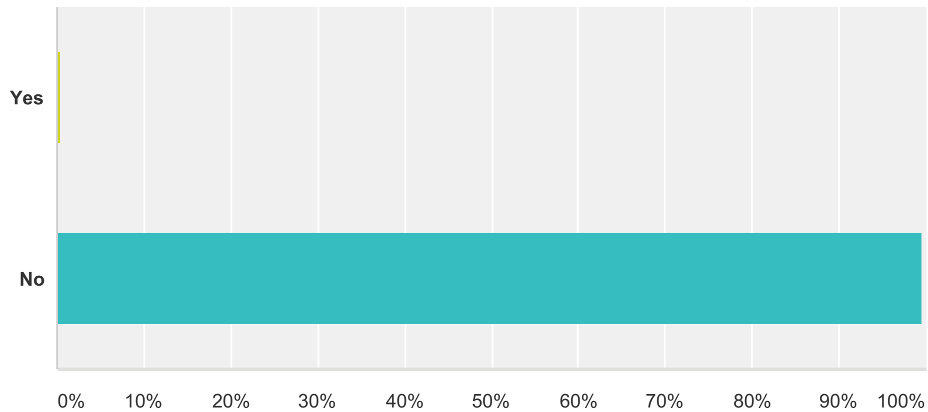
Answered: 646 Skipped: 25




| Answer Choices | Responses | |
|---|---|---|
| Yes | **7.59%** | 49 |
| No | **74.77%** | 483 |
| Not Sure | **17.65%** | 114 |
| **Total** | | **646** |

## Q16 Have you ever had problems securing homeowners or renters insurance due to risks from hazards?

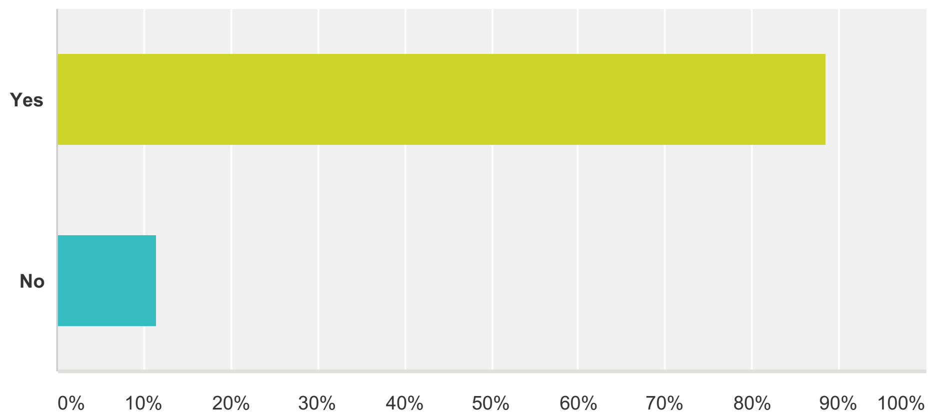
Answered: 641 Skipped: 30




| Answer Choices | Responses | |
|---|---|---|
| Yes | **0.47%** | 3 |
| No | **99.53%** | 638 |
| **Total** | | **641** |

## Q17 Do you support policies to restrict or prohibit development in designated hazard zones?

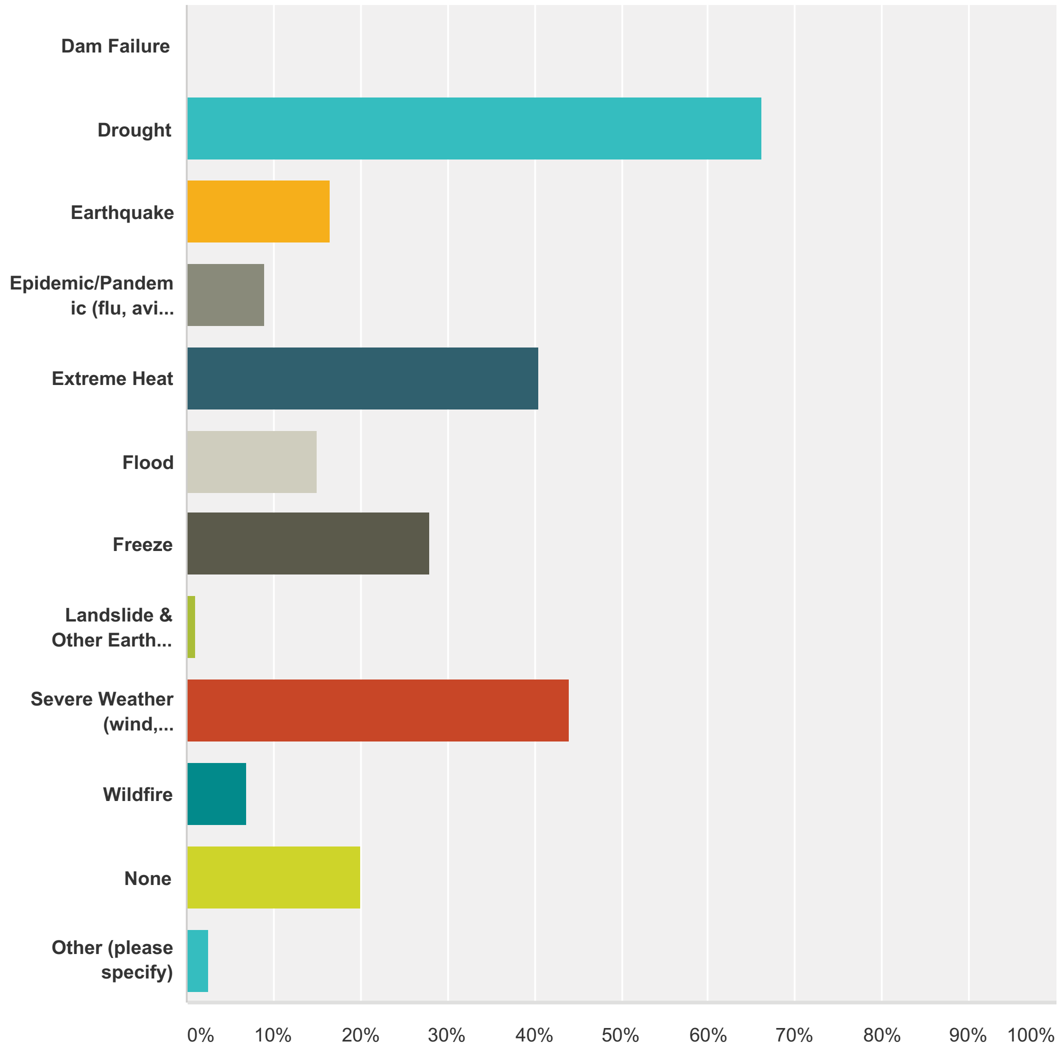
Answered: 623    Skipped: 48




| Answer Choices | Responses | |
|---|---|---|
| Yes | **88.60%** | 552 |
| No | **11.40%** | 71 |
| **Total** | | **623** |

## Q18 Which of the following natural hazard events have you or has anyone in your household experienced within the past 20 years in Roseville? (Check all that apply)

Answered: 556 Skipped: 115

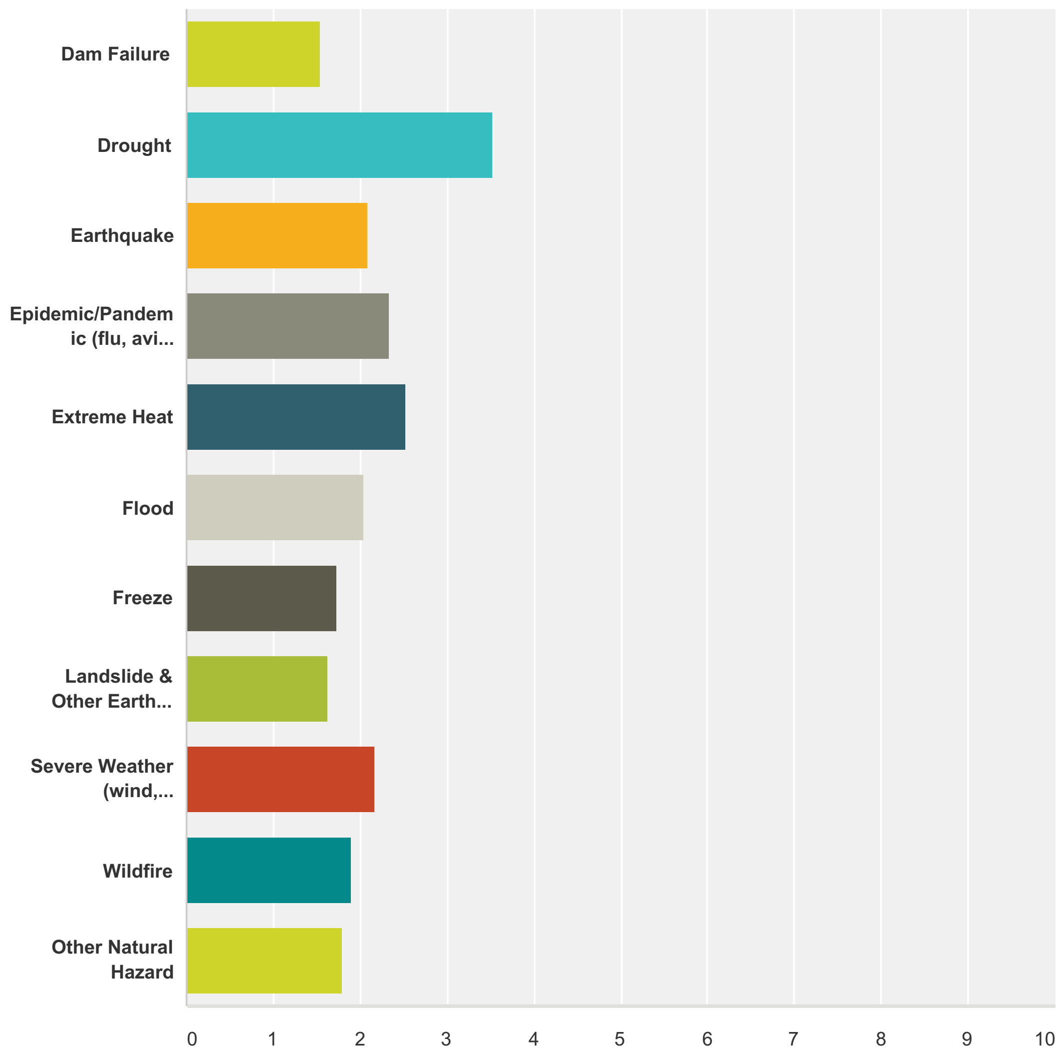



| Answer Choices | Responses | |
|---|---|---|
| Dam Failure | 0.00% | 0 |
| Drought | 66.19% | 368 |
| Earthquake | 16.55% | 92 |
| Epidemic/Pandemic (flu, avian flu, H1N1, West Nile) | 8.99% | 50 |
| Extreme Heat | 40.47% | 225 |
| Flood | 15.11% | 84 |
| Freeze | 27.88% | 155 |

| | | |
|---|---|---|
| Landslide & Other Earth Movements (non-seismic induced landslides and earth movements;subsidence;sinkholes;geologic hazard) | **1.08%** | 6 |
| Severe Weather (wind, lightning, winter storm, etc.) | **44.06%** | 245 |
| Wildfire | **6.83%** | 38 |
| None | **19.96%** | 111 |
| Other (please specify) | **2.52%** | 14 |
| **Total Respondents: 556** | | |

## Q19 How concerned are you about the following natural hazards in Roseville? (Please check one for each hazard)

Answered: 562 Skipped: 109

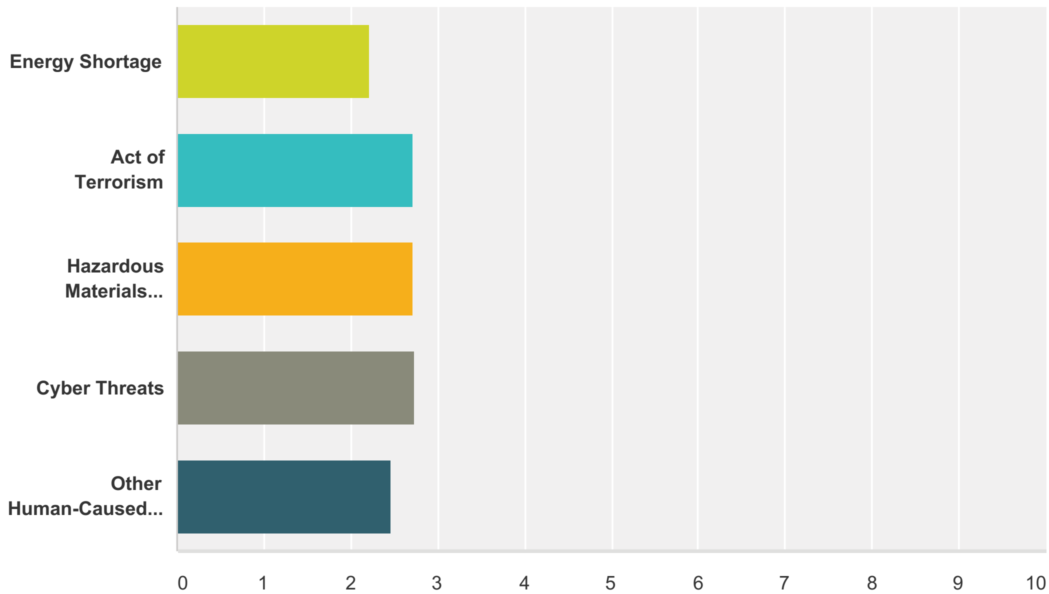



| | Not concerned | Somewhat concerned | Concerned | Very concerned | Extremely concerned | Total | Weighted Average |
|---|---|---|---|---|---|---|---|
| Dam Failure | **64.76%** 351 | **22.51%** 122 | **8.86%** 48 | **2.03%** 11 | **1.85%** 10 | 542 | 1.54 |
| Drought | **7.10%** 38 | **12.15%** 65 | **25.42%** 136 | **32.52%** 174 | **22.80%** 122 | 535 | 3.52 |
| Earthquake | **32.15%** 172 | **38.88%** 208 | **20.00%** 107 | **5.98%** 32 | **2.99%** 16 | 535 | 2.09 |
| Epidemic/Pandemic (flu, avian flu, H1N1, West Nile, Ebola) | **28.01%** 149 | **31.58%** 168 | **25.38%** 135 | **8.46%** 45 | **6.58%** 35 | 532 | 2.34 |
| Extreme Heat | **24.54%** 132 | **27.14%** 146 | **26.02%** 140 | **15.99%** 86 | **6.32%** 34 | 538 | 2.52 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Flood | **38.14%** 201 | **32.83%** 173 | **18.98%** 100 | **6.07%** 32 | **3.98%** 21 | 527 | 2.05 |
| Freeze | **52.31%** 272 | **29.23%** 152 | **12.50%** 65 | **4.04%** 21 | **1.92%** 10 | 520 | 1.74 |
| Landslide & Other Earth Movements (non-seismic induced landslides and earth movements;subsidence;sinkholes;geologic hazard) | **60.30%** 319 | **25.33%** 134 | **8.70%** 46 | **3.21%** 17 | **2.46%** 13 | 529 | 1.62 |
| Severe Weather (wind, lightning, winter storm, etc.) | **30.78%** 165 | **35.45%** 190 | **22.95%** 123 | **7.65%** 41 | **3.17%** 17 | 536 | 2.17 |
| Wildfire | **50.37%** 270 | **25.19%** 135 | **14.18%** 76 | **5.22%** 28 | **5.04%** 27 | 536 | 1.89 |
| Other Natural Hazard | **53.80%** 262 | **25.05%** 122 | **13.76%** 67 | **3.08%** 15 | **4.31%** 21 | 487 | 1.79 |

## Q20 How concerned are you with the following manmade hazards in Roseville? (Check all that apply)

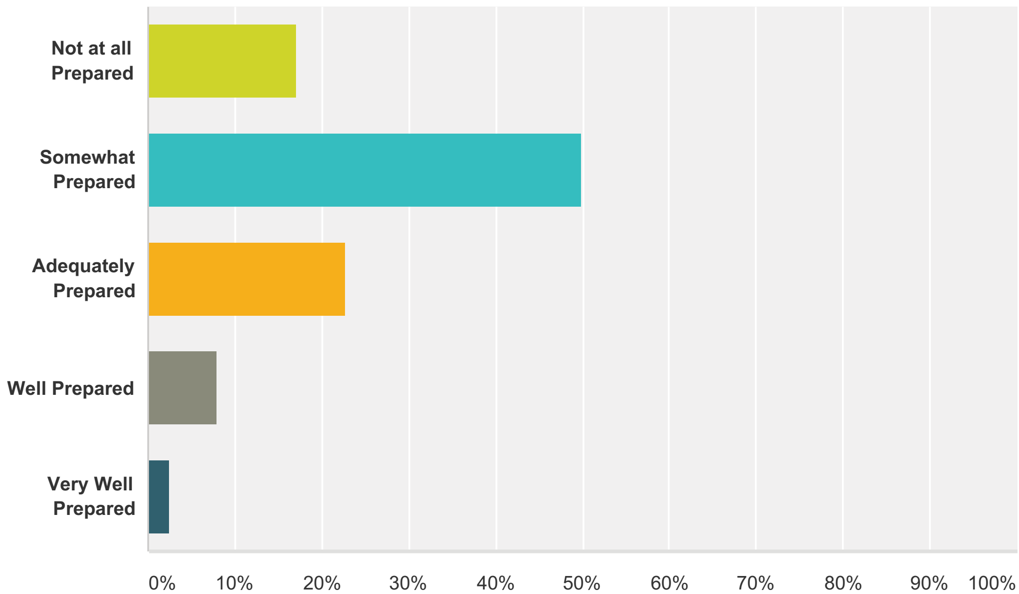
Answered: 562 Skipped: 109




| | Not concerned | Somewhat concerned | Concerned | Very concerned | Extremely concerned | Total | Weighted Average |
|---|---|---|---|---|---|---|---|
| Energy Shortage | **28.30%** 150 | **37.55%** 199 | **22.83%** 121 | **7.36%** 39 | **3.96%** 21 | 530 | 2.21 |
| Act of Terrorism | **16.76%** 90 | **30.54%** 164 | **26.63%** 143 | **16.95%** 91 | **9.12%** 49 | 537 | 2.71 |
| Hazardous Materials Release | **15.92%** 85 | **32.02%** 171 | **26.97%** 144 | **15.17%** 81 | **9.93%** 53 | 534 | 2.71 |
| Cyber Threats | **15.99%** 86 | **29.93%** 161 | **28.07%** 151 | **17.47%** 94 | **8.55%** 46 | 538 | 2.73 |
| Other Human-Caused Hazard | **25.20%** 125 | **29.84%** 148 | **25.81%** 128 | **11.49%** 57 | **7.66%** 38 | 496 | 2.47 |

## Q21 The FEMA website - Ready.gov - provides important information on how to prepare you and your family in the event of a disaster.How prepared is your household for a natural or human-caused hazard event? (Check one)

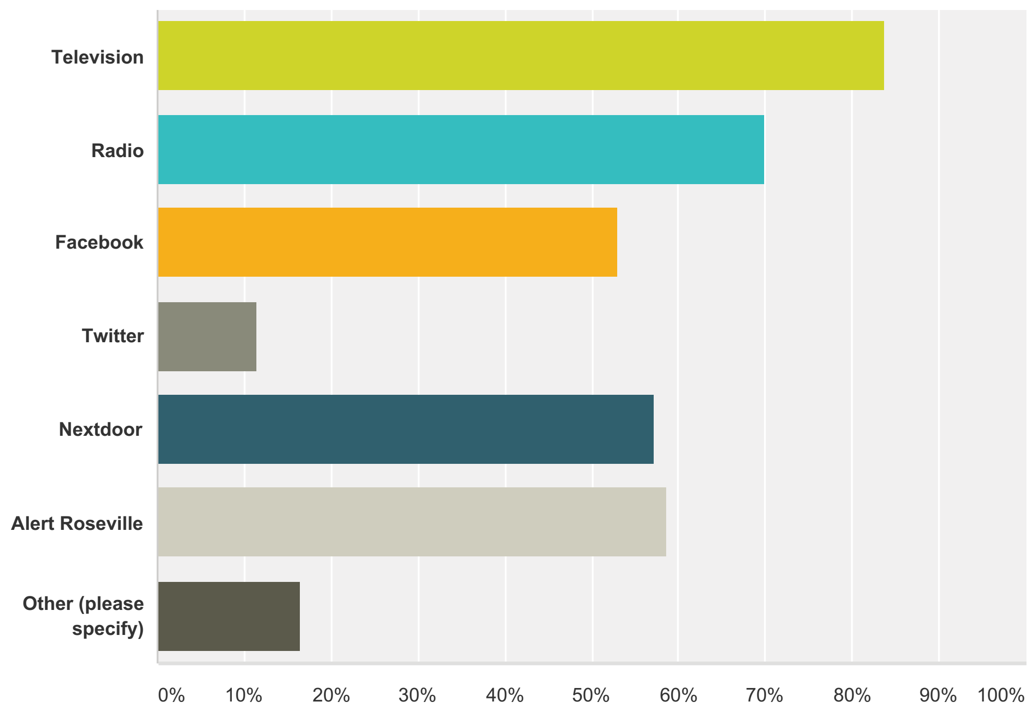
Answered: 562 Skipped: 109




| Answer Choices | Responses | |
|---|---|---|
| Not at all Prepared | **17.08%** | 96 |
| Somewhat Prepared | **49.82%** | 280 |
| Adequately Prepared | **22.78%** | 128 |
| Well Prepared | **7.83%** | 44 |
| Very Well Prepared | **2.49%** | 14 |
| **Total** | | **562** |

## Q22 How would you expect to be notified in case of an immediate threat caused by a natural or human-caused hazard.Select all that apply.

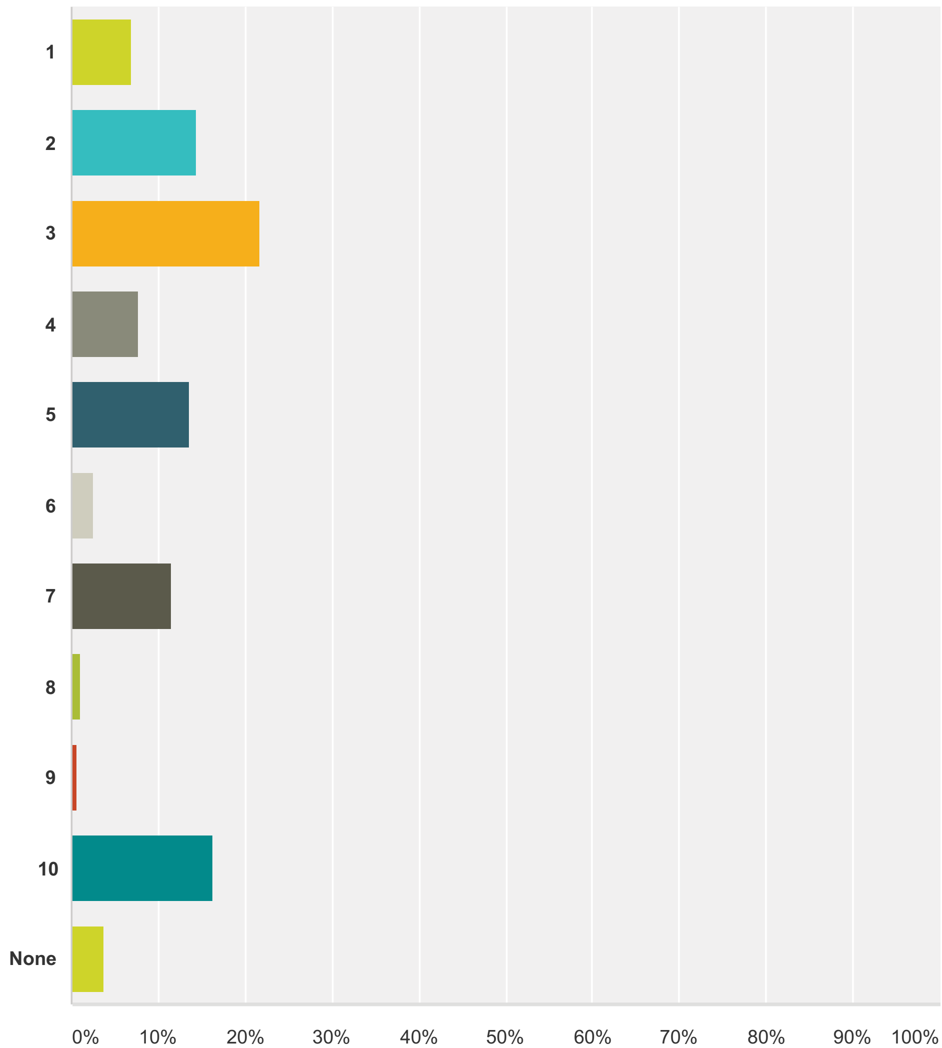
Answered: 562 Skipped: 109




| Answer Choices | Responses | |
|---|---|---|
| Television | **83.81%** | 471 |
| Radio | **69.93%** | 393 |
| Facebook | **53.02%** | 298 |
| Twitter | **11.57%** | 65 |
| Nextdoor | **57.12%** | 321 |
| Alert Roseville | **58.72%** | 330 |
| Other (please specify) | **16.55%** | 93 |
| **Total Respondents: 562** | | |

## Q23 FEMA suggests that households have at least 3 days of food, water, and vital supplies (e.g. medications) in hand in the event of a disaster. How many days of food, water, and vital supplies does your family have on hand in the event of a disaster?

Answered: 556 Skipped: 115

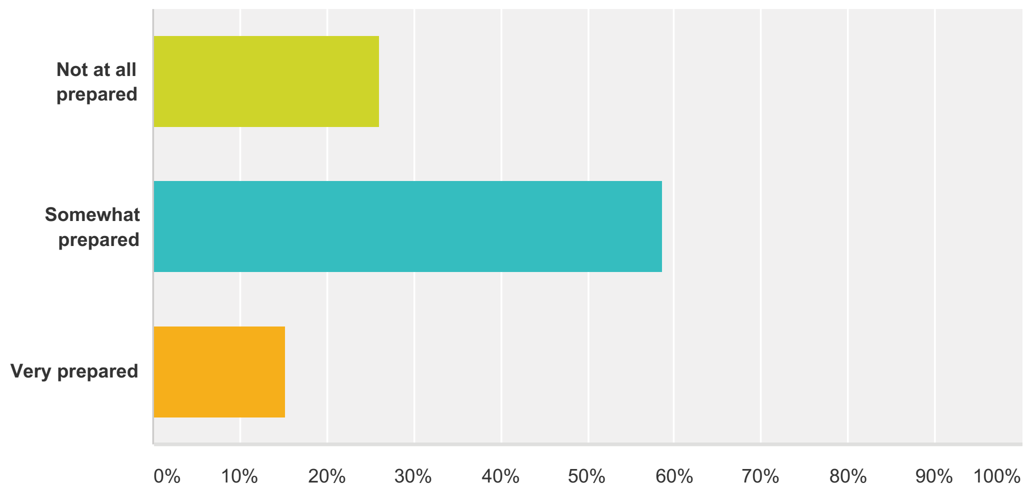



| Answer Choices | Responses | |
|---|---|---|
| 1 | **6.83%** | 38 |
| 2 | **14.39%** | 80 |
| 3 | **21.76%** | 121 |
| 4 | **7.73%** | 43 |
| 5 | **13.67%** | 76 |

| | | |
|---|---|---|
| 6 | **2.52%** | 14 |
| 7 | **11.51%** | 64 |
| 8 | **1.08%** | 6 |
| 9 | **0.54%** | 3 |
| 10 | **16.19%** | 90 |
| None | **3.78%** | 21 |
| **Total** | | **556** |

## Q24 How prepared are you to get along without electricity or natural gas for one to five days?

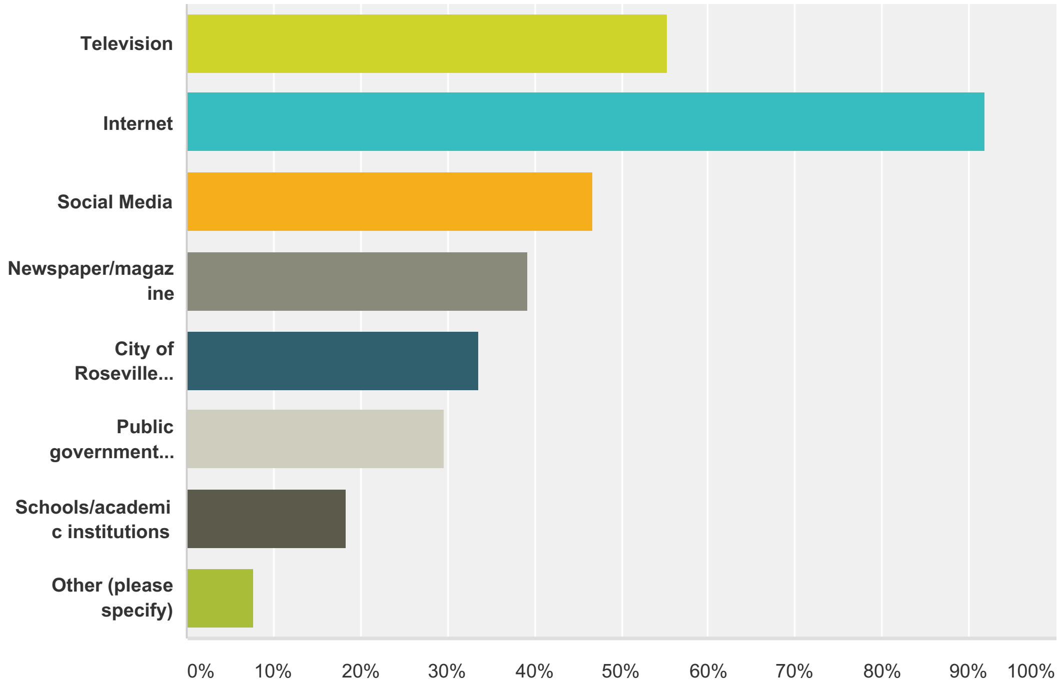
Answered: 558 Skipped: 113




| Answer Choices | Responses | |
|---|---|---|
| Not at all prepared | **26.16%** | 146 |
| Somewhat prepared | **58.60%** | 327 |
| Very prepared | **15.23%** | 85 |
| **Total** | | **558** |

## Q25 Where would you expect to find useful information to help you be prepared?Select all that apply.

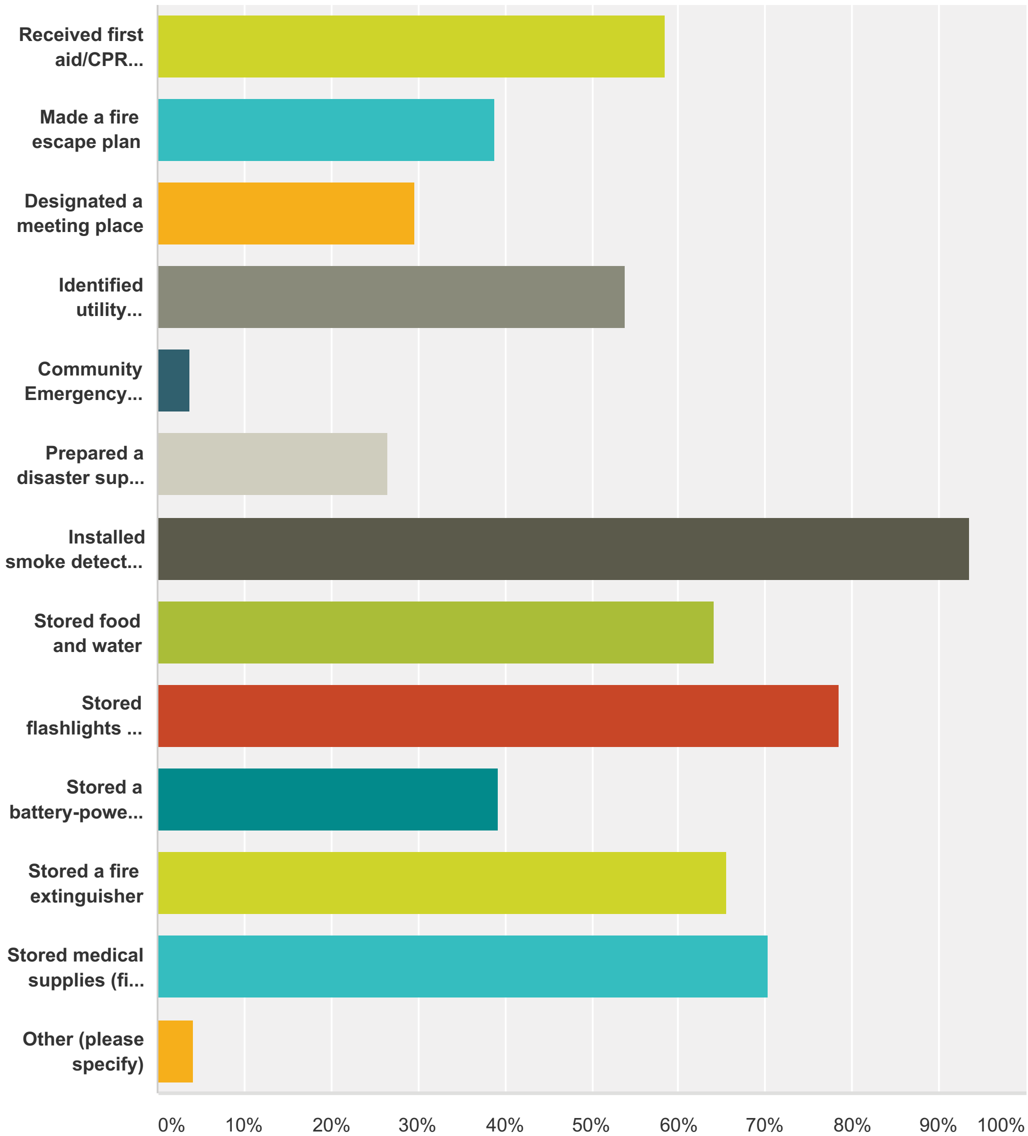
Answered: 560 Skipped: 111




| Answer Choices | Responses | |
|---|---|---|
| Television | **55.36%** | 310 |
| Internet | **91.79%** | 514 |
| Social Media | **46.79%** | 262 |
| Newspaper/magazine | **39.29%** | 220 |
| City of Roseville Public Library | **33.57%** | 188 |
| Public government meetings | **29.64%** | 166 |
| Schools/academic institutions | **18.39%** | 103 |
| Other (please specify) | **7.68%** | 43 |
| **Total Respondents: 560** | | |

## Q26 Which of the following steps has your household already undertaken to prepare for a natural or manmade disaster?Select all that apply.

Answered: 558 Skipped: 113




| Answer Choices | Responses | |
|---|---|---|
| Received first aid/CPR training | **58.42%** | 326 |
| Made a fire escape plan | **38.89%** | 217 |
| Designated a meeting place | **29.57%** | 165 |
| Identified utility shutoffs | **53.94%** | 301 |
| Community Emergency Response Training (CERT) | **3.76%** | 21 |

| | | |
|---|---|---|
| Prepared a disaster supply kit | **26.52%** | 148 |
| Installed smoke detectors on each level of the house | **93.55%** | 522 |
| Stored food and water | **64.16%** | 358 |
| Stored flashlights and batteries | **78.49%** | 438 |
| Stored a battery-powered radio | **39.25%** | 219 |
| Stored a fire extinguisher | **65.59%** | 366 |
| Stored medical supplies (first aid kit, medications) | **70.25%** | 392 |
| Other (please specify) | **4.12%** | 23 |
| **Total Respondents: 558** | | |

## Q27 Please provide any additional comments you would like to share with the City of Roseville Planning Team.

Answered: 65 Skipped: 606

## Q28 If you would like to receive information regarding upcoming public events and other participatory opportunities regarding hazard mitigation, please provide your email address below.

Answered: 223    Skipped: 448

**From:** City of Roseville <Roseville@public.govdelivery.com>
**Sent:** Tuesday, March 1, 2016 8:59 AM
**To:**
**Subject:** City of Roseville News - March 1, 2016


# Downtown Roseville update

It will be a busy couple years for city building projects in Downtown Roseville. All of the projects are part of the Downtown Specific Plan designed through a community visioning process in 2009. The highly popular Vernon Street Town Square and roundabout at Washington Boulevard and Oak Street are examples of projects already completed in accordance with the plan.

Current projects include an office building at 316 Vernon Street, the Oak Street Parking facility, a new downtown Fire Station, three pedestrian bridges and bike trail connections through downtown.

Find out more


Leaks can run, but they can't hide! Every day during Fix a Leak Week, visit the Roseville Utility Exploration Center to learn where water-wasting leaks hide around home, and learn how to fix them. Use a dye tablet to find toilet leaks, get your hands on a variety of sprinklers, and enter for a chance to win a smart timer or other water-saving technology. Best of all, it is free.

For more information call 916-746-1550 or visit the Fix A Leak Week page.

---

# Roseville explores creating waste into energy

Work is underway right now to develop a project that would one day help power one of the city's wastewater treatment plants or provide fleet vehicle fuel using Compressed Natural Gas (CNG). This project is in its infancy and more work is needed to see this effort become a reality. But we're hard at work behind the scenes to bring this project online within the next three to five years.

For more information

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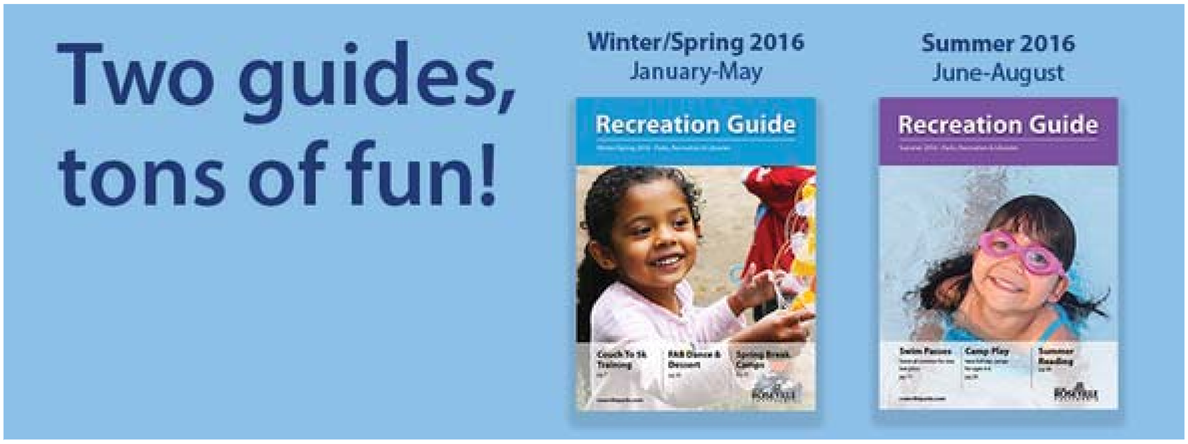


# Download them now at roseville.ca.us/guide

---

## Affordable Housing Information & Workshop

The City of Roseville Affordable Housing Program is offering down payment assistance for qualified households to purchase affordable homes at a new Lennar community in West Roseville.

The City and Lennar will host an affordable housing workshop to provide more information about the program, **5:30 p.m., Wednesday, March 9** in the Roseville City Council Chambers, 311 Vernon Street in Roseville.

Find out more.

---

## Do you know your risk...

. . .when it comes to flood, earthquake or any natural or man made disaster here in Roseville? Do you and your family have a three day supply ...of food and water should a disaster occur?

While a range of natural and man-made disasters can affect any community, the City of Roseville is always taking steps to reduce the risk to residents and businesses. We need your input to remain prepared and ensure our community can recover as quickly as possible, should a disaster occur. Please help us by taking a few minutes to complete this community survey

---

## Apply for up to $200 toward a new commuter bike

Apply for an opportunity to receive up to $200 toward a new commuter bike. Bucks for Bikes helps commuters start using an active, clean, traffic-relieving mode of travel—bicycling! **Submit your application by 5 p.m., Monday, March 21.** This is made possible by the City of Roseville and Placer County Transportation Planning Agency.

Find out more.

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## Superhero Storytime

We are all super heroes! Visit the Martha Riley Library on the 4th Tuesday of the month through May and we'll explore the everyday superheroes of our city. From 1-1:30 p.m., Miss Lisa will guide us through stories, songs, and activities to discover the super hero in you. Then, come explore the Utility Exploration Center from 1:30 - 2 p.m. to discover play time with special activities to help practice your superhero skills. These fun events are free.

**For more information call 916-746-1550**.

---


# UPCOMING CITY MEETINGS

[Meeting agendas and minutes]

**City Council Meeting** - 7 p.m., Wednesday, March 2

**Planning Commission Meeting** - 7 p.m., Thursday, March 10

**Parks and Recreation Commission Meeting** - 7 p.m., Monday, March 7

**Transportation Commission Meeting** - 7 p.m., Tuesday, March 15

**Public Utilities Commission Meeting** - 7 p.m., Tuesday, March 22

**Multi-Hazard Mitigation Plan Steering Committee Meeting** - 5:30 p.m., Tuesday, March 1, Civic Center Meeting Rooms 1 & 2

Unless otherwise noted, Council and Commission meetings are held in the Roseville City Council Chambers at 311 Vernon Street. Meetings held in the City Council Chambers can be viewed live online or later on demand.

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**Sent:** Tuesday, August 2, 2016 8:33 AM
**To:**
**Subject:** City of Roseville News - August 2, 2016


# Roseville named 11th healthiest city in U.S.

Roseville is the 11th healthiest city in the United States, according to Niche.com.

The ranking provides a comprehensive assessment of the general levels of health among residents in Roseville.

This grade takes into account key indicators of personal health, such as smoking, excessive alcoholic consumption, rates of obesity, as well as the availability and proximity of fitness facilities, doctors, and mental health practitioners, in an attempt to measure an area's performance in health and fitness.

[You can read more about the rankings here.]

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# Roseville among 25 safest cities in the country

Roseville has been ranked among the 25 safest cities in the US! Niche.com ranked U.S. cities over 100,000 population for safety, based on FBI crime statistics.

Roseville Police Chief Daniel Hahn said, “It takes more a good police department to create a safe city. It also takes city leaders who put public safety first; and a community that won’t settle for anything less, and is willing to get involved to make it happen. We’re very blessed in Roseville to have all three.”

See the rankings here.

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## Roseville recognized as national flood protection leader

FEMA has again been recognized Roseville as the national leader in flood preparation. Roseville is the only city in the country to hold FEMA's top flood control rating. Roseville’s top rating means flood insurance discounts of up to 45% for residents and businesses.

Find out more

## National Night Out is tonight

National Night Out is considered America's night out against crime.

We encourage you to lock your home and connect with your neighbors at one of the 40 National Night Out community events in Roseville.

Not sure if your neighborhood is hosting an NNO party? Visit the Roseville Coalition of Neighborhood Associations website at www.RCONA.org to contact your neighborhood association.

Find out more

## Talk trash with Curby

You know where trash comes from, but where does it go? Join the Utility Exploration Center **Saturday, August 27** for free family fun at Curby's Waste-a-Palooza!

Fight the unflushables in the Sewer Swim, defend against Trashville and talk trash with Curby to test your knowledge in our quiz show. Challenge yourself in the game room where you can reuse, rethink, recycle and help knock out excess waste.

Grab a water repair LEGO® City set for just $10 (while supplies last) in the activity room for a fun build-it activity!

Find out more

## Tired of the traffic backups?

Traffic is one of the topics we hear most about from you.  There is a plan to raise about $1.6 billion to fund highway projects, public transit expansion, local street maintenance and improvements including Highway 65 widening and the Highway 65 / I-80 interchange.

With other funding being more difficult to obtain, a ballot measure to increase retail sales tax by a half percent to raise funds for transportation improvements in Placer County was placed on the November 8, 2016, presidential general election ballot by the Placer County Board of Supervisors.

Find out more

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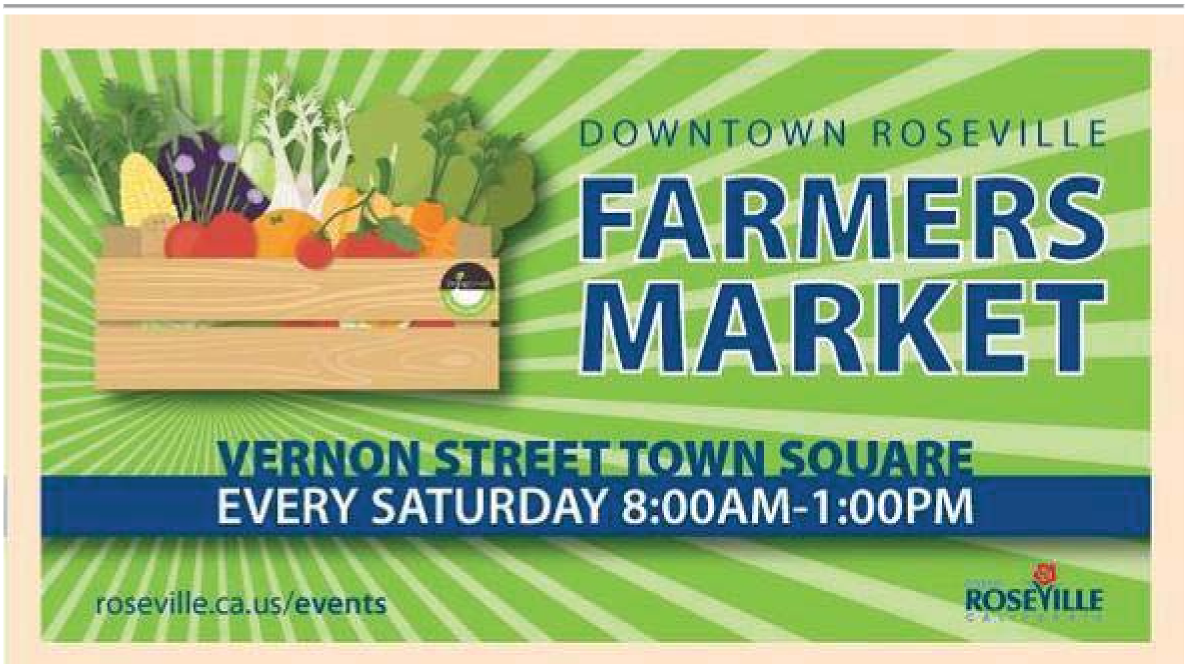


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## Street resurfacing ahead for parts of Roseville

Resurfacing is scheduled **to begin late summer/fall** for residential streets in the Foothills/Junction and West Park neighborhoods.

Some more heavily traveled roads in Roseville will also be resurfaced this summer. The specific roads and schedule can be found here.

Regular roadway maintenance reduces the need for major costly street repairs in the future by protecting Roseville streets.

Check out this short video to learn more about how we prioritize road maintenance.

# Tri County Job Fair to be held August 18

The Tri County Job Fair provides an excellent opportunity for job seekers to meet with businesses within the region and demonstrate their qualifications. This year's event will be held from **9 a.m. - noon, Thursday, August 18 at William Jessup University.**

For more information and to register

# Learn about planned changes to 916 area code

The 916 area code we use in Roseville is expected to use up its available prefixes by December 2018. The California Public Utilities Commission (CPUC) will be holding a public meeting to discuss proposed changes and to get public feedback on their plan at **1 p.m., Tuesday, August 16** in the Roseville Civic Center's Meeting Rooms 1 & 2.

The CPUC is proposing adding an additional area code to the region. The proposal would allow current customers to keep their area code. Beginning in June 2018, customers requesting new phone numbers may be assigned a new area code.

Find out more

# Comment on city's Draft Multi-Hazard Mitigation Plan

You are invited to review and provide comments on the 2016 City of Roseville Multi-Hazard Mitigation Plan.

This plan details the risks of both natural and manmade hazards in Roseville and includes programs and projects to help reduce the exposure of city residents and businesses should an event occur. By having a plan in place, Roseville is eligible for federal pre-disaster and post-disaster assistance.

Input on the plan can be submitted through Friday, August 19, 2016.

View the plan and find out more


## UPCOMING CITY MEETINGS

**Meeting agendas and minutes**

**City Council Meeting** - 7 p.m., Wednesday, August 3

**Planning Commission Meeting** - 7 p.m., Thursday, August 11

**Parks and Recreation Commission Meeting** - September meeting canceled

**Transportation Commission Meeting** - August meeting canceled

**Public Utilities Commission Meeting** - 7 p.m., Tuesday, August 23

Unless otherwise noted, Council and Commission meetings are held in the Roseville City Council Chambers at 311 Vernon Street.  Meetings held in the City Council Chambers can be viewed live online or later on demand.

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**To:**
**Subject:** City of Roseville News - August 16, 2016

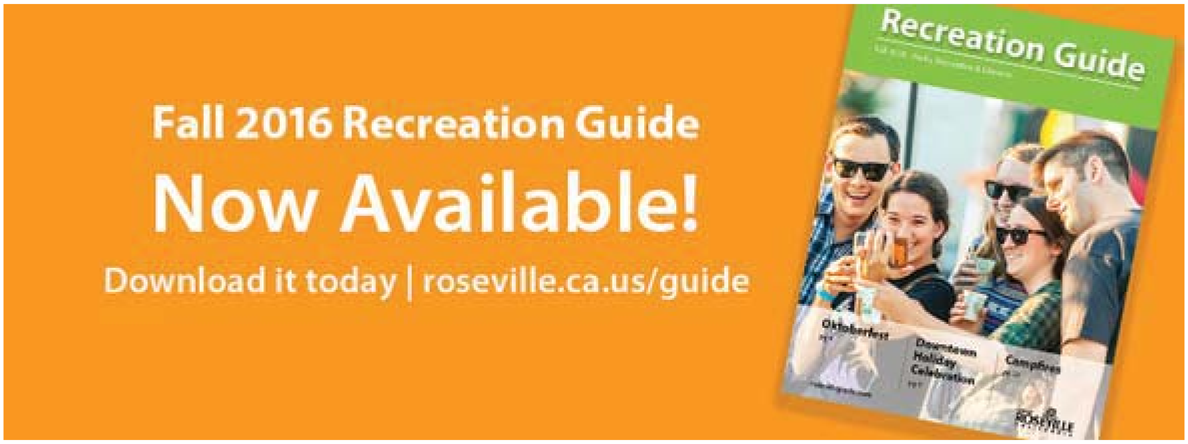

# Be safe heading back to school

All Roseville-area high school and elementary schools will be back in session this week. That means traffic around those schools will be congested.

**Read on for a refresher course on back-to-school safety.**

Walking or biking to school is a great idea. To combat the common fear that walking to school isn't safe, City of Roseville traffic engineers and the Safe Routes to School Coordinators have designated safe routes for students of all ages and abilities.

**Learn about our Safe Routes to School program**




## Unemployment rate drops to 3.8 percent in Roseville


The unemployment rate in Roseville is in the lowest 4 percent in the state, 20th of 482 cities in California.

“The leading job sector is healthcare, and healthcare-related businesses,” said Roseville Economic Development Director Chris Robles.

“We have Kaiser, the largest employer in the city, and then Sutter is also one of our top employers. Then we have Adventist Health, which is also a significant employer in the city. Their west coast headquarters are here in Roseville.”

"A part of Roseville’s economic growth is correlated with education levels; namely a more educated work force. The local population over age 25 with a bachelor’s degree or higher was over 39 percent as of 2014 – a growth margin of 5 percent since 2010, correlating with the increase in educated workforce members and growing employment figures."

**Read more in this article from the Roseville Press Tribune.**


# Talking traffic

Traffic is one of the topics we hear most about from you.  There is a plan to raise about $1.6 billion to fund highway projects, public transit expansion, local street maintenance and improvements including Highway 65 widening and the Highway 65 / I-80 interchange.

With other funding being more difficult to obtain, a ballot measure to increase retail sales tax by a half percent to raise funds for transportation improvements in Placer County was placed on the November 8, 2016, presidential general election ballot by the Placer County Board of Supervisors.

**Find out more**


## Woodcreek Oaks widening project workshop

We invite you to a community workshop to learn more about the Woodcreek Oaks Widening Project. The project team will be available to answer questions in an informal format.

Exhibits showing the project features and anticipated schedule will be on display.

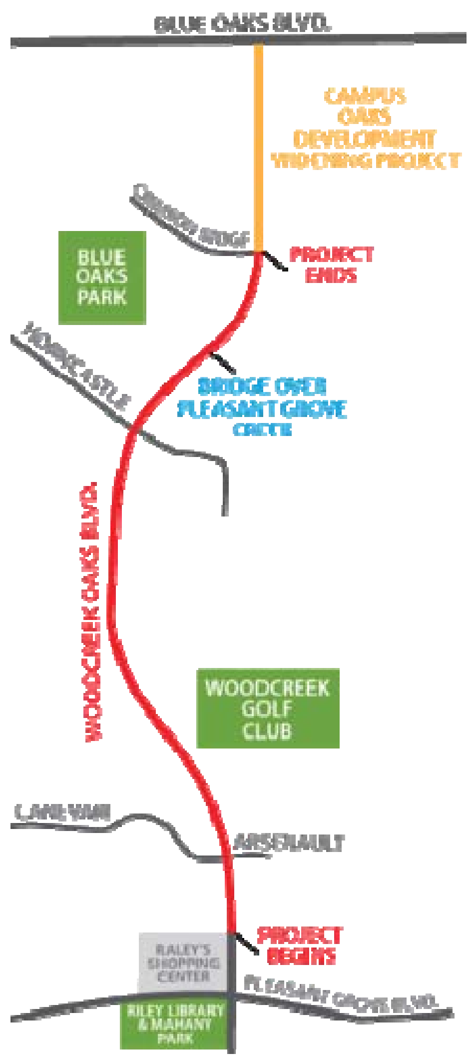
**Wednesday, August 24**
5 - 7 p.m.
Martha Riley Library, Reading Room 3
1501 Pleasant Grove Blvd

The proposed project will widen the segment of Woodcreek Oaks Boulevard, from Crimson Ridge way south to 600 feet north of Pleasant Grove Boulevard, into the median to a four lane road.

This project also proposes to widen the bridge over the south branch of Pleasant Grove Creek to accommodate the additional roadway.

The new Campus Oaks development will widen Woodcreek Oaks Boulevard from Blue Oaks Blvd south to Crimson Ridge Way, and is expected to be constructed by the end of 2016.

**Find out more**



# Trail resurfacing this week

Portions of Roseville trails system will be resurfaced this week. Notices of the upcoming closures will be posted at the trail entrances. While the resurfacing is underway, barricades will mark where the trails are closed. After the resurfacing is complete and the trail has reopened to the public, striping and sweeping will be performed.

**Find out more**

---

# Street resurfacing ahead for parts of Roseville

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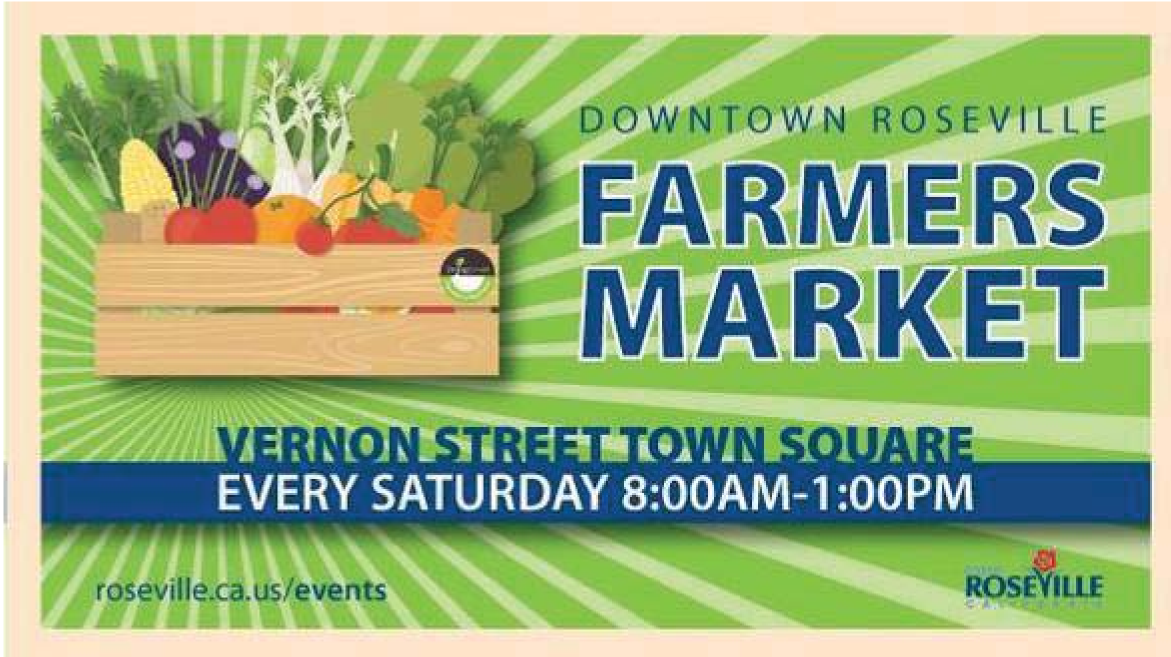


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**For more information and to register**


## Comment on city's Draft Multi-Hazard Mitigation Plan

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Input on the plan can be submitted through Friday, August 19, 2016.

**View the plan and find out more**


## UPCOMING CITY MEETINGS

**Meeting agendas and minutes**

**City Council Meeting** - 7 p.m., Wednesday, August 17

**Planning Commission Meeting** - 7 p.m., Thursday, August 25

**Parks and Recreation Commission Meeting** - September meeting canceled

**Transportation Commission Meeting** - August meeting canceled

**Public Utilities Commission Meeting** - 7 p.m., Tuesday, August 23

**Senior Commission Workshop** - 11 a.m., Tuesday, August 23 at Maidu Community Center

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**City of Roseville 2016** Multi-Hazard Mitigation Plan

# Appendix B. 2015 Progress Report

# Roseville Multi-Hazard Mitigation Plan
# 2015 PROGRESS REPORT

## Reporting Period

August 2014 through July 2015

## Background

Following a tradition of progressive and innovative planning, the City of Roseville City Council approved an update to the Roseville Multi-Hazard Mitigation Plan (RMHMP) on January 3, 2011. The RMHMP details the City's vision for reducing risk from all hazards, identifying resources, information, and strategies for risk reduction. In accordance with requirements of the Disaster Mitigation Act of 2000, the City completed a 10-month process to update its 2005 RMHMP in a way that provided as many tangible benefits for the City as possible from a single planning effort. These benefits are associated with grant funding eligibility and maintaining the nation's only Class 1 rating under FEMA's Community Rating System (CRS). The plan was approved by FEMA Region IX for compliance with Section 201.6, Chapter 44 of the Code of Federal Regulations on March 28, 2011. By completing this process, the City complied with the Disaster Mitigation Act and maintained eligibility for hazard mitigation grant funding opportunities afforded under the Robert T. Stafford Act. The plan is available to the public through the City of Roseville Public Library online at the following website:

https://www.roseville.ca.us/fire/preparedness/hazard_mitigation_plan.asp

### *Benefits of Mitigation Planning*

Maintenance of this plan enables the City of Roseville to pursue hazard mitigation grant funding administered by FEMA under the Robert T Stafford Act. A FEMA-approved Hazard Mitigation Plan is a principal prerequisite for this funding. Roseville has leveraged funding from this program in the past to significantly reduce the City's risk associated with natural hazards.

### *Summary Overview of the Plan's Progress*

The performance period for the Hazard Mitigation Plan began on March 28, 2011, with FEMA's final approval. The initial performance period for this plan is 5 years, with an update anticipated before March 2016. As of the most recent reporting period, the performance period is 82 percent complete. The Hazard Mitigation Plan identified 63 hazard mitigation initiatives to be pursued during the 5-year performance period. As of the most recent reporting period, the following progress can be reported:

- 51 out of 63 initiatives (81%) reported ongoing action toward completion.
- 10 out of 63 initiatives (16%) reported no action taken.
- 1 out of 63 initiatives (2%) was completed.
- 1 initiative was removed due to elimination of a program.

## *Purpose*

The purpose of this report is to provide the Roseville City Council, stakeholders and citizens an annual update on implementation of the action plan identified in the RMHMP. The objective of the annual evaluation is to ensure a continuous planning process that keeps the RMHMP dynamic and responsive to the needs of the stakeholders. This report was prepared by the planning team. It was reviewed and confirmed by the RMHMP Steering Committee, in accordance with Section 7.4 of the Plan, at the Steering Committee's annual meeting on November 3, 2015. This report discusses the following:

- Natural hazard events that have occurred within the last year
- Changes in risk exposure within the planning area
- Mitigation success stories
- Review of the action plan
- Changes in capability in the planning area that could impact plan implementation
- Recommendations for changes/enhancement

## *The RMHMP Steering Committee*

The update to the RMHMP was overseen by a steering committee appointed by the Roseville City Council and made up of stakeholders in the planning area. During the plan's development, the Steering Committee agreed that it would remain as a body to oversee the maintenance of the plan as established in Chapter 7. The Steering Committee continues to exist and function as organized in its established ground rules. At a minimum, it provides technical review and oversight on development of the annual progress report. It is anticipated the Steering Committee's role in overall plan implementation will evolve, based on the hazard mitigation needs of the city. Annual turnover in its membership is monitored via the progress report. For this reporting period, the Steering Committee membership is as indicated in Table 1.

**TABLE 1**
**2015 STEERING COMMITTEE MEMBERS**

| Name | Title | Jurisdiction or Agency |
|---|---|---|
| Rob Jensen | Acting City Manager | City Manager's Office |
| Jason Rizzi | Emergency Preparedness Manager | Fire Department |
| Wayne Wiley | Associate Planner | Development Services Dept. |
| Carl Walker | Senior Engineer/Floodplain Manager | Public Works Dept. |
| Helen Dyda | Public Information Specialist | Communications Dept. |
| Grace Keller | Resident | Community Emergency Response Team |
| Erik Angle | Emergency Preparedness Program | Sutter Roseville Medical Center |
| Brenette Macintosh | Safety Officer | Consolidated Communications |
| Mark Lacher | Risk Manager | Consolidated Communications |
| Mark Smith | Resident | RCONA Treasurer |
| Rod Rodriguez | Senior Emergency Services Specialist | Placer County OES |
| Rick Stalker | Stalker & Burnett RE Group | Placer County Association of Realtors |
| Michael Algots | Manager - Hazardous Materials | Union Pacific Railroad |

## Natural Hazard Events in the Planning Area

During the reporting period, the following hazard events affected the planning area:

- Due to the continuation of drought conditions, in May 2015, the City of Roseville announced further water-use restrictions for Roseville water customers. The restrictions were placed in response to Governor Brown's Executive Order and the State Water Resources Control Board's drought emergency action requiring a 25 percent statewide water-use reduction goal. In order to meet the State's goal, City of Roseville water customers were required to reduce water consumption by 28 percent over their use in 2013. For residential customers, the most noticeable change includes watering day restrictions for outdoor irrigation. Watering days for residential turf will be limited to two days per week, Monday and Friday only, before 10 a.m. and after 8 p.m. Commercial customers will have watering days limited to Monday and Thursday.

  In addition to restricted watering days, Roseville also incorporated additional water-use reduction strategies to achieve more water savings:

  - Water waste is prohibited.
  - Washing hardscape is prohibited, unless for health and safety concerns.
  - New or expanded landscape is limited to drought tolerant trees, shrubs and ground-cover irrigated on a drip irrigation system.
  - Fountains, ponds and decorative pools must be drained (unless ponds contain fish.)
  - Covers are required for all new pools and spas.
  - Low volume drip irrigation systems that irrigate at less than two gallons per hour are exempt from day of week watering restrictions.
- December 10-12, 2014: Over a three-day period, from December 10th to December 12, 2014, The National Weather Service forecasted a major winter storm to impact Northern California. All reasonable data from the National Weather Service estimated that the City of Roseville would receive 3.6 inches of rain from the storm event. Additionally, severe winds were forecasted to be a major factor in the event. In preparation of the storm event, the City of Roseville Fire Department chose to activate a Limited Emergency Operations Center (LEOC) at the Fire Department Administrative Headquarters, located at 401 Oak Street. The LEOC was staffed for a 36-hour period. The Placer County Office of Emergency Services was also activated during the storm event.

## Changes in Risk Exposure in the Planning Area

The RMHMP update addressed the probable impact of the following natural hazard events in the City of Roseville:

- Dam failure
- Drought
- Earthquake
- Flood
- Landslides
- Human-caused hazards
- Human health hazards
- Severe weather
- Wildland fire

There was an F-0 tornado occurrence during the reporting period. Damage associated with the event was minimal. The occurrence of this event should be acknowledged in future updates to the risk assessment for this plan. There were no other events during the reporting period that would alter or change the probability of occurrence or ranking of risk for the natural hazards addressed by the RMHMP.

## Mitigation Success Stories

During the current reporting period, the City had a number of mitigation success stories that reflect the City's commitment to multi-hazard mitigation and the philosophy that the City Council and staff are responsible for the good stewardship of City resources.

### *Deployment of Everbridge Notification System and Alert Roseville*

Using a Homeland Security grant, the City, along with Placer, Sacramento, and Yolo counties, implemented the Everbridge Mass Notification system. This is a robust and popular system that is used globally. The system will be used for both emergency and non-emergency notification of the public. In preparation for the deployment, over 100 city staff members from 13 city departments were trained in its use. Special courses were designed for public safety officials, including dispatchers, fire department chief officers, and police managers.

"Alert Roseville" (aka "Opt-In") went live in August 2014. This internet site was established to help members of the public register their contact information into the Everbridge system. A significant media and outreach program was developed to advertise the importance of getting this information from the public. The "Opt-In" portal will be explained at every public education event the Fire Department attends. Currently approximately 2,050 public members are signed up in the "Opt-In" portion of Everbridge. A significant increase is anticipated with the aggressive outreach program. To make this system really effective, the City will actively pursue getting those residents with primary cell phone service signed up to the Everbridge system. This is a high priority for the City.

### *Emergency Operation Center Drills, Incident Activations, and Training*

#### *Establishment of the Emergency Management Team*

In October 2014, the City of Roseville established the Emergency Management Team, which is a standing committee, whose mission is to plan and prioritize emergency preparedness activities, training, and facilities of the City's Emergency Management Organization. The Emergency Management is comprised of at least one member of each City department and meets monthly to:

- Develop the organizational framework for implementation of the California Standardized Emergency Management System (SEMS) and the National Incident Management System (NIMS) within the City of Roseville.
- Ensure that each City department has the resources and training to function effectively in the roles outlined in the City's Emergency Operations Plan (EOP).
- Plan and develop a minimum of two Emergency Operations Center (EOC) exercises annually.
- Develop and maintain EOC facilities that provide an effective location to conduct EOC operations.
- Develop and maintain technology resources within the EOC necessary to gather and disseminate information effectively.

#### *Preseason Flood Coordination*

On October 30, 2014, City Floodplain Management staff presented the 2014-15 Preseason Flood Coordination and Severe Weather Plan Update to the City's Emergency Management Team. The update included information on the 2014-15 winter weather outlook from the Climate Prediction Center and an overview of the changes to the City's Flood Warning & Response Plan. The most significant change to the Flood Warning & Response Plan was the addition of a Floodwall & Levee Failure component to the Plan.

### *EOC Activation—Levee Failure Exercise*

On May 11, 2015, City Emergency Management staff conducted a four-hour EOC activation drill. This exercise was a full activation of the Emergency Management Organization, including Department Operations Centers (DOC). The exercise centered on a levee failure scenario, which included the flooding of an assisted living facility. This exercise emphasized the need for multiple Incident Actions Plans from various City departments.

### *Roseville Galleria Exercise*

On May 27, 2015 the Roseville and Rocklin Regional SWAT Team, Roseville Rapid Containment Team, Explosive Ordnance Disposal Team, Placer County Special Enforcement Team, FBI and Roseville Fire Department's Tactical Medics, conducted a full scale training exercise at the Roseville Galleria. This was the third straight year Roseville's Public Safety teams and the Galleria have come together for critical incident planning and response training. This year's exercise was designed to address responses to improvised explosive devices by Public Safety and Galleria personnel.

The drill required unified command for organizing and deploying resources, coordinated response to multiple threats, and the ability to establish inter-operable communications across the agencies. Each FBI Field Office across the country was required to conduct a similar drill in coordination with local resources and our city was selected by FBI-Sacramento to be the lead partner agency out of all of the cities in the Sacramento FBI Field Office which covers most of the Central Valley from Fresno up to Oregon. Our drill was the first drill conducted in the country under this training requirement and was monitored from FBI HQ in Washington DC.

### *MCI 2015—Countywide First Responder Exercise*

On June 17, 2015 the Roseville Police and Fire Department, Rocklin Fire, South Placer Fire, American Medical Response, the National Guard, the Officer of Emergency Services and the Sutter Roseville Medical Center all participated in a regional planning and training exercise at Sutter Roseville. The exercise was centered on a mock helicopter crash. Public Safety's planning and training objectives included the development of a unified command structure as identified by the Incident Command Structure as well as planning and response to security needs on the hospital's grounds.

### *Terrorism Threat Assessments*

On May 7, 2014 Roseville Police Department staff performed a threat assessment of Roseville Electric's Power Plant, consisting of a "real-world "vulnerability and site security test at that location with unsuspecting employees Electric personnel.

A similar terrorism threat assessment was conducted in October 2014 at the Civic Center as well as Roseville Fire Station #1. Locations for the threat assessment were expanded to include Fire Stations #2, #5, and #9. Roseville Police Department plans to conduct future assessments for Fire Stations #3 and #4 in July and August of 2015.

### *Community Preparedness Education*

In support of Homeland Security Presidential Directive/HSPD-8, the Sutter-Roseville Medical Center (SRMC) Emergency Preparedness Program rolled out the "Emergency Preparedness and You" community education program. This program focused on how individuals can be safe and prepared when disasters strike. A version of this program was also rolled-out to healthcare staff, to provide staff readiness and add resiliency. To date, the SRMC Emergency Preparedness Program has provided training for over two hundred students.

### *Reorganization of the Emergency Operations Center*

The City's Emergency Preparedness Manager, working closely with the Central Services and Information Technology—GIS staff, have revised the layout of the City's Emergency Operations Center, and have included new technology to assist with the presentation and dissemination of geographic information during an EOC activation. Computers with access to GIS data and overhead projector displays have replaced the use of ineffective Plexiglas-topped tables and grease pens to supplement Planning Section briefings within the EOC. The new technology also allows for better communication between the EOC and the City's Department Operation Centers, located throughout the City.

### *Department of Water Resources—Flood Fight Methods Training*

On March 18, 2015 State of California Department of Water Resources staff provided a one-day Flood Fight Methods training exercise for the City's Public Works—Street Maintenance and Park Maintenance—Open Space Division staff. The Flood Fight Methods training is designed to assist public agencies with the implementation of corrective temporary methods utilized while combatting flood-related problems. The training consisted of four hours of classroom presentation and an afternoon of instruction on the techniques used to construct various sandbag structures and erosion protection methods.

### *Sutter Roseville Medical Center (SRMC)*

Sutter Roseville Medical Center (SRMC) prides itself in the quality it provides in the realm of patient care and excelling above national standards and best practice. The **SRMC Emergency Preparedness Program** is no different. Disasters strike daily all over the globe. California is no exception. For the benefit of the staff, patients, visitors and the community and with the strong support of our leadership and the Emergency Preparedness Committee, SRMC continues on the ongoing journey of Emergency Preparedness and quality best practices. In the past year, SRMC has demonstrated the following in **Mitigation Success Stories** in Emergency Preparedness:

- **Master Exercise Practitioner (MEP) Certification:** The SRMC EP Coordinator completed the national level certification from FEMA/DHS as that of **Master Exercise Practitioner (MEP)**. With this this certifies that the coordinator has obtained and demonstrated competency in high level of disaster exercise design, from Table Top; functional and Full Scale Disaster Exercise. Due to the difficulty in being accepted into this program and the challenge of the program, as of now there are only 2,300 individuals certified with MEP in the country.
- **National Level Instructor Certification:** The SRMC EP Coordinator completed the national level certification from FEMA/DHS as that of a national level **Certified Instructor**. The course is conducted in two phases: fundamental principles and applied principle. During the fundamental principles phase participants receive an overview of adult learning, task analysis, risk and hazard analysis, learning objectives and lesson plans, communication skills, instructional delivery and multimedia, testing and evaluations, and after action reviews. Then, during the applied principles phase, participants put these lessons into practice through a series of practice training sessions. With this this certifies that the coordinator has obtained and demonstrated competency and the ability to interact and instruct adult learners.
- **Disaster Education:** Sutter Roseville Medical Center (SRMC) EP Program prides itself on education. Our education program for 2015 is holding 45 courses on Emergency Preparedness and has also worked with TEEX and FEMA for bringing their courses and staff here to teach as well. The EP Program coordinator had the honor of teaching a lecture at the FEMA National Training

Center in February of 2014 and March 2015 teaching lectures at the Emergency Nurse's Association (ENA) and Association of Critical Care Nurses (AACN) conference in April 2014 and July 2015. Annually in December, SRMC hosts the EMS-a-Palooza educational event at the facility. Speakers from all aspects of emergency care, from Trauma, Burns and Pediatrics, provide presentations to not only Sutter Health staff but all of our hospitals throughout the region and our EMS community partners. The Emergency Preparedness Program Coordinator for Sutter Roseville Medical Center which provided an in-depth lecture on lecture on **Active Shooter Response for EMS and Healthcare.**

- **Disaster Exercises:** Sutter Roseville Medical Center (SRMC) held 20 Disaster exercises in the past year. These exercises are based on the identified Risks from our annual Hazard Vulnerability Assessment (HVA). Some exercises worthy of note due to their exceptional Interagency Cooperation and Participation were:
  - **2014 Ebola Response Exercise:** This tested the facility's ability to manage victims infected by the Ebola Virus Disease. This drill assisted in the designing and development of the EVD Response Training Program for SRMC.
  - **2015 Helipad Emergency Response Blackhawk Crash Exercise:** As SRMC is the Primary Receiving facility for the Air National Guard with back country rescues, SRMC held a **two-day** Full Scale Exercise which tested our ability to manage not only a surge of victims from a massive earthquake caused landslide but also a crash onto the helipad of a Medical Blackhawk Helicopter. This exercise had the participation with Roseville Fire Department, Rocklin Fire Department, Roseville Police Department and the California Air National Guard.
- **Emergency Preparedness Development- Hospital Incident Command System (HICS) Update:** The SRMC Emergency Preparedness Coordinator was selected by the California Emergency Management Authority (EMSA) to be a member of the national level committee that assisted in the development and review of the Hospital Incident Command System 2014 Updates. These updates are utilized all across the country at hospitals for incident response.
- **Emergency Preparedness Development- Hazardous Materials and Decontamination for Healthcare Facilities Course Update:** The SRMC Emergency Preparedness Coordinator was selected by the California State Training Institute (CSTI) to be a member of the committee that assisted in the development and review of the Hazardous Materials and Decontamination for Healthcare Facilities 2014 Course updates. These updates are utilized all across the country at hospitals for hazardous materials incident response. Additionally, portions of the plan from SRMC in regards to Vulnerable Populations was included in the teaching materials as **Best Practice** examples.
- **Emergency Preparedness Development- Management of Aggressive Behavior (MAB) Program and Course Update:** The SRMC Emergency Preparedness Coordinator, with Regional Safety and Security, on management and development team for the new and updated Violence in the Workplace Training Course and Policy Development and representing Sutter Health at CalOSHA Meetings. This will ensure the facility and Sutter Health is compliant with HSC 1257.8 and 1257.9 and with the new AB 1299 and drafted potential changes that were submitted to Cal OSHA related to SB 1299.
- **Community Involvement- Placer County Emergency Medical Control Committee Chair:** The SRMC Emergency Preparedness Coordinator is the co-chair of the Placer County Emergency Medical Control Committee. In this role, the chair coordinates meetings with all responders from the Placer County Region and reviews and approves policies and procedures for the region.
- **Community Involvement-City of Roseville Police and Fire Safety Fair:** The SRMC Emergency Preparedness Coordinator partnered with the City of Roseville Police Department and the city of Roseville Fire Department for their Second Annual City of Roseville Police and Fire Safety Fair. In this SRMC EP Program and SRMC had a booth on Emergency Preparedness, Safety and the medical center itself. On this day, over 500 brochures, coloring books on safety and emergency preparedness

were handed out. Also, 300 Bike Safety Lights were handed out as well. Due to our active participation, the City of Roseville Police Department donated $500.00 back to our Foundation to be used for Trauma or emergency Services.

### *2014 Ebola Response*

Emerging Infectious diseases, such as the 2014 Ebola virus outbreak, can significantly impact the health and safety of the citizens of Roseville. With the outbreak being monitored for a potential spread to California, the Roseville Fire Department (RFD) worked cooperatively with its regional partners to develop operational procedures and to obtain the necessary equipment to respond safely if necessary. The RFD continues to be proactive with its regional partners on training, protective equipment and is prepared to respond to an Ebola outbreak, or any other emerging infectious disease.

### *Oil Train Response Plan*

The City of Roseville is situated in a rail corridor that connects the Sierra Nevada Mountains to the San Francisco Bay. With the increased production of crude oil in North America, shipments have increased in recent years with the commodity currently traveling through the City of Roseville. The Roseville Fire Department (RFD) working with cooperating agencies throughout Placer and Nevada Counties developed an operational plan to respond to a rail emergency involving crude oil transport. The plan is maintained by the county of Placer Office of Emergency Services and is incorporated in regional training exercises.

## Review of the Action Plan

This section reviews the action plan and lists the status of each initiative from the hazard mitigation plan, grouped by the agency or department responsible for its completion. The action plan matrix in Table 2 provides the following information:

- Initiative number and brief summary; initiative numbers are coded by hazard type as follows:
  - DF = dam failure
  - D = drought
  - EQ = earthquake
  - F = flood
  - HC = human-caused hazards
  - HH = human health hazards
  - LS = landslides
  - SW = severe weather
  - WF = wildland fire
  - MH = multiple hazards
- Indication of whether any action has been taken
- Current timeline
- Indication of whether the project priority has changed
- Status (complete, ongoing or no progress)
- Comments, including the following information:
  - Was any element of the initiative carried out during the reporting period?
  - If no action was completed, why?
  - Is the timeline for implementation for the initiative still appropriate?
  - If the initiative was completed, does it need to be changed or removed from the action plan?

Part 4 of the plan provides detailed descriptions of each initiative and the prioritization process.

**TABLE 2.**
**ACTION PLAN MATRIX**

| Action Taken? | Timeline | Priority Changed? | Comment (Describe progress or changed priority) | Status |
|---|---|---|---|---|
| **Central Services Department Initiatives** | | | | |
| Initiative #F-21—Retrofit the city's Downtown library by sealing the exterior and installing a flood door to protect against flood damage should Dry Creek overspill the existing floodwall. | | | | |
| No | Long Term | No | No action was completed on this initiative during the reporting period. Priority and time line remain as assigned. Project priority should be changed to medium and time line should be cahnged to long-term pendiong the indentification of funding for this project. | No Progress |
| **City Council Initiatives** | | | | |
| Initiative #HC-3—Seek to establish appropriate staffing levels of public safety personnel to address vulnerabilities identified. | | | | |
| Yes | Short Term | No | The Police and Fire Chiefs meet quarterly with the City Manager to discuss staffing levels and needs based on current trends, population growth, and calls for service.<br>The Police Department Completed a "Request for Proposals," titled, Roseville Police Department Staffing Study. This RFP requested a professional, independent firm to assess the adequacy of current staffing levels for both sworn and non-sworn staff in the police department, and a sound methodology to project future staffing. Police and City Attorney staff reviewed the submittals and conducted interviews. The PD selected Matrix Consulting to complete the Staffing Study, which was approved by the City Council in October, 2015. The study is scheduled to commence in November, 2015. | Ongoing |
| **City Manager's Office Initiatives** | | | | |
| Initiative #HH-3—Collaborate with the Placer County Mosquito Abatement District to review resource protection policies that conflict with human health protection in the City of Roseville and work to resolve these policy issues | | | | |
| Yes | Short Term | No | The Placer Mosquito Abatement District and Roseville Environmental Coordinator is working together to both protect open space and wetland areas while limiting the amount of habitat for mosquitoes and vectors. | Ongoing |
| **Public Affairs & Communications Department Initiatives** | | | | |
| Initiative #HH-2—Support the public education efforts of the Placer County Health Department and the Placer Mosquito Abatement District | | | | |
| Yes | Short Term | No | The City supports the public education efforts of the Health Department and Mosquito Abatement District through print, government access television, social media channels, and web materials. The City has also had significant assistance from the District on public outreach efforts for rodent control through presentations at neighborhood meetings.<br>The Placer Mosquito Abatement District purchased a building in Roseville at 2021 Opportunity Drive and moved a majority of the operations to Roseville. This will enhance the availability of resources in closer proximity to Roseville residents and the mosquito-breeding areas west of Roseville. | Ongoing |

| TABLE 2. ACTION PLAN MATRIX | | | | |
|---|---|---|---|---|
| Action Taken? | Timeline | Priority Changed? | Comment (Describe progress or changed priority) | Status |
| Initiative #MH-2—Continue to maintain the hazard mitigation page on City website that provides following types of information:<br>• The Hazard Management Plan and its progress reports<br>• Hazard-specific information<br>• Mitigation information by hazard, with specific emphasis on private property<br>• Emergency response and warning information<br>• Links to county, state, and federal related agencies | | | | |
| Yes | Short Term | No | This is an on-going action. The City continues to maintain its website as specified in the plan maintenance section of the plan. The website can be viewed at:<br>http://www.roseville.ca.us/fire/preparedness/hazard_mitigation_plan.asp | Ongoing |
| **Development Services Department Initiatives** | | | | |
| Initiative #EQ-1—Perform building-specific, structural seismic vulnerability assessment of City- owned critical facilities constructed prior to 1980 (including infrastructure). Included in this assessment will be recommended mitigation alternatives that meet goals and objectives of this plan. | | | | |
| No | Long Term | Yes | Major construction on any city-owned building would require an assessment of the seismic vulnerability. The City will be applying for a Planning Grant under FEMA's various Hazard Mitigation Grant programs. This initiative will be included in the scope of work for updating the risk assessment to the plan. Priority should be changed to medium while timeline should be changed to long-term | No Progress |
| Initiative #EQ-2—Incorporate earthquake mitigation measures for private property into existing City-sponsored outreach programs such as printed media and the City's website. | | | | |
| Yes | Short Term | No | The California Building Officials (CALBO) website has consumer web pages and one in particular regarding Seismic Safety. The site will be upgraded and improved over time with more value to the average consumer regarding measures to improve earthquake safety. | Ongoing |
| Initiative #EQ-3—Reassess the overall vulnerability to the earthquake hazard using the best available science and technology as it becomes available. State-sponsored programs, Seismic Hazards Mapping Act, and future FEMA-sponsored initiatives are anticipated to create a wealth of knowledge regarding this hazard that did not exist during the preparation of this plan. | | | | |
| Yes | Short Term | No | Council has updated the maps for the Roseville area. The Public Works Department and Building Division anticipate review and implementation of the new mapping in conjunction with the International Building Council in 2008. The seismic risk assessment of the plan was updated using FEMA's enhanced HAZUS model (MR04) during the plan update process. The 2010 California Building Code based upon the International Building Code has been adopted by the City. | Ongoing |

**TABLE 2.**
**ACTION PLAN MATRIX**

| Action Taken? | Timeline | Priority Changed? | Comment (Describe progress or changed priority) | Status |
|---|---|---|---|---|
| Initiative #F-1—The City shall designate all areas identified as the 100-year floodplain. The boundaries of the 100-year floodplain shall be as specified in the floodplain designations section of this component of the city's general plan. Floodplain areas shall be preserved as specified in the open space and conservation element. Such preservation may include required dedication to the City. If needed, modify the City's ordinances to include floodplain use regulations consistent with the goals, policies, and implementation measures of the safety, land use, open space and conservation, and parks and recreation elements of the City's general plan. | | | | |
| Yes | Long Term | No | The city continued to implement its ongoing protocols and standard for identifying, mapping, and preserving the 100 yr floodplain during this reporting period. This initiative will continue to be implemented on an on-going basis, with a high priority. To comply with the new state Urban Level of Flood Protection, the City has contracted with a qualified engineering firm to determine the 200-year water surface elevation for the City's streams and areas that could potentially be inundated with 3 feet or more of floodwater during a 200-yr storm event. | Ongoing |
| Initiative #F-2—Refer any development proposal that has a direct or indirect impact on flood protection to Public Works for comment. In addition, forward such proposals to other agencies as applicable, including the U.S. Army Corps of Engineers, California Central Valley Flood Protection Board, FEMA, California Department of Fish and Game, Placer County Resource Conservation District, and Placer County Flood Control District. Consider the comments of the agencies during the development review process. | | | | |
| Yes | Short Term | No | The city continued to implement its ongoing protocols and standard for reviewing flooding impacts that may be caused by new developments and forward such developments to other agencies as applicable during this reporting period. This initiative will continue to be implemented on an ongoing basis, with a high priority. The PCFCD has completed a region-wide update of the Dry Creek Watershed Flood Control Plan in November 2011. | Ongoing |
| Initiative #F-9—Ensure that future specific plans and specific plan amendments are consistent with the goals and policies of the general plan. The specific plans shall include the designation and preservation of floodplain areas and adjacent habitat. Provisions shall be incorporated to ensure that public infrastructure, utilities, and emergency services remain functional during flood conditions. Such infrastructure and facilities include water, sewer and gas mains, telephone and electric lines, streets and bridges, hospitals, and fire and police stations. Financing mechanisms shall be explored to fund necessary flood protection improvements and maintenance. Development agreements may be used to secure implementation and funding provisions. (Specific plans have 100% cost recovery by developers). | | | | |
| Yes | Long Term | No | The city continued to implement its protocols and standard for reviewing proposed public infrastructure, utilities, and other emergency services so that they would remain functional during flood during this reporting period. This initiative will continue to be implemented on an ongoing basis, with a high priority. The Sierra Vista and Creekview Specific Plans were adopted by the City. The Amoruso Ranch and Placer Ranch Specific Plans are currently begin processed. The areas designated as floodplain and/or natural resource conservation areas will be preserved as permanent open space, consistent with General Plan policy and this action item. | Ongoing |

| TABLE 2. ACTION PLAN MATRIX | | | | |
|---|---|---|---|---|
| Action Taken? | Timeline | Priority Changed? | Comment (Describe progress or changed priority) | Status |
| Initiative #F-11—Require a master drainage plan as part of the approval process for all specific plans and large development projects as determined by the Public Works director. The master drainage plan should consider cumulative regional drainage and flooding mitigation. The plan's intent is to ensure that the overall rate of runoff from a project does not exceed predevelopment levels. If necessary, this objective shall be achieved by incorporating run-off control measures to minimize peak flows and/or assistance in financing or otherwise implementing comprehensive drainage plans. | | | | |
| Yes | Long Term | No | Master Drainage plans and flood studies have been prepared for the Sierra Vista and Creekview Specific Planning areas. The City is working with developers to prepare these studies for the Amoruso Ranch and Placer Ranch Specific Plans. The priority and timeline for this initiative will remain as assigned | Ongoing |
| Initiative #LS-2— Continue to implement policies adopted by the general plan that promote open space land uses within identified steep slope areas of Roseville. The City of Roseville Northeast Roseville Specific Plan and Stoneridge Specific Plans include the identified steep slope areas within Roseville. Both plan areas have continuing development. | | | | |
| Yes | Short Term | No | The City of Roseville Northeast Roseville Specific Plan and Stoneridge Specific Plans include the identified steep slope areas within Roseville. Both plan areas have continuing development. When individual projects are submitted, for example a housing development along a ravine in the Stoneridge area, all City development departments and the Fire Department enforce the General Plan, Specific Plan, City construction standards and individual project conditions to protect the steep slope open space that is dedicated to the City as part of the final maps for the projects. | Ongoing |
| Initiative #MH-1—Continue to maintain Office of Emergency Services certification of all City inspectors for post-disaster damage assessment. | | | | |
| Yes | Short Term | No | All building inspectors are certified by the Office of Emergency Services and have been recertified this year. The Building Division will continue to make sure staff keeps their certifications updated and that the certifications are documented per the International Accreditation requirements. | Ongoing |

**TABLE 2.**
**ACTION PLAN MATRIX**

| Action Taken? | Timeline | Priority Changed? | Comment (Describe progress or changed priority) | Status |
|---|---|---|---|---|
| **Environmental Utilities Department Initiatives** | | | | |
| Initiative #D-1—Perform a groundwater recharge feasibility study to determine the most cost-effective way to replenish groundwater resources within Roseville. | | | | |
| Yes | Long Term | No | The City completed a program-wide Environmental Impact Report review under the California Environmental Quality Act requirements. The Environmental Impact Report was adopted by the City Council on March 21, 2012. The City received an operating permit from the State Water Quality Control Board in 2012. The City has implemented this action by injecting excess treated surface water into two existing wells in 2013 and is constructing two additional groundwater wells with partial grant funding by the California Department of Water Resources. A long term ASR operations plan is being developed. The City is also the lead agency within the Western Placer Groundwater Management Plan area. | Ongoing |
| Initiative #D-2—Implement aquifer storage and recovery program that uses direct injection technique in areas identified as appropriate. | | | | |
| Yes | Long Term | No | EU has implemented this action by injecting treated drinking water into two wells in early 2013. Two more wells will be completed in 2014 to increase the injection capabilities, and a long term ASR operations plan is being developed. | Ongoing |
| Initiative #D-3—Continue to implement the Environmental Utility Department's recycled water program and seek all opportunities to expand its coverage, currently focusing on urban growth areas. The City pumps recycled water through a system of purple pipes completely separate from potable (drinking water) pipes. The City pumps the recycled water to customers such as streetscapes, golf courses and parks, where it irrigates turf and shrubs. Using recycled water for uses such as landscape irrigation reduces demand on the potable water system, creating a more reliable water supply for the entire City. Recycled water is not subject to the effects of drought. | | | | |
| Yes | Short Term | No | A Water Recycling Master Plan has been developed and is being implemented. This includes expanding recycled water in the region as well as finding opportunities in the existing service areas. Recycled water is considered as a resource in all new development areas being considered. | Ongoing |
| Initiative #D-4—Promote active water conservation techniques and strategies to private property owners through Roseville-sponsored outreach projects such as printed media and the City's website. | | | | |
| Yes | Short Term | No | Conservation efforts are an ongoing initiative of the Water Division and have been increased and accelerated in all areas due to the unprecedented drought conditions facing the state. | Ongoing |
| Initiative #F-19—Set back and raise the sewer ponds levees at the Dry Creek Sewer Plant so raw sewage will not enter Dry Creek. | | | | |
| Yes | Short Term | No | The construction of the Dry Creek Wastewater Treatment Plan Levee Relocation Project was completed in November 2011. | Complete |

| TABLE 2.<br>ACTION PLAN MATRIX | | | | |
|---|---|---|---|---|
| Action Taken? | Timeline | Priority Changed? | Comment (Describe progress or changed priority) | Status |
| Initiative #HC-5—Address vulnerabilities identified in vulnerability assessment of water facilities performed by the Environmental Utilities Department in response to EPA initiative. | | | | |
| Yes | Long Term | No | A Water System Security CIP was completed several years ago by the Environmental Utilities Department and continues to be updated as new facilities come on line. The project enhanced the physical security of water facilities with video monitoring and access control. Timeline for this initiative has been changed from long-term to on-going. | Ongoing |
| Initiative #SW-5—Enhance and implement strategies for debris management and removal during severe weather events. | | | | |
| Yes | Short Term | No | No change in the debris management and removal strategy that adopted in 2009. The Parks and Open Space Divisions implemented an Emergency action plan for storm situations. The Open Space Division Department purchased a new bucket truck this fiscal year that aids in the removal of hazardous and storm damaged trees. | Ongoing |
| **Information Technology Department Initiatives** | | | | |
| Initiative #HC-9—Protect the city's data, technology infrastructure and staff against malicious cyber-attacks and Cyber terrorism, such as but not limited to:<br>• Identity Theft<br>• Virus/Malware/Spyware/Spam<br>• Network and system attacks<br>• Web site hacking<br>• Denial-of-service attacks | | | | |
| Yes | Short Term | No | The Information Technology Department uses several strategies and technologies to combat Cyber-attacks including:<br>• Anti-phishing capability<br>• Internet content filtering<br>• PCI-DSS compliance<br>• Virus, malware, spyware and spam scanning<br>• Perimeter firewalls report and prevent intrusions<br>• Secure authentication<br>• Encryption<br>• EOC Cyber Security Incident Exercises | Ongoing |

| TABLE 2. ACTION PLAN MATRIX | | | | |
|---|---|---|---|---|
| Action Taken? | Timeline | Priority Changed? | Comment (Describe progress or changed priority) | Status |
| Initiative #MH-7—Strive to maintain high availability of essential communication services | | | | |
| Yes | Short Term | No | For the Communication and Information Systems:<br>The city has multiple, fully functional data centers which provide redundant hardware infrastructure. In the event of an extended outage; procedures are in place to restore essential communication and information services. The city's primary radio system has redundant components throughout. In addition the Police and Fire departments have alternative and independent systems in case the primary system fails.<br>One of the current production data centers is scheduled to be relocated at the end of the 2016 calendar year. This move will reduce the risk of flooding as it moves the critical technology infrastructure further away from the nearby creek.<br>The City is at present, working on an enterprise wide Business Impact Analysis study. This report will look at all information systems and services to evaluate and rank the level of impact to the City. This Business Impact Analysis report will be the primary input to developing a revised, more comprehensive Disaster Recovery/Business Continuity Plan. | Ongoing |
| Initiative #MH-8—Secure the city's physical locations that contain technology infrastructure | | | | |
| Yes | Short Term | No | Both of the cities data centers are armed with perimeter alarm systems and internal and external security cameras. Also access to these sites is restricted to a limited number of city employees. In addition, vendors and visitors will be required to sign in and be escorted. | Ongoing |
| **Parks and Recreation Department Open Space Division Initiatives** | | | | |
| Initiative #F-12—Continue the Parks and Recreation Department's regular creek maintenance program within the City's creeks and floodplain areas. This program clears and removes debris that could contribute to blockage and flooding and may include the removal of silt. This is only done in areas of high risk to flood damage or where property or facilities are threatened by flooding. | | | | |
| Yes | Long Term | No | The city continued to implement its ongoing protocol of inspecting and maintaining its creeks and streams during the reporting period. The Department of Fish and Wildlife executed a five-year Routine Maintenance Agreement with the City in April 2010 for work that is ongoing this summer. During the reporting period, the City of Roseville worked with the Placer County Resource Conservation District to remove Red Sesbania from stream segments within the Dry Creek basin. This initiative will continue to be implemented on an ongoing basis, with a higb priority. The City will continue to seek grant funding opportunities from FEMA and state agencies, when available, to assist in funding Arundo eradication along infested stream channels in the Dry Creek watershed. | Ongoing |

**TABLE 2.**
**ACTION PLAN MATRIX**

| Action Taken? | Timeline | Priority Changed? | Comment (Describe progress or changed priority) | Status |
|---|---|---|---|---|
| Initiative #F-22—Continue the Tree Mitigation Fund program administered by the Open Space Division in conjunction with non-profit organizations. The planting of oak trees in the open spaces adjacent to riparian zones increases infiltration and slows storm water surges. | | | | |
| Yes | Short Term | No | The Tree Mitigation program for native oak woodland restoration uses oak mitigation funds for projects in the open spaces. Over 7000 trees have been planted to date. | Ongoing |
| Initiative #F-23—Manage beaver dam sites for flood control protection and habitat restoration after dam removal. One primary issue is impacts to floodwater capacity of creeks. Part of the desired comprehensive approach to beaver management includes establishment of quantitative and qualitative “carrying capacity,” including acre-feet of flood capacity lost. Implement a standard monitoring and reporting process to track beaver dam locations, population, and impacts. Gain regulatory approval for beaver management techniques such as biological control and habitat manipulation using the most benign options first. | | | | |
| Yes | Short Term | No | The Park Maintenance—Open Space Division continues to use a Geographical Information Systems (GIS) database for tracking beaver dam locations and coordinates beaver removal per the City’s Beaver Management Policy and Nuisance Abatement Ordinance. | Ongoing |
| Initiative #WF-2—Continue “Goat Grazing” program for removal of grassland in areas of Roseville potentially vulnerable to wildfire. Implement goat grazing in City open space and preserve areas for fire and invasive plant species management and native plant restoration. | | | | |
| Yes | Short Term | No | The Fire Department and the Open Space Division continue working together to implement a goat grazing program. Approximately 400 goats have been utilized for the grazing of open space preserves. Goats provide an innovative, environmentally sensitive way to reduce fire fuel load by keeping open space vegetation under control. Projects completed in 2012-2013 include the open space area located east of Dry Creek near Lincoln Estates to Linda Creek. Grazing reduces fuel load by removing thatch and thinning woody plants and also removes non-native vegetation. | Ongoing |
| Initiative #MH-4—Implement an “Adopt an Open Space” program in coordination with the open space management program. Develop “adoption contracts” with neighborhoods, organizations, businesses, etc., describing the level of stewardship and the terms of the “adoption.” Publicize these activities through online resource directory and other media to encourage participation. | | | | |
| Yes | Long Term | No | During the reporting period, the City has implemented an “Adopt a Creek” program. The Adopt a Creek program is administered by the City’s Park Maintenance—Open Space Division. The City publicizes the program at the following website: http://www.roseville.ca.us/eu/stormwater_management/public_involvement_opportunities.asp | Ongoing |

**TABLE 2.**
**ACTION PLAN MATRIX**

| Action Taken? | Timeline | Priority Changed? | Comment (Describe progress or changed priority) | Status |
|---|---|---|---|---|
| Initiative #MH-5—Develop and disseminate best practices information to private property owners whose land is adjacent to open space areas describing stewardship opportunities and owners' role in preserving beneficial uses of open space areas (including vernal pool grassland and creek or riparian uses). Offer classes to provide in-depth information, such as demonstration projects, techniques for ecologically friendly weed abatement and vegetation control, and creating a backyard habitat compatible with open space areas. | | | | |
| No | Short Term | Yes | No actions towards the completion of this initiative were completed during the reporting period. This will continue to be a short-term initiative with a high priority pending funding. | No Progress |
| Initiative #MH-6—Work with the Roseville City School District, local high school districts, and non-profit organizations to promote ecology-oriented curricula and stewardship activities. Identify resource and administrative barriers that may be limiting schools' abilities to more actively participate in stewardship, and work collaboratively to identify solutions. | | | | |
| No | Short Term | No | No actions towards the completion of this initiative were completed during the reporting period. This will continue to be an ongoing initiative with a medium priority pending funding. | No Progress |
| **Police and Fire Department Initiatives** | | | | |
| Initiative #DF-1—Create a dam failure element for the City's emergency response plan that includes a phased warning protocol in response to the findings of the Folsom Dam Containment Dike Risk Assessment. | | | | |
| Yes | Short Term | Yes | The City of Roseville and the Placer County Office of Emergency Services has obtained a grant from the California Department of Water Resources to fund revisions to the City's and County's Dam Failure Emergency Response Plan under the DWR Flood Emergency Response Project grant program. The funding will assist in creating a dam failure element in the City's Emergency Response Plan during the next year. | Ongoing |
| Initiative #F-20—Implement recommendation of Downtown Roseville Specific Plan to relocate the Public safety Building | | | | |
| Yes | Short Term | No | The City plans to grade the parking lot and building pad for the future relocation of Fire Station #1 in 2014. The fire station will be relocated from it's current location at the intersection of Oak Street and Grant Street to the intersection of Oak Street and Lincoln Street. Building construction is planned to begin in 2015. | Ongoing |
| Initiative #HC-1—Commit support to Sacramento Urban Area Security Initiative; continue to seek funding from other federal sources to fund its initiatives | | | | |
| Yes | Short Term | No | Roseville hosts various training courses designed to support the regional Urban Areas Security Initiative (UASI) program. The City hosts a lot of classes for the UASI and they provide us with free seats in the classes in return. The Fire Chief continues to participate on the Joint<br><br>Terrorism task Force Executive Committee (JTTF). The Police Department continues to support and participate in the Joint Terrorism Task Force by having three officers identified as liaisons to the Sacramento Regional Threat Assessment Center (SacRTAC). These officers communicate with the SacRTAC and disseminate security unclassified information to Roseville officers. | Ongoing |

**TABLE 2.**
**ACTION PLAN MATRIX**

| Action Taken? | Timeline | Priority Changed? | Comment (Describe progress or changed priority) | Status |
|---|---|---|---|---|
| Initiative #HC-2—Enhance emergency response capability of City by contingency planning for specific events based on identified vulnerabilities. | | | | |
| Yes | Short Term | No | The Fire Department's Hazmat Team has completed one Type I recertification since 2006 and is currently in the process of going through another one right now.<br>The City's Training Division has determined that all new employees who are required to have the basic and intermediate level of ICS training (ICS 100, 200, 700, 800) obtain training and certification through FEMA's Online Emergency Management Institute's Independent Study program. Certificates are provided at the completion of the courses, and maintained in the form of individual transcripts by FEMA. Audits for compliance are completed by the training division annually.<br>Those employees required to have advanced level ICS courses (ICS 300, 400) have been identified by the City's Training Division based on NIMS requirements. ICS 300-400 training is provided annually in multiple 16-hour blocks.<br>The FEMA exercise mandates have been meet and exceeded. In October of 2009, the H1N1 virus EOC activation was completed and included the activation of a South Placer Point of Distribution (POD) for the H1N1 virus vaccination. In May of 2010, the EOC was activated for the "MCI 2010 Homeland Security Exercise" comprising of the cities of Roseville, Rocklin and surrounding jurisdictions. In 2011, the City participated in the "Golden Guardian" full scale exercise that was hosted by California Emergency Management Agency (CalEMA). This scenario centered on a catastrophic release of Folsom Lake due to a dam failure. In 2012 the EOC staff conducted an enhanced tabletop exercise that practiced Continuity of Operations Plans (COOP). The exercise scenario included a major explosion of a natural gas main in the Civic Center area. Again in 2012, the city participated and hosted the "MCI 2012 Homeland Security Exercise" that included a major chemical release with a fast moving vapor cloud into neighboring jurisdictions. This was a full scale exercise with a complete activation of the entire EOC staff. | Ongoing |
| Initiative #HC-4—Prepare a site-specific vulnerability assessment of City- owned critical facilities that use the best available science and technology with regards to human-caused hazards. | | | | |
| Yes | Short Term | No | Through the California Emergency Management Agency, Critical Infrastructure Protection Section and the 2008 Buffer Zone Protection Program, an assessment of the Sutter Roseville Medical Center was conducted. While SRMC is not city-owned, it is designated the City's medical provider. | Ongoing |

**TABLE 2.**
**ACTION PLAN MATRIX**

| Action Taken? | Timeline | Priority Changed? | Comment (Describe progress or changed priority) | Status |
|---|---|---|---|---|
| Initiative #HH-1—Continue to collaborate with the Placer County Health Department to ensure the health and welfare of the community | | | | |
| Yes | Short Term | No | The City Manager's Office, Fire Department, and Communications Division collaborate with the Placer County Health Department on issues that affect the health and welfare of Roseville residents and visitors. | Ongoing |
| Initiative #SW-4—Continue education/outreach programs to improve winter preparedness and minimize loss of life or injury. | | | | |
| Yes | Short Term | No | Educational materials are included on the city's web site on an ongoing basis, as well as a weekly tip sheet sent to all local media (print/broadcast). Web content is available to any viewer with a personal computer and Internet access. Typically there is also at least one city-authored column in the Roseville Press-Tribune on this topic per year—which reaches 40,000 readers. | Ongoing |
| Initiative #WF-3—Enhance existing City public outreach programs to include information on fire safety, defensible spaces, and areas of concern. | | | | |
| Yes | Short Term | No | The Fire Department continually evaluates the efficiency and effectiveness of its public education programs. Comparison with other accredited fire agencies reveals that our performance standards meet those of other agencies. Outreach efforts include seasonal safety messages through the media and City website. Public education programs have been reduced, with the primary focus being assembly type presentations at several elementary schools.<br>The fire department has taken an active role in the Neighborhood Association Meetings by having the on-duty staff to attend when possible. This allows the department to update it's citizens on various services and programs, as well as allows the citizens to voice any questions or concerns they have. | Ongoing |
| Initiative #MH-3—Establish/maintain a post-disaster action plan to be part of the City Emergency operations plan that will include following elements:<br>• Procedures for public information<br>• Post-disaster damage assessment<br>• Grant writing<br>• Code enforcement<br>• Redundant operations | | | | |
| No | Short Term | No | No action was taken on this initiative during the reporting period. The City is still committed to completing this action in the performance period of the plan. However, the City will pursue grants to complete this task. | No Progress |

**TABLE 2.**
**ACTION PLAN MATRIX**

| Action Taken? | Timeline | Priority Changed? | Comment (Describe progress or changed priority) | Status |
|---|---|---|---|---|
| **Public Works Department Initiatives** | | | | |
| Initiative #F-3—Continue City participation in the National Flood Insurance Program and the Community Rating System (CRS). Seek CRS classification improvements within capabilities of City programs, including adoption and administration of FEMA-approved ordinances and flood insurance rate maps (FIRM). | | | | |
| Yes | Short Term | No | The City of Roseville continued to participate in the CRS program, and re-certified its participation during the reporting period. The City's CRS Class I classification became effective on October 1, 2006. Flood Insurance policy holders within the City for property owners in flood areas will receive up to a 45% premium reduction based on the classification. Roseville is the first and only CRS Class 1 community in the nation. This initiative will continue to be implemented on an ongoing basis, with a high priority. The City has maintained its Class 1 rating through the reporting period. | Ongoing |
| Initiative #F-4—Maintain Roseville's compliance and good standing under the National Flood Insurance program. | | | | |
| Yes | Short Term | No | A Community Assistance Visit (CAV) was last performed on the City of Roseville on November 1, 2011. The CAV is the principle means by which FEMA monitors a community's NFIP compliance. This CAV found that the City was in full compliance and in is in good standing under the NFIP. | Ongoing |
| Initiative #F-5—Continue the City's outreach program to flood-prone property owners and the citizens of Roseville, to help make them aware of the flood threat and how best to deal with them. | | | | |
| Yes | Short Term | No | This is an on-going action that is a part of the City's CRS program. | Ongoing |
| Initiative #F-6—Continue to pursue a regional approach to flood issues by remaining actively involved in the Placer County Flood Control District. This involvement includes cooperation in the development of a comprehensive regional database. Continue to participate in regional flooding studies, including the Auburn Creek/Coon Creek/Pleasant Grove Creek flood mitigation plan and the Dry Creek watershed flood control plan. | | | | |
| Yes | Long Term | No | The City continued to be actively involved in the Placer County Flood Control District (PCFCD) and participate in regional flooding studies during this reporting period. Staff from the Floodplain Management Division attends the meetings on a monthly basis and a Councilmember serves on the District Board. The PCFCD is developing the Antelope Creek Flood Control Project, which is a regional flood control project, located within the City of Roseville. City staff will be assisting the PCFCD with the development and construction of the regional flood control project, scheduled for construction in 2015. This initiative will continue to be implemented on an ongoing basis, with a high priority. | Ongoing |

| TABLE 2. ACTION PLAN MATRIX | | | | |
|---|---|---|---|---|
| Action Taken? | Timeline | Priority Changed? | Comment (Describe progress or changed priority) | Status |
| Initiative #F-7—Continue City coordination with other agencies on issues of flood control. Coordination between the City and adjacent jurisdictions occurs through several mechanisms, including distribution of development proposals for review and comment. Continue City cooperation with federal, state, and local agencies, including the U.S. Army Corps of Engineers, California Central Valley Flood Protection Board, FEMA, California Department of Fish and Game, Placer County Resource Conservation District, and the Placer County Flood Control District. | | | | |
| Yes | Short Term | No | The City continued to coordinate with other outside agencies on issues of flood control during this reporting period. The coordination typically occurs on a project-by-project basis and agencies are included in the meetings based on their particular jurisdiction or expertise. This initiative will continue to be implemented on an on-going basis, with a high priority. The City is also actively involved with the State's new Flood-Safe program. | Ongoing |
| Initiative #F-8—Continue to develop, implement, and expand the Flood Alert and Early Warning Program systems and integrate the systems with other local jurisdictions to form a regional warning program. | | | | |
| Yes | Long Term | No | The City continues to develop, implement, and expand the Flood Alert system. New "ALERT" software was installed and the Flood Warning web site was updated. Durig the reporting period, the City and the Placer County Flood Control District applied a State Department of Water Resources Flood Emergency Response Projects grant to upgrade the Flood Alert System data transmission system to the "ALERT-2" protocol. While the grant application was not sucessful during the current grant cycle, the City and PCFCD will apply for funding in future grant cycles. This initiative will continue to be implemented on an ongoing basis with a high priority. | Ongoing |
| Initiative #F-10—Monitor and regularly update City flood studies, modeling, and associated land use, zoning, and other development regulations at a minimum of every 5 years or whenever information becomes available that would significantly modify previous data. New information could include new studies, change in City policy, consideration of a major development project or specific plan, or implementation of a flood control project. | | | | |
| Yes | Long Term | No | The City has updated the Pleasant Grove Creek flood studies. The City also participated with the 2011 update to PCFCD's Dry Creek flood study. The studies have also determined the 200-year WSE to comply with the implementation of the Urban Level of Flood Protection criteria. The priority and timeline for this initiative will remain as assigned. | Ongoing |
| Initiative #F-13—Continue annual inspection and maintenance program of City storm drain systems. Review after every major storm system function and performance. This program removes debris that could contribute to blockage of the storm drain system. | | | | |
| Yes | Short Term | No | The City continued to implement its ongoing protocol of inspecting and maintaining its storm drain system during the reporting period. This initiative will continue to be implemented on an ongoing basis with a high priority. | Ongoing |

**TABLE 2.**
**ACTION PLAN MATRIX**

| Action Taken? | Timeline | Priority Changed? | Comment (Describe progress or changed priority) | Status |
|---|---|---|---|---|
| Initiative #F-14—Complete the final two phases of the Cirby/Linda/Dry Creek flood control project (Phase 1 and 2). Five of the seven phases of this project have been completed at a cost of about $18,000,000. The basis for determining viability of this project will be a benefit /cost analysis to determine if project meets federal grant eligibility requirements. | | | | |
| No | Long Term | No | No actions towards the completion of this initiative were completed during the reporting period. This will continue to be a long-term initiative with a low priority pending funding. | No Progress |
| Initiative #F-15—Analyze alternative improvements to the Cirby/Linda/Dry Creek flood control project that may be cost effective in the flood-prone areas of Roseville:<br>• Dry Creek from Darling Way to Riverside Avenue<br>• Area on Dry Creek upstream of Folsom Road in the Columbia Avenue/Marilyn Avenue/Bonita Street area<br>• Linda Creek near Champion Oaks Drive/Samoa Way/Hurst Way area<br>• Cirby Creek in the Trimble Way/Zien Court area | | | | |
| No | Long Term | No | No actions towards the completion of this initiative were completed during the reporting period. This will continue to be a long-term initiative with a low priority pending funding. The City continues to pursue opportunities to acquire flood prone properties and remove them from the floodplain as a viable alternative to structural flood control. | No Progress |
| Initiative #F-16—Replace the Huntington Drive/Cirby Creek culvert with a bridge to protect Queens Court/Huntington Drive area. The Public Works Department oversees this project. | | | | |
| No | Long Term | Yes | The City is continuing to research grants that may be available for this project. The City has the 25% match for the project. The priority for this project has been changed to medium and the time line has been changed to long term pending the identification of funding for this project. | No Progress |
| Initiative #F-17—Divert the main drainage storm drain system down Crestmont Avenue to Cirby Way and then into Dry Creek so that the existing system will not exceed capacity. If system capacity is exceeded, the intersection on Cirby Way and Crestmont Avenue and nearby homes will flood during major flood events. | | | | |
| Yes | Short Term | No | Funds were allocated for this initiative in the 07/08 capital improvements budget but were diverted to fix a culvert on Atlantic Street in downtown Roseville rather than replacing this culvert. A portion of the project, consisting of the 48-inch outfall into Linda Creek and the storm drain pipe crossing South Cirby Way at the intersection of Piedmont Way, was constructed in 2010. The priority and timeline for this initiative will remain as assigned. Funding was replaced with the approval of the FY 2011/12 budget. | Ongoing |
| Initiative #F-18—Continue to promote and sponsor programs to buy out, relocate, and flood-proof existing flood-prone structures within Roseville. | | | | |
| Yes | Short Term | No | The City will continue to pursue the acquisition of additional target properties with a high priority. The City has targeted the property on Riverside Dr for grant funding under the FY-2013 HMA grant cycle. Completion of this project will be contngent upon grant award. | Ongoing |

| TABLE 2.<br>ACTION PLAN MATRIX | | | | |
|---|---|---|---|---|
| Action Taken? | Timeline | Priority Changed? | Comment (Describe progress or changed priority) | Status |
| Initiative #LS-1—Once California Geological Survey completes soils mapping for the Roseville vicinity under the Seismic Hazards Mapping Act, reassess landslide hazard using best available data to gauge the true vulnerability to this hazard. | | | | |
| No | Long Term | No | There was no mapping performed by CAGS in the Roseville vicinity under the Seismic Hazards Mapping Act during the reporting period. Time line and priority for this project will remain unchanged, pending action by CAGS. | No Progress |
| **Roseville Electric Initiatives** | | | | |
| Initiative #HC-6—Maintain compliance with California Energy Commission ("CEC") license conditions for the operations of the Roseville Energy Park ("REP") with respect to Hazardous Material Management | | | | |
| Yes | Short Term | No | The operation of the REP is in compliance with the CEC license conditions including the preparation of a Business Plan and a Risk Management Plan (RMP) submitted to the City's Fire Department and the CEC. In addition, a Vulnerability Assessment has been prepared and Site Security measures have been implemented to ensure that neither the REP site nor a shipment of hazardous material is the target of unauthorized access. | Ongoing |
| Initiative #HC-7—Maintain compliance with state and local laws and regulations for the operation of the Roseville Power Plant #2. | | | | |
| Yes | Long Term | No | All operating and compliance permits are being maintained by the power generation staff. Compliance with state and local laws is an ongoing practice. | Ongoing |
| Initiative #HC-8—Maintain compliance with North American Electric Reliability Corporation mandatory reliability standards related to plant operation, sabotage reporting and critical infrastructure protection (cyber security. | | | | |
| Yes | Short Term | No | Establishing compliance through development, implementation and adherence to policies and procedures | Ongoing |
| Initiative #SW-1—Continue ongoing program of conversion of overhead utilities to underground service. | | | | |
| Yes | Short Term | No | This Program is no longer being implemented by the City. Action should be removed from action plan at the next update. | No Progress |
| Initiative #SW-2—Continue the Shade Tree Program, an energy conservation rebate program provided by Roseville Electric | | | | |
| Yes | Short Term | No | Although temporarily suspended due to the drought, this ongoing program will continue upon reactivation to offer Roseville residents a rebate for trees that they select, purchase and plant at their own convenience. Rebates are limited to 6 trees per household and available to Roseville Electric customers only. | Ongoing |
| Initiative #SW-3—Continue ongoing line clearing and weed abatement of electrical utility facilities in order to reduce public exposure to vegetation hazards and maintain higher reliability during severe weather conditions. | | | | |
| Yes | Short Term | No | This is an ongoing program of Roseville Electric to both protect the public from hazards and to maintain the reliability of electricity service to Roseville Electric's more than 56,000 customers. | Ongoing |

| TABLE 2. ACTION PLAN MATRIX | | | | |
|---|---|---|---|---|
| Action Taken? | Timeline | Priority Changed? | Comment (Describe progress or changed priority) | Status |
| Initiative #SW-6—Continue to operate the Roseville Energy Park to support the City's electrical requirements and maintain service continuity during severe weather events. | | | | |
| Yes | Short Term | No | The Roseville Energy Park (REP), which opened in October 2007, is producing power and provides additional electric support to meet the City's electrical needs. In the event of a transmission line outage, the REP will help maintain electric service continuity. The Operations Department's Emergency Action Plan (EAP) specifically addresses severe weather operations in Section 5.9. The severe weather EAP will ensure continuity of operations while securing the safety of personnel and equipment. | Ongoing |
| Initiative #SW-7— Continue to operate Roseville Power Plant #2 to support the City's electrical requirements and maintain service continuity during severe weather events. | | | | |
| Yes | Short Term | No | Roseville Power Plant #2 is operated from the Roseville Energy Park Control Room. The Operations Department's Emergency Action Plan (EAP) specifically addresses severe weather operations in Section 5.9. The severe weather EAP will ensure continuity of operations while securing the safety of personnel and equipment. | Ongoing |

## Planning Area Changes That May Impact Plan Implementation

The planning area for the City changed with the adoption of 3 new Specific plans. The impacts of these changes will be addressed at the next update to this plan.

## Recommendations for Changes or Enhancements

Based on the review of this report by the RMHMP Steering Committee, the following recommendations will be noted for future updates or revisions to the plan.

- The Information Technology Department has recommended that Initiatives MH-3 and MH-7 be combined into a single initiative
- Include information on the potential impacts of the Biggerts/Waters Flood Insurance Reform Act in annual mailings to floodplain residents.
- Continue to hold a pre-rainy season meeting with all key departments and stakeholders, such as the meeting held on December 10, 2013 to review the City's Flood Warning & Response Plan.
- Continue to train with WebEOC to enhance communication with the county. Continue to offer classes prior to every EOC exercise; last year over 100 city staff received a WebEOC refresher class.
- Try to better forecast impacts on city storm drains from debris accumulations.
- Consider training in street closure in a flood scenario for street workers.

- Data from stream gauges was not a representation of actual emergencies in the field. During flooding events, field observers should be deployed to known street flooding locations, even if no gauge information indicates flooding at those locations.
- Continue to evaluate (and add as appropriate) new social media channels, which have proven essential for public and media communication in emergencies.
- The growth of recreational access to and residential units adjacent to the Pleasant Grove Creek oak forest in the Woodcreek, Crocker Ranch, and Fiddyment Farms neighborhoods increases the frequency, risk, and human impact of wildland fires. These increases may require fire and safety personnel reviews of first responder vehicle access to newly populated sections of the creek, updates of resident fire emergency notification and evacuation procedures, and creation or updates of interagency coordination procedures for resident relocation.
- Create different wording for the WebEOC initiative
- Enhance the drought hazard profile based on new information available on current drought situation in CA.
- Enhance human caused hazard profile to include discussion on cyber-terrorism.
- Create separation between natural and non-natural hazards of concern in part II of the plan

***Public review notice:*** *The contents of this report are considered to be public knowledge and have been prepared for total public disclosure. Copies of the report have been provided to the Roseville City Council and local media outlets. The report is also posted on the City of Roseville Multi-Hazard Mitigation Plan website. Any questions or comments regarding the contents of this report should be directed to:*

*Jason Rizzi*
*City of Roseville*
*311 Vernon St.*
*Roseville, CA 95678*
*(916) 774-5802*
*jrizzi@roseville.ca.us*

# Appendix C. Steering Committee Meeting Information

TETRA TECH

# MEETING SUMMARY

| | |
|---|---|
| **Date of Meeting:** | November 3, 2015 |
| **Subject:** | 1st Steering Committee (SC) meeting |
| **Project Name:** | City of Roseville Multi-Hazard Mitigation Plan –Update |
| **In Attendance:** | **Steering Committee**- Grace Keller (Chair), Rob Jensen, Jason Rizzi, Wayne Wiley, Carl Walker, Brian Jacobson (for Helen Dyda), Erik Angle, Brenette Macintosh, Mark Lacher, Rod Rodriguez, Rick Stalker, Jim Williams<br>**Planning Team**- Rob Flaner |
| **Not Present:** | Mark Smith, Michael Algots |
| **Summary Prepared by:** | Rob Flaner- 11/17/2015 |
| **Project No.:** | 103S4157 |
| **Quorum- Yes or No** | Yes |

| Item | Action |
|---|---|

**Welcome and Introductions**

- Chair, Grace Keller opened the meeting with brief group introduction.
- Round table introductions by all in attendance.
- Agenda was reviewed with no request for changes.
- There were no members of the public present and no public comment received by the Committee.
- Handouts provided included: Agenda, 2015 Progress report, work-plan for the plan update, Steering Committee ground rules, table of contents from the 2011 Multi-hazard mitigation plan.

**Why are you here? Purposes for planning**

Rob Flaner, the City's planning consultant from Tetra Tech, Inc. provided the committee and overview of the drivers for a hazard mitigation plan, and the Steering Committee's role in the process. There are 2 principle drivers for the City having a hazard mitigation plan; the Disaster Mitigation Act of 2000 (DMA) and the Community Rating System (CRS).

- **The DMA-** Federal legislation that stipulates that communities must have an approved all hazard mitigation plan to eligible for certain federal grant programs administered by the Federal Emergency Management Agency (FEMA). The City of Roseville has leveraged many of these grant programs in the past and wanted to continue to be eligible to pursue that funding, so it developed its hazard mitigation plan.
- **The CRS-** This is a FEMA program that is part of the National Flood Insurance Program (NFIP) that rewards participating communities for exceeding the minimum requirements of the NFIP

| Item | Action |
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by lowering the costs of flood insurance in participating communities. Communities are rated on a scale of 1-10, with class 1 being the best with up to a 45% reduction in flood insurance premiums. The City of Roseville is the nation's highest rated community, and the only CRS class 1. To achieve that designation, the City need to have a mitigation plan that met very prescriptive planning requirements

So utilizing these 2 drivers, the City developed its 1st hazard mitigation plan in 2005. That plan was updated in 2010, which is now being updated with this process. FEMA and CRS require that these plans be reviewed and updated every 5 years. Each of the planning processes were overseen bay steering committee made up of community stakeholders city officials. This plan update process will follow suit and has been scripted to meet CRS class 1 planning requirements.

**2015 Annual progress report**

The City has prepared a 2015 annual progress report for the 2011 Multi-hazard Mitigation plan in accordance with the plan maintenance chapter (chapter 7) of the plan. The progress report provides and overview of the plan and provides a status report of the 63 initiatives that were identified in the 2011 plan.

The performance period for the Hazard Mitigation Plan began on March 28, 2011, with FEMA's final approval. The initial performance period for this plan is 5 years, with an update anticipated before March 2016. As of the most recent reporting period, the performance period is 82 percent complete. The Hazard Mitigation Plan identified 63 hazard mitigation initiatives to be pursued during the 5-year performance period. As of the most recent reporting period, the following progress can be reported:

- 51 out of 63 initiatives (81%) reported ongoing action toward completion.
- 10 out of 63 initiatives (16%) reported no action taken.
- 1 out of 63 initiatives (2%) was completed.
- 1 initiative was removed due to elimination of a program.

The SC review the progress report, and made the following recommendations for changes before transmittal to City Council:

| Item | Action |
| --- | --- |
| • Add a short write-up on the Ebola exercise conducted during the reporting period to the hazard events section. | Erik Angle will write a paragraph about the Ebola exercise |
| • Add a short write-up about the City's "Oil by Rail" plan in the mitigation success story section of the plan. | Jason Rizzi will write a paragraph about the Oil by Rail Plan |
| • Rob was asked to provide an overview of all the recommended changes/enhancements for the plan from the prior progress reports to the SC at the next meeting. | Rob Flaner will provide a summary of all the annual recommendations from the annual plans to the next meeting |

| Item | Action |
|---|---|
| After the discussion on the progress report, the SC approved the report as amended for transmittal to City Council (Motion – Jason Rizzi, Second – Rob Jensen). Carl Walker will present the Progress Report to Council via GIM on or before December 16th. | Carl Walker will present the Progress Report to Council via GIM on or before December 16th |

**<u>2015/2016 Plan Update Work plan</u>**

Rob went over the scope of work for the plan update. The handout provided to the SC was the actual contact scope of work from Tetra Tech's contract with the City. The work plan is broken down in to 6 phases:

- Phase 1-Organize and review
- Phase 2-Update/Enhance the Risk Assessment
- Phase 3-Engage the Public
- Phase 4- PPI Framework
- Phase 5-Assemble the updated Plan
- Phase 6- Plan Adoption

| Item | Action |
|---|---|
| The current plan will expire on March 28, 2016. Plan expiration is not a big issue, unless the City's current pending grant application for the acquisition of 645 Riverside Dr. is not funded prior to March 28, 2016. This grant application has been held up by FEMA due to procedural requirements. Both Rob and Carl do not believe, that plan expiration will be an issue for this grant, however, they will seek clarification for both CalOES and FEMA Region IX. There may be a need to expedite the timeline for this project based on direction received from FEMA and the State. | Rob and Carl will reach out to CalOES and FEMA region IX to determine if an expedited schedule is warranted in order to process the grant for 645 Riverside Dr. |

**<u>Steering Committee Ground Rules</u>**

Since Steering Committee meetings will be conducted as open public meetings, the SC will need to have established ground rules for operation during the plan update process. The ground rules confirmed by the SC for the last plan update were provided to the SC. Rob went thru each of the components of the ground rules to make sure the current SC understood their application, and to seek input for changes or enhancements. The following changes were recommended by the SC for the 2015/2016 SC ground rules:

- Grace Keller was re-confirmed as Chairperson, and Wayne Wiley was confirmed as Vice-Chairperson for the next performance period of the plan.
- The quorum for the SC will remain as 50% plus 1, which will be 8 members for this plan update process.
- SC members will have the option to designate an alternate and these alternates will have full voting privileges when they attend a SC meeting in the place of a primary SC member. SC members wishing to designate an alternate will inform the planning team by Friday, November 20th.

Action: SC members wishing to designate an alternate should inform planning team by Friday, November 20th, 2015.

| Item | Action |
|---|---|
| • The city's standard protocol for receiving public comment at City Council meetings was incorporated in to the ground rules.<br>• The standard meeting date/time will strive for the 1st Tuesday of each month, from 6:00 to 8:00 PM at the Roseville City offices at 311 Vernon St. | |
| The SC voted to approve the ground rules as amended (Motion – Rick Stalker, Second – Mark Lacher). Carl will make sure that the final ground rules are posted on the Mitigation Plan website as soon as possible. | Carl to poste the final ground rules on the mitigation plan website. |
| **<u>Hazards of Concern</u>** | |
| The table of contents from the last plan illustrating the hazards of concern addressed was provided to the SC as a hand out. Rob explained that local hazard mitigation plans are required to be consistent with the State Hazard Mitigation plan as far as the hazards of concern addressed by a plan. So in other words, id the State plan says that Placer County and the City of Roseville is susceptible to a certain hazard, then the Roseville and Placer County plans should assess those hazards in their individual mitigation plans. The 2011 Roseville Multi-Hazard Mitigation Plan assessed: Dam Failure, Drought, Earthquake, Flood, Human Caused hazards, Human health hazards, Landslide, severe weather, and wildfire. These hazards were consistent with the last CA State hazard Mitigation plan. | |
| The Steering Committee was asked to do some homework prior to the next SC meeting as follow: | SC members to do homework as described. |
| All to read Chapter 11-18 of the 2011 plan and answer the following questions:<br>• Is there another hazard we need to assess?<br>• Since California will have Climate Change (Future Conditions) as a stand-alone risk, how should we accomplish that in our plan? | |
| All to read Goal section and answer the following questions:<br>• Are the Goals still valid?<br>• Do we need to add any new Goals? | |
| All to review the Annual reports for the last five years. | |
| Meeting was adjourned at 8:00 PM | |
| The next Steering Committee meeting is: | |

| Item | Action |
|---|---|
| **November 30th from 6:00 PM to 8:00 PM**<br>**Roseville City Hall**<br>**311 Vernon St., Roseville, CA 95678** | |

TETRA TECH

# MEETING SUMMARY

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|---|---|
| **Date of Meeting:** | November 30, 2015 |
| **Subject:** | 2nd Steering Committee (SC) meeting |
| **Project Name:** | City of Roseville Multi-Hazard Mitigation Plan –Update |
| **In Attendance:** | **Steering Committee**- Grace Keller (Chair), Rob Jensen, Jason Rizzi, Wayne Wiley, Carl Walker, Helen Dyda, Erik Angle, Brenette Macintosh, Mark Lacher, Rick Stalker, Jim Williams, Paul Holt, Joe Van Zant<br>**Planning Team**- Rob Flaner |
| **Not Present:** | Mark Smith, Rod Rodriguez, Michael Algots |
| **Summary Prepared by:** | Rob Flaner- 12/14/2015 |
| **Project No.:** | 103S4157 |
| **Quorum- Yes or No** | Yes |

| Item | Action |
|---|---|

**Welcome and Introductions**

- Vice-Chair, Wayne Wiley opened the meeting with a brief group introduction.
- Round table introductions by all in attendance.
- Agenda was reviewed with no request for changes.
- Meeting summary for Steering Committee (SC) Meeting #1 were reviewed and approved.
- There were no members of the public present and no public comment received by the SC.
- Handouts provided included: Agenda, Meeting #1 summary, example guiding principles and mission statements, the 2012 plan Goals and Objectives, Planning area map for the 2016 plan update, recommendations for changes and enhancements from the 2015 annual progress report.
- Chair, Grace Keller assumed leadership of the meeting upon her arrival.

**Progress Report Recommendations**

At the last SC meeting, the committee requested to see the changes and enhancement sections from the past progress reports. Rob provided the SC a handout that summarized the notations for changes and enhancements to the plan from the 2012 through 2014 progress reports. Rob led a discussion with the SC on what recommendations for changes or enhancements should be included in the 2015 progress report. The following recommendations were requested by the SC:

| Item | Action |
| --- | --- |
| • Create different wording for the WebEOC initiative<br>• Enhance the drought hazard profile based on new information available on current drought situation in California.<br>• Enhance the human-caused hazard profile to include a discussion on cyber-terrorism.<br>• Enhance the human health hazard profile to include a discussion on Ebola.<br>• Create separation between natural and non-natural hazards of concern in part II of the plan.<br>Rob and Carl will finalize the 2015 progress report for posting on the City website and submittal to the City Council<br>Carl asked the SC to review the planning area map that was provided as a handout. Carl explained to the SC that the planning area for the City has changed dramatically since the initial planning effort in 2005. The City has and will continue to grow that the direction of its General Plan and Specific Planning process. The map handout illustrated the new specific plan areas that will need an assessment in the 2016 update. | Rob and Carl to final finalize the 2015 progress report for posting on the City website and submittal to City Council |

**Confirm the Hazards of Concern**

The SC was asked at the last meeting to review the 2012 Roseville HMP and the 2013 CA State Hazard Mitigation plan and come to this meeting prepared to confirm the hazards of concern to be addressed by the 2016 plan update. After discussion of their observations from this review, the SC confirmed the following hazards of concern for the 2016 plan update, inclusive of the newly identified cyber terrorism and Ebola components of human-caused and human health hazards, respectively:

- Dam Failure
- Drought
- Earthquake
- Flood
- Human caused
  - Terrorism & Weapons of Mass Destruction
  - Technological
  - Civil Disorder
  - ***Cyber terrorism***
- Human Health
  - Influenza
  - Small Pox
  - Viral Hemorrhagic Fevers
  - Plague
  - Tularemia
  - Mosquito-borne Disease
  - Lyme Disease

| Item | Action |
|---|---|

- Anthrax
- Severe Acute Respiratory Syndrome
- Extreme weather
- ***Ebola***

- Landslide
- Severe Weather
- Wildfire-to include a discussion/profile on air quality issues

Additionally, the 2016 update will include a stand-alone chapter on climate change that will discuss qualitatively the possible impacts of climate change on each of the above hazards of concern. There will be separation created in the plan between the natural and non-natural hazards since they will be profiled and ranked differently. The risk ranking of the plan will only consider the natural hazards of concern.

**Guiding Principle/ Vision/Mission Statement**

A guiding principle or a mission statement for a plan is a written declaration of a plan's core purpose and focus that normally remains unchanged over time, regardless of a change to the plan's goals or objectives. Rob explained to the SC that the last 2 versions of the Roseville Hazard Mitigation plan did not identify a guiding principle or mission statement. These are not required components for DMA compliance, however, Rob explained to the SC that they are beneficial, as they provide a clear, singular message that can be the focal point for public engagement. Rob explained to the SC that he was unaware as to why the past Steering Committees chose to not identify a guiding principle, however, this SC could identify one for the 2016 update. The SC received a handout that listed several example mission statements from other planning efforts for reference and review. After reviewing the handout, Rob asked the SC if they wanted a guiding principle/ statement for the 2016 plan update. The consensus of the SC agreed on identifying a guiding principle. After discussion, the SC settled on the following guiding principle for the 2016 plan update:

*Through community partnerships, establish a plan to reduce vulnerability to hazards in order to protect the health, safety, welfare, and economy of the City.*

**Confirm Goals**

The SC received a handout that listed the 7 goals from the 2012 plan. Rob explained that the initial 2005 plan included 7 goals that were slightly enhanced during the 2012 plan update process. Rob asked the SC to review the 7 goals and identify any additions, deletions, or enhancements to the goals for the 2016 update. One change was requested by the SC. This change involved replacing "maintain, enhance, and restore" with "monitor and support" on Goal #7. The SC confirmed the following goals for the 2016 plan update:

| Item | Action |
|---|---|
| *G-1: Protect lives and reduce injury.*<br><br>*G-2: Promote hazard mitigation as an integrated policy.*<br><br>*G-3: Protect the continuity of local government to ensure no significant disruption of services during or due to a disaster.*<br><br>*G-4: Improve community emergency management preparedness, collaboration and outreach.*<br><br>*G-5: Minimize or reduce damage to property, including critical facilities.*<br><br>*G-6: Develop and implement mitigation strategies that optimize public funds in an efficient and cost-effective way.*<br><br>*G-7: Monitor and support the natural environment's capacity to deal with the impacts of natural hazards, taking into account the potential impacts of global climate change.*<br><br>**Confirm Objectives**<br><br>The SC received a handout that listed the 10 objectives from the 2012 plan. Rob explained that the initial 2005 plan included 10 objectives that were slightly enhanced during the 2012 plan update process. Rob asked the SC to review the 10 objectives and identify any additions, deletions, or enhancements to the goals for the 2016 update. The SC requested minor changes to objectives # 5, 7, and 10. The SC confirmed the following objectives for the 2016 plan update:<br><br>*O-1: Consider the impacts of hazards on future land uses in the City of Roseville by coordinating with other planning mechanisms such as the general plan and land-use code development.*<br><br>*O-2: Protect and sustain reliable local emergency operations and communication facilities during and after disasters.*<br><br>*O-3: Develop new or enhance existing early warning response systems and plans.*<br><br>*O-4: Seek to enhance emergency response capabilities through improvements to infrastructure and City programs.*<br><br>*O-5: Enhance the understanding of all present and future hazards that may impact the City of Roseville and the risk they pose.*<br><br>*O-6: Seek mitigation projects that provide the highest degree of hazard protection at the least cost.*<br><br>*O-7: Seek to update information on natural, environmental, and human-caused hazards, vulnerabilities, and mitigation measures by coordinating* | Carl to post the final Guiding Principle, Goals and Objectives on the City HMP website |

| Item | Action |
|---|---|
| *planning efforts and creating partnerships with appropriate local, private, county, state, and federal agencies.* | |
| *O-8: Seek to implement codes, standards, and policies that will protect life and property, including natural habitat, from the impacts of hazards within the City of Roseville.* | |
| *O-9: Educate the public on preparedness for and mitigation of potential impacts of hazards on the City of Roseville.* | |
| *O-10: Support efforts to retrofit, purchase, or relocate structures in high hazard areas, including those known to be repetitively damaged.* | |

**Public Involvement Strategy**

Discussion on this topic was tabled until the next meeting due to the lack of time.

The meeting adjourned at 8:00 PM

The next Steering Committee meeting is:

**January 5th from 6:00 PM to 8:00 PM**
**Roseville City Hall**
**311 Vernon St., Roseville, CA 95678**

TETRA TECH

# MEETING SUMMARY

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|---|---|
| **Date of Meeting:** | January 5, 2016 |
| **Subject:** | 3rd Steering Committee (SC) meeting |
| **Project Name:** | City of Roseville Multi-Hazard Mitigation Plan –Update |
| **In Attendance:** | **Steering Committee**- Grace Keller (Chair), Jason Rizzi, Wayne Wiley, Carl Walker, Helen Dyda, Erik Angle, Brenette Macintosh, Mark Lacher, Joe Van Zant, Rick Stalker, Michael Algots, Jim Williams, Paul Holt, Dom Casey, Jamie Garret<br>**Planning Team**- Rob Flaner, Jessica Cerutti |
| **Not Present:** | Rob Jensen, Rod Rodriguez |
| **Summary Prepared by:** | Jessica Cerutti – 01/08/16 |
| **Project No.:** | 103S4157 |
| **Quorum- Yes or No** | Yes |

| Item | Action |
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**Welcome and Introductions**

- Chair Grace Keller opened the meeting with a brief group introduction.
- Round table introductions by all in attendance.
- Agenda was reviewed with no request for changes.
- Meeting summary for Steering Committee (SC) Meeting #2 were reviewed and approved.
- There were no members of the public present and no public comment received by the SC.
- Handouts provided included: Agenda, Meeting #2 summary, Critical Facilities definition, Risk Assessment Update, Copy of the City of Roseville 2010 Public Survey.

**Risk Assessment Update**

Rob opened the discussion on the risk assessment (RA) update by indicating little change. He said that Tetra Tech is still data mining and addressing identified data gaps.

Rob and Carl revealed that they are adjusting the RA to reflect the Preliminary Flood Insurance rate Map (PFIRM) as the best available data for this plan update. Carl explained that the updated RA for flood will use the PFIRM received from FEMA on December 28th as the basis of the flood RA instead of the current effective FIRM. Carl said that the PFIRM provides a new study on Pleasant Grove Creek and will be best suited for inclusion into the 2016 plan update for enhanced future impact assessments.

| Item | Action |
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| **Public Involvement Strategy** | |
| *CRS Requirements* | |
| Rob reviewed the Community Rating System (CRS) requirements for public engagement, noting that the City of Roseville is already fulfilling most requirements through inviting public participation during committee meetings and maintaining a public facing website. He stressed that such initiatives must be maintained and public engagement must continue. | |
| *To survey or not to survey* | |
| Rob presented the SC with the 2010 Roseville HMP public survey and posed the question of whether or not the survey should be updated and distributed for the 2016 initiative. He said that to truly reap the benefits of the survey, the public must be provided a minimum of 30 days to maximize participation. He stressed that distribution of the survey may not necessarily be conducive to the expedited timeline for HMP completion, noting that the current target submission to FEMA is March 2016. This led to a discussion on the ramifications of extending the target submission. Rob mentioned that the City is still able to submit a LOI with an expired plan. Additionally, he said that HMGP approval can take anywhere from 6-8 months after initial submission. Carl noted that the only project that may be affected by an extended submission of the HMP to FEMA would be the acquisition project associated with 645 Riverside. Rob added that the City should be afforded some latitude regarding this project due to the lag in progress caused by CalOES and FEMA. At this point, Carl suggested to extend the HMP process to afford ample time to maximize public participation. | SC to review the previous survey by January 8 and return comments to Jessica. |
| Grace noted that the Flood Control District and FEMA will be meeting during late January and recommended engaging FEMA to be put on the agenda. Jason followed up by recommending that participating in RCONA meeting may be beneficial for furthering public outreach. | Carl and Jason to introduce the Roseville HMP initiative and public survey to the County CCO meeting, if possible. |
| *PPI Subcommittee* | |
| Rob initiated a discussion regarding the next item on the agenda – the Program for Public Information (PPI). He noted that this is an option for additional CRS credit. Given the City's current outreach initiatives, Rob said that it makes sense to capture them in a formalized program. He said that the PPI would be an annex to the plan, as the process for PPI planning will extend beyond the 2016 HMP effort. Carl requested additional information regarding the PPI, after which the subcommittee will meet – tentatively at the end of January. The PPI subcommittee is tentatively identified as follows:<br>• Carl Walker<br>• Jason Rizzi<br>• Helen Dyda<br>• Jamie Garrett<br>• Rick Stalker<br>• Paul Holt<br>• Michael Algots | Jessica to develop and send an overview of the PPI initiative, inclusive of requirements and considerations. |

| Item | Action |
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**Confirm Critical Facilities Definition**

Next, Rob reviewed the previous iterations of the critical facility definitions from the 2005 and 2010 plans. He stated that, at a minimum, the City should use the CRS standard definition. He provided additional examples for review and asked the SC for their views on the definition. The SC agreed that the standard definition should be used with some modification. The following definition was constructed and subsequently approved by the SC with a motion to approve from Joseph Van Zant and a second from Rick Stalker:

> *A structure or other improvement, public or private, that, because of its function, size, service area, or uniqueness, has the potential to cause serious bodily harm, extensive property damage, or disruption of vital socioeconomic activities if it is destroyed or damaged or if its functionality is impaired. Critical facilities may include, but is not limited to, health and safety facilities, utilities, government facilities, hazardous materials facilities, and transportation infrastructure.*

**General Plan Update/New CA General Planning Law**

Wayne updated the SC on current general Plan initiatives, including a discussion of SB 379. During this discussion, Wayne indicated that SB 379 will require a climate change component beginning with the first plan adopted after January 2017. As a result, the 2016 mitigation planning initiative will not be required to contain climate change, however Rob indicated that the previously discussed climate change chapter will serve as a segue into the post-2017 requirement.

**Emergency Operations Plan Review**

Rob indicated that the EOP review was currently underway. He stressed that an anticipated gap will include disabilities, access, and functional needs issues given the recent string of Americans with Disabilities Act lawsuits taking place around the country.

**Debris Management Plan**

Jessica introduced the SC to the debris management planning initiative. She provided the SC with an overview of debris management operations and stressed the need for a strong plan that follows recently updated Public Assistance Program and Policy Guide 10-point Debris Management Plan Checklist. Paul and Mike volunteered to serve on the debris management planning committee given their advanced knowledge of hazardous materials and debris management practices.

Action: Jessica to send out the 10-point Debris Management Checklist for SC review and reference.

Action: Jason to include Paul and Mike in the debris management planning process.

| Item | Action |
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| As a final action before meeting adjournment, Rick requested a copy of the SC contact information. | Carl to send Rick SC contact information |

The meeting adjourned at 7:47 PM

The next Steering Committee meeting is:

**February 2$^{nd}$ from 6:00 PM to 8:00 PM**

**Roseville City Hall**

**311 Vernon St., Roseville, CA 95678**

# MEETING SUMMARY

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|---|---|
| **Date of Meeting:** | February 2, 2016 |
| **Subject:** | 4th Steering Committee (SC) meeting |
| **Project Name:** | City of Roseville Multi-Hazard Mitigation Plan –Update |
| **In Attendance:** | **Steering Committee**- Grace Keller (Chair), Jason Rizzi, Wayne Wiley, Carl Walker, Helen Dyda, Brenette Macintosh, Mark Lacher, Joe Van Zant, Rick Stalker, Michael Algots, Jim Williams, Paul Holt, Jaime Garret<br>**Planning Team**- Rob Flaner, Jessica Cerutti |
| **Not Present:** | Rob Jensen, Rod Rodriguez, Erik Angle, Dom Casey |
| **Summary Prepared by:** | Jessica Cerutti – 02/08/16 |
| **Project No.:** | 103S4157 |
| **Quorum- Yes or No** | Yes |

| Item | Action |
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| **Welcome and Introductions**<br>• Chair Grace Keller opened the meeting with a brief group introduction.<br>• Agenda was reviewed with no request for changes.<br>• Meeting summary for Steering Committee (SC) Meeting #3 were reviewed and approved.<br>• There were no members of the public present and no public comment received by the SC.<br>• Handouts provided included: Agenda, Meeting #3 summary, Debris Management Plan Checklist, Risk Assessment Update, 2016 Roseville Public Questionnaire, PPI Overview, 2011 Mitigation Catalog. | |
| **Risk Assessment Update**<br>Rob opened the discussion on the risk assessment (RA) update by thanking Carl for the receipt of additional data, including flood data that provided the missing links on the assessor's data. Rob indicated that this missing data provides a key for making the overall RA more robust.<br>Next, Rob mentioned that there were previous issues with the LiDAR data, stating that the data received was not based on a bare earth model. He then said that Carl was able to acquire the formatted bare earth LiDAR model that FEMA is using for the Preliminary DFRIM, which will further strengthen the RA. | |
| Rob next stated that the RA results will be available by the next SC meeting. During the next meeting, these results will be reviewed for the earthquake, flood, and dam failure hazards with all updated inventories. He said that | Rob to provide RA results by Feb. 26th |

| Item | Action |
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| review of this information is key, as it will be the primary deliverable to share with the public. Rob said that Tetra Tech will work towards getting the SC the RA data by Friday, February 26th in order to provide an opportunity for SC review prior to the next meeting. He said that this data will come from Hazus and explained that the RA used a user defined, more specific model than simply using the Hazus pre-identified data. He requested that the SC review the RA methodology from the previous plan in preparation of reviewing the 2016 RA data.<br><br>Next, Rob talked about the hazard layers, saying that some datasets were provide by the California Geological Survey. He also spoke about the dam failure hazard, reminding the SC that this profile was originally developed during the previous planning process. He said that this hazard focused on analysis and results, but did not include specific mapping due to operational security. The SC agreed that general evacuation and inundation maps with arrows are permissible, but no specific mapping should be used that identifies definitive locations of the dam failure hazard due to security concerns. | SC to review the previous plan methodology for RA in preparation of 2016 RA review. |
| **Public Involvement Strategy**<br><br>*Survey*<br><br>The SC reviewed the final survey for distribution and discussed the timeline for deploying the survey in relation to the remaining timeline for the project. Jason recommended that communications should take the lead on deploying the survey through various means. Helen suggested running the survey for approximately 2 weeks. She also indicated that they would provide a follow up email and post to potential respondents before the survey is closed to remind potential participants to take the survey. | Helen and Jaime to deploy the survey via social media platforms and other channels. |
| *Public Meeting*<br><br>Rob then began a discussion on the public meeting. He said that the public meeting is dependent upon the availability of RA data. Grace recommended the use of the Utility Center. Jason said that he would check with the Parks and Rec Department to find out Center availability, but recommended against late March due to Spring Break, noting that many residents will likely be out of town during this time. Helen and Jaime recommended adding an option at the end of the survey where residents could provide their email address to remain informed on upcoming public meetings. | Jessica to add email option to end of survey. |
| Rob requested information regarding the potential format of the public meeting. The SC agreed that an open house format would be the best. Potential booth participants could include RCONA, Union Pacific, Red Cross, CERT, and others. Jason mentioned the Saturday open houses for the fire department as a potential vehicle for a captive audience. Helen recommended the Earth Day festivities on April 16th as a possible vehicle for the public meeting. In addition, she indicated that the Food Truck Mania event would be an ideal time to advertise for the public meeting | SC will provide input regarding the Planning Team's recommendations for a tentative schedule and begin preliminary event planning in March. |

| Item | Action |
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| **Public Involvement - PPI**<br><br>Carl started the conversation about the PPI by saying that the City would like to make the PPI more of an all hazards program that fulfills CRS requirements while simultaneously providing additional outreach considerations on other hazard issues. Jessica indicated that this is an ideal program, noting that a PPI allows for CRS credit based on topics outside of the six priority topics. She said that these additional topics can be general preparedness, all-hazards based.<br><br>Jessica then took the SC through an overview of the PPI development process. She reviewed each of the seven steps, beginning with the establishment of a PPI Committee. She noted that at the previous SC meeting, a list of tentative PPI committee members was discussed. From this list, the final committee will be selected based on CRS requirements. | Jess and Carl to discuss final PPI committee. |
| Jessica then discussed Step 2 of the process, drawing attention to the need to identify target areas and target audiences. She noted that this next step can only be conducted after the development of the RA which will allow the PPI committee to make a data-based determination on what specific areas to target. She reviewed the rest of the requirements of the PPI, including a reiteration on topics and annual review requirements | |
| **Alternatives Analysis**<br><br>Rob next discussed the alternatives analysis, bringing the SC's attention to the previous Mitigation Catalog. Rob reminded the SC that this catalog development is part of the statutory requirement to develop a comprehensive range of alternatives considered for actions in the plan. He noted that the catalog separates actions into a personal, corporate, and governmental scale and identifies opportunities to reduce risk.<br><br>Rob mentioned that the SC did not perform a Strengths, Weaknesses, Opportunities, and Obstacles (SWOO) session during the last planning process (2011 MHMP Update) and asked the SC if they would like to conduct a SWOO session for the 2016 initiative. He reminded the SC that they last SWOO session was held nearly 10 years ago, and that some risks have changed. For example, he noted that during the initial planning process, dam risk was unknown. New RA results will provide a better understanding of the dam hazard and how they relate to SWOO.<br><br>Jason requested best practices from other jurisdictions and their SWOO results as a reference, noting that while some risks need to be reassessed as part of the catalog process, others have remained the same. Rob recommended an abbreviated SWOO session during the next SC meeting, | |

| Item | Action |
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| for all-hazards, but specifically recommended focusing on newly identified risks, such as dam failure and cyber threats. | |

Grace asked Rob to conduct a sample SWOO to give the SC an idea of what to expect during the next meeting. Rob used Health Hazards as a sample:

- Strengths
  - Active community, parks and rec, available health programs
- Weaknesses
  - Homeless population
  - Elderly population – unable to call for help, alone in houses
- Opportunities
  - Change in potential funding to establish a program
  - Identify new opportunities to reduce risk
  - Seniors First – visitors already trained, opportunity for coordination
- Obstacles
  - Limited funding
  - Organizational resources lacking

With no further comments, the meeting adjourned at 8:00 PM

The next Steering Committee meeting is:

**March 1st from 5:30 PM to 8:00 PM**

**Roseville City Hall**
**311 Vernon St., Roseville, CA 95678**

# MEETING SUMMARY

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|---|---|
| **Date of Meeting:** | March 1, 2016 |
| **Subject:** | 5th Steering Committee (SC) meeting |
| **Project Name:** | City of Roseville Multi-Hazard Mitigation Plan –Update |
| **In Attendance:** | **Steering Committee**- Grace Keller (Chair), Jason Rizzi, Wayne Wiley, Carl Walker, Erik Angle, Helen Dyda, Brenette Macintosh, Mark Lacher, Joe Van Zant, Rick Stalker, Michael Algots, Jim Williams, Jaime Garret<br><br>**Planning Team**- Rob Flaner, Jessica Cerutti |
| **Not Present:** | Rob Jensen, Rod Rodriguez, Dom Casey |
| **Summary Prepared by:** | Jessica Cerutti – 03/10/16 |
| **Project No.:** | 103S4157 |
| **Quorum- Yes or No** | Yes |

| Item | Action |
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**Welcome and Introductions**

- Chair Grace Keller opened the meeting with a brief group introduction.
- Agenda was reviewed with no request for changes.
- Meeting summary for Steering Committee (SC) Meeting #4 were reviewed and approved.
- Two members of the public were presented and invited to comment at this time.
    - Both members of the public expressed interest in the planning process. On indicated an increased interest in understanding the concept of the plan, including how manmade hazard such as cyber are terrorism will be incorporated. SC members offered additional information regarding the background of hazard mitigation planning, including the emphasis on natural hazards.
- Handouts provided included: Agenda, Meeting #4 Summary, Preliminary Risk Assessment Results, and Preliminary Public Information Survey Results.

**Risk Assessment Update**

Rob opened the discussion on the risk assessment (RA) update by reviewing the essential terminology regarding the risk assessment data provided in the handout. He reminded the SC that FEMA is looking to quantify risk and avoided loss in monetary amounts. He reviewed the definition of assets in General Building Stock and Critical facilities. He noted that general building stock is where residents live and shop on a daily basis while critical infrastructure refers to the definition decided upon by the SC during SC Meeting #2.

| Item | Action |
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| Next, Rob reviewed the purpose of HAZUS – the program used to conduct the Roseville risk assessment. He noted that the updated risk assessment used HAZUS 5.1 and updated inventory, including new LiDAR data based on terrain and an updated value of identified assets. Additionally, Rob noted that the updated risk assessment contains new loss estimations for dam failure, earthquake, and flood. Rob said that expected changes occurred with the inclusion of better data, specifically regarding an increased floodplain due to the annexation of Sierra Vista and Creekview and new shake maps for seismic assessment.<br><br>From there, Rob explained that the actual risk ranking is based on HAZUS outputs on a level 2-user defined level. He explained that this meant that the assessment was conducted on a property-specific level instead of a general block level. Rob noted that this granular level of assessment provides increased capability for informed hazard ranking and overall mitigation planning.<br><br>Rob next reviewed the results of each hazard run, noting that the assessment is not complete for all anticipated models – particularly for landslide due to soil class discrepancies and the 10-, 50-, and 500-year flood scenarios. Rob noted that outside of flood and earthquake, the other hazards are given an estimate on potential damages in table format due to existing limitations in the HAZUS program.<br><br>Rob said that the April 16th Earth Day HAZUS work stations will rely on correct information in order to provide information to the public. | |
| **<u>Public Involvement Strategy</u>**<br><br>*Earth Day*<br><br>Next, Rob reviewed the public outreach strategy, noting that Roseville's April 16th Earth Day event at Mahany Park will be the foundation for the first public meeting. He explained the format, saying that there will be two HAZUS workstations, easels displaying maps, and hard copies of the survey available for attendees to complete. Carl and Jason discussed the issues associated with displaying information related to the dam failure hazard. Carl noted that the public survey results indicated a need to provide some information on dam failure, but consideration must be made regarding the exposure of potentially sensitive information.<br><br>Additionally, Rob requested the involvement of the SC as support staff during the Earth Day activities from 10:00am to 3:00pm. Carl requested that the SC sign up for times in which they would be available to support the initiative. The SC provided an initial schedule to Carl at this time. Carl also suggested the possibility of including a raffle giveaway to encourage participation, noting that an emergency preparedness Go-Bag would be a beneficial prize.<br><br>Rob closed the discussion on Earth Day by noting that the SC would not meet during the month of April due to the Earth Day event.<br><br>*Survey Results* | Carl to confirm SC participation in Earth Day activities. |

| Item | Action |
|---|---|
| Jessica reviewed the initial survey results. She stressed that the purpose of this survey was twofold: to assess the understanding of hazards at a community level and to assess the specific concerns for the community. She drew attention to the associated handout and noted that Jaime and Helen's public outreach resulted in 653 responses. | |
| First, Jessica reviewed the respondent top choices for receiving news and information about the City, noting that email and text messaging was the top selection for information, next was the social media platform, Nextdoor, followed Facebook, and Alert Roseville. | Tetra Tech to update hazard mitigation Best Practices based on SWOO results. |
| Next, Jessica noted that nearly 98% of respondents live in Roseville, and over half of the respondents work outside of Roseville. Jessica explained that this is a key factor in outreach, as families may be separated during a disaster. | |
| Jessica noted that while most respondents were aware of their location within or outside of a floodplain, approximately 40% were not sure. She described this as an indication of a need for additional outreach that can be targeted during the development of the PPI. Likewise, a large percentage (approximately 38%) indicated that they were unsure whether their residence was located in a dam failure zone or not. | |
| Jessica reviewed the assessment of the public top natural hazard threats. Drought was the top hazard threat, followed by extreme temperatures, epidemic, severe weather, earthquake, flood, wildfire, freeze and other hazards. She noted that multiple respondents cited radon as a natural hazard of concern. The SC agreed to take this information into consideration during the next LHMP update and possible include radon exposure as a future hazard of concern. | |

**<u>SWOO Session</u>**

Rob led the SC in the conduction of the SWOO Session. He began the session by explaining that the SC will focus on an overall programmatic assessment of Roseville, followed by a hazard specific assessment for the hazards of dam failure and cyber threats.

With no further comments, the meeting adjourned at 8:00 PM

The next Steering Committee meeting is:

**August 2nd from 6:00 PM to 8:00PM**

**Roseville City Hall**
**311 Vernon St., Roseville, CA 95678**

# MEETING SUMMARY

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|---|---|
| **Date of Meeting:** | August 2, 2016 |
| **Subject:** | 6th Steering Committee (SC) meeting |
| **Project Name:** | City of Roseville Multi-Hazard Mitigation Plan –Update |
| **In Attendance:** | **Steering Committee**- Grace Keller (Chair), Jason Rizzi, Wayne Wiley, Carl Walker, Helen Dyda, Erik Angle, Brenette Macintosh, Mark Lacher, Joe Van Zant, Rick Stalker, Michael Algots, Jim Williams,<br>**Public:** Michael Zasso<br>**Planning Team**- Rob Flaner, Jessica Cerutti |
| **Not Present:** | Rob Jensen, Rod Rodriguez, Dom Casey, Jaime Garret |
| **Summary Prepared by:** | Jessica Cerutti – 08/17/2016 |
| **Project No.:** | 103S4157 |
| **Quorum- Yes or No** | Yes |

| Item | Action |
|---|---|

**Welcome and Introductions**

- Chair Grace Keller opened the meeting with a brief group introduction.
- Agenda was reviewed with no request for changes.
- Meeting summary for Steering Committee (SC) Meeting #5 were reviewed and approved.
- There were no public comment received by the SC.
- Handouts provided included: Agenda, Meeting #3 summary, Draft RMHMP.

**Project Overview**

Rob Flaner began the discussion by indicating that the SC Meeting 6 doubled as a public meeting to review the Draft RMHMP. Carl stated that the public review period started on July 18th and would end on August 19th with an anticipated submittal to CalOES and FEMA by August 29th. From there, Carl said that Approval Pending Adoption is expected by October 18, with a target date to present the plan before City Council on November 2nd.

From there, Rob, provided an overview of the entire process and plan. He noted that this plan is a requirement to apply for certain federal funding programs – namely mitigation programs. Rob noted that the specific process undertaken by the City was driven by Community Rating System (CRS) requirements.

| Item | Action |
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Rob continued by explaining that the risk assessment conducted as part of this process is the hub of the mitigation wheel. He said that risk is probability multiplied by impact, and that the resulting ranking allowed the City to compare results and categorize hazards as high, medium, or low risk,

Rob next described the capability assessment. He said that the capability assessment serves a dual purpose. One purpose is to identify existing drivers and support for implementing mitigation strategies. The second purpose is to identify potential deficiencies that could be remedied as a mitigation item. He noted debris management as an example. He explained that the City identified the need for a debris management plan as a result of the previous capability assessment. As a result, a debris management plan was recommended and subsequently completed by the City.

Next, Rob described the importance of goals and objectives. He reminded the SC that this initiative is the third comprehensive update undertaken by the City. He noted that the goals and objectives from the previous plan were carried over into the 2016 plan with some minor adjustments to focus on climate change.

Finally, Carl and Wayne described the process for CEQA, namely the initial study/mitigated negative declaration designation (IS/MND). They indicated that pursuit of the IS/MND was based on the expectation that projects identified in the Plan would undergo a full CEQA review once they are initiated.

**Public Involvement Strategy**

During the discussion on public engagement, Jessica noted that a large part of the success of Roseville’s 2016 public engagement strategy was due to the successful implementation of Nextdoor as an outreach tool. She noted that the survey received a strong response in correlation with Nextdoor releases. Carl thanked the efforts of Helen and Jaime in coordinating the public outreach efforts.

**Action Items/Next Steps**

- Finalize plan based on public comments
- Submit to CalOES/FEMA for Review

With no further comments, the meeting adjourned at 7:00pm

# Exhibit B – City of Roseville Municipal Code 14.09

CITY OF ROSEVILLE CALIFORNIA

# Roseville Municipal Code

**Title 14 PUBLIC UTILITIES**

**Chapter 14.09 WATER CONSERVATION**

## 14.09.010 Short title.

This chapter may be cited as the Water Conservation and Drought Mitigation Ordinance. (Ord. 5311 § 2, 2014; Ord. 2413 § 2, 1991.)

## 14.09.020 General provisions.

A. Purpose. The purpose of this chapter is to ensure compliance with all federal, state and local requirements relating to water conservation and drought mitigation for the protection of public health, safety and welfare by:

1. Reducing the per capita water consumption throughout the City of Roseville (the "city") during years of normal precipitation and during years of drought;

2. Protecting and conserving the city's supply of water during specified times of emergency and/or crisis;

3. Minimizing and/or eliminating the waste of water through voluntary compliance or punitive action, if necessary;

4. Promoting the use of drip irrigation and other low volume irrigation methods that reduce outdoor water use by applying water more efficiently than traditional irrigation methods;

5. No person shall use, or cause to be used, any city water for landscape irrigation between the hours of 10:00 a.m. and 8:00 p.m., unless the city manager, or designee provides prior written consent to a different time limitation. A waiver may be granted for turf areas if the landscape contains too many irrigation valves to complete an irrigation event within the watering window.

6. Upon city declaration of a water shortage, the city manager, or designee, may impose revised and/or additional limitations on outdoor water use, as specified in Section 14.09.040, and no person shall use, or cause to be used, city water in violation of such limitations while the water shortage remains in effect.

B. Scope. The provisions of this chapter shall apply to all customers, users and/or recipients (hereinafter "users") of the city's potable and recycled water service within the city's territorial limits.

C. Administration and Enforcement. The city manager, or designee, including, but not limited to, an enforcement officer as defined herein, shall administer, implement, and enforce the provisions of this chapter. For purposes of this chapter an "enforcement officer" means any city employee or agent of the city with the authority to enforce any provision of this chapter and the authority to make any decision on behalf of the city manager required or called for by this chapter.

D. Compliance. All provisions of this chapter are subject to the compliance procedures set forth in this chapter unless otherwise expressly stated herein.

E. Notification. The city manager, or designee, shall determine the means by which the city shall notify its water users of drought stage determinations and any applicable upgrade or downgrade of such determinations or restrictions. Notification may be achieved through mass media, newspaper, public notice, mailings, utility billings or by any combination of such notice, or by other means as determined by the city manager, or designee. (Ord. 5491 § 1, 2015; Ord. 5311 § 2, 2014; Ord. 4629 § 1, 2008; Ord. 2413 § 2, 1991.)

## 14.09.030 Definition of water waste.

Any of the following acts or omissions, whether willful or negligent, shall constitute the waste of water:

A. Causing or permitting water to leak, discharge, flow or run to waste into any gutter, sanitary sewer, watercourse or public or private storm drain, or to any adjacent property, from any tap, hose, faucet, pipe, sprinkler, pond, pool, waterway, fountain or nozzle. In the case of irrigation, "discharge," "flow" or "run to waste"

means that the earth intended to be irrigated has been saturated with water to the point that excess water flows over or through the earth to waste. In the case of washing, "discharge," "flow" or "run to waste" means that water in excess of that necessary to wash, wet or clean the dirty or dusty object, such as an automobile, sidewalk, or parking area, flows to waste.

B. Allowing water fixtures (including, but not limited to, toilets, faucets, shower heads) or heating or cooling devices to leak or run to waste.

C. Maintaining ponds, waterways, decorative basins or swimming pools without water recirculation devices.

D. Backwashing so as to discharge to waste swimming pools, decorative basins or ponds in excess of the frequency necessary to ensure the healthful condition of the water or in excess of that required by standards for professionally administered maintenance or to address structural considerations, as determined by the city manager, or designee.

E. Operation of an irrigation system that applies water to an impervious surface or that is in disrepair.

F. Use of a water hose not equipped with a control nozzle capable of completely shutting off the flow of water except when positive pressure is applied.

G. Irrigation of landscaping during rainfall or 48 hours after a measurable rain event.

H. Overfilling of any pond, pool or fountain which results in water discharging to waste. (Ord. 5491 § 2, 2015; Ord. 5311 § 2, 2014; Ord. 4629 § 1, 2008; Ord. 3834 § 3, 2002; Ord. 2413 § 2, 1991.)

## 14.09.040 Water conservation and drought stages.

The following water conservation and drought stages are hereby established:

A. Basic Water Conservation Stage ("Basic Stage"). The basic stage shall exist when the city's water supply is adequate to meet all projected demands as determined by the city manager, or designee.

B. Stage One Drought. A stage one drought shall exist when the city's water supply is adequate to meet 90 percent of projected demands as determined by the city manager, or designee. An objective of a stage one drought condition is to reduce water usage up to 10 percent. Water shortage surcharges shall be implemented as set forth in Section 14.08.095.

C. Stage Two Drought. A stage two drought shall exist when the city's water supply is adequate to meet 80 percent of projected demands as determined by the city manager, or designee. An objective of a stage two drought condition is to reduce water usage up to 20 percent. Water shortage surcharges and excess water use charges shall be implemented as set forth in Section 14.08.095.

D. Stage Three Drought. A stage three drought shall exist when the city's water supply is adequate to meet 70 percent of projected demands as determined by the city manager or designee. An objective of a stage three drought condition is to reduce water usage up to 30 percent. Water shortage surcharges and excess water use charges shall be implemented as set forth in Section 14.08.095.

E. Stage Four Drought. A stage four drought shall exist when the city's water supply is adequate to meet 60 percent of projected demands as determined by the city manager or designee. An objective of a stage four drought condition is to reduce water usage up to 40 percent. Water shortage surcharges and excess water use charges shall be implemented as set forth in Section 14.08.095.

F. Stage Five Drought. A stage five drought shall exist when the city's water supply is adequate to meet 50 percent or less of projected demands as determined by the city manager, or designee. An objective of a stage five drought condition is to reduce water usage up to 50 percent. Water shortage surcharges and excess water use charges shall be implemented as set forth in Section 14.08.095. (Ord. 5491 § 3, 2015; Ord. 5311 § 2, 2014; Ord. 4724 § 3, 2009; Ord. 4629 § 1, 2008; Ord. 2413 § 2, 1991.)

### 14.09.050 Determination of drought staging—Effect of well water.

In determining the water conservation and drought stage in effect, the city manager, or designee, shall take into account only surface water available and able to be delivered from the Bureau of Reclamation and the Placer County Water Agency. Well water shall not be considered. In the event that this would result in a determination of a stage three drought or higher, groundwater wells may be activated to increase the supply to a stage two drought level. However, in no case shall well water be considered as an alternative to declaration of a stage one or stage two drought. (Ord. 5311 § 2, 2014; Ord. 4629 § 1, 2008; Ord. 2413 § 2, 1991.)

### 14.09.060 Basic stage restrictions.

During the basic water conservation stage, the following restrictions shall be in force:

Water shall be used for beneficial purposes only; all unnecessary and wasteful uses (as defined in Section 14.09.030) of water are prohibited.

A. Water shall be confined to the user's property and shall not be allowed to run off to adjoining properties, or to the roadside or to the gutter. Care shall be taken not to water past the point of saturation.

B. Free-flowing hoses for all uses are prohibited. Automatic shut-off devices shall be attached on any hose or filling apparatus in use.

C. All leaks (including irrigation systems, pipes, fixtures, pools, ponds, fountains and waterways) shall be repaired within five calendar days or less if warranted by the severity of the problem as determined in the discretion of the city manager, or designee.

D. All pools, spas, and ornamental fountains/ponds shall be equipped with a recirculation pump and shall be constructed to be leak-proof. Pool draining and refilling shall be allowed only to the extent required for health, maintenance, or structural considerations, and must otherwise comply with all applicable federal, state and local stormwater management program requirements, including, but not limited to, the urban stormwater quality management and discharge control ordinance set forth in Chapter 14.20 of Title 14 of the City of Roseville Municipal Code.

E. Landscaping.

1. All landscaping installed in the City of Roseville shall comply with the water efficient landscape requirements adopted by resolution of the city council.

2. Irrigation of new landscaping shall be allowed on any day of the week for a period of 30 days after the new landscaping is planted, unless the city manager, or designee, provides prior written consent to extend this time period based on plant type and the season when the new landscaping is planted. After the 30 days, irrigation days and run times should be decreased to settings appropriate for an established landscape.

3. Upon city declaration of a water shortage, the city manager may impose revised and/or additional limitations on the irrigation of new landscaping, as specified in Sections 14.09.060 through 14.09.100, and no person shall use, or cause to be used, city water in violation of such limitations while the water shortage remains in effect. A waiver may be granted to irrigate during an establishment period for actively used turf areas and/or sports fields. Allowance shall also be made for irrigation testing and repairs.

F. All site reviews shall include an evaluation of using recycled water. Recycled water shall be required if economically feasible. (Ord. 5491 § 4, 2015; Ord. 5311 § 2, 2014; Ord. 4629 § 1, 2008; Ord. 2762 § 1, 1993; Ord. 2413 § 2, 1991.)

## 14.09.070 Stage one drought restrictions.

During a stage one drought, the following restrictions may be required, as determined by the city manager and upon notification pursuant to Section 14.09.020(E):

A. All basic stage restrictions required by Sections 14.09.030 and 14.09.060 shall continue in place, except to the extent they are replaced by more restrictive conditions imposed by this section.

B. Residential users and non-residential users shall reduce water usage up to 10 percent.

C. Residential water users shall be permitted to irrigate with city water on the following schedule, unless the city manager, or designee, provides prior written consent to a different irrigation pattern:

1. 1st day of November – last day of February: up to one day per week irrigation on Monday of each week, if needed.

2. 1st day of March – last day of April and 1st day of September – last day of October: up to two days per week irrigation on Monday and Friday of each week, if needed.

3. 1st day of May – last day of August: up to three days per week irrigation on Monday, Wednesday and Friday of each week, if needed.

D. Nonresidential water users (including without limitation, commercial, industrial, church, cemeteries, and publicly owned users) shall be permitted to irrigate with city water on the following schedule, unless the city manager, or designee, provides prior written consent to a different irrigation pattern:

1. 1st day of November – last day of February: up to one day per week irrigation on Monday of each week, if needed.

2. 1st day of March – last day of April and 1st day of September – last day of October: up to two days per week irrigation on Monday and Thursday of each week, if needed.

3. 1st day of May – last day of August: up to three days per week irrigation on Monday, Thursday and Saturday of each week, if needed.

E. The limitations specified in subsections C and D shall not apply to a properly functioning low volume landscape irrigation system, the irrigation on container plants, or to the irrigation of new landscaping that is subject to the provisions of Section 14.09.060(E). Low volume irrigation means the application of irrigation water at low pressure through a system of tubing or lateral lines and low-volume emitters such as drip or drip lines irrigating at less than two gallons per hour. These systems are specifically designed to apply small volumes of water slowly at or near the root zone of plants.

F. References in this section to any day of the week shall mean the period beginning at 12:00 a.m. on that day and ending 24 hours later.

G. City park sites shall, as an aggregate, reduce usage up to 10 percent.

H. Washing streets, parking lots, driveways, sidewalks or buildings, except as necessary for health or sanitary purposes or pursuant to a term or condition in a permit issued by a state or federal agency, is prohibited.

I. Water shall not be served at restaurants except by request.

J. Water shortage surcharges shall be implemented as set forth in Section 14.08.095. (Ord. 5491 § 5, 2015; Ord. 5311 § 2, 2014; Ord. 4724 § 3, 2009; Ord. 4629 § 1, 2008; Ord. 2817 § 1, 1994; Ord. 2636 § 1, 1992; Ord. 2413 § 2, 1991.)

### 14.09.080 Stage two drought restrictions.

During a stage two drought, the following restrictions may be required, as determined by the city manager and upon notification pursuant to Section 14.09.020(E):

A. All basic stage and stage one restrictions required by Sections 14.09.060 and 14.09.070 shall continue in place, except to the extent they are replaced by more restrictive conditions imposed by this section.

B. Residential users and non-residential landscapes shall reduce water usage up to 20 percent.

C. City park sites shall, as an aggregate, reduce usage up to 20 percent.

D. Residential water users shall be permitted to irrigate with city water on the following schedule, unless the city manager, or designee, provides prior written consent to a different irrigation pattern:

1. 1st day of November – last day of February: up to one day per week irrigation on Monday of each week, if needed.

2. 1st day of March – last day of April and 1st day of September – last day of October: up to two days per week irrigation on Monday and Friday of each week, if needed.

3. 1st day of May – last day of August: up to three days per week irrigation on Monday, Wednesday and Friday of each week, if needed.

E. Nonresidential water users (including without limitation, commercial, industrial, church, cemeteries, and publicly owned users) shall be permitted to irrigate with city water on the following schedule, unless the city manager, or designee, provides prior written consent to a different irrigation pattern:

1. 1st day of November – last day of February: up to one day per week irrigation on Monday of each week, if needed.

2. 1st day of March – last day of April and 1st day of September – last day of October: up to two days per week irrigation on Monday and Thursday of each week, if needed.

3. 1st day of May – last day of August: up to three days per week irrigation on Monday, Thursday and Saturday of each week, if needed.

F. The limitations specified in subsections D and E shall not apply to a properly functioning low volume landscape irrigation system, the irrigation on container plants, or to the irrigation of new landscaping that is subject to the provisions of Section 14.09.060(E). Low volume irrigation means the application of irrigation water at low pressure through a system of tubing or lateral lines and low-volume emitters such as drip or drip lines irrigating at less than two gallons per hour. These systems are specifically designed to apply small volumes of water slowly at or near the root zone of plants.

G. References in this section to any day of the week shall mean the period beginning at 12:00 a.m. on that day and ending 24 hours later.

H. Washing of vehicles or boats is prohibited except:

1. When using a hose that is equipped with a control nozzle capable of completely shutting off the flow of water except when positive action or pressure to maintain the flow of water is applied; or

2. When washed in either an automatic or manual commercial car wash that recirculates its water and uses high pressure/low volume wash systems.

3. Temporary car washes, held for fundraising purposes, are encouraged to partner with an automatic commercial car wash that recirculates its water and uses high pressure/low volume wash systems. If run independently, the participants must use a hose nozzle that completely shuts off the flow of water when not in use and must comply with all applicable federal, state and local stormwater management program requirements, including, but not limited to, the urban stormwater quality management and discharge control ordinance set forth in Chapter 14.20 of Title 14 of the City of Roseville Municipal Code.

I. Water shortage surcharges and excess water use charges shall be implemented as set forth in Section 14.08.095. (Ord. 5491 § 6, 2015; Ord. 5311 § 2, 2014; Ord. 4724 § 3, 2009; Ord. 4629 § 1, 2008; Ord. 2611 § 1, 1992.)

## 14.09.090 Stage three drought restrictions.

During a stage three drought, the following restrictions may be required, as determined by the city manager and upon notification pursuant to Section 14.09.020(E):

A. All basic stage, stage one, and stage two restrictions required by Sections 14.09.060, 14.09.070 and 14.09.080 shall continue in place, except to the extent they are replaced by more restrictive conditions imposed by this section.

B. Residential users and non-residential landscapes are to reduce water usage up to 30 percent.

C. City park sites shall, as an aggregate, reduce usage up to 30 percent.

D. Residential water users shall be permitted to irrigate with city water on the following schedule, unless the city manager, or designee, provides prior written consent to a different irrigation pattern:

1. 1st day of September – last day of April: up to one day per week irrigation on Monday of each week, if needed.

2. 1st day of May – last day of August: up to two days per week irrigation on Monday and Friday of each week, if needed.

E. Nonresidential water users (including without limitation, commercial, industrial, church, cemeteries, and publicly owned users) shall be permitted to irrigate with city water on the following schedule, unless the city manager, or designee, provides prior written consent to a different irrigation pattern:

1. 1st day of September – last day of April: up to one day per week irrigation on Monday of each week, if needed.

2. 1st day of May – last day of August: up to two days per week irrigation on Monday and Thursday of each week, if needed.

F. The limitations specified in subsections D and E shall not apply to a properly functioning low volume landscape irrigation system, the irrigation on container plants, or to the irrigation of new landscaping that is subject to the provisions of Section 14.09.060(E). Low volume irrigation means the application of irrigation water at low pressure through a system of tubing or lateral lines and low-volume emitters such as drip or drip lines irrigating at less than two gallons per hour. These systems are specifically designed to apply small volumes of water slowly at or near the root zone of plants.

G. References in this section to any day of the week shall mean the period beginning at 12:00 a.m. on that day and ending 24 hours later.

H. New or expanded landscaping is limited to drought-tolerant trees, shrubs, and ground-cover and be irrigated using a low volume irrigation system. No new turf shall be planted, hydroseeded, or laid, unless prior written consent is received from the city manager. Low volume irrigation means the application of irrigation water at low pressure through a system of tubing or lateral lines and low-volume emitters such as drip or drip lines irrigating at less than two gallons per hour. These systems are specifically designed to apply small volumes of water slowly at or near the root zone of plants.

I. Except where recycled water is used, golf courses shall reduce irrigation up to 30 percent.

J. All decorative fountains, decorative (i.e., nonswimming) pools, and decorative waterways shall be drained and made dry. Such fountains, pools, and waterways shall not be refilled until the city has returned to the basic water conservation stage. Fountains, ponds or pools that are filled with recycled water are not subject to this provision. Decorative ponds that contain fish as a feature shall be exempt from this restriction as long as the system is maintained in good working order with measures taken to reduce the volume of makeup water required for evaporative losses.

K. Except where recycled or other non-potable water is used or as otherwise provided in this subsection, use of water for dust control is prohibited. Dust control shall be augmented by hardened, temporary travel routes with materials that are accepted by the city manager, city engineer, or designee. Potable water is allowed for construction water only where and to the extent required for public health and safety reasons.

L. New swimming pools and spas may be filled after construction using customer's metered water at then existing water rates. All new pools must include a means for minimizing evaporative loss, such as a pool cover, at time of final inspection by the city. After being filled with water for the first time, all pools and spas shall be subject to the requirements of Section 14.09.060(D).

M. Water shortage surcharges and excess water use charges shall be implemented as set forth in Section 14.08.095. (Ord. 5491 § 7, 2015; Ord. 5311 § 2, 2014; Ord. 4724 § 3, 2009; Ord. 4629 § 1, 2008; Ord. 2413 § 2, 1991.)

## 14.09.100 Stage four drought restrictions.

During a stage four drought, the following restrictions may be required, as determined by the city manager and upon notification pursuant to Section 14.09.020(E):

A. All basic stage, stage one, stage two, and stage three restrictions required by Sections 14.09.060, 14.09.070, 14.09.080 and 14.09.090 shall continue in place, except to the extent they are replaced by more restrictive conditions imposed by this section.

B. Residential customers and non-residential landscapes are to reduce water usage up to 40 percent.

C. City park sites shall, as an aggregate, reduce usage up to 40 percent.

D. Residential water users shall be permitted to irrigate with city water on the following schedule, unless the city manager, or designee, provides prior written consent to a different irrigation pattern:

1. 1st day of September – last day of April: No irrigation allowed.

2. 1st day of May – last day of August: up to one day per week irrigation on Monday, if needed.

E. Nonresidential water users (including without limitation, commercial, industrial, church, cemeteries, and publicly owned users) shall be permitted to irrigate with city water on the following schedule, unless the city manager, or designee, provides prior written consent to a different irrigation pattern:

1. 1st day of September – last day of April: No irrigation allowed.

2. 1st day of May – last day of August: up to one day per week irrigation on Monday of each week, if needed.

F. The limitations specified in subsections D and E shall not apply to a properly functioning low volume landscape irrigation system, the irrigation on container plants, or to the irrigation of new landscaping that is subject to the provisions of Section 14.09.060(E). Low volume irrigation means the application of irrigation water at low pressure through a system of tubing or lateral lines and low-volume emitters such as drip or drip lines irrigating at less than two gallons per hour. These systems are specifically designed to apply small volumes of water slowly at or near the root zone of plants.

G. References in this section to any day of the week shall mean the period beginning at 12:00 a.m. on that day and ending 24 hours later.

H. Installation of any new landscaping is prohibited unless irrigation is provided through connection to an active recycled water system. In the case of new construction, the city's building official will issue a temporary final upon completion of the structural development of the property. When the city has returned to a stage two drought restriction, landscaping installation can be completed and a building final will become available upon inspection by the city.

I. Except where recycled water is used, golf courses shall reduce irrigation up to 40 percent.

J. Automobiles or equipment shall be washed only at commercial establishments that recycle their water or by equipment and means that separates debris and recycles wash water for continual use.

K. Existing pools shall not be emptied and refilled using city water unless required for health or safety reasons until the city has returned to a stage two drought restriction. Pools may be re-filled only to the extent necessary to replace evaporative losses.

L. No commitments shall be made to provide water service as part of any new land use entitlement (general plan, specific plan or amendments requesting new water allocations) until the city has returned to a stage two drought restriction. Currently approved specific plans with accompanying development agreements and projects or properties that have received water allocations in advance of full entitlements may be issued building permits so long as they comply with the remainder of this chapter.

M. Water shortage surcharges and excess water use charges shall be implemented as set forth in Section 14.08.095. (Ord. 5491 § 8, 2015; Ord. 5311 § 2, 2014; Ord. 4724 § 3, 2009; Ord. 4629 § 1, 2008; Ord. 2413 § 2, 1991.)

## 14.09.110 Stage five drought restrictions.

During a stage five drought, the following restrictions may be required, as determined by the city manager and upon notification pursuant to Section 14.09.020(E):

A. All basic stage, or stage one, stage two, stage three and stage four restrictions required by Sections 14.09.060, 14.09.070, 14.09.080, 14.09.090 and 14.09.100 shall continue in place, except to the extent they are replaced by more restrictive conditions imposed by this section.

B. Residential users are to reduce water usage up to 50 percent.

C. Except where recycled water is used, water users shall reduce landscape irrigation as follows:

1. Turf shall not be irrigated.

2. Trees and shrubs may be irrigated with a properly functioning low volume landscape irrigation system or by use of a handheld hose equipped with a nozzle capable of completely shutting off the flow of water except when positive action or pressure to maintain the flow of water is applied. Low volume irrigation means the application of irrigation water at low pressure through a system of tubing or lateral lines and low-volume emitters such as drip or drip lines irrigating at less than two gallons per hour. These systems are specifically designed to apply small volumes of water slowly at or near the root zone of plants.

D. Filling new or existing swimming pools and spas with city water is prohibited.

E. Water shortage surcharges and excess water use charges shall be implemented as set forth in Section 14.08.095. (Ord. 5491 § 9, 2015; Ord. 5311 § 2, 2014; Ord. 4724 § 3, 2009; Ord. 4629 § 1, 2008; Ord. 2413 § 2, 1991.)

## 14.09.120 Determination of drought tolerance.

Where this chapter permits or prohibits acts based upon whether or not a planting, tree, shrub, or groundcover is "drought tolerant" the determination shall be made based upon Sunset's *Western Garden Book* (most recent edition), or UC Davis Arboretum's "All Stars" plant database (www.arboretum.ucdavis.edu). Where this chapter permits or prohibits acts based upon whether a form of irrigation is “low volume drip irrigation” the determination shall be made by the director, or designee, whose determination shall be final. (Ord. 5311 § 2, 2014; Ord. 4629 § 1, 2008; Ord. 2413 § 2, 1991.)

## 14.09.130 Determination of landscape water consumption reductions.

Whenever this chapter requires a reduction in consumption of water for irrigation purposes, the base year for measurement shall be the last year that the basic water conservation stage was in effect or a date specified by the Governor or state agency. If that data is not available for a property, allocations will be based on water use for similar properties. The city manager or designee may elect to base a reduction on the base year or on a landscape water consumption calculation if use was, in the city manager’s or designee’s, sole opinion, either excessive or extraordinarily low. For landscaping installed subsequent to the base year, the calculations shall be based on landscape water consumption calculations submitted with the landscape plan, or water consumption the previous year, whichever is less. (Ord. 5491 § 10, 2015; Ord. 5311 § 2, 2014; Ord. 4629 § 1, 2008; Ord. 2817 § 1, 1994; Ord. 2413 § 2, 1991.)

## 14.09.140 Violations.

It is unlawful for any user and/or person to violate any provision or fail to comply with any of the requirements of this chapter. Causing, permitting, aiding, abetting or concealing a violation of any provision of this chapter shall constitute a violation of this chapter. A violation of the provisions of this chapter shall occur irrespective of the negligence or intent of the violator and a violation of or failure to comply with any of the requirements of this chapter may be charged as either an infraction or a misdemeanor in the discretion of the city attorney. (Ord. 5311 § 2, 2014; Ord. 4629 § 1, 2008; Ord. 3834 § 3, 2002; Ord. 2413 § 2, 1991.)

## 14.09.150 Enforcement authority.

A. Whenever the city manager, or designee (including, but not limited to, an enforcement officer), determines that a user and/or person has violated any provision of, or failed to meet a requirement of, this chapter, an administrative citation pursuant to Chapter 2.50 or a written compliance order pursuant to Chapter 2.52 may be issued to any user and/or person responsible for the violation.

B. Any compliance order issued may require without limitation any or all of the following:

1. The allocation of a particular amount of water to a given user and/or person responsible for the violation;
2. The issuance of a fine;
3. The installation of a flow restriction device;
4. The performance of monitoring, analyses, and reporting;
5. That violations shall cease and desist; and/or
6. The discontinuation of water service.

The compliance order shall set forth a deadline within which the requirements of the compliance order must be completed. Said compliance order shall further advise that, should the violator fail to comply with the compliance order within the established deadline, a hearing on the compliance order shall be set.

(Ord. 5491 § 11, 2015; Ord. 5311 § 2, 2014; Ord. 4629 § 1, 2008; Ord. 3034 § 3, 2002; Ord. 2817 § 1, 1994; Ord. 2413 § 2, 1991.)

### 14.09.160 Hearing.

If full compliance is not achieved within the time specified in the compliance order, a hearing on the compliance order shall be set pursuant to Chapter 2.52. All penalties and remedies authorized by Chapter 2.52 shall apply to violations of this chapter. (Ord. 5311 § 2, 2014; Ord. 4629 § 1, 2008; Ord. 2413 § 2, 1991.)

### 14.09.170 Appeal.

Any user and/or person receiving a compliance order under Section 14.09.150 may appeal the determination of the director, or designee, to a hearing panel drawn from the membership of the board of appeals. The notice of appeal must be received by the city's environmental utilities department within 10 days from the date of the compliance order. Notice of hearing and hearing on the appeal will be conducted pursuant to the requirements of Chapter 2.52. (Ord. 5311 § 2, 2014; Ord. 4629 § 1, 2008; Ord. 2413 § 2, 1991.)

### 14.09.180 Separate offense for each day.

Any user and/or person that violates any provision of this chapter shall be guilty of a separate offense for each and every day during any portion of which any such user and/or person commits, continues, permits, or causes a violation thereof, and shall be punished accordingly. (Ord. 5311 § 2, 2014; Ord. 4629 § 1, 2008; Ord. 2413 § 2, 1991.)

### 14.09.190 Public nuisance.

In addition to the enforcement processes and penalties hereinbefore provided, any condition caused or permitted to exist in violation of any of the provisions of this chapter is a threat to public health, safety, and welfare, and is declared and deemed a nuisance, and may be summarily abated or restored by the city at the violator's expense, and/or a civil action to abate, enjoin, or otherwise compel the cessation of such nuisance may be initiated and/or taken by the city. (Ord. 5311 § 2, 2014; Ord. 4629 § 1, 2008; Ord. 2413 § 2, 1991.)

### 14.09.200 Remedies not exclusive.

Remedies under this chapter are in addition to and do not supersede or limit any and all other remedies, civil or criminal. The remedies provided for herein shall be cumulative and not exclusive. (Ord. 5311 § 2, 2014; Ord. 4629 § 2, 2008.)

### 14.09.210 Judicial review.

Any decision of the hearing panel shall be final. Any user and/or person aggrieved by an order of the hearing panel may obtain review of the order in the Superior Court by filing with the Court a petition for writ of mandate within 90 days pursuant to California Code of Civil Procedure Section 1094.6. (Ord. 5311 § 2, 2014; Ord. 4629 § 2, 2008.)

### 14.09.220 Chapter severable.

The provisions of this chapter are severable. The city council declares that it would have adopted the remainder of this chapter even if any of its provisions are declared unlawful or unenforceable. (Ord. 5311 § 2, 2014; Ord. 4629 § 2, 2008.)

# Exhibit C – Adoption Resolution

A copy of the adoption resolution will be included in the adopted version of the Water Shortage Contingency Plan.

# Appendix L – Roseville Municipal Code 14.09

## Roseville Municipal Code

**Title 14 PUBLIC UTILITIES**

**Chapter 14.09 WATER CONSERVATION**

### 14.09.010 Short title.

This chapter may be cited as the Water Conservation and Drought Mitigation Ordinance. (Ord. 5311 § 2, 2014; Ord. 2413 § 2, 1991.)

### 14.09.020 General provisions.

A. Purpose. The purpose of this chapter is to ensure compliance with all federal, state and local requirements relating to water conservation and drought mitigation for the protection of public health, safety and welfare by:

1. Reducing the per capita water consumption throughout the City of Roseville (the "city") during years of normal precipitation and during years of drought;

2. Protecting and conserving the city's supply of water during specified times of emergency and/or crisis;

3. Minimizing and/or eliminating the waste of water through voluntary compliance or punitive action, if necessary;

4. Promoting the use of drip irrigation and other low volume irrigation methods that reduce outdoor water use by applying water more efficiently than traditional irrigation methods;

5. No person shall use, or cause to be used, any city water for landscape irrigation between the hours of 10:00 a.m. and 8:00 p.m., unless the city manager, or designee provides prior written consent to a different time limitation. A waiver may be granted for turf areas if the landscape contains too many irrigation valves to complete an irrigation event within the watering window.

6. Upon city declaration of a water shortage, the city manager, or designee, may impose revised and/or additional limitations on outdoor water use, as specified in Section 14.09.040, and no person shall use, or cause to be used, city water in violation of such limitations while the water shortage remains in effect.

B. Scope. The provisions of this chapter shall apply to all customers, users and/or recipients (hereinafter "users") of the city's potable and recycled water service within the city's territorial limits.

C. Administration and Enforcement. The city manager, or designee, including, but not limited to, an enforcement officer as defined herein, shall administer, implement, and enforce the provisions of this chapter. For purposes of this chapter an "enforcement officer" means any city employee or agent of the city with the authority to enforce any provision of this chapter and the authority to make any decision on behalf of the city manager required or called for by this chapter.

D. Compliance. All provisions of this chapter are subject to the compliance procedures set forth in this chapter unless otherwise expressly stated herein.

E. Notification. The city manager, or designee, shall determine the means by which the city shall notify its water users of drought stage determinations and any applicable upgrade or downgrade of such determinations or restrictions. Notification may be achieved through mass media, newspaper, public notice, mailings, utility billings or by any combination of such notice, or by other means as determined by the city manager, or designee. (Ord. 5491 § 1, 2015; Ord. 5311 § 2, 2014; Ord. 4629 § 1, 2008; Ord. 2413 § 2, 1991.)

## 14.09.030 Definition of water waste.

Any of the following acts or omissions, whether willful or negligent, shall constitute the waste of water:

A. Causing or permitting water to leak, discharge, flow or run to waste into any gutter, sanitary sewer, watercourse or public or private storm drain, or to any adjacent property, from any tap, hose, faucet, pipe, sprinkler, pond, pool, waterway, fountain or nozzle. In the case of irrigation, "discharge," "flow" or "run to waste"

means that the earth intended to be irrigated has been saturated with water to the point that excess water flows over or through the earth to waste. In the case of washing, "discharge," "flow" or "run to waste" means that water in excess of that necessary to wash, wet or clean the dirty or dusty object, such as an automobile, sidewalk, or parking area, flows to waste.

B. Allowing water fixtures (including, but not limited to, toilets, faucets, shower heads) or heating or cooling devices to leak or run to waste.

C. Maintaining ponds, waterways, decorative basins or swimming pools without water recirculation devices.

D. Backwashing so as to discharge to waste swimming pools, decorative basins or ponds in excess of the frequency necessary to ensure the healthful condition of the water or in excess of that required by standards for professionally administered maintenance or to address structural considerations, as determined by the city manager, or designee.

E. Operation of an irrigation system that applies water to an impervious surface or that is in disrepair.

F. Use of a water hose not equipped with a control nozzle capable of completely shutting off the flow of water except when positive pressure is applied.

G. Irrigation of landscaping during rainfall or 48 hours after a measurable rain event.

H. Overfilling of any pond, pool or fountain which results in water discharging to waste. (Ord. 5491 § 2, 2015; Ord. 5311 § 2, 2014; Ord. 4629 § 1, 2008; Ord. 3834 § 3, 2002; Ord. 2413 § 2, 1991.)

## 14.09.040 Water conservation and drought stages.

The following water conservation and drought stages are hereby established:

A. Basic Water Conservation Stage ("Basic Stage"). The basic stage shall exist when the city's water supply is adequate to meet all projected demands as determined by the city manager, or designee.

B. Stage One Drought. A stage one drought shall exist when the city's water supply is adequate to meet 90 percent of projected demands as determined by the city manager, or designee. An objective of a stage one drought condition is to reduce water usage up to 10 percent. Water shortage surcharges shall be implemented as set forth in Section 14.08.095.

C. Stage Two Drought. A stage two drought shall exist when the city's water supply is adequate to meet 80 percent of projected demands as determined by the city manager, or designee. An objective of a stage two drought condition is to reduce water usage up to 20 percent. Water shortage surcharges and excess water use charges shall be implemented as set forth in Section 14.08.095.

D. Stage Three Drought. A stage three drought shall exist when the city's water supply is adequate to meet 70 percent of projected demands as determined by the city manager or designee. An objective of a stage three drought condition is to reduce water usage up to 30 percent. Water shortage surcharges and excess water use charges shall be implemented as set forth in Section 14.08.095.

E. Stage Four Drought. A stage four drought shall exist when the city's water supply is adequate to meet 60 percent of projected demands as determined by the city manager or designee. An objective of a stage four drought condition is to reduce water usage up to 40 percent. Water shortage surcharges and excess water use charges shall be implemented as set forth in Section 14.08.095.

F. Stage Five Drought. A stage five drought shall exist when the city's water supply is adequate to meet 50 percent or less of projected demands as determined by the city manager, or designee. An objective of a stage five drought condition is to reduce water usage up to 50 percent. Water shortage surcharges and excess water use charges shall be implemented as set forth in Section 14.08.095. (Ord. 5491 § 3, 2015; Ord. 5311 § 2, 2014; Ord. 4724 § 3, 2009; Ord. 4629 § 1, 2008; Ord. 2413 § 2, 1991.)

### 14.09.050 Determination of drought staging—Effect of well water.

In determining the water conservation and drought stage in effect, the city manager, or designee, shall take into account only surface water available and able to be delivered from the Bureau of Reclamation and the Placer County Water Agency. Well water shall not be considered. In the event that this would result in a determination of a stage three drought or higher, groundwater wells may be activated to increase the supply to a stage two drought level. However, in no case shall well water be considered as an alternative to declaration of a stage one or stage two drought. (Ord. 5311 § 2, 2014; Ord. 4629 § 1, 2008; Ord. 2413 § 2, 1991.)

### 14.09.060 Basic stage restrictions.

During the basic water conservation stage, the following restrictions shall be in force:

Water shall be used for beneficial purposes only; all unnecessary and wasteful uses (as defined in Section 14.09.030) of water are prohibited.

A. Water shall be confined to the user's property and shall not be allowed to run off to adjoining properties, or to the roadside or to the gutter. Care shall be taken not to water past the point of saturation.

B. Free-flowing hoses for all uses are prohibited. Automatic shut-off devices shall be attached on any hose or filling apparatus in use.

C. All leaks (including irrigation systems, pipes, fixtures, pools, ponds, fountains and waterways) shall be repaired within five calendar days or less if warranted by the severity of the problem as determined in the discretion of the city manager, or designee.

D. All pools, spas, and ornamental fountains/ponds shall be equipped with a recirculation pump and shall be constructed to be leak-proof. Pool draining and refilling shall be allowed only to the extent required for health, maintenance, or structural considerations, and must otherwise comply with all applicable federal, state and local stormwater management program requirements, including, but not limited to, the urban stormwater quality management and discharge control ordinance set forth in Chapter 14.20 of Title 14 of the City of Roseville Municipal Code.

E. Landscaping.

1. All landscaping installed in the City of Roseville shall comply with the water efficient landscape requirements adopted by resolution of the city council.

2. Irrigation of new landscaping shall be allowed on any day of the week for a period of 30 days after the new landscaping is planted, unless the city manager, or designee, provides prior written consent to extend this time period based on plant type and the season when the new landscaping is planted. After the 30 days, irrigation days and run times should be decreased to settings appropriate for an established landscape.

3. Upon city declaration of a water shortage, the city manager may impose revised and/or additional limitations on the irrigation of new landscaping, as specified in Sections 14.09.060 through 14.09.100, and no person shall use, or cause to be used, city water in violation of such limitations while the water shortage remains in effect. A waiver may be granted to irrigate during an establishment period for actively used turf areas and/or sports fields. Allowance shall also be made for irrigation testing and repairs.

F. All site reviews shall include an evaluation of using recycled water. Recycled water shall be required if economically feasible. (Ord. 5491 § 4, 2015; Ord. 5311 § 2, 2014; Ord. 4629 § 1, 2008; Ord. 2762 § 1, 1993; Ord. 2413 § 2, 1991.)

## 14.09.070 Stage one drought restrictions.

During a stage one drought, the following restrictions may be required, as determined by the city manager and upon notification pursuant to Section 14.09.020(E):

A. All basic stage restrictions required by Sections 14.09.030 and 14.09.060 shall continue in place, except to the extent they are replaced by more restrictive conditions imposed by this section.

B. Residential users and non-residential users shall reduce water usage up to 10 percent.

C. Residential water users shall be permitted to irrigate with city water on the following schedule, unless the city manager, or designee, provides prior written consent to a different irrigation pattern:

1. 1st day of November – last day of February: up to one day per week irrigation on Monday of each week, if needed.

2. 1st day of March – last day of April and 1st day of September – last day of October: up to two days per week irrigation on Monday and Friday of each week, if needed.

3. 1st day of May – last day of August: up to three days per week irrigation on Monday, Wednesday and Friday of each week, if needed.

D. Nonresidential water users (including without limitation, commercial, industrial, church, cemeteries, and publicly owned users) shall be permitted to irrigate with city water on the following schedule, unless the city manager, or designee, provides prior written consent to a different irrigation pattern:

1. 1st day of November – last day of February: up to one day per week irrigation on Monday of each week, if needed.

2. 1st day of March – last day of April and 1st day of September – last day of October: up to two days per week irrigation on Monday and Thursday of each week, if needed.

3. 1st day of May – last day of August: up to three days per week irrigation on Monday, Thursday and Saturday of each week, if needed.

E. The limitations specified in subsections C and D shall not apply to a properly functioning low volume landscape irrigation system, the irrigation on container plants, or to the irrigation of new landscaping that is subject to the provisions of Section 14.09.060(E). Low volume irrigation means the application of irrigation water at low pressure through a system of tubing or lateral lines and low-volume emitters such as drip or drip lines irrigating at less than two gallons per hour. These systems are specifically designed to apply small volumes of water slowly at or near the root zone of plants.

F. References in this section to any day of the week shall mean the period beginning at 12:00 a.m. on that day and ending 24 hours later.

G. City park sites shall, as an aggregate, reduce usage up to 10 percent.

H. Washing streets, parking lots, driveways, sidewalks or buildings, except as necessary for health or sanitary purposes or pursuant to a term or condition in a permit issued by a state or federal agency, is prohibited.

I. Water shall not be served at restaurants except by request.

J. Water shortage surcharges shall be implemented as set forth in Section 14.08.095. (Ord. 5491 § 5, 2015; Ord. 5311 § 2, 2014; Ord. 4724 § 3, 2009; Ord. 4629 § 1, 2008; Ord. 2817 § 1, 1994; Ord. 2636 § 1, 1992; Ord. 2413 § 2, 1991.)

### 14.09.080 Stage two drought restrictions.

During a stage two drought, the following restrictions may be required, as determined by the city manager and upon notification pursuant to Section 14.09.020(E):

A. All basic stage and stage one restrictions required by Sections 14.09.060 and 14.09.070 shall continue in place, except to the extent they are replaced by more restrictive conditions imposed by this section.

B. Residential users and non-residential landscapes shall reduce water usage up to 20 percent.

C. City park sites shall, as an aggregate, reduce usage up to 20 percent.

D. Residential water users shall be permitted to irrigate with city water on the following schedule, unless the city manager, or designee, provides prior written consent to a different irrigation pattern:

1. 1st day of November – last day of February: up to one day per week irrigation on Monday of each week, if needed.

2. 1st day of March – last day of April and 1st day of September – last day of October: up to two days per week irrigation on Monday and Friday of each week, if needed.

3. 1st day of May – last day of August: up to three days per week irrigation on Monday, Wednesday and Friday of each week, if needed.

E. Nonresidential water users (including without limitation, commercial, industrial, church, cemeteries, and publicly owned users) shall be permitted to irrigate with city water on the following schedule, unless the city manager, or designee, provides prior written consent to a different irrigation pattern:

1. 1st day of November – last day of February: up to one day per week irrigation on Monday of each week, if needed.

2. 1st day of March – last day of April and 1st day of September – last day of October: up to two days per week irrigation on Monday and Thursday of each week, if needed.

3. 1st day of May – last day of August: up to three days per week irrigation on Monday, Thursday and Saturday of each week, if needed.

F. The limitations specified in subsections D and E shall not apply to a properly functioning low volume landscape irrigation system, the irrigation on container plants, or to the irrigation of new landscaping that is subject to the provisions of Section 14.09.060(E). Low volume irrigation means the application of irrigation water at low pressure through a system of tubing or lateral lines and low-volume emitters such as drip or drip lines irrigating at less than two gallons per hour. These systems are specifically designed to apply small volumes of water slowly at or near the root zone of plants.

G. References in this section to any day of the week shall mean the period beginning at 12:00 a.m. on that day and ending 24 hours later.

H. Washing of vehicles or boats is prohibited except:

1. When using a hose that is equipped with a control nozzle capable of completely shutting off the flow of water except when positive action or pressure to maintain the flow of water is applied; or

2. When washed in either an automatic or manual commercial car wash that recirculates its water and uses high pressure/low volume wash systems.

3. Temporary car washes, held for fundraising purposes, are encouraged to partner with an automatic commercial car wash that recirculates its water and uses high pressure/low volume wash systems. If run independently, the participants must use a hose nozzle that completely shuts off the flow of water when not in use and must comply with all applicable federal, state and local stormwater management program requirements, including, but not limited to, the urban stormwater quality management and discharge control ordinance set forth in Chapter 14.20 of Title 14 of the City of Roseville Municipal Code.

I. Water shortage surcharges and excess water use charges shall be implemented as set forth in Section 14.08.095. (Ord. 5491 § 6, 2015; Ord. 5311 § 2, 2014; Ord. 4724 § 3, 2009; Ord. 4629 § 1, 2008; Ord. 2611 § 1, 1992.)

## 14.09.090 Stage three drought restrictions.

During a stage three drought, the following restrictions may be required, as determined by the city manager and upon notification pursuant to Section 14.09.020(E):

A. All basic stage, stage one, and stage two restrictions required by Sections 14.09.060, 14.09.070 and 14.09.080 shall continue in place, except to the extent they are replaced by more restrictive conditions imposed by this section.

B. Residential users and non-residential landscapes are to reduce water usage up to 30 percent.

C. City park sites shall, as an aggregate, reduce usage up to 30 percent.

D. Residential water users shall be permitted to irrigate with city water on the following schedule, unless the city manager, or designee, provides prior written consent to a different irrigation pattern:

1. 1st day of September – last day of April: up to one day per week irrigation on Monday of each week, if needed.

2. 1st day of May – last day of August: up to two days per week irrigation on Monday and Friday of each week, if needed.

E. Nonresidential water users (including without limitation, commercial, industrial, church, cemeteries, and publicly owned users) shall be permitted to irrigate with city water on the following schedule, unless the city manager, or designee, provides prior written consent to a different irrigation pattern:

1. 1st day of September – last day of April: up to one day per week irrigation on Monday of each week, if needed.

2. 1st day of May – last day of August: up to two days per week irrigation on Monday and Thursday of each week, if needed.

F. The limitations specified in subsections D and E shall not apply to a properly functioning low volume landscape irrigation system, the irrigation on container plants, or to the irrigation of new landscaping that is subject to the provisions of Section 14.09.060(E). Low volume irrigation means the application of irrigation water at low pressure through a system of tubing or lateral lines and low-volume emitters such as drip or drip lines irrigating at less than two gallons per hour. These systems are specifically designed to apply small volumes of water slowly at or near the root zone of plants.

G. References in this section to any day of the week shall mean the period beginning at 12:00 a.m. on that day and ending 24 hours later.

H. New or expanded landscaping is limited to drought-tolerant trees, shrubs, and ground-cover and be irrigated using a low volume irrigation system. No new turf shall be planted, hydroseeded, or laid, unless prior written consent is received from the city manager. Low volume irrigation means the application of irrigation water at low pressure through a system of tubing or lateral lines and low-volume emitters such as drip or drip lines irrigating at less than two gallons per hour. These systems are specifically designed to apply small volumes of water slowly at or near the root zone of plants.

I. Except where recycled water is used, golf courses shall reduce irrigation up to 30 percent.

J. All decorative fountains, decorative (i.e., nonswimming) pools, and decorative waterways shall be drained and made dry. Such fountains, pools, and waterways shall not be refilled until the city has returned to the basic water conservation stage. Fountains, ponds or pools that are filled with recycled water are not subject to this provision. Decorative ponds that contain fish as a feature shall be exempt from this restriction as long as the system is maintained in good working order with measures taken to reduce the volume of makeup water required for evaporative losses.

K. Except where recycled or other non-potable water is used or as otherwise provided in this subsection, use of water for dust control is prohibited. Dust control shall be augmented by hardened, temporary travel routes with materials that are accepted by the city manager, city engineer, or designee. Potable water is allowed for construction water only where and to the extent required for public health and safety reasons.

L. New swimming pools and spas may be filled after construction using customer's metered water at then existing water rates. All new pools must include a means for minimizing evaporative loss, such as a pool cover, at time of final inspection by the city. After being filled with water for the first time, all pools and spas shall be subject to the requirements of Section 14.09.060(D).

M. Water shortage surcharges and excess water use charges shall be implemented as set forth in Section 14.08.095. (Ord. 5491 § 7, 2015; Ord. 5311 § 2, 2014; Ord. 4724 § 3, 2009; Ord. 4629 § 1, 2008; Ord. 2413 § 2, 1991.)

## 14.09.100 Stage four drought restrictions.

During a stage four drought, the following restrictions may be required, as determined by the city manager and upon notification pursuant to Section 14.09.020(E):

A. All basic stage, stage one, stage two, and stage three restrictions required by Sections 14.09.060, 14.09.070, 14.09.080 and 14.09.090 shall continue in place, except to the extent they are replaced by more restrictive conditions imposed by this section.

B. Residential customers and non-residential landscapes are to reduce water usage up to 40 percent.

C. City park sites shall, as an aggregate, reduce usage up to 40 percent.

D. Residential water users shall be permitted to irrigate with city water on the following schedule, unless the city manager, or designee, provides prior written consent to a different irrigation pattern:

1. 1st day of September – last day of April: No irrigation allowed.

2. 1st day of May – last day of August: up to one day per week irrigation on Monday, if needed.

E. Nonresidential water users (including without limitation, commercial, industrial, church, cemeteries, and publicly owned users) shall be permitted to irrigate with city water on the following schedule, unless the city manager, or designee, provides prior written consent to a different irrigation pattern:

1. 1st day of September – last day of April: No irrigation allowed.

2. 1st day of May – last day of August: up to one day per week irrigation on Monday of each week, if needed.

F. The limitations specified in subsections D and E shall not apply to a properly functioning low volume landscape irrigation system, the irrigation on container plants, or to the irrigation of new landscaping that is subject to the provisions of Section 14.09.060(E). Low volume irrigation means the application of irrigation water at low pressure through a system of tubing or lateral lines and low-volume emitters such as drip or drip lines irrigating at less than two gallons per hour. These systems are specifically designed to apply small volumes of water slowly at or near the root zone of plants.

G. References in this section to any day of the week shall mean the period beginning at 12:00 a.m. on that day and ending 24 hours later.

H. Installation of any new landscaping is prohibited unless irrigation is provided through connection to an active recycled water system. In the case of new construction, the city's building official will issue a temporary final upon completion of the structural development of the property. When the city has returned to a stage two drought restriction, landscaping installation can be completed and a building final will become available upon inspection by the city.

I. Except where recycled water is used, golf courses shall reduce irrigation up to 40 percent.

J. Automobiles or equipment shall be washed only at commercial establishments that recycle their water or by equipment and means that separates debris and recycles wash water for continual use.

K. Existing pools shall not be emptied and refilled using city water unless required for health or safety reasons until the city has returned to a stage two drought restriction. Pools may be re-filled only to the extent necessary to replace evaporative losses.

L. No commitments shall be made to provide water service as part of any new land use entitlement (general plan, specific plan or amendments requesting new water allocations) until the city has returned to a stage two drought restriction. Currently approved specific plans with accompanying development agreements and projects or properties that have received water allocations in advance of full entitlements may be issued building permits so long as they comply with the remainder of this chapter.

M. Water shortage surcharges and excess water use charges shall be implemented as set forth in Section 14.08.095. (Ord. 5491 § 8, 2015; Ord. 5311 § 2, 2014; Ord. 4724 § 3, 2009; Ord. 4629 § 1, 2008; Ord. 2413 § 2, 1991.)

## 14.09.110 Stage five drought restrictions.

During a stage five drought, the following restrictions may be required, as determined by the city manager and upon notification pursuant to Section 14.09.020(E):

A. All basic stage, or stage one, stage two, stage three and stage four restrictions required by Sections 14.09.060, 14.09.070, 14.09.080, 14.09.090 and 14.09.100 shall continue in place, except to the extent they are replaced by more restrictive conditions imposed by this section.

B. Residential users are to reduce water usage up to 50 percent.

C. Except where recycled water is used, water users shall reduce landscape irrigation as follows:

1. Turf shall not be irrigated.

2. Trees and shrubs may be irrigated with a properly functioning low volume landscape irrigation system or by use of a handheld hose equipped with a nozzle capable of completely shutting off the flow of water except when positive action or pressure to maintain the flow of water is applied. Low volume irrigation means the application of irrigation water at low pressure through a system of tubing or lateral lines and low-volume emitters such as drip or drip lines irrigating at less than two gallons per hour. These systems are specifically designed to apply small volumes of water slowly at or near the root zone of plants.

D. Filling new or existing swimming pools and spas with city water is prohibited.

E. Water shortage surcharges and excess water use charges shall be implemented as set forth in Section 14.08.095. (Ord. 5491 § 9, 2015; Ord. 5311 § 2, 2014; Ord. 4724 § 3, 2009; Ord. 4629 § 1, 2008; Ord. 2413 § 2, 1991.)

## 14.09.120 Determination of drought tolerance.

Where this chapter permits or prohibits acts based upon whether or not a planting, tree, shrub, or groundcover is "drought tolerant" the determination shall be made based upon Sunset's *Western Garden Book* (most recent edition), or UC Davis Arboretum's "All Stars" plant database (www.arboretum.ucdavis.edu). Where this chapter permits or prohibits acts based upon whether a form of irrigation is "low volume drip irrigation" the determination shall be made by the director, or designee, whose determination shall be final. (Ord. 5311 § 2, 2014; Ord. 4629 § 1, 2008; Ord. 2413 § 2, 1991.)

### 14.09.130 Determination of landscape water consumption reductions.

Whenever this chapter requires a reduction in consumption of water for irrigation purposes, the base year for measurement shall be the last year that the basic water conservation stage was in effect or a date specified by the Governor or state agency. If that data is not available for a property, allocations will be based on water use for similar properties. The city manager or designee may elect to base a reduction on the base year or on a landscape water consumption calculation if use was, in the city manager's or designee's, sole opinion, either excessive or extraordinarily low. For landscaping installed subsequent to the base year, the calculations shall be based on landscape water consumption calculations submitted with the landscape plan, or water consumption the previous year, whichever is less. (Ord. 5491 § 10, 2015; Ord. 5311 § 2, 2014; Ord. 4629 § 1, 2008; Ord. 2817 § 1, 1994; Ord. 2413 § 2, 1991.)

### 14.09.140 Violations.

It is unlawful for any user and/or person to violate any provision or fail to comply with any of the requirements of this chapter. Causing, permitting, aiding, abetting or concealing a violation of any provision of this chapter shall constitute a violation of this chapter. A violation of the provisions of this chapter shall occur irrespective of the negligence or intent of the violator and a violation of or failure to comply with any of the requirements of this chapter may be charged as either an infraction or a misdemeanor in the discretion of the city attorney. (Ord. 5311 § 2, 2014; Ord. 4629 § 1, 2008; Ord. 3834 § 3, 2002; Ord. 2413 § 2, 1991.)

### 14.09.150 Enforcement authority.

A. Whenever the city manager, or designee (including, but not limited to, an enforcement officer), determines that a user and/or person has violated any provision of, or failed to meet a requirement of, this chapter, an administrative citation pursuant to Chapter 2.50 or a written compliance order pursuant to Chapter 2.52 may be issued to any user and/or person responsible for the violation.

B. Any compliance order issued may require without limitation any or all of the following:

1. The allocation of a particular amount of water to a given user and/or person responsible for the violation;

2. The issuance of a fine;

3. The installation of a flow restriction device;

4. The performance of monitoring, analyses, and reporting;

5. That violations shall cease and desist; and/or

6. The discontinuation of water service.

The compliance order shall set forth a deadline within which the requirements of the compliance order must be completed. Said compliance order shall further advise that, should the violator fail to comply with the compliance order within the established deadline, a hearing on the compliance order shall be set.

(Ord. 5491 § 11, 2015; Ord. 5311 § 2, 2014; Ord. 4629 § 1, 2008; Ord. 3034 § 3, 2002; Ord. 2817 § 1, 1994; Ord. 2413 § 2, 1991.)

### 14.09.160 Hearing.

If full compliance is not achieved within the time specified in the compliance order, a hearing on the compliance order shall be set pursuant to Chapter 2.52. All penalties and remedies authorized by Chapter 2.52 shall apply to violations of this chapter. (Ord. 5311 § 2, 2014; Ord. 4629 § 1, 2008; Ord. 2413 § 2, 1991.)

### 14.09.170 Appeal.

Any user and/or person receiving a compliance order under Section 14.09.150 may appeal the determination of the director, or designee, to a hearing panel drawn from the membership of the board of appeals. The notice of appeal must be received by the city's environmental utilities department within 10 days from the date of the compliance order. Notice of hearing and hearing on the appeal will be conducted pursuant to the requirements of Chapter 2.52. (Ord. 5311 § 2, 2014; Ord. 4629 § 1, 2008; Ord. 2413 § 2, 1991.)

### 14.09.180 Separate offense for each day.

Any user and/or person that violates any provision of this chapter shall be guilty of a separate offense for each and every day during any portion of which any such user and/or person commits, continues, permits, or causes a violation thereof, and shall be punished accordingly. (Ord. 5311 § 2, 2014; Ord. 4629 § 1, 2008; Ord. 2413 § 2, 1991.)

### 14.09.190 Public nuisance.

In addition to the enforcement processes and penalties hereinbefore provided, any condition caused or permitted to exist in violation of any of the provisions of this chapter is a threat to public health, safety, and welfare, and is declared and deemed a nuisance, and may be summarily abated or restored by the city at the violator's expense, and/or a civil action to abate, enjoin, or otherwise compel the cessation of such nuisance may be initiated and/or taken by the city. (Ord. 5311 § 2, 2014; Ord. 4629 § 1, 2008; Ord. 2413 § 2, 1991.)

### 14.09.200 Remedies not exclusive.

Remedies under this chapter are in addition to and do not supersede or limit any and all other remedies, civil or criminal. The remedies provided for herein shall be cumulative and not exclusive. (Ord. 5311 § 2, 2014; Ord. 4629 § 2, 2008.)

### 14.09.210 Judicial review.

Any decision of the hearing panel shall be final. Any user and/or person aggrieved by an order of the hearing panel may obtain review of the order in the Superior Court by filing with the Court a petition for writ of mandate within 90 days pursuant to California Code of Civil Procedure Section 1094.6. (Ord. 5311 § 2, 2014; Ord. 4629 § 2, 2008.)

### 14.09.220 Chapter severable.

The provisions of this chapter are severable. The city council declares that it would have adopted the remainder of this chapter even if any of its provisions are declared unlawful or unenforceable. (Ord. 5311 § 2, 2014; Ord. 4629 § 2, 2008.)

# Appendix M – Roseville Municipal Code 14.08.090, 14.08.095, 14.08.100

# Roseville Municipal Code

**Title 14 PUBLIC UTILITIES**

**Chapter 14.08 WATER**

## 14.08.090 Service charges for metered service.

There shall be due and payable the following monthly charges, upon submission of the bill by the city to the owner of the property supplied with service, for all treated water measured by meters for residential, commercial, industrial and manufacturing or other purposes:

A. Monthly Quantity Rates. Effective July 5, 2019 and July 1, 2020, the monthly quantity rates on billings shall be as follows:

| | Effective 7/5/2019 | Effective 7/1/2020 |
|---|---|---|
| Potable water usage (per 100 cubic feet) | $1.30 | $1.34 |
| Recycled water usage (per 100 cubic feet) | $0.65 | $0.67 |

B. Monthly Service Charges. Effective July 5, 2019 and July 1, 2020, the monthly service charges on billings shall be as follows:

| Meter Size (inches) | Peak Flow Rate (gallons per minute) | Effective 7/5/2019 | Effective 7/1/2020 |
|---|---|---|---|
| Up to 3/4 | 30 | $27.26 | $28.08 |
| 1 | 50 | $42.07 | $43.34 |
| 1-1/2 | 100 | $79.09 | $81.47 |
| 2 | 160 | $123.51 | $127.22 |
| 3 | 350 | $264.20 | $272.13 |
| 4 | 630 | $471.52 | $485.67 |
| 6 | 1300 | $967.61 | $996.64 |
| 8 | 2800 | $2,078.26 | $2,140.61 |
| 10 | 4200 | $3,114.89 | $3,208.31 |

C. The total amount due and payable shall be the sum of the monthly service charge plus the quantity rate. The monthly service charge is due and payable regardless of whether water has been consumed. The service charge shall be the greater of the charge based on the meter size or flow rate, with the following exceptions:

1. No service charge shall be made for fire service that has backflow prevention with detector check devices approved by the environmental utilities director.

2. No service charge shall be made for recycled water utility back-up systems that are required for reliability only and have backflow prevention and metering approved by the environmental utilities director. This exclusion does not extend to systems that are regularly required as part of normal operation. The recycled water operation shall be responsible for water volumetric charges for these services and any costs associated with meter maintenance.

D. For purposes of charging for treated water measured by meters:

1. A residential account is defined as a single metered water service which serves three or less dwelling units.

2. A nonresidential account is defined as a single metered water service which serves more than three dwelling units, or serves commercial, industrial, manufacturing, irrigation or other nonresidential land uses.

E. For single-family residential services that require automatic fire protection systems pursuant to Section 16.16.120, the increased meter size will not be assessed an additional charge associated with the fire protection system requirement. Service charges shall be based on the required service size as determined by the Uniform Plumbing Code without consideration for any fire protection system required by Section 16.16.120. (Ord. 6100 § 3, 2019; Ord. 5837 § 2, 2017; Ord. 5610 § 2, 2016; Ord. 5174 § 2, 2013; Ord. 4957 § 1, 2011; Ord. 4724 § 2, 2009; Ord. 4680 § 1, 2008; Ord. 4639 § 1, 2008; Ord. 4508 § 1, 2007; Ord. 4473 § 1, 2006; Ord. 4263 § 2, 2005; Ord. 4001 § 3, 2003; Ord. 3964 § 1, 2003; Ord. 3756 § 1, 2001; Ord. 3687 § 1, 2001; Ord. 3101 § 1, 1997; Ord. 2708 § 1, 1993; Ord. 1953 § 1, 1986; Ord. 1918 § 1, 1985; Ord. 1418 § 8, 1978; Ord. 1239 § 1, 1974; prior code § 27.14.)

## 14.08.095 Water rate surcharge and excess water use charge.

Effective on billings as of May 1, 2009, all quantity rates identified in Section 14.08.090, but not recycled water, will be subject to the water shortage surcharges and excess water use charges identified as follows when the drought stages identified and set forth in Sections 14.09.070 through 14.09.110 are declared, provided that the city manager determines that imposition of such charges is required under the identified drought stage.

| **Summary of Water Shortage Rate Charges** | | | |
|---|---|---|---|
| **Stage** | **Water Use Restriction** | **Water Shortage Surcharge (*1)** | **Excess Water Use Charge (*2)** |
| **First Year of a Water Shortage** | | | |
| Stage 1 | 10% | None | None |
| Stage 2 | 20% | 15% | None |
| Stage 3 | 30% | 33% | 25% |
| Stage 4 | 40% | 45% | 50% |
| Stage 5 | 50% | 60% | 100% |

| Summary of Water Shortage Rate Charges | | | |
|---|---|---|---|
| **Stage** | **Water Use Restriction** | **Water Shortage Surcharge (*1)** | **Excess Water Use Charge (*2)** |
| **Subsequent Year(s) of a Water Shortage** | | | |
| Stage 1 | 10% | 15% | None |
| Stage 2 | 20% | 20% | 25% |
| Stage 3 | 30% | 40% | 50% |
| Stage 4 | 40% | 50% | 100% |
| Stage 5 | 50% | 75% | 200% |

Notes:
(*1) The water shortage surcharge (identified hereafter) shall be added to all quantity rates identified in Section 14.08.090 as applicable, according to drought stage.
(*2) In addition to the applicable water shortage surcharge, an excess water use charge shall be added to water rates identified in Section 14.08.090, according to drought stage.

(Ord. 5837 § 3, 2017; Ord. 5311 § 1, 2014; Ord. 4724 § 2, 2009; Ord. 3101 § 1, 1997; Ord. 2414 § 1, 1991.)

## 14.08.095 Water rate surcharge and excess water use charge.

Effective on billings as of May 1, 2009, all quantity rates identified in Section 14.08.090, but not recycled water, will be subject to the water shortage surcharges and excess water use charges identified as follows when the drought stages identified and set forth in Sections 14.09.070 through 14.09.110 are declared, provided that the city manager determines that imposition of such charges is required under the identified drought stage.

| Summary of Water Shortage Rate Charges | | | |
|---|---|---|---|
| **Stage** | **Water Use Restriction** | **Water Shortage Surcharge (*1)** | **Excess Water Use Charge (*2)** |
| **First Year of a Water Shortage** | | | |
| Stage 1 | 10% | None | None |
| Stage 2 | 20% | 15% | None |
| Stage 3 | 30% | 33% | 25% |
| Stage 4 | 40% | 45% | 50% |
| Stage 5 | 50% | 60% | 100% |
| **Subsequent Year(s) of a Water Shortage** | | | |
| Stage 1 | 10% | 15% | None |
| Stage 2 | 20% | 20% | 25% |
| Stage 3 | 30% | 40% | 50% |

| Summary of Water Shortage Rate Charges | | | |
|---|---|---|---|
| **Stage** | **Water Use Restriction** | **Water Shortage Surcharge (*1)** | **Excess Water Use Charge (*2)** |
| Stage 4 | 40% | 50% | 100% |
| Stage 5 | 50% | 75% | 200% |

Notes:
(*1) The water shortage surcharge (identified hereafter) shall be added to all quantity rates identified in Section 14.08.090 as applicable, according to drought stage.
(*2) In addition to the applicable water shortage surcharge, an excess water use charge shall be added to water rates identified in Section 14.08.090, according to drought stage.

(Ord. 5837 § 3, 2017; Ord. 5311 § 1, 2014; Ord. 4724 § 2, 2009; Ord. 3101 § 1, 1997; Ord. 2414 § 1, 1991.)

## 14.08.100 Flat water rates.

The following service charges shall apply to flat rate consumers that the environmental utilities director determines are not cost effective to assign metered rates. The environmental utilities director shall conduct a water use study for consumers whom he or she determines may not be reasonably metered, and the director shall assign such consumers to an appropriate service rate level as set forth in this section. Water service rates for flat rate residential consumers shall be due and payable on a monthly basis according to the appropriate grouping set out in this section.

Effective July 5, 2019, and July 1, 2020, the flat rates on billings shall be as follows:

| Nonmetered or Flat Service Charges | Effective 7/5/2019 | Effective 7/1/2020 |
|---|---|---|
| Single-family lots under 4,900 square feet; each mobile home unit not within a park maintaining its own distribution system and service; each dwelling unit of duplexes, triplexes, fourplexes, unmetered apartments and other multiple living units; other detached living units; and offices and stores with less than peak use of 250 gallons per day | $37.38 | $38.51 |
| Single-family lots 4,901 to 8,900 square feet | $42.13 | $43.40 |
| Single-family lots 8,901 to 12,000 square feet | $45.79 | $47.17 |
| Single-family lots 12,001 to 15,000 square feet | $49.36 | $50.85 |
| Single-family lots existing before July 1, 1977, which are in excess of 15,000 square feet | $54.36 | $58.16 |
| | | |
| Mobile home parks, per living unit | 34.47 | 35.51 |
| All those single-family lots over 15,000 square feet, created on or after July 1, 1977, shall be metered pursuant to Section 14.08.105 | | |

(Ord. 6100 § 5, 2019; Ord. 5837 § 4, 2017; Ord. 5610 § 3, 2016; Ord. 5174 § 2, 2013; Ord. 4957 § 1, 2011; Ord. 4724 § 2, 2009; Ord. 4508 § 1, 2007; Ord. 4263 § 2, 2005; Ord. 3964 § 1, 2003; Ord. 3756, § 2, 2001; Ord. 3687 § 1, 2001; Ord. 3101 § 1, 1997; Ord. 2708 § 1, 1993; Ord. 1918 § 1, 1985; Ord. 1418 § 9, 1978; Ord. 1239 § 2, 1974; prior code § 27.15.)

# Appendix N – CalWEP BMP Compliance Reports

## Contact Information Update

| | |
|---|---|
| Date | 4/29/20 |
| Water District | City of Roseville |
| District Address | 2005 Hilltop Circle, Roseville, CA 95747 |
| District Website | www.roseville.ca.us |

### Conservation Coordinator

| | |
|---|---|
| First Name | Bobby |
| Last Name | Alvarez |
| Title | Water Conservation Administrator |
| Phone | (916) 746-1710 |
| Email | balvarez@roseville.ca.us |

### General Manager

| | |
|---|---|
| First Name | Sean |
| Last Name | Bigley |
| Title | Assistant Environmental Utilities Director |
| Phone | (916) 774-5513 |
| Email | sbigley@roseville.ca.us |

### Other Contact

| | |
|---|---|
| First Name | Jennifer |
| Last Name | Sbaffi |
| Title | Customer Service Supervisor |
| Phone | (916) 746-1707 |
| Email | jsbaffi@roseville.ca.us |

## Gallons Per Capita Water Reduction

| | |
|---|---|
| Reporting Year | 2019 |
| Data Year | 2019 |

### What was your GPCD the last 5 years?

| Year | GPCD |
|---|---|
| 2019 | 190.50 |
| 2018 | 190.90 |
| 2017 | 194.08 |
| 2016 | 177.32 |
| 2015 | 165.79 |

### If not using programmatic method of water efficiency, what is your district implementing to reduce water use? Provide a brief narrative.

City of Roseville does use a programmatic method of water efficiency.

If your district's GPCD is not declining, please provide a narrative of why and what your district will be doing to accomplish water usage savings.

The City of Roseville's GPCD is declining.

## Metering With Commodity Rates

Are all connections metered? ○ Yes ● No ○ NA

If not 100% metered, please provide a narrative of why and when your district will be fully metered.

The City of Roseville implemented a Meter Retrofit Program beginning in 2001 and concluding in 2011, whereby 99%+ of the City's service connections were retrofitted with meters, either individually or with master meters. In general, accounts were left unmetered where site plumbing issues make it challenging, if not practically impossible, to provide an individual meter to the account location at that time.

Currently, the remaining <1% of unmetered services are retrofitted as part of an ongoing

Are all metered connections billed by water usage? ● Yes ○ No ○ NA

If no, please provide a brief narrative of why and when your district will be billing by water usage?

## Retail Conservation Pricing

Is your district billing utilizing conserving rate structure? ○ Yes ● No ○ NA

| | |
|---|---|
| Website to billing rate structure | http://qcode.us/codes/roseville/ |

If no, please provide a brief narrative of why or when your district will be implementing a conserving rate structure.

As a component of its meter retrofit program, the City adopted conservation pricing for water on all metered accounts from 2011 through 2015. To comply with Proposition 218 requirements, a law passed in California, the City transitioned to a per-use, uniform rate billing structure in February 2016.

## Water Waste Prohibition

Water Waste Ordinance ◉ Yes ○ No ○ NA

| | |
|---|---|
| Ordinance Website Address | http://qcode.us/codes/roseville/ |

Other Pertinent Links

| | Title | Website |
|---|---|---|
| 1 | City of Roseville Water Efficiency Website | https://www.roseville.ca.us/cms/One.aspx?portalId=7964922&pageId=8905954 |
| 2 | City of Roseville Water Efficiency - Report Water Waste | https://roseville.maps.arcgis.com/apps/GeoForm/index.html?appid=d1a535cf27c845449697c6cf563d0469 |
| 3 | | |
| 4 | | |
| 5 | | |

Brief Comments/Narrative

The City currently restricts water waste within its service area. Roseville Municipal Code Chapter 14.09, Water Conservation Ordinance, defines water waste and associated penalties of continued infractions. Per the ordinance, customers in violation are provided a series of notifications at one week intervals: first a courtesy notice, second an administrative warning, and finally a formal citation. If the situation is not remedied by the time specified in the formal citation, additional measures can be taken to force compliance. These measures include fines, water restrictions, low flow devices, or discontinued service.

## Water Loss Control

Water Loss Program? ◉ Yes ○ No ○ NA

If not using AWWA Water Audit Software, brief description of program and/or link to website.

City of Roseville uses AWWA Water Audit Software.

AWWA Water Audit Software? ◉ Yes ○ No ○ NA

| | |
|---|---|
| Water Audit Data Validity Score | 68/100 |
| Data Validity Level | III (51-70) |
| Date of Last Analysis | 2018 |

Brief Comments/Narrative

In 2009 the City began using AWWA Water Loss software to develop an annual water loss audit. Results from the audit have helped the City identify where in the distribution process leaks are occurring. When coupled with detailed pipeline information stored in the City's asset management system, audit information helps identify leak-prone areas of the City's distribution system.

These areas are then targeted for annual visual and auditory leak detection surveys to isolate individual areas of leakage. Once isolated, the City's responses include corrosion monitoring programs, service cathodic protection and/or replacement. The City's asset management software is then updated with identified leaks, which in turn provides more information useful for prioritization of future rehabilitation programs.

## Public Outreach

### Briefly list/describe your Public Outreach Programs:

| | Title | Website |
|---|---|---|
| 1 | News stories on main page | http://roseville.ca.us/ |
| 2 | Green Living Workshops | https://www.roseville.ca.us/cms/one.aspx?portalId=7964922&pageId=15390262 |
| 3 | Mulch Mayhem | http://roseville.ca.us/workspaces/One.aspx?objectId=12537136&contextId=9754960 |
| 4 | Water Efficiency Rebates | https://www.roseville.ca.us/cms/one.aspx?portalId=7964922&pageId=11491211 |
| 5 | EU Today newsletter | http://roseville.ca.us/cms/One.aspx?portalId=7964922&pageId=87 17422 |
| 6 | Landscape makeover contest | https://www.roseville.ca.us/cms/one.aspx?portalId=7964922&pageId=8944823 |
| 7 | Regional Water Authority's Water Efficiency Program | www.bewatersmart.info |
| 8 | EPA Water Sense Partner, Fix-a-Leak Week | www.epa.gov |
| 9 | | |
| 10 | | |

### Brief Comments/Narrative

See website links for additional information.

## School Education Programs

### Briefly list/describe your School Education Programs:

| | Title | Website |
|---|---|---|
| 1 | Be Water Smart News | www.bewatersmart.info |
| 2 | Water, the Never Ending Cycle (water cycle program) | http://roseville.ca.us/cms/One.aspx?portalId=7964922&pageId=8715907 |
| 3 | Hydro Heroes (1st-3rd grade program) | https://www.roseville.ca.us/cms/one.aspx?portalId=7964922&pageId=8968185 |
| 4 | Water Warriors (1st-3rd grade program) | https://www.roseville.ca.us/cms/one.aspx?portalId=7964922&pageId=8968201 |
| 5 | H2Own (4th-6th grade program) | https://www.roseville.ca.us/cms/one.aspx?portalId=7964922&pageId=8968181 |
| 6 | Keepin' It Clean (4th-6th grade program) | https://www.roseville.ca.us/cms/one.aspx?portalId=7964922&pageId=8968188 |
| 7 | Planet Protectors comic books and lesson plans for Kindergarten | https://www.roseville.ca.us/cms/one.aspx?portalId=7964922&pageId=8940700 |
| 8 | Water Spots video contest for high school students | http://roseville.ca.us/cms/One.aspx?portalId=7964922&pageId=8715907 |
| 9 | Living Rivers of the Sacramento Valley Program | http://roseville.ca.us/cms/One.aspx?portalId=7964922&pageId=8715907 |
| 10 | Utility Exploration Center Exhibits | http://roseville.ca.us/cms/One.aspx?portalId=7964922&pageId=8715907 |

### Brief Comments/Narrative

Utility Exploration Center interactive exhibits teaching about water efficiency; website resources and links; teacher training workshops; other educational initiatives for various school-age groups.

Planet Protectors comic books and lesson plans (pre/post activities) for our Kindergarten Program, Hydro Heroes, Water Warriors, H2Own and Keepin it Clean; Sac Bee newspaper supplement "Water, the Never Ending Cycle".

Water Spots video contest for high school students (water efficiency theme); Living Rivers of the Sacramento Valley Program (watershed, human impacts, uses).

## Residential Programs

Briefly list/describe your Residential Programs:

| | Title | Website |
|---|---|---|
| 1 | Cash for Grass Rebate | http://roseville.ca.us/cms/One.aspx?portalId=7964922&pageId=10126299 |
| 2 | Showerhead Replacement | http://roseville.ca.us/cms/One.aspx?portalId=7964922&pageId=10783212 |
| 3 | Faucet Aerators Replacement | http://roseville.ca.us/cms/One.aspx?portalId=7964922&pageId=10783212 |
| 4 | Toilet Flapper Replacement | http://roseville.ca.us/cms/One.aspx?portalId=7964922&pageId=10783212 |
| 5 | Water Wise Housecalls | http://roseville.ca.us/cms/One.aspx?portalId=7964922&pageId=10783212 |
| 6 | Weather Based Controller Rebate | http://roseville.ca.us/cms/One.aspx?portalId=7964922&pageId=10126299 |
| 7 | Door Hangers | https://roseville.ca.us/cms/One.aspx?portalId=7964922&pageId=8905954 |
| 8 | Water Waste Patrols | https://roseville.ca.us/cms/One.aspx?portalId=7964922&pageId=8905954 |
| 9 | Irrigation Efficiency Rebate | http://roseville.ca.us/cms/One.aspx?portalId=7964922&pageId=10126299 |
| 10 | | |

Are your programs effective? ◉ Yes ○ No ○ NA

Has your district reached program participation saturation? ○ Yes ◉ No ○ NA

Brief Comments/Narrative

The City's Water Efficiency programs reach approximately 1000 residences per year, with continued efforts to engage the community and residents in rebate programs, water efficiency education, as well as best practices of water resource management. The City continues its effort to reach residents via water efficiency rebate programs, free water wise house call services, water waste patrol and outreach.

## Commercial, Institutional, and Industrial Programs

Briefly list/describe your CII Programs:

| | Title | Website |
|---|---|---|
| 1 | Landscape Conversion and Irrigation Upgrade Rebate | https://roseville.ca.us/cms/One.aspx?portalId=7964922&pageId=10126299 |
| 2 | Food Service One Stop Water Efficiency Rebate | https://roseville.ca.us/cms/One.aspx?portalId=7964922&pageId=10126299 |
| 3 | Customized Rebate Program | https://roseville.ca.us/cms/One.aspx?portalId=7964922&pageId=10126299 |
| 4 | Water Wise Evaluation Interior | https://roseville.ca.us/cms/One.aspx?portalId=7964922&pageId=10866145 |
| 5 | Water Wise Evaluation Exterior | https://roseville.ca.us/cms/One.aspx?portalId=7964922&pageId=10866145 |
| 6 | Water Budget Evaluation | https://roseville.ca.us/cms/One.aspx?portalId=7964922&pageId=10866145 |
| 7 | Water Waste Patrols | https://roseville.ca.us/cms/One.aspx?portalId=7964922&pageId=8905954 |
| 8 | | |

Are your programs effective? ◉ Yes ○ No ○ NA

Has your district reached program participation saturation? ○ Yes ◉ No ○ NA

Brief Comments/Narrative

The City continues its water efficiency efforts by engaging the commercial community with multiple programs and outreach. Our water wise evaluations are one of our most valuable water saving services.

## Landscape Programs

Briefly list/describe your Landscape Programs:

| | Title | Website |
|---|---|---|
| 1 | Cash for Grass Rebate | https://roseville.ca.us/cms/One.aspx?portalId=7964922&pageId=10126299 |
| 2 | Irrigation Efficiency Rebate | https://roseville.ca.us/cms/One.aspx?portalId=7964922&pageId=10126299 |
| 3 | Weather Based Irrigation Controller Rebate | https://roseville.ca.us/cms/One.aspx?portalId=7964922&pageId=10126299 |
| 4 | Green Gardening Events | https://roseville.ca.us/cms/one.aspx?portalId=7964922&pageId=15390262 |
| 5 | Water Wise Evaluation Exterior | https://roseville.ca.us/cms/One.aspx?portalId=7964922&pageId=10866145 |
| 6 | DIY Landscape Workshops | https://roseville.ca.us/cms/one.aspx?portalId=7964922&pageId=15390262 |
| 7 | Landscape Conversion and Irrigation Upgrade Rebate | https://roseville.ca.us/cms/One.aspx?portalId=7964922&pageId=10126299 |
| 8 | Water Efficient Landscape Ordinance (WELO) | https://roseville.ca.us/cms/One.aspx?portalId=7964922&pageId=8905954 |
| 9 | | |
| 10 | | |

Are your programs effective? (●) Yes ( ) No ( ) NA

Has your district reached program participation saturation? ( ) Yes (●) No ( ) NA

Brief Comments/Narrative

The City's Water Efficiency programs reach approximately 1000 residences and approximately 1000 commercial sites for landscape-related visits per year, with continued efforts to engage the community and residents in rebate programs, water efficiency education, as well as best practices of water resource management. The City continues its effort to reach residents and commercial customers via water efficiency rebate programs, free water wise house call services, commercial site evaluations, water waste patrol and outreach.

RECLAMATION
*Managing Water in the West*

## Contact Information Update

| | |
|---|---|
| Date | 4/1/19 |
| Water District | City of Roseville |
| District Address | 2005 Hilltop Circle, Roseville CA 95747 |
| District Website | www.roseville.ca.us |

### Conservation Coordinator

| | |
|---|---|
| First Name | Bobby |
| Last Name | Alvarez |
| Title | Water Conservation Administrator |
| Phone | (916)746-1710 |
| Email | balvarez@roseville.ca.us |

### General Manager

| | |
|---|---|
| First Name | Sean |
| Last Name | Bigley |
| Title | Acting Water Utility Manager |
| Phone | (916)774-5513 |
| Email | sbigley@roseville.ca.us |

### Other Contact

| | |
|---|---|
| First Name | Jennifer |
| Last Name | Sbaffi |
| Title | Acting Administrative Analyst |
| Phone | (916)746-1707 |
| Email | jsbaffi@roseville.ca.us |

## Gallons Per Capita Water Reduction

| | |
|---|---|
| Reporting Year | 2018 |
| Data Year | 2018 |

### What was your GPCD the last 5 years?

| Year | GPCD |
|---|---|
| 2018 | 190.9 |
| 2017 | 194.08 |
| 2016 | 177.32 |
| 2015 | 165.79 |
| 2014 | 201.45 |

### If not using programmatic method of water efficiency, what is your district implementing to reduce water use? Provide a brief narrative.

City of Roseville Water Conservation Ordinance Chapter detailing drought stages and restriction on water use to comply with the Governor's Executive Order and State Water Resource Control Board direction. http://qcode.us/codes/roseville/

Water Efficient Landscape Ordinance (WELO): http://qcode.us/codes/roseville/ CA Green Building Code included in our standards:

http://www.roseville.ca.us/gov/development_services/building/current_code_n_design_criteria.asp

The City uses its Asset Management System to detect leak-prone areas and then schedules projects to repair sections of mainline in those areas. The City also works

If your district's GPCD is not declining, please provide a narrative of why and what your district will be doing to accomplish water usage savings.

The City of Roseville's GPCD is not currently declining. This is primarily due to the recovery from drought conditions following the 2014-2015 drought period. While GPCD numbers have been slowly increasing, the City continues efforts to educate residents on the principles and best practices of Water Efficiency and Conservation. The City is already in compliance with targets for 20% water use reduction by the year 2020 by a significant margin, in accordance with SBX7-7.

## Metering With Commodity Rates

Are all connections metered? ○ Yes ◉ No ○ NA

If not 100% metered, please provide a narrative of why and when your district will be fully metered.

The City of Roseville implemented a Meter Retrofit Program beginning in 2001 and concluding in 2011, whereby 99%+ of the City's service connections were retrofitted with meters, either individually or with master meters. In general, accounts were left unmetered where site plumbing issues make it challenging, if not practically impossible, to provide an individual meter to the account location at that time.

Currently, the remaining <1% of unmetered services are retrofitted as part of an ongoing

Are all metered connections billed by water usage? ◉ Yes ○ No ○ NA

If no, please provide a brief narrative of why and when your district will be billing by water usage?

## Retail Conservation Pricing

Is your district billing utilizing conserving rate structure? ○ Yes ◉ No ○ NA

| | |
|---|---|
| Website to billing rate structure | Roseville Municipal Code Chapter 14.08.090; http://qcode.us/codes/roseville/ |

If no, please provide a brief narrative of why or when your district will be implementing a conserving rate structure.

As a component of its meter retrofit program, the City adopted conservation pricing for water on
all metered accounts from 2011 through 2015. To comply with Proposition 218 requirements, the
City transitioned to a per-use, uniform rate billing structure in February 2016.

## Water Waste Prohibition

Water Waste Ordinance ◉ Yes ○ No ○ NA

| | |
|---|---|
| Ordinance Website Address | http://qcode.us/codes/roseville/ |

Other Pertinent Links

| | Title | Website |
|---|---|---|
| 1 | City of Roseville Water Efficiency Website | https://www.roseville.ca.us/cms/One.aspx?portalId=7964922&pageId=8905954 |
| 2 | City of Roseville Water Efficiency - Report Water Waste | https://roseville.maps.arcgis.com/apps/GeoForm/index.html?appid=d1a535cf27c845449697c6cf563d0469 |
| 3 | | |
| 4 | | |
| 5 | | |

Brief Comments/Narrative

The City currently restricts water waste within its service area. Roseville Municipal Code Chapter 14.09, Water Conservation Ordinance, defines water waste
and associated penalties of continued infractions. Per the ordinance, customers in violation are
provided a series of notifications at one week intervals: first a courtesy notice, second an
administrative warning, and finally a formal citation. If the situation is not remedied by the time

## Water Loss Control

Water Loss Program? ◉ Yes ○ No ○ NA

If not using AWWA Water Audit Software, brief description of program and/or link to website.

AWWA Water Audit Software? ◉ Yes ○ No ○ NA

| | |
|---|---|
| Water Audit Data Validity Score | 67/100 |
| Data Validity Level | III (51-70) |
| Date of Last Analysis | 2017 |

Brief Comments/Narrative

In 2009 the City began using AWWA Water Loss software to develop an annual water loss
audit. Results from the audit have helped the City identify where in the distribution process leaks
are occurring. When coupled with detailed pipeline information stored in the City's asset management system, audit information helps identify leak-prone areas of the City's distribution
system. These areas are then targeted for annual visual and auditory leak detection surveys to
isolate individual areas of leakage. Once isolated, the City's responses include corrosion monitoring programs, service cathodic protection and/or replacement. The City's asset management software is then updated with identified leaks, which in turn provides more

# Public Outreach

## Briefly list/describe your Public Outreach Programs:

| | Title | Website |
|---|---|---|
| 1 | News stories on main page | http://roseville.ca.us/ |
| 2 | Green Living Workshops | https://www.roseville.ca.us/cms/one.aspx?portalId=7964922&pageId=15390262 |
| 3 | Mulch Mayhem | http://roseville.ca.us/workspaces/One.aspx?objectId=12537136&contextId=9754960 |
| 4 | Earth Day | https://www.roseville.ca.us/cms/one.aspx?portalId=7964922&pageId=11491211 |
| 5 | Water Efficiency Rebates | https://www.roseville.ca.us/cms/one.aspx?portalId=7964922&pageId=11491211 |
| 6 | EU Today newsletter | http://roseville.ca.us/cms/One.aspx?portalId=7964922&pageId=87 17422 |
| 7 | Landscape makeover contest | https://www.roseville.ca.us/cms/one.aspx?portalId=7964922&pageId=8944823 |
| 8 | Regional Water Authority's Water Efficiency Program | www.bewatersmart.info |
| 9 | | |
| 10 | | |

## Brief Comments/Narrative

# School Education Programs

## Briefly list/describe your School Education Programs:

| | Title | Website |
|---|---|---|
| 1 | Be Water Smart News | www.bewatersmart.info |
| 2 | Water, the Never Ending Cycle (water cycle program) | http://roseville.ca.us/cms/One.aspx?portalId=7964922&pageId=87 15907 |
| 3 | Hydro Heroes (1st-3rd grade program) | https://www.roseville.ca.us/cms/one.aspx?portalId=7964922&pageId=8968185 |
| 4 | Water Warriors (1st-3rd grade program) | https://www.roseville.ca.us/cms/one.aspx?portalId=7964922&pageId=8968201 |
| 5 | H2Own (4th-6th grade program) | https://www.roseville.ca.us/cms/one.aspx?portalId=7964922&pageId=8968181 |
| 6 | Keepin' It Clean (4th-6th grade program) | https://www.roseville.ca.us/cms/one.aspx?portalId=7964922&pageId=8968188 |
| 7 | Planet Protectors comic books and lesson plans for Kindergarten | https://www.roseville.ca.us/cms/one.aspx?portalId=7964922&pageId=8940700 |
| 8 | Water Spots video contest for high school students | http://roseville.ca.us/cms/One.aspx?portalId=7964922&pageId=87 15907 |
| 9 | Living Rivers of the Sacramento Valley Program | http://roseville.ca.us/cms/One.aspx?portalId=7964922&pageId=8715907 |
| 10 | Utility Exploration Center | https://www.roseville.ca.us/cms/one.aspx?portalId=7964922&pageId=8715907 |

## Brief Comments/Narrative

Utility Exploration Center interactive exhibits teaching about water efficiency; website resources and links; teacher training workshops

Planet Protectors comic books and lesson plans (pre/post activities) for our Kindergarten Program, Hydro Heroes, Water Warriors, H2Own and Keepin it Clean; Sac Bee newspaper supplement "Water, the Never Ending Cycle".

Water Spots video contest for high school students (water efficiency theme); Living Rivers of the Sacramento Valley Program (watershed, human impacts, uses).

## Residential Programs

Briefly list/describe your Residential Programs:

| | Title | Website |
|---|---|---|
| 1 | Cash for Grass Rebates | https://www.roseville.ca.us/rebates |
| 2 | Showerhead Replacements | https://www.roseville.ca.us/cms/One.aspx?portalId=7964922&pageId=10126299 |
| 3 | Faucet Aerators | https://www.roseville.ca.us/cms/one.aspx?portalId=7964922&pageId=10160801 |
| 4 | Landscape Water Surveys | https://www.roseville.ca.us/cms/one.aspx?portalId=7964922&pageId=10866100 |
| 5 | Residential Irrigation Efficiency Housecalls | https://www.roseville.ca.us/cms/one.aspx?portalId=7964922&pageId=10160801 |
| 6 | Leak Detection Surveys | https://www.roseville.ca.us/cms/one.aspx?portalId=7964922&pageId=8945467 |
| 7 | WaterSense Spec Toilets Installed | https://www.roseville.ca.us/cms/one.aspx?portalId=7964922&pageId=8945467 |
| 8 | Door Hangers | https://roseville.ca.us/cms/One.aspx?portalId=7964922&pageId=890595 |
| 9 | Water Waste Patrols | https://www.roseville.ca.us/cms/one.aspx?portalId=7964922&pageId=10160801 |
| 10 | | |

Are your programs effective? (●) Yes ( ) No ( ) NA

Has your district reached program participation saturation? ( ) Yes (●) No ( ) NA

Brief Comments/Narrative

The City's Water Efficiency programs reach approximately 1000 residences per year, with continued efforts to engage the community and residents in rebate programs, water efficiency education, as well as best practices of water resource management. Specifically, the City has reached saturation with respect to showerhead replacements and faucet aerators, with continued efforts to promote the Cash for Grass and Smart Irrigation Controller incentives.

## Commercial, Institutional, and Industrial Programs

Briefly list/describe your CII Programs:

| | Title | Website |
|---|---|---|
| 1 | High Efficiency Toilet Rebates | https://www.roseville.ca.us/cms/One.aspx?portalId=7964922&pageId=8905872 |
| 2 | High Efficiency Urinal Rebates | https://www.roseville.ca.us/cms/One.aspx?portalId=7964922&pageId=8905872 |
| 3 | High Efficiency Clothes Washer Rebates | https://www.roseville.ca.us/cms/One.aspx?portalId=7964922&pageId=8905872 |
| 4 | Commercial Laundry Retrofits | https://www.roseville.ca.us/cms/one.aspx?portalId=7964922&pageId=8904588 |
| 5 | Car Wash Reclamation Systems | https://www.roseville.ca.us/cms/One.aspx?portalId=7964922&pageId=8905872 |
| 6 | Commercial Water Audits | http://members.questline.com/FacilityAssessment.aspx?accountID=2631 |
| 7 | Green Gardening Events | https://roseville.ca.us/cms/One.aspx?portalId=7964922&pageId=10126299 |
| 8 | | |

Are your programs effective? (●) Yes ( ) No ( ) NA

Has your district reached program participation saturation? ( ) Yes (●) No ( ) NA

Brief Comments/Narrative

## Landscape Programs

Briefly list/describe your Landscape Programs:

| | Title | Website |
|---|---|---|
| 1 | Cash for Grass Rebates | https://www.roseville.ca.us/cms/One.aspx?portalId=7964922&pageId=10126299 |
| 2 | Irrigation Retrofits | https://roseville.ca.us/cms/One.aspx?portalId=7964922&pageId=10126299 |
| 3 | Smart Irrigation Controllers | https://roseville.ca.us/cms/One.aspx?portalId=7964922&pageId=10126299 |
| 4 | Green Gardening Events | https://roseville.ca.us/cms/One.aspx?portalId=7964922&pageId=10126299 |
| 5 | Landscape Water Surveys | https://roseville.ca.us/cms/One.aspx?portalId=7964922&pageId=10126299 |
| 6 | | |
| 7 | | |
| 8 | | |
| 9 | | |
| 10 | | |

Are your programs effective? (●) Yes ( ) No ( ) NA

Has your district reached program participation saturation? ( ) Yes (●) No ( ) NA

Brief Comments/Narrative

make Bobby give us good language for cool workshops

# Appendix O – Adoption Resolutions and Submission

A copy of the adoption resolution will be provided in the final version of the 2020 Urban Water Management Plan.

# Appendix P – DWR UWMP Checklist

| Water Code Section | Summary as Applies to UWMP | Subject | 2020 Guidebook Location | 2020 UWMP Location |
|---|---|---|---|---|
| 10608.20(e) | Retail suppliers shall provide baseline daily per capita water use, urban water use target, interim urban water use target, and compliance daily per capita water use, along with the bases for determining those estimates, including references to supporting data. | Baselines and Targets | Chapter 5 | Appendix F |
| 10608.22 | Retail suppliers' per capita daily water use reduction shall be no less than 5 percent of base daily per capita water use of the 5 year baseline. This does not apply if the suppliers base GPCD is at or below 100. | Baselines and Targets | Section 5.7.2 | Appendix F |
| 10608.24(a) | Retail suppliers shall meet their water use target by December 31, 2020. | Baselines and Targets | Section 5.7 | Appendix G |
| 10608.24(d)(2) | If the retail supplier adjusts its compliance GPCD using weather normalization, economic adjustment, or extraordinary events, it shall provide the basis for, and data supporting the adjustment. | Baselines and Targets | Sections 5.2 and 5.5.7 | Appendix G |
| 10608.36 | Wholesale suppliers shall include an assessment of present and proposed future measures, programs, and policies to help their retail water suppliers achieve targeted water use reductions. | Baselines and Targets | Section 5.1 | NA |
| 10608.4 | Retail suppliers shall report on their progress in meeting their water use targets. The data shall be reported using a standardized form. | Baselines and Targets | Section 5.8 and App E | Appendix G |
| 10631(e)(1) | Retail suppliers shall provide a description of the nature and extent of each demand management measure implemented over the past five years. | Demand Management Measures | Sections 9.2 and 9.3 | Section 9.1 |
| 10631(e)(2) | Wholesale suppliers shall describe specific demand management measures listed in code, their distribution system asset management program, and supplier assistance program. | Demand Management Measures | Sections 9.1 and 9.3 | NA |
| 10608.26(a) | Retail suppliers shall conduct a public hearing to discuss adoption, implementation, and economic impact of water use targets. | Plan Adoption, Submittal, and Implementation | Chapter 10 | Section 10.2<br>Section 10.3 |
| 10621(b) | Notify, at least 60 days prior to the public hearing, any city or county within which the supplier provides water that the urban water supplier will be reviewing the plan and considering amendments or changes to the plan. | Plan Adoption, Submittal, and Implementation | Section 10.2.1 | Appendix B |

| | | | | |
|---|---|---|---|---|
| 10621(f) | Each urban water supplier shall update and submit its 2020 plan to the department by July 1, 2021. | Plan Adoption, Submittal, and Implementation | Sections 10.3.1 and 10.4 | Appendix O |
| 10635(c) | Provide supporting documentation that Water Shortage Contingency Plan has been, or will be, provided to any city or county within which it provides water, no later than 60 days after the submission of the plan to DWR. | Plan Adoption, Submittal, and Implementation | Sections 8.12, 10.4 | Appendix K: Exhibit C |
| 10642 | Provide supporting documentation that the urban water supplier made the plan and contingency plan available for public inspection, published notice of the public hearing, and held a public hearing about the plan and contingency plan. | Plan Adoption, Submittal, and Implementation | Sections 10.2.2, 10.3, and 10.5 | Appendix B |
| 10642 | The water supplier is to provide the time and place of the hearing to any city or county within which the supplier provides water. | Plan Adoption, Submittal, and Implementation | Section 10.2 | Appendix B |
| 10642 | Provide supporting documentation that the plan and contingency plan has been adopted as prepared or modified. | Plan Adoption, Submittal, and Implementation | Section 10.3.1 | Appendix O, Appendix K: Exhibit C |
| 10644(a) | Provide supporting documentation that the urban water supplier has submitted this UWMP to the California State Library. | Plan Adoption, Submittal, and Implementation | Section 10.5 | Appendix O |
| 10644(a)(1) | Provide supporting documentation that the urban water supplier has submitted this UWMP to any city or county within which the supplier provides water no later than 30 days after adoption. | Plan Adoption, Submittal, and Implementation | Section 10.6 | Appendix O |
| 10644(a)(2) | The plan, or amendments to the plan, submitted to the department shall be submitted electronically. | Plan Adoption, Submittal, and Implementation | Sections 10.4.1 and 10.4.2 | Appendix O |
| 10645(a) | Provide supporting documentation that, not later than 30 days after filing a copy of its plan with the department, the supplier has or will make the plan available for public review during normal business hours. | Plan Adoption, Submittal, and Implementation | Section 10.5 | Appendix O |
| 10645(b) | Provide supporting documentation that, not later than 30 days after filing a copy of its water shortage contingency plan with the department, the supplier has or will make the plan available for public review during normal business hours. | Plan Adoption, Submittal, and Implementation | Section 10.6 | Appendix K: Exhibit C |
| 10620(b) | Every person that becomes an urban water supplier shall adopt an urban water management plan within one year after it has become an urban water supplier. | Plan Preparation | Section 2.1 | Section 2.1 |

| | | | | |
|---|---|---|---|---|
| 10620(d)(2) | Coordinate the preparation of its plan with other appropriate agencies in the area, including other water suppliers that share a common source, water management agencies, and relevant public agencies, to the extent practicable. | Plan Preparation | Section 2.5.2 | Section 2.4 |
| 10642 | Provide supporting documentation that the water supplier has encouraged active involvement of diverse social, cultural, and economic elements of the population within the service area prior to and during the preparation of the plan and contingency plan. | Plan Preparation | Section 2.6 | Appendix B |
| 10630.5 | Each plan shall include a simple description of the supplier's plan including water availability, future requirements, a strategy for meeting needs, and other pertinent information. | Summary | Chapter 1 | Executive Summary |
| 10631(a) | Describe the water supplier service area. | System Description | Section 3.1 | Section 3.2 |
| 10631(a) | Describe the climate of the service area of the supplier. | System Description | Section 3.3 | Section 3.3 |
| 10631(a) | Provide population projections for 2025, 2030, 2035, 2040 and optionally 2045. | System Description | Section 3.4 | DWR Table 3-1 |
| 10631(a) | Describe other social, economic, and demographic factors affecting the supplier's water management planning. | System Description | Section 3.4 | Section 3.4.2 |
| 10631(a) | Describe the land uses within the service area. | System Description | Section 3.5 | Section 3.5 |
| 10631(a) | Indicate the current population of the service area. | System Description and Baselines and Targets | Sections 3.4 and 5.4 | DWR Table 3-1 |
| 10631(b) | Identify and quantify the existing and planned sources of water available for 2020, 2025, 2030, 2035, 2040 and optionally 2045. | System Supplies | Section 6.2.8 | DWR Table 6-8<br>DWR Table 6-9 |
| 10631(b) | Indicate whether groundwater is an existing or planned source of water available to the supplier. | System Supplies | Section 6.2 | DWR Table 6-1<br>COR Table 7-C |
| 10631(b)(1) | Provide a discussion of anticipated supply availability under a normal, single dry year, and a drought lasting five years, as well as more frequent and severe drought. | System Supplies | Section 6.2 | Section 7.2 |
| 10631(b)(2) | When multiple sources of water supply are identified, describe the management of each supply in relationship to other identified supplies. | System Supplies | Section 6.1 | Section 6.11 |
| 10631(b)(3) | Describe measures taken to acquire and develop planned sources of water. | System Supplies | Section 6.1 | Section 6.12 |

| | | | | |
|---|---|---|---|---|
| 10631(b)(4)(A) | Indicate whether a groundwater sustainability plan or groundwater management plan has been adopted by the water supplier or if there is any other specific authorization for groundwater management. Include a copy of plan authorization | System Supplies | Section 6.2.2 | Section 6.3.2 |
| 10631(b)(4)(B) | Describe the groundwater basin. | System Supplies | Section 6.2.2 | Section 6.3.1 |
| 10631(b)(4)(B) | Indicate if the basin has been adjudicated and include a copy of the court order or decree and a description of the amount of water the supplier has the legal right to pump. | System Supplies | Section 6.2.2 | Section 6.3.1 |
| 10631(b)(4)(B) | For unadjudicated basins, indicate whether or not the department has identified the basin as a high or medium priority. Describe efforts by the supplier to coordinate with sustainability or groundwater agencies to achieve sustainable groundwater conditions. | System Supplies | Section 6.2.3 | Section 6.3.1 |
| 10631(b)(4)(C) | Provide a detailed description and analysis of the location, amount, and sufficiency of groundwater pumped by the urban water supplier for the past five years | System Supplies | Section 6.2.4 | Section 6.3.3 |
| 10631(b)(4)(D) | Provide a detailed description and analysis of the amount and location of groundwater that is projected to be pumped. | System Supplies | Section 6.2 | Section 6.12.2 |
| 10631(c) | Describe the opportunities for exchanges or transfers of water on a short-term or long- term basis. | System Supplies | Section 6.7 | Section 6.10 |
| 10631(f) | Describe the expected future water supply projects and programs that may be undertaken by the water supplier to address water supply reliability in average, single-dry, and for a period of drought lasting 5 consecutive water years. | System Supplies | Section 6.8 | Section 6.12 |
| 10631(g) | Describe desalinated water project opportunities for long-term supply. | System Supplies | Section 6.6 | Section 6.9 |
| 10631(h) | Retail suppliers will include documentation that they have provided their wholesale supplier(s) - if any - with water use projections from that source. | System Supplies | Section 2.5.1 | Appendix A |
| 10631(h) | Wholesale suppliers will include documentation that they have provided their urban water suppliers with identification and quantification of the existing and planned sources of water available from the wholesale to the urban supplier during various water year types. | System Supplies | Section 2.5.1 | NA |

| | | | | |
|---|---|---|---|---|
| 10633(b) | Describe the quantity of treated wastewater that meets recycled water standards, is being discharged, and is otherwise available for use in a recycled water project. | System Supplies (Recycled Water) | Section 6.2 | Section 6.5.1 |
| 10633(c) | Describe the recycled water currently being used in the supplier's service area. | System Supplies (Recycled Water) | Section 6.2 | Section 6.7 |
| 10633(d) | Describe and quantify the potential uses of recycled water and provide a determination of the technical and economic feasibility of those uses. | System Supplies (Recycled Water) | Section 6.2 | Section 6.8 |
| 10633(e) | Describe the projected use of recycled water within the supplier's service area at the end of 5, 10, 15, and 20 years, and a description of the actual use of recycled water in comparison to uses previously projected. | System Supplies (Recycled Water) | Section 6.2 | Section 6.7 |
| 10633(f) | Describe the actions which may be taken to encourage the use of recycled water and the projected results of these actions in terms of acre-feet of recycled water used per year. | System Supplies (Recycled Water) | Section 6.2 | Section 6.8 |
| 10633(g) | Provide a plan for optimizing the use of recycled water in the supplier's service area. | System Supplies (Recycled Water) | Section 6.2 | Section 6.8 |
| 10631(d)(1) | Quantify past, current, and projected water use, identifying the uses among water use sectors. | System Water Use | Section 4.2 | COR Table 4-A DWR Table 4-1, 4-2, 4-3 |
| 10631(d)(3)(A) | Report the distribution system water loss for for each of the 5 years preceding the plan update. | System Water Use | Section 4.3 | COR Table 4-D DWR Table 4-4 |
| 10631(d)(3)(C) | Retail suppliers shall provide data to show the distribution loss standards were met. | System Water Use | Section 4.2 | 4.2.6 |
| 10631.1(a) | Include projected water use needed for lower income housing projected in the service area of the supplier. | System Water Use | Section 4.5 | COR Table 4-G |
| 10632(a) | Provide a water shortage contingency plan (WSCP) with specified elements below. | Water Shortage Contingency Planning | Chapter 8 | Appendix K: Exhibit C |
| 10632(a)(2)(A) | Provide the written decision-making process and other methods that the supplier will use each year to determine its water reliability. | Water Shortage Contingency Planning | Section 8.2 | WSCP Table 5 |
| 10632(a)(2)(B) | Provide data and methodology to evaluate the supplier’s water reliability for the current year and one dry year pursuant to factors in the code. | Water Shortage Contingency Planning | Section 8.2 | WSCP Table 5 Steps 1-8 |

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| 10632(a)(3)(A) | Define six standard water shortage levels of 10, 20, 30, 40, 50 percent shortage and greater than 50 percent shortage. These levels shall be based on supply conditions, including percent reductions in supply, changes in groundwater levels, changes in surface elevation, or other conditions. The shortage levels shall also apply to a catastrophic interruption of supply. | Water Shortage Contingency Planning | Section 8.3 | WSCP Table 4 |
| 10632(a)(3)(B) | Suppliers with an existing water shortage contingency plan that uses different water shortage levels must cross reference their categories with the six standard categories. | Water Shortage Contingency Planning | Section 8.3 | WSCP Table 4 |
| 10632(a)(4)(A) | Suppliers with water shortage contingency plans that align with the defined shortage levels must specify locally appropriate supply augmentation actions. | Water Shortage Contingency Planning | Section 8.4 | WSCP Section 1.5 |
| 10632(a)(4)(B) | Specify locally appropriate demand reduction actions to adequately respond to shortages. | Water Shortage Contingency Planning | Section 8.4 | WSCP Table 6 |
| 10632(a)(4)(C) | Specify locally appropriate operational changes. | Water Shortage Contingency Planning | Section 8.4 | WSCP Section 1.5 |
| 10632(a)(4)(D) | Specify additional mandatory prohibitions against specific water use practices that are in addition to state-mandated prohibitions are appropriate to local conditions. | Water Shortage Contingency Planning | Section 8.4 | WSCP Table 6 |
| 10632(a)(4)(E) | Estimate the extent to which the gap between supplies and demand will be reduced by implementation of the action. | Water Shortage Contingency Planning | Section 8.4 | WSCP Table 6 |
| 10632(a)(5)(A) | Suppliers must describe that they will inform customers, the public and others regarding any current or predicted water shortages. | Water Shortage Contingency Planning | Section 8.5 | WSCP Table 5 |
| 10632(a)(5)(B) 10632(a)(5)(C) | Suppliers must describe that they will inform customers, the public and others regarding any shortage response actions triggered or anticipated to be triggered and other relevant communications. | Water Shortage Contingency Planning | Section 8.5, 8.6 | WSCP Table 5 |
| 10632(a)(7)(A) | Describe the legal authority that empowers the supplier to enforce shortage response actions. | Water Shortage Contingency Planning | Section 8.7 | WSCP Section 1.2 |
| 10632(a)(7)(B) | Provide a statement that the supplier will declare a water shortage emergency Water Code Chapter 3. | Water Shortage Contingency Planning | Section 8.7 | WSCP Table 5: Step 11 |

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| 10632(a)(7)(C) | Provide a statement that the supplier will coordinate with any city or county within which it provides water for the possible proclamation of a local emergency. | Water Shortage Contingency Planning | Section 8.7 | WSCP Table 2: Step 12 |
| 10632(a)(8)(A) | Describe the potential revenue reductions and expense increases associated with activated shortage response actions. | Water Shortage Contingency Planning | Section 8.8 | WSCP Section 1.6 |
| 10632(a)(8)(B) | Provide a description of mitigation actions needed to address revenue reductions and expense increases associated with activated shortage response actions | Water Shortage Contingency Planning | Section 8.8 | WSCP Section 1.7 |
| 10632(a)(8)(C) | Describe the cost of compliance with Water Code Chapter 3.3: Excessive Residential Water Use During Drought. | Water Shortage Contingency Planning | Section 8.8 | WSCP Section 1.7 |
| 10632(a)(9) | Retail suppliers must describe the monitoring and reporting requirements and procedures that ensure appropriate data is collected, tracked, and analyzed for purposes of monitoring customer compliance. | Water Shortage Contingency Planning | Section 8.9 | WSCP Table 2 Step 15 |
| 10632(a)(10) | Describe reevaluation and improvement procedures for monitoring and evaluation the water shortage contingency plan to ensure risk tolerance is adequate and appropriate water shortage mitigation strategies are implemented. | Water Shortage Contingency Planning | Section 8.10 | WSCP Table 2 Step 16 |
| 10632(b) | Analyze and define water features that are artificially supplied with water, including ponds, lakes, waterfalls, and fountains, separately from swimming pools and spas. | Water Shortage Contingency Planning | Section 8.11 | WSCP Table 6 |
| 10620(f) | Describe water management tools and options to maximize resources and minimize the need to import water from other regions. | Water Supply Reliability Assessment | Section 7.4 | Section 7.2.5 |
| 10634 | Provide information on the quality of existing sources of water available to the supplier and the manner in which water quality affects water management strategies and supply reliability. | Water Supply Reliability Assessment | Chapter 7 | Section 7.1.2 |
| 10635(a) | Assess the water supply reliability during normal, dry, and multiple dry water years by comparing the total water supply sources available to the water supplier with the total projected water use over the next 20 years. | Water Supply Reliability Assessment | Section 7.3 | DWR Table 7.2<br>DWR Table 7.3<br>DWR Table 7.4 |
| 10635(b) | Provide a drought risk assessment as part of information considered in developing the demand management measures and water supply projects. | Water Supply Reliability Assessment | Section 7.3 | DWR Table 7.5 |

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| 10635(b)(1) | Include a description of the data, methodology, and basis for one or more supply shortage conditions that are necessary to conduct a drought risk assessment for a drought period that lasts 5 consecutive years. | Water Supply Reliability Assessment | Section 7.3 | Section 7.2.5 |
| 10635(b)(2) | Include a determination of the reliability of each source of supply under a variety of water shortage conditions. | Water Supply Reliability Assessment | Section 7.3 | COR Table 7-D |
| 10635(b)(3) | Include a comparison of the total water supply sources available to the water supplier with the total projected water use for the drought period. | Water Supply Reliability Assessment | Section 7.3 | DWR Table 7.5 |
| 10635(b)(4) | Include considerations of the historical drought hydrology, plausible changes on projected supplies and demands under climate change condition, anticipated regulatory changes, and other locally applicable criteria. | Water Supply Reliability Assessment | Section 7.3 | Section 7.2.1 |