



## Appendix A

### Legislative Requirements



## WATER CODE - WAT

### **DIVISION 6. CONSERVATION, DEVELOPMENT, AND UTILIZATION OF STATE WATER RESOURCES [10000 - 12999]** (Heading of Division 6 amended by Stats. 1957, Ch. 1932. )

#### **PART 2.55. SUSTAINABLE WATER USE AND DEMAND REDUCTION [10608 - 10609.42]** ( Part 2.55 added by Stats.2009, 7th Ex. Sess., Ch. 4, Sec. 1. )

#### **CHAPTER 1. General Declarations and Policy [10608 - 10608.8]** ( Chapter 1 added by Stats. 2009, 7th Ex. Sess., Ch. 4, Sec. 1. )

### **10608.**

The Legislature finds and declares all of the following:

- (a) Water is a public resource that the California Constitution protects against waste and unreasonable use.
- (b) Growing population, climate change, and the need to protect and grow California's economy while protecting and restoring our fish and wildlife habitats make it essential that the state manage its water resources as efficiently as possible.
- (c) Diverse regional water supply portfolios will increase water supply reliability and reduce dependence on the Delta.
- (d) Reduced water use through conservation provides significant energy and environmental benefits, and can help protect water quality, improve stream flows, and reduce greenhouse gas emissions.
- (e) The success of state and local water conservation programs to increase efficiency of water use is best determined on the basis of measurable outcomes related to water use or efficiency.
- (f) Improvements in technology and management practices offer the potential for increasing water efficiency in California over time, providing an essential water management tool to meet the need for water for urban, agricultural, and environmental uses.
- (g) The Governor has called for a 20 percent per capita reduction in urban water use statewide by 2020.
- (h) The factors used to formulate water use efficiency targets can vary significantly from location to location based on factors including weather, patterns of urban and suburban development, and past efforts to enhance water use efficiency.
- (i) Per capita water use is a valid measure of a water provider's efforts to reduce urban water use within its service area. However, per capita water use is less useful for measuring relative water use efficiency between different water providers. Differences in weather, historical patterns of urban and suburban development, and density of housing in a particular location need to be considered when assessing per capita water use as a measure of efficiency.

(Added by Stats. 2009, 7th Ex. Sess., Ch. 4, Sec. 1. (SB 7 7x) Effective February 3, 2010.)

### **10608.4**

It is the intent of the Legislature, by the enactment of this part, to do all of the following:

- (a) Require all water suppliers to increase the efficiency of use of this essential resource.
- (b) Establish a framework to meet the state targets for urban water conservation identified in this part and called for by the Governor.
- (c) Measure increased efficiency of urban water use on a per capita basis.
- (d) Establish a method or methods for urban retail water suppliers to determine targets for achieving increased water use efficiency by the year 2020, in accordance with the Governor's goal of a 20-percent reduction.
- (e) Establish consistent water use efficiency planning and implementation standards for urban water suppliers and agricultural water suppliers.
- (f) Promote urban water conservation standards that are consistent with the California Urban Water Conservation Council's adopted best management practices and the requirements for demand management in Section 10631.
- (g) Establish standards that recognize and provide credit to water suppliers that made substantial capital investments in urban water conservation since the drought of the early 1990s.
- (h) Recognize and account for the investment of urban retail water suppliers in providing recycled water for beneficial uses.
- (i) Require implementation of specified efficient water management practices for agricultural water suppliers.
- (j) Support the economic productivity of California's agricultural, commercial, and industrial sectors.
- (k) Advance regional water resources management.

(Added by Stats. 2009, 7th Ex. Sess., Ch. 4, Sec. 1. (SB 7 7x) Effective February 3, 2010.)



## **10608.8**

(a) (1) Water use efficiency measures adopted and implemented pursuant to this part or Part 2.8 (commencing with Section 10800) are water conservation measures subject to the protections provided under Section 1011.

(2) Because an urban agency is not required to meet its urban water use target until 2020 pursuant to subdivision

(a) of Section 10608.24, an urban retail water supplier's failure to meet those targets shall not establish a violation of law for purposes of any state administrative or judicial proceeding prior to January 1, 2021.

Nothing in this paragraph limits the use of data reported to the department or the board in litigation or an administrative proceeding. This paragraph shall become inoperative on January 1, 2021.

(3) To the extent feasible, the department and the board shall provide for the use of water conservation reports required under this part to meet the requirements of Section 1011 for water conservation reporting.

(b) This part does not limit or otherwise affect the application of Chapter 3.5 (commencing with Section 11340), Chapter 4 (commencing with Section 11370), Chapter 4.5 (commencing with Section 11400), and Chapter 5 (commencing with Section 11500) of Part 1 of Division 3 of Title 2 of the Government Code.

(c) This part does not require a reduction in the total water used in the agricultural or urban sectors, because other factors, including, but not limited to, changes in agricultural economics or population growth may have greater effects on water use. This part does not limit the economic productivity of California's agricultural, commercial, or industrial sectors.

(d) The requirements of this part do not apply to an agricultural water supplier that is a party to the Quantification Settlement Agreement, as defined in subdivision (a) of Section 1 of Chapter 617 of the Statutes of 2002, during the period within which the Quantification Settlement Agreement remains in effect. After the expiration of the Quantification Settlement Agreement, to the extent conservation water projects implemented as part of the Quantification Settlement Agreement remain in effect, the conserved water created as part of those projects shall be credited against the obligations of the agricultural water supplier pursuant to this part.

*(Added by Stats. 2009, 7th Ex. Sess., Ch. 4, Sec. 1. (SB 7 7x) Effective February 3, 2010.)*



DIVISION 6. CONSERVATION, DEVELOPMENT, AND UTILIZATION OF STATE WATER RESOURCES [10000 - 12999]  
(Heading of Division 6 amended by Stats. 1957, Ch. 1932. )

PART 2.6. URBAN WATER MANAGEMENT PLANNING [10610 - 10657] ( Part 2.6 added by Stats. 1983, Ch. 1009, Sec.. )

**CHAPTER 1. General Declaration and Policy [10610 - 10610.4] ( Chapter 1 added by Stats. 1983, Ch. 1009, Alec. 1. )**

[10610](#) This part shall be known and may be cited as the "Urban Water Management Planning Act."

(Added by Stats. 1983, Ch. 1009, Sec. 1.)

[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.

(b) This part is intended to provide assistance to water agencies in carrying out their long-term resource planning responsibilities to ensure adequate water supplies to meet existing and future demands for water.

(Amended by Stats. 201B, Ch. 14, Sec. 18. (SB 606) Effective January 1, 201 9.)

[10610.4](#) The Legislature finds and declares that it is the policy of the state as follows:

(a) The management of urban water demands and efficient use of water shall be actively pursued to protect both the people of the state and their water resources.



**CHAPTER 2. Definitions [10611 - 10618] ( Chapter 2 added by Stats. 1983, Ch. 1009, iec. 1. )**

[10611.](#) Unless the context otherwise requires, the definitions of this chapter govern the construction of this part.

*(Added by Stats. 1983, Ch. 1009, Sec. 1.)*

[10611.3](#) “Customer” means a purchaser of water from a water supplier who uses the water for municipal purposes, including residential, commercial, governmental, and industrial uses.

*Added by renumbering Section 10612 by Stats. 2018, Ch. 14, Sec. 20. (SB 606) Effective January 1, 2019.)*

[10611.5](#) “Demand management” means those water conservation measures, programs, and incentives that prevent the waste of water and promote the reasonable and efficient use and reuse of available supplies.

*(Amended by Stats. 1995, Ch. 854, Sec. 3. Effective January 1, 1996.)*

[10612](#) “Drought risk assessment” means a method that examines water shortage risks based on the driest five- year historic sequence for the agency’s water supply, as described in subdivision (b) of Section 10635.

*(Added by Stats. 2018, Ch. 14, Sec. 21. (SB 606) Effective January 1, 2019.)*

[10613.](#) “Efficient use” means those management measures that result in the most effective use of water so as to prevent its waste or unreasonable use or unreasonable method of use.

*(Added by Stats. 1983, Ch. 1009, Exec. 1.)*

[10614.](#) “Person” means any individual, firm, association, organization, partnership, business, trust, corporation, company, public agency, or any agency of such an entity.

*(Added by Stats. 1983, Ch. 1009, Sec. 1.)*

[10615.](#) “Plan” means an urban water management plan prepared pursuant to this part. A plan shall describe and evaluate sources of supply, reasonable and practical efficient uses, reclamation and demand management activities. The components of the plan may vary according to an individual community or area’s characteristics and its capabilities to efficiently use and conserve water. The plan shall address measures for residential, commercial, governmental, and industrial water demand management as set forth in Article 2 (commencing with Section 10630) of Chapter 3. In addition, a strategy and time schedule for implementation shall be included in the plan.

*(Amended by Stats. 1995, Ch. 854, Sec. 4. Effective January 1, 1996.)*

[10616.](#) “Public agency” means any board, commission, county, city and county, city, regional agency, district, or other public entity.

*(Added by Stats. 1983, Ch. 1009, Sec. 1.)*

[10616.5](#) “Recycled water” means the reclamation and reuse of wastewater for beneficial use.

*(Added by Stats. 1995, Ch. 854, Sec. 5. Effective January 1, 1996)*

[10617.](#) “Urban water supplier” means a supplier, either publicly or privately owned, providing water for municipal purposes either directly or indirectly to more than 3,000 customers or supplying more than 3,000 acre-feet of water annually. An urban water supplier includes a supplier or contractor for water, regardless of the basis of right, which distributes or sells for ultimate resale to customers. This part applies only to water



supplied from public water systems subject to Chapter 4 (commencing with Section 116275) of Part 12 of Division 104 of the Health and Safety Code.

*(Amended by Stats. 1996, Ch. 1023, Sec. 428. Effective January 29, 1996.)*

[10617.5](#) “Water shortage contingency plan” means a document that incorporates the provisions detailed in subdivision (a) of Section 10632 and is subsequently adopted by an urban water supplier pursuant to this article.

*(Added by Stats. 2018, Ch. 14, Sec. 22. (SB 606) Effective January 1, 2019)*

[10618](#) “Water supply and demand assessment” means a method that looks at current year and one or more dry year supplies and demands for determining water shortage risks, as described in Section 10632.1.

*(Added by Stats. 2018, Ch. 14, Sec. 23 (SB 606). Effective January 1, 2019)*



**CHAPTER 3. Urban Water Management Plans [10620 - 10645] ( Chapter 3 added by Stabs. 1983, Ch. 1009, Sec. 1. )**

**ARTICLE 1. General Provisions [10620 - 1 0621] ( Article 1 added by Stats. 1 983, Ch. 1009, Sec. 1. )**

- [10620.](#) (a) Every urban water supplier shall prepare and adopt an urban water management plan in the manner set forth in Article 3 (commencing with Section 10640).
- (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.
- (c) An urban water supplier indirectly providing water shall not include planning elements in its water management plan as provided in Article 2 (commencing with Section 10630) that would be applicable to urban water suppliers or public agencies directly providing water, or to their customers, without the consent of those suppliers or public agencies.
- (d) (l) An urban water supplier may satisfy the requirements of this part by participation in areawide, regional, watershed, or basinwide urban water management planning where those plans will reduce preparation costs and contribute to the achievement of conservation, efficient water use, and improved local drought resilience.
- (2) Notwithstanding paragraph (1), each urban water supplier shall develop its own water shortage contingency plan, but an urban water supplier may incorporate, collaborate, and otherwise share information with other urban water suppliers or other governing entities participating in an areawide, regional, watershed, or basinwide urban water management plan, an agricultural management plan, or groundwater sustainability plan development.
- (3) Each urban water supplier shall 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.
- (e) The urban water supplier may prepare the plan with its own staff, by contract, or in cooperation with other governmental agencies.
- (f) An urban water supplier shall describe in the plan water management tools and options used by that entity that will maximize resources and minimize the need to import water from other regions.
- (Amended by Stats. 2018, Ch. 14, Sec. 24. (SB 606) Effective January 1, 2019.)*

- [10621](#) (a) Each urban water supplier shall update its plan at least once every five years on or before July 1, in years ending in six and one, incorporating updated and new information from the five years preceding each update.
- (b) Every urban water supplier required to prepare a plan pursuant to this part shall, at least 60 days before the public hearing on the plan required by Section 10642, notify any city or county within which the supplier provides water supplies that the urban water supplier will be reviewing the plan and considering amendments or changes to the plan. The urban water supplier may consult with, and obtain comments from, any city or county that receives notice pursuant to this subdivision.
- (c) An urban water supplier regulated by the Public Utilities Commission shall include its most recent plan and water shortage contingency plan as part of the supplier's general rate case filings.
- (d) The amendments to, or changes in, the plan shall be adopted and filed in the manner set forth in Article 3 (commencing with Section 10640)
- (e) Each urban water supplier shall update and submit its 2015 plan to the department by July1, 2016



(f) Each urban water supplier shall update and submit its 2020 plan to the department by July 1,2021

*(Amended by Stats. 2019, Ch. 239, Sec. 7. (AB 1414) Effective January 1, 2020.)*





## CHAPTER 3. Urban Water Management Plans [10620 - 10645] ( Chapter 3 added by Stats. 1983, Ch. 1009, Sec. 1. )

### ARTICLE 2. Contents of Plans [10630 - 10634] ( Article 2 added by Stats. 1983, Ch. 1009, Sec. 1. )

[10630](#) It is the intention of the Legislature, in enacting this part, to permit levels of water management planning commensurate with the numbers of customers served and the volume of water supplied, while accounting for impacts from climate change.

*(Amended by Stats. 2018, Ch. 14, Sec. 26. (SB 606) Effective January 1, 2019.)*

[10630.5](#) Each plan shall include a simple lay description of how much water the agency has on a reliable basis, how much it needs for the foreseeable future, what the agency's strategy is for meeting its water needs, the challenges facing the agency, and any other information necessary to provide a general understanding of the agency's plan.

*(Added by Stats. 2018, Ch. 14, Sec. 27. (SB 606) Effective January 1, 2019.)*

[10631](#) A plan shall be adopted in accordance with this chapter that shall do all of the following:

(a) Describe the service area of the supplier, including current and projected population, climate, and other social, economic, and demographic factors affecting the supplier's water management planning. The projected population estimates shall be based upon data from the state, regional, or local service agency population projections within the service area of the urban water supplier and shall be in five-year increments to 20 years or as far as data is available. The description shall include the current and projected land uses within the existing or anticipated 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.

(b) Identify and quantify, to the extent practicable, the existing and planned sources of water available to the supplier over the same five-year increments described in subdivision (a), providing supporting and related information, including all of the following:

(1) A detailed discussion of anticipated supply availability under a normal water year, single dry year, and droughts lasting at least five years, as well as more frequent and severe periods of drought, as described in the drought risk assessment. For each source of water supply, consider any information pertinent to the reliability analysis conducted pursuant to Section 10635, including changes in supply due to climate change.

(2) When multiple sources of water supply are identified, a description of the management of each supply in correlation with the other identified supplies.

(3) For any planned sources of water supply, a description of the measures that are being undertaken to acquire and develop those water supplies.

(4) If groundwater is identified as an existing or planned source of water available to the supplier, all of the following information:

The current version of any groundwater sustainability plan or alternative adopted pursuant to Part 2.74 (commencing with Section 10720), any groundwater management plan adopted by the urban water supplier, including plans adopted pursuant to Part 2.75 (commencing with Section 10750), or any other specific authorization for groundwater management for basins underlying the urban water supplier's service area.



(A) A description of any groundwater basin or basins from which the urban water supplier pumps groundwater. For basins that a court or the board has adjudicated the rights to pump groundwater, a copy of the order or decree adopted by the court or the board and a description of the amount of groundwater the urban water supplier has the legal right to pump under the order or decree. For a basin that has not been adjudicated, information as to whether the department has identified the basin as a high- or medium-priority basin in the most current official departmental bulletin that characterizes the condition of the groundwater basin, and a detailed description of the efforts being undertaken by the urban water supplier to coordinate with groundwater sustainability agencies or groundwater management agencies listed in subdivision (c) of Section 10723 to maintain or achieve sustainable groundwater conditions in accordance with a groundwater sustainability plan or alternative adopted pursuant to Part 2.74 (commencing with Section 10720).

(B) A detailed description and analysis of the location, amount, and sufficiency of groundwater pumped by the urban water supplier for the past five years. The description and analysis shall be based on information that is reasonably available, including, but not limited to, historic use records.

(C) A detailed description and analysis of the amount and location of groundwater that is projected to be pumped by the urban water supplier. The description and analysis shall be based on information that is reasonably available, including, but not limited to, historic use records.

(c) Describe the opportunities for exchanges or transfers of water on a short-term or long-term basis.

(d) (I) For an urban retail water supplier, quantify, to the extent records are available, past and current water use, over the same five-year increments described in subdivision (a), and projected water use, based upon information developed pursuant to subdivision (a), identifying the uses among water use sectors, including, but not necessarily limited to, all of the following:

(A) Single-family residential.

(B) Multifamily.

(C) Commercial.

(D) Industrial.

(E) Institutional and governmental.

(F) Landscape.

(G) Sales to other agencies.

(H) Saline water intrusion barriers, groundwater recharge, or conjunctive use, or any combination thereof.

(I) Agricultural.

(J) Distribution system water loss.

(2) The water use projections shall be in the same five-year increments described in subdivision (a).

(3) (A) The distribution system water loss shall be quantified for each of the five years preceding the plan update, in accordance with rules adopted pursuant to Section 10608.34.

(B) The distribution system water loss quantification shall be reported in accordance with a worksheet approved or developed by the department through a public process. The water loss quantification worksheet shall be based on the water system balance methodology developed by the American Water Works Association.

(C) In the plan due July 1, 2021, and in each update thereafter, data shall be included to show whether the urban retail water supplier met the distribution loss standards enacted by the board pursuant to Section 10608.34.

(4) (A) Water use projections, where available, shall display and account for the water savings estimated to result from adopted codes, standards, ordinances, or transportation and land use



plans identified by the urban water supplier, as applicable to the service area.

(B) To the extent that an urban water supplier reports the information described in subparagraph (A), an urban water supplier shall do both of the following:

(i) Provide citations of the various codes, standards, ordinances, or transportation and land use plans utilized in making the projections.

(ii) Indicate the extent that the water use projections consider savings from codes, standards, ordinances, or transportation and land use plans. Water use projections that do not account for these water savings shall be noted of that fact.

(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) For the supplement required of urban retail water suppliers by paragraph (2) of subdivision (f) of Section 10621, a narrative that describes the water demand management measures that the supplier plans to implement to achieve its urban water use objective by January 1, 2027, pursuant to Chapter 9 (commencing with Section 10609) of Part 2.55.

(C) 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.

(2) For an urban wholesale water supplier, as defined in Section 10608.12, a narrative description of the items in clauses (ii), (iv), (vi), and (vii) of subparagraph (C) of paragraph (1), and a narrative description of its distribution system asset management and wholesale supplier assistance programs.

(f) Include a description of all water supply projects and water supply programs that may be undertaken by the urban water supplier to meet the total projected water use, as established pursuant to subdivision (a) of Section 10635. The urban water supplier shall include a detailed description of expected future projects and programs that the urban water supplier may implement to increase the amount of the water supply available to the urban water supplier in normal and single-dry water years and for a period of drought lasting five consecutive water years. The description shall identify specific projects and include a description of the increase in water supply that is expected to be available from each project. The description shall include an estimate with regard to the implementation timeline for each project or program.

(g) Describe the opportunities for development of desalinated water, including, but not limited to, ocean water, brackish water, and groundwater, as a long-term supply.



(h) An urban water supplier that relies upon a wholesale agency for a source of water shall provide the wholesale agency with water use projections from that agency for that source of water in five-year increments to 20 years or as far as data is available. The wholesale agency shall provide information to the urban water supplier for inclusion in the urban water supplier's plan that identifies and quantifies, to the extent practicable, the existing and planned sources of water as required by subdivision (b), available from the wholesale agency to the urban water supplier over the same five-year increments, and during various water-year types in accordance with subdivision (f). An urban water supplier may rely upon water supply information provided by the wholesale agency in fulfilling the plan informational requirements of subdivisions (b) and (f).

*(Amended by Stats. 2018, Ch. 14, Sec. 28. (SB 606) Effective January 1, 2019.)*

[10631.1](#) (a) The water use projections required by Section 10631 shall include projected water use for single-family and multifamily residential housing needed for lower income households, as defined in Section 50079.5 of the Health and Safety Code, as identified in the housing element of any city, county, or city and county in the service area of the supplier.

(b) It is the intent of the Legislature that the identification of projected water use for single-family and multifamily residential housing for lower income households will assist a supplier in complying with the requirement under Section 65589.7 of the Government Code to grant a priority for the provision of service to housing units affordable to lower income households.

*(Added by Stats. 2005, Ch. 727, Sec. 2. Effective January 1, 2006.)*

[10631.2](#). (a) In addition to the requirements of Section 10631, an urban water management plan shall include any of the following information that the urban water supplier can readily obtain:

- (1) An estimate of the amount of energy used to extract or divert water supplies.
- (2) An estimate of the amount of energy used to convey water supplies to the water treatment plants or distribution systems.
- (3) An estimate of the amount of energy used to treat water supplies.
- (4) An estimate of the amount of energy used to distribute water supplies through its distribution systems.
- (5) An estimate of the amount of energy used for treated water supplies in comparison to the amount used for nontreated water supplies.
- (6) An estimate of the amount of energy used to place water into or withdraw from storage.
- (7) Any other energy-related information the urban water supplier deems appropriate.

(b) The department shall include in its guidance for the preparation of urban water management plans a methodology for the voluntary calculation or estimation of the energy intensity of urban water systems. The department may consider studies and calculations conducted by the Public Utilities Commission in developing the methodology.

(c) The Legislature finds and declares that energy use is only one factor in water supply planning and shall not be considered independently of other factors.

*(Amended by Stats. 2018, Ch. 14, Sec. 29. (SB 606a) Effective January 1, 2019.)*

[10632](#) (a) Every urban water supplier shall prepare and adopt a water shortage contingency plan as part of its urban water management plan that consists of each of the following elements:

- (1) The analysis of water supply reliability conducted pursuant to Section 10635.
- (2) The procedures used in conducting an annual water supply and demand assessment



that include, at a minimum, both of the following:

(A) The written decision making process that an urban water supplier will use each year to determine its water supply reliability.

(B) The key data inputs and assessment methodology used to evaluate the urban water supplier's water supply reliability for the current year and one dry year, including all of the following:

(i) Current year unconstrained demand, considering weather, growth, and other influencing factors, such as policies to manage current supplies to meet demand objectives in future years, as applicable.

(ii) Current year available supply, considering hydrological and regulatory conditions in the current year and one dry year. The annual supply and demand assessment may consider more than one dry year solely at the discretion of the urban water supplier.

(iii) Existing infrastructure capabilities and plausible constraints.

(iv) A defined set of locally applicable evaluation criteria that are consistently relied upon for each annual water supply and demand assessment.

(v) A description and quantification of each source of water supply.

(3) (A) Six standard water shortage levels corresponding to progressive ranges of up to 10, 20, 30, 40, and 50 percent shortages and greater than 50 percent shortage. Urban water suppliers shall define these shortage levels based on the suppliers' water supply conditions, including percentage reductions in water supply, changes in groundwater levels, changes in surface elevation or level of subsidence, or other changes in hydrological or other local conditions indicative of the water supply available for use. Shortage levels shall also apply to catastrophic interruption of water supplies, including, but not limited to, a regional power outage, an earthquake, and other potential emergency events.

(B) An urban water supplier with an existing water shortage contingency plan that uses different water shortage levels may comply with the requirement in subparagraph (A) by developing and including a cross-reference relating its existing categories to the six standard water shortage levels.

(4) Shortage response actions that align with the defined shortage levels and include, at a minimum, all of the following:

(A) Locally appropriate supply augmentation actions. Locally appropriate demand reduction actions to adequately respond to shortages.

(B) Locally appropriate operational changes.

(C) Additional, mandatory prohibitions against specific water use practices that are in addition to state-mandated prohibitions and appropriate to the local conditions.

(D) For each action, an estimate of the extent to which the gap between supplies and demand will be reduced by implementation of the action.

(5) Communication protocols and procedures to inform customers, the public, interested parties, and local, regional, and state governments, regarding, at a minimum, all of the following:

(A) Any current or predicted shortages as determined by the annual water supply and demand assessment described pursuant to Section 10632.1.

(B) Any shortage response actions triggered or anticipated to be triggered by the annual water supply and demand assessment described pursuant to Section 10632.1.

(C) Any other relevant communications.

(6) For an urban retail water supplier, customer compliance, enforcement, appeal, and exemption



procedures for triggered shortage response actions as determined pursuant to Section 10632.2.

(7) (A) A description of the legal authorities that empower the urban water supplier to implement and enforce its shortage response actions specified in paragraph (4) that may include, but are not limited to, statutory authorities, ordinances, resolutions, and contract provisions.

(B) A statement that an urban water supplier shall declare a water shortage emergency in accordance with Chapter 3 (commencing with Section 350) of Division 1.

(C) A statement that an urban water supplier shall coordinate with any city or county within which it provides water supply services for the possible proclamation of a local emergency, as defined in Section 8558 of the Government Code.

(8) A description of the financial consequences of, and responses for, drought conditions, including, but not limited to, all of the following:

(A) A description of potential revenue reductions and expense increases associated with activated shortage response actions described in paragraph (4).

(B) A description of mitigation actions needed to address revenue reductions and expense increases associated with activated shortage response actions described in paragraph (4).

(C) A description of the cost of compliance with Chapter 3.3 (commencing with Section 365) of Division 1.

(9) For an urban retail water supplier, monitoring and reporting requirements and procedures that ensure appropriate data is collected, tracked, and analyzed for purposes of monitoring customer compliance and to meet state reporting requirements.

(10) Reevaluation and improvement procedures for systematically monitoring and evaluating the functionality of the water shortage contingency plan in order to ensure shortage risk tolerance is adequate and appropriate water shortage mitigation strategies are implemented as needed.

(b) For purposes of developing the water shortage contingency plan pursuant to subdivision (a), an urban water supplier shall analyze and define water features that are artificially supplied with water, including ponds, lakes, waterfalls, and fountains, separately from swimming pools and spas, as defined in subdivision (a) of Section 115921 of the Health and Safety Code.

(c) The urban water supplier shall make available the water shortage contingency plan prepared pursuant to this article to its customers and any city or county within which it provides water supplies no later than 30 days after adoption of the water shortage contingency plan.

*(Repealed and added by Stats. 2018, Ch. 14, Sec. 32. (SB 606) Effective January 1, 2019.)*

[10632.1](#) An urban water supplier shall conduct an annual water supply and demand assessment pursuant to subdivision (a) of Section 10632 and, on or before June 1 of each year, submit an annual water shortage assessment report to the department with information for anticipated shortage, triggered shortage response actions, compliance and enforcement actions, and communication actions consistent with the supplier's water shortage contingency plan. An urban water supplier that relies on imported water from the State Water Project or the Bureau of Reclamation shall submit its annual water supply and demand assessment within 14 days of receiving its final allocations, or by June 1 of each year, whichever is later.

*(Added by Stats. 2018, Ch. 14, Sec. 33. (SB 606) Effective January 1, 2019.)*

[10632.2](#) An urban water supplier shall follow, where feasible and appropriate, the prescribed procedures and implement determined shortage response actions in its water shortage contingency plan, as identified in subdivision

(a) of Section 10632, or reasonable alternative actions, provided that descriptions of the alternative actions are submitted with the annual water shortage assessment report pursuant to Section



10632.1. Nothing in this section prohibits an urban water supplier from taking actions not specified in its water shortage contingency plan, if needed, without having to formally amend its urban water management plan or water shortage contingency plan.

*(Added by Stats. 2018, Ch. 14, Sec. 34. (SB 606) Effective January 1, 2019.)*

[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.

*(Added by Stats. 2018, Ch. 14, Sec. 35. (SB 606) Effective January 1, 2019.)*

[10632.5](#) (a) In addition to the requirements of paragraph (3) of subdivision (a) of Section 10632, beginning January 1, 2020, the plan shall include a seismic risk assessment and mitigation plan to assess the vulnerability of each of the various facilities of a water system and mitigate those vulnerabilities.

(b) An urban water supplier shall update the seismic risk assessment and mitigation plan when updating its urban water management plan as required by Section 10621.

(c) An urban water supplier may comply with this section by submitting, pursuant to Section 10644, a copy of the most recent adopted local hazard mitigation plan or multihazard mitigation plan under the federal Disaster Mitigation Act of 2000 (Public Law 106-390) if the local hazard mitigation plan or multihazard mitigation plan addresses seismic risk.

*(Added by Stats. 2015, Ch. 681, Sec. 1. (SB 664a Effective January 1, 2016.)*

[10633](#) The plan shall provide, to the extent available, information on recycled water and its potential for use as a water source in the service area of the urban water supplier. The preparation of the plan shall be coordinated with local water, wastewater, groundwater, and planning agencies that operate within the supplier's service area, and shall include all of the following:

(a) A description of the wastewater collection and treatment systems in the supplier's service area, including a quantification of the amount of wastewater collected and treated and the methods of wastewater disposal.

(b) A description of the quantity of treated wastewater that meets recycled water standards, is being discharged, and is otherwise available for use in a recycled water project.

(c) A description of the recycled water currently being used in the supplier's service area, including, but not limited to, the type, place, and quantity of use.

(d) A description and quantification of the potential uses of recycled water, including, but not limited to, agricultural irrigation, landscape irrigation, wildlife habitat enhancement, wetlands, industrial reuse, groundwater recharge, indirect potable reuse, and other appropriate uses, and a determination with regard to the technical and economic feasibility of serving those uses.

(e) 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 pursuant to this subdivision.

(f) A description of actions, including financial incentives, 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.

(g) A plan for optimizing the use of recycled water in the supplier's service area, including actions to facilitate the installation of dual distribution systems, to promote recirculating uses, to facilitate the increased use of treated wastewater that meets recycled water standards, and to overcome any obstacles to achieving that increased use.



*(Amended by Stats. 2009, Ch. 534, Sec. 2. (AB 1465) Effective January 1, 2010.)*

[10634](#) The plan shall include information, to the extent practicable, relating to the quality of existing sources of water available to the supplier over the same five-year increments as described in subdivision (a) of Section 10631, and the manner in which water quality affects water management strategies and supply reliability.

*(Added by Stats. 2001, Ch. 644, Sec. 3. Effective January 1, 2002.)*





**CHAPTER 3. Urban Water Management Plans [10620 - 10645] ( Chapter 3 added by Stabs. 1983, Ch. 1009, Sec. 1. )**

**ARTICLE 2.5. Water Service Reliability [10635- 10635.] ( Article 2.5 added by Stats. 1995, Ch. 854, Sec. 11. )**

[10635.](#) (a) Every urban water supplier shall include, as part of its urban water management plan, an assessment of the reliability of its water service to its customers during normal, dry, and multiple dry water years. This water supply and demand assessment shall compare the total water supply sources available to the water supplier with the long-term total projected water use over the next 20 years, in five-year increments, for a normal water year, a single dry water year, and a drought lasting five consecutive water years. The water service reliability assessment shall be based upon the information compiled pursuant to Section 10631, including available data from state, regional, or local agency population projections within the service area of the urban water supplier.

(b) Every urban water supplier shall include, as part of its urban water management plan, a drought risk assessment for its water service to its customers as part of information considered in developing the demand management measures and water supply projects and programs to be included in the urban water management plan. The urban water supplier may conduct an interim update or updates to this drought risk assessment within the five-year cycle of its urban water management plan update. The drought risk assessment shall include each of the following:

- (1) 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 five consecutive water years, starting from the year following when the assessment is conducted.
- (2) A determination of the reliability of each source of supply under a variety of water shortage conditions. This may include a determination that a particular source of water supply is fully reliable under most, if not all, conditions.
- (3) A comparison of the total water supply sources available to the water supplier with the total projected water use for the drought period.
- (4) Considerations of the historical drought hydrology, plausible changes on projected supplies and demands under climate change conditions, anticipated regulatory changes, and other locally applicable criteria.

(c) The urban water supplier shall provide that portion of its urban water management plan prepared pursuant to this article to any city or county within which it provides water supplies no later than 60 days after the submission of its urban water management plan.

(d) Nothing in this article is intended to create a right or entitlement to water service or any specific level of water service.

(e) Nothing in this article is intended to change existing law concerning an urban water supplier's obligation to provide water service to its existing customers or to any potential future customers

*(Amended by Stats. 2018, Ch. 14, Sec. 36. (SB 606) Effective January 1, 2019.)*



**CHAPTER 3. Urban Water Management Plans [10620 - 10645] ( Chapter 3 added by Stabs. 1983, Ch. 1009, Sec. 1. )**

**ARTICLE 3. Adoption and Implementation of Plans [1 0640 - 10645] Article 3 added by Stats. 1983, Ch. 1009, Sec. 1.)**

[10640.](#) (a) Every urban water supplier required to prepare a plan pursuant to this part shall prepare its plan pursuant to Article 2 (commencing with Section 10630). The supplier shall likewise periodically review the plan as required by Section 10621, and any amendments or changes required as a result of that review shall be adopted pursuant to this article.

(b) Every urban water supplier required to prepare a water shortage contingency plan shall prepare a water shortage contingency plan pursuant to Section 10632. The supplier shall likewise periodically review the water shortage contingency plan as required by paragraph (10) of subdivision (a) of Section 10632 and any amendments or changes required as a result of that review shall be adopted pursuant to this article.

*(Amended by Stats. 2018, Ch. 14, Sec. 37. (SB 606a Effective January 1, 20J 9.g*

[10641](#) An urban water supplier required to prepare a plan or a water shortage contingency plan may consult with, and obtain comments from, any public agency or state agency or any person who has special expertise with respect to water demand management methods and techniques.

*(Amended by Stats. 2018, Ch. 14, Sec. 38. (SB 606a Effective January 1, 20J 9.g*

[10642.](#) Each urban water supplier shall encourage the active involvement of diverse social, cultural, and economic elements of the population within the service area prior to and during the preparation of both the plan and the water shortage contingency plan. Prior to adopting either, the urban water supplier shall make both the plan and the water shortage contingency plan available for public inspection and shall hold a public hearing or hearings thereon. Prior to any of these hearings, notice of the time and place of the hearing shall be published within the jurisdiction of the publicly owned water supplier pursuant to Section 6066 of the Government Code. The urban water supplier shall provide notice of the time and place of a hearing to any city or county within which the supplier provides water supplies. Notices by a local public agency pursuant to this section shall be provided pursuant to Chapter 17.5 (commencing with Section 7290) of Division 7 of Title 1 of the Government Code. A privately owned water supplier shall provide an equivalent notice within its service area. After the hearing or hearings, the plan or water shortage contingency plan shall be adopted as prepared or as modified after the hearing or hearings.

*(Amended by Stats. 2018, Ch. 14, Sec. 39. (SB 606\$ Effective January 1, 70J 9.g*

[10643](#) An urban water supplier shall implement its plan adopted pursuant to this chapter in accordance with the schedule set forth in its plan.

*(Added by Stats. 1983, Ch. 1009, Sec. 1.)*

[10644](#) (a) (1) An urban water supplier shall submit to the department, the California State Library, and any city or county within which the supplier provides water supplies a copy of its plan no later than 30 days after adoption. Copies of amendments or changes to the plans shall be submitted to the department, the California State Library, and any city or county within which the supplier provides water supplies within 30 days after adoption.

(2) The plan, or amendments to the plan, submitted to the department pursuant to paragraph (1)



shall be submitted electronically and shall include any standardized forms, tables, or displays specified by the department.

(b) If an urban water supplier revises its water shortage contingency plan, the supplier shall submit to the department a copy of its water shortage contingency plan prepared pursuant to subdivision (a) of Section 10632 no later than 30 days after adoption, in accordance with protocols for submission and using electronic reporting tools developed by the department.

(c) (1) (A) Notwithstanding Section 10231.5 of the Government Code, the department shall prepare and submit to the Legislature, on or before July 1, in the years ending in seven and two, a report summarizing the status of the plans and water shortage contingency plans adopted pursuant to this part. The report prepared by the department shall identify the exemplary elements of the individual plans and water shortage contingency plans. The department shall provide a copy of the report to each urban water supplier that has submitted its plan and water shortage contingency plan to the department. The department shall also prepare reports and provide data for any legislative hearings designed to consider the effectiveness of plans and water shortage contingency plans submitted pursuant to this part.

(B) The department shall prepare and submit to the board, on or before September 30 of each year, a report summarizing the submitted water supply and demand assessment results along with appropriate reported water shortage conditions and the regional and statewide analysis of water supply conditions developed by the department. As part of the report, the department shall provide a summary and, as appropriate, urban water supplier specific information regarding various shortage response actions implemented as a result of annual supplier-specific water supply and demand assessments performed pursuant to Section 10632.1.

(C) The department shall submit the report to the Legislature for the 2015 plans by July 1, 2017, and the report to the Legislature for the 2020 plans and water shortage contingency plans by July 1, 2022.

(2) A report to be submitted pursuant to subparagraph (A) of paragraph (1) shall be submitted in compliance with Section 9795 of the Government Code.

(d) The department shall make available to the public the standard the department will use to identify exemplary water demand management measures.

*(Amended by Stats. 2018, Ch. 14, Sec. 40. (SB 606) Effective January 1, 2019.)*

[10645.](#) (a) Not later than 30 days after filing a copy of its plan with the department, the urban water supplier and the department shall make the plan available for public review during normal business hours.

(b) Not later than 30 days after filing a copy of its water shortage contingency plan with the department, the urban water supplier and the department shall make the plan available for public review during normal business hours.

*(Amended by Stats. 2018, Ch. 14, Sec. 41. (SB 606) Effective January 1, 2019.)*



**CHAPTER 4. Miscellaneous Provisions [1 0650 - 10657] ( Chapter 4 added by :itats. 1 983, Ch. 1009, iec. 1. )**

[10650](#) Any actions or proceedings, other than actions by the board, to attack, review, set aside, void, or annul the acts or decisions of an urban water supplier on the grounds of noncompliance with this part shall be commenced as follows:

(a) An action or proceeding alleging failure to adopt a plan or a water shortage contingency plan shall be commenced within 18 months after that adoption is required by this part.

(b) Any action or proceeding alleging that a plan or water shortage contingency plan, or action taken pursuant to either, does not comply with this part shall be commenced within 90 days after filing of the plan or water shortage contingency plan or an amendment to either pursuant to Section 10644 or the taking of that action.

*(Amended by Stats. 2018, Ch. 14, Sec. 42. (SB 606) Effective January 1, 2019.)*

[10651](#) In any action or proceeding to attack, review, set aside, void, or annul a plan or a water shortage contingency plan, or an action taken pursuant to either by an urban water supplier on the grounds of noncompliance with this part, the inquiry shall extend only to whether there was a prejudicial abuse of discretion. Abuse of discretion is established if the supplier has not proceeded in a manner required by law or if the action by the water supplier is not supported by substantial evidence.

*(Amended by Stats. 2018, Ch. 14, Sec. 43. (SB 606) Effective January 1, 2019)*

[10652](#) The California Environmental Quality Act (Division 13 (commencing with Section 21000) of the Public Resources Code) does not apply to the preparation and adoption of plans pursuant to this part or to the implementation of actions taken pursuant to Section 10632. Nothing in this part shall be interpreted as exempting from the California Environmental Quality Act any project that would significantly affect water supplies for fish and wildlife, or any project for implementation of the plan, other than projects implementing Section 10632, or any project for expanded or additional water supplies.

*(Amended by Stats. 1995, Ch. 854, Sec. 6. Effective January 1, 1996.)*

[10653](#) The adoption of a plan shall satisfy any requirements of state law, regulation, or order, including those of the board and the Public Utilities Commission, for the preparation of water management plans, water shortage contingency plans, or conservation plans; provided, that if the board or the Public Utilities Commission requires additional information concerning water conservation, drought response measures, or financial conditions to implement its existing authority, nothing in this part shall be deemed to limit the board or the commission in obtaining that information. The requirements of this part shall be satisfied by any urban water demand management plan that complies with analogous federal laws or regulations after the effective date of this part, and which substantially meets the requirements of this part, or by any existing urban water management plan which includes the contents of a plan required under this part.

*(Amended by Stats. 2018, Ch. 14, Sec. 45. (SB 606) Effective January 1, 2019)*

[10654](#) An urban water supplier may recover in its rates the costs incurred in preparing its urban water management plan, its drought risk assessment, its water supply and demand assessment, and its water shortage contingency plan and implementing the reasonable water conservation measures included in either of the plans.

*(Amended by Stats. 2018, Ch. 14, Sec. 44. (SB 606) Effective January 1, 2019)*

[10655](#) If any provision of this part or the application thereof to any person or circumstances is held invalid, that invalidity shall not affect other provisions or applications of this part which can be given effect without the invalid provision or application thereof, and to this end the provisions of this part are severable.



*(Amended by Stats. 1983, Ch. 1009, Sec. 1)*

[10656](#) An urban water supplier is not eligible for a water grant or loan awarded or administered by the state unless the urban water supplier complies with this part.

*(Amended by Stats. 2018, Ch. 14, Sec. 46. (SB 606) Effective January 1, 2019)*

[10657](#) The department may adopt regulations regarding the definitions of water, water use, and reporting periods, and may adopt any other regulations deemed necessary or desirable to implement this part. In developing regulations pursuant to this section, the department shall solicit broad public participation from stakeholders and other interested persons.

*(Amended by Stats. 2018, Ch. 14, Sec. 47. (SB 606) Effective January 1, 2019)*



## Appendix B

### DWR 2020 Urban Water Management Plan Tables

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 *
<i>Add additional rows as needed</i>			
4910006	City of Petaluma	20,713	7,731
<b>TOTAL</b>		<b>20,713</b>	<b>7,731</b>
<b>* Units of measure (AF, CCF, MG) must remain consistent throughout the UWMP as reported in Table 2-3.</b>			
NOTES: Volumes are in AF.			

Submittal Table 2-2: Plan Identification		
Select Only One	Type of Plan	Name of RUWMP or Regional Alliance <i>if applicable</i> (select from drop down list)
<input checked="" type="checkbox"/>	<b>Individual UWMP</b>	
	<input type="checkbox"/> Water Supplier is also a member of a RUWMP	
	<input checked="" type="checkbox"/> Water Supplier is also a member of a Regional Alliance	North Marin-Sonoma Alliance
<input type="checkbox"/>	<b>Regional Urban Water Management Plan (RUWMP)</b>	
NOTES:		



Submittal Table 2-3: Supplier Identification	
Type of Supplier (select one or both)	
<input type="checkbox"/>	Supplier is a wholesaler
<input checked="" type="checkbox"/>	Supplier is a retailer
Fiscal or Calendar Year (select one)	
<input checked="" type="checkbox"/>	UWMP Tables are in calendar years
<input type="checkbox"/>	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
<i>* Units of measure (AF, CCF, MG) must remain consistent throughout the UWMP as reported in Table 2-3.</i>	
NOTES:	

**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

*Add additional rows as needed*

Sonoma County Water Agency (Sonoma Water)

NOTES:

Submittal Table 3-1 Retail: Population - Current and Projected						
Population Served	2020	2025	2030	2035	2040	2045(opt)
	64,251	65,894	67,285	68,505	69,980	71,486
NOTES: 2018 ABAG Population Projection for 2020 is 63,168. Actual population for 2020 is 64,251.						

**Submittal Table 4-1 Retail: Demands for Potable and Non-Potable<sup>1</sup> Water - Actual**

Use Type	2020 Actual		
<p><b>Drop down list</b>                      May select each use multiple times                      These are the only Use Types that will be recognized by the WUEdata online submittal tool</p>	Additional Description (as needed)	Level of Treatment When Delivered Drop down list	Volume <sup>2</sup>
Add additional rows as needed			
Single Family		Drinking Water	4,354
Multi-Family		Drinking Water	888
Commercial		Drinking Water	955
Industrial		Drinking Water	403
Institutional/Governmental		Drinking Water	235
Landscape	All dedicated irrigation accounts	Drinking Water	893
Other Potable		Drinking Water	3
<b>TOTAL</b>			<b>7,731</b>

<sup>1</sup> Recycled water demands are NOT reported in this table. Recycled water demands are reported in Table 6-4.

<sup>2</sup> Units of measure (AF, CCF, MG) must remain consistent throughout the UWMP as reported in Table 2-3.

NOTES: Volumes are in AF.

**Submittal Table 4-2 Retail: Use for Potable and Non-Potable<sup>1</sup> Water - Projected**

Use Type	Additional Description (as needed)	Projected Water Use <sup>2</sup> <i>Report To the Extent that Records are Available</i>				
		2025	2030	2035	2040	2045 (opt)
<b>Drop down list.</b> May select each use multiple times These are the only Use Types that will be recognized by the WUEdata online submittal tool						
Add additional rows as needed						
Single Family		4,642	4,740	4,826	4,930	5,036
Multi-Family		523	631	653	679	706
Commercial		1,067	1,102	1,144	1,239	1,341
Industrial		497	497	497	497	497
Institutional/Governmental		384	397	412	446	483
Landscape	Commercial and Institutional Irrigation	1,043	1,078	1,119	1,211	1,312
Groundwater recharge						
Saline water intrusion barrier						
Agricultural irrigation						
Wetlands or wildlife habitat						
Sales/Transfers/Exchanges to other agencies						
Sales/Transfers/Exchanges to other agencies						
Losses	See note a.	749	775	794	826	861
Other Potable						
Other Non-Potable						
Other	Estimated Passive Savings <sup>(b)</sup>	-200	-350	-471	-573	-659
<b>TOTAL</b>		<b>8,705</b>	<b>8,870</b>	<b>8,974</b>	<b>9,255</b>	<b>9,577</b>

<sup>1</sup> Recycled water demands are NOT reported in this table. Recycled water demands are reported in Table 6-4. <sup>2</sup> Units of measure (AF, CCF, MG) must remain consistent throughout the UWMP as reported in Table 2-3.

NOTES: Volumes are in AF.  
 (a) Water losses are based on the average percentage of water loss reported for 2017 through 2019.  
 (b) Passive water savings are based on the AWE Conservation Tracking Tool.

**Submittal Table 4-3 Retail: Total Water Use (Potable and Non-Potable)**

	2020	2025	2030	2035	2040	2045 (opt)
Potable Water, Raw, Other Non-potable <i>From Tables 4-1R and 4-2 R</i>	7,731	8,705	8,870	8,974	9,255	9,577
Recycled Water Demand <sup>1</sup> <i>From Table 6-4</i>	651	2,000	2,540	2,540	2,540	2,540
Optional Deduction of Recycled Water Put Into Long-Term Storage <sup>2</sup>						
<b>TOTAL WATER USE</b>	8,382	10,705	11,410	11,514	11,795	12,117

<sup>1</sup> Recycled water demand fields will be blank until Table 6-4 is complete

<sup>2</sup> Long term storage means water placed into groundwater or surface storage that is not removed from storage in the same year. Supplier **may** deduct recycled water placed in long-term storage from their reported demand. This value is manually entered into Table 4-3.

NOTES: Volumes are in AF.

**Submittal Table 4-4 Retail: Last Five Years of Water Loss Audit Reporting**

Reporting Period Start Date (mm/yyyy)	Volume of Water Loss <sup>1,2</sup>
01/2015	591
01/2016	742
01/2017	453
01/2018	828
01/2019	305

<sup>1</sup> Taken from the field "Water Losses" (a combination of apparent losses and real losses) from the AWWA worksheet.

<sup>2</sup> **Units of measure (AF, CCF, MG)** must remain consistent throughout the UWMP as reported in Table 2-3.

NOTES: Volumes are in AF.

<b>Submittal Table 4-5 Retail Only: Inclusion in Water Use Projections</b>	
<p><b>Are Future Water Savings Included in Projections?</b>            (Refer to Appendix K of UWMP Guidebook)  <i>Drop down list (y/n)</i></p>	Yes
<p>If "Yes" to above, state the section or page number, in the cell to the right, where citations of the codes, ordinances, or otherwise are utilized in demand projections are found.</p>	Chapter 4 (Section 4.3)
<p><b>Are Lower Income Residential Demands Included In Projections?</b>  <i>Drop down list (y/n)</i></p>	Yes
NOTES:	



**Submittal Table 5-1 Baselines and Targets Summary**  
**From SB X7-7 Verification Form**  
*Retail Supplier or Regional Alliance Only*

Baseline Period	Start Year *	End Year *	Average Baseline GPCD*	Confirmed 2020 Target*
10-15 year	1995	2004	177	141
5 Year	2003	2007	157	

*\*All cells in this table should be populated manually from the supplier's SBX7-7 Verification Form and reported in Gallons per Capita per Day (GPCD)*

NOTES:

<b>Submittal Table 5-2: 2020 Compliance</b> <b>From SB X7-7 2020 Compliance Form</b> <i>Retail Supplier or Regional Alliance Only</i>				
2020 GPCD			2020 Confirmed Target GPCD*	Did Supplier Achieve Targeted Reduction for 2020? Y/N
Actual 2020 GPCD*	2020 TOTAL Adjustments*	Adjusted 2020 GPCD* <i>(Adjusted if applicable)</i>		
102		102	141	Yes
<i>*All cells in this table should be populated manually from the supplier's SBX7-7 2020 Compliance Form and reported in Gallons per Capita per Day (GPCD)</i>				
NOTES:				

Submittal Table 6-1 Retail: Groundwater Volume Pumped						
<input type="checkbox"/>	Supplier does not pump groundwater. The supplier will not complete the table below.					
<input type="checkbox"/>	All or part of the groundwater described below is desalinated.					
Groundwater Type <i>Drop Down List</i> May use each category multiple times	Location or Basin Name	2016*	2017*	2018*	2019*	2020*
<i>Add additional rows as needed</i>						
Alluvial Basin	Petaluma Valley	382	67	0	6	37
<b>TOTAL</b>		382	67	0	6	37
<b>* Units of measure (AF, CCF, MG) must remain consistent throughout the UWMP as reported in Table 2-3.</b>						
NOTES: Volumes are in AF.						

**Submittal Table 6-2 Retail: Wastewater Collected Within Service Area in 2020**

There is no wastewater collection system. The supplier will not complete the table below.

Percentage of 2020 service area covered by wastewater collection system *(optional)*

Percentage of 2020 service area population covered by wastewater collection system *(optional)*

Wastewater Collection			Recipient of Collected Wastewater			
Name of Wastewater Collection Agency	Wastewater Volume Metered or Estimated? <i>Drop Down List</i>	Volume of Wastewater Collected from UWMP Service Area 2020 *	Name of Wastewater Treatment Agency Receiving Collected Wastewater	Treatment Plant Name	Is WWTP Located Within UWMP Area? <i>Drop Down List</i>	Is WWTP Operation Contracted to a Third Party? <i>(optional)</i> <i>Drop Down List</i>
City of Petaluma	Metered	5059	City of Petaluma	ECWRF	Yes	No
<b>Total Wastewater Collected from Service Area in 2020:</b>		5,059				

*\* Units of measure (AF, CCF, MG) must remain consistent throughout the UWMP as reported in Table 2-3 .*

NOTES: Volumes are in AF.

**Submittal Table 6-3 Retail: Wastewater Treatment and Discharge Within Service Area in 2020**

<input type="checkbox"/> No wastewater is treated or disposed of within the UWMP service area. The supplier will not complete the table below.											
2020 volumes <sup>1</sup>											
Wastewater Treatment Plant Name	Discharge Location Name or Identifier	Discharge Location Description	Wastewater Discharge ID Number (optional) <sup>2</sup>	Method of Disposal <i>Drop down list</i>	Does This Plant Treat Wastewater Generated Outside the Service Area? <i>Drop down list</i>	Treatment Level <i>Drop down list</i>	Wastewater Treated	Discharged Treated Wastewater	Recycled Within Service Area	Recycled Outside of Service Area	Instream Flow Permit Requirement
ECWRF	E-001S	Petaluma River		River or creek outfall	Yes	Tertiary	5,059	2,314	651	1,115	
<b>Total</b>							5,059	2,314	651	1,115	0

<sup>1</sup> Units of measure (AF, CCF, MG) must remain consistent throughout the UWMP as reported in Table 2-3.

<sup>2</sup> If the Wastewater Discharge ID Number is not available to the UWMP preparer, access the SWRCB CIWQS regulated facility website at <https://ciwqs.waterboards.ca.gov/ciwqs/readOnly/CiwqsReportServlet?inCommand=reset&reportName=RegulatedFacility>

NOTES: Volumes are in AF.

**Submittal Table 6-4 Retail: Recycled Water Direct Beneficial Uses Within Service Area**

Recycled water is not used and is not planned for use within the service area of the supplier.  
The supplier will not complete the table below.

Name of Supplier/Producing (Treating) the Recycled Water: **City of Petaluma**

Name of Supplier/Operating the Recycled Water Distribution System: **City of Petaluma**

Supplemental Water Added in 2020 (volume) *Include units*

Source of 2020 Supplemental Water

Beneficial Use Type <i>Insert additional rows if needed.</i>	Potential Beneficial Uses of Recycled Water (Describe)	Amount of Potential Uses of Recycled Water (Quantity) <i>Include volume units<sup>1</sup></i>	General Description of 2020 Uses	Level of Treatment <i>Drop down list</i>	2020 <sup>1</sup>	2025 <sup>1</sup>	2030 <sup>1</sup>	2035 <sup>1</sup>	2040 <sup>1</sup>	2045 <sup>1</sup> (opt)
Agricultural irrigation			Ag and Urban Irrigation Projections		0	2,000	2,540	2,540	2,540	2,540
Landscape irrigation (exc golf courses)					228					
Golf course irrigation					413					
Commercial use										
Industrial use										
Geothermal and other energy production										
Seawater intrusion barrier										
Recreational impoundment										
Wetlands or wildlife habitat										
Groundwater recharge (IPR)										
Reservoir water augmentation (IPR)										
Direct potable reuse										
Other (Hauled Recycled Water)			Hauled RW		10					
<b>Total:</b>					<b>651</b>	<b>2,000</b>	<b>2,540</b>	<b>2,540</b>	<b>2,540</b>	<b>2,540</b>
<b>2020 Internal Reuse</b>					<b>422</b>					

<sup>1</sup> **Units of measure (AF, CCF, MG) must remain consistent throughout the UWMP as reported in Table 2-3.**

NOTES: Volumes are in AF. 2020 Ag recycled water use outside of service area was 1,115 AF.

## Submittal Table 6-5 Retail: 2015 UWMP Recycled Water Use Projection Compared to 2020 Actual



Recycled water was not used in 2015 nor projected for use in 2020. The supplier will not complete the table below. If recycled water was not used in 2020, and was not predicted to be in 2015, then check the box and do not complete the table.

Beneficial Use Type	2015 Projection for 2020 <sup>1</sup>	2020 Actual Use <sup>1</sup>
<i>Insert additional rows as needed.</i>		
Agricultural irrigation		
Landscape irrigation (exc golf courses)	371	228
Golf course irrigation	765	413
Commercial use	2	
Industrial use		
Geothermal and other energy production		
Seawater intrusion barrier		
Recreational impoundment		
Wetlands or wildlife habitat		
Groundwater recharge (IPR)		
Reservoir water augmentation (IPR)		
Direct potable reuse		
Other (Hauled Recycled Water)		10
<b>Total</b>	<b>1,138</b>	<b>651</b>

<sup>1</sup> Units of measure (AF, CCF, MG) must remain consistent throughout the UWMP as reported in Table 2-3.

NOTE: Volumes are in AF. Ag recycled water use outside water service area was 1,115 AF in 2020. 2020 Landscape irrigation did not meet 2015 projected demands because the City's urban expansion program is dependent on funding. The City is in the process of planning an urban pipeline that will add a few park and school recycled water connections. 2020 Golf Course irrigation did not meet 2015 projected demands because one of the two golf courses taking recycled water closed, and only took 123 AF of water in 2020.

**Submittal Table 6-6 Retail: Methods to Expand Future Recycled Water Use**

Supplier does not plan to expand recycled water use in the future. Supplier will not complete the table below but will provide narrative explanation.

Provide page location of narrative in UWMP

Name of Action	Description	Planned Implementation Year	Expected Increase in Recycled Water Use *
----------------	-------------	-----------------------------	---

*Add additional rows as needed*

Tertiary Treatment Expansion	Increase the tertiary treatment capacity of the ECWRF from 4.68 MGD to 6.8 MGD, producing a yield of 712 AFY to meet peak demands.	2023-2024	712
Urban Expansion Pipeline	Expand urban distribution pipeline to provide 173 AFY of potable water offset for irrigation.	2025+	173
Ag Expansion Pipeline	Expand Ag distribution pipeline to provide 1,343 AFY of recycled water for irrigation.	2025+	1,343

**Total** 2,228

*\*Units of measure (AF, CCF, MG) must remain consistent throughout the UWMP as reported in Table 2-3.*

NOTES: Volumes are in AF. Expected increase in recycled water use of 712 AF for the tertiary treatment expansion is to meet peak demands of existing Urban and Ag customers. Expected increase in recycled water use at full buildout of Urban and Ag expansion pipelines, which have no planned implementation year at this time.



Submittal Table 6-7 Retail: Expected Future Water Supply Projects or Programs						
<input checked="" type="checkbox"/>	No expected future water supply projects or programs that provide a quantifiable increase to the agency's water supply. Supplier will not complete the table below.					
<input type="checkbox"/>	Some or all of the supplier's future water supply projects or programs are not compatible with this table and are described in a narrative format.					
	Provide page location of narrative in the UWMP					
Name of Future Projects or Programs	Joint Project with other suppliers?		Description (if needed)	Planned Implementation Year	Planned for Use in Year Type <i>Drop Down List</i>	Expected Increase in Water Supply to Supplier* <i>This may be a range</i>
	<i>Drop Down List (y/n)</i>	<i>If Yes, Supplier Name</i>				
<i>Add additional rows as needed</i>						
<b>*Units of measure (AF, CCF, MG) must remain consistent throughout the UWMP as reported in Table 2-3.</b>						
NOTES: Volumes are in AF.						

**Submittal Table 6-8 Retail: Water Supplies — Actual**

Water Supply	Additional Detail on Water Supply	2020		
<b>Drop down list</b> May use each category multiple times. These are the only water supply categories that will be recognized by the WUEdata online submittal tool		Actual Volume*	Water Quality Drop Down List	Total Right or Safe Yield* (optional)
Add additional rows as needed				
Purchased or Imported Water	Sonoma Water	7,323	Drinking Water	13,400
Groundwater (not desalinated)	Municipal Wells	37	Drinking Water	
Recycled Water	ECWRF	1,820	Recycled Water	
<b>Total</b>		9,180		13,400

*\*Units of measure (AF, CCF, MG) must remain consistent throughout the UWMP as reported in Table 2-3.*

NOTES: Volumes are in AF. Actual volume purchased from Sonoma Water is for 12/26/2019-12/23/2020. Recycled Water volume of 1,820 includes Ag Use of 1,115 AF (outside of service area) and 705 AF Urban Use (inside service area). Recycled Water volume does not include onsite reuse at ECWRF.

Submittal Table 6-9 Retail: Water Supplies — Projected											
Water Supply		Projected Water Supply * Report To the Extent Practicable									
Additional Detail on Water Supply		2025		2030		2035		2040		2045 (opt)	
		Reasonably Available Volume	Total Right or Safe Yield (optional)	Reasonably Available Volume	Total Right or Safe Yield (optional)	Reasonably Available Volume	Total Right or Safe Yield (optional)	Reasonably Available Volume	Total Right or Safe Yield (optional)	Reasonably Available Volume	Total Right or Safe Yield (optional)
Add additional rows as needed											
Purchased or Imported Water		8,705	13,400	8,870	13,400	8,974	13,400	9,255	13,400	9,577	13,400
Groundwater (not desalinated)											
Recycled Water		2,000		2,540		2,540		2,540		2,540	
<b>Total</b>		10,705	13,400	11,410	13,400	11,514	13,400	11,795	13,400	12,117	13,400

*\*Units of measure (AF, CCF, MG) must remain consistent throughout the UWMP as reported in Table 2-3.*

NOTES: Volumes are in AF. The City of Petaluma plans to use groundwater to meet peak demands or for emergency purposes only. The range for groundwater supply in Petaluma Valley GSA's Groundwater Sustainability Plan projections for municipal groundwater projections is 0-300 AF (2025), and 300-600 AF (2030-2045+). Recycled Water projected supply is equal to projected recycled water demand. Projected Recycled Water Supply includes demand for both Urban and Ag Use.

**Submittal Table 7-1 Retail: Basis of Water Year Data (Reliability Assessment)**

Year Type	Base Year If not using a calendar year, type in the last year of the fiscal, water year, or range of years, for example, water year 2019-2020, use 2020	Available Supplies if Year Type Repeats	
		<input type="checkbox"/>	Quantification of available supplies is not compatible with this table and is provided elsewhere in the UWMP. Location _____
		<input type="checkbox"/>	Quantification of available supplies is provided in this table as either volume only, percent only, or both.
		Volume Available *	% of Average Supply
Average Year	2002	13,400	100%
Single-Dry Year	1977	13,400	100%
Consecutive Dry Years 1st Year	1987	13,400	100%
Consecutive Dry Years 2nd Year	1988	13,400	100%
Consecutive Dry Years 3rd Year	1989	13,400	100%
Consecutive Dry Years 4th Year	1990	13,400	100%
Consecutive Dry Years 5th Year	1991	13,400	100%

*Supplier may use multiple versions of Table 7-1 if different water sources have different base years and the supplier chooses to report the base years for each water source separately. If a Supplier uses multiple versions of Table 7-1, in the "Note" section of each table, state that multiple versions of Table 7-1 are being used and identify the particular water source that is being reported in each table.*

**\*Units of measure (AF, CCF, MG) must remain consistent throughout the UWMP as reported in Table 2-3.**

NOTES: Volumes are in AF. 13,400 AF is Petaluma's annual supply allocation from Sonoma Water.

**Submittal Table 7-2 Retail: Normal Year Supply and Demand Comparison**

	2025	2030	2035	2040	2045 (Opt)
Supply totals (autofill from Table 6-9)	10,705	11,410	11,514	11,795	12,117
Demand totals (autofill from Table 4-3)	10,705	11,410	11,514	11,795	12,117
Difference	0	0	0	0	0

NOTES: Volumes are in AF.

**Submittal Table 7-3 Retail: Single Dry Year Supply and Demand Comparison**

	2025	2030	2035	2040	2045 (Opt)
Supply totals*	11,005	10,298	10,313	10,463	10,632
Demand totals*	10,705	11,410	11,514	11,795	12,117
Difference	300	(1,112)	(1,201)	(1,332)	(1,485)

*\*Units of measure (AF, CCF, MG) must remain consistent throughout the UWMP as reported in Table 2-3.*

NOTES: Volumes are in AF. Supply totals include projected demand with forecasted reduction from Sonoma Water for each year, local groundwater supply, and recycled water supply. Demand totals are based on normal demand and include projected potable demand and recycled water demand from EKI Environment & Water, Inc. 2020 Water Demand Analysis and Water Conservation Measure Update for City of Petaluma.

**Submittal Table 7-4 Retail: Multiple Dry Years Supply and Demand Comparison**

		2025*	2030*	2035*	2040*	2045* (Opt)
First year	Supply totals	10,705	11,410	11,514	11,795	12,117
	Demand totals	10,705	11,410	11,514	11,795	12,117
	Difference	0	0	0	0	0
Second year	Supply totals	10,705	11,410	11,514	11,795	12,117
	Demand totals	10,705	11,410	11,514	11,795	12,117
	Difference	0	0	0	0	0
Third year	Supply totals	10,705	11,410	11,514	11,795	12,117
	Demand totals	10,705	11,410	11,514	11,795	12,117
	Difference	0	0	0	0	0
Fourth year	Supply totals	10,705	11,410	11,514	11,795	12,117
	Demand totals	10,705	11,410	11,514	11,795	12,117
	Difference	0	0	0	0	0
Fifth year	Supply totals	10,705	11,410	11,514	11,795	12,117
	Demand totals	10,705	11,410	11,514	11,795	12,117
	Difference	0	0	0	0	0
Sixth year (optional)	Supply totals	10,705	11,410	11,514	11,795	12,117
	Demand totals	10,705	11,410	11,514	11,795	12,117
	Difference	0	0	0	0	0

**\*Units of measure (AF, CCF, MG) must remain consistent throughout the UWMP as reported in Table 2-3.**

NOTES: Volumes are in AF. Based on projected demands. Supply does not include groundwater because there is no projected deficit between supply and demand. Groundwater is only used as emergency backup supply.

<b>2021</b>		<b>Total</b>
Total Water Use		9,927
Total Supplies		9,927
Surplus/Shortfall w/o WSCP Action		0
<b>Planned WSCP Actions</b> (use reduction and supply augmentation)		
WSCP - supply augmentation benefit		
WSCP - use reduction savings benefit		
Revised Surplus/(shortfall)		0
Resulting % Use Reduction from WSCP action		0%
<b>2022</b>		
<b>2022</b>		<b>Total</b>
Total Water Use		10,121
Total Supplies		10,121
Surplus/Shortfall w/o WSCP Action		0
<b>Planned WSCP Actions</b> (use reduction and supply augmentation)		
WSCP - supply augmentation benefit		
WSCP - use reduction savings benefit		
Revised Surplus/(shortfall)		0
Resulting % Use Reduction from WSCP action		0%
<b>2023</b>		
<b>2023</b>		<b>Total</b>
Total Water Use		10,316
Total Supplies		10,316
Surplus/Shortfall w/o WSCP Action		0
<b>Planned WSCP Actions</b> (use reduction and supply augmentation)		
WSCP - supply augmentation benefit		
WSCP - use reduction savings benefit		
Revised Surplus/(shortfall)		0
Resulting % Use Reduction from WSCP action		0%
<b>2024</b>		
<b>2024</b>		<b>Total</b>
Total Water Use		10,510
Total Supplies		10,510
Surplus/Shortfall w/o WSCP Action		0
<b>Planned WSCP Actions</b> (use reduction and supply augmentation)		
WSCP - supply augmentation benefit		
WSCP - use reduction savings benefit		
Revised Surplus/(shortfall)		0
Resulting % Use Reduction from WSCP action		0%
<b>2025</b>		
<b>2025</b>		<b>Total</b>
Total Water Use		10,705
Total Supplies		10,705
Surplus/Shortfall w/o WSCP Action		0
<b>Planned WSCP Actions</b> (use reduction and supply augmentation)		
WSCP - supply augmentation benefit		
WSCP - use reduction savings benefit		
Revised Surplus/(shortfall)		0
Resulting % Use Reduction from WSCP action		0%
NOTE: Units are in AF. Water Use includes total from Water Use Worksheet in Table 4-2, plus 2000 AFY Recycled Water Demand. Incremental growth for each year between the 5 year projections.		



**Submittal Table 8-1****Water Shortage Contingency Plan Levels**

<b>Shortage Level</b>	<b>Percent Shortage Range</b>	<b>Shortage Response Actions</b> <i>(Narrative description)</i>
1	Up to 10%	Voluntary - up to 10% reduction in citywide water use.
2	Up to 20%	Mandatory - up to 20% reduction in citywide water use, including customer demand reduction plan.
3	Up to 30%	Mandatory - up to 30% reduction in citywide water use, including customer demand reduction plan.
4	Up to 40%	Mandatory - up to 40 % reduction in citywide water use, including customer demand reduction plan.
5	Up to 50%	Mandatory - up to 50 % reduction in citywide water use, including customer demand reduction plan.
6	>50%	Mandatory - more than 50 % reduction in citywide water use, including customer demand reduction plan.
NOTES:		

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Submittal Table 8-2: Demand Reduction Actions				
Shortage Level	Demand Reduction Actions <i>Drop down list</i> <i>These are the only categories that will be accepted by the WUEdata online submittal tool. Select those that apply.</i>	How much is this going to reduce the shortage gap? <i>Include units used (volume type or percentage)</i>	Additional Explanation or Reference <i>(optional)</i>	Penalty, Charge, or Other Enforcement? <i>For Retail Suppliers Only Drop Down List</i>
<i>Add additional rows as needed</i>				
1	Expand Public Information Campaign	15% to 20%		No
1	Increase Frequency of Meter Reading	0.50%	Always offered, anticipated increase in calls for high-usage.	No
1	Offer Water Use Surveys	<0.5%	Always offered, anticipate increase in participation.	No
1	Provide Rebates on Plumbing Fixtures and Devices	<0.5%	Always offered, anticipated increase in participation.	No
1	Provide Rebates for Turf Replacement	<0.5%	Always offered, anticipated increase in participation.	No
1	Increase Water Waste Patrols	<0.5%	Enforcement of all water waste prohibitions in ordinance.	Yes
1	landscape - Other landscape restriction or prohibition	<0.5%	Landscape irrigation is limited to the hours of 9pm to 6am.	No
1	landscape - Restrict or prohibit runoff from landscape irrigation	<0.5%	Always enforced by water waste ordinance.	Yes
1	Other - Customers must repair leaks, breaks, and malfunctions in a timely manner	<0.5%	Always enforced by water waste ordinance.	Yes
1	Other - Require automatic shut of hoses	<0.5%	Always enforced by water waste ordinance.	Yes
1	Other - Prohibit use of potable water for washing hand surfaces	<0.5%		Yes
2	Expand Public Information Campaign	15% to 20%		No
2	Other	Up to 5%	All demand reduction actions in Stage 1 apply in stage 2	Yes
2	CI - Restaurants may only serve water upon request	<0.5%		Yes
2	Other	0-2%	Implement Customer Demand Reduction Plan, as needed	Yes
2	Other - Prohibit vehicle washing except at facilities using recycled or recirculating water	<0.5%		Yes
2	CI - Lodging establishment must offer opt out of linen service	<0.5%		Yes
3	Other - Prohibit use of potable water for construction and dust control	<0.5%	Recycled water must be used for dust control when available.	Yes
2	Other	<0.5%	No new potable water hauler accounts authorized.	No
2	landscape - Limit landscape irrigation to specific times	0-2%	Specific days and times determined by Director.	Yes
3	Expand Public Information Campaign	15% to 20%		
3	Other	Up to 11.5%	All demand actions in Stages 1 and 2 apply.	Yes
3	Water Features - Restrict water use for decorative water features, such as fountains	<0.5%		Yes
3	Pools and Spas - Require covers for pools and spas	<0.5%		Yes
3	Other water feature or swimming pool restriction	<0.5%	Filling new pools and spas prohibited.	Yes
3	Decrease Line Flushing	<0.5%	Determined by Director	Yes
3	landscape - Prohibit certain types of landscape irrigation	0-5%	No landscape irrigation with potable water allowed at parks, golf courses, landscape assessment districts, schools, medians, and frontages. School and park irrigation restricted to playing fields and mature trees only. Golf course irrigation restricted to putting greens only.	Yes
3	Other	0-2%	Implement Customer Demand Reduction Plan or increase implementation	Yes
3	Moratorium or Net Zero Demand Increase on New Connections	0-4%	City may implement a water demand offset policy for new development.	Yes
4	Expand Public Information Campaign	15%-20%		
4	Other	Up to 24.5%	All demand actions in Stages 1, 2, and 3 apply.	Yes
4	Other water feature or swimming pool restriction	<0.5%	Filling or topping off existing pools and spas prohibited, except for public facilities.	Yes
4	landscape - Other landscape restriction or prohibition	0-1%	Moratorium on installation of new landscapes or replanting of existing landscapes that require water.	Yes
4	Other	<0.5%	City may restrict street sweepers to recycled water for street cleaning.	Yes
5	Expand Public Information Campaign	15%-20%		
5	Other	Up to 26.5%	All demand actions in Stages 1, 2, 3, and 4 apply.	Yes
5	landscape - Prohibit certain types of landscape irrigation	0-10%	No landscape irrigation except for food gardens and mature trees. Public irrigation uses only allowed for playing fields and mature trees or shrubs. Director may eliminate all public irrigation depending on shortage condition.	Yes
6	Expand Public Information Campaign	15%-20%		
6	Other	Up to 36.5%	All demand actions in Stages 1, 2, 3, 4 and 5 apply.	Yes
6	landscape - Prohibit all landscape irrigation	0-20%	No landscape irrigation except for food gardens and mature trees. Public irrigation uses only allowed for playing fields and mature trees or shrubs. Director may eliminate all public irrigation depending on shortage condition.	Yes

NOTES:

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**Submittal Table 8-3: Supply Augmentation and Other Actions**

Shortage Level	Supply Augmentation Methods and Other Actions by Water Supplier <i>Drop down list</i> <i>These are the only categories that will be accepted by the WUEdata online submittal tool</i>	How much is this going to reduce the shortage gap? <i>Include units used (volume type or percentage)</i>	Additional Explanation or Reference <i>(optional)</i>
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*Add additional rows as needed*

All	New Recycled Water	Up to 2%	Recycled water can reduce shortage gap by up to 2%, when demand reduction actions are in place to minimize citywide water use.
All	Stored Emergency Supply	Up to 100%	Stored water supply can reduce shortage gap by up to 100% for a period of time, when demand reduction actions are in place to minimize citywide water use.
All	Other Actions (describe)	Up to 100%	Local groundwater supply can reduce shortage gap by up to 100% for a period of time, when demand reduction actions are in place to minimize citywide water use.

NOTES: Supply augmentation methods may be used at any water shortage level, as determined by the City, but most likely will be used in the more severe water shortage stages 3-6.

**Submittal Table 10-1 Retail: Notification to Cities and Counties**

City Name	60 Day Notice	Notice of Public Hearing
<i>Add additional rows as needed</i>		
City of Petaluma	Yes	Yes
County Name <i>Drop Down List</i>	60 Day Notice	Notice of Public Hearing
<i>Add additional rows as needed</i>		
Sonoma County	Yes	Yes
NOTES:		

DWR 2020 Urban Water Management Plan Checklist

## Appendix C UWMP Checklist



Retail	Wholesale	2020 Guidebook Location	Water Code Section	Summary as Applies to UWMP	Subject	2020 UWMP Location (For Agency Review Use)
X	X	Chapter 1	10615	A plan shall describe and evaluate sources of supply, reasonable and practical efficient uses, reclamation and demand management activities.	Introduction and Overview	Executive Summary
X	X	Chapter 1	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. Additionally, a supplier may also choose to include a simple description at the beginning of each chapter.	Summary	Executive Summary
X	X	Section 2.2	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
X	X	Section 2.6	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
X	X	Section 2.6.2	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 2.5.3
X		Section 2.6, Section 6.1	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
	X	Section 2.6	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	NA
X	X	Section 3.1	10631(a)	Describe the water supplier service area.	System Description	Section 3.2
X	X	Section 3.3	10631(a)	Describe the climate of the service area of the supplier.	System Description	Section 3.3
X	X	Section 3.4	10631(a)	Provide population projections for 2025, 2030, 2035, 2040 and optionally 2045.	System Description	Section 3.4.1
X	X	Section 3.4.2	10631(a)	Describe other social, economic, and demographic factors affecting the supplier's water management planning.	System Description	Section 3.4.2
X	X	Sections 3.4 and 5.4	10631(a)	Indicate the current population of the service area.	System Description and Baselines and Targets	Section 3.4.1
X	X	Section 3.5	10631(a)	Describe the land uses within the service area.	System Description	Section 3.5



## Appendix C UWMP Checklist



Retail	Wholesale	2020 Guidebook Location	Water Code Section	Summary as Applies to UWMP	Subject	2020 UWMP Location (For Agency Review Use)
X	X	Section 4.2	10631(d)(1)	Quantify past, current, and projected water use, identifying the uses among water use sectors.	System Water Use	Section 4.3.2
X	X	Section 4.2.4	10631(d)(3)(C)	Retail suppliers shall provide data to show the distribution loss standards were met.	System Water Use	Section 4.4
X	X	Section 4.2.6	10631(d)(4)(A)	In projected water use, include estimates of water savings from adopted codes, plans, and other policies or laws.	System Water Use	Section 4.3.3, 4.5
X	X	Section 4.2.6	10631(d)(4)(B)	Provide citations of codes, standards, ordinances, or plans used to make water use projections.	System Water Use	Section 4.3.3
X	optional	Section 4.3.2.4	10631(d)(3)(A)	Report the distribution system water loss for each of the 5 years preceding the plan update.	System Water Use	Section 4.4
X	optional	Section 4.4	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, 4.6
X	X	Section 4.5	10635(b)	Demands under climate change considerations must be included as part of the drought risk assessment.	System Water Use	Section 4.7
X		Chapter 5	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	Section 5.2, 5.3, 5.5, 5.6
X		Chapter 5	10608.24(a)	Retail suppliers shall meet their water use target by December 31, 2020.	Baselines and Targets	Section 5.6
	X	Section 5.1	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	NA
X		Section 5.2	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	NA
X		Section 5.5	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 5.2
X		Section 5.5 and Appendix E	10608.4	Retail suppliers shall report on their compliance in meeting their water use targets. The data shall be reported using a standardized form in the SBX7-7 2020 Compliance Form.	Baselines and Targets	Appendix H
X	X	Sections 6.1 and 6.2	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 periods of drought.	System Supplies	Section 6.2, 7.1.3

## Appendix C UWMP Checklist



Retail	Wholesale	2020 Guidebook Location	Water Code Section	Summary as Applies to UWMP	Subject	2020 UWMP Location (For Agency Review Use)
X	X	Sections 6.1	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 periods of drought, <i>including changes in supply due to climate change</i> .	System Supplies	Section 6.2, 6.3,
X	X	Section 6.1	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 6.2
X	X	Section 6.1.1	10631(b)(3)	Describe measures taken to acquire and develop planned sources of water.	System Supplies	Section 6.2.8
X	X	Section 6.2.8	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 6.2.9
X	X	Section 6.2	10631(b)	Indicate whether groundwater is an existing or planned source of water available to the supplier.	System Supplies	Section 6.2.2
X	X	Section 6.2.2	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 the plan or authorization.	System Supplies	Section 6.2.2
X	X	Section 6.2.2	10631(b)(4)(B)	Describe the groundwater basin.	System Supplies	Section 6.2.2
X	X	Section 6.2.2	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
X	X	Section 6.2.2.1	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 6.2.2
X	X	Section 6.2.2.4	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 6.2.2.1
X	X	Section 6.2.2	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 6.2.9
X	X	Section 6.2.7	10631(c)	Describe the opportunities for exchanges or transfers of water on a short-term or long-term basis.	System Supplies	Section 6.2.7
X	X	Section 6.2.5	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 6.2.5
X	X	Section 6.2.5	10633(c)	Describe the recycled water currently being used in the supplier's service area.	System Supplies (Recycled Water)	Section 6.2.5

## Appendix C

### UWMP Checklist



Retail	Wholesale	2020 Guidebook Location	Water Code Section	Summary as Applies to UWMP	Subject	2020 UWMP Location (For Agency Review Use)
X	X	Section 6.2.5	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 6.2.5
X	X	Section 6.2.5	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 6.2.5.3
X	X	Section 6.2.5	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 6.2.5.4
X	X	Section 6.2.5	10633(g)	Provide a plan for optimizing the use of recycled water in the supplier's service area.	System Supplies (Recycled Water)	Section 6.2.5.4
X	X	Section 6.2.6	10631(g)	Describe desalinated water project opportunities for long-term supply.	System Supplies	Section 6.2.6
X	X	Section 6.2.5	10633(a)	Describe the wastewater collection and treatment systems in the supplier's service area with quantified amount of collection and treatment and the disposal methods.	System Supplies (Recycled Water)	Section 6.2.5.1
X	X	Section 6.2.8, Section 6.3.7	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 6.2.8
X	X	Section 6.4 and Appendix O	10631.2(a)	The UWMP must include energy information, as stated in the code, that a supplier can readily obtain.	System Suppliers, Energy Intensity	Section 6.4
X	X	Section 7.2	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	Section 7.1
X	X	Section 7.2.4	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 7.1.4
X	X	Section 7.3	10635(a)	Service Reliability Assessment: Assess the water supply reliability during normal, dry, and a drought lasting five consecutive 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 7.1.3
X	X	Section 7.3	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 7.2

## Appendix C

### UWMP Checklist



Retail	Wholesale	2020 Guidebook Location	Water Code Section	Summary as Applies to UWMP	Subject	2020 UWMP Location (For Agency Review Use)
X	X	Section 7.3	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 7.2.1
X	X	Section 7.3	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 7.2.2
X	X	Section 7.3	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 7.2.3
X	X	Section 7.3	10635(b)(4)	Include considerations of the historical drought hydrology, plausible changes on projected supplies and demands under climate change conditions, anticipated regulatory changes, and other locally applicable criteria.	Water Supply Reliability Assessment	Section 7.2
X	X	Chapter 8	10632(a)	Provide a water shortage contingency plan (WSCP) with specified elements below.	Water Shortage Contingency Planning	Chapter 8 and Appendix
X	X	Chapter 8	10632(a)(1)	Provide the analysis of water supply reliability (from Chapter 7 of Guidebook) in the WSCP	Water Shortage Contingency Planning	Section 8.1
X	X	Section 8.10	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 8.9
X	X	Section 8.2	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
X	X	Section 8.2	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
X	X	Section 8.3	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
X	X	Section 8.3	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	NA
X	X	Section 8.4	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 8.4.3

## Appendix C

### UWMP Checklist



Retail	Wholesale	2020 Guidebook Location	Water Code Section	Summary as Applies to UWMP	Subject	2020 UWMP Location (For Agency Review Use)
X	X	Section 8.4	10632(a)(4)(B)	Specify locally appropriate demand reduction actions to adequately respond to shortages.	Water Shortage Contingency Planning	Section 8.4.1
X	X	Section 8.4	10632(a)(4)(C)	Specify locally appropriate operational changes.	Water Shortage Contingency Planning	Section 8.4.4
X	X	Section 8.4	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 8.4.2
X	X	Section 8.4	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
X	X	Section 8.4.6	10632.5	The plan shall include a seismic risk assessment and mitigation plan.	Water Shortage Contingency Plan	Section 8.4.6
X	X	Section 8.5	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
X	X	Section 8.5 and 8.6	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
X		Section 8.6	10632(a)(6)	Retail supplier must describe how it will ensure compliance with and enforce provisions of the WSCP.	Water Shortage Contingency Planning	Section 8.6
X	X	Section 8.7	10632(a)(7)(A)	Describe the legal authority that empowers the supplier to enforce shortage response actions.	Water Shortage Contingency Planning	Section 8.7
X	X	Section 8.7	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
X	X	Section 8.7	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
X	X	Section 8.8	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
X	X	Section 8.8	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
X		Section 8.8	10632(a)(8)(C)	Retail suppliers must describe the cost of compliance with Water Code Chapter 3.3: Excessive Residential Water Use During Drought	Water Shortage Contingency Planning	Section 8.8

## Appendix C UWMP Checklist



Retail	Wholesale	2020 Guidebook Location	Water Code Section	Summary as Applies to UWMP	Subject	2020 UWMP Location (For Agency Review Use)
X		Section 8.9	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
X		Section 8.11	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 8.10
X	X	Sections 8.12 and 10.4	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 30 days after the submission of the plan to DWR.	Plan Adoption, Submittal, and Implementation	Section 8.12
X	X	Section 8.14	10632(c)	Make available the Water Shortage Contingency Plan to customers and any city or county where it provides water within 30 (days) after adopted the plan.	Water Shortage Contingency Planning	Section 8.12
	X	Sections 9.1 and 9.3	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	NA
X		Sections 9.2 and 9.3	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. The description will address specific measures listed in code.	Demand Management Measures	Section 9.2
X		Chapter 10	10608.26(a)	Retail suppliers shall conduct a public hearing to discuss adoption, implementation, and economic impact of water use targets (recommended to discuss compliance).	Plan Adoption, Submittal, and Implementation	Section 10.3
X	X	Section 10.2.1	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. Reported in Table 10-1.	Plan Adoption, Submittal, and Implementation	Section 10.2
X	X	Section 10.4	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	Section 10.4
X	X	Sections 10.2.2, 10.3, and 10.5	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	Section 10.2.2, 10.3
X	X	Section 10.2.2	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 10.2.1
X	X	Section 10.3.2	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
X	X	Section 10.4	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 C

### UWMP Checklist

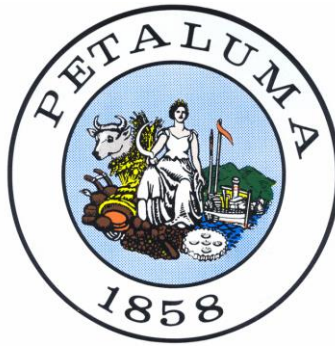


Retail	Wholesale	2020 Guidebook Location	Water Code Section	Summary as Applies to UWMP	Subject	2020 UWMP Location (For Agency Review Use)
X	X	Section 10.4	10644(a)(1)	Provide supporting documentation that the urban water supplier has submitted this UWMP to any city or county within which the supplier provides water no later than 30 days after adoption.	Plan Adoption, Submittal, and Implementation	Section 10.4
X	X	Sections 10.4.1 and 10.4.2	10644(a)(2)	The plan, or amendments to the plan, submitted to the department shall be submitted electronically.	Plan Adoption, Submittal, and Implementation	Section 10.4
X	X	Section 10.5	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
X	X	Section 10.5	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 10.5
X	X	Section 10.6	10621(c)	If supplier is regulated by the Public Utilities Commission, include its plan and contingency plan as part of its general rate case filings.	Plan Adoption, Submittal, and Implementation	NA
X	X	Section 10.7.2	10644(b)	If revised, submit a copy of the water shortage contingency plan to DWR within 30 days of adoption.	Plan Adoption, Submittal, and Implementation	Section 10.6

## Appendix D

### 2020 Urban Water Management Plan Water Demand Analysis and Water Conservation Measure Update, EKI





# **2020 Water Demand Analysis and Water Conservation Measure Update**

## **City of Petaluma**

**December 2020  
(EKI C00004.00)**

**Prepared by:**  
EKI Environment & Water, Inc.  
2001 Junipero Serra Boulevard, Suite 300  
Daly City, California 94014  
(650) 292-9100

**2020 Water Demand Analysis and  
Water Conservation Measure Update  
City of Petaluma**

**Table of Contents**

- 1. INTRODUCTION ..... 1-1**
- 2. REGULATORY CONTEXT ..... 2-1**
  - 2.1. 2020 UWMP Demand Projections Requirements ..... 2-1
  - 2.2. New Requirements for 2020 UWMPs and Future Demand Planning ..... 2-2
    - 2.2.1. Annual Urban Water Use Objectives ..... 2-2
    - 2.2.2. Supply Reliability ..... 2-4
    - 2.2.3. Water Shortage Contingency Plans ..... 2-4
- 3. WATER USE CHARACTERISTICS ..... 3-1**
  - 3.1. Historical Total and Per Capita Water Use ..... 3-1
  - 3.2. Historical Average Water Use Per Account ..... 3-1
  - 3.3. Estimated Indoor and Outdoor Water Use ..... 3-2
- 4. WATER DEMAND PROJECTIONS..... 4-1**
  - 4.1. Basis for Account Growth Projections ..... 4-1
  - 4.2. Planned Development Within the Service Area ..... 4-2
  - 4.3. Water Demand Factors..... 4-3
    - 4.3.1. Potable Water ..... 4-3
    - 4.3.2. Non-Revenue Water (Potable Water System) ..... 4-4
    - 4.3.3. Recycled Water ..... 4-5
  - 4.4. Passive Water Savings Estimates..... 4-5
  - 4.5. Projected Water Demand Through 2045 ..... 4-6
- 5. CONSERVATION PROGRAM PARTICIPATION ..... 5-1**
  - 5.1. Conservation Programs ..... 5-1
  - 5.2. Historical Conservation Program Participation ..... 5-2
  - 5.3. Estimated Savings from Past Conservation Programs..... 5-2
- 6. CONSERVATION PROGRAM UPDATE..... 6-1**
  - 6.1. Methodology for Screening of Potential Water Conservation Programs ..... 6-1
  - 6.2. Screening of Regional Conservation Measures ..... 6-2
    - 6.2.1. Agency Actions and Water Rate Based Conservation Programs ..... 6-2
    - 6.2.2. Public Outreach and Education Based Conservation Programs ..... 6-2
    - 6.2.3. Device and Financial Incentive Based Conservation Programs ..... 6-3
    - 6.2.4. Policy and Regulation Based Conservation Programs ..... 6-3
    - 6.2.5. Regional Program Screening Findings..... 6-4
  - 6.3. Screening of Local Conservation Measures..... 6-4
  - 6.4. Evaluation of Future Water Conservation Programs ..... 6-5
- 7. CONCLUSION ..... 7-1**
- 8. REFERENCES..... 8-1**

## 2020 Water Demand Analysis and Water Conservation Measure Update City of Petaluma

### Table of Contents

#### TABLES

<b>Table 3-1.</b>	Water Use and Population
<b>Table 3-2.</b>	Water Use by Customer Sector
<b>Table 3-3.</b>	Number of Accounts by Customer Sector
<b>Table 3-4.</b>	Per Account Water Use by Customer Sector
<b>Table 3-5.</b>	Monthly Water Use
<b>Table 3-6.</b>	Estimated Indoor and Outdoor Water Use
<b>Table 4-1.</b>	Population and Employment Growth Projections
<b>Table 4-2.</b>	Historical and Projected Account Growth Rate by Customer Sector
<b>Table 4-3.</b>	Change in Number of Accounts based on Projected Growth
<b>Table 4-4.</b>	Potential Potable Water Demand Factors Considered
<b>Table 4-5.</b>	Selected Water Demand Factors
<b>Table 4-6.</b>	Projected Water Demand
<b>Table 5-1.</b>	Summary of Conservation Program Participation
<b>Table 5-2.</b>	Summary of Conservation School Education Program Participation
<b>Table 5-3.</b>	Estimated Water Savings Achieved by Conservation Programs and Passive Savings
<b>Table 6-1.</b>	Regional Prioritization of Conservation Measures and Programs
<b>Table 6-2.</b>	City of Petaluma Prioritization of Conservation Measures and Programs
<b>Table 6-3a.</b>	Conservation Program Scenarios
<b>Table 6-3b.</b>	Costs and Savings of Potential Conservation Programs
<b>Table 6-3c.</b>	Comparison of Program Scenarios – Costs and Savings

#### FIGURES

<b>Figure 1-1.</b>	Participating Sonoma-Marín Saving Water Partnership Members
<b>Figure 1-2.</b>	City of Petaluma Service Area

#### APPENDICES

<b>Appendix A.</b>	California Water Code Revisions per AB-1668, SB-606, and SB-664, Redlines prepared by DWR
<b>Appendix B.</b>	Pending Projects Summary – City of Petaluma Planning Division
<b>Appendix C.</b>	AWE Model Assumptions
<b>Appendix D.</b>	Prioritization and Screening of Future Water Conservation Measures

**2020 Water Demand Analysis and  
Water Conservation Measure Update  
City of Petaluma**

**ABBREVIATIONS AND ACRONYMS**

AB	Assembly Bill
ABAG	Association of Bay Area Governments
AFY	acre-feet per year
AMI	advanced metering infrastructure
AWE	Alliance for Water Efficiency
CA	California
CEQA	California Environmental Quality Act
CII	commercial, industrial, and institutional
CWC	California Water Code
DMM	demand management measure
DOF	Department of Finance
DRA	drought risk assessment
DWR	Department of Water Resources
EIR	Environmental Impact Report
EIS	Environmental Impact Statement
GPCD	gallons per capita per day
GPD	gallons per day
gpf	gallons per flush
HECW	high efficiency clothes washer
HET	high efficiency toilet
HEU	high efficiency urinal
MFR	multi-family residential
NBWRP	North Bay Water Reuse Program
QWEL	Qualified Water Efficient Landscaper
SB	Senate Bill
SCWA	Sonoma County Water Agency
SFR	single family residential
SMSWP	Sonoma-Marin Saving Water Partnership
sq ft	square feet
SWRCB	State Water Resources Control Board
UHET	ultra high-efficiency toilet
UWMP	Urban Water Management Plan
WSA	Water Supply Assessment
WSCP	Water Shortage Contingency Plan
WWHC	Water-Wise HouseCall

## 1. INTRODUCTION

In preparation for development of their 2020 Urban Water Management Plan (UWMP) updates, nine members of the Sonoma-Marín Saving Water Partnership (SMSWP or Water Contractors) coordinated to conduct a joint update of their water demand projections and water conservation planning efforts (i.e., the *2020 Water Demand and Conservation Project*). The participating SMSWP members include: City of Cotati, City of Petaluma, City of Rohnert Park, City of Santa Rosa, City of Sonoma, Marin Municipal Water District, North Marin Water District, Town of Windsor, and Valley of the Moon Water District. These nine agencies are shown on **Figure 1-1**.

The goals of the *2020 Water Demand and Conservation Project* were to apply a common methodology to conduct the following analysis for each Water Contractor:

- Evaluate and document recent historical water use characteristics and trends, including population and account growth;
- Estimate projected water demands for the years 2025 through 2045 to support both the 2020 UWMP update and coordination and planning efforts with Sonoma County Water Agency (SCWA);
- Update the suite of common regional conservation measures that are being considered for implementation in the future;
- Review and document past participation in water conservation programs; and
- Estimate the potential water savings associated with future water conservation program implementation.

This 2020 Water Demand and Conservation report presents the results for the City of Petaluma (City), which is located in Sonoma County and served a population of approximately 65,161 people in 2019 (**Figure 1-2**). The City’s water supplies include surface water purchased from the Sonoma County Water Agency (SCWA), local groundwater wells,<sup>1</sup> and recycled water produced at its own recycling facility (Petaluma, 2016). Potable water is supplied to urban customers, and recycled water is served to both urban and agricultural customers. Over the years, the City has worked to increase water efficiency (conservation) among itself and its customers in response to both the SB X7-7 UWMP requirements and as part of the regional SMSWP. This conservation has been achieved through the implementation of water conservation programs, including some administered by the City and some administered through the regional SMSWP.

This 2020 Water Demand and Conservation report is organized as follows:

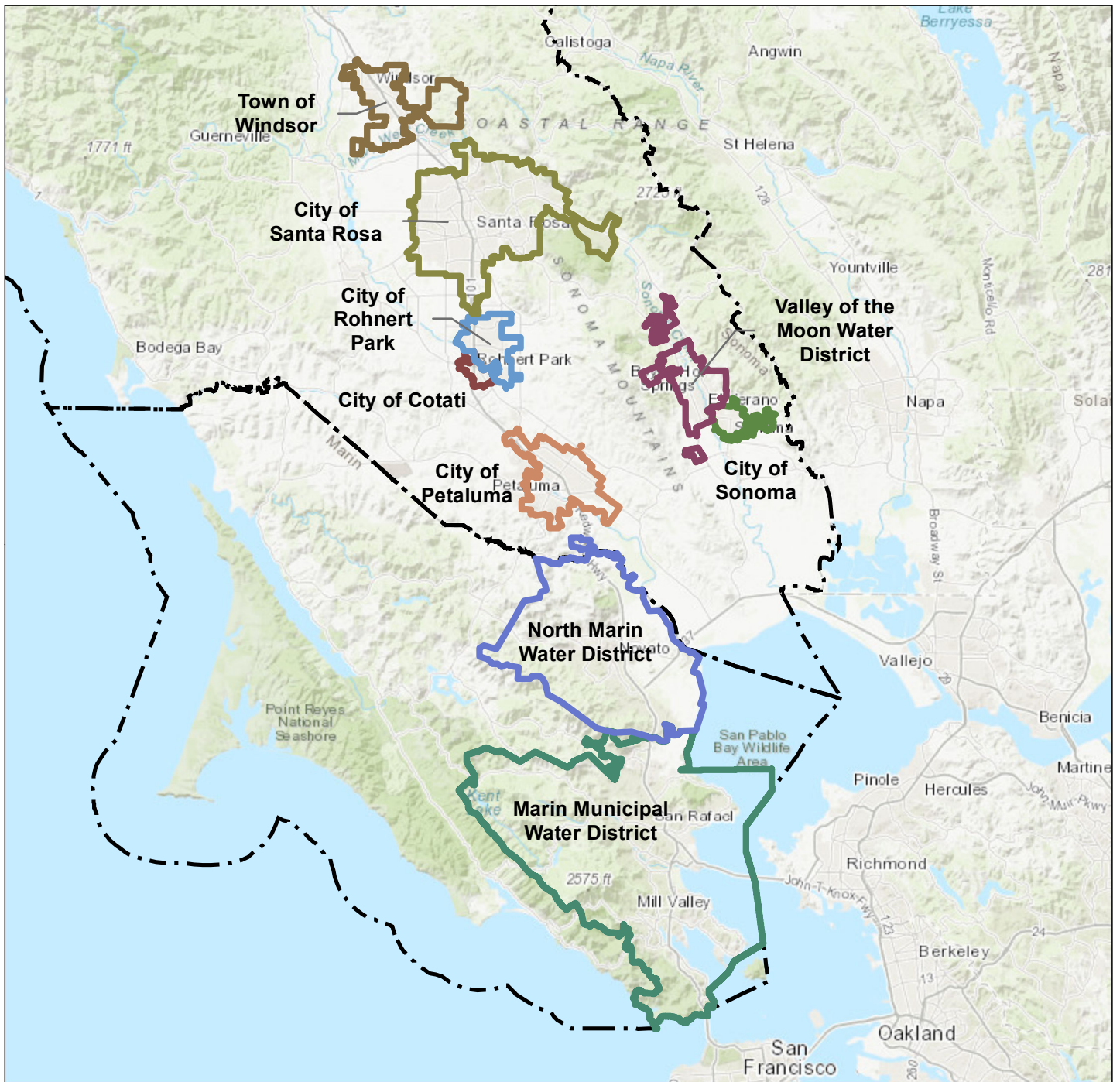
- **Section 1** identifies the goals and objectives of this report;
- **Section 2** provides the regulatory context for the demand projections described in this report as well as new requirements related to UWMPs and long-term demand planning that agencies will need to consider in development of their 2020 UWMPs;

---

<sup>1</sup> Petaluma groundwater wells are used to meet peak water demand and for emergency backup supply. Over the last ten years, local groundwater has been utilized for approximately 5% of the City’s supply.

- **Section 3** describes historical water use patterns and characteristics within the City;
- **Section 4** describes the projected water demands through 2045, including the assumptions and methodology used;
- **Section 5** documents past participation in conservation programs and estimated savings associated with program implementation;
- **Section 6** documents the water conservation measure screening process, identifies individual programs and program scenarios for potential future implementation by the City, and presents the results of a benefit-cost analysis and an estimate of the potential water savings associated with these conservation programs;
- **Section 7** provides conclusions regarding the main findings of the report; and
- **Section 8** provides key references and source.

Small tables are provided within text throughout the document. Figures and large tables and charts are provided at the end of each section.



**Legend**

- County Boundary
- City of Cotati
- City of Petaluma
- City of Rohnert Park
- City of Santa Rosa
- City of Sonoma
- Marin Municipal Water District
- North Marin Water District
- Town of Windsor
- Valley of the Moon Water District

**Sources**

1. Service area boundary provided by respective agencies.
2. Basemap provided by ESRI.



**Participating Sonoma-Marin Saving Water Partnership Members**

Sonoma-Marin Saving Water Partnership  
 December 2020  
 C00004.00

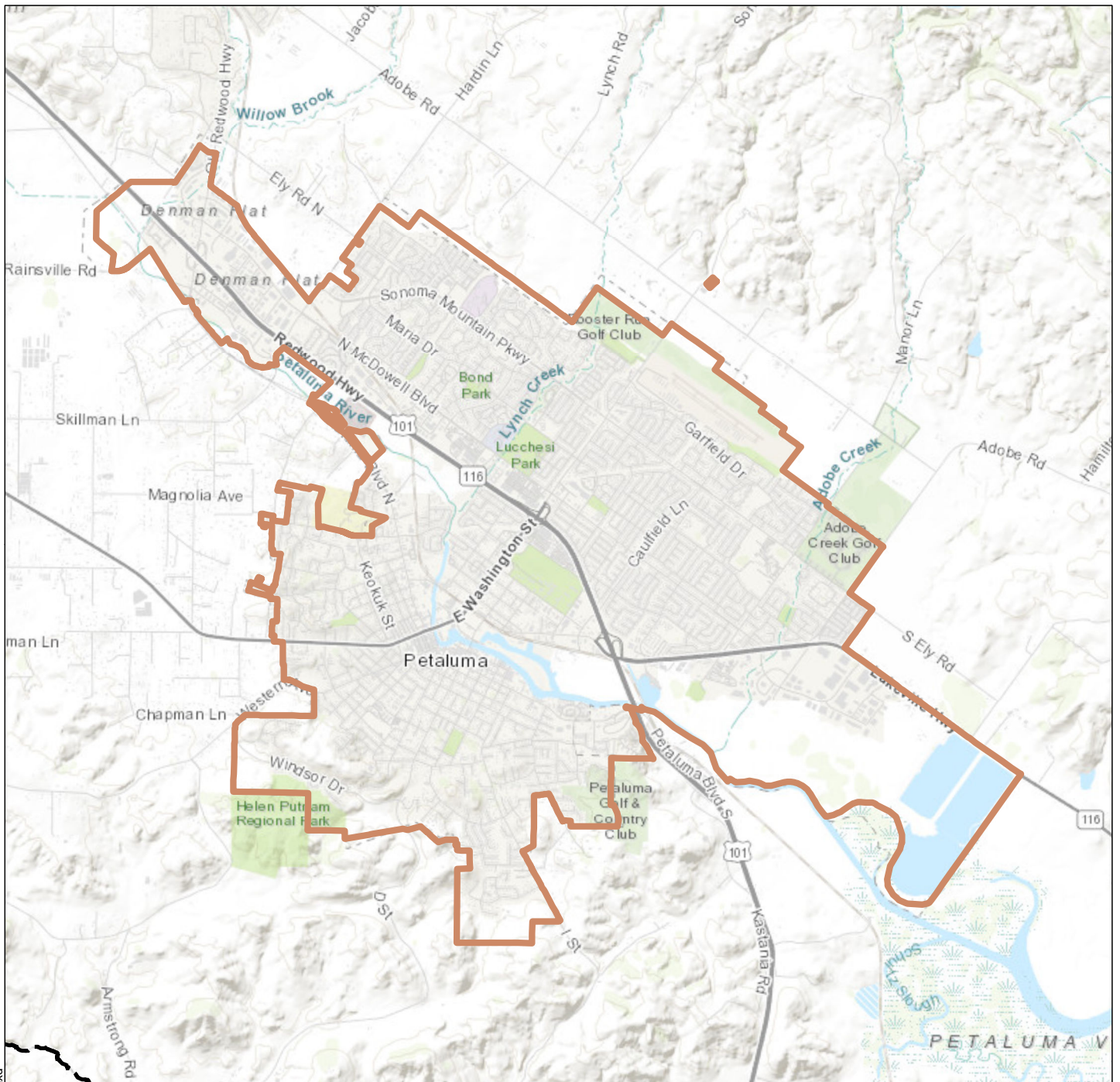


**Figure 1-1**

Path: X:\C00004\_SonomaMarinMap\2020\09\SMSWP\_Map\_20200904.mxd



**Notes**

1. All locations are approximate.



Path: X:\C00004\_SonomaMarinMap\2020\08\AgencyBoundary\Maps\_20200904.mxd

**Legend**

-  County Boundary
-  City of Petaluma



**City of Petaluma  
Service Area**

**Notes**

1. All locations are approximate.

**Sources**

1. Service area boundary provided by City of Petaluma.
2. Basemap provided by ESRI.

Sonoma-Marín Saving Water Partnership  
December 2020  
C00004.00



**Figure 1-2**



## 2. REGULATORY CONTEXT

This section is provided both as regulatory background for the requirements to project future demand in the 2020 UWMP, and for elements of the City’s 2020 UWMP that are beyond the scope of the *2020 Water Demand and Conservation Project*, such as consideration of supply reliability, water shortage contingency planning, and the annual urban water use objectives agencies will be required to report on in 2023 and meet by 2027.

### 2.1. 2020 UWMP Demand Projections Requirements

California Water Code (CWC) § 10631, excerpted below, describes the requirements to develop water demand projections that consider water use by customer sector, incorporate distribution system water loss, and account for anticipated water savings. As described further in Section 4, water demand projections were developed for the City using a land-use based approach that is consistent with these requirements, and can be incorporated into the City’s 2020 UWMP.

#### **CWC § 10631**

*A plan shall be adopted in accordance with this chapter that shall do all of the following:*

...

*(d) (1) For an urban retail water supplier, quantify, to the extent records are available, past and current water use, over the same five-year increments described in subdivision (a), and projected water use, based upon information developed pursuant to subdivision (a), identifying the uses among water use sectors, including, but not necessarily limited to, all of the following:*

*(A) Single-family residential.*

*(B) Multifamily.*

*(C) Commercial.*

*(D) Industrial.*

*(E) Institutional and governmental.*

*(F) Landscape.*

*(G) Sales to other agencies.*

*(H) Saline water intrusion barriers, groundwater recharge, or conjunctive use, or any combination thereof.*

*(I) Agricultural.*

*(J) Distribution system water loss.*

*(2) The water use projections shall be in the same five-year increments described in subdivision (a).*

...

*(d)(4) (A) Water use projections, where available, shall display and account for the water savings estimated to result from adopted codes, standards, ordinances, or transportation and land use plans identified by the urban water supplier, as applicable to the service area.*

*(B) To the extent that an urban water supplier reports the information described in subparagraph (A), an urban water supplier shall do both of the following:*

*(i) Provide citations of the various codes, standards, ordinances, or transportation and land use plans utilized in making the projections.*

*(ii) Indicate the extent that the water use projections consider savings from codes, standards, ordinances, or transportation and land use plans. Water use projections that do not account for these water savings shall be noted of that fact.*

## 2.2. New Requirements for 2020 UWMPs and Future Demand Planning

Through the recent *Making Water Conservation a California Way of Life* (Assembly Bill [AB]-1668/Senate Bill [SB]-606) and other legislation, the State has made numerous changes to the requirements for UWMPs and related water conservation planning efforts. In many cases, the updated regulations reference details and methodologies to be developed by the California Department of Water Resources (DWR), and/or are somewhat vague and will benefit from the development of guidelines/further clarification by DWR. DWR is currently developing an updated guidebook to support the development of the 2020 UWMPs, which is expected to be complete by late 2020. This new guidebook is anticipated to provide direction to agencies with respect to many elements of the new legislation.

A summary of key changes to various elements of 2020 UWMP and related planning efforts is provided below. Copies of the revisions to relevant sections of the California Water Code per AB-1668, SB-606, and SB-664 are provided in **Appendix A**.

### 2.2.1. Annual Urban Water Use Objectives

Beginning in 2023,<sup>2</sup> agencies will be required to report on “annual water use objectives” by November 1 of each year, per CWC § 10609. The specific standards that will be used to determine an agency’s annual urban water use objectives are currently under development and are the source of a great deal of uncertainty with respect to the long-term water conservation and demand planning as part of the 2020 UWMP. Although the 2020 UWMP will not identify or calculate these new annual urban water use objectives, the new standards will become effective within the UWMP planning horizon. Per CWC § 10609.25, agencies will be required to “provide a narrative that describes the water demand management measures that the supplier plans to implement to achieve its urban water use objective by January 1, 2027.” Details regarding the annual urban water use objectives and other requirements are expected to evolve significantly over the next two years.

- **Residential outdoor water use:** Per CWC § 10609.6, DWR and California State Water Resources Control Board (SWRCB) “shall conduct necessary studies and investigations and recommend, no later than October 1, 2021, standards for outdoor residential use” which “incorporate the principles of the model water efficient landscape” and “apply to irrigable lands.” DWR is currently working with a contractor to measure all of the single- and multi-family landscape (irrigable) area within urban water suppliers’ service areas across the state based on aerial imagery. The result of these measurements will become the basis for an agency’s residential landscape water use component of the annual water use objectives. In order to accurately calculate and compare against this metric, agencies will be responsible for identifying what dedicated irrigation accounts are associated with residential water use (including multi-family residential), and what dedicated

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<sup>2</sup> DWR acknowledged publicly on 5 December 2019 that this and other related deadlines are likely to slip. DWR indicated that compliance with these objectives will most likely begin in 2024.

irrigation accounts are associated with commercial, industrial and institutional (CII) use. The landscape area measurement process is being lead through a stakeholder workgroup process with periodic public meetings.

- **Residential indoor water use:** Per CWC § 10609.4.(a), “(1) Until January 1, 2025, the standard for indoor residential water use shall be 55 gallons per capita daily. (2) Beginning January 1, 2025, and until January 1, 2030, the standard for indoor residential water use shall be the greater of 52.5 gallons per capita daily or a standard recommended pursuant to subdivision (b). (3) Beginning January 1, 2030, the standard for indoor residential water use shall be the greater of 50 gallons per capita daily or a standard recommended pursuant to subdivision (b).” While the legislation appears to be clear on the method to calculate the indoor residential water use component, the SWRCB has begun the California Environmental Quality Act (CEQA) process for the new water use objective requirements and has expressed concern that using the 55 gallons per capita per day (GPCD) number in the legislation will constitute “backsliding” and thus will need to be ratcheted down.
- **Water loss:** Per CWC § 10608.34.(i), “No earlier than January 1, 2019, and no later than July 1, 2020, the board shall adopt rules requiring urban retail water suppliers to meet performance standards for the volume of water losses. In adopting these rules, the board shall employ full life-cycle cost accounting to evaluate the costs of meeting the performance standards. The board may consider establishing a minimum allowable water loss threshold that, if reached and maintained by an urban water supplier, would exempt the urban water supplier from further water loss reduction requirements.” The SWRCB is developing a complicated cost-benefit analysis methodology that would need to be conducted by agencies in order to determine what water loss controls are deemed cost-effective and thus required to be implemented. Water agencies and the California Municipal Utilities Association are advocating for an alternative methodology. The implementation of these requirements has been delayed beyond the 1 July 2020 deadline.
- **CII:** Rather than developing a water volume-based standard for the CII sector, DWR was tasked with developing a set of performance standards through a workgroup process to increase water efficiency, per CWC § 10609.10, with adoption of these performance measures by 30 June 2022. Based on this process, DWR has determined that it is impossible to set such standards today, but agencies will be required to report on progress towards key actions related to potential future standards, such as conversion of mixed CII meters to dedicated irrigation meters, performance of water audits for CII accounts, development of water management plans for CII accounts, detailed classification of CII accounts by industry, etc. The specific actions that agencies will be required to report are not yet known.
- **Recycled Water Use:** In previous UWMPs, calculations of SB X7-7 baselines, targets, and gross water use for compliance were based only on potable water use, and thus the use of recycled water to offset potable water use was an effective method to help agencies conserve potable water and meet their SB X7-7 targets. However, under CWC § 10609.(b)(2)(F), the benefit of recycled water for compliance with annual water use objectives is much more limited: “Provides a bonus incentive for the amount of potable recycled water used the previous year when comparing the previous year’s water use with the urban water use objective, of up to 10 percent of the urban water use objective.” Thus, adoption and expansion of recycled water use only provides a compliance benefit if it constitutes direct potable reuse, indirect potable reuse, or reservoir augmentation (CWC § 10608.12.(o)).

### 2.2.2. Supply Reliability

- Agencies will be required to develop procedures to conduct annual water supply and demand assessments to determine its water supply reliability for the current year and one dry year and to conduct these assessments annually beginning in 2022 (CWC § 10632(a)(2)). These procedures are required to include the following (emphasis added):
  - (A) The **written decision making process** that an urban water supplier will use each year to determine its water supply reliability.
  - (B) The key data inputs and assessment methodology used to evaluate the urban water supplier’s water supply reliability for the current year and one dry year, including all of the following:
    - (i) Current year unconstrained demand, **considering weather, growth, and other influencing factors**, such as policies to manage current supplies to meet demand objectives in future years, as applicable.
    - (ii) Current year available supply, considering **hydrological and regulatory conditions in the current year and one dry year**. The annual supply and demand assessment may consider more than one dry year solely at the discretion of the urban water supplier.
    - (iii) Existing infrastructure capabilities and plausible constraints.
    - (iv) **A defined set of locally applicable evaluation criteria** that are consistently relied upon for each annual water supply and demand assessment.
    - (v) A description and **quantification of each source** of water supply.
- In addition, the requirement to analyze supply reliability for a period of multiple consecutive drought years has been extended from a 3-year period to a 5-year period, per CWC §10631(f) and §10635(a). Specifically, agencies are now required to “compare the total water supply sources available to the water supplier with the long-term total projected water use over the next 20 years, in five-year increments, for a normal water year, a single dry water year, and a drought lasting five consecutive water years.”

### 2.2.3. Water Shortage Contingency Plans

The new regulations also add new requirements related to drought planning and Water Shortage Contingency Plans (WSCPs):

- Agencies will now be required to conduct a drought risk assessment (DRA) as part of their UWMPs to assess water supply reliability (or vulnerability) for a period of drought lasting **five consecutive water years**,<sup>3</sup> starting from the year following that of the UWMP, and to compare water supplies (assessing each source of supply separately) with total projected water use (CWC § 10635(b)) during that period. The DRA five-year period for this 2020 UWMP is 2021-2025. During the 10 March 2020 workshop, DWR indicated that agencies will be expected to identify supply and

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<sup>3</sup> While the corresponding Water Supply Assessment (WSA) regulations have not been updated to require analysis of a five-year period, agencies should consider including a five-year drought period in their supply reliability assessment in any new WSAs.

demand on a monthly basis for this purpose, although it is noted that this does not appear to be an explicit requirement of the regulations.

- Per CWC § 10632.5 agencies' WSCPs "shall include a seismic risk assessment and mitigation plan to assess the vulnerability of each of the various facilities of a water system and mitigate those vulnerabilities" and an agency may submit "a copy of the most recent adopted local hazard mitigation plan or multihazard mitigation plan under the federal Disaster Mitigation Act of 2000 (Public Law 106-390) if the local hazard mitigation plan or multihazard mitigation plan addresses seismic risk."
- WSCPs will be required to use "Six standard water shortage levels corresponding to progressive ranges of up to 10, 20, 30, 40, and 50 percent shortages and greater than 50 percent shortage," or to provide a "cross-reference relating its existing categories to the six standard water shortage levels."

### 3. WATER USE CHARACTERISTICS

This section describes historical water use by customers within the City, including changes in use observed during and after the historic 2014 - 2016 drought, changes in average per account water use over time, and estimates of indoor and outdoor water use, based on data provided by the City. This information is used to provide context and background to support the projections of future demands (Section 4) and estimates of potential conservation program benefits (Section 6).

#### 3.1. Historical Total and Per Capita Water Use

**Table 3-1** summarizes the City’s historical water use, service area population, and per capita water use for the years 2010 through 2019 (Petaluma, 2020b). Water use is described both in terms of total water produced and average per capita water use. It should be noted that the per capita water use for purposes of comparing water use to SB X7-7 water conservation targets may be different, due to the prescriptive method by DWR for determining an agencies compliance population and total water use. SB X7-7 compliance will need to be separately addressed by the City’s 2020 UWMP.

Total water use, including both potable and recycled water, ranged from 8,778 acre-feet per year (AFY) to 10,682 AFY over this period. Total per capita water use (i.e., including both potable and recycled water use) ranged from 125 GPCD to 157 GPCD. It is noted that the majority of recycled water use is by agricultural (i.e., non-urban) customers.

Both the total and per capita water use declined from 2013 through 2015, likely influenced by the historic drought conditions, mandatory state-wide restrictions in urban water use imposed by the SWRCB, and local drought response. Total and per capita water use has remained lower than pre-drought conditions, with a slight increase in 2017 and 2018, indicating a degree of rebound following the drought.

Historical water use by customer sector is provided in **Table 3-2**. The single family residential (SFR) sector comprises the largest proportion of the City’s total water use (i.e., 43% in 2019). By comparison, in 2019, dedicated irrigation accounts, including recycled water, collectively comprised 20% of total water use; the combined CII sector comprised 19% of total water use; and the multi-family residential (MFR) sector comprised 9% of total water use. In 2019, non-revenue water was estimated to be 9.6% of the total water demand.

#### 3.2. Historical Average Water Use Per Account

The total number of accounts varies over time due to growth and development within the City and shifts in land use (e.g., redevelopment of industrial areas).

The total number of accounts by customer sector for the 2010 to 2019 period is shown in **Table 3-3**, including a pie chart illustrating the relative proportion of accounts (Petaluma, 2020c). The SFR sector comprised the highest proportion of accounts in 2019 (88%), followed by CII (6.4%), and MFR (3.3%). From 2010 to 2019, the number of accounts increased between 2.4% and 8.6% for most sectors. The number of industrial accounts, however, decreased by 4.2% over this period. Due to the development and expansion of the City’s recycled water program, the number of recycled water accounts nearly doubled over this period.

Average water use per account is presented in **Table 3-4**. For most sectors, per account water usage has followed the same general trends over time as total water use in the City (per **Table 3-1**). However, commercial water use appears to have had less fluctuation over time, and per account water use by industrial and recycled water customers actually increased during the drought and has declined since.

### 3.3. Estimated Indoor and Outdoor Water Use

When designing and estimating the benefits of potential water conservation programs, it is important to understand the relative proportion of water use that is used indoors versus outdoors.

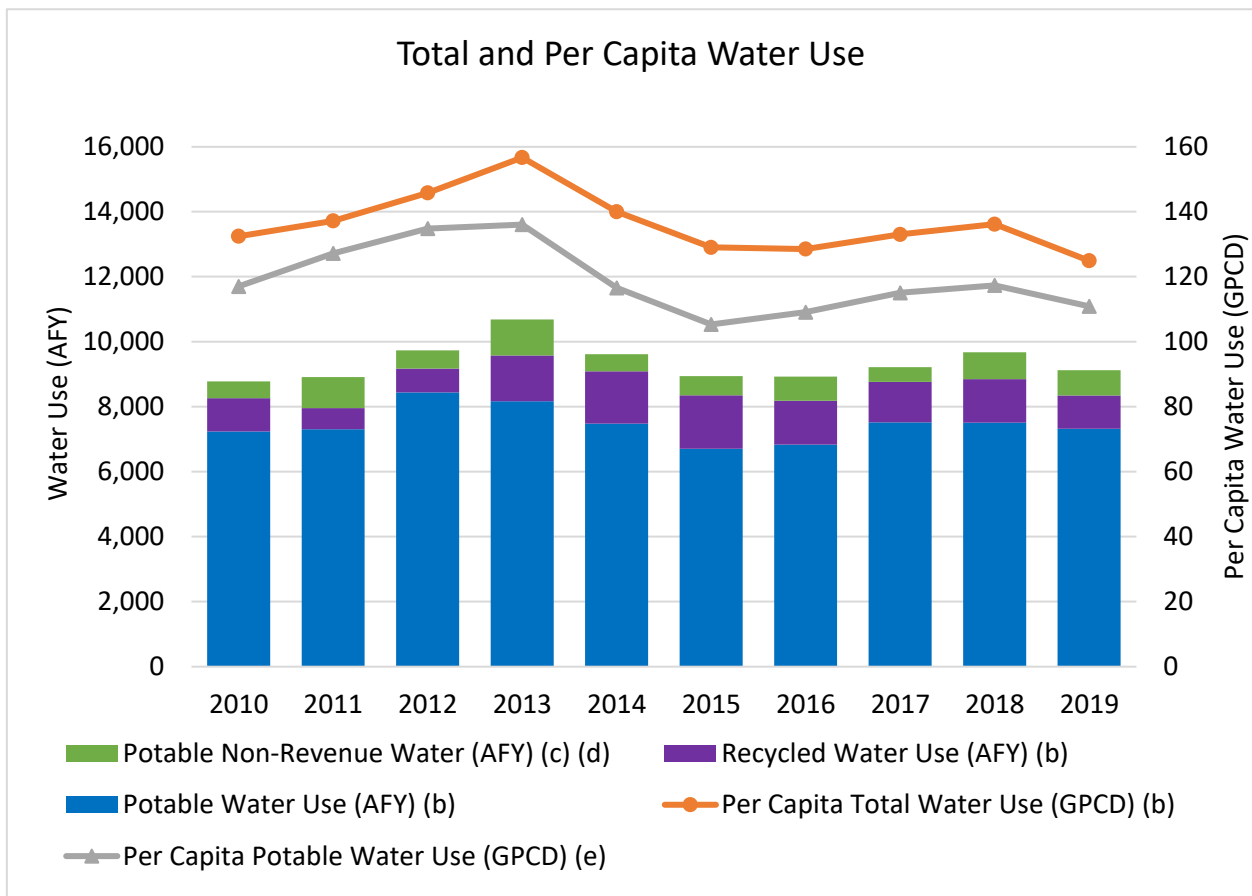
As shown in the first chart in **Table 3-5**, potable water use within the City varies seasonally, and water use in the summer is often two to three times greater than water use during the winter. This seasonality is typically driven by increased irrigation needs in the summer, as compared to the more limited irrigation water use during the wetter and cooler winter months. The second chart in **Table 3-5** shows the seasonality of recycled water use, which is limited to use for irrigation. Based on the recycled water use patterns, irrigation rates appear to be nearly zero during winter months, confirming that it is reasonable and conservative to assume that minimal irrigation with potable water occurs during winter months. It is noted that this is a high-level estimate of indoor and outdoor water use, which errs on the side of estimating higher indoor water use.

Given the water use patterns presented in **Table 3-5**, the minimum average daily water use during winter months (December-March) was used to estimate the indoor water use for all non-irrigation customer sectors. The results of this estimate are shown in **Table 3-6**. Approximately 59% of all potable water use within the City is estimated to be indoor use, and 41% to be outdoor water use.

Aside from the dedicated irrigation sectors (100% outdoor water use), SFR water use is estimated to have the highest proportion of outdoor water use at 40%, followed by industrial/governmental at 44% and commercial at 33%. The MFR sector has an estimated 19% outdoor water use, although it should be noted that landscape areas for larger multi-family developments tend to have dedicated irrigation accounts. Further, some industries within the CII sector, such as restaurants and manufacturing, may also experience some degree of seasonality in indoor use, with increased business and production during summer months. Thus, these should be considered high-level estimates of indoor and outdoor use proportions.

**Table 3-1  
Water Use and Population**  
City of Petaluma, Sonoma-Marín Saving Water Partnership

Year (a)	Potable Water Use (AFY) (b)	Potable Non-Revenue Water (AFY) (c) (d)	Recycled Water Use (AFY) (b)	Total Water Use (AFY)	Service Area Population (b)	Per Capita Potable Water Use (GPCD) (e)	Per Capita Total Water Use (GPCD) (e)
2010	7,236	518	1,024	8,778	59,126	117	132
2011	7,305	955	650	8,909	57,941	127	137
2012	8,435	563	733	9,731	59,550	135	146
2013	8,167	1,110	1,405	10,682	60,829	136	157
2014	7,476	528	1,609	9,613	61,258	117	140
2015	6,703	591	1,643	8,937	61,798	105	129
2016	6,833	742	1,349	8,924	61,955	109	129
2017	7,516	453	1,245	9,214	61,801	115	133
2018	7,506	828	1,339	9,673	63,379	117	136
2019	7,321	777	1,024	9,123	65,161	111	125





**Table 3-1**  
**Water Use and Population**  
City of Petaluma, Sonoma-Marín Saving Water Partnership

Abbreviations:

AFY = acre-feet per year  
GPCD = gallons per capita per day

Notes:

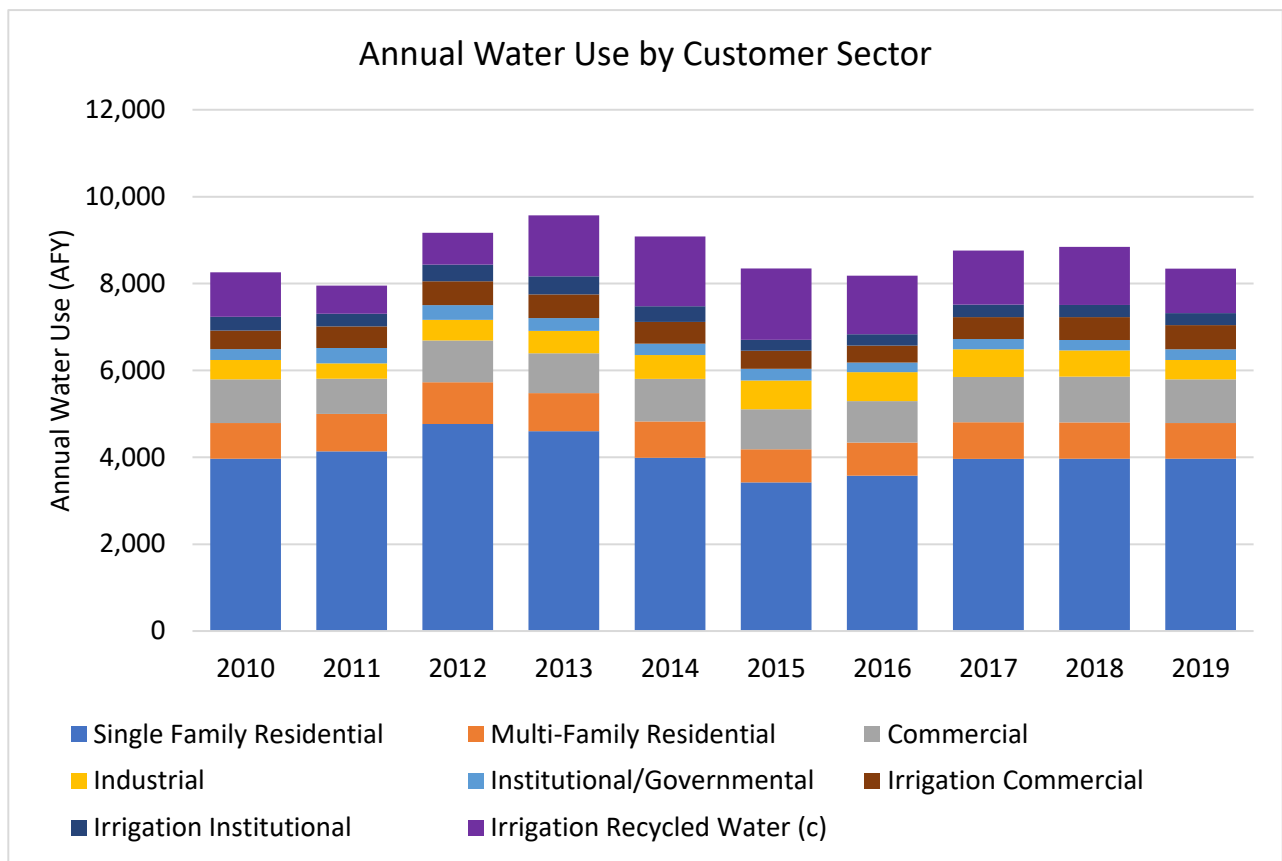
- (a) Data are presented on a calendar year basis.
- (b) Water use and service area population per Reference 1. Recycled water use includes both urban and agricultural uses.
- (c) Estimated non-revenue water per Table 3-2.
- (d) Estimates of non-revenue water are based on the potable water system and include both real and apparent losses. The recycled water system would be expected to have a degree of water loss, but this loss has not been quantified.
- (e) Per capita water use is calculated by dividing the annual water use by service area population and the number of days in a year.

References:

1. Petaluma, 2020. Historical Water Demand And Acct Info.xlsx, provided by the City of Petaluma on 14 April 2020.

**Table 3-2**  
**Water Use by Customer Sector**  
 City of Petaluma, Sonoma-Marín Saving Water Partnership

Water Use Sector	Water Use (AFY) (a) (b)									
	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Single Family Residential	3,966	4,137	4,765	4,599	3,989	3,422	3,576	3,962	3,967	3,966
Multi-Family Residential	823	860	964	878	835	761	763	845	836	823
Commercial	1,005	813	960	917	982	922	955	1,044	1,054	1,005
Industrial	445	352	476	518	549	662	664	636	606	445
Institutional/Governmental	249	352	339	293	259	271	224	234	239	249
Irrigation Commercial	427	498	549	544	501	416	391	505	527	556
Irrigation Institutional	320	291	383	417	360	248	260	289	278	277
Irrigation Recycled Water (c)	1,024	650	733	1,405	1,609	1,643	1,349	1,245	1,339	1,024
<b>Total Water Consumption</b>	<b>8,260</b>	<b>7,954</b>	<b>9,168</b>	<b>9,572</b>	<b>9,086</b>	<b>8,346</b>	<b>8,182</b>	<b>8,761</b>	<b>8,845</b>	<b>8,345</b>
Non-revenue Water (d) (e)	6.7%	12%	6.3%	12%	6.6%	8.1%	9.8%	5.7%	9.9%	9.6%
	518	955	563	1,110	528	591	742	453	828	777
<b>Total Water Use</b>	<b>8,778</b>	<b>8,909</b>	<b>9,731</b>	<b>10,682</b>	<b>9,613</b>	<b>8,937</b>	<b>8,924</b>	<b>9,214</b>	<b>9,673</b>	<b>9,123</b>



Abbreviations:

AFY = acre-feet per year

DWR = Department of Water Resources

**Table 3-2**  
**Water Use by Customer Sector**  
City of Petaluma, Sonoma-Marín Saving Water Partnership

Notes:

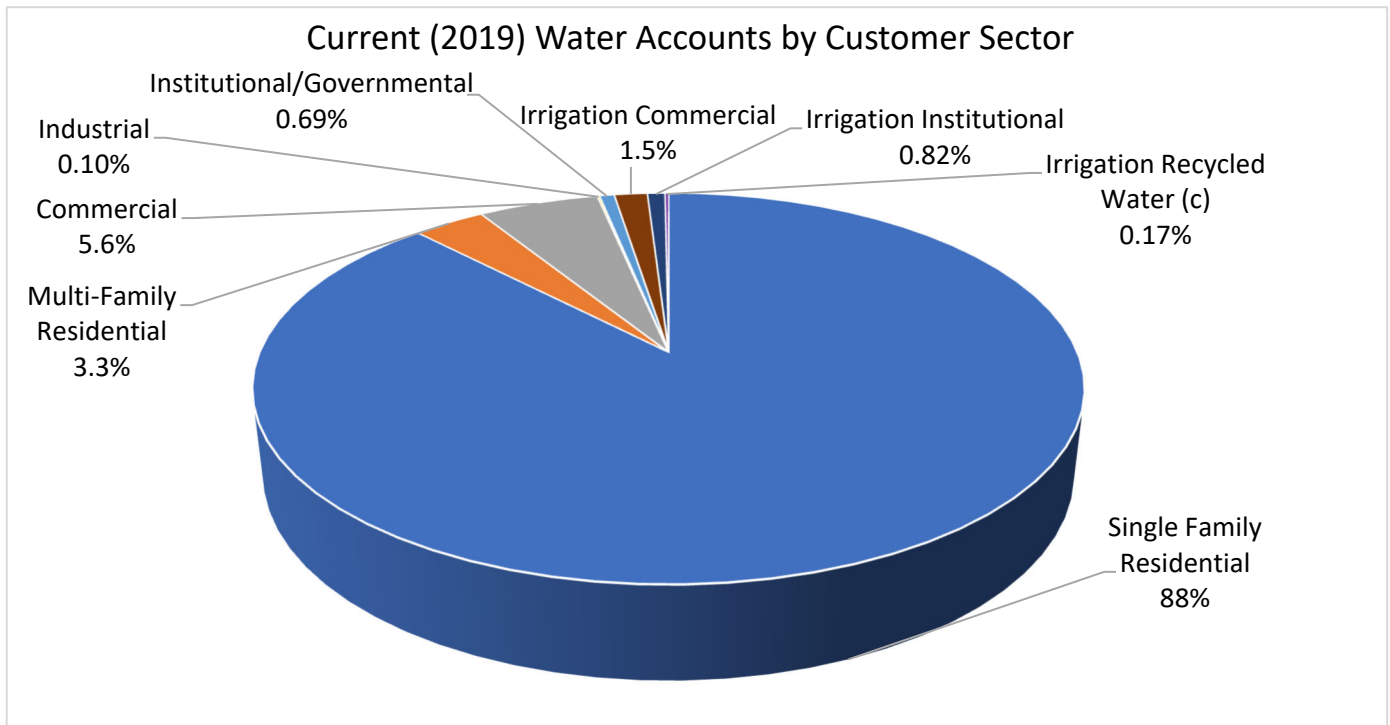
- (a) Data are presented on a calendar year basis.
- (b) Water use by sector per Reference 3.
- (c) Recycled water use includes both urban and agricultural uses.
- (d) Non-revenue water for 2010-2012 per Reference 2 and 2013-2018 per Reference 3. For 2019 where non-revenue water data was unavailable, the average percent water loss from the 2016-2018 DWR Water Audit Reports was used, per Reference 1.
- (e) Estimates of non-revenue water are based on the potable water system and include both real and apparent losses. The recycled water system would be expected to have a degree of water loss, but this loss has not been quantified.

References:

- 1. DWR, 2020. WUEdata - Water Audit Report Data website, accessed 13 June 2020, ([https://wuedata.water.ca.gov/awwa\\_plans](https://wuedata.water.ca.gov/awwa_plans)).
- 2. Petaluma, 2015. DSS Water Demand & Conservation Model, prepared by Maddaus Water Management, dated 1 July 2015.
- 3. Petaluma, 2020. Historical Water Demand And Acct Info.xlsx, provided by the City of Petaluma on 14 April 2020.

**Table 3-3  
Number of Accounts by Customer Sector**  
City of Petaluma, Sonoma-Marín Saving Water Partnership

Water Use Sector	Number of Accounts (a) (b)									
	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Single Family Residential	18,884	18,907	19,186	19,083	18,849	18,952	18,929	19,209	19,060	19,339
Multi-Family Residential	710	711	751	739	745	750	770	756	744	738
Commercial	1,135	1,127	1,144	1,151	1,228	1,241	1,247	1,221	1,241	1,233
Industrial	24	22	25	24	25	24	25	25	26	23
Institutional/Governmental	139	143	157	165	157	172	151	151	151	151
Irrigation Commercial	316	323	315	312	322	332	330	332	335	338
Irrigation Institutional	174	174	179	178	179	182	177	178	182	180
Irrigation Recycled Water (c)	20	19	18	40	34	37	33	33	41	38
<b>Total Accounts</b>	<b>21,402</b>	<b>21,426</b>	<b>21,775</b>	<b>21,692</b>	<b>21,539</b>	<b>21,690</b>	<b>21,662</b>	<b>21,905</b>	<b>21,780</b>	<b>22,040</b>



**Notes:**

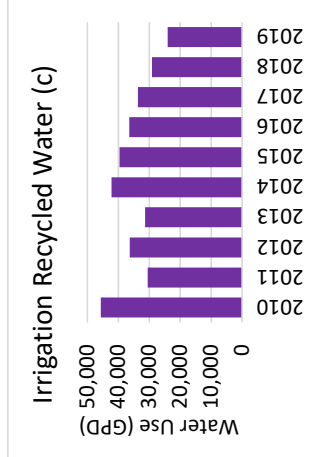
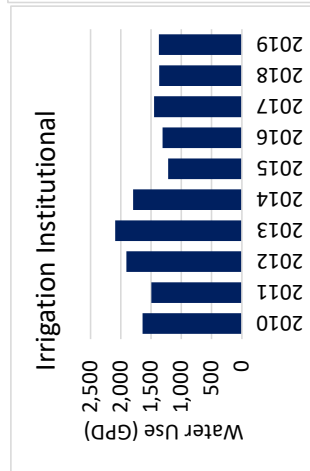
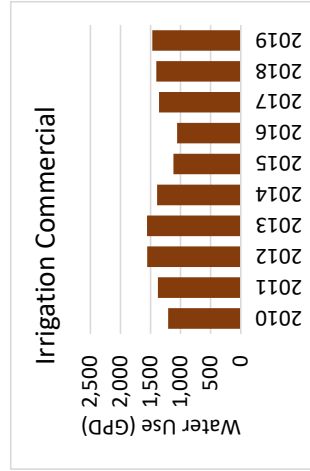
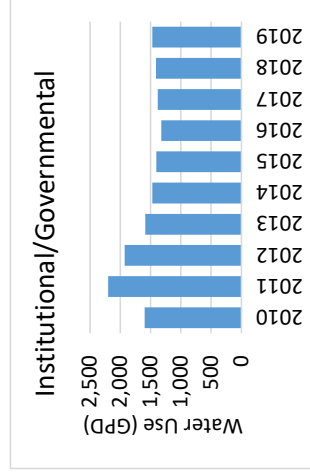
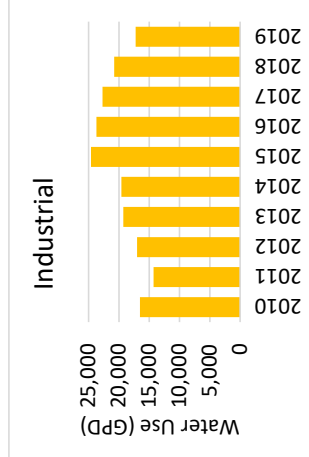
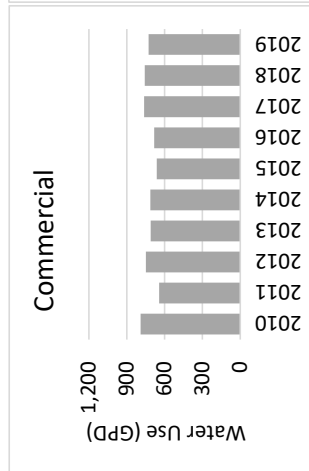
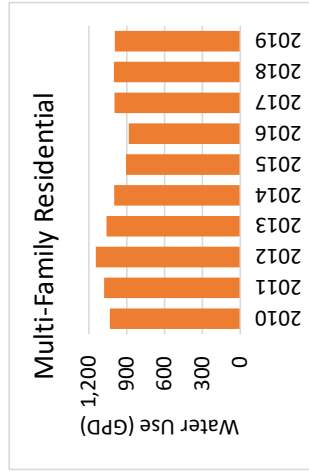
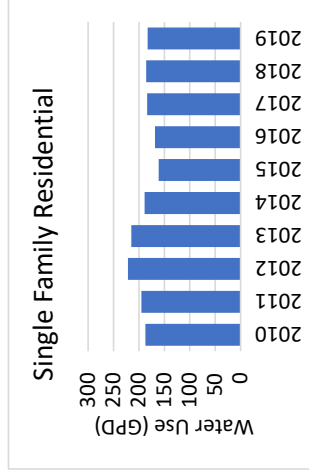
- (a) Data are presented on a calendar year basis.
- (b) Number of accounts by sector per Reference 1.
- (c) Recycled water accounts include both urban and agricultural uses.

**References:**

- 1. Petaluma, 2020. Active accounts per year per account type.xlsx, provided by the City of Petaluma on 21 April 2020.

**Table 3-4**  
**Per Account Water Use by Customer Sector**  
 City of Petaluma, Sonoma-Marín Saving Water Partnership

Water Use Sector	Water Use per Account (GPD) (a) (b)									
	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Single Family Residential	187	195	222	215	189	161	169	184	186	183
Multi-Family Residential	1,035	1,079	1,146	1,060	1,000	906	884	998	1,003	995
Commercial	790	643	748	710	713	662	683	763	757	727
Industrial	16,530	14,284	16,996	19,266	19,602	24,617	23,708	22,697	20,787	17,249
Institutional/Governmental	1,597	2,199	1,927	1,587	1,471	1,405	1,323	1,382	1,411	1,471
Irrigation Commercial	1,207	1,376	1,554	1,556	1,389	1,119	1,057	1,358	1,402	1,468
Irrigation Institutional	1,639	1,494	1,907	2,091	1,795	1,217	1,308	1,450	1,365	1,371
Irrigation Recycled Water (c)	45,679	30,500	36,313	31,327	42,223	39,612	36,472	33,663	29,128	24,042



**Abbreviations:**

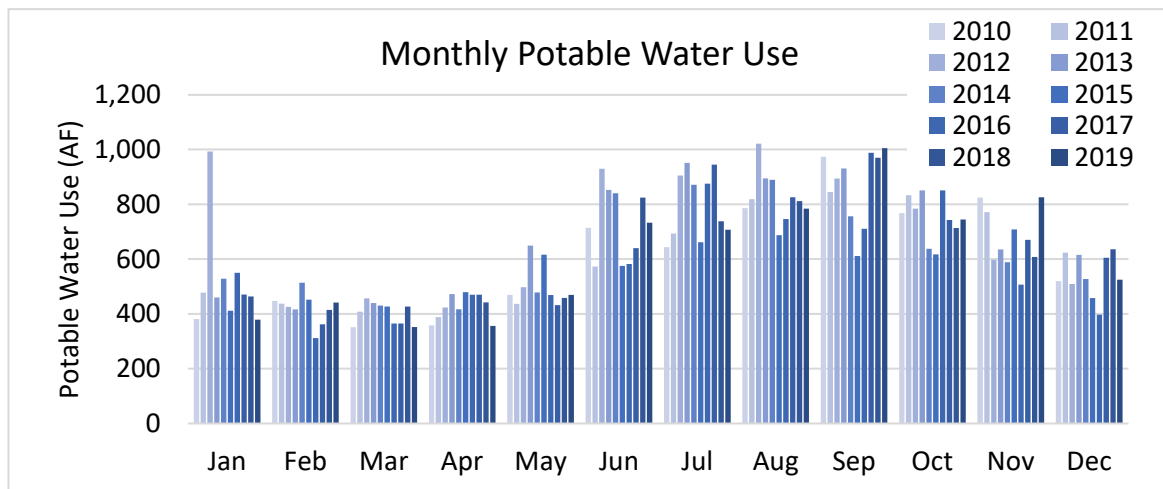
GPD = gallons per day

**Notes:**

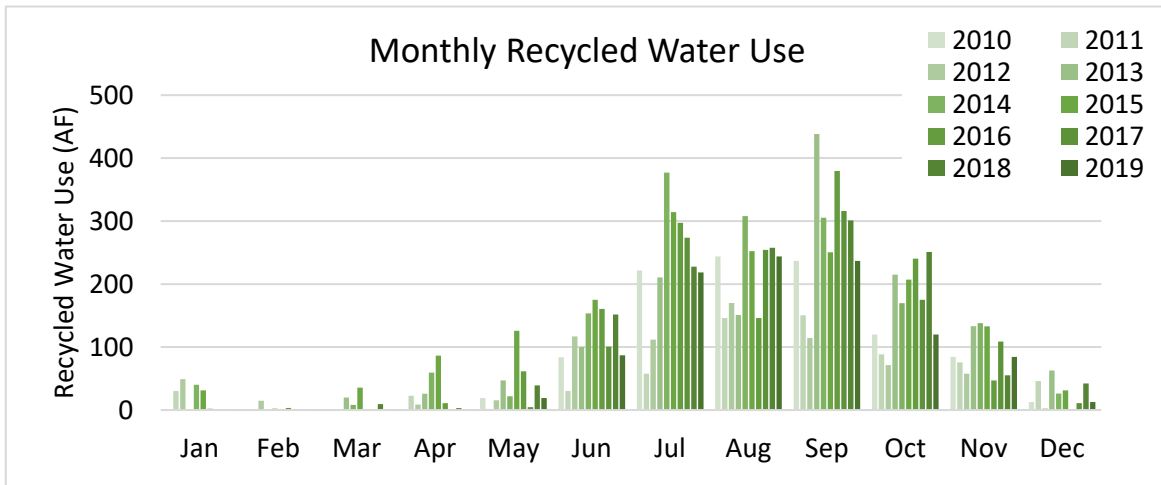
- (a) Data are presented on a calendar year basis.
- (b) Water use and number of accounts by sector per Tables 3-2 and 3-3.
- (c) Recycled water use includes both urban and agricultural uses.

**Table 3-5**  
**Monthly Water Use**  
 City of Petaluma, Sonoma-Marín Saving Water Partnership

Month	Monthly Water Use (AF) (a)									
	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
<b>Potable Water Use</b>										
January	381	477	993	460	528	411	550	471	463	379
February	447	437	425	416	513	452	312	362	414	441
March	351	408	457	440	430	427	365	365	427	352
April	358	388	423	472	417	479	470	470	442	356
May	469	437	498	649	478	616	469	432	458	469
June	714	573	929	853	840	575	582	640	824	732
July	644	693	905	951	871	662	875	945	738	707
August	786	819	1,021	895	889	687	746	826	812	784
September	974	845	894	931	756	611	710	988	970	1,005
October	768	833	784	851	638	617	851	743	713	745
November	825	771	597	635	589	708	506	670	608	826
December	519	623	509	615	527	458	397	605	636	525
<b>Recycled Water Use (b)</b>										
January	0.35	30	49	0.74	40	31	1.9	0.35	0.32	0.35
February	0.58	0.32	15	0.80	2.4	0.96	3.3	0.22	0.70	0.58
March	0.47	0.34	0.30	20	8.1	36	0.37	0.47	9.5	0.47
April	0.62	23	8.7	26	60	86	11	0.52	3.0	0.62
May	19	1.9	15	47	22	126	61	4.5	39	19
June	84	30	117	100	153	175	161	100	152	87
July	221	58	112	211	377	314	297	274	228	218
August	244	146	170	151	308	252	146	254	258	244
September	237	150	114	438	305	250	380	316	301	237
October	120	88	71	215	170	207	240	175	251	120
November	84	76	58	133	138	133	47	109	55	84
December	13	46	2.5	63	26	31	0.62	11	42	13



**Table 3-5**  
**Monthly Water Use**  
 City of Petaluma, Sonoma-Marín Saving Water Partnership



Abbreviations:

AF = acre-feet

Notes:

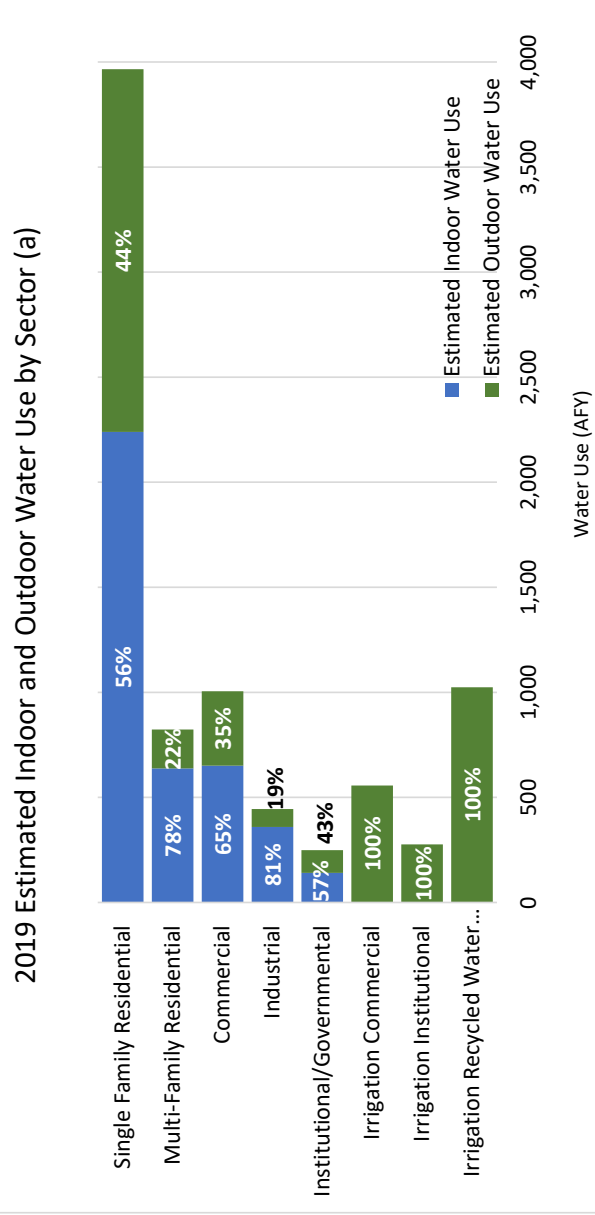
- (a) Monthly potable and recycled water use per Reference 1.
- (b) Recycled water use includes both urban and agricultural uses.

References:

1. Petaluma, 2020. Historical Water Demand And Acct Info.xlsx, provided by the City of Petaluma on 14 April 2020.

**Table 3-6**  
**Estimated Indoor and Outdoor Water Use**  
 City of Petaluma, Sonoma-Marín Saving Water Partnership

Water Use Sector	2017			2018			2019			Average Pct.		
	Indoor Water Use (AFY)	Outdoor Water Use (AFY)	Pct. Indoor	Indoor Water Use (AFY)	Outdoor Water Use (AFY)	Pct. Outdoor	Indoor Water Use (AFY)	Outdoor Water Use (AFY)	Pct. Indoor	Pct. Outdoor	Indoor Use	Outdoor Use
Single Family Residential	2,258	1,704	57%	2,660	1,306	67%	2,239	1,727	56%	44%	60%	40%
Multi-Family Residential	642	204	76%	743	93	89%	638	185	78%	22%	81%	19%
Commercial	665	379	64%	763	291	72%	651	355	65%	35%	67%	33%
Industrial	531	105	83%	527	78	87%	359	86	81%	19%	84%	16%
Institutional/Governmental	128	106	55%	132	107	55%	141	108	57%	43%	56%	44%
Irrigation Commercial	0	505	0%	0	527	100%	0	556	0%	100%	0%	100%
Irrigation Institutional	0	289	0%	0	278	100%	0	277	0%	100%	0%	100%
<b>Total (Potable)</b>	<b>4,223</b>	<b>3,292</b>	<b>56%</b>	<b>4,826</b>	<b>2,680</b>	<b>64%</b>	<b>4,028</b>	<b>3,293</b>	<b>55%</b>	<b>45%</b>	<b>59%</b>	<b>41%</b>
Irrigation Recycled Water (b)	0	1,245	0%	0	1,339	100%	0	1,024	0%	100%	0%	100%
<b>Total (Potable &amp; Recycled)</b>	<b>4,223</b>	<b>4,538</b>	<b>48%</b>	<b>4,826</b>	<b>4,019</b>	<b>55%</b>	<b>4,028</b>	<b>4,317</b>	<b>48%</b>	<b>52%</b>	<b>50%</b>	<b>50%</b>





**Table 3-6**  
**Estimated Indoor and Outdoor Water Use**  
City of Petaluma, Sonoma-Marin Saving Water Partnership

Abbreviations:

AFY = acre-feet per year

Pct. = Percentage

Notes:

- (a) The minimum average daily water use from December through March was used to estimate indoor water use for all non-irrigation customer sectors. This method is used to assess the relative proportion of indoor and outdoor use, and conservatively errs on the side of estimating more indoor water use, so that the potential for outdoor water savings is not over-estimated.
- (b) Recycled water use includes both urban and agricultural uses.

References:

- 1. Petaluma, 2020. Historical Water Demand And Acct Info.xlsx, provided by the City of Petaluma on 14 April 2020.

## 4. WATER DEMAND PROJECTIONS

The purpose of this section is to document the basis, methodology, and resulting projected demands for the City through 2045. As described in more detail below, the future water demands for the City were estimated by:

1. Applying an estimated growth rate to accounts within each water use sector based on projected population and employment growth rates,
2. Identifying known planned developments within the City to verify that account growth projections consider all anticipated growth,
3. Evaluating and selecting water demand factors for each water use sector based on review of recent average per account water use representing three scenarios,
4. Estimating future passive savings using the Alliance for Water Efficiency (AWE) Water Conservation Tracking Tool (AWE model), and
5. Calculating estimated future water demand that incorporates the anticipated account growth, water demand factors, and estimated future passive water savings.

This methodology is consistent with California Water Code (CWC) § 10631(d)(4)(A), which requires that “Water use projections, where available, shall display and account for the water savings estimated to result from adopted codes, standards, ordinances, or transportation and land use plans identified by the urban water supplier, as applicable to the service area.” The assumptions used as the bases for demand projections were developed in close coordination with the City and reflect a land-use based approach consistent with the City’s community planning.

### 4.1. Basis for Account Growth Projections

Water demand increases as new accounts are added to the system, among other factors. In order to estimate how accounts will grow within the City, recent historical account growth within the City was considered, as well as projected future growth in population and employment. As described below, it was assumed, that depending on the customer sector, the number of accounts will grow at the same *rate* as the projected population or employment growth.

**Table 4-1** presents historical population and 2018 Association of Bay Area Governments (ABAG) Plan Bay Area Projections 2040 population and employment growth projections for the City, in context with recent historical population estimates.<sup>4</sup>

**Table 4-2**, identifies which growth projection was applied to each potable water use sector (population or employment) at the City’s direction, identifies the average annual growth rate in accounts observed

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<sup>4</sup> Several growth projections were evaluated as potential bases for growth assumptions, including previous 2013 ABAG Plan Bay Area Projections (ABAG, 2013), ABAG Plan Bay Area Projections 2040 (ABAG, 2018), and 2020 Department of Finance (DOF) Total Estimated and Projected Population for California and Counties (DOF, 2020). The DOF (2020) projections are only available at the County-wide level and show a decline in population over the planning horizon and given the recent historical growth observed in the City, are not considered appropriately conservative for planning purposes. Although anticipated to be released in 2020, updated ABAG projections are not yet available. Therefore ABAG (2018) projections were selected as the basis for growth assumptions for the City.

within the City (based on data presented in **Table 3-3**), and the associated average annual growth rate projected by ABAG (2018).

Historical growth rates for accounts within the MFR, commercial, and institutional/governmental sectors are generally consistent with ABAG (2018) projections. The historical growth rate observed for SFR accounts is roughly half the ABAG (2018) projected growth rate. From 2010 to 2019, there was an overall decrease in the number of industrial accounts; given this, it is assumed that there will be no growth in industrial accounts over the planning horizon. Based on a comparison of recent historical growth in accounts, these projections are assumed to be reasonably conservative for planning purposes.

The planning horizon for the 2020 UWMP is 2045; however, the ABAG (2018) projections extend only through 2040. For purposes of demand projections, it is therefore assumed that the projected growth rates from 2035 through 2040 extend through 2045.

**Table 4-2  
Historical and Projected Account Growth Rate by Customer Sector  
(Potable Water)**

Water Use Sector	Basis for Account Growth	Average Annual Growth (a)	
		Historic (2010-2019)	ABAG 2018 (2020-2040)
Single Family Residential	population	0.27%	0.54%
Multi-Family Residential	population	0.44%	0.54%
Commercial	employment	0.96%	0.96%
Industrial	no growth	-0.46%	n/a
Institutional/Governmental	employment	0.96%	0.96%
Irrigation Commercial	employment	0.77%	0.96%
Irrigation Institutional	employment	0.38%	0.96%

**Abbreviations:**

ABAG = Association of Bay Area Governments

**Notes:**

(a) Growth is presented on an average annual basis over the indicated period. When applied to account growth, the specific growth rate between each 5-year period, per ABAG 2018 was applied.

#### 4.2. Planned Development Within the Service Area

Future demand projections should account for all growth within the City. In order to verify that the ABAG (2018) growth assumptions appropriately include new developments, known planned developments were inventoried. Based on information provided by the City’s Planning Department (provided in **Appendix B**), there are currently 48 new development projects in various stages of planning within the City, including:

- 18 commercial projects totaling 400,697 square feet (sq ft),
- 7 mixed-use projects totaling 602,964 sq ft of commercial space and 920 residential units (primarily multi-family units), and

- 23 residential developments comprised of 565 single family units, 1,096 multi-family units, and 1 duplex unit (Petaluma, 2019).<sup>5</sup>

The number of new accounts associated with these planned developments is estimated and presented in **Table 4-3**, along with the projected increase in accounts over the planning horizon based on the growth projections described in Section 4.1 and taking into account the planned development described under Section 4.2. For purposes of this assessment, it is conservatively assumed that all planned projects will be built out by 2025.

### 4.3. Water Demand Factors

Water use is influenced by a variety of factors, including weather, economic recession, and state and local regulations, among other drivers. Given this, selecting a “representative” baseline year is important to developing the land-use based water demand factors to estimate baseline water use by existing customers, which can then be extrapolated and applied to future growth within the City.

Water demand factors based on historical use within the City were used as the basis of future demand projections for potable water accounts, considering in particular the range of water use associated with pre-drought conditions, post-drought conditions, and a midpoint scenario that assumes water use partially rebounds to pre-drought conditions. **Table 3-2** provides historical water use by sector within the City. To more fully capture total water use within the City, non-revenue water is estimated as a percentage of potable water production as discussed in 4.3.2, and recycled water use is projected based on planned expansion of the recycled water system infrastructure.

#### 4.3.1. Potable Water

As shown in **Table 4-4**, the City evaluated a range of potable water demand factors for each potable water use sector using three water use scenarios, based on recent historical average per account water use for selected time periods, representing pre-drought water use rates, post-drought water use rates, and a partial rebound to pre-drought water use rates. Specifically:

1. *Pre-drought demand factors* based on the maximum per account water use by sector for 2011 through 2013 (**Table 3-4**), generally representing higher water use before drought restrictions were put in place.
2. *Post-drought demand factors* based on the maximum per account water use by sector for 2017 through 2019 (**Table 3-4**), generally representing lower water use than pre-drought conditions but with some amount of rebound.
3. *Partial rebound demand factors* estimated as the midpoint of the pre-drought and post-drought demand factors, representing an average of the two scenarios.

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<sup>5</sup> Totals are summarized to the extent that development data are available. Not all proposed or planned developments may be realized. Other planned developments over the next 25 years include the Golden Eagle Shopping Center and the Sonoma-Marin Fairgrounds; however, specific buildout information is not currently available (Petaluma, 2020a).

**Table 4-4  
Potential Potable Water Demand Factors Considered**

Water Use Sector	Water Demand Factor (GPD/account)		
	Pre-Drought (2011-2013)	Partial Rebound	Post-Drought (2017-2019)
Single Family Residential	222	204	186
Multi-Family Residential	1,146	1,074	1,003
Commercial	748	756	763
Industrial	19,266	20,982	22,697
Institutional/Governmental	2,199	1,835	1,471
Irrigation Commercial	1,556	1,512	1,468
Irrigation Institutional	2,091	1,770	1,450

**Abbreviations:**  
GPD = gallons per day

As shown in **Table 4-5**, below, for purposes of developing the City’s 2045 demand projections, the City directed EKI to apply partial rebound demand factors to the residential sectors, and the pre-drought demand factors were selected for the CII and potable irrigation sectors.<sup>6</sup>

**Table 4-5  
Selected Water Demand Factors**

Water Use Sector	Water Demand Factor (GPD/account)	Basis for Demand Factor
Single Family Residential	204	Partial rebound
Multi-Family Residential	1,074	Partial rebound
Commercial	748	Pre-drought
Industrial	19,266	Pre-drought
Institutional/Governmental	2,199	Pre-drought
Irrigation Commercial	1,556	Pre-drought
Irrigation Institutional	2,091	Pre-drought

**Abbreviations:**  
GPD = gallons per day

#### 4.3.2. Non-Revenue Water (Potable Water System)

Non-revenue water is water that has been produced but not billed, and thus does not generate revenue for the supplier. Non-revenue water includes unbilled authorized uses (such as water for fighting fires and

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<sup>6</sup> The planned developments within the City (**Appendix B**) include the development of 1,741 MFR units, of which 408 units are anticipated to be single-metered condominiums. For purposes of demand projections, the SFR demand factor is used to project demands for these condominiums.

flushing mains) and water losses (including real losses due to distribution system leaks and apparent losses due to metering inaccuracies). Urban water agencies are required to perform an annual audit of water loss of their potable water distribution system, which is used as the basis for estimating future water use associated with non-revenue water. As shown in **Table 4-6**, potable non-revenue water is projected to range from 749 AFY to 861 AFY through 2045, based on the average percentage of water loss reported from 2017 to 2019 (8.4%, see **Table 3-2**).

#### 4.3.3. Recycled Water

The recycled water system is entirely separate from the potable water system and has a more limited footprint within the City. Expansion of recycled water use is generally dependent on (1) location and proximity to recycled water distribution system, (2) the presence of substantial enough opportunities for use of non-potable water (i.e., irrigation) to warrant connection to the recycled water distribution system, and (3) the capacity of the recycled water treatment facility and distribution system to meet the available demand. Therefore, while some recycled water use may be expected to increase relative to population or employment growth within the City, system infrastructure is a more significant driver in projecting future recycled water use.

Therefore, recycled water projections are based on the North Bay Water Reuse Program (NBWRP) Phase 2 Environmental Impact Report/Environmental Impact Statement (EIR/EIS; NBWRA, 2018). The NBWRP is a multi-agency project and includes the expansion and upgrade of existing recycled water facilities and construction of nearly 20 miles of new pipeline, including 11.4 miles of pipeline for the City (NBWRA, 2018). Based on this, recycled water access and demand within the City is expected to increase for urban uses by 173 AFY and for agricultural uses by 1,343 AFY, for a total of 1,516 AFY in additional recycled water use. For purposes of demand projections, it is conservatively assumed that the infrastructure expansion and demands will be fully achieved by 2030.<sup>7</sup>

#### 4.4. **Passive Water Savings Estimates**

Passive water savings are the water savings associated with the natural replacement of older toilets, showerheads, clothes washers, and other water using appliances with newer high efficiency devices that are available due to both market shifts and increasing efficiency mandated by the building code and other regulatory requirements. The AWE model<sup>8</sup> was used to estimate future passive savings within the City. The AWE model takes into account estimates of historical population, residential building stock, number of accounts, and projected population and account growth to estimate future passive savings. The estimated passive savings are presented in **Table 4-6** and are subtracted from the water demand projected based on the water demand factors described in Section 4.3 above. Passive savings are only applied to potable water use.

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<sup>7</sup> It should be noted that a degree of water loss would be estimated to occur in the recycled water system as well, but that there is currently no quantification of this loss and no similar regulatory requirements to conduct water loss audits.

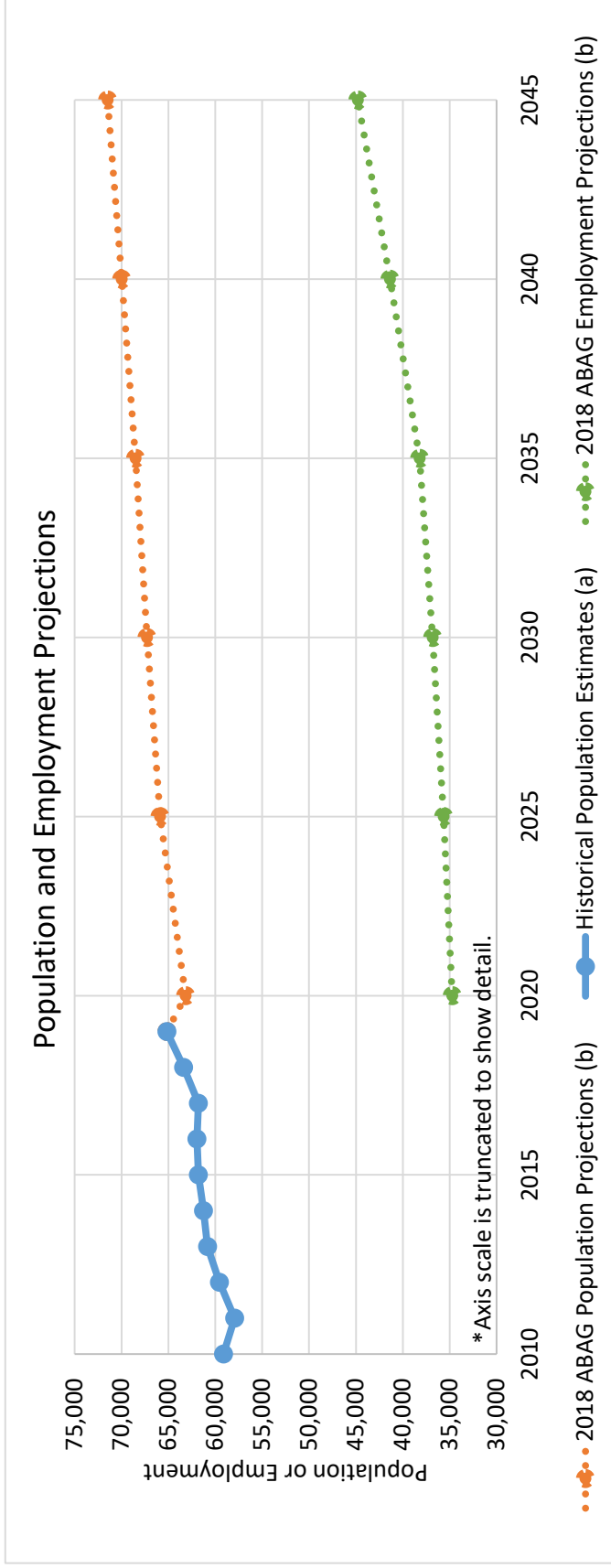
<sup>8</sup> Alliance for Water Efficiency, Water Conservation Tracking Tool Version 3, released in July 2016.

#### 4.5. Projected Water Demand Through 2045

Future potable water demand was projected for each sector based on their respective demand factors, non-revenue water estimated as a proportion of total potable water production, and estimated passive savings, and is shown in **Table 4-6**. Projected recycled water demand, also shown in **Table 4-6**, was based on planned expansion to the recycled water system. Potable water demand is projected to increase to 9,576 AFY in 2045, which is an 18% increase over 2019 water demand. Recycled water demand is projected to increase to 2,540 AFY, which is a 148% increase over 2019 water demand. Potable water demand projections are generally consistent with the City's 2015 UWMP demand projections; recycled water demand projections are higher than those projected in the 2015 UWMP (Petaluma, 2016).

**Table 4-1**  
**Population and Employment Growth Projections**  
 City of Petaluma, Sonoma-Marin Saving Water Partnership

Category	Growth Projections										Total Growth Rate 2020-2040	Average Annual Growth Rate 2020-2040	
	2015	2016	2017	2018	2019	2020	2025	2030	2035	2040			2045 (c)
<b>Population</b>													
Historical Population Estimates (a)	61,798	61,955	61,801	63,379	65,161	--	--	--	--	--	--	--	--
2018 ABAG Population Projections (b)	--	--	--	--	63,168	65,894	67,285	68,505	69,980	71,486	11%	0.54%	
<b>Employment</b>													
2018 ABAG Employment Projections (b)	--	--	--	--	34,725	35,649	36,823	38,209	41,371	44,795	19%	0.96%	





**Table 4-1**  
**Population and Employment Growth Projections**  
City of Petaluma, Sonoma-Marín Saving Water Partnership

Abbreviations:

-- = not available

ABAG = Association of Bay Area Governments

DOF = California Department of Finance

Notes:

- (a) Historical population estimates per Reference 3.
- (b) 2018 ABAG population and employment projections per Reference 1. Population and employment projections are adjusted for accounts located outside of the City, but within the water service area. The adjustments are based on the percent increase of population between 2020 DOF per Reference 2 and adjusted estimates (3.8%) per Reference 4, and include an additional 2,590 people and 1,531 jobs through 2040 located within the service area but outside of the City.
- (c) ABAG 2018 includes projections through 2040. 2045 population and employment projections are calculated based on 2035-2040 growth rates (2.2% and 8.3%, respectively).

References:

1. ABAG, 2018. Association of Bay Area Governments, Plan Bay Area Projections 2040, released on November 2018.
2. DOF, 2020. California Department of Finance - Demographic Research Unit, Total Estimated and Projected Population for California and Counties: July 1, 2010 to July 1, 2060 in 1-year Increments, Report P-1, Released on 10 January 2020.
3. Petaluma, 2020a. Historical Water Demand And Acct Info.xlsx, provided by the City of Petaluma on 14 April 2020.
4. Petaluma, 2020b. Information provided by the City of Petaluma via email, received 30 June 2020.

**Table 4-3**  
**Change in Number of Accounts based on Projected Growth**  
 City of Petaluma, Sonoma-Marín Saving Water Partnership

**Projected Number of Accounts**

Water Use Sector	Number of Accounts (a)				
	2025	2030	2035	2040	2045 (b)
Single Family Residential	20,340	20,770	21,147	21,602	22,067
Multi-Family Residential	911	1,001	1,019	1,041	1,063
Commercial	1,272	1,314	1,364	1,477	1,599
Industrial	23	23	23	23	23
Institutional/Governmental	156	161	167	181	196
Irrigation Commercial	349	360	374	405	438
Irrigation Institutional	186	192	199	216	233
<b>Total Accounts</b>	<b>23,238</b>	<b>23,821</b>	<b>24,292</b>	<b>24,943</b>	<b>25,619</b>

**Incremental Increase in Accounts from 2019**

Water Use Sector	Number of Accounts				
	2025	2030	2035	2040	2045
Single Family Residential	1,001	1,431	1,808	2,263	2,728
Multi-Family Residential	173	263	281	303	325
Commercial	39	81	131	244	366
Industrial	0	0	0	0	0
Institutional/Governmental	5	10	16	30	45
Irrigation Commercial	11	22	36	67	100
Irrigation Institutional	6	12	19	36	53
<b>Total New Accounts</b>	<b>1,236</b>	<b>1,819</b>	<b>2,290</b>	<b>2,941</b>	<b>3,617</b>

**Estimate of Known Planned Development**

Water Use Sector	Number of Accounts; Cumulative (c)				
	2025	2030	2035	2040	2045
Single Family Residential	661	661	661	661	661
Multi-Family Residential	173	263	263	263	263
Commercial	30	30	30	30	30
Industrial	--	--	--	--	--
Institutional/Governmental	--	--	--	--	--
Irrigation Commercial	11	11	11	11	11
Irrigation Institutional	--	--	--	--	--
<b>Total New Accounts</b>	<b>875</b>	<b>965</b>	<b>965</b>	<b>965</b>	<b>965</b>

**Table 4-3**  
**Change in Number of Accounts based on Projected Growth**  
City of Petaluma, Sonoma-Marín Saving Water Partnership

Abbreviations:

-- = not available

ABAG = Association of Bay Area Governments

Notes:

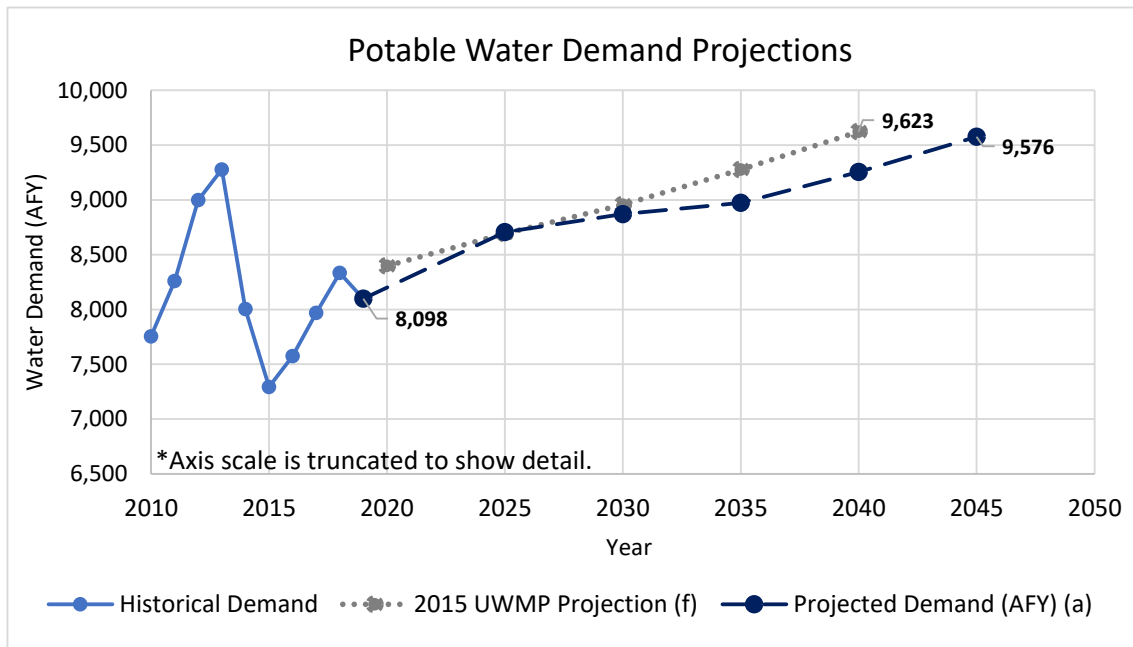
- (a) Growth in number of accounts is estimated based on ABAG 2018 projected growth rates for population and employment, per Reference 1 and shown in Table 4-2. Residential sectors are estimated relative to population growth, while commercial, institutional and irrigation are estimated relative to employment growth. Multi-family residential accounts are adjusted for known planned development beyond that anticipated by ABAG 2018 growth rates.
- (b) ABAG 2018 includes projections through 2040. For purposes of demand and account projections, it is assumed that the growth rate remains constant from 2036 through 2045.
- (c) Known planned development is discussed in Section 3.1 and based on References 2 and 3. Of the 1,741 multi-family residential units planned for development, 1,333 will share 10 master meters and 408 units will be condos with individual meters. Based on the existing multi-family residential housing stock on which multi-family demand factors are based, the demand factors represent approximately 8 units per account. Thus, new development demand estimates are based on an assumed 8 units/account and one irrigation account per master meter.

References:

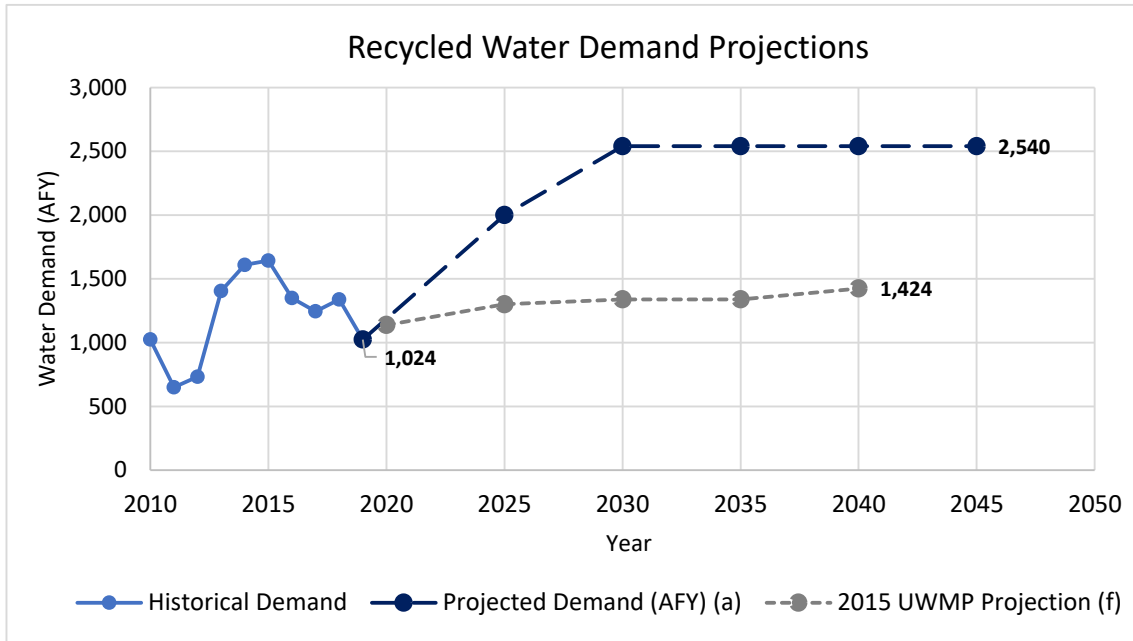
1. ABAG, 2018. Association of Bay Area Governments, Plan Bay Area Projections 2040, released on November 2018.
2. Petaluma, 2019. *Pending Projects Summary*, provided by City of Petaluma on 6 October 2020.
3. Petaluma, 2020. Information provided by City of Petaluma via email, received 7 August 2020.

**Table 4-6  
Projected Water Demand**  
City of Petaluma, Sonoma-Marín Saving Water Partnership

Water Use Sector	Projected Demand (AFY) (a)				
	2025	2030	2035	2040	2045
<b>Potable Water</b>					
Single Family Residential	4,642	4,740	4,826	4,930	5,036
Multi-Family Residential (b)	523	631	653	679	706
Commercial	1,067	1,102	1,144	1,239	1,341
Industrial	497	497	497	497	497
Institutional/Governmental	384	397	412	446	483
Irrigation Commercial	608	628	652	706	765
Irrigation Institutional	435	450	467	505	547
Non-revenue Water (c)	8.4%	8.4%	8.4%	8.4%	8.4%
	749	775	794	826	861
Estimated Passive Savings (d)	-200	-350	-471	-573	-659
<b>Total Potable Demand</b>	<b>8,706</b>	<b>8,870</b>	<b>8,973</b>	<b>9,255</b>	<b>9,576</b>
<b>Recycled Water</b>					
Irrigation Recycled Water (e)	2,000	2,540	2,540	2,540	2,540
<b>Total Recycled Water Demand</b>	<b>2,000</b>	<b>2,540</b>	<b>2,540</b>	<b>2,540</b>	<b>2,540</b>



**Table 4-6  
Projected Water Demand**  
City of Petaluma, Sonoma-Marín Saving Water Partnership



**Abbreviations:**

- ABAG = Association of Bay Area Governments
- AFY = acre-feet per year
- AWE = Alliance for Water Efficiency
- UWMP = Urban Water Management Plan

**Notes:**

- (a) Water demand projections are estimated based on partial rebound demand factors for residential sectors and pre-drought demand factors for commercial, industrial and institutional sectors, based on recent historical use. Growth in accounts is based on ABAG 2018 projections, as identified in Table 4-1.
- (b) The planned developments within the City (Appendix A) include the development of 1,741 multi-family residential units, of which 408 are anticipated to be single-metered condominiums. For purposes of demand projections, the single-family residential demand factor is used to project demands for these condominiums.
- (c) Estimates of non-revenue water are based on the average percentage of water loss reported for 2017 through 2019, per Table 3-2.
- (d) Passive water savings are based on the AWE Conservation Tracking Tool. Estimates should be considered preliminary and may be further refined.
- (e) Recycled water projections per Reference 3, and include both urban and agricultural uses.
- (f) 2015 UWMP projections per Reference 2.

**References:**

1. ABAG, 2018. Association of Bay Area Governments, Plan Bay Area Projections 2040, released on November 2018.
2. Petaluma, 2016. 2015 Urban Water Management Plan, prepared by City of Petaluma, dated June 2016.
3. Petaluma, 2020. Information provided by City of Petaluma via email, received 4 September 2020.

## 5. CONSERVATION PROGRAM PARTICIPATION

The following section evaluates past participation in water conservation programs by City customers, including presenting historic program participation and estimated water savings associated with program participation. The purpose of this section is to document program participation and savings in order to inform future program selection and implementation, and to support the demand management measure (DMM) reporting required in the UWMP under CWC § 10631.(e).<sup>9</sup>

### 5.1. Conservation Programs

The City currently implements four conservation programs offered directly to customers. These programs are described below.

- **Water-Wise HouseCall Program.** A Water-Wise HouseCall (WWHC) is a personalized program to help water/sewer customers use water more efficiently both inside and outside the home. A water efficiency professional assesses the customers current water usage by performing various tasks such as: Visually inspect faucets, shower heads, toilets, and other water using apparatus for leaks; Provide free low-flow aerators and shower heads if needed; Share details about how to qualify for high-efficiency toilets (HET) and high-efficiency clothes washer (HECW) rebates; Outline the most practical ways to maximize water savings. Outdoor assessments include: test irrigation systems and look for leaks and broken sprinkler heads; Identify areas of the systems that may need maintenance or upgrades; Discuss how soil types can affect watering needs; Provide efficient irrigation schedule for programmers and program if needed; Teach the customer how to read their water meter and monitor their water usage. All HouseCalls are free to water customers and typically take 30 minutes.
- **High-Efficiency Toilet Rebate Program.** The City offers two types of rebates in this program, a residential rebate for HETs and commercial rebates for HETs and high-efficiency urinals (HEUs). To qualify for a residential or commercial HET/HEU rebate a customer must call and schedule a free Water-Wise HouseCall. A pre-approval must be obtained before replacing the older existing toilet/urinal. The existing toilet/urinal must be inspected by a City employee to determine eligibility for the rebates (toilets must flush 1.6 gallon per flush (gpf) or more and urinals must flush 1 gpf or more). If qualified, an application form is provided during the appointment as well as instructions on how to obtain the rebate and where to recycle their older fixtures. Customer must submit the rebate application with original receipts of the new HET(s)/HEU(s) purchased and proof of receipt of recycling the older toilet(s) or urinal(s). Residential rebates are up to \$150 per HET and the commercial toilet/urinal rebates are up to \$260.
- **Mulch Madness Program.** To qualify for the Mulch Madness Program, a single family residential, multi-family residential, or commercial water customer must first sign up for a Water-Wise HouseCall. A trained Environmental Services Technician evaluates the turf area and determines if it qualifies for the program. To qualify for the program residential and commercial accounts must be actively maintaining a minimum of 500 square feet of high water-use turf landscape. Lawns that are

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<sup>9</sup> The information presented herein supports a portion of the required DMM analysis, focusing on device and education-focused programs. Additional details regarding customer billing rates and structure, conservation staffing levels, customer metering, etc. are required under CWC § 10631.(e), but not addressed herein.

dead, have already been removed, and areas of non-turf (weed or dirt patches) are not eligible for the program. The site must have in-ground irrigation and be regularly irrigated and maintained at the time of pre-inspection. Upon being qualified by a Technician, customers are provided contact information for the vendors who supply the products to help complete their sheet mulching project. This program includes free delivery of mulch, compost, and a double layer of cardboard, and a drip irrigation conversion kit to pick up. (Kits only available to single family residential accounts).

- **High-Efficiency Clothes Washer Rebate.** The City offers a \$75 rebate to residential water and/or sewer service customers who purchase and install a new, qualifying high-efficiency clothes washer. To participate the customer must replace a top-loading clothes washer with a qualifying front-loading clothes washer to receive a rebate. Only Energy Star "Most Efficient" models qualify for the rebate. Note: The rebate used to be \$125, but was decreased to \$75 on July 2018.

In addition to programs offered by the City, several regional programs are offered through the SMSWP, including: (1) education and outreach to schools, (2) public outreach and educational workshops, (3) Qualified Water Efficient Landscaper (QWEL) Training, and (4) garden tours.

## 5.2. Historical Conservation Program Participation

**Table 5-1** summarizes participation in the City’s conservation programs, including rebates for high-efficiency toilets, urinals, and clothes washers, turf replacement, and Water Assessment surveys for homes and businesses from 2009 through 2019. Of these programs, the HECW Rebate Program has reached the most customers, with approximately 2,800 participants. Participation in these programs were generally the highest from 2010 through 2013, with little participation observed in 2017 through 2019. Through the Mulch Madness Program, nearly 1,200,000 square feet of turf have been removed.

**Table 5-2** summarizes participation in the regional SMSWP water conservation school education and outreach programs from the 2015-2016 to 2019-2020 school years. Over this period, 6,000 students were reached by direct instruction and over 33,000 students were reached through indirect instruction such as assemblies, video and poster contests, and other educational materials.

## 5.3. Estimated Savings from Past Conservation Programs

The AWE model<sup>10</sup> was used to estimate water savings associated with the implementation of all device or turf replacement and audit programs identified in **Table 5-1** for the period of 2010 to 2020. Water savings estimates were based AWE model default values, values developed for the City in 2015, and other literature values, as needed. The specific assumptions used in this assessment are presented in **Appendix C**. The results of this analysis are presented in **Table 5-3**.

Based on this, it is estimated that conservation programs included in this assessment resulted in a savings of between 920 AFY and 1,349 AFY between 2010 and 2020.<sup>11</sup> In addition, over this period, it is

<sup>10</sup> Alliance for Water Efficiency, Water Conservation Tracking Tool Version 3, released in July 2016.

<sup>11</sup> Free ridership refers to customers who participate in a conservation program, but who would have taken the water saving action (e.g., replace a toilet) regardless of whether the conservation program incentive was available. The amount of free ridership is unknown, and thus a range of savings is shown, assuming 0% to 100% free ridership for programs, as appropriate.

estimated that the City saved 2,213 AFY through passive savings. Thus, total active and passive savings is estimated to be between 2,642 AFY and 3,562 AFY.



**Table 5-1**  
**Summary of Conservation Program Participation**  
 City of Petaluma, Sonoma-Marín Saving Water Partnership

Program Name	End Use		Number of Program Participants										Total	Pct. of Accounts (b)	
	Sector (a)	Indoor/ Outdoor	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018			2019
Water-Wise HouseCall Program	SFR	Both	--	--	136	186	--	--	--	199	379	370	347	1,617	8%
Water-Wise HouseCall Program	CII	Both	--	--	0	0	--	--	5	12	30	16	63	63	4%
HET Rebate Program	SFR	Indoor	141	180	155	132	115	174	251	154	126	109	132	1,669	9%
HET Rebate Program	CII	Indoor	1	2	3	1	0	4	10	3	3	6	5	38	3%
HECW Rebate Program	SFR	Indoor	188	629	518	462	377	241	156	96	69	40	22	2,798	14%
Mulch Madness Program	SFR, CII	Outdoor	--	160	129	97	89	133	208	82	35	25	17	975	5%
<b>Total Turf Replaced (sq ft)</b>															
Mulch Madness Program	SFR, CII	Outdoor	--	199,771	116,100	100,240	101,400	167,200	246,500	139,150	40,061	28,137	23,700	1,162,259	--

**Abbreviations**

- CII = Commercial, Industrial, Institutional
- HET = High Efficiency Toilet
- HECW = High Efficiency Clothes Washer
- SFR = Single-family residential

**Notes**

- (a) Predominant sector for program participants.
- (b) Participation is calculated as a percentage of total accounts of the predominant sector indicated.
- (c) Colored shading is added for visualization purposes. Green shading represents higher participation values.

**Table 5-2**  
**Summary of Conservation School Education Program Participation**  
 City of Petaluma, Sonoma-Marín Saving Water Partnership

Program Name	Number of Students Reached by School Year						Total
	2015-2016	2016-2017	2017-2018	2018-2019	2019-2020		
<b>Direct Instruction</b>							
Kindergarten	156	187	233	237	252		<b>1,065</b>
3rd Grade	211	262	389	623	541		<b>2,026</b>
5th Grade	352	691	631	534	302		<b>2,510</b>
Middle/High School	347	191	97	0	0		<b>635</b>
<b>Total</b>	<b>1,066</b>	<b>1,331</b>	<b>1,350</b>	<b>1,394</b>	<b>1,095</b>		<b>6,236</b>
<b>Indirect Instruction</b>							
ZunZun Assembly	1,212	430	1,200	1,483	761		<b>5,086</b>
Video Contest	0	2	2	0	0		<b>4</b>
WA Poster Contest	405	450	889	441	703		<b>2,888</b>
Materials	4,672	4,251	6,742	5,548	4,101		<b>25,314</b>
<b>Total</b>	<b>6,289</b>	<b>5,133</b>	<b>8,833</b>	<b>7,472</b>	<b>5,565</b>		<b>33,292</b>

**Abbreviations**

SMSWP = Sonoma-Marín Saving Water Partnership

WA = Water Awareness

**Notes**

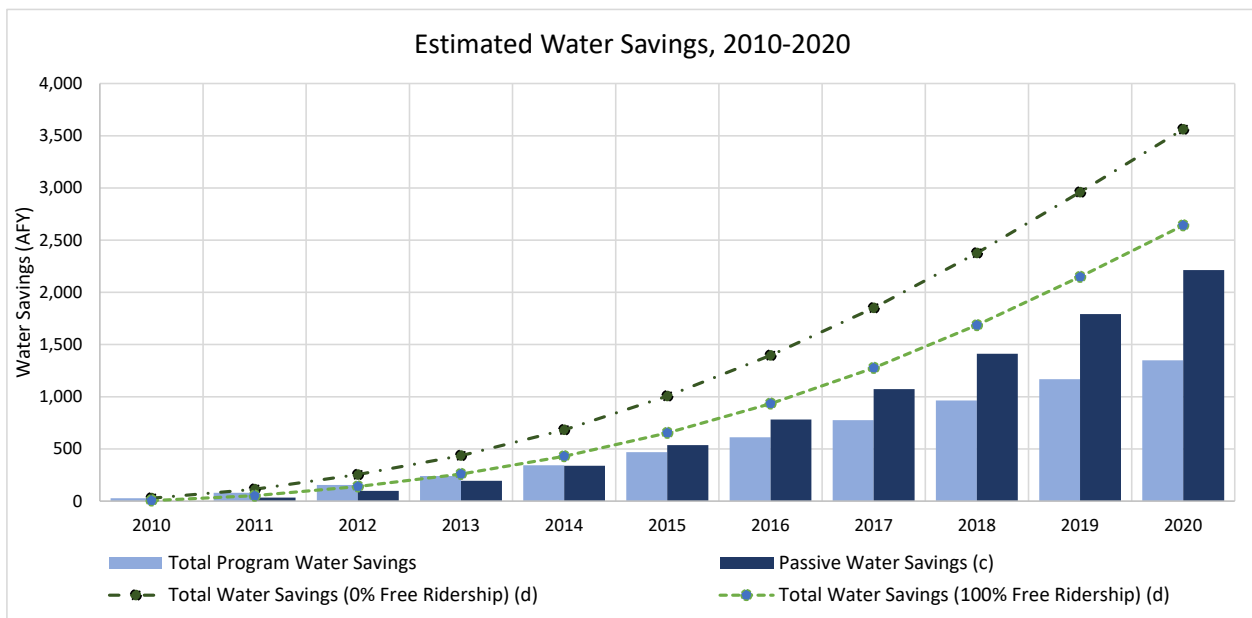
- (a) School education program participation is presented by number of students reached, per SMSWP, 2020.
- (b) Colored shading is added for visualization purposes. Green shading represents higher participation values.
- (c) ZunZun Assembly was provided as distance learning for 227 students in 2019-2020.

**Source**

SMSWP, 2020. Water Conservation School Education Participation 2015 - 2020, provided by SMSWP on 8 June 2020.

**Table 5-3**  
**Estimated Water Savings Achieved by Conservation Programs and Passive Savings**  
 City of Petaluma, Sonoma-Marín Saving Water Partnership

Water Saving Type	End Use		Estimated Cumulative Water Savings (AFY) (b)										
	Sector (a)	Indoor/ Outdoor	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
<i>Conservation Programs</i>													
Water-Wise HouseCall Program	SFR	Both	0	5	16	25	32	38	49	69	99	137	167
Water-Wise HouseCall Program	CII	Both	0	0	0	0	0	0	2	7	23	40	54
HET Rebate Program	SFR	Indoor	10	26	48	76	110	158	212	270	332	399	465
HET Rebate Program	CII	Indoor	0	1	2	3	5	8	11	14	18	22	26
HECW Rebate Program	SFR	Indoor	10	27	50	78	108	140	171	202	232	262	290
Mulch Madness Program	SFR, CII	Outdoor	8	21	38	59	87	125	169	214	261	308	347
<i>Total Program Water Savings</i>			<i>28</i>	<i>81</i>	<i>155</i>	<i>242</i>	<i>344</i>	<i>469</i>	<i>613</i>	<i>776</i>	<i>965</i>	<i>1,169</i>	<i>1,349</i>
<i>Passive Water Savings (c)</i>			<i>0</i>	<i>33</i>	<i>99</i>	<i>194</i>	<i>339</i>	<i>537</i>	<i>783</i>	<i>1,074</i>	<i>1,411</i>	<i>1,791</i>	<i>2,213</i>
<b>Total Water Savings (100% Free Ridership) (d)</b>			<b>5</b>	<b>52</b>	<b>140</b>	<b>260</b>	<b>429</b>	<b>654</b>	<b>935</b>	<b>1,277</b>	<b>1,685</b>	<b>2,148</b>	<b>2,642</b>
<b>Total Water Savings (0% Free Ridership) (d)</b>			<b>28</b>	<b>114</b>	<b>254</b>	<b>436</b>	<b>683</b>	<b>1,006</b>	<b>1,395</b>	<b>1,850</b>	<b>2,376</b>	<b>2,960</b>	<b>3,562</b>



**Abbreviations**

CII = Commercial, Industrial, Institutional  
 HET = High Efficiency Toilet

HECW = High Efficiency Clothes Washer  
 SFR = Single-family residential

**Notes**

- (a) Predominant sector for program participants.
- (b) Water savings are estimated per the AWE model.
- (c) Passive water savings are water savings associated with the natural change out of water using fixtures and devices with higher efficiency ones, due to plumbing code and market changes. Passive savings are estimated for the whole service area.
- (d) Free ridership refers to customers who participate in a conservation program, but who would have taken the water saving action (e.g., replace a toilet) regardless of whether the conservation program incentive was available. The amount of free ridership is unknown, and thus a range is shown. Free ridership is applied to device and turf replacement programs only.

**Sources**

- 1. City of Petaluma, 2020. Program Participation Data, provided by City of Petaluma on 14 April 2020.

## 6. CONSERVATION PROGRAM UPDATE

The following section evaluates current and potential conservation programs for both the City and the SMSWP. The purpose of this section is to compile programs that are prioritized by both the City and by all Water Contractors in the SMSWP collectively in order to calculate the potential water savings and economic feasibility of those programs. Section 6.1 discusses the methodology used to prioritize conservation programs. Section 6.2 describes the programs given high priority for implementation by all nine Water Contractors collectively, and Section 6.3 describes programs given high priority by the City. Section 6.4 analyzes the potential water savings and cost-benefit for those programs selected by the City as both individual programs and in three implementation scenarios. By assessing the feasibility of these programs, the City can make more informed decisions regarding program selection and implementation.

### 6.1. Methodology for Screening of Potential Water Conservation Programs

In order to evaluate the potential for new conservation programs, a comprehensive list of over 100 conservation programs was developed (**Appendix D**). Each of the nine Water Contractors were first asked to review and identify any additional programs to add to this list. Following receipt of feedback from the Water Contractors, each Water Contractor was asked to review the list and identify:

- Priority (on a scale of 1 to 5, with 5 being the highest priority) as a program to be implemented regionally through the SMSWP;
- Priority (on a scale of 1 to 5, with 5 being the highest priority) as a program to be implemented locally through their agency;
- Preference for the program to be implemented either regionally or locally; and
- Whether each program is currently or has previously been implemented by their agency.

The list of water conservation programs is organized into four categories, specifically: (1) agency actions and water rates, (2) public outreach and education, (3) device-based and financial incentive programs, and (4) policies and regulations. The results of the water conservation program prioritization and screening are summarized for all Water Contractors combined, representing overall regional priorities and preferences (**Table 6-1**), and for each individual Water Contractor, representing each agencies local priorities and preferences. **Table 6-1** shows the average prioritization ranking for all Water Contractors for each program for regional and local implementation as well as the percentage of Water Contractors that prefer each program to be implemented at the local level or the regional level.<sup>12</sup> The results presented in **Table 6-1** are discussed below for each water conservation program category. **Table 6-2** provides the results of this screening for the City of Petaluma, including priorities and preferences for each water conservation program, and identifies the target sector, whether the program addresses indoor or outdoor water use, and the primary end use.

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<sup>12</sup> Water Contractors were asked to provide a preference for local or regional implementation for all programs they ranked a priority score of 3 or above. Thus, the percentages of Water Contractors shown in **Table 6-1** does not sum to 100%.

## 6.2. Screening of Regional Conservation Measures

### 6.2.1. Agency Actions and Water Rate Based Conservation Programs

Of the 15 agency action and water rate based conservation programs included in the screening list, the Water Contractors identified the following eleven programs as high priority (average score of three or higher) to implement at the local level:

1. Install Advanced Metering Infrastructure (AMI) for High Water Users and Large Landscape Accounts
2. Install AMI in New Development
3. Customer Water Loss Reduction (AMI Leak Detection)
4. Install AMI for Existing Accounts
5. Tiered Water Rates (Conservation Pricing)
6. Water Budgeting/Monitoring for Large Landscape Accounts
7. Water Budget Based Billing for Only Irrigation Customers
8. Modification to or Implementation of Tiered Rate Conservation Pricing
9. Establish Separate Pricing Structure for Irrigation Accounts
10. Rate Structure Evaluation
11. Increase Enforcement of State Water Waste Regulations

By their nature as water retailer actions, these programs do not lend themselves to regional implementation. However, in some cases, such as the “Increase Enforcement of State Water Waste Regulations” program, there may be an opportunity to coordinate across the region at a policy or education level. For example, SB-407<sup>13</sup> requires older plumbing fixtures to be replaced with new, more efficient fixtures that meet current water efficiency standards; this requirement is supposed to be enforced at time of sale. If this or similar policies are being enforced differently across Water Contractor jurisdictions, it could result in confusion among customers. Thus, even for agency action-based programs, there may be opportunity for the Water Contractors to coordinate these efforts and share staff education resources.

### 6.2.2. Public Outreach and Education Based Conservation Programs

Of the 11 public outreach and education-based water conservation programs included in the screening, the Water Contractors identified the following six programs as high priority (average score of three or higher), with a preference for regional implementation through SMSWP:

1. QWEL Training
2. Public Outreach through Print & Electronic Media – Focused on Outdoor Irrigation
3. Educational Workshops
4. School Education Programs
5. Public Outreach through Print & Electronic Media – Focused on Indoor Conservation
6. Garden tour

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<sup>13</sup> SB 407: [https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill\\_id=200920100SB407](https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=200920100SB407)

All of these programs are currently being implemented by the SMWSP. In addition to these programs, the Water Contractors also indicated that water use surveys or audits for single-family residential and CII customers were a high priority; however, the Water Contractors generally expressed a preference for these programs to be implemented locally.

#### 6.2.3. Device and Financial Incentive Based Conservation Programs

Of the 61 device- and financial incentive- based water conservation programs included in the screening list, the Water Contractors identified the following 11 programs as high priority (average score of three or higher) to implement at either the regional or local level:

1. Landscape Conversion or Turf Removal – MFR and CII
2. Landscape Conversion or Turf Removal – SFR
3. High Efficiency Faucet Aerator / Showerhead Giveaway – Residential Customers
4. Smart Irrigation Controller (Weather-Based Irrigation Controller) Rebates – Large Landscape
5. Drip Irrigation Incentive for SFR
6. High Efficiency Faucet Aerator / Showerhead Giveaway – CII Customers
7. Drip Irrigation Incentive for MFR and CII
8. High Efficiency Clothes Washer Rebate – Residential
9. Smart Irrigation Controller (Weather-Based Irrigation Controller) Rebates – SFR
10. Restaurant Spray Nozzle Rebates
11. Incentivize Irrigation Equipment Upgrades – SFR

The above list includes four programs that focus on indoor water use (“High Efficiency Faucet Aerator / Showerhead Giveaway – Residential Customers”, “High Efficiency Faucet Aerator / Showerhead Giveaway – CII Customers”, “High Efficiency Clothes Washer Rebate – Residential,” and “Restaurant Spray Nozzle Rebates”). The remaining preferred programs all focus on outdoor water use, including turf removal and methods to increase irrigation efficiency.

Of these preferred programs, the Water Contractors expressed a preference for two of the programs to be administered at a regional level rather than local level, specifically the “High Efficiency Clothes Washer Rebate – Residential” and the “Restaurant Spray Nozzle Rebates”.

#### 6.2.4. Policy and Regulation Based Conservation Programs

Of the 29 policy- and regulation- based water conservation programs included in the screening list, the Water Contractors identified the following six programs as high priority (average score of three or higher) to implement at the local level:

1. Water Waste Ordinance
2. Require Submetering of Landscaping for New MFR and Commercial Developments
3. Require Water Efficiency Plan Reviews for New CII Development
4. Require High Efficiency Clothes Washers in New Development
5. Require Weather Adjusting Smart Irrigation Controllers, Rain Sensors, and/or Soil Moisture Sensors in New Development
6. Demand Offset/Water Neutral Policy for Large New Developments

Nearly all of the highest priority programs focus on ensuring efficiency in new developments, and target both indoor and outdoor water use. The Water Contractors expressed that the program “Require Irrigation Designers / Installers be Certified (QWEL)” is a high priority at the local level but were split equally as to whether they would prefer this program to be implemented at a local or regional level. Further, given the shift in state policy regarding recycled water use (i.e., that non-potable use of recycled water use will no longer be counted towards water conservation), some Water Contractors were conflicted as to how recycled water should be considered in policies regarding new development, in particular with respect to the program “Demand Offset/Water Neutral Policy for Large New Development.”

### 6.2.5. Regional Program Screening Findings

With some exceptions, the Water Contractors expressed a strong preference for water conservation programs to be implemented locally rather than regionally through the SMSWP, with the exception of programs that are already implemented regionally by the SMSWP. However, as listed above, there was general consensus among Water Contractors about which water conservation programs are a high priority, and thus important for the region. Given this consensus, while there is not an apparent desire to implement programs regionally, there may be opportunity for further coordination and collaboration on these programs, such as sharing of educational resources, training of staff (e.g., building permit and plan review staff), and collaboration on creating similar program structure and requirements (such as for financial incentive-based programs) across the region.

### 6.3. Screening of Local Conservation Measures

**Table 6-2** shows the results of this screening for the City of Petaluma, and lists the programs considered by the City to be medium or high priority to consider for the future. **Table 6-2** also identifies the target sector, whether the program addresses indoor or outdoor water use, and the primary targeted end use.

- **Agency Actions and Water Rate Based Conservation Programs.** Twelve agency action and water rate based conservation programs were identified for potential future implementation. Of these, five are existing programs or actions currently implemented by the City, and seven are potential new programs for consideration. The high priority programs preferred by Petaluma target both indoor and outdoor water use, and address a range of end uses, including water loss, irrigation efficiency, and indoor efficiency. The potential new programs identified are as follows, in general order of priority:
  - Establish Separate Pricing Structure for Irrigation Accounts
  - Water Budget Based Billing for Only Irrigation Customers
  - Water Budgeting/Monitoring for Large Landscape Accounts
  - Customer Water Loss Reduction (Advanced Metering Infrastructure (AMI) Leak Detection)
  - Increase Enforcement of Indoor Fixture Retrofit at Time of Sale
  - Install AMI for High Water Users and Large Landscape Accounts
  - Install AMI in New Development

- **Public Outreach and Education Based Conservation Programs.** The City ranked six public outreach and education-based water conservation programs as medium to high priority for potential future implementation, with Water Use Surveys/Audits for CII, MFR and SFR as the highest priority. The City indicated a preference for all public outreach and education programs to be implemented at the regional level, most of which are currently implemented by the SMSWP (see **Table 6-1**). The SMWSP currently implements a variety of public education and outreach programs that are available to school age children, adults, and landscape professionals. The only additional program identified as high priority by the City is expanding the Water Use Surveys/Audits to CII customers.
- **Device and Financial Incentive Based Conservation Programs.** Twenty-four device and financial incentive based programs were ranked as medium to high priority for potential future implementation, including 13 that would target indoor water use, nine that would target outdoor water use, and two that would target both. Six of these programs are currently implemented by the City. The potential new programs identified are as follows, in general order of priority:

  - High Efficiency Faucet Aerator / Showerhead Giveaway – CII Customers
  - Drip Irrigation Incentive for MFR and CII
  - Drip Irrigation Incentive for SFR
  - High Efficiency Clothes Washer Rebate – Residential
  - High Efficiency Clothes Washer Rebate Program – CII
  - Incentivize Irrigation Equipment Upgrades – Large Landscapes
  - Incentivize Irrigation Equipment Upgrades – SFR
  - Incentivize Replacement of Inefficient Commercial and Industrial Equipment
  - Incentivize Submetering for Existing Customers – CII
  - Incentivize Submetering for Existing Customers – MFR
  - Indoor Fixture Program for Hotels & Motels
  - Indoor Fixture Program for Schools
  - Mulch rebate
  - Restaurant Spray Nozzle Rebates
  - Thermostatic Shut-Off Valve Showerheads/Tub Spouts Rebates
  - Ultra high-efficiency toilet (UHET) <1.0 gal/flush Rebate – CII
  - UHET <1.0 gal/flush Rebate – Residential
  - Water Savings Incentive Program for CII
- **Policy and Regulation Based Conservation Programs.** Three policy and regulation based programs were identified as highest priority for potential future implementation, two of which would be new programs for the City (i.e., “Require Submetering of Landscaping for New MFR and Commercial Developments” and “Water Waste Ordinance”) and one that is currently being implemented (i.e., “Water Waste Ordinance”). A new program for “Demand Offset/Water Neutral Policy for Large New Developments” was also identified as medium priority for future implementation. The preference is for any of these new programs to be implemented locally.

#### 6.4. Evaluation of Future Water Conservation Programs

Based on the conservation screening process described in Sections 6.2 and 6.3 above, a suite of conservation programs to be considered for future implementation were evaluated. These programs were



evaluated both individually and as components in three water conservation program scenarios, as shown in **Table 6-3a**. The three program scenarios represent three potential approaches or strategies for the City’s future conservation programs, specifically:

- **Scenario A** represents a focus on programs that target outdoor water savings,
- **Scenario B** represents a more “business as usual” approach based on programs ranked most highly by the City, and
- **Scenario C** represents a focus on the programs that all nine Water Contractors collectively identified as highest priority.

**Table 6-3a** also identifies the customer sectors each program would target as well as whether the program focuses on indoor or outdoor water use, or both.

The benefits and costs associated with implementation of these programs were evaluated using the AWE model, using a series of assumptions documented in **Appendix C**.<sup>14</sup> Key assumptions and considerations related to the methodology used by the AWE model and in this analysis are provided below:

- Financial assumptions related to both costs to the utility and customer water rates were provided by the City.
- Financial assumptions related to energy costs to the customer were assumed based on typical PG&E rates (PG&E, 2020; PG&E and Sonoma Clean Power, 2020).
- Water savings assumptions were based on a combination of AWE model default assumptions, assumptions developed for the City as a part of the 2015 conservation modeling per Petaluma (2016), and water savings factors developed based on other published literature sources.
- Assumed rate of program implementation was based on historical participation levels by City customers in similar programs.
- For purposes of near-term conservation program analysis, it is assumed that all programs are active from 2021 through 2025; water savings projections beyond this period reflect cumulative savings achieved over time from implementation during this five-year period.
- Benefit-costs ratios are particularly sensitive to the assumed nominal rate of increase of the utility water cost.
- Lost revenue due to reduced water sales is not included as a cost.
- Additional program-specific considerations are provided as notes in the attached tables.

**Table 6-3b** presents a comparison of individual water conservation measures, and identifies the following information for each program:

- **Net present value of costs and benefits** – represents the present value over the 25-year period discounted to current 2020 dollars.

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<sup>14</sup> Alliance for Water Efficiency, Water Conservation Tracking Tool Version 3, released in July 2016.

- **Benefit to cost ratio** – calculated as present value of costs divided by the present value of benefits.
- **Water Utility Costs** – costs that the City as a water utility will incur to operate the program including administrative costs.
- **Customer Costs** – costs customers will incur to implement a program in the Water Contractor’s service area.
- **Utility Benefits** – the avoided cost to the City to produce the volume of water saved.
- **Customer Benefits** – the savings from reduced water/sewer utility bills and energy savings resulting from reduced use of hot water.
- **Total Water Utility Costs** – includes costs to the City for program implementation from 2021-2025.
- **Water Savings in 2025** – one-year estimated water savings in 2025.
- **Water Utility Cost of Water Saved for individual programs** – cost of water saved dividing by the lifetime water savings of that program.
- **Water Utility Cost of Water Saved for program scenarios** – weighted average of Water Utility Cost of Water Saved for the individual programs by the cumulative water savings through 2045.

This analysis estimates active program savings based on the AWE model, and does not include additional savings anticipated from passive savings (i.e., water savings associated with the natural replacement of less efficient water using fixtures and appliances due to both market shifts and increasing efficiency mandated by the building code and other regulatory requirements). Based on this analysis, and the assumptions presented in **Appendix C**, the benefit-cost ratios for the City range from 0.37 to 20.

**Table 6-3c** presents the results of the analysis of the three conservation program scenarios identified in **Table 6-3a**, and includes a summary of costs and benefits to the City and customers, estimated cumulative water savings through 2045 (based on assumed program implementation from 2021-2025), and the estimated cost of water saved to the City. Based on this, the approach of focusing water conservation measures on those ranked highest by all nine Water Contractors collectively (i.e., Scenario C) has a greater benefit to cost ratio than that of Scenarios A or B. The projected water savings associated with implementation of Scenario C is 560 AF by 2025 and 1,487 by 2045, at a cost of approximately \$758/AF.

**Table 6-1**  
**Prioritization of Conservation Measures and Programs**  
 Sonoma-Marín Saving Water Partnership

Conservation Measure/Program	Prioritization (a)		Preference (b)		Current SMSWP Program	
	Regional	Local	Regional Program	Local Program		
<b>AGENCY ACTIONS AND WATER RATES</b>						
Install AMI for High Water Users and Large Landscape Accounts	2.5	4.7	11%	67%	No	✗
Install AMI in New Development	2.4	4.7	0%	67%	No	✗
Customer Water Loss Reduction (AMI Leak Detection)	2.4	4.4	0%	89%	No	✗
Install AMI for Existing Accounts	2.4	4.0	0%	86%	No	✗
Tiered Water Rates (Conservation Pricing)	2.0	3.6	0%	88%	No	✗
Water Budgeting/Monitoring for Large Landscape Accounts	2.5	3.4	0%	83%	No	✗
Water Budget Based Billing for Only Irrigation Customers	2.1	3.4	0%	86%	No	✗
Modification to or Implementation of Tiered Rate Conservation Pricing	2.0	3.4	0%	88%	No	✗
Establish Separate Pricing Structure for Irrigation Accounts	2.0	3.2	0%	83%	No	✗
Rate Structure Evaluation	2.4	3.1	0%	78%	No	✗
Increase Enforcement of State Water Waste Regulations	2.6	3.0	0%	86%	No	✗
Water Budget Based Billing for All Customers	2.3	2.4	0%	50%	No	✗
Increase Enforcement of Indoor Fixture Retrofit at Time of Sale	1.9	2.2	17%	67%	No	✗
Increase Enforcement of Customer Pressure Reducing Valve (PRV) Requirement	1.6	1.9	0%	40%	No	✗
Regional UHET and/or Urinal Bulk Purchase Program	1.9	1.7	75%	0%	No	✗
<b>Average by Program Type</b>	2.2	3.3				
<b>PUBLIC OUTREACH AND EDUCATION</b>						
QWEL Training (Qualified Water Efficient Landscaper)	4.3	2.0	89%	0%	Yes	✓
Public Outreach through Print & Electronic Media Focused on Outdoor Irrigation	4.0	3.9	67%	0%	Yes	✓
Educational Workshops	4.0	3.2	63%	0%	Yes	✓
School Education Programs	4.0	3.1	78%	0%	Yes	✓

**Table 6-1**  
**Prioritization of Conservation Measures and Programs**  
 Sonoma-Marín Saving Water Partnership

Conservation Measure/Program	Prioritization (a)		Preference (b)		Current SMSWP Program	
	Regional	Local	Regional Program	Local Program		
Water Use Surveys/Audits - SFR	3.5	3.9	22%	44%	No	✗
Public Outreach through Print & Electronic Media Focused on Indoor Conservation	3.6	3.3	57%	0%	Yes	✓
Garden tour	3.6	1.9	86%	0%	Yes	✓
Water Use Surveys/Audits - CII	3.0	3.4	38%	38%	No	✗
Water Use Surveys/Audits - MFR	2.8	3.3	29%	43%	No	✗
Promote Green Building and Certification	3.1	2.2	33%	17%	No	✗
Provide Support with Smart Irrigation Controller Setup	2.9	2.3	60%	0%	No	✗
<b>Average by Program Type</b>	3.5	3.0				
<b>DEVICE-BASED AND FINANCIAL INCENTIVE PROGRAMS</b>						
Landscape Conversion or Turf Removal - MFR and CII	3.9	4.6	11%	78%	No	✗
Landscape Conversion or Turf Removal -SFR	3.9	4.6	22%	67%	No	✗
High Efficiency Faucet Aerator / Showerhead Giveaway - Residential Customers	3.0	3.9	11%	44%	No	✗
Smart Irrigation Controller (Weather-Based Irrigation Controller) Rebates - Large Landscape	3.1	3.6	38%	38%	No	✗
Drip Irrigation Incentive for SFR	2.4	3.6	25%	50%	No	✗
High Efficiency Faucet Aerator / Showerhead Giveaway - CII Customers	2.9	3.4	14%	57%	No	✗
Drip Irrigation Incentive for MFR and CII	2.4	3.4	25%	50%	No	✗
High Efficiency Clothes Washer Rebate - Residential	3.3	3.3	44%	11%	Yes	✓
Smart Irrigation Controller (Weather-Based Irrigation Controller) Rebates - SFR	2.9	3.2	14%	57%	No	✗
Restaurant Spray Nozzle Rebates	3.1	2.8	50%	0%	No	✗
Incentivize Irrigation Equipment Upgrades - SFR	2.1	3.0	17%	50%	No	✗
Indoor Fixture Program For Schools	2.9	2.9	14%	71%	No	✗
Rotating Sprinkler Nozzle Rebate	2.9	2.9	40%	20%	No	✗

**Table 6-1**  
**Prioritization of Conservation Measures and Programs**  
 Sonoma-Marin Saving Water Partnership

Conservation Measure/Program	Prioritization (a)		Preference (b)		Current SMSWP Program	
	Regional	Local	Regional Program	Local Program		
High Efficiency Clothes Washer Rebate Program - CII	2.8	2.8	29%	29%	No	✗
Direct Install of Efficient Indoor Fixtures - Low Income Residential	2.8	2.6	60%	0%	No	✗
Indoor Fixture Program For Hotels & Motels	2.8	2.2	29%	43%	No	✗
Mulch rebate	2.6	2.7	33%	50%	No	✗
Rain Sensor Rebate	2.5	2.6	33%	50%	No	✗
Incentivize Submetering for Existing Customers - CII	2.4	2.6	25%	25%	No	✗
Incentivize Submetering for Existing Customers - MFR	2.4	2.6	25%	25%	No	✗
Incentivize Gray Water Retrofit for Existing SFR Customers	2.3	2.6	20%	60%	No	✗
Toilet Flapper Giveaway - SFR customers	2.1	2.6	40%	40%	No	✗
Rotating Sprinkler Nozzle Giveaway	2.5	2.1	60%	0%	No	✗
Incentivize Replacement of Inefficient Commercial and Industrial Equipment	2.4	2.4	33%	33%	No	✗
Soil Moisture Sensor Rebate	2.4	2.4	60%	20%	No	✗
High Efficiency Urinal (<0.25 gal/flush) Rebates - CII	2.4	2.4	25%	0%	No	✗
Incentivize Gray Water Systems for New CII Development	2.3	2.4	50%	25%	No	✗
Incentivize Irrigation Equipment Upgrades - Large Landscapes	1.9	2.4	20%	40%	No	✗
Direct Install of Efficient Indoor Fixtures - Residential	2.4	2.2	50%	0%	No	✗
High Efficiency Clothes Washer Install - Low Income Residential Customers	2.4	2.2	50%	0%	No	✗
Smart Irrigation Controller (Weather-Based Irrigation Controller) Giveaway - Large Landscape	2.4	2.0	80%	0%	No	✗
Smart Irrigation Controller (Weather-Based Irrigation Controller) Giveaway - SFR	2.4	2.0	60%	20%	No	✗
Incentivize Artificial Turf for Sports Fields	2.3	2.3	75%	0%	No	✗
UHET <1.0 gal/flush Rebate - Residential	2.1	2.3	50%	17%	No	✗
Water Savings Incentive Program for CII	2.1	2.2	40%	40%	No	✗

**Table 6-1**  
**Prioritization of Conservation Measures and Programs**  
 Sonoma-Marín Saving Water Partnership

Conservation Measure/Program	Prioritization (a)		Preference (b)		Current SMSWP Program	
	Regional	Local	Regional Program	Local Program		
Hot Water on Demand Pump System Rebate	2.0	2.2	60%	20%	No	✗
UHET Direct Installation - CII	2.1	1.8	40%	0%	No	✗
Plumber Initiated UHET and / or Urinal Retrofit Program	2.1	1.8	67%	0%	No	✗
Direct Install of Efficient Indoor Fixtures - Government Buildings	2.1	1.6	50%	0%	No	✗
Rain Barrel Rebate	1.9	2.1	40%	40%	No	✗
Incentivize Replacement of Pressure Reducing Valves (PRVs) with 60-70 psi PRVs	2.0	2.0	33%	33%	No	✗
Thermostatic Shut-Off Valve Showerheads/Tub Spouts Rebates	2.0	1.9	50%	0%	No	✗
Dipper Well Rebates	2.0	1.8	50%	0%	No	✗
Rain Sensor Giveaway	2.0	1.7	75%	0%	No	✗
Rebates for Conductivity Controllers on Cooling Towers	2.0	1.6	75%	0%	No	✗
Rainwater Catchment System Rebate for Large Landscapes	1.9	2.0	50%	25%	No	✗
Nonresidential Incentive for Self-closing or Metering Faucets	1.9	1.9	33%	33%	No	✗
Efficient (EnergyStar) Dishwasher Rebates	1.9	1.8	50%	0%	No	✗
Rain Barrel Giveaway	1.9	1.7	75%	0%	No	✗
UHET Direct Installation - Residential	1.9	1.7	50%	0%	No	✗
Autoclave (Steam-Sterilizer) Retrofit Rebates	1.9	1.7	67%	0%	No	✗
Connectionless Food Steamer Rebates	1.9	1.7	67%	0%	No	✗
Dry Vacuum Pumps	1.9	1.6	33%	0%	No	✗
Incentivize Cooling Tower Upgrades	1.9	1.6	50%	0%	No	✗
UHET <1.0 gal/flush Rebate - CII	1.8	1.8	60%	20%	No	✗
Soil Moisture Sensor Giveaway	1.8	1.7	67%	0%	No	✗
Direct Install of Efficient Indoor Fixtures - Commercial and Industrial	1.8	1.7	67%	0%	No	✗

**Table 6-1**  
**Prioritization of Conservation Measures and Programs**  
 Sonoma-Marín Saving Water Partnership

Conservation Measure/Program	Prioritization (a)		Preference (b)		Current SMSWP Program	
	Regional	Local	Regional Program	Local Program		
Swimming Pool and Hot Tub Cover Rebates	1.3	1.7	50%	25%	No	✗
Urinal Direct Installation - CII	1.5	1.4	50%	0%	No	✗
Tier 4 Exemption	1.3	1.4	25%	25%	No	✗
Incentivize Submetering of Cooling Towers for Existing Customers	1.3	1.4	50%	0%	No	✗
<b>Average by Program Type</b>	2.3	2.3				
<b>POLICIES AND REGULATIONS</b>						
Water Waste Ordinance	2.9	4.3	0%	63%	No	✗
Require Submetering of Landscaping for New MFR and Commercial Developments	2.8	4.0	0%	63%	No	✗
Require Water Efficiency Plan Reviews for New CII Development	2.5	3.7	14%	57%	No	✗
Require High Efficiency Clothes Washers in New Development	2.8	3.3	17%	67%	No	✗
Require Weather Adjusting Smart Irrigation Controllers, Rain Sensors, and/or Soil Moisture Sensors in New Development	2.4	3.1	0%	80%	No	✗
Require Irrigation Designers / Installers be Certified (QWEL)	3.0	2.9	40%	40%	No	✗
Demand Offset/Water Neutral Policy for Large New Developments	2.4	3.0	0%	83%	No	✗
Require Efficient (EnergyStar) Dishwashers in New Development	2.8	2.9	20%	60%	No	✗
Require <0.25 gal/flush Urinals in New Development	2.3	2.8	0%	67%	No	✗
Water Conserving Landscape and Irrigation Codes, More Stringent than MWEL0	1.6	2.8	0%	67%	No	✗
Require Swimming Pool and Hot Tub Covers	2.0	2.7	40%	20%	No	✗
Require Submetering by Unit for New Commercial Developments	2.3	2.6	0%	50%	No	✗
Require Submetering of Landscaping for Existing MFR and Commercial Customers	2.4	2.4	0%	67%	No	✗
Require Hot Water on Demand / Structured Plumbing in New Residential Development	2.3	2.4	25%	50%	No	✗
Require Submetering by Unit for Existing Commercial Customers	2.1	2.4	0%	25%	No	✗

**Table 6-1**  
**Prioritization of Conservation Measures and Programs**  
 Sonoma-Marín Saving Water Partnership

Conservation Measure/Program	Prioritization (a)		Preference (b)		Current SMSWP Program	
	Regional	Local	Regional Program	Local Program		
Require Submetering for New MFR Developments	1.9	2.4	0%	50%	No	✗
Require Plumbing for Recycled Water in New MFR Development	2.0	2.3	0%	60%	No	✗
Require <1.0 gal/flush Toilets in New Development	2.0	2.3	0%	80%	No	✗
Require Submetering for New Mobile Home Park Developments	2.0	2.3	0%	40%	No	✗
Prohibit Once through Cooling Systems	2.0	2.2	0%	50%	No	✗
Require Plumbing for Recycled Water in New CII Development	1.9	2.2	0%	60%	No	✗
Require On-Site Water Reuse Systems (Grey Water or Black Water) for Large CII Developments	1.8	2.1	25%	50%	No	✗
Require Plumbing for Gray Water in New SFR Development	1.6	2.1	0%	75%	No	✗
Require Submetering of Cooling Towers for New Development	2.0	1.9	0%	33%	No	✗
Require Submetering of Existing MFR (and Mobile Home Park) Customers	1.9	1.9	0%	50%	No	✗
Restrict Landscape Irrigation to Designated Days/Times	1.6	1.8	33%	0%	No	✗
Require Rain Barrels in New Development	1.5	1.8	0%	67%	No	✗
Require Submetering of Cooling Towers for Existing Customers	1.8	1.6	0%	50%	No	✗
Require Cooling Tower Retrofits	1.5	1.4	0%	33%	No	✗
<b>Average by Program Type</b>	<b>2.1</b>	<b>2.5</b>				



**Table 6-1**  
**Prioritization of Conservation Measures and Programs**  
Sonoma-Marín Saving Water Partnership

Abbreviations:

AMI = advanced metering infrastructure  
CII = commercial, industrial, institutional  
MFR = multi-family residential  
MWEL0 = Model Water Efficient Landscape Ordinance  
PRV = pressure reducing valve  
SFR = single-family residential  
SMSWP = Sonoma-Marín Saving Water Partnership  
UHET = ultra high efficiency toilet

Notes:

(a) Each Water Contractor was asked to rank each conservation program or measure in terms of priority as a regionally-administered program, and as a locally-administered program, where 5 indicated highest priority and 1 indicated the lowest priority. Results are presented as an average of the responses of all nine Water Contractors.

(b) For each program a Water Contractor ranked as "3" or above, the Water Contractor was asked to indicate whether they would prefer the program to be administered regionally or locally. The results are presented as a percentage of the number of Water Contractors. Results of contractors who expressed "no preference" are not shown, and thus the total may not sum to 100% for a given measure.

**Table 6-2**  
**Prioritization of Conservation Measures and Programs**  
 City of Petaluma, Sonoma-Marín Saving Water Partnership

Conservation Measure/Program	Prioritization (a)	Sector	Indoor	Outdoor	Primary End Use	Preference (b)	Local Program
<b>AGENCY ACTIONS AND WATER RATES</b>							
Modification to or Implementation of Tiered Rate Conservation Pricing	5	All	X	X	All	Locally	Yes, currently
Tiered Water Rates (Conservation Pricing)	5	All	X	X	All	Locally	Yes, currently
Establish Separate Pricing Structure for Irrigation Accounts	4	IRR		X	Irrigation	Locally	No
Water Budget Based Billing for Only Irrigation Customers	4	CII, IRR		X	Irrigation	Locally	No
Water Budgeting/Monitoring for Large Landscape Accounts	4	IRR	X	X	Irrigation	Locally	No
Customer Water Loss Reduction (AMI Leak Detection)	3	All	X	X	Water Loss	Locally	No
Increase Enforcement of Indoor Fixture Retrofit at Time of Sale	3	All	X		Toilet, Urinal, Faucet, Showerhead	Locally	No
Increase Enforcement of State Water Waste Regulations	3	All		X	Irrigation	Locally	Yes, currently
Install AMI for High Water Users and Large Landscape Accounts	3	All		X	Water Loss	Locally	No
Install AMI in New Development	3	All	X	X	Water Loss	No preference	No
Rate Structure Evaluation	3	All	X	X	All	Locally	Yes, currently
Regional UHET and/or Urinal Bulk Purchase Program	3	All	X		Toilet / Urinal	Regionally	Yes, currently
<b>PUBLIC OUTREACH AND EDUCATION</b>							
Water Use Surveys/Audits - CII	5	CII	X	X	All	Regionally	No
Water Use Surveys/Audits - MFR	5	MFR	X		All Indoor	Regionally	Yes, currently
Water Use Surveys/Audits - SFR	5	SFR	X	X	All	Regionally	Yes, currently
Educational Workshops	4	SFR		X	All Outdoor	Regionally	Yes, currently
Public Outreach through Print & Electronic Media - Focused on Outdoor Irrigation	4	All	X		Irrigation	Regionally	Yes, currently
Public Outreach through Print & Electronic Media - Focused on Indoor Conservation	3	All		X	All Indoor	Regionally	Yes, currently
<b>DEVICE-BASED AND FINANCIAL INCENTIVE PROGRAMS</b>							
Landscape Conversion or Turf Removal - MFR and CII	5	MFR, CII		X	Irrigation	Locally	Yes, currently
Landscape Conversion or Turf Removal -SFR	5	SFR		X	Irrigation	Locally	Yes, currently
High Efficiency Faucet Aerator / Showerhead Giveaway - CII Customers	4	CII	X		Faucet, Showerhead	No preference	No

**Table 6-2**  
**Prioritization of Conservation Measures and Programs**  
City of Petaluma, Sonoma-Marín Saving Water Partnership

Conservation Measure/Program	Prioritization (a)	Sector	Indoor	Outdoor	Primary End Use	Preference (b)	Local Program
High Efficiency Faucet Aerator / Showerhead Giveaway - Residential Customers	4	SFR, MFR	X		Faucet, Showerhead	No preference	Yes, currently
Drip Irrigation Incentive for MFR and CII	3	MFR, CII		X	Irrigation	No preference	No
Drip Irrigation Incentive for SFR	3	SFR		X	Irrigation	No preference	No
High Efficiency Clothes Washer Rebate - Residential	3	SFR, MFR	X		Clothes Washer	Regionally	No
High Efficiency Clothes Washer Rebate Program - CII	3	CII	X		Clothes Washer	No preference	No
High Efficiency Urinal (<0.25 gal/flush) Rebates - CII	3	CII	X		Urinal	No preference	Yes, currently
Incentivize Irrigation Equipment Upgrades - Large Landscapes	3	MFR, CII, IRR		X	Irrigation	No preference	No
Incentivize Irrigation Equipment Upgrades - SFR	3	SFR		X	Irrigation	No preference	No
Incentivize Replacement of Inefficient Commercial and Industrial Equipment	3	CII	X		CII Equipment	No preference	No
Incentivize Submetering for Existing Customers - CII	3	MFR, COM, IRR	X	X	All Indoor	Locally	No
Incentivize Submetering for Existing Customers - MFR	3	MFR	X	X	All Indoor	Locally	No
Indoor Fixture Program For Hotels & Motels	3	CII	X		All Indoor	Locally	No
Indoor Fixture Program For Schools	3	CII	X		All Indoor	Locally	No
Mulch rebate	3	SFR		X	Irrigation	Locally	No
Restaurant Spray Nozzle Rebates	3	CII	X		CII Equipment	No preference	No
Smart Irrigation Controller (Weather-Based Irrigation Controller) Rebates - Large Landscape	3	MFR, CII		X	Irrigation	No preference	Yes, currently
Smart Irrigation Controller (Weather-Based Irrigation Controller) Rebates - SFR	3	SFR		X	Irrigation	No preference	Yes, currently
Thermostatic Shut-Off Valve Showerheads/Tub Spouts Rebates	3	SFR, MFR, CII	X		Shower	No preference	No
UHET <1.0 gal/flush Rebate - CII	3	CII	X		Toilet	Regionally	No
UHET <1.0 gal/flush Rebate - Residential	3	SFR, MFR	X		Toilet	Regionally	No
Water Savings Incentive Program for CII	3	CII	X		All Indoor	Regionally	No
<b>POLICIES AND REGULATIONS</b>							
Require Submetering of Landscaping for New MFR and Commercial Developments	5	CII		X	Irrigation	Locally	No
Require Water Efficiency Plan Reviews for New CII Development	5	CII	X	X	All Indoor	Locally	No
Water Waste Ordinance	5	All		X	All Outdoor	No preference	Yes, currently

**Table 6-2**  
**Prioritization of Conservation Measures and Programs**  
 City of Petaluma, Sonoma-Marín Saving Water Partnership

Conservation Measure/Program	Prioritization (a)	Sector	Indoor	Outdoor	Primary End Use	Preference (b)	Local Program
Demand Offset/Water Neutral Policy for Large New Developments	3	All	X	X	All	Locally	No

Abbreviations:

- AMI = advanced metering infrastructure
- CII = commercial, industrial, institutional
- COM = commercial
- IRR = irrigation account
- MFR = multi-family residential
- MWELO = Model Water Efficient Landscape Ordinance
- PRV = pressure reducing valve
- SFR = single-family residential
- SMSWP = Sonoma-Marín Saving Water Partnership
- UHET = ultra high efficiency toilet

Notes:

- (a) Each Water Contractor was asked to rank each conservation program or measure in terms of priority as a locally-administered program, where 5 indicated highest priority and 1 indicated the lowest priority.
- (b) For each program a Water Contractor ranked as "3" or above, the Water Contractor was asked to indicate whether they would prefer the program to be administered regionally or locally. N/A indicates no preference given for programs given a ranking lower than three for both local and regional priority.

**Table 6-3a**

**Conservation Program Scenarios**

City of Petaluma, Sonoma-Marín Saving Water Partnership

Program	Sector	Indoor/ Outdoor	Program Scenario (a)		
			A) Outdoor Programs	B) Highly-Ranked Local Programs	C) Highly-Ranked Regional Programs
Drip Irrigation Incentive for MFR and CII	MFR, CII	Outdoor	X	X	
Drip Irrigation Incentive for SFR	SFR	Outdoor	X	X	
High Efficiency Clothes Washer Rebate - Residential	SFR, MFR	Indoor			X
High Efficiency Faucet Aerator / Showerhead Giveaway - CII Customers	CII	Indoor		X	
High Efficiency Faucet Aerator / Showerhead Giveaway - Residential Customers	SFR, MFR	Indoor		X	
Incentivize Irrigation Equipment Upgrades - Large Landscapes	MFR, CII, IRR	Outdoor			X
Incentivize Irrigation Equipment Upgrades - SFR	SFR	Outdoor	X		X
Landscape Conversion or Turf Removal - MFR and CII	MFR, CII	Outdoor	X	X	
Landscape Conversion or Turf Removal -SFR	SFR	Outdoor	X	X	
Mulch rebate	SFR	Outdoor	X	X	
Restaurant Spray Nozzle Rebates	CII	Indoor			X
Smart Irrigation Controller (Weather-Based Irrigation Controller) Rebates - Large Landscape	MFR, CII	Outdoor	X	X	X
Smart Irrigation Controller (Weather-Based Irrigation Controller) Rebates - SFR	SFR	Outdoor	X	X	X
Water Use Surveys/Audits - CII	CII	Both	X		X
Water Use Surveys/Audits - MFR	MFR	Indoor		X	
Water Use Surveys/Audits - SFR	SFR	Both	X		X

**Table 6-3a**

**Conservation Program Scenarios**

City of Petaluma, Sonoma-Marín Saving Water Partnership

**Abbreviations**

CII = Commercial, Industrial, and Institutional  
MFR = multi-family residential

SFR = Single-family residential

**Notes**

(a) Program scenarios represent three potential approaches to program selection. Scenario A represents a focus on outdoor water savings, Scenario B represents a more "business as usual" approach based on programs ranked most highly by City of Petaluma, and Scenario C represents a focus on the programs all nine Water Contractors collectively identified as highest priority.

**Table 6-3b**  
**Costs and Savings of Potential Conservation Programs**  
 City of Petaluma, Sonoma-Marín Saving Water Partnership

Program (a)	Sector	Indoor/ Outdoor	Note	Present Value of Benefits		Present Value of Cost		Benefit to Cost Ratio		Water Utility Costs 2021-2025 (b)	Water Savings in 2025 (AFY)	Water Utility Cost of Water Saved (\$/AF)
				Water Utility	Customers	Water Utility	Customers	Water Utility	Customers			
Drip Irrigation Incentive for MFR and CII	MFR, CII	Outdoor	(c)	\$66,499	\$83,604	\$44,449	\$34,192	1.5	2.4	\$40,625	2.9	\$1,120
Drip Irrigation Incentive for SFR	SFR	Outdoor	(c)	\$66,499	\$74,819	\$177,796	\$136,766	0.37	0.55	\$162,500	2.9	\$4,478
High Efficiency Clothes Washer Rebate - Residential	SFR, MFR	Indoor		\$520,414	\$1,842,866	\$135,481	\$1,007,422	3.8	1.8	\$123,825	18	\$549
High Efficiency Faucet Aerator / Showerhead Giveaway - CII Customers	CII	Indoor		\$75,305	\$99,997	\$85,342	\$136,766	0.88	0.73	\$78,000	9	\$1,766
High Efficiency Faucet Aerator / Showerhead Giveaway - Residential Customers	SFR, MFR	Indoor		\$202,082	\$240,144	\$130,062	\$208,432	1.6	1.2	\$118,872	23	\$1,003
Incentivize Irrigation Equipment Upgrades - Large Landscapes	MFR, CII, IRR	Outdoor		\$205,200	\$240,506	\$142,237	\$109,413	1.4	2.2	\$130,000	11	\$1,137
Incentivize Irrigation Equipment Upgrades - SFR	SFR	Outdoor		\$490,382	\$560,557	\$142,237	\$109,413	3.4	5.1	\$130,000	26	\$476
Landscape Conversion or Turf Removal	MFR, CII	Outdoor		\$439,194	\$560,997	\$413,291	\$953,749	1.1	0.59	\$377,735	24	\$1,544
Landscape Conversion or Turf Removal	SFR	Outdoor		\$439,194	\$502,044	\$413,291	\$953,749	1.1	0.53	\$377,735	24	\$1,544
Mulch rebate	SFR	Outdoor		\$205,004	\$243,616	\$206,646	\$63,583	0.99	3.8	\$188,867	24	\$1,571
Restaurant Spray Nozzle Rebates	CII	Indoor		\$146,749	\$627,115	\$7,326	\$5,635	20	111	\$6,696	13	\$98
Smart Irrigation Controller (Weather-Based Irrigation Controller) Rebates - Large Landscape	MFR, CII	Outdoor		\$549,229	\$643,730	\$142,237	\$109,413	3.9	5.9	\$130,000	30	\$425
Smart Irrigation Controller (Weather-Based Irrigation Controller) Rebates - SFR	SFR	Outdoor		\$490,382	\$560,557	\$71,119	\$142,237	6.9	3.9	\$65,000	26	\$238
Water Use Surveys/Audits - CII	CII	Both		\$162,147	\$216,719	\$175,061	\$218,826	0.93	0.99	\$160,000	19	\$1,668
Water Use Surveys/Audits - MFR	MFR	Indoor		\$163,644	\$369,550	\$175,061	\$218,826	0.93	1.7	\$160,000	19	\$1,668
Water Use Surveys/Audits - SFR	SFR	Both		\$325,586	\$714,105	\$311,073	\$73,854	1.0	9.7	\$284,310	34	\$1,632

**Abbreviations**

AFY = acre-feet per year  
 CII = Commercial, Industrial, and Institutional  
 MFR = multi-family residential  
 SFR = Single-family residential  
 sq ft = square feet  
 \$/AF = dollars per acre-foot

**Table 6-3b**  
**Costs and Savings of Potential Conservation Programs**  
City of Petaluma, Sonoma-Marin Saving Water Partnership

**Notes**

- (a) Estimated water savings, benefits, and costs are calculated using the AWE model. Assumptions used are presented in Appendix C.
- (b) For purposes of near-term conservation program analysis, it is assumed that all programs are active from 2021 through 2025.
- (c) The benefit-cost results of the drip irrigation programs are strongly influenced by the lawn size. As lawn size goes up, the unit cost goes down, and the benefit-cost ratio goes up.



**Table 6-3c**  
**Comparison of Program Scenarios – Costs and Savings**  
 City of Petaluma, Sonoma-Marín Saving Water Partnership

Scenario (a)	Present Value of Benefits		Present Value of Cost		Benefit to Cost Ratio		Cumulative Water Savings (AF)					Water Utility Cost of Water Saved (\$/AF) (b)
	Water Utility	Customers	Water Utility	Customers	Water Utility	Customers	2025	2030	2035	2040	2045	
A) Outdoor Programs	\$3,234,117	\$ 4,160,749	\$2,097,200	\$ 2,795,783	1.5	1.5	662	1,473	1,755	1,756	1,756	\$1,194
B) Highly-Ranked Local Programs	\$2,697,033	\$ 3,379,059	\$1,859,294	\$ 2,957,715	1.5	1.1	561	1,249	1,478	1,480	1,480	\$1,257
C) Highly-Ranked Regional Programs	\$2,890,090	\$ 5,406,155	\$1,126,770	\$ 1,776,214	2.6	3.0	560	1,216	1,465	1,487	1,487	\$758

**Abbreviations**

AF = acre-feet

\$/AF = dollars per acre-foot

**Notes**

- (a) For purposes of near-term conservation program analysis, it is assumed that all programs are active from 2021 through 2025. Cumulative water savings achieved beyond 2025 reflect the ongoing benefit of program implementation.
- (b) The water utility cost is based on the cumulative savings achieved through 2045 cumulative water savings.

## 7. CONCLUSION

This report presents the results of demand analysis and projections, developed consistent with CWC § 10631(d)(4)(A), which requires that “Water use projections, where available, shall display and account for the water savings estimated to result from adopted codes, standards, ordinances, or transportation and land use plans identified by the urban water supplier, as applicable to the service area.” The assumptions used as the bases for demand projections were developed in close coordination with the City and reflect a land-use based approach consistent with the City’s community planning, using the best available information. It should be noted that all demand and conservation projections have limitations and should be considered estimates that require revisiting as factors that affect demands arise, such as significant economic or population shifts, extreme hydrological conditions, etc.

The methodology used to develop demand projections herein is also consistent with the CWC §10635(b)(4), requirement to consider climate change on projected demands.<sup>15</sup> California experienced a historic drought between 2011-2017. In 2014, Governor Brown issued Executive Order B-26-14 declaring a Drought State of Emergency and requested all Californians to voluntarily reduce water use by 20%. In 2015, the State Water Resources Control Board implemented emergency conservation regulations that, among other things, required water agencies to reduce their water use and prohibited certain types of water uses. As a result, the City experienced an overall decrease in demands during the historic drought, most significantly during 2015. The demand factors evaluated herein consider the 2011-2013 period, in which customers increased their water use (in part due to the drought conditions, prior to the imposed restrictions), as well as the observed rebound in demand following the drought (2017-2019). Thus, the periods used to develop the demand projections reflect conditions representative of the hotter, drier weather expected as a result of climate change.

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<sup>15</sup> CWC §10635(b)(4) requires that suppliers consider plausible changes on projected supplies and demands under climate change conditions specific to their five-year drought risk assessments. Section 4.5 of the draft 2020 UWMP Guidebook more generally recommends that consideration of climate change be incorporated into all demand projections.

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## Appendix A

**California Water Code Revisions per AB-1668, SB-606, and SB-664, Redlines prepared by DWR**

[Home](#)[Bill Information](#)[California Law](#)[Publications](#)[Other Resources](#)[My Subscriptions](#)[My Favorites](#)**SB-664 Water: urban water management planning.** (2015-2016)**As Amends the Law Today****[As Amends the Law on Nov 20, 2015](#)****SECTION 1.** *Section 10632.5 is added to the Water Code, to read:*

**10632.5.** (a) *In addition to the requirements of paragraph (3) of subdivision (a) of Section 10632, beginning January 1, 2020, the plan shall include a seismic risk assessment and mitigation plan to assess the vulnerability of each of the various facilities of a water system and mitigate those vulnerabilities.*

(b) *An urban water supplier shall update the seismic risk assessment and mitigation plan when updating its urban water management plan as required by Section 10621.*

(c) *An urban water supplier may comply with this section by submitting, pursuant to Section 10644, a copy of the most recent adopted local hazard mitigation plan or multihazard mitigation plan under the federal Disaster Mitigation Act of 2000 (Public Law 106-390) if the local hazard mitigation plan or multihazard mitigation plan addresses seismic risk.*


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**AB-1668 Water management planning.** (2017-2018)

**As Amends the Law Today**

**[As Amends the Law on Nov 08, 2018](#)**

**SECTION 1.** Section 531.10 of the Water Code is amended to read:

**531.10.** (a) (1) An agricultural water supplier shall submit an annual report to the department that summarizes aggregated farm-gate delivery data, on a monthly or bimonthly basis, using best professional practices. The annual report for the prior year shall be submitted to the department by April 1 of each year. The annual report shall be organized by basin, as defined in Section 10721, within the service area of the agricultural water supplier, if applicable.

(2) The report, and any amendments to the report, submitted to the department pursuant to this subdivision shall be submitted electronically and shall include any standardized forms, tables, or displays specified by the department.

(3) The department shall post all reports on its Internet Web site in a manner that allows for comparisons across water suppliers. The department shall make the reports available for public viewing in a timely manner after it receives them.

(b) Nothing in this article shall be construed to require the implementation of water measurement programs or practices that are not locally cost effective.

(c) It is the intent of the Legislature that the requirements of this section shall complement and not affect the scope of authority granted to the department or the board by provisions of law other than this article.

**SEC. 2.** Section 1120 of the Water Code is amended to read:

**1120.** This chapter applies to any decision or order issued under this part or Section 275, Part 2 (commencing with Section 1200), Part 2 (commencing with Section 10500) of Division 6, Part 2.55 (commencing with Section 10608) of Division 6, or Chapter 11 (commencing with Section 10735) of Part 2.74 of Division 6, Article 7 (commencing with Section 13550) of Chapter 7 of Division 7, or the public trust doctrine.

**SEC. 3.** *Section 1846.5 is added to the Water Code, to read:*

**1846.5.** (a) *An urban retail water supplier who commits any of the violations identified in subdivision (b) may be liable in an amount not to exceed the following, as applicable:*

*(1) If the violation occurs in a critically dry year immediately preceded by two or more consecutive below normal, dry, or critically dry years or during a period for which the Governor has issued a proclamation 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, ten thousand dollars (\$10,000) for each day in which the violation occurs.*

*(2) For all violations other than those described in paragraph (1), one thousand dollars (\$1,000) for each day in which the violation occurs.*

*(b) Liability pursuant to this section may be imposed for any of the following violations:*

*(1) Violation of an order issued under Chapter 9 (commencing with Section 10609) of Part 2.55 of Division 6.*

*(2) Violation of a regulation issued under Chapter 9 (commencing with Section 10609) of Part 2.55 of Division 6, if the violation occurs after November 1, 2027.*

*(c) Civil liability may be imposed by the superior court. The Attorney General, upon the request of the board, shall petition the superior court to impose, assess, and recover those sums.*

*(d) Civil liability may be imposed administratively by the board pursuant to Section 1055.*

**SEC. 4.** Section 10608.12 of the Water Code is amended to read:

**10608.12.** Unless the context otherwise requires, the following definitions govern the construction of this part:

(a) "Agricultural water supplier" means a water supplier, either publicly or privately owned, providing water to 10,000 or more irrigated acres, excluding recycled water. "Agricultural water supplier" includes a supplier or contractor for water, regardless of the basis of right, that distributes or sells water for ultimate resale to customers. "Agricultural water supplier" does not include the department.

(b) "Base daily per capita water use" means any of the following:

(1) The urban retail water supplier's estimate of its average gross water use, reported in gallons per capita per day and calculated over a continuous 10-year period ending no earlier than December 31, 2004, and no later than December 31, 2010.

(2) For an urban retail water supplier that meets at least 10 percent of its 2008 measured retail water demand through recycled water that is delivered within the service area of an urban retail water supplier or its urban wholesale water supplier, the urban retail water supplier may extend the calculation described in paragraph (1) up to an additional five years to a maximum of a continuous 15-year period ending no earlier than December 31, 2004, and no later than December 31, 2010.

(3) For the purposes of Section 10608.22, the urban retail water supplier's estimate of its average gross water use, reported in gallons per capita per day and calculated over a continuous five-year period ending no earlier than December 31, 2007, and no later than December 31, 2010.

(c) "Baseline commercial, industrial, and institutional water use" means an urban retail water supplier's base daily per capita water use for commercial, industrial, and institutional users.

(d) "CII water use" means water used by commercial water users, industrial water users, institutional water users, and large landscape water users.

(e) "Commercial water user" means a water user that provides or distributes a product or service.

(f) "Compliance daily per capita water use" means the gross water use during the final year of the reporting period, reported in gallons per capita per day.

(g) "Disadvantaged community" means a community with an annual median household income that is less than 80 percent of the statewide annual median household income.

(h) "Gross water use" means the total volume of water, whether treated or untreated, entering the distribution system of an urban retail water supplier, excluding all of the following:

(1) Recycled water that is delivered within the service area of an urban retail water supplier or its urban wholesale water supplier.

(2) The net volume of water that the urban retail water supplier places into long-term storage.

(3) The volume of water the urban retail water supplier conveys for use by another urban water supplier.

(4) The volume of water delivered for agricultural use, except as otherwise provided in subdivision (f) of Section 10608.24.

(i) "Industrial water user" means a water user that is primarily a manufacturer or processor of materials as defined by the North American Industry Classification System code sectors 31 to 33, inclusive, or an entity that is a water user primarily engaged in research and development.

(j) "Institutional water user" means 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.



(k) "Interim urban water use target" means the midpoint between the urban retail water supplier's base daily per capita water use and the urban retail water supplier's urban water use target for 2020.

(l) "Large landscape" means a nonresidential landscape as described in the performance measures for CII water use adopted pursuant to Section 10609.10.

(m) "Locally cost effective" means that the present value of the local benefits of implementing an agricultural efficiency water management practice is greater than or equal to the present value of the local cost of implementing that measure.

(n) "Performance measures" means actions to be taken by urban retail water suppliers that will result in increased water use efficiency by CII water users. Performance measures may include, but are not limited to, educating CII water users on best management practices, conducting water use audits, and preparing water management plans. Performance measures do not include process water.

(o) "Potable reuse" means direct potable reuse, indirect potable reuse for groundwater recharge, and reservoir water augmentation as those terms are defined in Section 13561.

(p) "Process water" means water used by industrial water users for producing a product or product content or water used for research and development. Process water includes, but is not limited to, continuous manufacturing processes, and water used for testing, cleaning, and maintaining equipment. Water used to cool machinery or buildings used in the manufacturing process or necessary to maintain product quality or chemical characteristics for product manufacturing or control rooms, data centers, laboratories, clean rooms, and other industrial facility units that are integral to the manufacturing or research and development process is process water. Water used in the manufacturing process that is necessary for complying with local, state, and federal health and safety laws, and is not incidental water, is process water. Process water does not mean incidental water uses.

(q) "Recycled water" means recycled water, as defined in subdivision (n) of Section 13050.

(r) "Regional water resources management" means sources of supply resulting from watershed-based planning for sustainable local water reliability or any of the following alternative sources of water:

(1) The capture and reuse of stormwater or rainwater.

(2) The use of recycled water.

(3) The desalination of brackish groundwater.

(4) The conjunctive use of surface water and groundwater in a manner that is consistent with the safe yield of the groundwater basin.

(s) "Reporting period" means the years for which an urban retail water supplier reports compliance with the urban water use targets.

(t) "Urban retail water supplier" means a water supplier, either publicly or privately owned, that directly provides potable municipal water to more than 3,000 end users or that supplies more than 3,000 acre-feet of potable water annually at retail for municipal purposes.

(u) "Urban water use objective" means an estimate of aggregate efficient water use for the previous year based on adopted water use efficiency standards and local service area characteristics for that year, as described in Section 10609.20.

(v) "Urban water use target" means the urban retail water supplier's targeted future daily per capita water use.

(w) "Urban wholesale water ~~supplier~~ supplier," means a water supplier, either publicly or privately owned, that provides more than 3,000 acre-feet of water annually at wholesale for potable municipal purposes.

**SEC. 5.** Section 10608.20 of the Water Code is amended to read:

**10608.20.** (a) (1) Each urban retail water supplier shall develop urban water use targets and an interim urban water use target by July 1, 2011. Urban retail water suppliers may elect to determine and report progress toward achieving these targets on an individual or regional basis, as provided in subdivision (a) of Section 10608.28, and may determine the targets on a fiscal year or calendar year basis.

(2) It is the intent of the Legislature that the urban water use targets described in paragraph (1) cumulatively result in a 20-percent reduction from the baseline daily per capita water use by December 31, 2020.

(b) An urban retail water supplier shall adopt one of the following methods for determining its urban water use target pursuant to subdivision (a):

(1) Eighty percent of the urban retail water supplier's baseline per capita daily water use.

(2) The per capita daily water use that is estimated using the sum of the following performance standards:

(A) For indoor residential water use, 55 gallons per capita daily water use as a provisional standard. Upon completion of the department's ~~2017~~ 2016 report to the Legislature pursuant to Section 10608.42, this standard may be adjusted by the Legislature by statute.

(B) For landscape irrigated through dedicated or residential meters or connections, water efficiency equivalent to the standards of the Model Water Efficient Landscape Ordinance set forth in Chapter 2.7 (commencing with Section 490) of Division 2 of Title 23 of the California Code of Regulations, as in effect the later of the year of the landscape's installation or 1992. An urban retail water supplier using the approach specified in this subparagraph shall use satellite imagery, site visits, or other best available technology to develop an accurate estimate of landscaped areas.

(C) For commercial, industrial, and institutional uses, a 10-percent reduction in water use from the baseline commercial, industrial, and institutional water use by 2020.

(3) Ninety-five percent of the applicable state hydrologic region target, as set forth in the state's draft 20x2020 Water Conservation Plan (dated April 30, 2009). If the service area of an urban water supplier includes more than one hydrologic region, the supplier shall apportion its service area to each region based on population or area.

(4) A method that shall be identified and developed by the department, through a public process, and reported to the Legislature no later than December 31, 2010. The method developed by the department shall identify per capita targets that cumulatively result in a statewide 20-percent reduction in urban daily per capita water use by December 31, 2020. In developing urban daily per capita water use targets, the department shall do all of the following:

(A) Consider climatic differences within the state.

(B) Consider population density differences within the state.

(C) Provide flexibility to communities and regions in meeting the targets.

(D) Consider different levels of per capita water use according to plant water needs in different regions.

(E) Consider different levels of commercial, industrial, and institutional water use in different regions of the state.

(F) Avoid placing an undue hardship on communities that have implemented conservation measures or taken actions to keep per capita water use low.

(c) If the department adopts a regulation pursuant to paragraph (4) of subdivision (b) that results in a requirement that an urban retail water supplier achieve a reduction in daily per capita water use that is greater than 20 percent by December 31, 2020, an urban retail water supplier that adopted the method described in paragraph (4) of subdivision (b) may limit its urban water use target to a reduction of not more than 20 percent by December 31, 2020, by adopting the method described in paragraph (1) of subdivision (b).

(d) The department shall update the method described in paragraph (4) of subdivision (b) and report to the Legislature by December 31, 2014. An urban retail water supplier that adopted the method described in paragraph (4) of subdivision (b) may adopt a new urban daily per capita water use target pursuant to this updated method.

(e) An urban retail water supplier shall include in its urban water management plan due in 2010 pursuant to Part 2.6 (commencing with Section 10610) the 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.

(f) When calculating per capita values for the purposes of this chapter, an urban retail water supplier shall determine population using federal, state, and local population reports and projections.

(g) An urban retail water supplier may update its 2020 urban water use target in its 2015 urban water management plan required pursuant to Part 2.6 (commencing with Section 10610).

(h) (1) The department, through a public process and in consultation with the California Urban Water Conservation Council, shall develop technical methodologies and criteria for the consistent implementation of this part, including, but not limited to, both of the following:

(A) Methodologies for calculating base daily per capita water use, baseline commercial, industrial, and institutional water use, compliance daily per capita water use, gross water use, service area population, indoor residential water use, and landscaped area water use.

(B) Criteria for adjustments pursuant to subdivisions (d) and (e) of Section 10608.24.

(2) The department shall post the methodologies and criteria developed pursuant to this subdivision on its ~~internet website,~~ [Internet Web site](#), and make written copies available, by October 1, 2010. An urban retail water supplier shall use the methods developed by the department in compliance with this part.

(i) (1) The department shall adopt regulations for implementation of the provisions relating to process water in accordance with Section 10608.12, subdivision (e) of Section 10608.24, and subdivision (d) of Section 10608.26.

(2) The initial adoption of a regulation authorized by this subdivision is deemed to address an emergency, for purposes of Sections 11346.1 and 11349.6 of the Government Code, and the department is hereby exempted for that purpose from the requirements of subdivision (b) of Section 11346.1 of the Government Code. After the initial adoption of an emergency regulation pursuant to this subdivision, the department shall not request approval from the Office of Administrative Law to readopt the regulation as an emergency regulation pursuant to Section 11346.1 of the Government Code.

(j) (1) An urban retail water supplier is granted an extension to July 1, 2011, for adoption of an urban water management plan pursuant to Part 2.6 (commencing with Section 10610) due in 2010 to allow the use of technical methodologies developed by the department pursuant to paragraph (4) of subdivision (b) and subdivision (h). An urban retail water supplier that adopts an urban water management plan due in 2010 that does not use the methodologies developed by the department pursuant to subdivision (h) shall amend the plan by July 1, 2011, to comply with this part.

(2) An urban wholesale water supplier whose urban water management plan prepared pursuant to Part 2.6 (commencing with Section 10610) was due and not submitted in 2010 is granted an extension to July 1, 2011, to permit coordination between an urban wholesale water supplier and urban retail water suppliers.

**SEC. 6.** Section 10608.48 of the Water Code is amended to read:

**10608.48.** (a) On or before July 31, 2012, an agricultural water supplier shall implement efficient water management practices pursuant to subdivisions (b) and (c).

(b) Agricultural water suppliers shall implement both of the following critical efficient management practices:

(1) Measure the volume of water delivered to customers with sufficient accuracy to comply with subdivision (a) of Section 531.10 and to implement paragraph (2).

(2) Adopt a pricing structure for water customers based at least in part on quantity delivered.

(c) Agricultural water suppliers shall implement additional efficient management practices, including, but not limited to, practices to accomplish all of the following, if the measures are locally cost effective and technically feasible:

(1) Facilitate alternative land use for lands with exceptionally high water duties or whose irrigation contributes to significant problems, including drainage.

(2) Facilitate use of available recycled water that otherwise would not be used beneficially, meets all health and safety criteria, and does not harm crops or soils.

(3) Facilitate the financing of capital improvements for on-farm irrigation systems.

(4) Implement an incentive pricing structure that promotes one or more of the following goals:

(A) More efficient water use at the farm level.

(B) Conjunctive use of groundwater.

(C) Appropriate increase of groundwater recharge.

(D) Reduction in problem drainage.

(E) Improved management of environmental resources.

(F) Effective management of all water sources throughout the year by adjusting seasonal pricing structures based on current conditions.

(5) Expand line or pipe distribution systems, and construct regulatory reservoirs to increase distribution system flexibility and capacity, decrease maintenance, and reduce seepage.

(6) Increase flexibility in water ordering by, and delivery to, water customers within operational limits.

(7) Construct and operate supplier spill and tailwater recovery systems.

(8) Increase planned conjunctive use of surface water and groundwater within the supplier service area.

(9) Automate canal control structures.

(10) Facilitate or promote customer pump testing and evaluation.

(11) Designate a water conservation coordinator who will develop and implement the water management plan and prepare progress reports.

(12) Provide for the availability of water management services to water users. These services may include, but are not limited to, all of the following:

(A) On-farm irrigation and drainage system evaluations.

(B) Normal year and real-time irrigation scheduling and crop evapotranspiration information.

(C) Surface water, groundwater, and drainage water quantity and quality data.

(D) Agricultural water management educational programs and materials for farmers, staff, and the public.

(13) Evaluate the policies of agencies that provide the supplier with water to identify the potential for institutional changes to allow more flexible water deliveries and storage.

(14) Evaluate and improve the efficiencies of the supplier's pumps.

(d) Agricultural water suppliers shall include in the agricultural water management plans required pursuant to Part 2.8 (commencing with Section 10800) a report on which efficient water management practices have been implemented and are planned to be implemented, an estimate of the water use efficiency improvements that have occurred since the last report, and an estimate of the water use efficiency improvements estimated to occur five and 10 years in the future. If an agricultural water supplier determines that an efficient water management practice is not locally cost effective or technically feasible, the supplier shall submit information documenting that determination.

(e) The department shall require information about the implementation of efficient water management practices to be reported using a standardized form developed pursuant to Section 10608.52.

(f) An agricultural water supplier may meet the requirements of subdivisions (d) and (e) by submitting to the department a water conservation plan submitted to the United States Bureau of Reclamation that meets the requirements described in Section 10828.

(g) On or before December 31, 2013, December 31, 2016, and December 31, 2021, the department, in consultation with the board, shall submit to the Legislature a report on the agricultural efficient water management practices that have been implemented and are planned to be implemented and an assessment of the manner in which the implementation of those efficient water management practices has affected and will affect agricultural operations, including estimated water use efficiency improvements, if any.

(h) The department may update the efficient water management practices required pursuant to subdivision (c), in consultation with the Agricultural Water Management Council, the United States Bureau of Reclamation, and the board. All efficient water management practices for agricultural water use pursuant to this chapter shall be adopted or revised by the department only after the department conducts public hearings to allow participation of the diverse geographical areas and interests of the state.

(i) (1) The department shall adopt regulations that provide for a range of options that agricultural water suppliers may use or implement to comply with the measurement requirement in paragraph (1) of subdivision (b).

(2) The initial adoption of a regulation authorized by this subdivision is deemed to address an emergency, for purposes of Sections 11346.1 and 11349.6 of the Government Code, and the department is hereby exempted for that purpose from the requirements of subdivision (b) of Section 11346.1 of the Government Code. After the initial adoption of an emergency regulation pursuant to this subdivision, the department shall not request approval from the Office of Administrative Law to readopt the regulation as an emergency regulation pursuant to Section 11346.1 of the Government Code.

**SEC. 7.** *Chapter 9 (commencing with Section 10609) is added to Part 2.55 of Division 6 of the Water Code, to read:*

**CHAPTER 9. Urban Water Use Objectives and Water Use Reporting**

**10609.** (a) *The Legislature finds and declares that this chapter establishes a method to estimate the aggregate amount of water that would have been delivered the previous year by an urban retail water supplier if all that water had been used efficiently. This estimated aggregate water use is the urban retail water supplier's urban water use objective. The method is based on water use efficiency standards and local service area characteristics for that year. By comparing the amount of water actually used in the previous year with the urban water use objective, local urban water suppliers will be in a better position to help eliminate unnecessary use of water; that is, water used in excess of that needed to accomplish the intended beneficial use.*

(b) *The Legislature further finds and declares all of the following:*

(1) *This chapter establishes standards and practices for the following water uses:*

(A) *Indoor residential use.*

(B) *Outdoor residential use.*

(C) *CII water use.*

(D) *Water losses.*

(E) *Other unique local uses and situations that can have a material effect on an urban water supplier's total water use.*

(2) *This chapter further does all of the following:*

(A) *Establishes a method to calculate each urban water use objective.*

(B) *Considers recycled water quality in establishing efficient irrigation standards.*

(C) *Requires the department to provide or otherwise identify data regarding the unique local conditions to support the calculation of an urban water use objective.*

(D) *Provides for the use of alternative sources of data if alternative sources are shown to be as accurate as, or more accurate than, the data provided by the department.*

(E) *Requires annual reporting of the previous year's water use with the urban water use objective.*

(F) *Provides a bonus incentive for the amount of potable recycled water used the previous year when comparing the previous year's water use with the urban water use objective, of up to 10 percent of the urban water use objective.*

(3) *This chapter requires the department and the board to solicit broad public participation from stakeholders and other interested persons in the development of the standards and the adoption of regulations pursuant to this chapter.*

*(4) This chapter preserves the Legislature's authority over long-term water use efficiency target setting and ensures appropriate legislative oversight of the implementation of this chapter by doing all of the following:*

*(A) Requiring the Legislative Analyst to conduct a review of the implementation of this act, including compliance with the adopted standards and regulations, accuracy of the data, use of alternate data, and other issues the Legislative Analyst deems appropriate.*

*(B) Stating legislative intent that the director of the department and the chairperson of the board appear before the appropriate Senate and Assembly policy committees to report on progress in implementing this chapter.*

*(C) Providing one-time-only authority to the department and board to adopt water use efficiency standards, except as explicitly provided in this chapter. Authorization to update the standards shall require separate legislation.*

*(c) It is the intent of the Legislature that the following principles apply to the development and implementation of long-term standards and urban water use objectives:*

*(1) Local urban retail water suppliers should have primary responsibility for meeting standards-based water use targets, and they shall retain the flexibility to develop their water supply portfolios, design and implement water conservation strategies, educate their customers, and enforce their rules.*

*(2) Long-term standards and urban water use objectives should advance the state's goals to mitigate and adapt to climate change.*

*(3) Long-term standards and urban water use objectives should acknowledge the shade, air quality, and heat-island reduction benefits provided to communities by trees through the support of water-efficient irrigation practices that keep trees healthy.*

*(4) The state should identify opportunities for streamlined reporting, eliminate redundant data submissions, and incentivize open access to data collected by urban and agricultural water suppliers.*

**10609.2.** *(a) The board, in coordination with the department, shall adopt long-term standards for the efficient use of water pursuant to this chapter on or before June 30, 2022.*

*(b) Standards shall be adopted for all of the following:*

*(1) Outdoor residential water use.*

*(2) Outdoor irrigation of landscape areas with dedicated irrigation meters in connection with CII water use.*

*(3) A volume for water loss.*

*(c) When adopting the standards under this section, the board shall consider the policies of this chapter and the proposed efficiency standards' effects on local wastewater management, developed and natural parklands, and urban tree health. The standards and potential effects shall be identified by May 30, 2022. The board shall allow for public comment on potential effects identified by the board under this subdivision.*

*(d) The long-term standards shall be set at a level designed so that the water use objectives, together with other demands excluded from the long-term standards such as CII indoor water use and CII outdoor water use not connected to a dedicated landscape meter, would exceed the statewide conservation targets required pursuant to Chapter 3 (commencing with Section 10608.16).*

*(e) The board, in coordination with the department, shall adopt by regulation variances recommended by the department pursuant to Section 10609.14 and guidelines and methodologies pertaining to the calculation of an urban retail water supplier's urban water use objective recommended by the department pursuant to Section 10609.16.*

**10609.4.** *(a) (1) Until January 1, 2025, the standard for indoor residential water use shall be 55 gallons per capita daily.*

*(2) Beginning January 1, 2025, and until January 1, 2030, the standard for indoor residential water use shall be the greater of 52.5 gallons per capita daily or a standard recommended pursuant to subdivision (b).*

*(3) Beginning January 1, 2030, the standard for indoor residential water use shall be the greater of 50 gallons per capita daily or a standard recommended pursuant to subdivision (b).*

(b) (1) The department, in coordination with the board, shall conduct necessary studies and investigations and may jointly recommend to the Legislature a standard for indoor residential water use that more appropriately reflects best practices for indoor residential water use than the standard described in subdivision (a). A report on the results of the studies and investigations shall be made to the chairpersons of the relevant policy committees of each house of the Legislature by January 1, 2021, and shall include information necessary to support the recommended standard, if there is one. The studies and investigations shall also include an analysis of the benefits and impacts of how the changing standard for indoor residential water use will impact water and wastewater management, including potable water usage, wastewater, recycling and reuse systems, infrastructure, operations, and supplies.

(2) The studies, investigations, and report described in paragraph (1) shall include collaboration with, and input from, a broad group of stakeholders, including, but not limited to, environmental groups, experts in indoor plumbing, and water, wastewater, and recycled water agencies.

**10609.6.** (a) (1) The department, in coordination with the board, shall conduct necessary studies and investigations and recommend, no later than October 1, 2021, standards for outdoor residential use for adoption by the board in accordance with this chapter.

(2) (A) The standards shall incorporate the principles of the model water efficient landscape ordinance adopted by the department pursuant to the Water Conservation in Landscaping Act (Article 10.8 (commencing with Section 65591) of Chapter 3 of Division 1 of Title 7 of the Government Code).

(B) The standards shall apply to irrigable lands.

(C) The standards shall include provisions for swimming pools, spas, and other water features. Ornamental water features that are artificially supplied with water, including ponds, lakes, waterfalls, and fountains, shall be analyzed separately from swimming pools and spas.

(b) The department shall, by January 1, 2021, provide each urban retail water supplier with data regarding the area of residential irrigable lands in a manner that can reasonably be applied to the standards adopted pursuant to this section.

(c) The department shall not recommend standards pursuant to this section until it has conducted pilot projects or studies, or some combination of the two, to ensure that the data provided to local agencies are reasonably accurate for the data's intended uses, taking into consideration California's diverse landscapes and community characteristics.

**10609.8.** (a) The department, in coordination with the board, shall conduct necessary studies and investigations and recommend, no later than October 1, 2021, standards for outdoor irrigation of landscape areas with dedicated irrigation meters or other means of calculating outdoor irrigation use in connection with CII water use for adoption by the board in accordance with this chapter.

(b) The standards shall incorporate the principles of the model water efficient landscape ordinance adopted by the department pursuant to the Water Conservation in Landscaping Act (Article 10.8 (commencing with Section 65591) of Chapter 3 of Division 1 of Title 7 of the Government Code).

(c) The standards shall include an exclusion for water for commercial agricultural use meeting the definition of subdivision (b) of Section 51201 of the Government Code.

**10609.9.** For purposes of Sections 10609.6 and 10609.8, "principles of the model water efficient landscape ordinance" means those provisions of the model water efficient landscape ordinance applicable to the establishment or determination of the amount of water necessary to efficiently irrigate both new and existing landscapes. These provisions include, but are not limited to, all of the following:

(a) Evapotranspiration adjustment factors, as applicable.

(b) Landscape area.

(c) Maximum applied water allowance.

(d) Reference evapotranspiration.

(e) Special landscape areas, including provisions governing evapotranspiration adjustment factors for different types of water used for irrigating the landscape.

**10609.10.** (a) *The department, in coordination with the board, shall conduct necessary studies and investigations and recommend, no later than October 1, 2021, performance measures for CII water use for adoption by the board in accordance with this chapter.*

(b) *Prior to recommending performance measures for CII water use, the department shall solicit broad public participation from stakeholders and other interested persons relating to all of the following:*

(1) *Recommendations for a CII water use classification system for California that address significant uses of water.*

(2) *Recommendations for setting minimum size thresholds for converting mixed CII meters to dedicated irrigation meters, and evaluation of, and recommendations for, technologies that could be used in lieu of requiring dedicated irrigation meters.*

(3) *Recommendations for CII water use best management practices, which may include, but are not limited to, water audits and water management plans for those CII customers that exceed a recommended size, volume of water use, or other threshold.*

(c) *Recommendations of appropriate performance measures for CII water use shall be consistent with the October 21, 2013, report to the Legislature by the Commercial, Industrial, and Institutional Task Force entitled "Water Use Best Management Practices," including the technical and financial feasibility recommendations provided in that report, and shall support the economic productivity of California's commercial, industrial, and institutional sectors.*

(d) (1) *The board, in coordination with the department, shall adopt performance measures for CII water use on or before June 30, 2022.*

(2) *Each urban retail water supplier shall implement the performance measures adopted by the board pursuant to paragraph (1).*

**10609.12.** *The standards for water loss for urban retail water suppliers shall be the standards adopted by the board pursuant to subdivision (i) of Section 10608.34.*

**10609.14.** (a) *The department, in coordination with the board, shall conduct necessary studies and investigations and, no later than October 1, 2021, recommend for adoption by the board in accordance with this chapter appropriate variances for unique uses that can have a material effect on an urban retail water supplier's urban water use objective.*

(b) *Appropriate variances may include, but are not limited to, allowances for the following:*

(1) *Significant use of evaporative coolers.*

(2) *Significant populations of horses and other livestock.*

(3) *Significant fluctuations in seasonal populations.*

(4) *Significant landscaped areas irrigated with recycled water having high levels of total dissolved solids.*

(5) *Significant use of water for soil compaction and dust control.*

(6) *Significant use of water to supplement ponds and lakes to sustain wildlife.*

(7) *Significant use of water to irrigate vegetation for fire protection.*

(8) *Significant use of water for commercial or noncommercial agricultural use.*

(c) *The department, in recommending variances for adoption by the board, shall also recommend a threshold of significance for each recommended variance.*

(d) *Before including any specific variance in calculating an urban retail water supplier's water use objective, the urban retail water supplier shall request and receive approval by the board for the inclusion of that variance.*

(e) *The board shall post on its Internet Web site all of the following:*

(1) *A list of all urban retail water suppliers with approved variances.*

(2) *The specific variance or variances approved for each urban retail water supplier.*



(3) *The data supporting approval of each variance.*

**10609.15.** *To help streamline water data reporting, the department and the board shall do all of the following:*

(a) *Identify urban water reporting requirements shared by both agencies, and post on each agency's Internet Web site how the data is used for planning, regulatory, or other purposes.*

(b) *Analyze opportunities for more efficient publication of urban water reporting requirements within each agency, and analyze how each agency can integrate various data sets in a publicly accessible location, identify priority actions, and implement priority actions identified in the analysis.*

(c) *Make appropriate data pertaining to the urban water reporting requirements that are collected by either agency available to the public according to the principles and requirements of the Open and Transparent Water Data Act (Part 4.9 (commencing with Section 12400)).*

**10609.16.** *The department, in coordination with the board, shall conduct necessary studies and investigations and recommend, no later than October 1, 2021, guidelines and methodologies for the board to adopt that identify how an urban retail water supplier calculates its urban water use objective. The guidelines and methodologies shall address, as necessary, all of the following:*

(a) *Determining the irrigable lands within the urban retail water supplier's service area.*

(b) *Updating and revising methodologies described pursuant to subparagraph (A) of paragraph (1) of subdivision (h) of Section 10608.20, as appropriate, including methodologies for calculating the population in an urban retail water supplier's service area.*

(c) *Using landscape area data provided by the department or alternative data.*

(d) *Incorporating precipitation data and climate data into estimates of a urban retail water supplier's outdoor irrigation budget for its urban water use objective.*

(e) *Estimating changes in outdoor landscape area and population, and calculating the urban water use objective, for years when updated landscape imagery is not available from the department.*

(f) *Determining acceptable levels of accuracy for the supporting data, the urban water use objective, and compliance with the urban water use objective.*

**10609.18.** *The department and the board shall solicit broad public participation from stakeholders and other interested persons in the development of the standards and the adoption of regulations pursuant to this chapter. The board shall hold at least one public meeting before taking any action on any standard or variance recommended by the department.*

**SEC. 8.** *Chapter 10 (commencing with Section 10609.40) is added to Part 2.55 of Division 6 of the Water Code, to read:*

**CHAPTER 10. Countywide Drought and Water Shortage Contingency Plans**

**10609.40.** *The Legislature finds and declares both of the following:*

(a) *Small water suppliers and rural communities are often not covered by established water shortage planning requirements. Currently, most counties do not address water shortages or do so minimally in their general plan or the local hazard mitigation plan.*

(b) *The state should provide guidance to improve drought planning for small water suppliers and rural communities.*

**10609.42.** (a) *No later than January 1, 2020, the department, in consultation with the board and other relevant state and local agencies and stakeholders, shall use available data to identify small water suppliers and rural communities that may be at risk of drought and water shortage vulnerability. The department shall notify counties and groundwater sustainability agencies of those suppliers or communities that may be at risk within its jurisdiction, and may make the information publicly accessible on its Internet Web site.*

(b) *The department shall, in consultation with the board, by January 1, 2020, propose to the Governor and the Legislature recommendations and guidance relating to the development and implementation of countywide drought and water shortage contingency plans to address the planning needs of small water suppliers and rural communities. The department shall recommend how these plans can be included in county local hazard*

*mitigation plans or otherwise integrated with complementary existing planning processes. The guidance from the department shall outline goals of the countywide drought and water shortage contingency plans and recommend components including, but not limited to, all of the following:*

*(1) Assessment of drought vulnerability.*

*(2) Actions to reduce drought vulnerability.*

*(3) Response, financing, and local communication and outreach planning efforts that may be implemented in times of drought.*

*(4) Data needs and reporting.*

*(5) Roles and responsibilities of interested parties and coordination with other relevant water management planning efforts.*

*(c) In formulating the proposal, the department shall utilize a public process involving state agencies, cities, counties, small communities, small water suppliers, and other stakeholders.*

**SEC. 9.** Section 10801 of the Water Code is amended to read:

**10801.** The Legislature finds and declares all of the following:

(a) The waters of the state are a limited and renewable resource.

(b) The California Constitution requires that water in the state be used in a reasonable and beneficial manner.

(c) The efficient use of agricultural water supplies is of great statewide concern.

(d) There is a great amount of reuse of delivered water, both inside and outside the water service areas of agricultural water suppliers.

(e) Significant noncrop beneficial uses are associated with agricultural water use, including the preservation and enhancement of fish and wildlife resources.

(f) Significant opportunities exist in some areas, through improved irrigation water management, to conserve water or to reduce the quantity of highly saline or toxic drainage water.

(g) Changes in water management practices should be carefully planned and implemented to minimize adverse effects on other beneficial uses currently being served.

(h) Agricultural water suppliers that receive water from the federal Central Valley Project are required by federal law to prepare and implement water conservation plans.

(i) Agricultural water users applying for a permit to appropriate water from the board are required to prepare and implement water conservation plans.

**SEC. 10.** Section 10802 of the Water Code is amended to read:

**10802.** The Legislature finds and declares that all of the following are the policies of the state:

(a) The efficient use of water shall be pursued actively to protect both the people of the state and the state's water resources.

(b) The efficient use of agricultural water supplies shall be an important criterion in public decisions with regard to water.

(c) Agricultural water suppliers shall be required to prepare water management plans to achieve greater efficiency in the use of water.

**SEC. 11.** Section 10814 of the Water Code is amended to read:

**10814.** "Person" has the same meaning as defined in Section 10614.

**SEC. 12.** Section 10817 of the Water Code is amended to read:

**10817.** "Water use efficiency" means the efficient management of water resources for beneficial uses, preventing waste, or accomplishing additional benefits with the same amount of water.

**SEC. 13.** Section 10820 of the Water Code is amended to read:

**10820.** (a) (1) Except as provided in paragraph (2), an agricultural water supplier shall prepare and adopt an agricultural water management plan in the manner set forth in this chapter on or before December 31, 2012, and shall update that plan on December 31, 2015.

(2) (A) The agricultural water management plan shall be updated on or before April 1, 2021, and thereafter on or before April 1 in the years ending in six and one. The plan shall satisfy the requirements of Section 10826.

(B) An agricultural water supplier shall submit its plan to the department no later than 30 days after the adoption of the plan. The plan shall be submitted electronically and shall include any standardized forms, tables, or displays specified by the department.

(b) (1) The department shall review each plan that is due pursuant to paragraph (2) of subdivision (a). The department may coordinate its review with the Department of Food and Agriculture and the board.

(2) The department shall notify an agricultural water supplier that it is not in compliance with this part if the department determines that actions are required to comply with the requirements of this part or if a supplier fails to update a plan as provided in paragraph (2) of subdivision (a). The department shall identify the specific deficiencies and the supplier shall have 120 days to remedy an identified deficiency. The department may provide additional time to remedy a deficiency if it finds that a supplier is making substantial progress toward remedying the deficiency. An agricultural water supplier that fails to submit corrective actions or a completed plan shall not be in compliance with this part.

(3) If the department has not received a plan or the department has determined that the plan submitted does not comply with the requirements of this part, and a revised plan has not been submitted, the department may undertake the following actions:

(A) Contract with a state academic institution or qualified entity to prepare or complete an agricultural water management plan on behalf of the supplier. The costs and expenses related to preparation or completion of a plan, including the costs of the contract and contract administration, shall be recoverable by the department from the supplier.

(B) If a supplier does not provide data necessary for the preparation or completion of a plan to the department or the contracting entity as determined by the department in accordance with subparagraph (A), the department may assess a fine of one thousand dollars (\$1,000) per day, not to exceed twenty-five thousand dollars (\$25,000), until data is made available.

(4) (A) A plan prepared or completed pursuant to paragraph (3) shall be deemed the adopted plan for the supplier.

(B) Any action to challenge or invalidate the adequacy of the plan prepared or completed pursuant to paragraph (3) shall be brought against the supplier for whom the plan was prepared.

(c) Every supplier that becomes an agricultural water supplier after December 31, 2012, shall prepare and adopt an agricultural water management plan within one year after the date it has become an agricultural water supplier.

(d) A water supplier that indirectly provides water to customers for agricultural purposes shall not prepare a plan pursuant to this part without the consent of each agricultural water supplier that directly provides that water to its customers.

**SEC. 14.** Section 10825 of the Water Code is amended to read:

**10825.** (a) It is the intent of the Legislature in enacting this part to allow levels of water management planning commensurate with the numbers of customers served and the volume of water supplied.

(b) This part does not require the implementation of water use efficiency programs or practices that are not locally cost effective.

**SEC. 15.** Section 10826 of the Water Code is amended to read:

**10826.** An agricultural water management plan shall be adopted in accordance with this chapter. The plan shall do all of the following:

(a) Describe the agricultural water supplier and the service area, including all of the following:

- (1) Size of the service area.
- (2) Location of the service area and its water management facilities.
- (3) Terrain and soils.
- (4) Climate.
- (5) Operating rules and regulations.
- (6) Water delivery measurements or calculations.
- (7) Water rate schedules and billing.
- (8) Water shortage allocation policies.

(b) Describe the quantity and quality of water resources of the agricultural water supplier, including all of the following:

- (1) Surface water supply.
- (2) Groundwater supply.
- (3) Other water supplies, including recycled water.
- (4) Source water quality monitoring practices.
- (5) Water uses within the agricultural water supplier's service area, including all of the following:
  - (A) Agricultural.
  - (B) Environmental.
  - (C) Recreational.
  - (D) Municipal and industrial.
  - (E) Groundwater recharge, including estimated flows from deep percolation from irrigation and seepage.

(c) Include an annual water budget based on the quantification of all inflow and outflow components for the service area of the agricultural water supplier. Components of inflow shall include surface inflow, groundwater pumping in the service area, and effective precipitation. Components of outflow shall include surface outflow, deep percolation, and evapotranspiration. An agricultural water supplier shall report the annual water budget on a water-year basis. The department shall provide tools and resources to assist agricultural water suppliers in developing and quantifying components necessary to develop a water budget.

(d) Include an analysis, based on available information, of the effect of climate change on future water supplies.

(e) Describe previous water management activities.

(f) Identify water management objectives based on the water budget to improve water system efficiency or to meet other water management objectives. The agricultural water supplier shall identify, prioritize, and implement actions to reduce water loss, improve water system management, and meet other water management objectives identified in the plan.

(g) Include in the plan information regarding efficient water management practices required pursuant to Section 10608.48.

(h) Quantify the efficiency of agricultural water use within the service area of the agricultural water supplier using the appropriate method or methods from among the four water use efficiency quantification methods developed by the department in the May 8, 2012, report to the Legislature entitled "A Proposed Methodology for

Quantifying the Efficiency of Agricultural Water Use." The agricultural water supplier shall account for all water uses, including crop water use, agronomic water use, environmental water use, and recoverable surface flows.

**SEC. 16.** Section 10826.2 is added to the Water Code, to read:

**10826.2.** As part of its agricultural water management plan, each agricultural water supplier shall develop a drought plan for periods of limited water supply describing the actions of the agricultural water supplier for drought preparedness and management of water supplies and allocations during drought conditions. The drought plan shall contain both of the following:

(a) Resilience planning, including all of the following:

(1) Data, indicators, and information needed to determine the water supply availability and levels of drought severity.

(2) Analyses and identification of potential vulnerability to drought.

(3) A description of the opportunities and constraints for improving drought resilience planning, including all of the following:

(A) The availability of new technology or information.

(B) The ability of the agricultural water supplier to obtain or use additional water supplies during drought conditions.

(C) A description of other actions planned for implementation to improve drought resilience.

(b) Drought response planning, including all of the following:

(1) Policies and a process for declaring a water shortage and for implementing water shortage allocations and related response actions.

(2) Methods and procedures for the enforcement or appeal of, or exemption from, triggered shortage response actions.

(3) Methods and procedures for monitoring and evaluation of the effectiveness of the drought plan.

(4) Communication protocols and procedures to inform and coordinate customers, the public, interested parties, and local, regional, and state government.

(5) A description of the potential impacts on the revenues, financial condition, and planned expenditures of the agricultural water supplier during drought conditions that reduce water allocations, and proposed measures to overcome those impacts, including reserve-level policies.

**SEC. 17.** Section 10843 of the Water Code is amended to read:

**10843.** (a) An agricultural water supplier shall submit to the entities identified in subdivision (b) a copy of its plan no later than 30 days after review of the plan pursuant to subdivision (b) of Section 10820.

(b) An agricultural water supplier shall submit a copy of its plan to each of the following entities:

(1) The department.

(2) Any city, county, or city and county within which the agricultural water supplier provides water supplies.

(3) Any groundwater management entity within which jurisdiction the agricultural water supplier extracts or provides water supplies.

(4) The California State Library.

**SEC. 18.** Section 10845 of the Water Code is amended to read:

**10845.** (a) The department shall prepare and submit to the Legislature, on or before April 30, 2022, and thereafter in the years ending in seven and years ending in two, a report summarizing the status of the plans adopted pursuant to this part.

(b) The report prepared by the department shall identify the outstanding elements of any plan adopted pursuant to this part. The report shall include an evaluation of the effectiveness of this part in promoting efficient agricultural water management practices and recommendations relating to proposed changes to this part, as appropriate.

(c) The department shall provide a copy of the report to each agricultural water supplier that has submitted its plan to the department. The department shall also prepare reports and provide data for any legislative hearing designed to consider the effectiveness of plans submitted pursuant to this part.

(d) This section does not authorize the department, in preparing the report, to approve, disapprove, or critique individual plans submitted pursuant to this part.

**SEC. 19.** Section 10910 of the Water Code is amended to read:

**10910.** (a) Any city or county that determines that a project, as defined in Section 10912, is subject to the California Environmental Quality Act (Division 13 (commencing with Section 21000) of the Public Resources Code) under Section 21080 of the Public Resources Code shall comply with this part.

(b) The city or county, at the time that it determines whether an environmental impact report, a negative declaration, or a mitigated negative declaration is required for any project subject to the California Environmental Quality Act pursuant to Section 21080.1 of the Public Resources Code, shall identify any water system whose service area includes the project site and any water system adjacent to the project site that is, or may become as a result of supplying water to the project identified pursuant to this subdivision, a public water system, as defined in Section 10912, that may supply water for the project. If the city or county is not able to identify any public water system that may supply water for the project, the city or county shall prepare the water assessment required by this part after consulting with any entity serving domestic water supplies whose service area includes the project site, the local agency formation commission, and any public water system adjacent to the project site.

(c) (1) The city or county, at the time it makes the determination required under Section 21080.1 of the Public Resources Code, shall request each public water system identified pursuant to subdivision (b) to determine whether the projected water demand associated with a proposed project was included as part of the most recently adopted urban water management plan adopted pursuant to Part 2.6 (commencing with Section 10610).

(2) If the projected water demand associated with the proposed project was accounted for in the most recently adopted urban water management plan, the public water system may incorporate the requested information from the urban water management plan in preparing the elements of the assessment required to comply with subdivisions (d), (e), (f), and (g).

(3) If the projected water demand associated with the proposed project was not accounted for in the most recently adopted urban water management plan, or the public water system has no urban water management plan, the water supply assessment for the project shall include a discussion with regard to whether the public water system's total projected water supplies available during normal, single dry, and multiple dry water years during a 20-year projection will meet the projected water demand associated with the proposed project, in addition to the public water system's existing and planned future uses, including agricultural and manufacturing uses.

(4) If the city or county is required to comply with this part pursuant to subdivision (b), the water supply assessment for the project shall include a discussion with regard to whether the total projected water supplies, determined to be available by the city or county for the project during normal, single dry, and multiple dry water years during a 20-year projection, will meet the projected water demand associated with the proposed project, in addition to existing and planned future uses, including agricultural and manufacturing uses.

(d) (1) The assessment required by this section shall include an identification of any existing water supply entitlements, water rights, or water service contracts relevant to the identified water supply for the proposed project, and a description of the quantities of water received in prior years by the public water system, or the city or county if either is required to comply with this part pursuant to subdivision (b), under the existing water supply entitlements, water rights, or water service contracts.

(2) An identification of existing water supply entitlements, water rights, or water service contracts held by the public water system, or the city or county if either is required to comply with this part pursuant to subdivision (b), shall be demonstrated by providing information related to all of the following:

- (A) Written contracts or other proof of entitlement to an identified water supply.
- (B) Copies of a capital outlay program for financing the delivery of a water supply that has been adopted by the public water system.
- (C) Federal, state, and local permits for construction of necessary infrastructure associated with delivering the water supply.
- (D) Any necessary regulatory approvals that are required in order to be able to convey or deliver the water supply.
- (e) If no water has been received in prior years by the public water system, or the city or county if either is required to comply with this part pursuant to subdivision (b), under the existing water supply entitlements, water rights, or water service contracts, the public water system, or the city or county if either is required to comply with this part pursuant to subdivision (b), shall also include in its water supply assessment pursuant to subdivision (c), an identification of the other public water systems or water service contractholders that receive a water supply or have existing water supply entitlements, water rights, or water service contracts, to the same source of water as the public water system, or the city or county if either is required to comply with this part pursuant to subdivision (b), has identified as a source of water supply within its water supply assessments.
- (f) If a water supply for a proposed project includes groundwater, the following additional information shall be included in the water supply assessment:
- (1) A review of any information contained in the urban water management plan relevant to the identified water supply for the proposed project.
- (2) (A) A description of any groundwater basin or basins from which the proposed project will be supplied.
- (B) For those basins for which a court or the board has adjudicated the rights to pump groundwater, a copy of the order or decree adopted by the court or the board and a description of the amount of groundwater the public water system, or the city or county if either is required to comply with this part pursuant to subdivision (b), has the legal right to pump under the order or decree.
- (C) For a basin that has not been adjudicated that is a basin designated as high- or medium-priority pursuant to Section 10722.4, information regarding the following:
- (i) Whether the department has identified the basin as being subject to critical conditions of overdraft pursuant to Section 12924.
- (ii) If a groundwater sustainability agency has adopted a groundwater sustainability plan or has an approved alternative, a copy of that alternative or plan.
- (D) For a basin that has not been adjudicated that is a basin designated as low- or very low priority pursuant to Section 10722.4, information as to whether the department has identified the basin or basins as overdrafted or has projected that the basin will become overdrafted if present management conditions continue, in the most current bulletin of the department that characterizes the condition of the groundwater basin, and a detailed description by the public water system, or the city or county if either is required to comply with this part pursuant to subdivision (b), of the efforts being undertaken in the basin or basins to eliminate the long-term overdraft condition.
- (3) A detailed description and analysis of the amount and location of groundwater pumped by the public water system, or the city or county if either is required to comply with this part pursuant to subdivision (b), for the past five years from any groundwater basin from which the proposed project will be supplied. The description and analysis shall be based on information that is reasonably available, including, but not limited to, historic use records.
- (4) A detailed description and analysis of the amount and location of groundwater that is projected to be pumped by the public water system, or the city or county if either is required to comply with this part pursuant to subdivision (b), from any basin from which the proposed project will be supplied. The description and analysis shall be based on information that is reasonably available, including, but not limited to, historic use records.
- (5) An analysis of the sufficiency of the groundwater from the basin or basins from which the proposed project will be supplied to meet the projected water demand associated with the proposed project. A water supply assessment shall not be required to include the information required by this paragraph if the public water system

determines, as part of the review required by paragraph (1), that the sufficiency of groundwater necessary to meet the initial and projected water demand associated with the project was addressed in the description and analysis required by subparagraph (D) of paragraph (4) of subdivision (b) of Section 10631.

(g) (1) Subject to paragraph (2), the governing body of each public water system shall submit the assessment to the city or county not later than 90 days from the date on which the request was received. The governing body of each public water system, or the city or county if either is required to comply with this act pursuant to subdivision (b), shall approve the assessment prepared pursuant to this section at a regular or special meeting.

(2) Prior to the expiration of the 90-day period, if the public water system intends to request an extension of time to prepare and adopt the assessment, the public water system shall meet with the city or county to request an extension of time, which shall not exceed 30 days, to prepare and adopt the assessment.

(3) If the public water system fails to request an extension of time, or fails to submit the assessment notwithstanding the extension of time granted pursuant to paragraph (2), the city or county may seek a writ of mandamus to compel the governing body of the public water system to comply with the requirements of this part relating to the submission of the water supply assessment.

(h) Notwithstanding any other provision of this part, if a project has been the subject of a water supply assessment that complies with the requirements of this part, no additional water supply assessment shall be required for subsequent projects that were part of a larger project for which a water supply assessment was completed and that has complied with the requirements of this part and for which the public water system, or the city or county if either is required to comply with this part pursuant to subdivision (b), has concluded that its water supplies are sufficient to meet the projected water demand associated with the proposed project, in addition to the existing and planned future uses, including, but not limited to, agricultural and industrial uses, unless one or more of the following changes occurs:

(1) Changes in the project that result in a substantial increase in water demand for the project.

(2) Changes in the circumstances or conditions substantially affecting the ability of the public water system, or the city or county if either is required to comply with this part pursuant to subdivision (b), to provide a sufficient supply of water for the project.

(3) Significant new information becomes available that was not known and could not have been known at the time when the assessment was prepared.

(i) For the purposes of this section, hauled water is not considered as a source of water.

***SEC. 20. This act shall become operative only if Senate Bill 606 of the 2017–18 Regular Session is enacted and becomes effective.***



[Home](#)[Bill Information](#)[California Law](#)[Publications](#)[Other Resources](#)[My Subscriptions](#)[My Favorites](#)**SB-606 Water management planning.** (2017-2018)**As Amends the Law Today****[As Amends the Law on Nov 08, 2018](#)****SECTION 1.** Section 350 of the Water Code is amended to read:

**350.** The governing body of a distributor of a public water supply, whether publicly or privately owned and including a mutual water company, shall declare a water shortage emergency condition to prevail within the area served by such distributor whenever it finds and determines that the ordinary demands and requirements of water consumers cannot be satisfied without depleting the water supply of the distributor to the extent that there would be insufficient water for human consumption, sanitation, and fire protection.

**SEC. 2.** Section 377 of the Water Code is amended to read:

**377.** (a) From and after the publication or posting of any ordinance or resolution pursuant to Section 376, a violation of a requirement of a water conservation program adopted pursuant to Section 376 is a misdemeanor. A person convicted under this subdivision shall be punished by imprisonment in the county jail for not more than 30 days, or by a fine not exceeding one thousand dollars (\$1,000), or by both.

(b) A court or public entity may hold a person civilly liable in an amount not to exceed ten thousand dollars (\$10,000) for a violation of any of the following:

(1) An ordinance or resolution adopted pursuant to Section 376.

(2) A regulation adopted by the board under Section 1058.5 or Chapter 9 (commencing with Section 10609) of Part 2.55 of Division 6, unless the board regulation provides that it cannot be enforced under this section or provides for a lesser applicable maximum penalty.

(c) Commencing on the 31st day after the public entity notified a person of a violation described in subdivision (b), the person additionally may be civilly liable in an amount not to exceed ten thousand dollars (\$10,000) plus five hundred dollars (\$500) for each additional day on which the violation continues.

(d) Remedies prescribed in this section are cumulative and not alternative, except that no liability shall be recoverable under this section for any violation of paragraph (2) of subdivision (b) if the board has filed a complaint pursuant to Section 1846 alleging the same violation.

(e) A public entity may administratively impose the civil liability described in subdivisions (b) and (c) after providing notice and an opportunity for a hearing. The public entity shall initiate a proceeding under this subdivision by a complaint issued pursuant to Section 377.5. The public entity shall issue the complaint at least 30 days before the hearing on the complaint and the complaint shall state the basis for the proposed civil liability order.

(f) (1) In determining the amount of civil liability to assess, a court or public entity shall take into consideration all relevant circumstances, including, but not limited to, the nature and persistence of the violation, the extent of the harm caused by the violation, the length of time over which the violation occurs, and any corrective action taken by the violator.

(2) The civil liability calculated pursuant to paragraph (1) for the first violation of subdivision (b) by a residential water user shall not exceed one thousand dollars (\$1,000) except in extraordinary situations where the court or public entity finds all of the following:

(A) The residential user had actual notice of the requirement found to be violated.

(B) The conduct was intentional.

(C) The amount of water involved was substantial.

(g) Civil liability imposed pursuant to this section shall be paid to the public entity and expended solely for the purposes of this chapter.

(h) An order setting administrative civil liability shall become effective and final upon issuance of the order and payment shall be made. Judicial review of any final order shall be pursuant to Section 1094.5 of the Code of Civil Procedure.

(i) In addition to the remedies prescribed in this section, a public entity may enforce water use limitations established by an ordinance or resolution adopted pursuant to this chapter, or as otherwise authorized by law, by a volumetric penalty in an amount established by the public entity.

**SEC. 3.** Section 1058.5 of the Water Code is amended to read:

**1058.5.** (a) This section applies to any emergency regulation adopted by the board for which the board makes both of the following findings:

(1) The emergency regulation is adopted to prevent the waste, unreasonable use, unreasonable method of use, or unreasonable method of diversion, of water, to promote water recycling or water conservation, to require curtailment of diversions when water is not available under the diverter's priority of right, or in furtherance of any of the foregoing, to require reporting of diversion or use or the preparation of monitoring reports.

(2) The emergency regulation is adopted in response to conditions which exist, or are threatened, in a critically dry year immediately preceded by two or more consecutive below normal, dry, or critically dry years or during a period for which the Governor has issued a proclamation 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.

(b) Notwithstanding Sections 11346.1 and 11349.6 of the Government Code, any findings of emergency adopted by the board, in connection with the adoption of an emergency regulation under this section, are not subject to review by the Office of Administrative Law.

(c) An emergency regulation adopted by the board under this section may remain in effect for up to one year, as determined by the board, and is deemed repealed immediately upon a finding by the board that due to changed conditions it is no longer necessary for the regulation to remain in effect. An emergency regulation adopted by the board under this section may be renewed if the board determines that the conditions specified in paragraph (2) of subdivision (a) are still in effect.

(d) In addition to any other applicable civil or criminal penalties, any person or entity ~~that~~ *who* violates a regulation adopted by the board pursuant to this section is guilty of an infraction punishable by a fine of up to five hundred dollars (\$500) for each day in which the violation occurs.

(e) (1) Notwithstanding subdivision (b) of Section 1551 or subdivision (e) of Section 1848, a civil liability imposed under Chapter 12 (commencing with Section 1825) of Part 2 of Division 2 by the board or a court for a violation of an emergency conservation regulation adopted pursuant to this section shall be deposited, and separately accounted for, in the Water Rights Fund. Funds deposited in accordance with this subdivision shall be available, upon appropriation, for water conservation activities and programs.

(2) For purposes of this subdivision, an "emergency conservation regulation" means an emergency regulation that requires an end user of water, a water retailer, or a water wholesaler to conserve water or report to the board on water conservation. Water conservation includes restrictions or limitations on particular uses of water or a reduction in the amount of water used or served, but does not include curtailment of diversions when water is not available under the diverter's priority of right or reporting requirements related to curtailments.

**SEC. 4.** Section 1120 of the Water Code is amended to read:

**1120.** This chapter applies to any decision or order issued under this part or Section 275, Part 2 (commencing with Section 1200), Part 2 (commencing with Section 10500) of Division 6, Part 2.55 (commencing with Section 10608) of Division 6, or Chapter 11 (commencing with Section 10735) of Part 2.74 of Division 6, Article 7 (commencing with Section 13550) of Chapter 7 of Division 7, or the public trust doctrine.

**SEC. 5.** Section 10608.12 of the Water Code is amended to read:

**10608.12.** Unless the context otherwise requires, the following definitions govern the construction of this part:

(a) "Agricultural water supplier" means a water supplier, either publicly or privately owned, providing water to 10,000 or more irrigated acres, excluding recycled water. "Agricultural water supplier" includes a supplier or contractor for water, regardless of the basis of right, that distributes or sells water for ultimate resale to customers. "Agricultural water supplier" does not include the department.

(b) "Base daily per capita water use" means any of the following:

(1) The urban retail water supplier's estimate of its average gross water use, reported in gallons per capita per day and calculated over a continuous 10-year period ending no earlier than December 31, 2004, and no later than December 31, 2010.

(2) For an urban retail water supplier that meets at least 10 percent of its 2008 measured retail water demand through recycled water that is delivered within the service area of an urban retail water supplier or its urban wholesale water supplier, the urban retail water supplier may extend the calculation described in paragraph (1) up to an additional five years to a maximum of a continuous 15-year period ending no earlier than December 31, 2004, and no later than December 31, 2010.

(3) For the purposes of Section 10608.22, the urban retail water supplier's estimate of its average gross water use, reported in gallons per capita per day and calculated over a continuous five-year period ending no earlier than December 31, 2007, and no later than December 31, 2010.

(c) "Baseline commercial, industrial, and institutional water use" means an urban retail water supplier's base daily per capita water use for commercial, industrial, and institutional users.

(d) "CII water use" means water used by commercial water users, industrial water users, institutional water users, and large landscape water users.

(e) "Commercial water user" means a water user that provides or distributes a product or service.

(f) "Compliance daily per capita water use" means the gross water use during the final year of the reporting period, reported in gallons per capita per day.

(g) "Disadvantaged community" means a community with an annual median household income that is less than 80 percent of the statewide annual median household income.

(h) "Gross water use" means the total volume of water, whether treated or untreated, entering the distribution system of an urban retail water supplier, excluding all of the following:

(1) Recycled water that is delivered within the service area of an urban retail water supplier or its urban wholesale water supplier.

(2) The net volume of water that the urban retail water supplier places into long-term storage.

(3) The volume of water the urban retail water supplier conveys for use by another urban water supplier.

(4) The volume of water delivered for agricultural use, except as otherwise provided in subdivision (f) of Section 10608.24.

(i) "Industrial water user" means a water user that is primarily a manufacturer or processor of materials as defined by the North American Industry Classification System code sectors 31 to 33, inclusive, or an entity that is a water user primarily engaged in research and development.

(j) "Institutional water user" means 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.

(k) "Interim urban water use target" means the midpoint between the urban retail water supplier's base daily per capita water use and the urban retail water supplier's urban water use target for 2020.

(l) "Large landscape" means a nonresidential landscape as described in the performance measures for CII water use adopted pursuant to Section 10609.10.

(m) "Locally cost effective" means that the present value of the local benefits of implementing an agricultural efficiency water management practice is greater than or equal to the present value of the local cost of implementing that measure.

(n) "Performance measures" means actions to be taken by urban retail water suppliers that will result in increased water use efficiency by CII water users. Performance measures may include, but are not limited to, educating CII water users on best management practices, conducting water use audits, and preparing water management plans. Performance measures do not include process water.

(o) "Potable reuse" means direct potable reuse, indirect potable reuse for groundwater recharge, and reservoir water augmentation as those terms are defined in Section 13561.

(p) "Process water" means water used by industrial water users for producing a product or product content or water used for research and development. Process water includes, but is not limited to, continuous manufacturing processes, and water used for testing, cleaning, and maintaining equipment. Water used to cool machinery or buildings used in the manufacturing process or necessary to maintain product quality or chemical characteristics for product manufacturing or control rooms, data centers, laboratories, clean rooms, and other industrial facility units that are integral to the manufacturing or research and development process is process water. Water used in the manufacturing process that is necessary for complying with local, state, and federal health and safety laws, and is not incidental water, is process water. Process water does not mean incidental water uses.

(q) "Recycled water" means recycled water, as defined in subdivision (n) of Section 13050.

(r) "Regional water resources management" means sources of supply resulting from watershed-based planning for sustainable local water reliability or any of the following alternative sources of water:

(1) The capture and reuse of stormwater or rainwater.

(2) The use of recycled water.

(3) The desalination of brackish groundwater.

(4) The conjunctive use of surface water and groundwater in a manner that is consistent with the safe yield of the groundwater basin.

(s) "Reporting period" means the years for which an urban retail water supplier reports compliance with the urban water use targets.

(t) "Urban retail water supplier" means a water supplier, either publicly or privately owned, that directly provides potable municipal water to more than 3,000 end users or that supplies more than 3,000 acre-feet of potable water annually at retail for municipal purposes.

(u) "Urban water use objective" means an estimate of aggregate efficient water use for the previous year based on adopted water use efficiency standards and local service area characteristics for that year, as described in Section 10609.20.

(v) "Urban water use target" means the urban retail water supplier's targeted future daily per capita water use.

(w) "Urban wholesale water ~~supplier~~ supplier," means a water supplier, either publicly or privately owned, that provides more than 3,000 acre-feet of water annually at wholesale for potable municipal purposes.

**SEC. 6.** Section 10608.20 of the Water Code is amended to read:

**10608.20.** (a) (1) Each urban retail water supplier shall develop urban water use targets and an interim urban water use target by July 1, 2011. Urban retail water suppliers may elect to determine and report progress toward achieving these targets on an individual or regional basis, as provided in subdivision (a) of Section 10608.28, and may determine the targets on a fiscal year or calendar year basis.

(2) It is the intent of the Legislature that the urban water use targets described in paragraph (1) cumulatively result in a 20-percent reduction from the baseline daily per capita water use by December 31, 2020.

(b) An urban retail water supplier shall adopt one of the following methods for determining its urban water use target pursuant to subdivision (a):

- (1) Eighty percent of the urban retail water supplier's baseline per capita daily water use.
- (2) The per capita daily water use that is estimated using the sum of the following performance standards:
  - (A) For indoor residential water use, 55 gallons per capita daily water use as a provisional standard. Upon completion of the department's ~~2017~~ 2016 report to the Legislature pursuant to Section 10608.42, this standard may be adjusted by the Legislature by statute.
  - (B) For landscape irrigated through dedicated or residential meters or connections, water efficiency equivalent to the standards of the Model Water Efficient Landscape Ordinance set forth in Chapter 2.7 (commencing with Section 490) of Division 2 of Title 23 of the California Code of Regulations, as in effect the later of the year of the landscape's installation or 1992. An urban retail water supplier using the approach specified in this subparagraph shall use satellite imagery, site visits, or other best available technology to develop an accurate estimate of landscaped areas.
  - (C) For commercial, industrial, and institutional uses, a 10-percent reduction in water use from the baseline commercial, industrial, and institutional water use by 2020.
- (3) Ninety-five percent of the applicable state hydrologic region target, as set forth in the state's draft 20x2020 Water Conservation Plan (dated April 30, 2009). If the service area of an urban water supplier includes more than one hydrologic region, the supplier shall apportion its service area to each region based on population or area.
- (4) A method that shall be identified and developed by the department, through a public process, and reported to the Legislature no later than December 31, 2010. The method developed by the department shall identify per capita targets that cumulatively result in a statewide 20-percent reduction in urban daily per capita water use by December 31, 2020. In developing urban daily per capita water use targets, the department shall do all of the following:
  - (A) Consider climatic differences within the state.
  - (B) Consider population density differences within the state.
  - (C) Provide flexibility to communities and regions in meeting the targets.
  - (D) Consider different levels of per capita water use according to plant water needs in different regions.
  - (E) Consider different levels of commercial, industrial, and institutional water use in different regions of the state.
  - (F) Avoid placing an undue hardship on communities that have implemented conservation measures or taken actions to keep per capita water use low.
- (c) If the department adopts a regulation pursuant to paragraph (4) of subdivision (b) that results in a requirement that an urban retail water supplier achieve a reduction in daily per capita water use that is greater than 20 percent by December 31, 2020, an urban retail water supplier that adopted the method described in paragraph (4) of subdivision (b) may limit its urban water use target to a reduction of not more than 20 percent by December 31, 2020, by adopting the method described in paragraph (1) of subdivision (b).
- (d) The department shall update the method described in paragraph (4) of subdivision (b) and report to the Legislature by December 31, 2014. An urban retail water supplier that adopted the method described in paragraph (4) of subdivision (b) may adopt a new urban daily per capita water use target pursuant to this updated method.
- (e) An urban retail water supplier shall include in its urban water management plan due in 2010 pursuant to Part 2.6 (commencing with Section 10610) the 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.
- (f) When calculating per capita values for the purposes of this chapter, an urban retail water supplier shall determine population using federal, state, and local population reports and projections.
- (g) An urban retail water supplier may update its 2020 urban water use target in its 2015 urban water management plan required pursuant to Part 2.6 (commencing with Section 10610).

(h) (1) The department, through a public process and in consultation with the California Urban Water Conservation Council, shall develop technical methodologies and criteria for the consistent implementation of this part, including, but not limited to, both of the following:

(A) Methodologies for calculating base daily per capita water use, baseline commercial, industrial, and institutional water use, compliance daily per capita water use, gross water use, service area population, indoor residential water use, and landscaped area water use.

(B) Criteria for adjustments pursuant to subdivisions (d) and (e) of Section 10608.24.

(2) The department shall post the methodologies and criteria developed pursuant to this subdivision on its ~~internet website,~~ *Internet Web site*, and make written copies available, by October 1, 2010. An urban retail water supplier shall use the methods developed by the department in compliance with this part.

(i) (1) The department shall adopt regulations for implementation of the provisions relating to process water in accordance with Section 10608.12, subdivision (e) of Section 10608.24, and subdivision (d) of Section 10608.26.

(2) The initial adoption of a regulation authorized by this subdivision is deemed to address an emergency, for purposes of Sections 11346.1 and 11349.6 of the Government Code, and the department is hereby exempted for that purpose from the requirements of subdivision (b) of Section 11346.1 of the Government Code. After the initial adoption of an emergency regulation pursuant to this subdivision, the department shall not request approval from the Office of Administrative Law to readopt the regulation as an emergency regulation pursuant to Section 11346.1 of the Government Code.

(j) (1) An urban retail water supplier is granted an extension to July 1, 2011, for adoption of an urban water management plan pursuant to Part 2.6 (commencing with Section 10610) due in 2010 to allow the use of technical methodologies developed by the department pursuant to paragraph (4) of subdivision (b) and subdivision (h). An urban retail water supplier that adopts an urban water management plan due in 2010 that does not use the methodologies developed by the department pursuant to subdivision (h) shall amend the plan by July 1, 2011, to comply with this part.

(2) An urban wholesale water supplier whose urban water management plan prepared pursuant to Part 2.6 (commencing with Section 10610) was due and not submitted in 2010 is granted an extension to July 1, 2011, to permit coordination between an urban wholesale water supplier and urban retail water suppliers.

**SEC. 7.** *Section 10608.35 is added to the Water Code, to read:*

**10608.35.** *(a) The department, in coordination with the board, shall conduct necessary studies and investigations and make a recommendation to the Legislature, by January 1, 2020, on the feasibility of developing and enacting water loss reporting requirements for urban wholesale water suppliers.*

*(b) The studies and investigations shall include an evaluation of the suitability of applying the processes and requirements of Section 10608.34 to urban wholesale water suppliers.*

*(c) In conducting necessary studies and investigations and developing its recommendation, the department shall solicit broad public participation from stakeholders and other interested persons.*

**SEC. 8.** *Section 10609.20 is added to the Water Code, immediately following Section 10609.18, to read:*

**10609.20.** *(a) Each urban retail water supplier shall calculate its urban water use objective no later than November 1, 2023, and by November 1 every year thereafter.*

*(b) The calculation shall be based on the urban retail water supplier's water use conditions for the previous calendar or fiscal year.*

*(c) Each urban water supplier's urban water use objective shall be composed of the sum of the following:*

*(1) Aggregate estimated efficient indoor residential water use.*

*(2) Aggregate estimated efficient outdoor residential water use.*

*(3) Aggregate estimated efficient outdoor irrigation of landscape areas with dedicated irrigation meters or equivalent technology in connection with CII water use.*

(4) Aggregate estimated efficient water losses.

(5) Aggregate estimated water use in accordance with variances, as appropriate.

(d) (1) An urban retail water supplier that delivers water from a groundwater basin, reservoir, or other source that is augmented by potable reuse water may adjust its urban water use objective by a bonus incentive calculated pursuant to this subdivision.

(2) The water use objective bonus incentive shall be the volume of its potable reuse delivered to residential water users and to landscape areas with dedicated irrigation meters in connection with CII water use, on an acre-foot basis.

(3) The bonus incentive pursuant to paragraph (1) shall be limited in accordance with one of the following:

(A) The bonus incentive shall not exceed 15 percent of the urban water supplier's water use objective for any potable reuse water produced at an existing facility.

(B) The bonus incentive shall not exceed 10 percent of the urban water supplier's water use objective for any potable reuse water produced at any facility that is not an existing facility.

(4) For purposes of this subdivision, "existing facility" means a facility that meets all of the following:

(A) The facility has a certified environmental impact report, mitigated negative declaration, or negative declaration on or before January 1, 2019.

(B) The facility begins producing and delivering potable reuse water on or before January 1, 2022.

(C) The facility uses microfiltration and reverse osmosis technologies to produce the potable reuse water.

(e) (1) The calculation of the urban water use objective shall be made using landscape area and other data provided by the department and pursuant to the standards, guidelines, and methodologies adopted by the board. The department shall provide data to the urban water supplier at a level of detail sufficient to allow the urban water supplier to verify its accuracy at the parcel level.

(2) Notwithstanding paragraph (1), an urban retail water supplier may use alternative data in calculating the urban water use objective if the supplier demonstrates to the department that the alternative data are equivalent, or superior, in quality and accuracy to the data provided by the department. The department may provide technical assistance to an urban retail water supplier in evaluating whether the alternative data are appropriate for use in calculating the supplier's urban water use objective.

**SEC. 9.** Section 10609.22 is added to the Water Code, to read:

**10609.22.** (a) An urban retail water supplier shall calculate its actual urban water use no later than November 1, 2023, and by November 1 every year thereafter.

(b) The calculation shall be based on the urban retail water supplier's water use for the previous calendar or fiscal year.

(c) Each urban water supplier's urban water use shall be composed of the sum of the following:

(1) Aggregate residential water use.

(2) Aggregate outdoor irrigation of landscape areas with dedicated irrigation meters in connection with CII water use.

(3) Aggregate water losses.

**SEC. 10.** Section 10609.24 is added to the Water Code, to read:

**10609.24.** (a) An urban retail water supplier shall submit a report to the department no later than November 1, 2023, and by November 1 every year thereafter. The report shall include all of the following:

(1) The urban water use objective calculated pursuant to Section 10609.20 along with relevant supporting data.

(2) The actual urban water use calculated pursuant to Section 10609.22 along with relevant supporting data.

(3) Documentation of the implementation of the performance measures for CII water use.

*(4) A description of the progress made towards meeting the urban water use objective.*

*(b) The department shall post the reports and information on its Internet Web site.*

*(c) The board may issue an information order or conservation order to, or impose civil liability on, an entity or individual for failure to submit a report required by this section.*

**SEC. 11.** *Section 10609.26 is added to the Water Code, to read:*

**10609.26.** *(a) (1) On and after November 1, 2023, the board may issue informational orders pertaining to water production, water use, and water conservation to an urban retail water supplier that does not meet its urban water use objective required by this chapter. Informational orders are intended to obtain information on supplier activities, water production, and conservation efforts in order to identify technical assistance needs and assist urban water suppliers in meeting their urban water use objectives.*

*(2) In determining whether to issue an informational order, the board shall consider the degree to which the urban retail water supplier is not meeting its urban water use objective, information provided in the report required by Section 10609.24, and actions the urban retail water supplier has implemented or will implement in order to help meet the urban water use objective.*

*(3) The board shall share information received pursuant to this subdivision with the department.*

*(4) An urban water supplier may request technical assistance from the department. The technical assistance may, to the extent available, include guidance documents, tools, and data.*

*(b) On and after November 1, 2024, the board may issue a written notice to an urban retail water supplier that does not meet its urban water use objective required by this chapter. The written notice may warn the urban retail water supplier that it is not meeting its urban water use objective described in Section 10609.20 and is not making adequate progress in meeting the urban water use objective, and may request that the urban retail water supplier address areas of concern in its next annual report required by Section 10609.24. In deciding whether to issue a written notice, the board may consider whether the urban retail water supplier has received an informational order, the degree to which the urban retail water supplier is not meeting its urban water use objective, information provided in the report required by Section 10609.24, and actions the urban retail water supplier has implemented or will implement in order to help meet its urban water use objective.*

*(c) (1) On and after November 1, 2025, the board may issue a conservation order to an urban retail water supplier that does not meet its urban water use objective. A conservation order may consist of, but is not limited to, referral to the department for technical assistance, requirements for education and outreach, requirements for local enforcement, and other efforts to assist urban retail water suppliers in meeting their urban water use objective.*

*(2) In issuing a conservation order, the board shall identify specific deficiencies in an urban retail water supplier's progress towards meeting its urban water use objective, and identify specific actions to address the deficiencies.*

*(3) The board may request that the department provide an urban retail water supplier with technical assistance to support the urban retail water supplier's actions to remedy the deficiencies.*

*(d) A conservation order issued in accordance with this chapter may include requiring actions intended to increase water-use efficiency, but shall not curtail or otherwise limit the exercise of a water right, nor shall it require the imposition of civil liability pursuant to Section 377.*

**SEC. 12.** *Section 10609.28 is added to the Water Code, to read:*

**10609.28.** *The board may issue a regulation or informational order requiring a wholesale water supplier, an urban retail water supplier, or a distributor of a public water supply, as that term is used in Section 350, to provide a monthly report relating to water production, water use, or water conservation.*

**SEC. 13.** *Section 10609.30 is added to the Water Code, to read:*

**10609.30.** *On or before January 10, 2024, the Legislative Analyst shall provide to the appropriate policy committees of both houses of the Legislature and the public a report evaluating the implementation of the water use efficiency standards and water use reporting pursuant to this chapter. The board and the department shall provide the Legislative Analyst with the available data to complete this report.*



*(a) The report shall describe all of the following:*

*(1) The rate at which urban retail water users are complying with the standards, and factors that might facilitate or impede their compliance.*

*(2) The accuracy of the data and estimates being used to calculate urban water use objectives.*

*(3) Indications of the economic impacts, if any, of the implementation of this chapter on urban water suppliers and urban water users, including CII water users.*

*(4) The frequency of use of the bonus incentive, the volume of water associated with the bonus incentive, value to urban water suppliers of the bonus incentive, and any implications of the use of the bonus incentive on water use efficiency.*

*(5) The early indications of how implementing this chapter might impact the efficiency of statewide urban water use.*

*(6) Recommendations, if any, for improving statewide urban water use efficiency and the standards and practices described in this chapter.*

*(7) Any other issues the Legislative Analyst deems appropriate.*

**SEC. 14.** *Section 10609.32 is added to the Water Code, to read:*

**10609.32.** *It is the intent of the Legislature that the chairperson of the board and the director of the department appear before the appropriate policy committees of both houses of the Legislature on or around January 1, 2026, and report on the implementation of the water use efficiency standards and water use reporting pursuant to this chapter. It is the intent of the Legislature that the topics to be covered include all of the following:*

*(a) The rate at which urban retail water suppliers are complying with the standards, and factors that might facilitate or impede their compliance.*

*(b) What enforcement actions have been taken, if any.*

*(c) The accuracy of the data and estimates being used to calculate urban water use objectives.*

*(d) Indications of the economic impacts, if any, of the implementation of this chapter on urban water suppliers and urban water users, including CII water users.*

*(e) The frequency of use of the bonus incentive, the volume of water associated with the bonus incentive, value to urban water suppliers of the bonus incentive, and any implications of the use of the bonus incentive on water use efficiency.*

*(f) An assessment of how implementing this chapter is affecting the efficiency of statewide urban water use.*

**SEC. 15.** *Section 10609.34 is added to the Water Code, to read:*

**10609.34.** *Notwithstanding Section 15300.2 of Title 14 of the California Code of Regulations, an action of the board taken under this chapter shall be deemed to be a Class 8 action, within the meaning of Section 15308 of Title 14 of the California Code of Regulations, provided that the action does not involve relaxation of existing water conservation or water use standards.*

**SEC. 16.** *Section 10609.36 is added to the Water Code, to read:*

**10609.36.** *(a) Nothing in this chapter shall be construed to determine or alter water rights. Sections 1010 and 1011 apply to water conserved through implementation of this chapter.*

*(b) Nothing in this chapter shall be construed to authorize the board to update or revise water use efficiency standards authorized by this chapter except as explicitly provided in this chapter. Authorization to update the standards beyond that explicitly provided in this chapter shall require separate legislation.*

*(c) Nothing in this chapter shall be construed to limit or otherwise affect the use of recycled water as seawater barriers for groundwater salinity management.*

**SEC. 17.** *Section 10609.38 is added to the Water Code, to read:*

**10609.38.** *The board may waive the requirements of this chapter for a period of up to five years for any urban retail water supplier whose water deliveries are significantly affected by changes in water use as a result of damage from a disaster such as an earthquake or fire. In establishing the period of a waiver, the board shall take into consideration the breadth of the damage and the time necessary for the damaged areas to recover from the disaster.*

**SEC. 18.** Section 10610.2 of the Water Code is amended to read:

**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.
- (b) This part is intended to provide assistance to water agencies in carrying out their long-term resource planning responsibilities to ensure adequate water supplies to meet existing and future demands for water.

**SEC. 19.** Section 10610.4 of the Water Code is amended to read:

**10610.4.** The Legislature finds and declares that it is the policy of the state as follows:

- (a) The management of urban water demands and efficient use of water shall be actively pursued to protect both the people of the state and their water resources.
- (b) The management of urban water demands and efficient use of urban water supplies shall be a guiding criterion in public decisions.
- (c) Urban water suppliers shall be required to develop water management plans to achieve the efficient use of available supplies and strengthen local drought planning.

**SEC. 20.** Section 10612 of the Water Code is amended and renumbered to read:

~~10642.~~ **10611.3.** ~~"Drought risk assessment"~~ *"Customer"* means a ~~method that examines water shortage risks based on the driest five-year historic sequence for the agency's water supply, as described in subdivision (b) of Section 10635.~~ *purchaser of water from a water supplier who uses the water for municipal purposes, including residential, commercial, governmental, and industrial uses.*

**SEC. 21.** Section 10612 is added to the Water Code, to read:

**10612.** "Drought risk assessment" means a method that examines water shortage risks based on the driest five-year historic sequence for the agency's water supply, as described in subdivision (b) of Section 10635.

**SEC. 22.** Section 10617.5 is added to the Water Code, to read:

**10617.5.** "Water shortage contingency plan" means a document that incorporates the provisions detailed in subdivision (a) of Section 10632 and is subsequently adopted by an urban water supplier pursuant to this article.

**SEC. 23.** Section 10618 is added to the Water Code, to read:

**10618.** "Water supply and demand assessment" means a method that looks at current year and one or more dry year supplies and demands for determining water shortage risks, as described in Section 10632.1.

**SEC. 24.** Section 10620 of the Water Code is amended to read:

**10620.** (a) Every urban water supplier shall prepare and adopt an urban water management plan in the manner set forth in Article 3 (commencing with Section 10640).

(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.

(c) An urban water supplier indirectly providing water shall not include planning elements in its water management plan as provided in Article 2 (commencing with Section 10630) that would be applicable to urban water suppliers or public agencies directly providing water, or to their customers, without the consent of those suppliers or public agencies.

(d) (1) An urban water supplier may satisfy the requirements of this part by participation in areawide, regional, watershed, or basinwide urban water management planning where those plans will reduce preparation costs and contribute to the achievement of conservation, efficient water use, and improved local drought resilience.

(2) Notwithstanding paragraph (1), each urban water supplier shall develop its own water shortage contingency plan, but an urban water supplier may incorporate, collaborate, and otherwise share information with other urban water suppliers or other governing entities participating in an areawide, regional, watershed, or basinwide urban water management plan, an agricultural management plan, or groundwater sustainability plan development.

(3) Each urban water supplier shall 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.

(e) The urban water supplier may prepare the plan with its own staff, by contract, or in cooperation with other governmental agencies.

(f) An urban water supplier shall describe in the plan water management tools and options used by that entity that will maximize resources and minimize the need to import water from other regions.

**SEC. 25.** Section 10621 of the Water Code is amended to read:

**10621.** (a) Each urban water supplier shall update its plan at least once every five years on or before July 1, in years ending in six and one, incorporating updated and new information from the five years preceding each update.

(b) Every urban water supplier required to prepare a plan pursuant to this part shall, at least 60 days before the public hearing on the plan required by Section 10642, notify any city or county within which the supplier provides water supplies that the urban water supplier will be reviewing the plan and considering amendments or changes to the plan. The urban water supplier may consult with, and obtain comments from, any city or county that receives notice pursuant to this subdivision.

(c) An urban water supplier regulated by the Public Utilities Commission shall include its most recent plan and water shortage contingency plan as part of the supplier's general rate case filings.

(d) The amendments to, or changes in, the plan shall be adopted and filed in the manner set forth in Article 3 (commencing with Section 10640).

(e) Each urban water supplier shall update and submit its 2015 plan to the department by July 1, 2016.

(f) (1) Each urban water supplier shall update and submit its 2020 plan to the department by July 1, 2021.

*(2) By January 1, 2024, each urban retail water supplier shall adopt and submit to the department a supplement to the adopted 2020 plan that includes information required pursuant to subparagraph (B) of paragraph (1) of subdivision (e) of Section 10631. This supplement is not an update or an amendment to the plan and, therefore, an urban water supplier is not required to comply with the public notice, hearing, and adoption requirements of Section 10642 before submitting the information to the department.*

**SEC. 26.** Section 10630 of the Water Code is amended to read:

**10630.** It is the intention of the Legislature, in enacting this part, to permit levels of water management planning commensurate with the numbers of customers served and the volume of water supplied, while accounting for impacts from climate change.

**SEC. 27.** *Section 10630.5 is added to the Water Code, to read:*

*10630.5. Each plan shall include a simple lay description of how much water the agency has on a reliable basis, how much it needs for the foreseeable future, what the agency's strategy is for meeting its water needs, the challenges facing the agency, and any other information necessary to provide a general understanding of the agency's plan.*

**SEC. 28.** Section 10631 of the Water Code is amended to read:

**10631.** A plan shall be adopted in accordance with this chapter that shall do all of the following:

(a) Describe the service area of the supplier, including current and projected population, climate, and other social, economic, and demographic factors affecting the supplier's water management planning. The projected population estimates shall be based upon data from the state, regional, or local service agency population projections within the service area of the urban water supplier and shall be in five-year increments to 20 years or as far as data is available. The description shall include the current and projected land uses within the existing or anticipated 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.

(b) Identify and quantify, to the extent practicable, the existing and planned sources of water available to the supplier over the same five-year increments described in subdivision (a), providing supporting and related information, including all of the following:

(1) A detailed discussion of anticipated supply availability under a normal water year, single dry year, and droughts lasting at least five years, as well as more frequent and severe periods of drought, as described in the drought risk assessment. For each source of water supply, consider any information pertinent to the reliability analysis conducted pursuant to Section 10635, including changes in supply due to climate change.

(2) When multiple sources of water supply are identified, a description of the management of each supply in correlation with the other identified supplies.

(3) For any planned sources of water supply, a description of the measures that are being undertaken to acquire and develop those water supplies.

(4) If groundwater is identified as an existing or planned source of water available to the supplier, all of the following information:

(A) The current version of any groundwater sustainability plan or alternative adopted pursuant to Part 2.74 (commencing with Section 10720), any groundwater management plan adopted by the urban water supplier, including plans adopted pursuant to Part 2.75 (commencing with Section 10750), or any other specific authorization for groundwater management for basins underlying the urban water supplier's service area.

(B) A description of any groundwater basin or basins from which the urban water supplier pumps groundwater. For basins that a court or the board has adjudicated the rights to pump groundwater, a copy of the order or decree adopted by the court or the board and a description of the amount of groundwater the urban water supplier has the legal right to pump under the order or decree. For a basin that has not been adjudicated, information as to whether the department has identified the basin as a high- or medium-priority basin in the most current official departmental bulletin that characterizes the condition of the groundwater basin, and a detailed description of the efforts being undertaken by the urban water supplier to coordinate with groundwater sustainability agencies or groundwater management agencies listed in subdivision (c) of Section 10723 to maintain or achieve sustainable groundwater conditions in accordance with a groundwater sustainability plan or alternative adopted pursuant to Part 2.74 (commencing with Section 10720).

(C) A detailed description and analysis of the location, amount, and sufficiency of groundwater pumped by the urban water supplier for the past five years. The description and analysis shall be based on information that is reasonably available, including, but not limited to, historic use records.

(D) A detailed description and analysis of the amount and location of groundwater that is projected to be pumped by the urban water supplier. The description and analysis shall be based on information that is reasonably available, including, but not limited to, historic use records.

(c) Describe the opportunities for exchanges or transfers of water on a short-term or long-term basis.

(d) (1) For an urban retail water supplier, quantify, to the extent records are available, past and current water use, over the same five-year increments described in subdivision (a), and projected water use, based upon information developed pursuant to subdivision (a), identifying the uses among water use sectors, including, but not necessarily limited to, all of the following:

(A) Single-family residential.

(B) Multifamily.

(C) Commercial.

(D) Industrial.

(E) Institutional and governmental.

(F) Landscape.

(G) Sales to other agencies.

(H) Saline water intrusion barriers, groundwater recharge, or conjunctive use, or any combination thereof.

(I) Agricultural.

(J) Distribution system water loss.

(2) The water use projections shall be in the same five-year increments described in subdivision (a).

(3) (A) The distribution system water loss shall be quantified for each of the five years preceding the plan update, in accordance with rules adopted pursuant to Section 10608.34.

(B) The distribution system water loss quantification shall be reported in accordance with a worksheet approved or developed by the department through a public process. The water loss quantification worksheet shall be based on the water system balance methodology developed by the American Water Works Association.

(C) In the plan due July 1, 2021, and in each update thereafter, data shall be included to show whether the urban retail water supplier met the distribution loss standards enacted by the board pursuant to Section 10608.34.

(4) (A) Water use projections, where available, shall display and account for the water savings estimated to result from adopted codes, standards, ordinances, or transportation and land use plans identified by the urban water supplier, as applicable to the service area.

(B) To the extent that an urban water supplier reports the information described in subparagraph (A), an urban water supplier shall do both of the following:

(i) Provide citations of the various codes, standards, ordinances, or transportation and land use plans utilized in making the projections.

(ii) Indicate the extent that the water use projections consider savings from codes, standards, ordinances, or transportation and land use plans. Water use projections that do not account for these water savings shall be noted of that fact.

(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) For the supplement required of urban retail water suppliers by paragraph (2) of subdivision (f) of Section 10621, a narrative that describes the water demand management measures that the supplier plans to implement to achieve its urban water use objective by January 1, 2027, pursuant to Chapter 9 (commencing with Section 10609) of Part 2.55.*

~~(B)~~ (C) 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.

(2) For an urban wholesale water supplier, as defined in Section 10608.12, a narrative description of the items in clauses (ii), (iv), (vi), and (vii) of subparagraph ~~(B)~~ (C) of paragraph (1), and a narrative description of its distribution system asset management and wholesale supplier assistance programs.

(f) Include a description of all water supply projects and water supply programs that may be undertaken by the urban water supplier to meet the total projected water use, as established pursuant to subdivision (a) of Section 10635. The urban water supplier shall include a detailed description of expected future projects and programs that the urban water supplier may implement to increase the amount of the water supply available to the urban water supplier in normal and single-dry water years and for a period of drought lasting five consecutive water years. The description shall identify specific projects and include a description of the increase in water supply that is expected to be available from each project. The description shall include an estimate with regard to the implementation timeline for each project or program.

(g) Describe the opportunities for development of desalinated water, including, but not limited to, ocean water, brackish water, and groundwater, as a long-term supply.

(h) An urban water supplier that relies upon a wholesale agency for a source of water shall provide the wholesale agency with water use projections from that agency for that source of water in five-year increments to 20 years or as far as data is available. The wholesale agency shall provide information to the urban water supplier for inclusion in the urban water supplier's plan that identifies and quantifies, to the extent practicable, the existing and planned sources of water as required by subdivision (b), available from the wholesale agency to the urban water supplier over the same five-year increments, and during various water-year types in accordance with subdivision (f). An urban water supplier may rely upon water supply information provided by the wholesale agency in fulfilling the plan informational requirements of subdivisions (b) and (f).

**SEC. 29.** Section 10631.2 of the Water Code is amended to read:

**10631.2.** (a) In addition to the requirements of Section 10631, an urban water management plan shall include any of the following information that the urban water supplier can readily obtain:

- (1) An estimate of the amount of energy used to extract or divert water supplies.
- (2) An estimate of the amount of energy used to convey water supplies to the water treatment plants or distribution systems.
- (3) An estimate of the amount of energy used to treat water supplies.
- (4) An estimate of the amount of energy used to distribute water supplies through its distribution systems.
- (5) An estimate of the amount of energy used for treated water supplies in comparison to the amount used for nontreated water supplies.
- (6) An estimate of the amount of energy used to place water into or withdraw from storage.
- (7) Any other energy-related information the urban water supplier deems appropriate.

(b) The department shall include in its guidance for the preparation of urban water management plans a methodology for the voluntary calculation or estimation of the energy intensity of urban water systems. The department may consider studies and calculations conducted by the Public Utilities Commission in developing the methodology.

(c) The Legislature finds and declares that energy use is only one factor in water supply planning and shall not be considered independently of other factors.

**SEC. 30.** Section 10631.7 of the Water Code is repealed.

**SEC. 31.** Section 10632 of the Water Code is repealed.

~~**10632.** (a) Every urban water supplier shall prepare and adopt a water shortage contingency plan as part of its urban water management plan that consists of each of the following elements:~~

~~(1) The analysis of water supply reliability conducted pursuant to Section 10635.~~

~~(2) The procedures used in conducting an annual water supply and demand assessment that include, at a minimum, both of the following:~~

~~(A) The written decisionmaking process that an urban water supplier will use each year to determine its water supply reliability.~~

~~(B) The key data inputs and assessment methodology used to evaluate the urban water supplier's water supply reliability for the current year and one dry year, including all of the following:~~

~~(i) Current year unconstrained demand, considering weather, growth, and other influencing factors, such as policies to manage current supplies to meet demand objectives in future years, as applicable.~~

~~(ii) Current year available supply, considering hydrological and regulatory conditions in the current year and one dry year. The annual supply and demand assessment may consider more than one dry year solely at the discretion of the urban water supplier.~~

~~(iii) Existing infrastructure capabilities and plausible constraints.~~

~~(iv) A defined set of locally applicable evaluation criteria that are consistently relied upon for each annual water supply and demand assessment.~~

~~(v) A description and quantification of each source of water supply.~~

~~(3) (A) Six standard water shortage levels corresponding to progressive ranges of up to 10, 20, 30, 40, and 50 percent shortages and greater than 50 percent shortage. Urban water suppliers shall define these shortage levels based on the suppliers' water supply conditions, including percentage reductions in water supply, changes in groundwater levels, changes in surface elevation or level of subsidence, or other changes in hydrological or other local conditions indicative of the water supply available for use. Shortage levels shall also apply to catastrophic interruption of water supplies, including, but not limited to, a regional power outage, an earthquake, and other potential emergency events.~~

~~(B) An urban water supplier with an existing water shortage contingency plan that uses different water shortage levels may comply with the requirement in subparagraph (A) by developing and including a cross-reference relating its existing categories to the six standard water shortage levels.~~

~~(4) Shortage response actions that align with the defined shortage levels and include, at a minimum, all of the following:~~

~~(A) Locally appropriate supply augmentation actions:~~

~~(B) Locally appropriate demand reduction actions to adequately respond to shortages:~~

~~(C) Locally appropriate operational changes:~~

~~(D) Additional, mandatory prohibitions against specific water use practices that are in addition to state mandated prohibitions and appropriate to the local conditions:~~

~~(E) For each action, an estimate of the extent to which the gap between supplies and demand will be reduced by implementation of the action:~~

~~(5) Communication protocols and procedures to inform customers, the public, interested parties, and local, regional, and state governments, regarding, at a minimum, all of the following:~~

~~(A) Any current or predicted shortages as determined by the annual water supply and demand assessment described pursuant to Section 10632.1.~~

~~(B) Any shortage response actions triggered or anticipated to be triggered by the annual water supply and demand assessment described pursuant to Section 10632.1.~~

~~(C) Any other relevant communications:~~

~~(6) For an urban retail water supplier, customer compliance, enforcement, appeal, and exemption procedures for triggered shortage response actions as determined pursuant to Section 10632.2.~~

~~(7) (A) A description of the legal authorities that empower the urban water supplier to implement and enforce its shortage response actions specified in paragraph (4) that may include, but are not limited to, statutory authorities, ordinances, resolutions, and contract provisions:~~

~~(B) A statement that an urban water supplier shall declare a water shortage emergency in accordance with Chapter 3 (commencing with Section 350) of Division 1.~~

~~(C) A statement that an urban water supplier shall coordinate with any city or county within which it provides water supply services for the possible proclamation of a local emergency, as defined in Section 8558 of the Government Code:~~

~~(8) A description of the financial consequences of, and responses for, drought conditions, including, but not limited to, all of the following:~~

~~(A) A description of potential revenue reductions and expense increases associated with activated shortage response actions described in paragraph (4):~~

~~(B) A description of mitigation actions needed to address revenue reductions and expense increases associated with activated shortage response actions described in paragraph (4):~~

~~(C) A description of the cost of compliance with Chapter 3.3 (commencing with Section 365) of Division 1.~~

~~(9) For an urban retail water supplier, monitoring and reporting requirements and procedures that ensure appropriate data is collected, tracked, and analyzed for purposes of monitoring customer compliance and to meet state reporting requirements:~~

~~(10) Reevaluation and improvement procedures for systematically monitoring and evaluating the functionality of the water shortage contingency plan in order to ensure shortage risk tolerance is adequate and appropriate water shortage mitigation strategies are implemented as needed.~~

~~(b) For purposes of developing the water shortage contingency plan pursuant to subdivision (a), an urban water supplier shall analyze and define water features that are artificially supplied with water, including ponds, lakes,~~



~~waterfalls, and fountains, separately from swimming pools and spas, as defined in subdivision (a) of Section 115921 of the Health and Safety Code.~~

~~(c) The urban water supplier shall make available the water shortage contingency plan prepared pursuant to this article to its customers and any city or county within which it provides water supplies no later than 30 days after adoption of the water shortage contingency plan.~~

**SEC. 32.** Section 10632 is added to the Water Code, to read:

**10632.** (a) Every urban water supplier shall prepare and adopt a water shortage contingency plan as part of its urban water management plan that consists of each of the following elements:

(1) The analysis of water supply reliability conducted pursuant to Section 10635.

(2) The procedures used in conducting an annual water supply and demand assessment that include, at a minimum, both of the following:

(A) The written decisionmaking process that an urban water supplier will use each year to determine its water supply reliability.

(B) The key data inputs and assessment methodology used to evaluate the urban water supplier's water supply reliability for the current year and one dry year, including all of the following:

(i) Current year unconstrained demand, considering weather, growth, and other influencing factors, such as policies to manage current supplies to meet demand objectives in future years, as applicable.

(ii) Current year available supply, considering hydrological and regulatory conditions in the current year and one dry year. The annual supply and demand assessment may consider more than one dry year solely at the discretion of the urban water supplier.

(iii) Existing infrastructure capabilities and plausible constraints.

(iv) A defined set of locally applicable evaluation criteria that are consistently relied upon for each annual water supply and demand assessment.

(v) A description and quantification of each source of water supply.

(3) (A) Six standard water shortage levels corresponding to progressive ranges of up to 10, 20, 30, 40, and 50 percent shortages and greater than 50 percent shortage. Urban water suppliers shall define these shortage levels based on the suppliers' water supply conditions, including percentage reductions in water supply, changes in groundwater levels, changes in surface elevation or level of subsidence, or other changes in hydrological or other local conditions indicative of the water supply available for use. Shortage levels shall also apply to catastrophic interruption of water supplies, including, but not limited to, a regional power outage, an earthquake, and other potential emergency events.

(B) An urban water supplier with an existing water shortage contingency plan that uses different water shortage levels may comply with the requirement in subparagraph (A) by developing and including a cross-reference relating its existing categories to the six standard water shortage levels.

(4) Shortage response actions that align with the defined shortage levels and include, at a minimum, all of the following:

(A) Locally appropriate supply augmentation actions.

(B) Locally appropriate demand reduction actions to adequately respond to shortages.

(C) Locally appropriate operational changes.

(D) Additional, mandatory prohibitions against specific water use practices that are in addition to state-mandated prohibitions and appropriate to the local conditions.

(E) For each action, an estimate of the extent to which the gap between supplies and demand will be reduced by implementation of the action.

(5) Communication protocols and procedures to inform customers, the public, interested parties, and local, regional, and state governments, regarding, at a minimum, all of the following:

(A) Any current or predicted shortages as determined by the annual water supply and demand assessment described pursuant to Section 10632.1.

(B) Any shortage response actions triggered or anticipated to be triggered by the annual water supply and demand assessment described pursuant to Section 10632.1.

(C) Any other relevant communications.

(6) For an urban retail water supplier, customer compliance, enforcement, appeal, and exemption procedures for triggered shortage response actions as determined pursuant to Section 10632.2.

(7) (A) A description of the legal authorities that empower the urban water supplier to implement and enforce its shortage response actions specified in paragraph (4) that may include, but are not limited to, statutory authorities, ordinances, resolutions, and contract provisions.

(B) A statement that an urban water supplier shall declare a water shortage emergency in accordance with Chapter 3 (commencing with Section 350) of Division 1.

(C) A statement that an urban water supplier shall coordinate with any city or county within which it provides water supply services for the possible proclamation of a local emergency, as defined in Section 8558 of the Government Code.

(8) A description of the financial consequences of, and responses for, drought conditions, including, but not limited to, all of the following:

(A) A description of potential revenue reductions and expense increases associated with activated shortage response actions described in paragraph (4).

(B) A description of mitigation actions needed to address revenue reductions and expense increases associated with activated shortage response actions described in paragraph (4).

(C) A description of the cost of compliance with Chapter 3.3 (commencing with Section 365) of Division 1.

(9) For an urban retail water supplier, monitoring and reporting requirements and procedures that ensure appropriate data is collected, tracked, and analyzed for purposes of monitoring customer compliance and to meet state reporting requirements.

(10) Reevaluation and improvement procedures for systematically monitoring and evaluating the functionality of the water shortage contingency plan in order to ensure shortage risk tolerance is adequate and appropriate water shortage mitigation strategies are implemented as needed.

(b) For purposes of developing the water shortage contingency plan pursuant to subdivision (a), an urban water supplier shall analyze and define water features that are artificially supplied with water, including ponds, lakes, waterfalls, and fountains, separately from swimming pools and spas, as defined in subdivision (a) of Section 115921 of the Health and Safety Code.

(c) The urban water supplier shall make available the water shortage contingency plan prepared pursuant to this article to its customers and any city or county within which it provides water supplies no later than 30 days after adoption of the water shortage contingency plan.

**SEC. 33.** Section 10632.1 is added to the Water Code, to read:

**10632.1.** An urban water supplier shall conduct an annual water supply and demand assessment pursuant to subdivision (a) of Section 10632 and, on or before June 1 of each year, submit an annual water shortage assessment report to the department with information for anticipated shortage, triggered shortage response actions, compliance and enforcement actions, and communication actions consistent with the supplier's water shortage contingency plan. An urban water supplier that relies on imported water from the State Water Project or the Bureau of Reclamation shall submit its annual water supply and demand assessment within 14 days of receiving its final allocations, or by June 1 of each year, whichever is later.

**SEC. 34.** Section 10632.2 is added to the Water Code, to read:

**10632.2.** An urban water supplier shall follow, where feasible and appropriate, the prescribed procedures and implement determined shortage response actions in its water shortage contingency plan, as identified in subdivision (a) of Section 10632, or reasonable alternative actions, provided that descriptions of the alternative

*actions are submitted with the annual water shortage assessment report pursuant to Section 10632.1. Nothing in this section prohibits an urban water supplier from taking actions not specified in its water shortage contingency plan, if needed, without having to formally amend its urban water management plan or water shortage contingency plan.*

**SEC. 35.** *Section 10632.3 is added to the Water Code, to read:*

**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.*

**SEC. 36.** Section 10635 of the Water Code is amended to read:

**10635.** (a) Every urban water supplier shall include, as part of its urban water management plan, an assessment of the reliability of its water service to its customers during normal, dry, and multiple dry water years. This water supply and demand assessment shall compare the total water supply sources available to the water supplier with the long-term total projected water use over the next 20 years, in five-year increments, for a normal water year, a single dry water year, and a drought lasting five consecutive water years. The water service reliability assessment shall be based upon the information compiled pursuant to Section 10631, including available data from state, regional, or local agency population projections within the service area of the urban water supplier.

(b) Every urban water supplier shall include, as part of its urban water management plan, a drought risk assessment for its water service to its customers as part of information considered in developing the demand management measures and water supply projects and programs to be included in the urban water management plan. The urban water supplier may conduct an interim update or updates to this drought risk assessment within the five-year cycle of its urban water management plan update. The drought risk assessment shall include each of the following:

(1) 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 five consecutive water years, starting from the year following when the assessment is conducted.

(2) A determination of the reliability of each source of supply under a variety of water shortage conditions. This may include a determination that a particular source of water supply is fully reliable under most, if not all, conditions.

(3) A comparison of the total water supply sources available to the water supplier with the total projected water use for the drought period.

(4) Considerations of the historical drought hydrology, plausible changes on projected supplies and demands under climate change conditions, anticipated regulatory changes, and other locally applicable criteria.

(c) The urban water supplier shall provide that portion of its urban water management plan prepared pursuant to this article to any city or county within which it provides water supplies no later than 60 days after the submission of its urban water management plan.

(d) Nothing in this article is intended to create a right or entitlement to water service or any specific level of water service.

(e) Nothing in this article is intended to change existing law concerning an urban water supplier's obligation to provide water service to its existing customers or to any potential future customers.

**SEC. 37.** Section 10640 of the Water Code is amended to read:

**10640.** (a) Every urban water supplier required to prepare a plan pursuant to this part shall prepare its plan pursuant to Article 2 (commencing with Section 10630). The supplier shall likewise periodically review the plan as required by Section 10621, and any amendments or changes required as a result of that review shall be adopted pursuant to this article.

(b) Every urban water supplier required to prepare a water shortage contingency plan shall prepare a water shortage contingency plan pursuant to Section 10632. The supplier shall likewise periodically review the water

shortage contingency plan as required by paragraph (10) of subdivision (a) of Section 10632 and any amendments or changes required as a result of that review shall be adopted pursuant to this article.

**SEC. 38.** Section 10641 of the Water Code is amended to read:

**10641.** An urban water supplier required to prepare a plan or a water shortage contingency plan may consult with, and obtain comments from, any public agency or state agency or any person who has special expertise with respect to water demand management methods and techniques.

**SEC. 39.** Section 10642 of the Water Code is amended to read:

**10642.** Each urban water supplier shall encourage the active involvement of diverse social, cultural, and economic elements of the population within the service area prior to and during the preparation of both the plan and the water shortage contingency plan. Prior to adopting either, the urban water supplier shall make both the plan and the water shortage contingency plan available for public inspection and shall hold a public hearing or hearings thereon. Prior to any of these hearings, notice of the time and place of the hearing shall be published within the jurisdiction of the publicly owned water supplier pursuant to Section 6066 of the Government Code. The urban water supplier shall provide notice of the time and place of a hearing to any city or county within which the supplier provides water supplies. Notices by a local public agency pursuant to this section shall be provided pursuant to Chapter 17.5 (commencing with Section 7290) of Division 7 of Title 1 of the Government Code. A privately owned water supplier shall provide an equivalent notice within its service area. After the hearing or hearings, the plan or water shortage contingency plan shall be adopted as prepared or as modified after the hearing or hearings.

**SEC. 40.** Section 10644 of the Water Code is amended to read:

**10644.** (a) (1) An urban water supplier shall submit to the department, the California State Library, and any city or county within which the supplier provides water supplies a copy of its plan no later than 30 days after adoption. Copies of amendments or changes to the plans shall be submitted to the department, the California State Library, and any city or county within which the supplier provides water supplies within 30 days after adoption.

(2) The plan, or amendments to the plan, submitted to the department pursuant to paragraph (1) shall be submitted electronically and shall include any standardized forms, tables, or displays specified by the department.

(b) If an urban water supplier revises its water shortage contingency plan, the supplier shall submit to the department a copy of its water shortage contingency plan prepared pursuant to subdivision (a) of Section 10632 no later than 30 days after adoption, in accordance with protocols for submission and using electronic reporting tools developed by the department.

(c) (1) (A) Notwithstanding Section 10231.5 of the Government Code, the department shall prepare and submit to the Legislature, on or before July 1, in the years ending in seven and two, a report summarizing the status of the plans and water shortage contingency plans adopted pursuant to this part. The report prepared by the department shall identify the exemplary elements of the individual plans and water shortage contingency plans. The department shall provide a copy of the report to each urban water supplier that has submitted its plan and water shortage contingency plan to the department. The department shall also prepare reports and provide data for any legislative hearings designed to consider the effectiveness of plans and water shortage contingency plans submitted pursuant to this part.

(B) The department shall prepare and submit to the board, on or before September 30 of each year, a report summarizing the submitted water supply and demand assessment results along with appropriate reported water shortage conditions and the regional and statewide analysis of water supply conditions developed by the department. As part of the report, the department shall provide a summary and, as appropriate, urban water supplier specific information regarding various shortage response actions implemented as a result of annual supplier-specific water supply and demand assessments performed pursuant to Section 10632.1.

(C) The department shall submit the report to the Legislature for the 2015 plans by July 1, 2017, and the report to the Legislature for the 2020 plans and water shortage contingency plans by July 1, 2022.

(2) A report to be submitted pursuant to subparagraph (A) of paragraph (1) shall be submitted in compliance with Section 9795 of the Government Code.

(d) The department shall make available to the public the standard the department will use to identify exemplary water demand management measures.

**SEC. 41.** Section 10645 of the Water Code is amended to read:

**10645.** (a) Not later than 30 days after filing a copy of its plan with the department, the urban water supplier and the department shall make the plan available for public review during normal business hours.

(b) Not later than 30 days after filing a copy of its water shortage contingency plan with the department, the urban water supplier and the department shall make the plan available for public review during normal business hours.

**SEC. 42.** Section 10650 of the Water Code is amended to read:

**10650.** Any actions or proceedings, other than actions by the board, to attack, review, set aside, void, or annul the acts or decisions of an urban water supplier on the grounds of noncompliance with this part shall be commenced as follows:

(a) An action or proceeding alleging failure to adopt a plan or a water shortage contingency plan shall be commenced within 18 months after that adoption is required by this part.

(b) Any action or proceeding alleging that a plan or water shortage contingency plan, or action taken pursuant to either, does not comply with this part shall be commenced within 90 days after filing of the plan or water shortage contingency plan or an amendment to either pursuant to Section 10644 or the taking of that action.

**SEC. 43.** Section 10651 of the Water Code is amended to read:

**10651.** In any action or proceeding to attack, review, set aside, void, or annul a plan or a water shortage contingency plan, or an action taken pursuant to either by an urban water supplier on the grounds of noncompliance with this part, the inquiry shall extend only to whether there was a prejudicial abuse of discretion. Abuse of discretion is established if the supplier has not proceeded in a manner required by law or if the action by the water supplier is not supported by substantial evidence.

**SEC. 44.** Section 10653 of the Water Code is amended to read:

**10653.** The adoption of a plan shall satisfy any requirements of state law, regulation, or order, including those of the board and the Public Utilities Commission, for the preparation of water management plans, water shortage contingency plans, or conservation plans; provided, that if the board or the Public Utilities Commission requires additional information concerning water conservation, drought response measures, or financial conditions to implement its existing authority, nothing in this part shall be deemed to limit the board or the commission in obtaining that information. The requirements of this part shall be satisfied by any urban water demand management plan that complies with analogous federal laws or regulations after the effective date of this part, and which substantially meets the requirements of this part, or by any existing urban water management plan which includes the contents of a plan required under this part.

**SEC. 45.** Section 10654 of the Water Code is amended to read:

**10654.** An urban water supplier may recover in its rates the costs incurred in preparing its urban water management plan, its drought risk assessment, its water supply and demand assessment, and its water shortage contingency plan and implementing the reasonable water conservation measures included in either of the plans.

**SEC. 46.** Section 10656 of the Water Code is amended to read:

**10656.** An urban water supplier is not eligible for a water grant or loan awarded or administered by the state unless the urban water supplier complies with this part.

**SEC. 47.** *Section 10657 is added to the Water Code, to read:*

*10657. The department may adopt regulations regarding the definitions of water, water use, and reporting periods, and may adopt any other regulations deemed necessary or desirable to implement this part. In developing regulations pursuant to this section, the department shall solicit broad public participation from stakeholders and other interested persons.*

**SEC. 48.** *This act shall become operative only if Assembly Bill 1668 of the 2017–18 Regular Session is enacted and becomes effective.*

## Appendix B

### Pending Projects Summary – City of Petaluma Planning Division

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# CITY OF PETALUMA – PLANNING DIVISION

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## PENDING PROJECTS SUMMARY (March 3, 2020)

This update provides a summary of all proposed major developments within the City of Petaluma. The development summary tables are separated by Commercial Projects, Mixed Use Projects, Residential Projects and Annexations. Please contact the developer directly for project details such as construction timing, cost and availability.

## DEFINITIONS OF STATUS CATEGORIES

**IN PLANNING PROCESS:** Formal project application has been filed for one or more discretionary planning approvals. Residential projects of fewer than two units are not included unless Planning Commission approval is required, nor are non-residential projects that do not result in new development.

**ALL PLANNING APPROVALS:** The project has received all discretionary approvals from the city, with no appeals pending.

**IN PLAN CHECK:** The project has received all planning approvals; construction drawings have been submitted to the Building Division.

**UNDER CONSTRUCTION:** The project has received all planning approvals; final plans approved; building and other permits have been issued; may be under construction.

**INACTIVE:** Action by applicant needed; more than six months passed since request for action made by staff.

NOTE: This list was prepared by the City of Petaluma Planning Division for informational purposes only. The City does not warrant the accuracy of the information provided.

## PLANNER CONTACT INFORMATION

HH – Heather Hines, Planning Manager, 707-778-4316, [hhines@cityofpetaluma.org](mailto:hhines@cityofpetaluma.org)  
BB – Brittany Ann Bendix, Deputy Planning Manager, 707-778-4314, [bbendix@cityofpetaluma.org](mailto:bbendix@cityofpetaluma.org)  
EU – Emmanuel Ursu, Principal Planner, 707-778-4401, [eursu@cityofpetaluma.org](mailto:eursu@cityofpetaluma.org)  
AH – Aaron Hollister, Senior Planner, [ahollister@cityofpetaluma.org](mailto:ahollister@cityofpetaluma.org)  
TR – Tiffany Robbe, Senior Planner, 707-778-4318, [trobbe@cityofpetaluma.org](mailto:trobbe@cityofpetaluma.org)  
KR – Krystle Rizzi, Associate Planner, 707-778-4472, [krizzi@cityofpetaluma.org](mailto:krizzi@cityofpetaluma.org)  
DB – David Brosky, Associate Planner, 707-778-4340, [dbrosky@cityofpetaluma.org](mailto:dbrosky@cityofpetaluma.org)  
ER – Eric Roberts, Assistant Planner, 707-778-4317, [eroberts@cityofpetaluma.org](mailto:eroberts@cityofpetaluma.org)

Map #	Applicant	APN	Project Location	Status	Date Filed	Zoning	Description	Units/SQFT	Planner
<b>Commerical</b>									
1	Project: Brooks Note Winery - PLMA-19-0007								
	Daniel Welles Summit Engineering, Inc., 463 Aviation Blvd, Ste 209, Santa Rosa, CA 95403	006-163-015	426 Petaluma Blvd	All Planning Approvals	10/2/2019	T-5	The project proposes a winery production facility with ancillary tasting room and events. The project will utilize the existing structure at 426 Petaluma Boulevard North, with some exterior modifications to the facades. The proposed production facility will be approximately 4700 sq ft and tasting room will be 2300 square feet.	7,000	KR
2	Project: Wasatch Storage Facility SPAR - PLSR-19-0017								
	Scott Wyckoff 801-692-1417	150-020-008	85 Corona Road	In Planning Process	9/10/2019	PCD Rancho Arroyo Business Center	New construction of a two-story storage facility containing 686 storage units, 900 square feet of office and retail space, and retaining the 14,774 square foot building location on eastern portion of the parcel	90,540	KR
3	Project: Adobe Road Winery - PLMA-18-0003								
	Kevin Buckler 707-939-7967	008-069-002	1 C Street	In Plan Check	3/26/2018	T-5	New construction of a two-story 15,848 square foot building containing a winery, tasting room, private event space and a motorsports gallery, collectively operated as the Adobe Road Winery. The proposal also includes improvements to the public frontages along C Street and First Street.	15,848 sf	BB
4	Project: 1395 N. McDowell Boulevard SPAR - PLSR-18-0002								
	Hank Malak hany@mckently.com 626-583-8348	007-411-019	1395 N. McDowell Blvd.	In Plan Check	1/23/2018	PUD - Redwood Technology Center	New 6,378 square foot 4-unit commercial building on a vacant building pad established by the Redwood Techonology Center PUD.	6,378 sf	BB
5	Project: Valero Gas Station - PLMA-18-0001								
	Ed Hale ehale@barghausen.com 760-884-7011	007-061-043 & 042	532 E. Washington Street	In Plan Check	1/23/2018	MU1A	Demolition of existing gas station and consturction of a new one in its place, including a convenience store and smog station	3,036 sf	BB
6	Project: McDonald's Remodel - PLSR-17-0030								
	Stantec Architecture, Inc. zorah.mariano@stantec.com 916-669-5928	007-350-015	259 N. McDowell Blvd.	Building Permit Issued	10/4/2017	C2	Demolish and reconstruct the existing McDonald's Restaurant. Net increase of 14 sf.	4,456 sf	AH
7	Project: Washington Square Façade Remodel - PLSR-17-0023								
	Nick Carter nickc@fulcrumproperty.com 916-383-3333	007-280-055	373 S. McDowell Blvd.	All Planning Approvals	8/29/2017	C2	Façade remodel for a portion of the Washington Square Shopping Center.	50,000 sf of the 200,000 sf shopping center	BB
8	Project: Cagwin and Dorward - PLMA-16-0013								
	Greg LeDoux & Associates greg@gledoux.com 707-795-8855	005-040-055	0 Lakeville Highway	Under Construction	10/31/2016	PCD Park Central/Park Sqaure	New commercial building to accommodate Cagwin and Dorward Landscaping. Project includes office and landscape maintenance operations for approx. 100 employees	22,727 sq/ft	TR

Map #	Applicant	APN	Project Location	Status	Date Filed	Zoning	Description	Units/SQFT	Planner
9	Project: Labcon Warehouse Addition - PLSR-16-0007								
	Greg LeDoux & Associates greg@gledoux.com 707-795-8855	005-040-039	3200 Lakeville	Under Construction	2/16/2016	BP	Addition and associated site improvements including landscaping, parking facilities, frontage improvements along Cader Lane and Lakeville Highway.	40,000 sq/ft	TR
10	Project: 76 Gas Station Remodel - PLSR-15-0013								
	Muthana Ibraim MI Architects, INC. 925-287-1174 x1	007-412-015	4998 Petaluma Blvd. N	Under Construction	5/13/2015	C2	Demolition of gas station and construction of a convenience store, self serve car wash and storage area.	2,179 sq/ft fueling canopy	HH
11	Project: Floathouse - PLSR-14-0013								
	Greg Sabourin Petaluma Small Craft Center info@petalumasmallcraftcenter.org	007-142-018	150 Weller St.	In Plan Check	5/8/2014	SMART Rail Station Master Plan	Floating rental office and dock in the turning basin & restroom facility in Cavanagh Landing Park.	440 sf	HH
12	Project: Hansel Toyota Expansion and Remodel - PLSR-14-0009								
	Henry Hansel hhansel@hanselauto.com	150-020-033 and -034, -035	1125 Auto Center Drive	Under Construction	5/1/2014	PCD - Auto Center	Expansion to the north and west for showroom, sales and offices from 14,786 sf to 25,404 sf	25,404 sf	HH
13	Project: Petaluma Poultry Expansion - PLSR-14-0004								
	Petaluma Poultry, Steve Lafranchi, steve@sjla.com	005-040-059	2700 Lakeville Hwy.	Under Construction	2/3/2014	BP	Addition for office space, parking, and site design modifications and addition of second shift	4,000 sq/ft	HH
14	Project: Petaluman Hotel - PLSR-13-0019								
	Ross Jones 707-971-9400 rossjones@hotmail.com	007-582-009	2 Petaluma Blvd. S	In Planning Process. Waiting on revisions.	10/31/2013	MU2	Construction of a 54 room boutique hotel	48256 sf	TR
15	Project: Safeway Fuel Center - PLSR-13-0012								
	Santec Architecture Gary Semling, 707-765-1660, gary.semling@stantec.com	007-280-046	335 S McDowell Blvd.	In Plan Check	7/25/2013	C2	New gas station including 8 dispensers, 16 fuel stations, canopy and convenience store.	697 sf	HH
16	Project: Home 2 Suites - PLSR-18-0025								
	Matthew Sherrill Basin Street Properties 707-283-0780	007-411-034	1205 Redwood Way	In Plan Check	8/9/2018	PUD - Redwood Technology Center	New construction of a 85,802 sf hotel on a vacant pad established by the Redwood Technology Center PUD. The hotel will contain 140 guestrooms.	85,802 sf	BB
17	Project: BioMarin PLSR-19-0010								
	Shar Zamanpour BioMarin 415-382-5726 shar.zamanpour@bmm.com 7770 Lindaro Street San Rafael, CA 94901	005-280-009	1700 S McDowell Blvd	All Planning Approvals	5/15/2019	Lakeville PCD	Proposed commercial research and development facility including two buildings, approx. 32,000 and 40,000 square feet on the vacant 5.89-acre project site.	32,000 sf research and office; 40,00 sf warehouse	HH

Map #	Applicant	APN	Project Location	Status	Date Filed	Zoning	Description	Units/SQFT	Planner
<b>Mixed Use</b>									
<b>18</b>	Project: Scannell Mixed Use Development - PLMA-20-0001								
	Matt Anderson Scannell Properties 3468 Mt. Diablo Blvd, Suite B-1115 Lafayette, CA 94549	136-010-024 & 007-171-023	500 Lakeville Street and 500 Hopper Street	In Planning Process	2/10/2020	River Dependent Industrial	The application is to develop the 39.22 acre site with a mix of commercial office and residential uses. The proposal also includes improvements to Hopper Street and will create a new public riverfront greenway with multi-use trail along the McNear Channel and Petaluma River.	275 units; 190,000 gsf of commercial office use	BB
<b>19</b>	Project: East Washington Place SPAR and ZTA - PLMA-19-0009								
	Norman W. Sears SGPA Architecture and Planning 200 Pine Street, Studio 500 San Francisco, CA 94104	007-241-002, 007-473-001, 007-251-001, 007-031-001	401 Kenilworth Drive	In Planning Process. Waiting on revisions.	12/19/2019	MU1B	Site Plan and Architectural Review for two new single story buildings on vacant pads, site landscaping and hardscape improvements, updated exterior colors and finishes, and changes to the Master Signage Program. Project also includes a Zoning Text amendment to pursue free standing freeway oriented signs.		BB
<b>20</b>	Project: 132 Petaluma Blvd. Historic SPAR - PLSR-18-0029								
	Richard Perlstein Polsky Perlstein Architects rich@polskyarchitects.com	006-282-007	132 Petaluma Blvd. N	In Planning Process. Waiting on revisions.	10/4/2018	T-5	Site Plan and architectural Review for renovation of a commercial building with a new residential component.	2,1948 sf of commercial; 2 dwelling units	BB
<b>21</b>	Project: Omahony Mixed Use Building - PLMA-17-0009								
	Paul Foley/Mike Omahony 131 Liberty St LLC paul@clmbuilders.net 415-451-4841	006-361-030	131 Liberty Street	In Plan Check	11/14/2017	MU2	Tentative Subdivision Map/Site Plan and Architectural Review for Mixed Use Development	1,500 sf commercial and 10 residential units	AH
<b>22</b>	Project: Riverfront 2010 - 11-TSM-0130-CR								
	Riverfront, LLC Frank Marinello frank@basin-street.com	136-010-027	500 Hopper Street	Under Construction	2/10/2011	T4/T5/CS	Tentative Subdivision Map for Mixed Use Development that includes 273 Residential units (134 single family, 39 town homes, 100 apartments) hotel with 120 rooms, 60,000 sq.ft. office, 30,000 sq/ft on a vacant 35.7 acre site.	273 Residential units (134 single family, 39 town homes, 100 apartments) hotel with 120 rooms, 60,000 sq.ft. office, 30,000 sq/ft	EU
<b>23</b>	Project: North River Apartments - PLSR-15-0015								
	AG Spanos Corp Karen Garrett kgarrett@agspanos.com 209-955-2574	006-163 -040, - 041	368 and 402 Petaluma Blvd. N	In Plan Check	6/1/2015	T5	184 new residential units on a 3.92-acre property located at the intersection of Petaluma Blvd North and Oak Street. The project includes the extension of Oak Street and Water Street North, a new Class I multi-use path along the Petaluma River, and an emergency vehicle access roadway to the vicinity of Washington Street	184 residential units	BB
<b>24</b>	Project: Haystack Pacifica - PLMA-16-0001								
	Carey Algaze Pacifica Companies 619-296-9000	007-143-003 and 004, 007, 014, 015	215 Weller Street	All Planning Approvals	1/7/2013	T5/T6	178 new residential units with 14,516 sq/ft of commercial at corners.	178 residential units and 14,516 sf of commercial	TR

Map #	Applicant	APN	Project Location	Status	Date Filed	Zoning	Description	Units/SQFT	Planner
25	Project: Deer Creek Village - 09-SPC-0091								
	Merlone Geier Management Mike Grehl 858-259-9909 mgrehl@merlonegeier.com	007-380-005 and -027	N. McDowell Blvd. btwn Lynch Creek and Rainier Ave.	Under Construction	3/29/2009	MU1B	345,000 sq/ft commercial center and associated site improvements.	345,000 sq/ft	HH

Map #	Applicant	APN	Project Location	Status	Date Filed	Zoning	Description	Units/SQFT	Planner
<b>Residential</b>									
26	Project: DRG Casa Grande - PLMA-19-0006								
	Doyle Heaton Falcon Point Assoc, 3496 Buskik Avenue, #104, Pleasant Hill, CA 94532	017-040-020 & 059	240 & 250 Casa Grande	In Planning Process	10/15/2018	R4	The project proposes 35 single-family residential units; 30 market rate and 5 affordable on the 4.5 acre site. The project also includes establishment of a PUD and will require a subdivision map.	35 residential units	AH
27	Project: Vartnaw Ranch - PLMA-19-0004								
	Geoff McComic RBMC Advisors, 1500 3rd Street, Suite B1, Napa, CA 94559 415-332-3868	019-210-032	149 McNear Ave	In Planning Process	9/26/2019	R4	Demolish all existing on-site structures (including three single-family dwellings) and the construction of 56 residential units on the 4.09-acre site. All five parcels that comprise the project site would be merged, and the property would be re-subdivided via a one-lot parcel map that would establish the proposed condominium ownership structure for each of the 56 units in the project.	56 residential units	AH
28	Project: 109 Ellis Street- PLSR-18-0030								
	Jerry Kler Architects 415-332-3868	007-361-003	109 Ellis Street	All Planning Approvals	10/15/2018	PUD	13 unit apartment complex	13 residential units	AH
29	Project: Deer Creek Residential - PLMA-18-0005								
	Merlone Geier Management Mike Grehl 858-259-9909 mgrehl@merlonegeier.com	007-380-034	0 N McDowell	All Planning Approvals	10/1/2018	MU1B	New construction of a 129-unit residential development within five three-story buildings on 4.71 acres. The project will provide up to 194 off-street parking spaces.	129 residential units	BB
30	Project: Olin Residence- PLSR-18-0027								
	Alan Olin alolin@gmail.com	008-069-002	118 Kimberly Way	In Planning Process. Waiting on applicant response.	9/5/2018	MU2	New 2,461 square foot Single Family home within the South Hills General Plan sub area, subject to hillside ordinance.	2,461 square foot single family dwelling	BB
31	Project: Baywood Apartments - PLSR-18-0016								
	Matt Taylor Farrell-Faber matt@farrellfaber.com 707-579-3811	005-060-042	2592 Casa Grande Road	In Planning Process	5/31/2018	R5	Proposal for 299 apartments in 27 different three- story buildings. Project includes a recreation center and indoor pool and all associated site improvements.	299 units	BB
32	Project: PEP Housing Senior Housing - PLSR-18-0006								
	Robert W. Hayes 415-332-0999	008-530-007	951 Petaluma Blvd S	In Plan Check	2/26/2018	T5	Demolition of all existing buildings/site features and construcion of affordable housing units in new two to three story struncture with a manager's unit and one two-story community building	53 dwelling units and 1 manager's unit.	BB
33	Project: Sepaher Residential Building - PLMA-17-0008								
	Nick Lee Nick Lee Architecture nick@nickleearchitecture.com 415-378-4337	007-154-013	315 Lakeville Street	In Plan Check	9/13/2017	MU1A	New building containing 4 residential units and associated parking on site. Application includes a CUP to allow for residential on the ground floor.	4 dwelling units	BB
34	Project: Williams Residential Historic SPAR - PLSR-16-0039								
	Peter Williams grenware@gmail.com	006-214-014	331 Kentucky Street	In Plan Check	12/27/2016	R3	Modifications to an existing single family residence including a 1st floor rear addition and conversion of exiting attic space into 2nd floor livingspace.	single family dwelling	BB

Map #	Applicant	APN	Project Location	Status	Date Filed	Zoning	Description	Units/SQFT	Planner
35	Project: Brody Ranch Subdivision - PLMA-15-0007								
	DeNova Homes Trent Sanson 925-685-0110 trent@denovahomes.com	137-061-042	360 Corona Road	Under Construction	11/30/2015	PUD - Brody Ranch	Development of 199 units consisting of 59 detached single family residences, one duplex and 138 condominiums	199 dwelling units	EU
36	Project: East Washington Commons - PLSR-15-0036								
	Jerry Kler Jerry Kler Architects 415-332-3868	007-022-033, 055, 058	817, 822, 825 E. Washington Street	In Plan Check	12/21/2015	MU1A	SPAR and CUP for a new 3 story, 24-unit residential project on 3 parcels, including 2 floors of residential over ground floor parking and street level tenant amenities.	24 dwelling units	HH
37	Project: Riverbend Crossing PUD, SPAR and Subdivision - PLMA-19-0003								
	Steve Lafranchi 707-762-3122	007-041-006	529 Madison	In Planning Process	3/20/2019	R3	Tentative map, PUD Zoning Amendment (PUD and SPAR for a 29 lot single family residential development	29 dwelling units	AH
38	Project: Addison Ranch Apartments - 13-SPC-0122								
	GALA Construction Gary Whitesides gary@galaconstruction.com 916-719-5902	007-610-005 007-610-006 007-610-029 007-610-019 and 007-610-031	200 Greenbriar Circle	Under Construction	9/22/2014	R4	Add an additional 100 multi-family units in an existing apartment complex.	100 dwelling units	TR
39	Project: Davidon Homes - 03-TSM-0396-CR								
	Davidon Homes Steve Abbs	019-120-040, 041	Windsor and D Street	In Planning Process. Revised project submitted and under review	7/21/2014	R1	New construction of 28 single family detached units and development of open space for future expansion of Helen Putnam Park.	28 dwelling units	HH
40	Project: Sid Commons 03-GPA-0379-CR								
	Mark Johnson Acclaim Homes mark@acclaimhomesinc.com 650-324-9439	019-010-006 and 007, 008, 009	End of Graylawn	In Planning Process	12/15/2014	R4 & PUD	New 278 unit apartment complex	278 dwelling units	TR
41	Project: Sunnyslope II / the Oaks at Sunnyslope 03-TSM-0460-CR								
	Lafferty Communities	019-203-008	674 Sunnyslope Road	In Plan Check and under construction	8/11/2014	PUD - Sunnyslope II	The Oaks at Sunnyslope 18 single family parcels in multiple phases. SPAR required for 17 lots and existing historic house on lot 18. Lots 1-6 and 10-18 have received SPAR approval as of October 2018. Site Grading and Construction of lower homes is underway.	18 dwelling units	BB/TR
42	Project: Quarry Heights (Lomas) 09-GPA-0560-CR, 06-SPC-0615-CR								
	KB Homes 925-983-4522, htay@kbhome.com	019-210-010 019-210-011 019-220-027 019-220-012	Petaluma Blvd. S (Dutra Quarry)	142 townhome units and 40 SFD are complete. Remaining 90 SFD not yet under construction	2/28/2006	PUD- Quarry Heights	272 new single family and townhomes. 91 single-family dwellings to be constructed.	272 dwelling units	TR
43	Project: Dailey Single Family Dwelling - PLSR-19-0003								
	Derek Dailey 530-570-9755 derekdailey@dbcontracting.com	008-630-052	123 Kimberly Way	All Planning Approvals	1/17/2019	PUD - Country Club Estates	Major SPAR for a new single family home in the Country Club Estates PUD	single family dwelling	KR

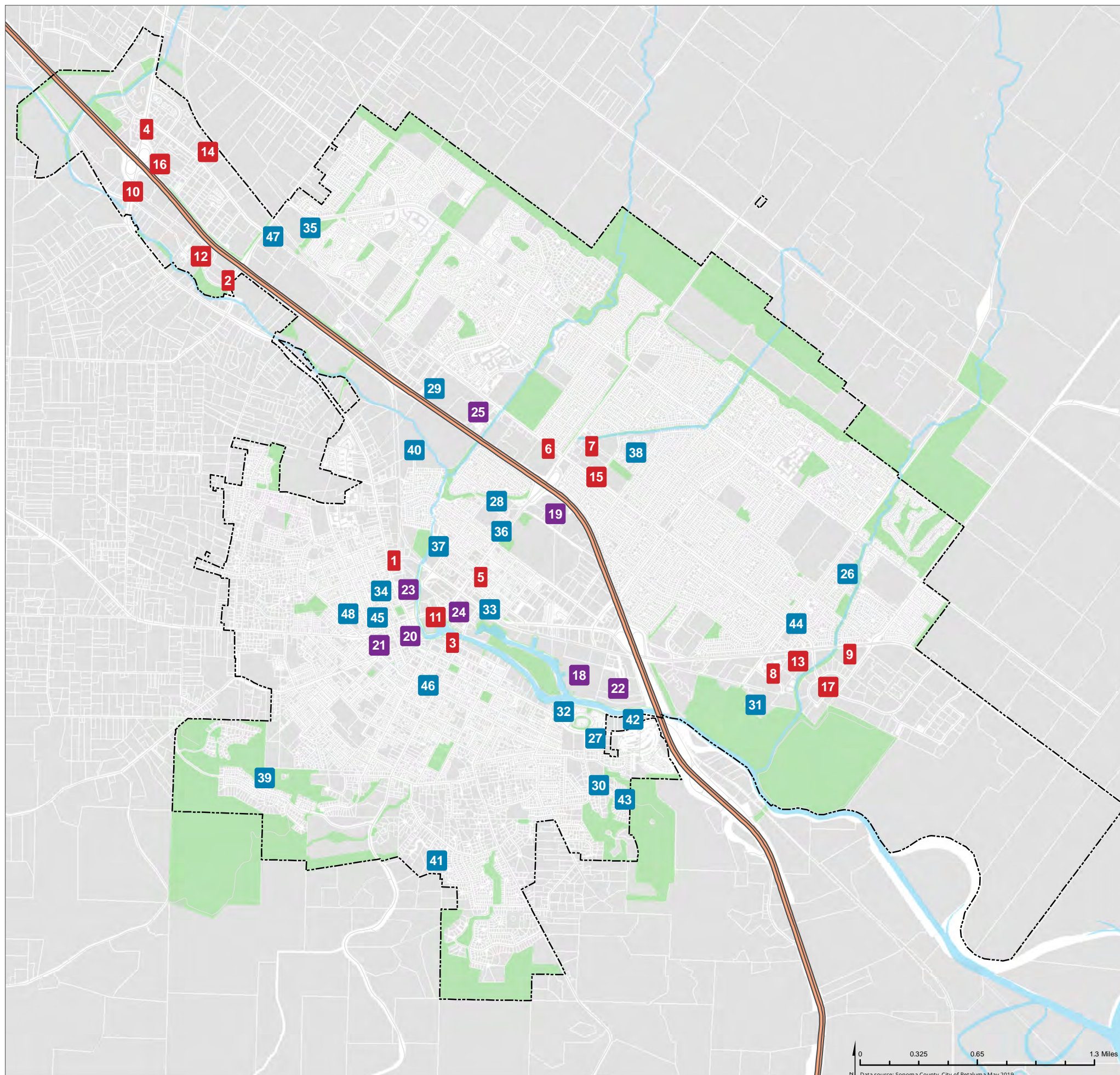
Map #	Applicant	APN	Project Location	Status	Date Filed	Zoning	Description	Units/SQFT	Planner
44	Project: Sartori Historic SPAR - PLSR-19-0002								
	Steve Lafranchi 707-762-3122	005-250-044	1416 Casa Grande Road	In Planning Process	1/2/2019	R2	Proposal to retain existing historic house, subdivide property into seven parcels, rezone to a PUD, and pursue SPAR for development of six new homes.	6 dwelling units	EU
45	Project: Luchetti Residence Garage Replacement PLSR-19-0001								
	Brent Russell Russell202@comcast.net	006-271-007	245 Keokuk	In Plan Check	1/8/2019	R3; Oakhill Brewster Historic District	Removal of addition at rear, new construction of garage and ADU.	single family dwelling and ADU	HH
46	Project: 107 6th Street - PLSR-18-0033								
	Charisse Rathle 415-238-8682 crathle@sbcglobal.net	008-104-016	107 6th Street	In Planning Process	12/26/2018	R3; A Street Historic District	New garage with approx. 480 sf ADU above. Includes interior remodel and 2-story expansions at the side and rear.	single family dwelling and ADU	BB
47	Project: Corona Station SPAR, TM, ZA, IS - PLMA-18-0006								
	Todd Kurtin (Lomas-Corona Station) 310-230-9278	137-061-019	890 N. Mcdowell Blvd.	In Planning Process	12/4/2018	MU1B	Zoning Text Amendment, Major Subdivision, and Site Plan and Architectural review of new 112 units single family residential development adjacent to the future SMART station.	112 dwelling units	HH
48	Project: Pettigrew ADU and Porch, Historic SPAR - PLSR-19-0007								
	Chris Lynch MAD Architecture 707-481-7410 chris@madarch.com	006-201-009	309/307 Walnut Street	Building Permit Issued	4/29/2019	R3/Oakhill Brewster	Project proposes to construct a new ADU at the location of an existing ADU on the property. Proposal also includes construction of a carport and a restoration of the front porch on the primary dwelling.	ADU	AH



# City of Petaluma - Planning Division

## Map of Major Development Projects

March 3, 2020



### Commercial Projects

1. Brooks Note Winery
2. Wasatch Storage Facility
3. Adobe Road Winery
4. 1395 N. McDowell Boulevard SPAR
5. Valero Gas Station
6. McDonald's Remodel
7. Washington Square Façade Remodel
8. Cagwin and Dorward
9. Labcon Warehouse Addition
10. 76 Gas Station Remodel
11. Floathouse
12. Hansel Toyota Expansion and Remodel
13. Petaluma Poultry Expansion
14. Petaluman Hotel
15. Safeway Fuel Center
16. Home 2 Suites
17. Biomarin

### Residential Projects

26. DRG Casa Grande
27. Vartnaw Ranch
28. 109 Ellis Street
29. Deer Creek Residential
30. Olin Residence
31. Baywood Apartments
32. PEP Housing Senior Housing
33. Sepaher Residential Building
34. Williams Residential Historic SPAR
35. Brody Ranch Subdivision
36. East Washington Commons
37. Riverbend Crossing PUD and Subdivision
38. Addison Ranch Apartments
39. Davidon Homes
40. Sid Commons
41. Sunnyslope II
42. Quarry Heights
43. Dailey Single Family Dwelling
44. Sartori Historic SPAR
45. Luchetti Residence Garage
46. 107 6th Street
47. Corona Station SPAR TM ZA IS
48. Pettigrew ADU and Porch Historic SPAR

### Mixed Use Projects

18. Scannell Mixed Use Development
19. East Washington Place SPAR and ZTA
20. 132 Petaluma Blvd Historic SPAR
21. Omahony Mixed Use Building
22. Riverfront 2010
23. North River Apartments
24. Haystack Pacifica
25. Deer Creek Village

### Annexations

No new annexation projects  
as of March 3, 2020

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## Appendix C

### AWE Model Assumptions

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**Getting Started:** On this worksheet you enter information the tracking tool needs to operate. This includes specifying whether to use English or Metric units, setting up customer classes, specifying the first year for forecasts, entering forecasted population, housing, and customer accounts, setting financial assumptions, providing information needed to calculate water and energy savings due to appliance and plumbing standards for toilets, clothes washers, and dishwashers, and providing information needed to calculate water savings for landscape conservation measures included in the conservation measure library. It sounds like a lot, but you probably have developed much of this data for other planning purposes.

Scenario ""Empty"" loaded into model on 7/27/2016 5:44:04 PM

<b>State</b>	CA	▼	Model will use CA plumbing standards	
<b>Volume Units</b>	Acre-Feet (AF)	▼	Flow Units Will Be:	MGD

### Population, Housing, and Account Forecasts

Enter Starting Year for Forecasts

DU are based on scaling Of ABGA 2018 population estimates, sector based on pop and employment

#### Population & Housing

	2010	2015	2020	2025	2030	2035	2040	2045
Population	59,126	61,798	63,168	65,894	67,285	68,505	69,980	71,486
Single Family Dwelling Units	18,899	19,753	20,191	21,062	21,507	21,897	22,368	22,849
Multi Family Dwelling Units	4,681	4,893	5,001	5,217	5,327	5,424	5,541	5,660

#### Number of Accounts

Single Family	18,884	18,952	19,372	20,340	20,770	21,147	21,602	22,067
Multi Family	710	750	767	1,156	1,156	1,177	1,202	1,228
Commercial	1,135	1,241	1,269	1,272	1,314	1,364	1,477	1,599
Industrial	24	24	25	23	23	23	23	23
Institutional	139	172	176	156	161	167	181	196
Irrigation Commercial	316	332	339	349	360	374	405	438
Irrigation Institutional	174	182	186	186	192	199	216	233
Not in use								
Not in use								

Institutional/Governmental = Institutional

### Financial Assumptions

These inputs are used by the tracking tool to standardize costs and benefits, calculate present values, and estimate utility and customer benefits of conservation.

Dollar Base Year	2020
Annual Inflation Rate	3.0%
Nominal Interest Rate	2.3%

#### Utility Rates in 2010

Customer Class	Average Class Rate (2020 Dollars)				Annual Rate of Increase			
	Water	Sewer	Electricity	Gas	Water	Sewer	Electricity	Gas
	(\$/Thou Gal)	(\$/Thou Gal)	(\$/KWh)	(\$/Therm)	(%/Yr)	(%/Yr)	(%/Yr)	(%/Yr)

Single Family	\$5.28	\$12.20	\$0.28	\$2.00	3.5%	1.5%	3.0%	3.0%
Multi Family	\$5.28	\$12.20	\$0.28	\$2.00	3.5%	1.5%	3.0%	3.0%
Commercial	\$5.90	\$16.01	\$0.27	\$0.80	3.5%	1.5%	3.0%	3.0%
Industrial	\$5.90	\$9.88	\$0.20	\$0.76	3.5%	1.5%	3.0%	3.0%
Institutional	\$5.90		\$0.20	\$0.76	3.0%	3.0%	3.0%	3.0%
Irrigation Commercial	\$5.90		\$0.32		3.0%	3.0%	3.0%	3.0%
Irrigation Institutional	\$5.90		\$0.32		3.0%	3.0%	3.0%	3.0%
Not in use								
Not in use								

### Information Needed to Calculate Water/Energy Savings from Plumbing/Appliance Standards

These inputs are used by the tracking tool to estimate water and energy savings for national toilet and showerhead standards, which first took effect in 1994, and clothes washer and dishwasher appliance standards, which first included maximum allowable water factors in 2011 and 2010, respectively. Toilet standards took effect in 1992 in California and Texas.

	Single Family	Multi Family
Persons per household	3	2.00
Full Baths/Dwelling Unit	2.04	1.87
Half Baths/Dwelling Unit	0.24	0.59
Dwelling Units in 1992	13,648	2,796
Population in 1990	44,159	

### Information Needed to Calculate Water Savings for Landscape Measures in Library

Average landscape water use for residential and non-residential sites is used by the model to calculate water savings for various landscape conservation measures included in the program library. Average landscape water use is calculated using the following equation. Alternatively, you can use your own landscape water use estimate by selecting the "Use My Own Estimate" option.

$$use\ per\ site = \left( \frac{1}{irr.\ eff.} \right) \times (ET_0 \times K_L - R_e) \times Area \times C_v, \text{ where}$$

*irr. eff.* = typical irrigation efficiency  
*ET<sub>0</sub>* = reference evapotranspiration  
*K<sub>L</sub>* = landscape coefficient (% of *ET<sub>0</sub>* needed by crop)  
*R<sub>e</sub>* = effective rainfall (% of annual rainfall contributing to plant water requirement)  
*C<sub>v</sub>* = coefficient that converts water use to appropriate volume units (gal for english units, M<sup>3</sup> for metric units)

Use my own landscape water use estimates
  Use model's landscape water use calculator

Reference ET	in/yr	40.00
Avg Annual Rainfall	in/yr	26.00

Effective Rainfall                    %                    

25%
-----

Landscape Water Requirement Coefficient (K<sub>L</sub>)

Turf                    % of ET<sub>0</sub>

80%
-----

Other than turf                    % of ET<sub>0</sub>

60%
-----

		<b>Non Residential</b>	
		<b>Residential</b>	<b>Residential</b>
Avg Landscape Area Per Site	ft <sup>2</sup>		
Avg Turf Area (% of Total)	%		
Avg Irrigation Efficiency (%)	%	75%	81%

Drip Irrigation Savings estimate

		<b>Non Residential</b>	
		<b>Residential</b>	<b>Residential</b>
Irrigation Requirement			
Turf Area	in/ft <sup>2</sup> /yr	34	31
Other	in/ft <sup>2</sup> /yr	23	22

Drip Irrigation Savings estimate  
2.518518519 in/ft<sup>2</sup>/yr

		<b>Non Residential</b>	
		<b>Residential</b>	<b>Residential</b>
Avg Landscape Water Use Per Site			
Turf Area	Gal/Yr	0	0
Other	Gal/Yr	0	0
Total	Gal/Yr	0	0





**AWE CONSERVATION TRACKING TOOL: DEFINE CONSERVATION ACTIVITIES WORKSHEET**

**Define conservation activities:** Click the Define/Edit/Delete button to setup and edit conservation activities. You can use the form to define your own activities or import activities from the tracking tool's library. Once imported, library activities can be customized. Conservation activity specifications are stored in a table on this worksheet. This table is hidden by default. You can unhide the table by clicking the "Show Activities Table" button. You can edit activities directly in the table if you find this easier than using the form. **HOWEVER, DO NOT DELETE TABLE ROWS. ONLY USE THE FORM TO DELETE CONSERVATION ACTIVITIES.**

Scenario ""Empty"" loaded into model on 7/27/2016 5:44:04 PM

**NOTE: You can define activities in the table rather than using the form. BUT ONLY USE THE FORM TO DELETE ACTIVITIES.**

Activity ID	Activity Name	Class	Savings, Per Unit (gpy)	Savings, Annual Rate of Decay (%)	Savings, Peak Period (% of Annual Savings)	Savings, Useful Life (yrs)	Savings, Participant Free Riders (% of Participants)	Utility Costs, Year Denominated	Utility Costs, Initial Fixed (\$)	Utility Costs, Initial Variable (\$/unit)	Utility Costs, Years of Follow-up (yrs)	Utility Costs, Follow-up Fixed (\$/yr)	Utility Costs, Follow-up Variable (\$/unit/yr)	Participant Costs, Year Denominated	Participant Costs, Initial (\$)	Participant Costs, Years of On-going (yrs)	Participant Costs, On-going (\$/Yr)	Participant Savings, Sewer (gpy)	Participant Savings, Gas (Therms/Gal)	Participant Savings, Electricity (KWh/Gal)	Plumbing Code, Year Effective	Plumbing Code, Unit Savings (gpy)	Plumbing Code, Natural Replacement Rate NRR (%)		
1	Drip Irrigation Incentive for MFR and CII	Commercial	9,483	0%		12	0%	2020		\$406.25				2020	\$312.50										
2	Drip Irrigation Incentive for SFR	Single Family	1,897	0%		12	0%	2020		\$325.00				2020	\$250.00										
3	High Efficiency Clothes Washer Rebate - Residential	Single Family	5,000	0%	0%	15	0%	2020		\$97.50				2020	\$725.00			5,000.00	0.0035	0.0036	2011	3500	7.14%		
4	High Efficiency Faucet Aerator / Showerhead Giveaway	Commercial	5,678	0%		5	0%	2020		\$156.00				2020	\$250.00										
5	High Efficiency Faucet Aerator / Showerhead Giveaway	Single Family	2,000	0%		5	0%	2020		\$31.20				2020	\$50.00										
6	Incentivize Irrigation Equipment Upgrades - Large Landscapes	Irrigation Comr	36,108	0%		10	0%	2020		\$1,300.00				2020	\$1,000.00										
7	Incentivize Irrigation Equipment Upgrades - SFR	Single Family	17,258	0%		10	0%	2020		\$260.00				2020	\$200.00										
8	Landscape Conversion or Turf Removal - MFR and CII	Commercial	13	0%	80%	10	0%	2020		\$0.65				2020	\$1.50		0.00	0.0000	0.0000		0	0	0.00%		
9	Landscape Conversion or Turf Removal -SFR	Single Family	13	0%	80%	10	0%	2020		\$0.65				2020	\$1.50		0.00	0.0000	0.0000		0	0	0.00%		
10	Mulch rebate	Single Family	13	0%		5	0%	2020		\$0.33				2020	\$0.10										
11	Restaurant Spray Nozzle Rebates	Commercial	43,830	0%		5	0%	2019		\$65.00				2020	\$50.00		43,830.00	0.0083							
12	Smart Irrigation Controller (Weather-Based Irrigation)	Irrigation Comr	96,645	0%	70%	10	0%	2020		\$1,300.00				2020	\$1,000.00		0.00	0.0000	0.0000		0	0	0.00%		
13	Smart Irrigation Controller (Weather-Based Irrigation)	Single Family	17,258	0%	70%	10	0%	2020		\$130.00				2020	\$260.00		0.00	0.0000	0.0000		0	0	0.00%		
14	Water Use Surveys/Audits - CII	Commercial	114,983	20%		5	0%	2020		\$2,000.00				2020	\$2,500.00										
15	Water Use Surveys/Audits - MFR	Multi Family	114,983	20%	0%	5	0%	2020		\$2,000.00				2020	\$2,500.00		4,015.00	0.0024	0.0000		0	0	0.00%		
16	Water Use Surveys/Audits - SFR	Single Family	12,373	20%	68%	5	0%	2020		\$210.60				2020	\$50.00		4,949.20	0.0010	0.0000		0	0	0.00%		

**AWE CONSERVATION TRACKING**

**Enter annual conservation activity:** Use this worksheet to enter the annual activity levels for the conservation activities you defined on the 4. Define Activities worksheet. You can enter activity through the end of your forecast period, but this is not required. It is okay to enter activity for shorter periods. You also can start an activity in

**Enter Annual Conservation Activity**

Activity ID	Class	Activity Name	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045
1	Commercial	Drip Irrigation Incentive for MFR and CII	20	20	20	20	20																				
2	Single Family	Drip Irrigation Incentive for SFR	100	100	100	100	100																				
3	Single Family	High Efficiency Clothes Washer Rebate - Res	254	254	254	254	254																				
4	Commercial	High Efficiency Faucet Aerator / Showerhead	100	100	100	100	100																				
5	Single Family	High Efficiency Faucet Aerator / Showerhead	762	762	762	762	762																				
6	Irrigation Com	Incentivize Irrigation Equipment Upgrades - L	20	20	20	20	20																				
7	Single Family	Incentivize Irrigation Equipment Upgrades - S	100	100	100	100	100																				
8	Commercial	Landscape Conversion or Turf Removal - MF	116226	116226	116226	116226	116226																				
9	Single Family	Landscape Conversion or Turf Removal -SFF	116226	116226	116226	116226	116226																				
10	Single Family	Mulch rebate	116226	116226	116226	116226	116226																				
11	Commercial	Restaurant Spray Nozzle Rebates	20	20	20	20	20																				
12	Irrigation Com	Smart Irrigation Controller (Weather-Based Ir	20	20	20	20	20																				
13	Single Family	Smart Irrigation Controller (Weather-Based Ir	100	100	100	100	100																				
14	Commercial	Water Use Surveys/Audits - CII	16	16	16	16	16																				
15	Multi Family	Water Use Surveys/Audits - MFR	16	16	16	16	16																				
16	Single Family	Water Use Surveys/Audits - SFR	270	270	270	270	270																				

Annual Program Overhead Cost (2020 dollars)	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	
Enter additional program cost not included in activity definitions																										

Model calculation tables below this line. Do not delete or modify.

**Effective Conservation Activity**

Activity ID	Class	Activity Name	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045
1	Commercial	Drip Irrigation Incentive for MFR and CII	20	40	60	80	100	100	100	100	100	100	100	100	80	60	40	20	0	0	0	0	0	0	0	0	0
2	Single Family	Drip Irrigation Incentive for SFR	100	200	300	400	500	500	500	500	500	500	500	500	400	300	200	100	0	0	0	0	0	0	0	0	0
3	Single Family	High Efficiency Clothes Washer Rebate - Res	254	508	762	1,016	1,270	1,270	1,270	1,270	1,270	1,270	1,270	1,270	1,270	1,270	1,016	762	508	254	0	0	0	0	0	0	0
4	Commercial	High Efficiency Faucet Aerator / Showerhead	100	200	300	400	500	400	300	200	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	Single Family	High Efficiency Faucet Aerator / Showerhead	762	1,524	2,286	3,048	3,810	3,048	2,286	1,524	762	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	Irrigation Com	Incentivize Irrigation Equipment Upgrades - L	20	40	60	80	100	100	100	100	100	100	80	60	40	20	0	0	0	0	0	0	0	0	0	0	0
7	Single Family	Incentivize Irrigation Equipment Upgrades - S	100	200	300	400	500	500	500	500	500	500	400	300	200	100	0	0	0	0	0	0	0	0	0	0	0
8	Commercial	Landscape Conversion or Turf Removal - MF	116,226	232,452	348,678	464,904	581,130	581,130	581,130	581,130	581,130	581,130	464,904	348,678	232,452	116,226	0	0	0	0	0	0	0	0	0	0	0
9	Single Family	Landscape Conversion or Turf Removal -SFF	116,226	232,452	348,678	464,904	581,130	581,130	581,130	581,130	581,130	581,130	464,904	348,678	232,452	116,226	0	0	0	0	0	0	0	0	0	0	0
10	Single Family	Mulch rebate	116,226	232,452	348,678	464,904	581,130	464,904	348,678	232,452	116,226	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11	Commercial	Restaurant Spray Nozzle Rebates	20	40	60	80	100	80	60	40	20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12	Irrigation Com	Smart Irrigation Controller (Weather-Based Ir	20	40	60	80	100	100	100	100	100	100	80	60	40	20	0	0	0	0	0	0	0	0	0	0	0
13	Single Family	Smart Irrigation Controller (Weather-Based Ir	100	200	300	400	500	500	500	500	500	500	400	300	200	100	0	0	0	0	0	0	0	0	0	0	0
14	Commercial	Water Use Surveys/Audits - CII	16	29	39	47	54	38	25	15	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15	Multi Family	Water Use Surveys/Audits - MFR	16	29	39	47	54	38	25	15	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16	Single Family	Water Use Surveys/Audits - SFR	270	486	659	797	908	638	422	249	111	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

**Gross Water Savings (AF)**

Activity ID	Class	Activity Name	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045
1	Commercial	Drip Irrigation Incentive for MFR and CII	0.6	1.2	1.7	2.3	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.3	1.7	1.2	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	Single Family	Drip Irrigation Incentive for SFR	0.6	1.2	1.7	2.3	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.3	1.7	1.2	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	Single Family	High Efficiency Clothes Washer Rebate - Res	3.9	7.8	11.7	15.6	19.5	19.5	19.5	19.5	19.5	19.5	19.5	19.5	19.5	19.5	15.6	11.7	7.8	3.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	Commercial	High Efficiency Faucet Aerator / Showerhead	1.7	3.5	5.2	7.0	8.7	7.0	5.2	3.5	1.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	Single Family	High Efficiency Faucet Aerator / Showerhead	4.7	9.4	14.0	18.7	23.4	18.7	14.0	9.4	4.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6	Irrigation Com	Incentivize Irrigation Equipment Upgrades - L	2.2	4.4	6.6	8.9	11.1	11.1	11.1	11.1	11.1	11.1	8.9	6.6	4.4	2.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7	Single Family	Incentivize Irrigation Equipment Upgrades - S	5.3	10.6	15.9	21.2	26.5	26.5	26.5	26.5	26.5	26.5	21.2	15.9	10.6	5.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8	Commercial	Landscape Conversion or Turf Removal - MF	4.7	9.5	14.2	19.0	23.7	23.7	23.7	23.7	23.7	23.7	19.0	14.2	9.5	4.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
9	Single Family	Landscape Conversion or Turf Removal -SFF	4.7	9.5	14.2	19.0	23.7	23.7	23.7	23.7	23.7	23.7	19.0	14.2	9.5	4.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10	Single Family	Mulch rebate	4.7	9.5	14.2	19.0	23.7	19.0	14.2	9.5	4.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11	Commercial	Restaurant Spray Nozzle Rebates	2.7	5.4	8.1	10.8	13.5	10.8	8.1	5.4	2.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12	Irrigation Com	Smart Irrigation Controller (Weather-Based Ir	5.9	11.9	17.8	23.7	29.7	29.7	29.7	29.7	29.7	29.7	23.7	17.8	11.9	5.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
13	Single Family	Smart Irrigation Controller (Weather-Based Ir	5.3	10.6	15.9	21.2	26.5	26.5	26.5	26.5	26.5	26.5	21.2	15.9	10.6	5.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
14	Commercial	Water Use Surveys/Audits - CII	5.6	10.2	13.8	16.7	19.0	13.3	8.8	5.2	2.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
15	Multi Family	Water Use Surveys/Audits - MFR	5.6	10.2	13.8	16.7	19.0	13.3	8.8	5.2	2.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
16	Single Family	Water Use Surveys/Audits - SFR	10.3	18.5	25.0	30.3	34.5	24.2	16.0	9.4	4.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		<b>Total Gross Water Savings</b>	<b>68.7</b>	<b>133.1</b>	<b>194.0</b>	<b>252.2</b>	<b>308.1</b>	<b>272.7</b>	<b>241.6</b>	<b>214.0</b>	<b>189.1</b>	<b>166.4</b>	<b>138.2</b>	<b>110.0</b>	<b>80.6</b>	<b>51.2</b>	<b>21.8</b>	<b>16.8</b>	<b>11.7</b>	<b>7.8</b>	<b>3.9</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	







Activity ID	Class	Activity Name	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045
1	Commercial	Drip Irrigation Incentive for MFR and CII	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	Single Family	Drip Irrigation Incentive for SFR	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	Single Family	High Efficiency Clothes Washer Rebate - Res	4,572.0	8,915.4	13,046.5	16,980.5	20,731.5	19,740.6	18,820.4	17,965.9	17,172.5	16,435.8	15,751.6	15,116.4	14,526.5	13,978.7	13,470.1	10,573.2	7,785.3	5,098.5	2,505.6	0.0	0.0	0.0	0.0	0.0	0.0
4	Commercial	High Efficiency Faucet Aerator / Showerhead	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	Single Family	High Efficiency Faucet Aerator / Showerhead	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6	Irrigation Comr	Incentivize Irrigation Equipment Upgrades - L	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7	Single Family	Incentivize Irrigation Equipment Upgrades - S	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8	Commercial	Landscape Conversion or Turf Removal - MF	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
9	Single Family	Landscape Conversion or Turf Removal -SFF	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10	Single Family	Mulch rebate	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11	Commercial	Restaurant Spray Nozzle Rebates	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12	Irrigation Comr	Smart Irrigation Controller (Weather-Based Ir	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
13	Single Family	Smart Irrigation Controller (Weather-Based Ir	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
14	Commercial	Water Use Surveys/Audits - CII	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
15	Multi Family	Water Use Surveys/Audits - MFR	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
16	Single Family	Water Use Surveys/Audits - SFR	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<b>Total Electricity Savings</b>			<b>4,572.0</b>	<b>8,915.4</b>	<b>13,046.5</b>	<b>16,980.5</b>	<b>20,731.5</b>	<b>19,740.6</b>	<b>18,820.4</b>	<b>17,965.9</b>	<b>17,172.5</b>	<b>16,435.8</b>	<b>15,751.6</b>	<b>15,116.4</b>	<b>14,526.5</b>	<b>13,978.7</b>	<b>13,470.1</b>	<b>10,573.2</b>	<b>7,785.3</b>	<b>5,098.5</b>	<b>2,505.6</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>

**Customer Electricity Bill Savings (2020 dollars)**

Activity ID	Class	Activity Name	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045
1	Commercial	Drip Irrigation Incentive for MFR and CII	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
2	Single Family	Drip Irrigation Incentive for SFR	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
3	Single Family	High Efficiency Clothes Washer Rebate - Res	\$1,283	\$2,502	\$3,661	\$4,765	\$5,817	\$5,539	\$5,281	\$5,041	\$4,819	\$4,612	\$4,420	\$4,242	\$4,076	\$3,922	\$3,780	\$2,967	\$2,185	\$1,431	\$703	\$0	\$0	\$0	\$0	\$0	\$0
4	Commercial	High Efficiency Faucet Aerator / Showerhead	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
5	Single Family	High Efficiency Faucet Aerator / Showerhead	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
6	Irrigation Comr	Incentivize Irrigation Equipment Upgrades - L	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
7	Single Family	Incentivize Irrigation Equipment Upgrades - S	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
8	Commercial	Landscape Conversion or Turf Removal - MF	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
9	Single Family	Landscape Conversion or Turf Removal -SFF	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
10	Single Family	Mulch rebate	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
11	Commercial	Restaurant Spray Nozzle Rebates	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
12	Irrigation Comr	Smart Irrigation Controller (Weather-Based Ir	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
13	Single Family	Smart Irrigation Controller (Weather-Based Ir	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
14	Commercial	Water Use Surveys/Audits - CII	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
15	Multi Family	Water Use Surveys/Audits - MFR	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
16	Single Family	Water Use Surveys/Audits - SFR	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
<b>Total Electricity Savings</b>			<b>\$1,283</b>	<b>\$2,502</b>	<b>\$3,661</b>	<b>\$4,765</b>	<b>\$5,817</b>	<b>\$5,539</b>	<b>\$5,281</b>	<b>\$5,041</b>	<b>\$4,819</b>	<b>\$4,612</b>	<b>\$4,420</b>	<b>\$4,242</b>	<b>\$4,076</b>	<b>\$3,922</b>	<b>\$3,780</b>	<b>\$2,967</b>	<b>\$2,185</b>	<b>\$1,431</b>	<b>\$703</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>

**Customer Gas Savings (Therms)**

Activity ID	Class	Activity Name	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045
1	Commercial	Drip Irrigation Incentive for MFR and CII	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	Single Family	Drip Irrigation Incentive for SFR	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	Single Family	High Efficiency Clothes Washer Rebate - Res	4,445	8,668	12,684	16,509	20,156	19,192	18,298	17,467	16,695	15,979	15,314	14,696	14,123	13,590	13,096	10,280	7,569	4,957	2,436	0	0	0	0	0	
4	Commercial	High Efficiency Faucet Aerator / Showerhead	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
5	Single Family	High Efficiency Faucet Aerator / Showerhead	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	Irrigation Comr	Incentivize Irrigation Equipment Upgrades - L	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7	Single Family	Incentivize Irrigation Equipment Upgrades - S	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8	Commercial	Landscape Conversion or Turf Removal - MF	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9	Single Family	Landscape Conversion or Turf Removal -SFF	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10	Single Family	Mulch rebate	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11	Commercial	Restaurant Spray Nozzle Rebates	7,305	14,610	21,915	29,220	36,525	29,220	21,915	14,610	7,305	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12	Irrigation Comr	Smart Irrigation Controller (Weather-Based Ir	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13	Single Family	Smart Irrigation Controller (Weather-Based Ir	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14	Commercial	Water Use Surveys/Audits - CII	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15	Multi Family	Water Use Surveys/Audits - MFR	4,404	7,928	10,747	13,002	14,806	10,401	6,878	4,059	1,804	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
16	Single Family	Water Use Surveys/Audits - SFR	3,199	5,758	7,806	9,444	10,754	7,555	4,996	2,948	1,310	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
<b>Total Gas Savings</b>			<b>19,353</b>	<b>36,964</b>	<b>53,151</b>	<b>68,174</b>	<b>82,240</b>	<b>66,368</b>	<b>52,086</b>	<b>39,084</b>	<b>27,115</b>	<b>15,979</b>	<b>15,314</b>	<b>14,696</b>	<b>14,123</b>	<b>13,590</b>	<b>13,096</b>	<b>10,280</b>	<b>7,569</b>	<b>4,957</b>	<b>2,436</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	

**Customer Gas Savings (2020 dollars)**

Activity ID	Class	Activity Name	2021	2022	2023	2024	2025	2026	2027	2028	2029
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15	Multi Family	Water Use Surveys/Audits - MFR	\$8,818	\$15,872	\$21,515	\$26,030	\$29,642	\$20,824	\$13,770	\$8,126	\$3,612	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
16	Single Family	Water Use Surveys/Audits - SFR	\$6,405	\$11,529	\$15,628	\$18,907	\$21,530	\$15,125	\$10,002	\$5,903	\$2,623	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
	<b>Total Gas Savings</b>		<b>\$29,995</b>	<b>\$56,500</b>	<b>\$80,156</b>	<b>\$101,481</b>	<b>\$120,890</b>	<b>\$97,866</b>	<b>\$78,023</b>	<b>\$60,745</b>	<b>\$45,534</b>	<b>\$31,991</b>	<b>\$30,660</b>	<b>\$29,423</b>	<b>\$28,275</b>	<b>\$27,209</b>	<b>\$26,219</b>	<b>\$20,580</b>	<b>\$15,154</b>	<b>\$9,924</b>	<b>\$4,877</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	

**User Entered Utility Avoided Water System Cost (2020 dollars)**

Activity ID	Class	Activity Name	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045
1	Commercial	Drip Irrigation Incentive for MFR and CII	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
2	Single Family	Drip Irrigation Incentive for SFR	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
3	Single Family	High Efficiency Clothes Washer Rebate - Res	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
4	Commercial	High Efficiency Faucet Aerator / Showerhead	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
5	Single Family	High Efficiency Faucet Aerator / Showerhead	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
6	Irrigation Comr	Incentivize Irrigation Equipment Upgrades - L	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
7	Single Family	Incentivize Irrigation Equipment Upgrades - S	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
8	Commercial	Landscape Conversion or Turf Removal - MF	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
9	Single Family	Landscape Conversion or Turf Removal -SFF	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
10	Single Family	Mulch rebate	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
11	Commercial	Restaurant Spray Nozzle Rebates	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
12	Irrigation Comr	Smart Irrigation Controller (Weather-Based Ir	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
13	Single Family	Smart Irrigation Controller (Weather-Based Ir	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
14	Commercial	Water Use Surveys/Audits - CII	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
15	Multi Family	Water Use Surveys/Audits - MFR	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
16	Single Family	Water Use Surveys/Audits - SFR	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
	<b>Total Avoided Cost</b>		<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>

**User Entered Utility Avoided Wastewater System Cost (2020 dollars)**

Activity ID	Class	Activity Name	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045
1	Commercial	Drip Irrigation Incentive for MFR and CII	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
2	Single Family	Drip Irrigation Incentive for SFR	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
3	Single Family	High Efficiency Clothes Washer Rebate - Res	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
4	Commercial	High Efficiency Faucet Aerator / Showerhead	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
5	Single Family	High Efficiency Faucet Aerator / Showerhead	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
6	Irrigation Comr	Incentivize Irrigation Equipment Upgrades - L	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
7	Single Family	Incentivize Irrigation Equipment Upgrades - S	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
8	Commercial	Landscape Conversion or Turf Removal - MF	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
9	Single Family	Landscape Conversion or Turf Removal -SFF	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
10	Single Family	Mulch rebate	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
11	Commercial	Restaurant Spray Nozzle Rebates	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
12	Irrigation Comr	Smart Irrigation Controller (Weather-Based Ir	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
13	Single Family	Smart Irrigation Controller (Weather-Based Ir	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
14	Commercial	Water Use Surveys/Audits - CII	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
15	Multi Family	Water Use Surveys/Audits - MFR	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
16	Single Family	Water Use Surveys/Audits - SFR	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
	<b>Total Avoided Cost</b>		<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>

**User Entered Other Utility Avoided Cost (2020 dollars)**

Activity ID	Class	Activity Name	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045
1	Commercial	Drip Irrigation Incentive for MFR and CII	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
2	Single Family	Drip Irrigation Incentive for SFR	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
3	Single Family	High Efficiency Clothes Washer Rebate - Res	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
4	Commercial	High Efficiency Faucet Aerator / Showerhead	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
5	Single Family	High Efficiency Faucet Aerator / Showerhead	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
6	Irrigation Comr	Incentivize Irrigation Equipment Upgrades - L	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
7	Single Family	Incentivize Irrigation Equipment Upgrades - S	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
8	Commercial	Landscape Conversion or Turf Removal - MF	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
9	Single Family	Landscape Conversion or Turf Removal -SFF	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
10	Single Family	Mulch rebate	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
11	Commercial	Restaurant Spray Nozzle Rebates	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
12	Irrigation Comr	Smart Irrigation Controller (Weather-Based Ir	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
13	Single Family	Smart Irrigation Controller (Weather-Based Ir	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
14	Commercial	Water Use Surveys/Audits - CII	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
15	Multi Family	Water Use Surveys/Audits - MFR	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
16	Single Family	Water Use Surveys/Audits - SFR	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
	<b>Total Avoided Cost</b>		<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>

**Model Calculator Utility Water System Avoided Cost (2020 dollars)**

Activity ID	Class	Activity Name	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045
1	Commercial	Drip Irrigation Incentive for MFR and CII	\$837	\$1,708	\$2,613	\$3,552	\$4,525	\$4,619	\$4,713	\$4,806	\$4,900	\$4,994	\$5,097	\$5,201	\$4,243	\$3,244	\$2,204	\$1,125	\$								





## Appendix D

### **Prioritization and Screening of Future Water Conservation Measures**

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**Prioritization and Screening of Future Water Conservation Measures**

Marin-Sonoma Saving Water Partnership

**INSTRUCTIONS:** Please review and complete the orange highlighted cells using the provided dropdown lists. Comments and clarifications may be added to the comments column on the right. You may use the filter features to help navigate this list. "Preference for Implementation" need only be completed when a program is given a priority of 3 or greater. See READ ME tab for additional information.

Conservation Measure/Program	Type	Indoor / Outdoor	Primary End Use	Sector	Priority as a Regional Program	Priority as a Local Program	Preference for Implementation	Current Implementation Status	Notes / Comments	Source	Added By
<b>Agency Actions and Water Rates</b>											
Customer Water Loss Reduction (AMI Leak Detection)	Agency action	Both	Water Loss	All						2015 Screening	EKI
Increase Enforcement of Customer Pressure Reducing Valve (PRV) Requirement	Agency action	Both	Water Loss; Irrigation	All						Added 2020	EKI
Increase Enforcement of Indoor Fixture Retrofit at Time of Sale	Agency action	Indoor	Toilet, Urinal, Faucet, Showerhead	All					Enforcement of SB 407 at time of sale.	2015 Screening	EKI
Increase Enforcement of State Water Waste Regulations	Agency action	Outdoor	Irrigation	All					Assumes water waste regulations per Executive Order B-40-17 rulemaking is completed largely as currently proposed.	Added 2020	EKI
Install AMI for Existing Accounts	Agency action	Both	Water Loss	All						2015 Screening	EKI
Install AMI for High Water Users and Large Landscape Accounts	Agency action	Outdoor	Water Loss	All						2015 Screening	EKI
Install AMI in New Development	Agency action	Both	Water Loss	All						2015 Screening	EKI
Rate Structure Evaluation	Agency action	Both	All	All						2015 Screening	EKI
Regional UHET and/or Urinal Bulk Purchase Program	Agency action	Indoor	Toilet / Urinal	All					Fixtures are purchased in bulk at a discounted rate and then sold to customers at the discounted rate	2015 Screening	EKI
Water Budgeting/Monitoring for Large Landscape Accounts	Agency action	Both	Irrigation	IRR						2015 Screening	EKI
Establish Separate Pricing Structure for Irrigation Accounts	Water Rates	Outdoor	Irrigation	IRR						2015 Screening	EKI
Modification to or Implementation of Tiered Rate Conservation Pricing	Water Rates	Both	All	All						2015 Screening	EKI
Tiered Water Rates (Conservation Pricing)	Water Rates	Both	All	All						2015 Screening	EKI
Water Budget Based Billing for All Customers	Water Rates	Both	All	All						2015 Screening	EKI
Water Budget Based Billing for Only Irrigation Customers	Water Rates	Outdoor	Irrigation	CII, IRR						2015 Screening	EKI
<b>Public Outreach and Education</b>											
Water Use Surveys/Audits - CII	Audit/ Survey	Both	All	CII						2015 Screening	EKI
Water Use Surveys/Audits - MFR	Audit/ Survey	Indoor	All Indoor	MFR						2015 Screening	EKI
Water Use Surveys/Audits - SFR	Audit/ Survey	Both	All	SFR						2015 Screening	EKI
Educational Workshops	Public Outreach/ Workshop	Outdoor	All Outdoor	SFR						Added 2020	MMWD
Garden tour	Public Outreach/ Workshop	Outdoor	Outdoor	SFR						Added 2020	MMWD
Promote Green Building and Certification	Public Outreach/ Workshop	Both	All	All						2015 Screening	EKI
Provide Support with Smart Irrigation Controller Setup	Public Outreach/ Workshop	Outdoor	Irrigation	All						Added 2020	EKI
Public Outreach through Print & Electronic Media - Focused on Indoor Conservation	Public Outreach/ Workshop	Outdoor	All Indoor	All						2015 Screening	EKI
Public Outreach through Print & Electronic Media - Focused on Outdoor Irrigation	Public Outreach/ Workshop	Indoor	Irrigation	All						2015 Screening	EKI
QWEL Training (Qualified Water Efficient Landscaper)	Public Outreach/ Workshop	Outdoor	Irrigation	All						Added 2020	EKI
School Education Programs	Public Outreach/ Workshop	Both	All	SFR, MFR						2015 Screening	EKI
<b>Device-Based and Financial Incentive Programs</b>											
Direct Install of Efficient Indoor Fixtures - Commercial and Industrial	Direct Install/ No-Cost Device	Indoor	Toilet, Urinal, Faucet, Showerhead	CII						2015 Screening	EKI
Direct Install of Efficient Indoor Fixtures - Government Buildings	Direct Install/ No-Cost Device	Indoor	Toilet, Urinal, Faucet, Showerhead	CII						2015 Screening	EKI
Direct Install of Efficient Indoor Fixtures - Low Income Residential	Direct Install/ No-Cost Device	Indoor	Toilet, Faucet, Showerhead	SFR, MFR						2015 Screening	EKI
Direct Install of Efficient Indoor Fixtures - Residential	Direct Install/ No-Cost Device	Indoor	Toilet, Faucet, Showerhead	SFR, MFR						2015 Screening	EKI
High Efficiency Clothes Washer Install - Low Income Residential Customers	Direct Install/ No-Cost Device	Indoor	Clothes Washer	SFR, MFR						Added 2020	EKI
High Efficiency Faucet Aerator / Showerhead Giveaway - CII Customers	Direct Install/ No-Cost Device	Indoor	Faucet, Showerhead	CII						2015 Screening	EKI
High Efficiency Faucet Aerator / Showerhead Giveaway - Residential Customers	Direct Install/ No-Cost Device	Indoor	Faucet, Showerhead	SFR, MFR						2015 Screening	EKI
Rain Barrel Giveaway	Direct Install/ No-Cost Device	Outdoor	Irrigation	SFR						Added 2020	EKI
Rain Sensor Giveaway	Direct Install/ No-Cost Device	Outdoor	Irrigation	All						2015 Screening	EKI
Rotating Sprinkler Nozzle Giveaway	Direct Install/ No-Cost Device	Outdoor	Irrigation	All						Added 2020	EKI
Smart Irrigation Controller (Weather-Based Irrigation Controller) Giveaway - Large Landscape	Direct Install/ No-Cost Device	Outdoor	Irrigation	MFR, CII						2015 Screening	EKI
Smart Irrigation Controller (Weather-Based Irrigation Controller) Giveaway - SFR	Direct Install/ No-Cost Device	Outdoor	Irrigation	SFR						Added 2020	EKI
Soil Moisture Sensor Giveaway	Direct Install/ No-Cost Device	Outdoor	Irrigation	All						Added 2020	EKI
Toilet Flapper Giveaway - SFR customers	Direct Install/ No-Cost Device	Indoor	Toilet	SFR, MFR					Could be used for CII customers, but hasn't been yet.	Added 2020	Santa Rosa
UHET Direct Installation - CII	Direct Install/ No-Cost Device	Indoor	Toilet	CII						2015 Screening	EKI
UHET Direct Installation - Residential	Direct Install/ No-Cost Device	Indoor	Toilet	SFR, MFR						2015 Screening	EKI
Urinal Direct Installation - CII	Direct Install/ No-Cost Device	Indoor	Urinal	CII						Added 2020	EKI
Autoclave (Steam-Sterilizer) Retrofit Rebates	Rebate/ Financial Incentive	Indoor	CII Equipment	CII					More info: <a href="https://www.energy.gov/eere/femp/water-efficient-technology-opportunity-steam-sterilizer-condensate-retrofit-kit">https://www.energy.gov/eere/femp/water-efficient-technology-opportunity-steam-sterilizer-condensate-retrofit-kit</a>	Added 2020	EKI
Connectionless Food Steamer Rebates	Rebate/ Financial Incentive	Indoor	CII Equipment	CII					More info: <a href="https://www.energy.gov/eere/femp/water-efficient-technology-opportunity-connectionless-food-steamer">https://www.energy.gov/eere/femp/water-efficient-technology-opportunity-connectionless-food-steamer</a>	Added 2020	EKI
Dipper Well Rebates	Rebate/ Financial Incentive	Indoor	CII Equipment	CII					Incentivize replacement of perpetual-flow holders for ice cream dippers & utensils; <a href="https://server-products.com/equipment/conservewell/utensil-holder/87740.htm">https://server-products.com/equipment/conservewell/utensil-holder/87740.htm</a>	Added 2020	EKI
Drip Irrigation Incentive for MFR and CII	Rebate/ Financial Incentive	Outdoor	Irrigation	MFR, CII						2015 Screening	EKI
Drip Irrigation Incentive for SFR	Rebate/ Financial Incentive	Outdoor	Irrigation	SFR						2015 Screening	EKI
Dry Vacuum Pumps	Rebate/ Financial Incentive	Indoor	CII Equipment	CII						2015 Screening	EKI
Efficient (EnergyStar) Dishwasher Rebates	Rebate/ Financial Incentive	Indoor	Dishwashers	SFR						2015 Screening	EKI
High Efficiency Clothes Washer Rebate - Residential	Rebate/ Financial Incentive	Indoor	Clothes Washer	SFR, MFR						2015 Screening	EKI
High Efficiency Clothes Washer Rebate Program - CII	Rebate/ Financial Incentive	Indoor	Clothes Washer	CII						2015 Screening	EKI
High Efficiency Urinal (<0.25 gal/flush) Rebates - CII	Rebate/ Financial Incentive	Indoor	Urinal	CII						2015 Screening	EKI

**Prioritization and Screening of Future Water Conservation Measures**

Marin-Sonoma Saving Water Partnership

**INSTRUCTIONS:** Please review and complete the orange highlighted cells using the provided dropdown lists. Comments and clarifications may be added to the comments column on the right. You may use the filter features to help navigate this list. "Preference for Implementation" need only be completed when a program is given a priority of 3 or greater. See READ ME tab for additional information.

Conservation Measure/Program	Type	Indoor / Outdoor	Primary End Use	Sector	Priority as a Regional Program	Priority as a Local Program	Preference for Implementation	Current Implementation Status	Notes / Comments	Source	Added By
Hot Water on Demand Pump System Rebate	Rebate/ Financial Incentive	Indoor	Hot Water	SFR, MFR						2015 Screening	EKI
Incentivize Artificial Turf for Sports Fields	Rebate/ Financial Incentive	Outdoor	Irrigation	CII						2015 Screening	EKI
Incentivize Cooling Tower Upgrades	Rebate/ Financial Incentive	Indoor	Cooling Towers	CII						Added 2020	EKI
Incentivize Gray Water Retrofit for Existing SFR Customers	Rebate/ Financial Incentive	Outdoor	Irrigation / Gray Water	SFR						2015 Screening	EKI
Incentivize Gray Water Systems for New CII Development	Rebate/ Financial Incentive	Both	Irrigation / Gray Water	CII						2015 Screening	EKI
Incentivize Irrigation Equipment Upgrades - Large Landscapes	Rebate/ Financial Incentive	Outdoor	Irrigation	MFR, CII, IRR						2015 Screening	EKI
Incentivize Irrigation Equipment Upgrades - SFR	Rebate/ Financial Incentive	Outdoor	Irrigation	SFR						2015 Screening	EKI
Incentivize Replacement of Inefficient Commercial and Industrial Equipment	Rebate/ Financial Incentive	Indoor	CII Equipment	CII					Example: SoCal Water Smart Water Savings Incentive Program: <a href="https://socialwatersmart.com/en/commercial/water-savings-incentive-program/">https://socialwatersmart.com/en/commercial/water-savings-incentive-program/</a>	2015 Screening	EKI
Incentivize Replacement of Pressure Reducing Valves (PRVs) with 60-70 psi PRVs	Rebate/ Financial Incentive	Both	Water loss; Irrigation	All					PRVs must be installed by customers with pressure exceeding 80 psi, per the plumbing code	2015 Screening	EKI
Incentivize Submetering for Existing Customers - CII	Rebate/ Financial Incentive	Both	All Indoor	MFR, COM, IRR						2015 Screening	EKI
Incentivize Submetering for Existing Customers - MFR	Rebate/ Financial Incentive	Both	All Indoor	MFR						2015 Screening	EKI
Incentivize Submetering of Cooling Towers for Existing Customers	Rebate/ Financial Incentive	Indoor	Cooling Towers	CII						2015 Screening	EKI
Indoor Fixture Program For Hotels & Motels	Rebate/ Financial Incentive	Indoor	All Indoor	CII						2015 Screening	EKI
Indoor Fixture Program For Schools	Rebate/ Financial Incentive	Indoor	All Indoor	CII						2015 Screening	EKI
Landscape Conversion or Turf Removal - MFR and CII	Rebate/ Financial Incentive	Outdoor	Irrigation	MFR, CII						2015 Screening	EKI
Landscape Conversion or Turf Removal -SFR	Rebate/ Financial Incentive	Outdoor	Irrigation	SFR						2015 Screening	EKI
Mulch rebate	Rebate/ Financial Incentive	Outdoor	Irrigation	SFR						Added 2020	MMWD
Nonresidential Incentive for Self-closing or Metering Faucets	Rebate/ Financial Incentive	Indoor	Faucet	CII						Added 2020	Sonoma
Plumber Initiated UHET and / or Urinal Retrofit Program	Rebate/ Financial Incentive	Indoor	Toilet	All						2015 Screening	EKI
Rain Barrel Rebate	Rebate/ Financial Incentive	Outdoor	Irrigation	SFR						2015 Screening	EKI
Rain Sensor Rebate	Rebate/ Financial Incentive	Outdoor	Irrigation	All						2015 Screening	EKI
Rainwater Catchment System Rebate for Large Landscapes	Rebate/ Financial Incentive	Outdoor	Irrigation	MFR, CII						2015 Screening	EKI
Rebates for Conductivity Controllers on Cooling Towers	Rebate/ Financial Incentive	Indoor	Cooling Towers	CII						2015 Screening	EKI
Restaurant Spray Nozzle Rebates	Rebate/ Financial Incentive	Indoor	CII Equipment	CII						2015 Screening	EKI
Rotating Sprinkler Nozzle Rebate	Rebate/ Financial Incentive	Outdoor	Irrigation	All						2015 Screening	EKI
Smart Irrigation Controller (Weather-Based Irrigation Controller) Rebates - Large Landscape	Rebate/ Financial Incentive	Outdoor	Irrigation	MFR, CII						2015 Screening	EKI
Smart Irrigation Controller (Weather-Based Irrigation Controller) Rebates - SFR	Rebate/ Financial Incentive	Outdoor	Irrigation	SFR						2015 Screening	EKI
Soil Moisture Sensor Rebate	Rebate/ Financial Incentive	Outdoor	Irrigation	All						2015 Screening	EKI
Swimming Pool and Hot Tub Cover Rebates	Rebate/ Financial Incentive	Outdoor	Pool/Hot Tub	SFR, MFR						Added 2020	EKI
Thermostatic Shut-Off Valve Showerheads/Tub Spouts Rebates	Rebate/ Financial Incentive	Indoor	Shower	SFR, MFR, CII					Reduce hot water use before showering <a href="https://www.thinkevolve.com/">https://www.thinkevolve.com/</a>	Added 2020	EKI
Tier 4 Exemption	Rebate/ Financial Incentive	Both	toilet, Faucet, Showerhead, clothes washer, irrigation	SFR					Exemption from high tier water rates w/installation of devices	Added 2020	MMWD
UHET <1.0 gal/flush Rebate - CII	Rebate/ Financial Incentive	Indoor	Toilet	CII						2015 Screening	EKI
UHET <1.0 gal/flush Rebate - Residential	Rebate/ Financial Incentive	Indoor	Toilet	SFR, MFR						2015 Screening	EKI
Water Savings Incentive Program for CII	Rebate/ Financial Incentive	Indoor	All Indoor	CII					Financial incentive to reward demonstrated water savings and offset capital improvement costs; Example: SoCal Water Smart Water Savings Incentive Program: <a href="https://socialwatersmart.com/en/commercial/water-savings-incentive-program/">https://socialwatersmart.com/en/commercial/water-savings-incentive-program/</a>	2015 Screening	EKI
<b>Policies and Regulations</b>											
Demand Offset/Water Neutral Policy for Large New Developments	Policy/ Regulation	Both	All	All						Added 2020	EKI
Prohibit Once through Cooling Systems	Policy/ Regulation	Both	CII Equipment	CII						2015 Screening	EKI
Require <0.25 gal/flush Urinals in New Development	Policy/ Regulation	Indoor	Urinal	CII						2015 Screening	EKI
Require <1.0 gal/flush Toilets in New Development	Policy/ Regulation	Indoor	Toilet	All					State minimum efficiency is 1.28 gal/flush	Added 2020	EKI
Require Cooling Tower Retrofits	Policy/ Regulation	Indoor	Cooling Towers	CII						2015 Screening	EKI
Require Efficient (EnergyStar) Dishwashers in New Development	Policy/ Regulation	Indoor	Dishwashers	SFR, MFR						2015 Screening	EKI
Require High Efficiency Clothes Washers in New Development	Policy/ Regulation	Indoor	Clothes Washer	SFR, MFR						2015 Screening	EKI
Require Hot Water on Demand / Structured Plumbing in New Residential Development	Policy/ Regulation	Indoor	Shower/Sink	SFR, MFR						2015 Screening	EKI
Require Irrigation Designers / Installers be Certified (QWEL)	Policy/ Regulation	Outdoor	Irrigation	All						2015 Screening	EKI
Require On-Site Water Reuse Systems (Grey Water or Black Water) for Large CII Developments	Policy/ Regulation	Outdoor	Irrigation / Recycled Water	CII					Example: <a href="https://sfwater.org/index.aspx?page=686">https://sfwater.org/index.aspx?page=686</a>	Added 2020	EKI
Require Plumbing for Gray Water in New SFR Development	Policy/ Regulation	Outdoor	Irrigation / Gray Water	SFR						2015 Screening	EKI
Require Plumbing for Recycled Water in New CII Development	Policy/ Regulation	Outdoor	Irrigation / Recycled Water	CII						Added 2020	EKI
Require Plumbing for Recycled Water in New MFR Development	Policy/ Regulation	Outdoor	Irrigation / Recycled Water	MFR						Added 2020	EKI
Require Rain Barrels in New Development	Policy/ Regulation	Outdoor	Irrigation	SFR						2015 Screening	EKI
Require Submetering by Unit for Existing Commercial Customers	Policy/ Regulation	Indoor	All Indoor	CII						Added 2020	EKI
Require Submetering by Unit for New Commercial Developments	Policy/ Regulation	Indoor	All Indoor	CII						Added 2020	EKI
Require Submetering for New MFR Developments	Policy/ Regulation	Indoor	All Indoor	MFR						2015 Screening	EKI
Require Submetering for New Mobile Home Park Developments	Policy/ Regulation	Indoor	All Indoor	MFR						2015 Screening	EKI
Require Submetering of Cooling Towers for Existing Customers	Policy/ Regulation	Indoor	Cooling Towers	CII						Added 2020	EKI
Require Submetering of Cooling Towers for New Development	Policy/ Regulation	Indoor	Cooling Towers	CII						Added 2020	EKI
Require Submetering of Existing MFR (and Mobile Home Park) Customers	Policy/ Regulation	Indoor	All Indoor	MFR						Added 2020	EKI
Require Submetering of Landscaping for Existing MFR and Commercial Customers	Policy/ Regulation	Outdoor	Irrigation	MFR, CII						Added 2020	EKI
Require Submetering of Landscaping for New MFR and Commercial Developments	Policy/ Regulation	Outdoor	Irrigation	CII						Added 2020	EKI
Require Swimming Pool and Hot Tub Covers	Policy/ Regulation	Outdoor	Pool/Hot Tub	SFR, MFR						2015 Screening	EKI

**Prioritization and Screening of Future Water Conservation Measures**

Marin-Sonoma Saving Water Partnership

**INSTRUCTIONS:** Please review and complete the orange highlighted cells using the provided dropdown lists. Comments and clarifications may be added to the comments column on the right. You may use the filter features to help navigate this list. "Preference for Implementation" need only be completed when a program is given a priority of 3 or greater. See READ ME tab for additional information.

Conservation Measure/Program	Type	Indoor / Outdoor	Primary End Use	Sector	Priority as a Regional Program	Priority as a Local Program	Preference for Implementation	Current Implementation Status	Notes / Comments	Source	Added By
Require Water Efficiency Plan Reviews for New CII Development	Policy/ Regulation	Both	All Indoor	CII						2015 Screening	EKI
Require Weather Adjusting Smart Irrigation Controllers, Rain Sensors, and/or Soil Moisture Sensors in New Development	Policy/ Regulation	Outdoor	Irrigation	All						2015 Screening	EKI
Restrict Landscape Irrigation to Designated Days/Times	Policy/ Regulation	Outdoor	Irrigation	All					Under all conditions, not just drought	2015 Screening	EKI
Water Conserving Landscape and Irrigation Codes, More Stringent than MWELO	Policy/ Regulation	Outdoor	Irrigation	All						2015 Screening	EKI
Water Waste Ordinance	Policy/ Regulation	Outdoor	All Outdoor	All						Added 2020	MMWD

**Abbreviations:**

- AMI = advanced metering infrastructure
- CII = commercial, industrial, institutional
- COM = commercial
- HET = high efficiency toilet
- HEU = high efficiency urinal
- Info = information
- IRR = irrigation account
- MFR = multi-family residential
- MWELo = Model Water Efficient Landscape Ordinance
- PRV = pressure reducing valve
- SFR = single-family residential
- SMSWP = Sonoma-Marín Saving Water Partnership
- UHET = ultra high efficiency toilet



## Appendix E

### Agency and Public Notices



# CITY OF PETALUMA

POST OFFICE BOX 61  
PETALUMA, CA 94953-0061

December 10, 2020

**Teresa Barrett**  
*Mayor*

**D'Lynda Fischer**  
**Mike Healy**  
**Gabe Kearney**  
**Dave King**  
**Kevin McDonnell**  
**Kathy Miller**  
*Councilmembers*

To: Interested Agencies

Re: Notice of Review and Preparation of the 2020 Urban Water Management Plan Update

The City of Petaluma is currently reviewing and updating the City's Urban Water Management Plan (UWMP), as required by State law. The 2020 UWMP is due to the California Department of Water Resources by July 1, 2021.

A draft of the 2020 UWMP will be made available for public review in spring of 2021 and a public hearing will be scheduled and noticed at least 14-days prior to the hearing. The UWMP will provide an analysis of the projected water demand and supply over the next 25 years, as well as an updated water conservation plan.

If you are interested in providing input during the preparation of the UWMP, please contact me at (707) 778-4580 or [kcarothers@cityofpetaluma.org](mailto:kcarothers@cityofpetaluma.org)

Sincerely,

**Kent Carothers**  
Deputy Director of Public Works & Utilities - Operations

**Distribution List:**

Sonoma County Water Agency, Attention: Grant Davis  
Sonoma Valley County Sanitation District, Attention: Grant Davis  
County of Sonoma PRMD (Permit Sonoma), Attention: Tennis Wick  
City of Santa Rosa, Attention: Jennifer Burke  
City of Sonoma, Attention: Colleen Ferguson  
Sonoma County LAFCO, Attn: Cynthia Olson  
City of Rohnert Park, Attention: Mary Grace Pawson  
City of Cotati, Attention: Craig Scott  
Town of Windsor, Attention: Sandi Potter  
North Marin Water District, Attention: Drew McIntyre  
Marin Municipal Water District, Attention: Ben Horenstein  
Valley of the Moon Water District, Attention: Matt Fullner  
Petaluma Valley Groundwater Sustainability Agency, Attention: Ann DuBay  
Sonoma Ecology Center, Attention: Richard Dale

**Public Works & Utilities**

**City Engineer**  
11 English Street  
Petaluma, CA 94952  
Phone (707) 778-4303

**Environmental Services**  
Ellis Creek Water  
Recycling Facility  
3890 Cypress Drive  
Petaluma, CA 94954  
Phone (707) 776-3777  
Fax: (707) 656-4067

**Parks & Facility  
Maintenance**  
840 Hopper St. Ext.  
Petaluma, CA 94952  
Phone (707) 778-4303  
Fax (707) 206-6065

**Transit Division**  
555 N. McDowell Blvd.  
Petaluma, CA 94954  
Phone (707) 778-4421

**Utilities & Field Operations**  
202 N. McDowell Blvd.  
Petaluma, CA 94954  
Phone (707) 778-4546  
Fax (707) 206-6034

E-Mail: [publicworks@cityofpetaluma.org](mailto:publicworks@cityofpetaluma.org)

**NOTICE OF PUBLIC HEARING**  
**ADOPTION OF THE CITY OF**  
**PETALUMA'S 2020 URBAN WATER**  
**MANAGEMENT PLAN**

Notice is hereby given that a public hearing will be conducted by the City Council on Monday, May 17, 2021, at the hour of 6:30 p.m., or as soon thereafter as the matter will be heard.

The hearing will be teleconferenced via Zoom. Information on how to listen and/or speak at the hearing will be on the May 17, 2021 Petaluma City Council meeting agenda: <https://cityofpetaluma.org/meetings/> by May 14, 2021. The purpose of the public hearing will be to receive public comment prior to formal addition of the City of Petaluma's "2020 Urban Water Management Plan."

The "2020 Urban Water Management Plan" will be available for public review at the City of Petaluma's website: <https://cityofpetaluma.org/water-supply/> by May 3, 2021.

If you cannot attend, you are encouraged to submit written comments and recommendations prior to the public hearing. Written comments may be mailed to: City Clerk, City of Petaluma, 11 English Street, Petaluma, CA 94952, or emailed to [cityclerk@cityofpetaluma.org](mailto:cityclerk@cityofpetaluma.org).

Samantha Pascoe  
Deputy City Clerk

85077 – Pub. Apr 15, 22, 29 May 6, 13,  
2021 5ti.



## Distribution System Water Loss Audits



# AWWA Free Water Audit Software: Reporting Worksheet

WAS v5.0  
American Water Works Association  
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?	Click to access definition
+	Click to add a comment

Water Audit Report for: **Petaluma**  
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: MILLION GALLONS (US) 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' ----->			
Volume from own sources:	+ ? 8	114.489	MG/Yr
Water imported:	+ ? 8	2,379.565	MG/Yr
Water exported:	+ ? 8	0.000	MG/Yr

**Master Meter and Supply Error Adjustments**

		Pcnt:			Value:	
+ ? 8	1.00%	<input checked="" type="radio"/>	<input type="radio"/>	1.00%		MG/Yr
+ ? 8	1.00%	<input checked="" type="radio"/>	<input type="radio"/>			MG/Yr
+ ?		<input checked="" type="radio"/>	<input type="radio"/>			MG/Yr

**WATER SUPPLIED:**      **2,469.360** MG/Yr

Enter negative % or value for under-registration  
Enter positive % or value for over-registration

**AUTHORIZED CONSUMPTION**

Billed metered:	+ ? 8	2,219.031	MG/Yr
Billed unmetered:	+ ? 10	0.086	MG/Yr
Unbilled metered:	+ ? 10	26.881	MG/Yr
Unbilled unmetered:	+ ?	30.867	MG/Yr

Default option selected for Unbilled unmetered - a grading of 5 is applied but not displayed

**AUTHORIZED CONSUMPTION:**      **2,276.865** MG/Yr

Click here: ?  
for help using option buttons below

Pcnt:	1.25%	<input checked="" type="radio"/>	<input type="radio"/>	Value:		MG/Yr
-------	-------	----------------------------------	-----------------------	--------	--	-------

Use buttons to select percentage of water supplied OR value

Pcnt:	0.25%	<input checked="" type="radio"/>	<input type="radio"/>	Value:		MG/Yr
-------	-------	----------------------------------	-----------------------	--------	--	-------

Pcnt:	4.00%	<input checked="" type="radio"/>	<input type="radio"/>	Value:		MG/Yr
Pcnt:	0.25%	<input checked="" type="radio"/>	<input type="radio"/>	Value:		MG/Yr

**WATER LOSSES (Water Supplied - Authorized Consumption)**

**192.495** MG/Yr

**Apparent Losses**

Unauthorized consumption:      + ?      **6.173** MG/Yr

Default option selected for unauthorized consumption - a grading of 5 is applied but not displayed

Customer metering inaccuracies:	+ ? 8	93.580	MG/Yr
Systematic data handling errors:	+ ?	5.548	MG/Yr

Default option selected for Systematic data handling errors - a grading of 5 is applied but not displayed

**Apparent Losses:**      **105.301** MG/Yr

**Real Losses (Current Annual Real Losses or CARL)**

**Real Losses = Water Losses - Apparent Losses:**      ?      **87.194** MG/Yr

**WATER LOSSES:**      **192.495** MG/Yr

**NON-REVENUE WATER**

**NON-REVENUE WATER:**      ?      **250.243** MG/Yr

= Water Losses + Unbilled Metered + Unbilled Unmetered

**SYSTEM DATA**

Length of mains:	+ ? 8	268.0	miles
Number of <u>active AND inactive</u> service connections:	+ ? 8	19,739	
Service connection density:	?	74	conn./mile main

Are customer meters typically located at the curbside or property line?      No  
Average length of customer service line:      + ? 8      10.0 ft      (length of service line, beyond the property boundary, that is the responsibility of the utility)

Average operating pressure:      + ? 8      55.0 psi

**COST DATA**

Total annual cost of operating water system:	+ ? 10	\$19,789,638	\$/Year
Customer retail unit cost (applied to Apparent Losses):	+ ? 10	\$4.81	\$/100 cubic feet (ccf)
Variable production cost (applied to Real Losses):	+ ? 8	\$8,316.00	\$/Million gallons <input type="checkbox"/> Use Customer Retail Unit Cost to value real losses

Retail costs are less than (or equal to) production costs; please review and correct if necessary

**WATER AUDIT DATA VALIDITY SCORE:**

**\*\*\* YOUR SCORE IS: 82 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: Water imported
- 2: Unauthorized consumption
- 3: Systematic data handling errors



# AWWA Free Water Audit Software: Reporting Worksheet

WAS v5.0  
American Water Works Association.  
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? Click to access definition  
+ Click to add a comment

**Water Audit Report for:** City of Petaluma  
**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: MILLION GALLONS (US) 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' ----->

Volume from own sources:	+ ?	3	106.758	MG/Yr
Water imported:	+ ?	9	2,369.559	MG/Yr
Water exported:	+ ?	n/a		MG/Yr

**Master Meter and Supply Error Adjustments**

Pcnt:	+ ?	3	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>		MG/Yr
Value:	+ ?	6	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>		MG/Yr
	+ ?		<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>		MG/Yr

Enter negative % or value for under-registration  
Enter positive % or value for over-registration

**WATER SUPPLIED:** 2,476.317 MG/Yr

**AUTHORIZED CONSUMPTION**

Billed metered:	+ ?	5	2,233.450	MG/Yr
Billed unmetered:	+ ?	10	0.236	MG/Yr
Unbilled metered:	+ ?	n/a		MG/Yr
Unbilled unmetered:	+ ?	7	0.859	MG/Yr

Click here: ?  
for help using option buttons below

Pcnt:	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>		MG/Yr
Value:				0.859	MG/Yr

**AUTHORIZED CONSUMPTION:** 2,234.545 MG/Yr

Use buttons to select percentage of water supplied OR value

**WATER LOSSES (Water Supplied - Authorized Consumption)**

241.772 MG/Yr

**Apparent Losses**

Unauthorized consumption: + ? 6.191 MG/Yr

Default option selected for unauthorized consumption - a grading of 5 is applied but not displayed

Customer metering inaccuracies:	+ ?	1	22.560	MG/Yr
Systematic data handling errors:	+ ?		5.584	MG/Yr

Default option selected for Systematic data handling errors - a grading of 5 is applied but not displayed

**Apparent Losses:** 34.335 MG/Yr

Pcnt:	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	0.25%	MG/Yr
-------	-----------------------	----------------------------------	-----------------------	-------	-------

Pcnt:	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	1.00%	MG/Yr
	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	0.25%	MG/Yr

**Real Losses (Current Annual Real Losses or CARL)**

Real Losses = Water Losses - Apparent Losses: 207.437 MG/Yr

**WATER LOSSES:** 241.772 MG/Yr

**NON-REVENUE WATER**

**NON-REVENUE WATER:** 242.631 MG/Yr

= Water Losses + Unbilled Metered + Unbilled Unmetered

**SYSTEM DATA**

Length of mains:	+ ?	7	249.8	miles
Number of <u>active AND inactive</u> service connections:	+ ?	5	19,966	
Service connection density:	+ ?		80	conn./mile main

Are customer meters typically located at the curbside 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: + ? 4 55.0 psi

**COST DATA**

Total annual cost of operating water system:	+ ?	10	\$16,264,471	\$/Year
Customer retail unit cost (applied to Apparent Losses):	+ ?	4	\$12.99	\$/100 cubic feet (ccf)
Variable production cost (applied to Real Losses):	+ ?	4	\$2,638.74	\$/Million gallons <input type="checkbox"/> 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: Customer metering inaccuracies
- 2: Billed metered
- 3: Customer retail unit cost (applied to Apparent Losses)



# AWWA Free Water Audit Software: Reporting Worksheet

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American Water Works Association.  
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?	Click to access definition
+	Click to add a comment

**Water Audit Report for:** City of Petaluma (4910006)  
**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: MILLION GALLONS (US) 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' ----->	
Volume from own sources:	+ ? 3 21.894 MG/Yr
Water imported:	+ ? 7 2,563.153 MG/Yr
Water exported:	+ ? n/a MG/Yr

**Master Meter and Supply Error Adjustments**

Pcnt:	Value:	MG/Yr
+ ? 3	<input type="radio"/> <input type="radio"/>	
+ ? 6	-0.89% <input type="radio"/> <input type="radio"/>	
+ ?	<input type="radio"/> <input type="radio"/>	

Enter negative % or value for under-registration  
Enter positive % or value for over-registration

**WATER SUPPLIED:** **2,608.064** MG/Yr

**AUTHORIZED CONSUMPTION**

Billed metered:	+ ? 5 2,453.630 MG/Yr
Billed unmetered:	+ ? 10 0.221 MG/Yr
Unbilled metered:	+ ? n/a MG/Yr
Unbilled unmetered:	+ ? 7 6.520 MG/Yr

Click here: ?  
for help using option buttons below

Pcnt:	Value:	MG/Yr
	<input type="radio"/> <input checked="" type="radio"/>	6.520

Use buttons to select percentage of water supplied OR value

**AUTHORIZED CONSUMPTION:** **2,460.371** MG/Yr

**WATER LOSSES (Water Supplied - Authorized Consumption)**

**147.693** MG/Yr

**Apparent Losses**

Unauthorized consumption: + ? 6.520 MG/Yr

Default option selected for unauthorized consumption - a grading of 5 is applied but not displayed

Customer metering inaccuracies:	+ ? 1 24.784 MG/Yr
Systematic data handling errors:	+ ? 6.134 MG/Yr

Default option selected for Systematic data handling errors - a grading of 5 is applied but not displayed

**Apparent Losses:** **37.438** MG/Yr

Pcnt:	Value:	MG/Yr
0.25%	<input checked="" type="radio"/> <input type="radio"/>	

1.00%	<input type="radio"/> <input type="radio"/>	
0.25%	<input checked="" type="radio"/> <input type="radio"/>	

**Real Losses (Current Annual Real Losses or CARL)**

Real Losses = Water Losses - Apparent Losses: ? **110.255** MG/Yr

**WATER LOSSES:** **147.693** MG/Yr

**NON-REVENUE WATER**

**NON-REVENUE WATER:** **154.213** MG/Yr

= Water Losses + Unbilled Metered + Unbilled Unmetered

**SYSTEM DATA**

Length of mains:	+ ? 7 242.8 miles
Number of <u>active AND inactive</u> service connections:	+ ? 5 19,982
Service connection density:	? 82 conn./mile main

Are customer meters typically located at the curbside or property line?

(length of service line, beyond the property boundary, that is the responsibility of the utility)

Average length of customer service line: + ?

Average length of customer service line has been set to zero and a data grading score of 10 has been applied

Average operating pressure: + ? 4 61.0 psi

**COST DATA**

Total annual cost of operating water system:	+ ? 10 \$16,355,423 \$/Year
Customer retail unit cost (applied to Apparent Losses):	+ ? 4 \$11.91 \$/100 cubic feet (ccf)
Variable production cost (applied to Real Losses):	+ ? 4 \$3,140.18 \$/Million gallons <input type="checkbox"/> Use Customer Retail Unit Cost to value real losses

**WATER AUDIT DATA VALIDITY SCORE:**

**\*\*\* YOUR SCORE IS: 61 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: Water imported
- 2: Customer metering inaccuracies
- 3: Billed metered



# AWWA Free Water Audit Software: Reporting Worksheet

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?	Click to access definition
+	Click to add a comment

**Water Audit Report for:** City of Petaluma (CA4910006)  
**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: MILLION GALLONS (US) 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' ----->

Volume from own sources:	+	?	n/a		MG/Yr
Water imported:	+	?	7	2,736.241	MG/Yr
Water exported:	+	?	n/a		MG/Yr

### Master Meter and Supply Error Adjustments

Pcnt:		Value:		MG/Yr
	+	?		MG/Yr
	+	?	n/a	MG/Yr
	+	?		MG/Yr

Enter negative % or value for under-registration  
Enter positive % or value for over-registration

**WATER SUPPLIED:** 2,736.241 MG/Yr

### AUTHORIZED CONSUMPTION

Billed metered:	+	?	5	2,452.113	MG/Yr
Billed unmetered:	+	?	10	0.220	MG/Yr
Unbilled metered:	+	?	n/a		MG/Yr
Unbilled unmetered:	+	?	7	14.002	MG/Yr

Click here: ?  
for help using option buttons below

Pcnt:		Value:		MG/Yr
			14.002	MG/Yr

Use buttons to select percentage of water supplied OR value

**AUTHORIZED CONSUMPTION:** 2,466.335 MG/Yr

### WATER LOSSES (Water Supplied - Authorized Consumption)

269.906 MG/Yr

#### Apparent Losses

Unauthorized consumption:	+	?		6.841	MG/Yr
---------------------------	---	---	--	-------	-------

Default option selected for unauthorized consumption - a grading of 5 is applied but not displayed

Customer metering inaccuracies:	+	?	1	50.043	MG/Yr
Systematic data handling errors:	+	?	5	6.130	MG/Yr

Default option selected for Systematic data handling errors - a grading of 5 is applied but not displayed

**Apparent Losses:** 63.014 MG/Yr

Pcnt:		Value:		MG/Yr
	0.25%			MG/Yr

Pcnt:		Value:		MG/Yr
	2.00%			MG/Yr
	0.25%			MG/Yr

### Real Losses (Current Annual Real Losses or CARL)

**Real Losses = Water Losses - Apparent Losses:** 206.892 MG/Yr

**WATER LOSSES:** 269.906 MG/Yr

### NON-REVENUE WATER

**NON-REVENUE WATER:** 283.908 MG/Yr

= Water Losses + Unbilled Metered + Unbilled Unmetered

### SYSTEM DATA

Length of mains:	+	?	7	243.8	miles
Number of <u>active AND inactive</u> service connections:	+	?	5	20,570	
Service connection density:	?			84	conn./mile main

Are customer meters typically located at the curbside or property line? Yes

Average length of customer service line: 61.0 (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:	+	?	4	61.0	psi
-----------------------------	---	---	---	------	-----

### COST DATA

Total annual cost of operating water system:	+	?	10	\$16,176,457	\$/Year
Customer retail unit cost (applied to Apparent Losses):	+	?	8	\$12.75	\$/100 cubic feet (ccf)
Variable production cost (applied to Real Losses):	+	?	4	\$3,951.72	\$/Million gallons

Use Customer Retail Unit Cost to value real losses

### WATER AUDIT DATA VALIDITY SCORE:

**\*\*\* YOUR SCORE IS: 64 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: Water imported
- 2: Customer metering inaccuracies
- 3: Billed metered



# AWWA Free Water Audit Software: Reporting Worksheet

WAS v5.0  
American Water Works Association  
Copyright © 2014. All Rights Reserved.

? Click to access definition  
+ Click to add a comment

**Water Audit Report for:** City of Petaluma (CA4910006)  
**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: MILLION GALLONS (US) 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

Volume from own sources:  MG/Yr  
Water imported:  2,491.850 MG/Yr  
Water exported:  MG/Yr

### Master Meter and Supply Error Adjustments

Enter grading in column 'E' and 'J' -----> Pcnt: Value:  
  MG/Yr  
  MG/Yr  
  MG/Yr

**WATER SUPPLIED:**  MG/Yr

Enter negative % or value for under-registration  
Enter positive % or value for over-registration

### AUTHORIZED CONSUMPTION

Billed metered:  2,386.142 MG/Yr  
Billed unmetered:  0.233 MG/Yr  
Unbilled metered:  MG/Yr  
Unbilled unmetered:  6.230 MG/Yr

**AUTHORIZED CONSUMPTION:**  MG/Yr

Click here: ?  
for help using option buttons below

Pcnt: Value:  
  MG/Yr

Use buttons to select percentage of water supplied OR value

Pcnt: Value:  
  MG/Yr

MG/Yr  
  MG/Yr

### WATER LOSSES (Water Supplied - Authorized Consumption)

**99.245** MG/Yr

### Apparent Losses

Unauthorized consumption:  6.230 MG/Yr

Default option selected for unauthorized consumption - a grading of 5 is applied but not displayed

Customer metering inaccuracies:  48.697 MG/Yr  
Systematic data handling errors:  5.965 MG/Yr

**Apparent Losses:**  MG/Yr

### Real Losses (Current Annual Real Losses or CARL)

Real Losses = Water Losses - Apparent Losses:  MG/Yr

**WATER LOSSES:**  MG/Yr

### NON-REVENUE WATER

**NON-REVENUE WATER:**  MG/Yr

= Water Losses + Unbilled Metered + Unbilled Unmetered

### SYSTEM DATA

Length of mains:  238.8 miles  
Number of active AND inactive service connections:  20,159  
Service connection density:  conn./mile main

Are customer meters typically located at the curbstop or property line?

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:  61.0 psi

### COST DATA

Total annual cost of operating water system:  \$17,508,169 /Year  
Customer retail unit cost (applied to Apparent Losses):  \$13.69 /\$100 cubic feet (ccf)  
Variable production cost (applied to Real Losses):  \$4,007.23 /\$Million gallons  Use Customer Retail Unit Cost to value real losses

### WATER AUDIT DATA VALIDITY SCORE:

**\*\*\* YOUR SCORE IS: 66 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: Water imported

2: Customer metering inaccuracies

3: Billed metered



## Appendix G

Not Used

SB X7-7 Compliance Form



<b>SB X7-7 Table 0: Units of Measure Used in 2020 UWMP*</b> <i>(select one from the drop down list)</i>
Acre Feet
<i>*The unit of measure must be consistent throughout the UWMP, as reported in Submittal Table 2-3.</i>
NOTES:

**SB X7-7 Table 2: Method for 2020 Population Estimate**

<b>Method Used to Determine 2020 Population</b> (may check more than one)	
<input checked="" type="checkbox"/>	<b>1. Department of Finance (DOF) or American Community Survey (ACS)</b>
<input type="checkbox"/>	<b>2. Persons-per-Connection Method</b>
<input type="checkbox"/>	<b>3. DWR Population Tool</b>
<input type="checkbox"/>	<b>4. Other</b> DWR recommends pre-review
NOTES:	

<b>SB X7-7 Table 3: 2020 Service Area Population</b>	
<b>2020 Compliance Year Population</b>	
<b>2020</b>	64,251
NOTES:	

**SB X7-7 Table 4: 2020 Gross Water Use**

Compliance Year 2020	2020 Volume Into Distribution System <i>This column will remain blank until SB X7-7 Table 4-A is completed.</i>	2020 Deductions					2020 Gross Water Use
		Exported Water *	Change in Dist. System Storage* (+/-)	Indirect Recycled Water <i>This column will remain blank until SB X7-7 Table 4-B is completed.</i>	Water Delivered for Agricultural Use*	Process Water <i>This column will remain blank until SB X7-7 Table 4-D is completed.</i>	
	7,360			-		-	7,360

\* 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.

<b>Name of Source</b>		Sonoma Water	
<b>This water source is (check one):</b>			
<input type="checkbox"/>	The supplier's own water source		
<input checked="" type="checkbox"/>	A purchased or imported source		
Compliance Year 2020	Volume Entering Distribution System <sup>1</sup>	Meter Error Adjustment <sup>2</sup> <i>Optional</i> (+/-)	Corrected Volume Entering Distribution System
	7,323	-	7,323
<sup>1</sup> 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. <sup>2</sup> Meter Error Adjustment - See guidance in Methodology 1, Step 3 of Methodologies Document			
NOTES: Volumes are in AF. From DWR Table 6-8.			

**SB X7-7 Table 4-A: 2020 Volume Entering the Distribution System(s) Meter Error Adjustment**

Complete one table for each source.

<b>Name of Source</b>		Groundwater	
<b>This water source is (check one):</b>			
<input checked="" type="checkbox"/>	The supplier's own water source		
<input type="checkbox"/>	A purchased or imported source		
Compliance Year 2020	Volume Entering Distribution System <sup>1</sup>	Meter Error Adjustment <sup>2</sup> <i>Optional</i> (+/-)	Corrected Volume Entering Distribution System
	37		37
<sup>1</sup> 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. <sup>2</sup> Meter Error Adjustment - See guidance in Methodology 1, Step 3 of Methodologies Document			
NOTES: Volumes are in AF. From DWR Table 6-8.			

<b>SB X7-7 Table 5: 2020 Gallons Per Capita Per Day (GPCD)</b>		
<b>2020 Gross Water</b> <i>Fm SB X7-7 Table 4</i>	<b>2020 Population</b> <i>Fm SB X7-7 Table 3</i>	<b>2020 GPCD</b>
7,360	64,251	<b>102</b>
NOTES:		

**SB X7-7 Table 9: 2020 Compliance**

Actual 2020 GPCD <sup>1</sup>	Optional Adjustments to 2020 GPCD					2020 Confirmed Target GPCD <sup>1,2</sup>	Did Supplier Achieve Targeted Reduction for 2020?
	Enter "0" if Adjustment Not Used			TOTAL Adjustments <sup>1</sup>	Adjusted 2020 GPCD <sup>1</sup> <i>(Adjusted if applicable)</i>		
	Extraordinary Events <sup>1</sup>	Weather Normalization <sup>1</sup>	Economic Adjustment <sup>1</sup>				
102	-	-	-	-	102	141	YES

<sup>1</sup> All values are reported in GPCD  
<sup>2</sup> **2020 Confirmed Target GPCD** is taken from the Supplier's SB X7-7 Verification Form Table SB X7-7, 7-F.

NOTES:

**SB X7-7 RA1 - Weighted Baseline**

Participating Member Agency Name	10-15 year Baseline GPCD*	Average Population During 10-15 Year Baseline Period	(Baseline GPCD) X (Population)	Regional Alliance Weighted Average 10-15 Year Baseline GPCD
City of Cotati	159	6,559	1,043,146	
Marin Municipal Water District	149	178,670	26,690,318	
North Marin Water District	173	54,061	9,370,435	
City of Petaluma	180	52,622	9,491,997	
City of Rohnert Park	161	40,811	6,582,847	
City of Santa Rosa	145	143,109	20,806,963	
City of Sonoma	225	9,679	2,173,212	
Valley of the Moon Water Distict	146	20,969	3,058,648	
Town of Windsor	156	24,572	3,834,809	
<b>Regional Alliance Total</b>	<b>1,495</b>	<b>531,051</b>	<b>83,052,375</b>	<b>156</b>

*\*All participating agencies must submit individual SB X7-7 Tables, as applicable, showing the individual agency's calculations. These tables are: SB X7-7 Tables 0 through 6 , Table 7, any required supporting tables (as stated in SB X7-7 Table 7), and SB X7-7 Table 9, as applicable. These individual agency tables will be submitted with the individual or Regional Urban Water Management Plan.*

NOTES



### SB X7-7 RA1 - Weighted 2020 Target

Participating Member Agency Name	2020 Target GPCD*	2015 Population	(Target) X (Population)	Regional Alliance Weighted Average 2020 Target
City of Cotati	130	7,288	947,440	
Marin Municipal Water District	124	189,000	23,436,000	
North Marin Water District	139	61,381	8,531,959	
City of Petaluma	141	61,798	8,713,518	
City of Rohnert Park	119	41,675	4,959,325	
City of Santa Rosa	126	173,071	21,806,946	
City of Sonoma	180	11,147	2,006,460	
Valley of the Moon Water Distri	124	23,478	2,911,272	
Town of Windsor	130	27,486	3,573,180	
<b>Regional Alliance Total</b>	<b>1,213</b>	<b>596,324</b>	<b>76,886,100</b>	<b>129</b>

*\*All participating agencies must submit individual SB X7-7 Tables, as applicable, showing the individual agency's calculations. These tables are: SB X7-7 Tables 0 through 6, Table 7, any required supporting tables (as stated in SB X7-7 Table 7), and SB X7-7 Table 9, as applicable. These individual agency tables will be submitted with the individual or Regional Urban Water Management Plan.*

NOTES

## SB X7-7 Regional Alliance - 2020 GPCD (Actual)

Participating Member Agency Name <i>Add rows as needed</i>	2020 Actual GPCD <sup>1</sup>	2020 Population	(2020 GPCD) X (2020 Population)	Regional Alliance 2020 GPCD (Actual)
City of Cotati	113	7,533	851,229	
Marin Municipal Water District	128	191,269	24,482,432	
North Marin Water District	119	61,658	7,337,302	
City of Petaluma	107	64,251	6,900,557	
City of Rohnert Park	96	43,069	4,126,872	
City of Santa Rosa	99	173,628	17,189,172	
City of Sonoma	166	11,725	1,946,350	
Valley of the Moon Water Dist	102	23,077	2,353,854	
Town of Windsor	119	28,397	3,379,243	
<b>Regional Alliance Totals</b>	<b>1,049</b>	<b>604,607</b>	<b>68,567,011</b>	<b>113</b>

*\* All participating agencies must submit individual SB X7-7 Tables, as applicable, showing the individual agency's calculations. These tables are: SB X7-7 Tables 0 through 6, Table 7, any required supporting tables (as stated in SB X7-7 Table 7), and SB X7-7 Table 9, as applicable. These individual agency tables will be submitted with the individual or Regional Urban Water Management Plan.*

NOTES

<b>SB X7-7 Regional Alliance - 2020 Compliance</b>				
2020 Actual GPCD	Optional Adjustment for Economic Growth <sup>1</sup>	Adjusted 2020 Actual GPCD	2020 Target GPCD <sup>2</sup>	Did Alliance Achieve Targeted Reduction for 2020?
113	-	113	129	YES
<p><sup>1</sup> Adjustments for economic growth can be applied to either the individual supplier's data or to the aggregate regional alliance data (but not both), depending upon availability of suitable data and methods.</p> <p><sup>2</sup> 2020 Target GPCD will be taken from the Regional Alliance's SB X7-7 Verification Form, Weighted Target Table.</p>				
NOTES				



## Appendix I

# Regional Alliance Agreement



April 8, 2021

**MEMORANDUM**

VIA EMAIL

Attn: Drew McIntyre  
General Manager, Technical Advisory Committee Chair  
North Marin Water District  
P.O. Box 146  
Novato, CA 94948

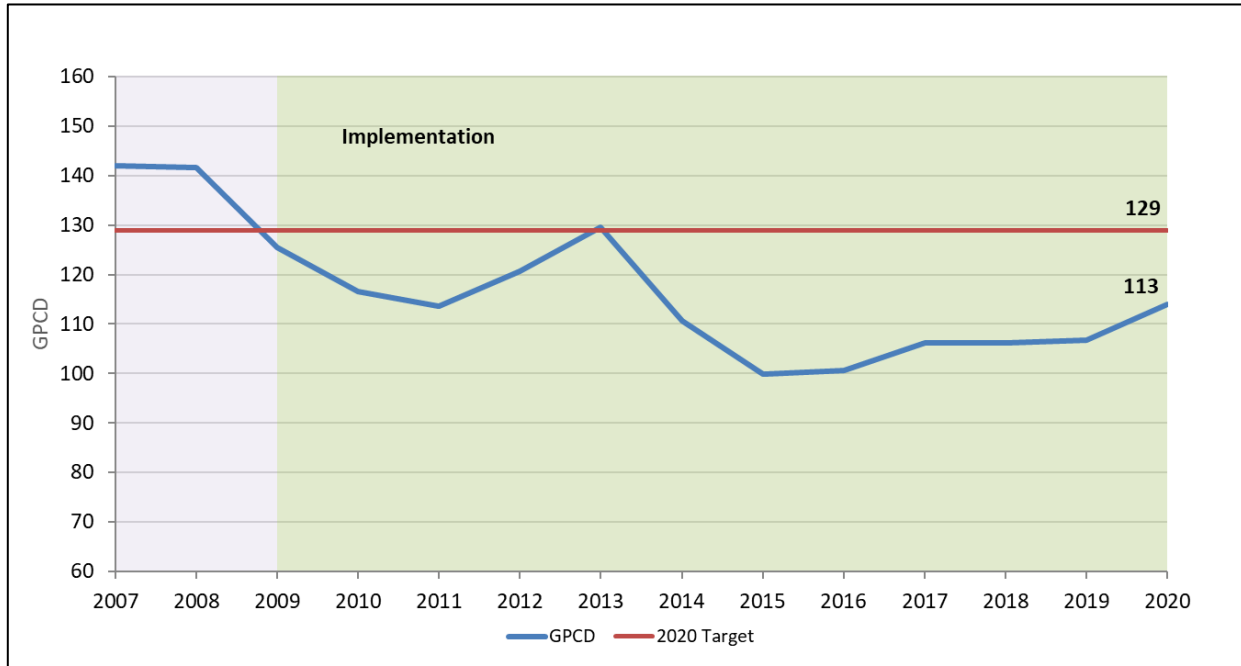
**RE: Sonoma-Marín Regional Alliance 2020 GPCD for SBx7-7**

Dear Chair McIntyre:

In 2010, the Sonoma-Marín Saving Water Partnership (SMSWP) established a regional commitment to work collaboratively on the implementation of appropriate water use efficiency programs. The Department of Water Resources was then subsequently notified that a North Marin-Sonoma Regional Alliance had been formed between and among the cities of Santa Rosa, Rohnert Park, Sonoma, Cotati, Petaluma, Town of Windsor and North Marin, Marin Municipal and Valley of the Moon Water Districts to comply with Senate Bill X7-7, the Water Conservation Act of 2009. Senate Bill X7-7 (SBx7-7) calls for a 20% reduction in gallon per capita per day (GPCD) water use by the year 2020. The regional alliance was formed pursuant to the Department of Water Resources *Methodologies for Calculating Baseline and Compliance Urban Per Capita Water Use* (DWR Methodology) because the parties receive water from a common wholesale water supplier, the Sonoma County Water Agency (Sonoma Water).

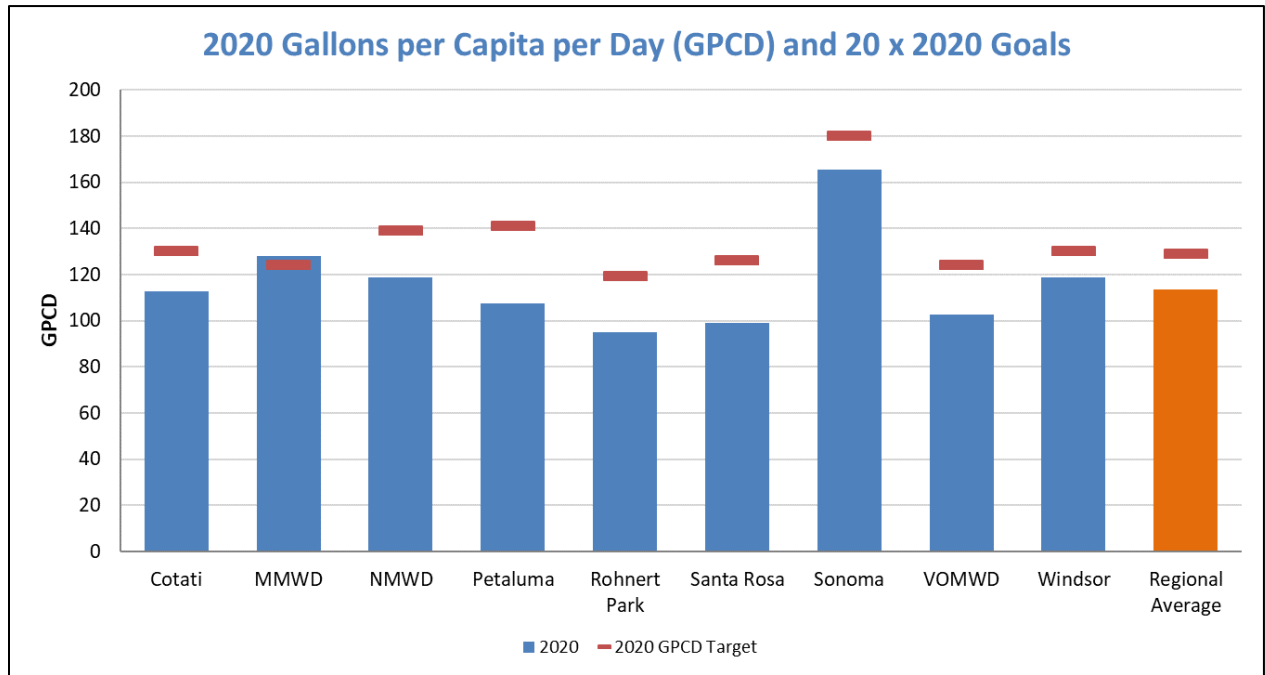
Graph 1 below demonstrates the long term progress our region has made towards incorporating water use efficiency as a social norm to our customers. Starting from a weighted average regional baseline GPCD of 156, which was established in accordance with the DWR Methodology, the regional alliance was required to achieve a 20% reduction, or 129 GPCD by 2020. As shown, the SMSWP regional alliance has achieved a 28% reduction in per capita water use while experiencing a 5.8% increase in population over the implementation period.

**Graph 1: Regional Gallons per Capita per Day**



The Partnership is the agreed upon mechanism used for tracking each water contractor's individual progress towards SBx7-7 compliance on an annual basis. This data is collected and utilized to calculate the regional status. Graph 2 below shows the reported 2020 per capita water use and the 2020 SBx7-7 GPCD Target for each water contractor and the region as a whole. There are many factors that contribute to the range of per capita water use in our region including climate, tourism, water intensive industries and socioeconomic factors.

**Graph 2: 2020 GPCD by Water Contractor and Region Alliance**



	Cotati	MMWD	NMWD	Petaluma	Rohnert Park	Santa Rosa	Sonoma	VOMWD	Windsor	Regional Average
<b>2020 GPCD</b>	113	128	119	107	95	99	166	103	119	<b>113</b>
<b>2020 Target</b>	130	124	143	136	119	127	173	124	130	<b>129</b>

If you have any questions about this memorandum, please do not hesitate to contact me at [paul.piazza@scwa.ca.gov](mailto:paul.piazza@scwa.ca.gov).

Sincerely,

Paul Piazza  
Principal Programs Specialist  
Sonoma Water

## Energy Intensity Calculation Tables



**Urban Water Supplier:**

enter supplier name

**Water Delivery Product** (If delivering more than one type of product use Table O-1C)

Retail Potable Deliveries

Table O-1B: Recommended Energy Reporting - Total Utility Approach			
Enter Start Date for Reporting Period		Urban Water Supplier Operational Control	
1/1/2019	End Date	12/31/2019	
<input type="checkbox"/> Is upstream embedded in the values reported?			
Water Volume Units Used		AF	
Volume of Water Entering Process (volume unit)		Total Utility	Net Utility
		7232	7648
Energy Consumed (kWh)		Hydropower	Non-Consequential Hydropower
		340836	0
Energy Intensity (kWh/volume)		47.1	0.0
			44.6

**Quantity of Self-Generated Renewable Energy**

kWh

**Data Quality** (Estimate, Metered Data, Combination of Estimates and Metered Data)

Metered Data

**Data Quality Narrative:**

Volume of water entering process is total imported water from Sonoma Water.

**Narrative:**

**Urban Water Supplier:**

enter supplier name

Table O-2: Recommended Energy Reporting - Wastewater & Recycled Water	
Enter Start Date for Reporting Period	1/1/2019
End Date	12/31/2019
<input type="checkbox"/> Is upstream embedded in the values reported?	
<b>Volume of Water Units Used</b>	<b>AF</b>
Volume of Wastewater Entering Process (volume units selected above)	6621
Wastewater Energy Consumed (kWh)	8302456.8
Wastewater Energy Intensity (kWh/volume)	1254.0
Volume of Recycled Water Entering Process (volume units selected above)	1581
Recycled Water Energy Consumed (kWh)	2075614.2
Recycled Water Energy Intensity (kWh/volume)	1312.8

**Quantity of Self-Generated Renewable Energy related to recycled water and wastewater operations**

kWh

Data Quality (Estimate, Metered Data, Combination of Estimates and Metered Data)

Metered Data

Data Quality Narrative:

Narrative:

Urban Water Supplier Operational Control			
Water Management Process			
Collection / Conveyance	Treatment	Discharge / Distribution	Total
0	0	0	6621
0	0	0	8302456.8
0.0	0.0	0.0	1254.0
0	0	0	1581
0	0	0	2075614.2
0.0	0.0	0.0	1312.8

Sonoma Water Water Supply Reliability

**Section 5 - Water Supply Characterization**

**Table 5-1. Future Water Agency Russian River Demands Modeled**

Scenario	Demand
Year	ac-ft
2025	65,020
2030	69,177
2035	70,725
2040	72,588
2045	74,547

**Average Year Min Storages**

**Table 5-2. Average Year Minimum Lake Mendocino Storage (2002)**

Scenario	Lake Storage,	Date of Minimum
Year	ac-ft	Lake Elevation
2025	61,269	12/12/2002
2030	60,553	12/12/2002
2035	59,961	12/12/2002
2040	59,792	12/12/2002
2045	59,007	12/12/2002

**Table 5-3. Average Year Minimum Lake Sonoma Storage (2002)**

Scenario	Lake Storage,	Date of Minimum
Year	ac-ft	Lake Elevation
2025	178,645	12/12/2002
2030	175,308	12/12/2002
2035	173,333	12/12/2002
2040	171,184	12/12/2002
2045	168,987	12/12/2002

**Single Dry Min Storages**

**Table 5-4. Single Dry Year Minimum Lake Mendocino Storage (1977)**

Scenario	Lake Storage	Date of Minimum
Year	ac-ft	Lake Elevation
2025	18,787	11/20/1977
2030	18,050	11/20/1977
2035	17,525	11/20/1977
2040	17,282	11/20/1977
2045	16,764	11/20/1977

**Table 5-5. Single Dry Year Minimum Lake Sonoma Storage (1977)**

Scenario	Lake Storage	Date of Minimum
Year	ac-ft	Lake Elevation
2025 <sup>(a)</sup>	61,628	11/20/1977
2030 <sup>(a)</sup>	62,497	11/20/1977
2035 <sup>(a)</sup>	59,620	11/20/1977
2040 <sup>(a)</sup>	56,333	11/20/1977
2045 <sup>(a)</sup>	52,905	11/20/1977

**5-yr Drought Storages**

**Table 5-6. Multiple Dry Year Minimum Lake Mendocino Storage (1987-91)**

Scenario	Lake Storage	Date of Minimum
Year	ac-ft	Lake Elevation
2025	50,001	11/15/1988
2030	49,240	11/15/1988
2035	48,278	11/15/1988
2040	48,534	11/15/1988
2045	47,045	11/15/1988

**Table 5-7. Multiple Dry Year Minimum Lake Sonoma Storage (1987-91)**

Scenario	Lake Storage	Date of Minimum
Year	ac-ft	Lake Elevation
2025	156,597	2/28/1991
2030	148,040	2/28/1991
2035	146,877	2/28/1991
2040	146,369	2/28/1991
2045	140,058	2/28/1991

**Table 5-8. Wholesale: Groundwater Volume Pumped, ac-ft (DWR Table 6-1 W)**

Groundwater Type	Location or Basin Name	2016	2017	2018	2019	2020
Alluvial Basin	Santa Rosa Plain Sub-basin (1-55.01)	73	27	2	0	0
TOTAL		73	27	2	0	0

**Section 6 - Water Supply Reliability**

**Table 6-1. Wholesale: Bases of Water Year Data (2025 as basis) (DWR Table 7-1 W)**

Year Type	Base Year	Available supplies if	
		year type repeats	% of average supply
Average Year	2002	65,020	100%
Single-Dry Year	1977	65,020	100%
Multiple-Dry Years 1st Year	1987	65,020	100%
Multiple-Dry Years 2nd Year	1988	65,020	100%
Multiple-Dry Years 3rd Year	1989	65,020	100%
Multiple-Dry Years 4th Year	1990	65,020	100%
Multiple-Dry Years 5th Year	1991	65,020	100%

**Table 6-2. Wholesale: Normal Year Supply and Demand Comparison, ac-ft (DWR Table 7-2)**

	2020	2025	2030	2035	2040	2045 (Opt)
Supply totals <sup>(b)</sup>	52,842	65,020	69,177	70,725	72,588	74,547
Demand totals <sup>(b)</sup>	52,842	65,020	69,177	70,725	72,588	74,547
Difference	0	0	0	0	0	0

**Table 6-3. Wholesale: Single Dry Year Supply and Demand Comparison, ac-ft (DWR Table 7-3)**

	2020	2025	2030	2035	2040	2045 (Opt)
Supply totals	52,842	65,020	58,168	58,897	59,789	60,656
Demand totals	52,842	65,020	69,177	70,725	72,588	74,547
Difference	0	0	-11,009	-11,828	-12,799	-13,891

**Table 6-4. Wholesale: Multiple Dry Years Supply and Demand Comparison, ac-ft (DWR Table 7-4)**

	2020	2025	2030	2035	2040	2045 (Opt)
First year						
Supply totals	52,842	65,020	69,177	70,725	72,588	74,547
Demand totals	52,842	65,020	69,177	70,725	72,588	74,547
Difference	0	0	0	0	0	0
Second year						
Supply totals	52,842	65,020	69,177	70,725	72,588	74,547
Demand totals	52,842	65,020	69,177	70,725	72,588	74,547
Difference	0	0	0	0	0	0
Third year						
Supply totals	52,842	65,020	69,177	70,725	72,588	74,547
Demand totals	52,842	65,020	69,177	70,725	72,588	74,547
Difference	0	0	0	0	0	0
fourth year						
Supply totals	52,842	65,020	69,177	70,725	72,588	74,547
Demand totals	52,842	65,020	69,177	70,725	72,588	74,547
Difference	0	0	0	0	0	0
Fifth year						
Supply totals	52,842	65,020	69,177	70,725	72,588	74,547
Demand totals	52,842	65,020	69,177	70,725	72,588	74,547
Difference	0	0	0	0	0	0

**Drought Risk Assessment**

**Submittal Table 7-5: Five-Year Drought Risk Assessment Tables to address Water Code Section 10635(b)**

2021	Total
Total Water Use	65,020
Total Supplies	65,020
Surplus/Shortfall w/o WSCP Action	0
<b>Planned WSCP Actions</b> (use reduction and supply augmentation)	
WSCP - supply augmentation benefit	0
WSCP - use reduction savings benefit	0
Revised Surplus/(shortfall)	0
Resulting % Use Reduction from WSCP action	0%

2022	Total
Total Water Use	65,020
Total Supplies	65,020
Surplus/Shortfall w/o WSCP Action	0
<b>Planned WSCP Actions</b> (use reduction and supply augmentation)	
WSCP - supply augmentation benefit	0
WSCP - use reduction savings benefit	0
Revised Surplus/(shortfall)	0
Resulting % Use Reduction from WSCP action	0%

2023	Total
Total Water Use	65,020
Total Supplies	65,020
Surplus/Shortfall w/o WSCP Action	0
<b>Planned WSCP Actions</b> (use reduction and supply augmentation)	
WSCP - supply augmentation benefit	0
WSCP - use reduction savings benefit	0
Revised Surplus/(shortfall)	0
Resulting % Use Reduction from WSCP action	0%

2024	Total
Total Water Use	65,020
Total Supplies	65,020
Surplus/Shortfall w/o WSCP Action	0
<b>Planned WSCP Actions</b> (use reduction and supply augmentation)	
WSCP - supply augmentation benefit	0
WSCP - use reduction savings benefit	0
Revised Surplus/(shortfall)	0
Resulting % Use Reduction from WSCP action	0%

2025	Total
Total Water Use	65,020
Total Supplies	65,020
Surplus/Shortfall w/o WSCP Action	0
<b>Planned WSCP Actions</b> (use reduction and supply augmentation)	
WSCP - supply augmentation benefit	0
WSCP - use reduction savings benefit	0
Revised Surplus/(shortfall)	0
Resulting % Use Reduction from WSCP action	0%

City of Petaluma Water Shortage Contingency Plan



## City of Petaluma

### Amended 2020 Water Shortage Contingency Plan

The Amended 2020 Water Shortage Contingency Plan includes the following Sections:

1. **Introduction**
2. **Water Supply Reliability Analysis** summarizes key elements of the water supply reliability analysis conducted for the City's Amended 2020 Urban Water Management Plan.
3. **Annual Water Supply and Demand Assessment Procedures** outlines the process that the City will use to conduct assessments each year to determine if a shortage exist or is anticipated and provides decision-making steps for actions in a shortage event.
4. **Water Shortage Levels** describes the City's six water shortage levels.
5. **Shortage Response Actions** describes the shortage response actions that the City will implement for each shortage level.
6. **Communication Protocols** explains the protocols and procedures to inform customers, the public, interested parties, and government entities of any current or predicted shortages and associated response actions.
7. **Compliance and Enforcement** describes how the City will ensure compliance with and enforcement of provisions of the Amended 2020 WSCP.
8. **Legal Authorities** describes the legal authority that will empower the City and enforce its shortage response actions.
9. **Financial Consequences of Amended 2020 WSCP** describes potential financial consequences of shortage response actions including revenue reductions and expense increases.
10. **Monitoring and Reporting** summarizes how the City will monitor customer compliance and meet state reporting requirements.
11. **WSCP Refinement Procedures** describes how the City will assess the Amended 2020 WSCP and make necessary adjustments.
12. **Plan Adoption, Submittal and Availability** outlines how the City will adopt, submit, implement, and amend the Amended 2020 WSCP and how the City will make it publicly available.

#### List of Appendices:

Appendix A: City of Petaluma Local Hazard Mitigation Plan

Appendix B: DRAFT Water Shortage Emergency Resolution

## **1 Introduction**

This Amended 2020 Water Shortage Contingency Plan (Amended 2020 WSCP) was adopted by the City of Petaluma (City) City Council on August 1, 2022, to revise the original 2020 WSCP adopted by City Council on June 21, 2021. This City of Petaluma Amended 2020 WSCP is a component of the City's Amended 2020 Urban Water Management Plan (Amended 2020 UWMP) and describes how the City will respond to varying water shortage scenarios. The WSCP is updated periodically to address the most current requirements of Section 10632 of the California Water Code (Water Code), the Urban Water Management Planning Act, and to give the City flexibility in addressing short- and long-term water supply shortages that may result from droughts, climate change, human or natural caused disasters, reduced deliveries from the Sonoma County Water Agency (Sonoma Water), and other water shortage conditions. These regulations will be enforced in the event of a water shortage scenario and are in addition to the City's Water Conservation Regulations located in Chapter 15, Section 17 of the Petaluma Municipal Code (PMC).

Petaluma's Amended 2020 WSCP addresses demand reduction strategies for the Petaluma water distribution system. Sonoma Water, the City's water wholesaler, determines trigger points for water shortage conditions on the Russian River system, and water shortage provisions for the Sonoma Water system are governed by the Restructured Agreement for Water Supply (Restructured Agreement) dated June 2006. The Restructured Agreement defines how water supply reductions will be administered by Sonoma Water in the event of a water shortage. In addition to the water shortage provisions defined in Section 3.5 of the Restructured Agreement, the Water Shortage Allocation Methodology adopted by the Sonoma Water Board in April 2006, reinstated in May 2021, and revised and readopted in September 2021, further defines shortage provisions.

The City's Amended 2020 WSCP includes additional elements as required by new State regulations enacted in response to the severe drought of 2012-2016.

## **2 Water Supply Reliability Analysis**

This section provides an analysis of the reliability of the City's water service to its customers over the planning horizon out to 2045. This assessment compares projected water demands to total water supply sources for a normal water year, a single dry water year, and a dry period lasting five consecutive water years. The water supply reliability analysis extends through 2045 and is based on the information provided in Chapters 4 and 6 of the Amended 2020 UWMP.

In summary, the water supply reliability assessment through 2045 found the following:

- Normal Water Years. The City projects having adequate water supplies in normal years to meet demands through 2045.
- Single Dry Water Years. The City projects experiencing a shortfall in contract water supply from Sonoma Water by 2030 in a single dry year that is hydrologically equivalent to the driest water year on record (1977). However, the City does not anticipate a shortfall in groundwater supply or recycled water supply. To mitigate the shortfall in contract water supply, the City may decide to temporarily reduce its demands and supply groundwater to ensure demand does not exceed supply should such a shortage occur during a single dry water year.
- Dry Five-Year Periods: The City projects having adequate water supplies for dry five-year periods that are hydrologically equivalent to the five driest consecutive years on record (1987-1991) to meet demands through 2045.

## **2.1 Water Supply**

The City's primary source of water supply is from Sonoma Water, which delivers water imported from the Russian River and from groundwater wells in the Santa Rosa Plain to the City of Petaluma. Under the Restructured Agreement for Water Supply (Restructured Agreement) between Sonoma Water and its contractors, including the City of Petaluma, the City is entitled to delivery of water at a rate of 21.8 million gallons per day with an annual volume limit of 13,400-acre feet. The City has 10 municipal wells used for supplemental and emergency purposes only.

The City has historically used imported surface water from Sonoma Water, groundwater, and recycled water to supply its various customer demands. The City's current short- and long-term future supply strategy relies on imported surface water from Sonoma Water and recycled water from the City's Ellis Creek Water Recycling Facility (ECWRF).

## **2.2 Projected Water Supplies**

Chapter 6 of the City's Amended 2020 UWMP projects long-term availability of each water source in five-year increments through 2045. Projected potable and recycled water demand is based on a 2020 Water Demand Analysis and Water Conservation Measure Update (Water Demand and Conservation Report) prepared by EKI Environment and Water, Inc. (EKI) for the City of Petaluma and considers the City's past and current use, trends in customer water use, population growth, employment growth, and known planned development. The City's projected water demand through 2045 from the EKI Water Demand and Conservation Report, is shown in Table 2-1.

<b>Table 2-1. Projected Water Demand 2025-2045 (AFY)</b>					
	2025	2030	2035	2040	2045
Potable Water	8,705	8,870	8,973	9,255	9,576
Recycled Water	2,000	2,540	2,540	2,540	2,540
Total	10,705	11,410	11,514	11,795	12,117

## 2.3 Water Supply Reliability Analysis and Drought Risk Assessment

### 2.3.1 Water Supply Reliability Analysis

This section discusses the reliability of the City’s water supply during normal conditions, single dry year conditions, and five-consecutive dry year periods for 2025 through 2045. This analysis compares projected water demands shown in Table 2-1 to total water supply for a normal year, a single dry year, and dry periods lasting five consecutive years, in five-year increments through 2045.

**Normal Year:** During normal water years, the City anticipates its full annual entitlement from Sonoma Water to be 13,400 AFY per the Restructured Agreement. Sonoma Water’s 2020 UWMP projects the City’s full entitlement of 13,400 AFY during normal water years through 2045. During normal water years, the City does not plan to use groundwater as a source of water supply. Recycled water during normal water years is anticipated at 2,000 AFY in 2025, and 2,540 AFY in 2030-2045 based on EKI Water Demand and Conservation Report projections shown in Table 2-1.

Table 2-2 compares projected water supply and demand in normal water years through 2045. The City anticipates having adequate water supply in normal years to meet demands through 2045.

<b>Table 2-2. Normal Year Water Supply and Demand Comparison (AFY)</b>					
	2025	2030	2035	2040	2045
Potable Water (Imported from Sonoma Water)	8,705	8,870	8,973	9,255	9,576
Groundwater	0	0	0	0	0
Recycled Water	2,000	2,540	2,540	2,540	2,540
Supply Total	10,705	11,410	11,514	11,795	12,117
Demand Total	10,705	11,410	11,514	11,795	12,117
<b>Difference</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

**Single Dry Year:** During single dry water years, the City anticipates a supply reduction from Sonoma Water for each year beginning in 2030, as described in Sonoma Water’s 2020

UWMP. The City does not plan to use groundwater for water supply during the normal water year, but projects 300 AFY of groundwater supply during the single-dry year to account for a deficit in water supply due to projected reduction from Sonoma Water. Recycled water during single dry water years is anticipated at 2,000 AFY in 2025, and 2,540 AFY in 2030-2045 based on EKI Water Demand and Conservation Report projections shown in Table 2-1.

Table 2-3 compares projected water supply and demand in single dry water years through 2045. The City anticipates receiving the following percentages of a normal year supply from Sonoma Water during a single dry year scenario through 2045: 2025 (100%), 2030 (90.3%), 2035 (89.6%), 2040 (88.7%), and 2045 (87.7%).

In the event of a single dry year when there is a deficit in water supply, the City will enact the Amended 2020 WSCP based on supply shortage to reduce customer demand. Appropriate water shortage response actions would be taken to ensure demand does not exceed supply during a water shortage scenario.

	2025	2030	2035	2040	2045
Potable Water (Imported from Sonoma Water)	8,705	8,870	8,973	9,255	9,576
Groundwater	300	300	300	300	300
Recycled Water	2,000	2,540	2,540	2,540	2,540
Supply Total	11,005	10,298	10,313	10,463	10,632
Demand Total	10,705	11,410	11,514	11,795	12,117
<b>Difference</b>	<b>300</b>	<b>(1,112)</b>	<b>(1,201)</b>	<b>(1,332)</b>	<b>(1,485)</b>

**Five-Consecutive Year:** During five consecutive dry year periods, the City anticipates water supply from Sonoma Water that is less than a normal year supply, as described in Sonoma Water’s 2020 UWMP. Sonoma Water uses the driest five-year period on record from 1987-1991 for the five-year period model. While Sonoma Water projects having less water during a five-year dry period than in a normal year, their model does not anticipate water shortages during these multiple dry year periods through 2045. During multiple dry year periods when no reduction in water supply is anticipated by Sonoma Water, the City does not plan to use groundwater as a source of water supply. Recycled water during multiple water years is anticipated at 2,000 AFY in 2025, and 2,540 AFY in 2030-2045 based on EKI Water Demand and Conservation Report projections shown in Table 2-1.

Table 2-4 compares projected water supply and demand during five consecutive dry year periods. The City anticipates having adequate water supply during five consecutive dry year periods to meet demands through 2045.

**Table 2-4. Five Consecutive Dry Year Period Water Supply and Demand Comparison (AFY)**

		2025	2030	2035	2040	2045
First Year	Potable Water (Imported from Sonoma Water)	8,705	8,870	8,973	9,255	9,576
	Groundwater	0	0	0	0	0
	Recycled Water	2,000	2,540	2,540	2,540	2,540
	Supply Total	10,705	11,410	11,514	11,795	12,117
	Demand Total	10,705	11,410	11,514	11,795	12,117
	<b>Difference</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
Second Year	Potable Water (Imported from Sonoma Water)	8,705	8,870	8,973	9,255	9,576
	Groundwater	0	0	0	0	0
	Recycled Water	2,000	2,540	2,540	2,540	2,540
	Supply Total	10,705	11,410	11,514	11,795	12,117
	Demand Total	10,705	11,410	11,514	11,795	12,117
	<b>Difference</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
Third Year	Potable Water (Imported from Sonoma Water)	8,705	8,870	8,973	9,255	9,576
	Groundwater	0	0	0	0	0
	Recycled Water	2,000	2,540	2,540	2,540	2,540
	Supply Total	10,705	11,410	11,514	11,795	12,117
	Demand Total	10,705	11,410	11,514	11,795	12,117
	<b>Difference</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
Fourth Year	Potable Water (Imported from Sonoma Water)	8,705	8,870	8,973	9,255	9,576
	Groundwater	0	0	0	0	0
	Recycled Water	2,000	2,540	2,540	2,540	2,540
	Supply Total	10,705	11,410	11,514	11,795	12,117
	Demand Total	10,705	11,410	11,514	11,795	12,117
	<b>Difference</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
Fifth Year	Potable Water (Imported from Sonoma Water)	8,705	8,870	8,973	9,255	9,576
	Groundwater	0	0	0	0	0
	Recycled Water	2,000	2,540	2,540	2,540	2,540
	Supply Total	10,705	11,410	11,514	11,795	12,117
	Demand Total	10,705	11,410	11,514	11,795	12,117
	<b>Difference</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

### 2.3.2 Drought Risk Assessment

The Drought Risk Assessment (DRA), described in Chapter 7 of the City’s Amended 2020 UWMP, evaluates the City’s water supply reliability if a drought were to occur in the upcoming five years. This section provides estimated water supply for the next five years from 2021-2025, assuming the hydrology will be equivalent to the driest five-year period on record.

Sonoma Water analyzed hydrologic records for the region and determined that the driest five-year on record was between 1987-1991. Sonoma Water assessed its water supply for 2021-2025 assuming dry conditions equivalent to the five-driest years on record, using contractor demands for 2025 for all five years of the DRA because it was the most conservative demand estimate.

The City estimated annual water use for 2021-2025 at unconstrained levels, or under normal water year conditions. To estimate demand under normal water year conditions, the City used actual 2020 water demand and 2025 projected demand from the EKI Water Demand and Conservation Report. The anticipated difference between 2020 demand and 2025 projected demand was prorated to estimate water use for 2021, 2022, 2023, 2024, and 2025. No groundwater was used in the DRA, since the City does not plan to use groundwater for water supply during unconstrained conditions. Recycled water was estimated at 2,000 AFY for 2021-2025, which is the 2025 projected demand for recycled water.

Table 2-5 compares estimated water supply and demand under normal water year conditions for 2021-2025. The City anticipates having adequate supply to meet unconstrained demand if 2021-2025 is hydraulically equivalent to the driest five-year period on record.

<b>Table 2-5. Drought Risk Assessment Estimated Water Use for 2021-2025 (AFY)</b>					
	2021	2022	2023	2024	2025
Potable Water	7,927	8,121	8,316	8,510	8,705
Recycled Water	2,000	2,000	2,000	2,000	2,000
Total Supply	9,927	10,121	10,316	10,510	10,705
Total Water Use	9,927	10,121	10,316	10,510	10,705
<b>Difference</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
Planned Amended 2020 WSCP Actions	-	-	-	-	-

## **2.4 Drought and Emergency Response Planning**

In addition to responding to drought conditions, the City's Amended 2020 WSCP can be used to respond to emergency conditions that interrupt water supply to the City. Water supply may be interrupted in the future due to water supply contamination, major transmission pipeline break, regional power failures, or a natural disaster such as an earthquake. In the event of an emergency, the City will respond as outlined below.

### **2.4.1 Supply Interruption**

If Sonoma Water's Russian River supply becomes contaminated (i.e., due to a chemical spill or other environmental incident) or is unavailable due to natural disaster, it may be possible that no water would be available from Sonoma Water for a period of time. In such a case, the City would need to rely on water from system storage facilities and emergency wells. The City will first determine existing storage supply, secure the Kastania storage tanks, evaluate the potential length of supply shut down, and then determine which water storage stage to declare. Once a water shortage stage is selected, the City will implement the appropriate measures as defined in the stage description.

### **2.4.2 Power Failure**

If an area-wide electrical power failure were to occur within the City's water service area, many of the City's pumping facilities could potentially be impacted. Uninterruptible power supplies are used at the Public Works and Utilities Building and at each of the field sites to power the SCADA system. The batteries can provide approximately eight hours of power, which should be sufficient time to return power or connect to a standby generator. Three portable generators are available and have been used in the past to support power outage response. Sonoma Water's facilities may also be vulnerable to power outages; most of the Sonoma Water facilities which serve the City have backup power provisions.

### **2.4.3 Seismic Risk and Mitigation**

The Water Code requires that WSCPs include a seismic risk assessment and mitigation plan to assess water system vulnerabilities and mitigate those vulnerabilities. Local Hazard Mitigation Plans (LHMP) may be incorporated into WSCPs to address this requirement if it addresses seismic risk.

The City's LHMP was adopted by City Council on November 2, 2020 by Resolution No. 2020-160 N.C.S. The LHMP was submitted to the Federal Emergency Management Authority (FEMA), which found the plan to be in conformance with 44 CFR 201.6. The 2020 LHMP is included with the Amended 2020 WSCP, Appendix A.



As described in the LHMP, the City is situated within an area of high potential seismic activity (the San Francisco Bay Region), and so the fault systems within and around the City have the potential to produce earthquakes that could impact the City significantly (e.g., the San Andreas Fault System which is currently active). A high-magnitude earthquake on one of the faults could cause moderate to high ground shaking in the City. Worst-case shaking scenario that the City will experience strong ground shaking, which has the potential to be damaging.

According to the USGS Earthquake Hazards Program data for liquefaction susceptibility, there are several areas of liquefaction susceptibility in the City. Most of the City is in the moderate liquefaction susceptibility zone, while parts in the center and close to Highway 101 (near Washington Street and Western Avenue) are within more severe liquefaction susceptibility zones. Most of the highly susceptible categories follow the Petaluma River's general location as it flows from the northwest of the City, through the center and downtown area, then out through the center east.

Water system infrastructure, including pump stations, storage tanks, and pipelines, can be damaged during a strong earthquake. The City's facilities have been constructed in accordance with the applicable building codes to minimize potential damage during an earthquake. Major reconstruction of existing facilities must also be designed to meet the provisions of the Uniform Building Code for Seismic Zone four. However, it is expected that some facilities may be damaged as the result of a strong earthquake. The City has multiple storage facilities and looped distribution pipelines, to allow potentially damaged portions of the City's system to be quickly isolated and repaired.

#### **2.4.4 Water Conservation**

In addition to the City's drought and emergency response planning, the City funds a robust water conservation program to help ensure water is used wisely year-round. The City's water conservation program is discussed in Chapter 9 of the City's Amended 2020 UWMP. The City will continue to provide ongoing, innovative water conservation programs to protect the City's water supply in advance of a water shortage condition.

### **3 Annual Water Supply and Demand Assessment Procedures**

This section presents the procedures that will be used by the City to conduct an Annual Water Supply and Demand Assessment (Annual Assessment). The Annual Assessment is required to be submitted annually to the Department of Water Resources (DWR) beginning on July 1, 2022. The Annual Assessment forecasts near-term water supply conditions (12 months) to ensure shortage response actions are triggered in a timely manner. The Annual Assessment will provide a description and quantification of each source of the City's water supply compared to water demands for the current year and on subsequent dry year. The

decision-making process and data and methodologies are described in this section. These procedures may be modified overtime.

### **3.1 Decision-Making Process**

This section presents the decision-making process and timeline that the City will use each year to determine its water supply reliability. The assessment will be conducted annually and completed by July 1.

- 1. Develop Annual Assessment.** Sonoma Water staff will provide a draft of their Annual Assessment of water supply conditions, considering demand projections for Sonoma Water contractors, by April. City staff will work with Sonoma Water and its contractors to provide City demand projections and review Sonoma Water's draft Annual Assessment, which is to be released as final in June. City staff will complete the Annual Assessment in accordance with the methodology described in Section 2 of the Amended 2020 WSCP for the current year and one subsequent dry year. City staff will present a draft of the Annual Assessment to the Director of Public Works & Utilities (Director) for review and approval by June, or an earlier date determined by the release date of Sonoma Water's final Annual Assessment. If the Annual Assessment determines that projected supply will not meet projected demand, the Director may decide to present the Annual Assessment to the City Council, and request input on the findings and staff recommendations for specific shortage response actions resulting from the assessment.
- 2. Submit Annual Assessment to DWR.** The City will submit the Annual Assessment to DWR by July 1 of each year.

### **3.2 Data and Methodologies**

This section presents the data inputs and assessment methodology that will be used to evaluate the City's water supply. The evaluation criteria, water supply, unconstrained demand, planned water use, and infrastructure considerations are described.

- 1. Evaluation Criteria.** Evaluation criteria are determined by forecasted demand and Sonoma Water's supply conditions and factors that may impact the City's groundwater and recycled water supply. The criteria include the key data inputs and the constraints imposed on water supply and demand.

Key data inputs used by the City to forecast water supply and demand for the remainder of the current year and a subsequent dry year include the items described below.

- Unconstrained customer demand. Current and subsequent year unconstrained demand considering growth, weather, prior-year conditions, anticipated new demands, policy, and other influencing factors.
  - Sonoma Water Supply. Sonoma Water's Russian River system is controlled and influenced by a variety of agreements and decisions. There are several constraints, requirements, and restrictions on water supply that will be considered as part of Sonoma Water's Annual Assessment.
  - Groundwater Supply. Planned groundwater supply and quantity will be described and consistent with supply projections in the Amended 2020 UWMP, and will consider growth, weather, prior-year conditions, water quality, infrastructure, coordination with the Petaluma Valley Groundwater Sustainability Agency, and other influencing factors.
  - Recycled Water Supply. Planned recycled water supply and quantity will be described and consistent with supply projections in the Amended 2020 UWMP, and will consider growth, weather, prior-year conditions, anticipated new demand, infrastructure, and other influencing factors.
2. **Water Supply.** Water supply sources will be described, and estimates made of the availability of supply sources, in the Annual Assessment. Water supply source and quantity will be consistent with the supply projections in the Amended 2020 UWMP and based on Sonoma Water's Annual Assessment results for the City of Petaluma. The City may adjust water supply projections to account for weather, prior year conditions, Sonoma Water supply availability, water quality, infrastructure, or other influencing factors.
  3. **Unconstrained Customer Demand.** Unconstrained customer demand refers to anticipated customer water needs for the year, prior to any water shortage response actions that might be necessary to ensure demand does not exceed supply. Unconstrained customer demand projections will be consistent with the demand projections in Chapter 4 of the Amended 2020 UWMP. The City may adjust water demand projections to account for weather, prior-year conditions, Sonoma Water supply availability, infrastructure, or other influencing factors.
  4. **Planned Water Use for Current Year Considering Dry Subsequent Year.** The Annual Assessment will provide an evaluation of the amount of anticipated water supply for the current year as well as how supply will be used, while anticipating that the following year will be dry. The assessment of planned water use will be based on evaluating the key data inputs to determine availability and reliability of each water supply source.

5. **Infrastructure Considerations.** The Annual Assessment will include an evaluation of how infrastructure capabilities and constraints may affect the City’s ability to deliver supply to meet expected customer water use needs in the coming year. Evaluation will include anticipated capital projects that may influence capabilities, such as repairs or new projects.
6. **Other Factors.** The City will describe any specific locally applicable factors that can influence or disrupt supply, along with other unique local considerations that are considered as part of the Annual Assessment.

#### 4 Water Shortage Levels

To provide a consistent regional and statewide approach to conveying the relative severity of water supply shortage conditions, the 2018 Water Conservation Legislation mandates that water suppliers plan for six standard water shortage levels that correspond to progressive ranges of up to 10, 20, 30, 40, 50 percent, and greater than 50 percent shortages from the normal reliability condition. Each shortage condition corresponds to additional actions the City would implement to meet the severity of the impending shortage.

Table 4-1 summarizes the City’s six water shortage stages and corresponding water shortage level conditions. The City’s water shortage levels apply to both foreseeable and unforeseeable water supply shortage conditions. Water shortage is the gap between available supply and planned demand.

<b>Table 4-1. Water Shortage Contingency Plan Levels</b>		
Shortage Level	Percent Shortage Range	Shortage Response Actions
1	Up to 10%	Voluntary – up to 10% reduction in citywide water use
2	Up to 20%	Mandatory – up to 20% reduction in citywide water use, including customer demand reduction plan
3	Up to 30%	Mandatory – up to 30% reduction in citywide water use, including customer demand reduction plan
4	Up to 40%	Mandatory – up to 40% reduction in citywide water use, including customer demand reduction plan
5	Up to 50%	Mandatory – up to 50% reduction in citywide water use, including customer demand reduction plan

6	>50%	Mandatory – more than 50% reduction in citywide water use, including customer demand reduction plan
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## **5 Shortage Response Actions**

The Water Code requires shortage response actions that align with the defined shortage levels. The City’s shortage response actions consist of a combination of supply augmentation, demand reduction, and operational changes. The City’s response actions are dependent on the event that causes a water shortage level, the time of the year the event occurs, the water supply sources available, and the condition of its water system infrastructure. Depending on the foreseeable or unforeseeable events that led to the water shortage condition, the City may implement one or a combination of any of the shortage response actions described in this section.

### **5.1 Supply Augmentation**

In the event the City’s water supply from Sonoma Water is significantly and suddenly reduced, the City may activate its production, standby, or emergency wells to augment water supply. Under normal water conditions, the City does not use groundwater as a water supply source.

### **5.2 Demand Reduction Actions**

Demand reduction measures will be implemented at each stage of a water shortage. Table 5-1 provides a summary of demand reduction actions the City will implement at each stage of the Amended 2020 WSCP. Each progressive stage includes the prohibitions, restrictions, and actions of the previous stage. A summary of the City’s public information campaign is discussion in Section 6 Communication Protocols, and a summary of the Customer Demand Reduction Plan is provided in Section 5.2.1 below.

**Table 5-1. Demand Reduction Actions**

Shortage Level	Demand Reduction Target	Demand Reduction Action	Additional Explanation or Reference
1 Voluntary	Up to 10 %	Adopt resolution implementing Amended 2020 WSCP Stage 1, requesting voluntary demand reduction of up to 10%.	See Appendix B, Draft Resolution
		Expand public information campaign.	See Section 6, Communication Protocols
		Contact the Two Rock USCG Training Center to discuss water shortage level and demand reduction target. Director may determine reduced allocations to the Training Center based on demand reduction target.	
		Expand leak detection and customer service programs.	
		Implement water waste patrols, as needed.	
		Hire additional staff or increase overtime, as needed.	
		Conduct enforcement, as needed. - Water Waste Ordinance (PMC 15.17), always in effect.	Enforcement of PMC Chapter 15.17
		Customer Mandates: - Landscape irrigation is limited to the hours of 7 pm to 8 am. - The application of potable water to sidewalks, driveways, buildings, structures, patios, parking lots, or other hard-surfaced areas is prohibited, except in cases where health and safety are at risk, or as determined by the City Manager. - Homeowner’s Associations are prohibited from penalizing homeowners who reduce or eliminate the watering of	See below for example of exception for health and safety.

**Table 5-1. Demand Reduction Actions**

Shortage Level	Demand Reduction Target	Demand Reduction Action	Additional Explanation or Reference
		<p>vegetation or lawns during a declared drought emergency; and from requiring a homeowner to reverse or remove water-efficient landscaping that has been installed in response to a drought emergency once a drought emergency is concluded.</p>	
<p>2 Mandatory</p>	<p>Up to 20%</p>	<p><b>All demand reduction actions established in previous stage, plus:</b></p>	<p>See Stage 1 demand reduction actions</p>
		<p>Adopt resolution implementing Amended 2020 WSCP Stage 2, requiring mandatory demand reduction of up to 20%</p>	<p>See Appendix B, Draft Resolution</p>
		<p>Update public information campaign with Stage 2 requirements. <i>Expand public information campaign.</i></p>	<p>See Section 6, Communication Protocols</p>
		<p>Implement Customer Demand Reduction Plan, as needed.</p>	<p>See below summary of Customer Reduction Plan</p>
		<p>Evaluate City landscapes for water conservation opportunities with reduced watering schedules, irrigation system repairs, and conversion of potable irrigation accounts to recycled water.</p>	
		<p>Customer Mandates:</p> <ul style="list-style-type: none"> <li>- Irrigation of landscape with potable water limited to specific hours and days, as determined by the City Manager.</li> <li>- Restaurants may only serve water upon request.</li> <li>- Vehicle washing only at commercial facilities.</li> <li>- Operators of hotels and motels to provide guest with option of</li> </ul>	

**Table 5-1. Demand Reduction Actions**

Shortage Level	Demand Reduction Target	Demand Reduction Action	Additional Explanation or Reference
2 (Continued)		choosing to have towels and linens laundered daily. Hotel or motel shall display notice of this option in each guestroom. <ul style="list-style-type: none"> <li>- Recycled water must be used for dust control when available.</li> <li>- No new water hauler accounts permitted to purchase potable water, or as determined by City Manager.</li> <li>- Pull inactive hydrant meters and accounts.</li> <li>- Water meters for construction will be evaluated on a case-by-case basis.</li> </ul>	
3 Mandatory	Up to 30 %	<p><b>All demand reduction actions established in previous stages, plus:</b></p> <p>Adopt resolution implementing Amended 2020 WSCP Stage 3, requiring mandatory demand reduction of up to 30%.</p> <p>Update public information campaign with Stage 3 requirements. Expand public information campaign.</p> <p>Implement Customer Demand Reduction Plan.</p> <p>Option to implement water shortage rate structure as adopted by the City’s Water Rate Resolution. Most current rates apply.</p> <p>Customer Mandates:</p> <ul style="list-style-type: none"> <li>- Operation of non-recirculating ornamental water fountains and water features prohibited.</li> <li>- Frequency and type of landscape irrigation with potable water at parks, golf courses, landscape assessment districts, schools, medians, frontages, and</li> </ul>	<p>See Stages 1-2 demand reduction actions</p> <p>See Appendix B, Draft Resolution</p> <p>See Section 6, Communication Protocols</p> <p>See below summary of Customer Reduction Plan</p>



**Table 5-1. Demand Reduction Actions**

Shortage Level	Demand Reduction Target	Demand Reduction Action	Additional Explanation or Reference
<p>3 (Continued)</p>		<p>commercial, industrial, and institutional water accounts to be determined by City Manager.</p> <ul style="list-style-type: none"> <li>- Moratorium on issuance of permits for new pools and spas.</li> <li>- City Council may consider a prohibition on filling and/or topping off existing pools and spas.</li> <li>- City Council may implement water demand offset policy for new development.</li> <li>- Number of recycled water haulers permitted to use recycled water for purposes other than construction to be determined by City Manager.</li> <li>- Potable water meters limited to use for water line hydrostatic testing, chlorination, and building/plumbing testing.</li> <li>- Flushing of mains and hydrants may be limited as determined by City Manager.</li> <li>- Current potable water hauler accounts will not be allowed to haul more than current allocation, and load accounts will be monitored for monthly usage. No new potable water hauler customers will be permitted, or as determined by City Manager.</li> </ul>	<p>See below for information on water demand offset policy for new development.</p>

**Table 5-1. Demand Reduction Actions**

Shortage Level	Demand Reduction Target	Demand Reduction Action	Additional Explanation or Reference
<p align="center">4</p> <p>Mandatory</p>	<p>Up to 40%</p>	<p><b>All demand reduction actions established in previous stages, plus:</b></p>	<p>See Stages 1-3 demand reduction actions</p>
		<p>Adopt resolution implementing Amended 2020 WSCP Stage 4, requiring mandatory demand reduction of up to 40%.</p>	<p>See Appendix B, Draft Resolution</p>
		<p>Update public information campaign with Stage 4 requirements. Expand public information campaign.</p>	<p>See Section 6, Communication Protocols</p>
		<p>Customer Mandates:</p> <ul style="list-style-type: none"> <li>- City Council may choose to implement a moratorium on the installation of landscaping that requires potable water for irrigation. Details of implementation to be determined upon entry into Stage 4.</li> <li>- Street sweepers restricted to recycled water for street cleaning.</li> </ul>	
<p align="center">5</p> <p>Mandatory</p>	<p>Up to 50%</p>	<p><b>All demand reduction actions established in previous stages, plus:</b></p>	<p>See Stages 1-4 demand reduction actions</p>
		<p>Adopt resolution implementing Amended 2020 WSCP Stage 5, requiring mandatory demand reduction of up to 50%.</p>	<p>See Appendix B, Draft Resolution</p>
		<p>Update public information campaign with Stage 5 requirements.</p>	<p>See Section 6, Communication Protocols</p>
		<p>Customer Mandates:</p> <ul style="list-style-type: none"> <li>- Operating all ornamental water fountains and water features prohibited.</li> <li>- No landscape irrigation except for food gardens and mature trees, or</li> </ul>	

**Table 5-1. Demand Reduction Actions**

Shortage Level	Demand Reduction Target	Demand Reduction Action	Additional Explanation or Reference
5 (Continued)		<p>as determined by the City Manager. City Manager may eliminate all public irrigation depending on shortage condition. City Council may consider moratorium on new water service connections.</p> <ul style="list-style-type: none"> <li>- City Council may consider implementing restrictions on new water service connections for landscape installations using potable water.</li> </ul>	<p>See below for information on example of restrictions on new connections.</p>
6 Mandatory	Greater than 50%	<p><b>All demand reduction actions established in previous stages, plus:</b></p>	<p>See Stages 1-5 demand reduction actions</p>
		<p>Adopt resolution implementing Amended 2020 WSCP Stage 6, requiring mandatory demand reduction of greater than 50%.</p>	<p>See Appendix B, Draft Resolution</p>
		<p>Update public information campaign with Stage 5 requirements. Expand public information campaign.</p>	<p>See Section 6, Communication Protocols</p>
		<p>Customer Mandates:</p> <ul style="list-style-type: none"> <li>- No use of potable water for outdoor irrigation allowed. Exceptions to prohibition of all outdoor irrigation may be determined by City Council at time of implementation.</li> <li>- Potable water shall be used for health and safety requirements only.</li> <li>- No new water service connections shall be granted, or as determined by City Manager.</li> </ul>	<p>See below for example of water use for health and safety.</p>

### **5.2.1 Customer Demand Reduction Plan**

The Customer Demand Reduction Plan (Reduction Plan) is a demand reduction tool the City may implement beginning in Stage 2 of a water shortage emergency. The City will identify high-usage customer water accounts for inclusion into a Reduction Plan. Customers placed into a Reduction Plan can meet demand reduction requirements in two ways:

1. Achieve a percent reduction from a baseline year's usage of same billing period. Percent reduction and baseline year are determined at implementation of a water shortage stage.
2. Meet reduction requirements and milestones determined by the City and defined in a Reduction Plan.

Customers placed in a Reduction Plan, that do not meet percent reduction goals from baseline year's usage of same billing period or as assigned by a Reduction Plan will be issued warning notices, fines, or other enforcement as described in Section 7 Compliance and Enforcement.

### **5.2.2 Water Demand Offset Policy for New Development**

Beginning in Stage 3 of the Amended 2020 WSCP, the City Council may implement a water demand offset policy for new development based on water shortage levels and the gap between water supply and water demand. This policy would aim to mitigate the impact of new development on the total water demand within the City's potable water service area by looking at on-site and/or off-site offsets. On-site offset may be achieved via the implementation of water efficiency measures, while off-site offsets may be achieved by securing a new water source or other off-site measure that achieves the offset goal of the projected water demand of a new development. A fee may be assessed to sponsor water conservation projects within the City's potable water service area for new developments that are unable to meet an offset requirement.

The City does not currently have a water demand offset policy. This policy would be developed for implementation either before, or at the time the City Council decides implementation of a water demand offset policy for new development is necessary to achieve the demand reduction required by the water shortage stage, beginning in Stage 3.

### **5.2.3 Restrictions on New Service Connections**

Beginning in Stage 5 of the Amended 2020 WSCP, the City Council may consider restrictions on new water service connections including granting new service connections for indoor

purposes only and delaying new connection landscape installations using potable water until City Council determines the water shortage emergency no longer requires this restriction. The restriction may be implemented during landscape plan review as part of the application for a new water service connection. This restriction may prohibit new water service connections from using potable water for any new landscaping. Restrictions may also apply to rehabilitated landscapes. Implementation details of new service connection restrictions would be developed at the time the City Council decides to use this restriction, beginning in Stage 5 or higher.

#### **5.2.4 Exceptions for Health and Safety**

Some customer demand reduction actions listed in Table 5-1 have an exception for health and safety. Health and safety exceptions for use of potable water for washing hard-surfaced areas must be reasonable and legitimate. Examples include using potable water for removing animal, human, and food waste from sidewalks, parking garages, patios, and outdoor food services areas, or as determined by the City Manager. When possible, cleaning methods that do not require water should be used, such as a broom to remove debris.

In stage 6, potable water must only be used to meet minimum requirements for health and safety. In this case, health and safety uses must be reasonable and legitimate. Examples include use of potable water for bathing, washing clothes and dishes, cooking, and indoor cleaning, or as determined by the City Manager.

#### **5.2.5 Water Conservation Program and Water Waste Ordinance**

In addition to the demand reduction actions listed in Table 5-1, the City funds a robust water conservation program to help ensure water is used wisely year-round. The City will continue to provide ongoing, innovative water conservation programs to reduce water waste and protect the City's water supply during normal water years in water shortage conditions. The City anticipates increasing water conservation program outreach and participation during a water shortage to decrease the water shortage gap. The City's water conservation programs are constantly evolving to maintain or increase water use efficiency. For current programming, refer to the City's water conservation program website.

Below is a summary of the City's year-round water conservation programs:

- Public Information Campaign
- Water-Wise HouseCalls
- Mulch Madness Program
- Rebates for High-Efficiency Toilets, Urinals, and Clothes Washers
- Free Water Conservation Devices – showerheads, kitchen faucet aerator, faucet flow bags, DIY leak kits, hose-end nozzles, toilet leak detection

Below is a summary of the City's water waste prohibitions, Chapter 15.17 of the Petaluma Municipal Code (PMC). Refer to the PMC for a complete list of regulations. As these requirements are subject to change, the most current regulations apply.

- Hose-end shut-off nozzles required on all garden and utility hoses for washing of sidewalks, walkways, driveways, parking lots, other hard-surfaced areas, and cars, boats, trailers, and other vehicles.
- No runoff or overspray caused by outdoor irrigation.
- Escape of water through breaks or leaks within the customer's plumbing or private distribution system for any substantial period time once customer discovers or receives notice of break or leak.
- Irrigation in a manner or to the extent that causes runoff or over-spray.
- No water used for non-recycling water features such as fountains.
- Irrigation accounts cannot exceed allocated water budgets by more than twenty percent.
- Application of potable water to outdoor landscapes during and within 48 hours after measurable rainfall is prohibited.
- Pools and spas must be covered while not in use.

### **5.3 Shortage Response Action Effectiveness**

Table 5-2 summarizes the City's water shortage response actions with their estimated water reductions for each stage. Because the City may continuously monitor and adjust its response actions to reasonably equate demands with available supply, the extent to which the gap between water supplies and water demand will be reduced by implementation of each action is difficult to quantify and is provided as an estimate. Certain response actions, such as public outreach and enforcement, support the effectiveness of other response actions and do not have a quantifiable effect on their own.

**Table 5-2 Shortage Response Action Effectiveness**

Shortage Level	Demand Reduction Action	How much is this going to reduce the shortage gap?	Penalty, Charge, or Enforcement?
1	Expand public information campaign.	15%-20%	No
1	Expand leak detection and customer service programs.	Up to 2%	No
1	Implement water waste patrols, as needed.	< 0.5%	No, unless in violation of PMC Chapter 15.17
1	Conduct enforcement, as needed. Water Waste Ordinance (PMC 15.17), always in effect.	Up to 1.5%	Yes
1	Landscape irrigation is limited to the hours of 7pm to 8 am.	< 0.5%	Yes
1	No application of potable water to sidewalks, driveways, buildings, structures, patios, parking lots, or other hard-surfaced areas is prohibited, except in cases where health and safety are at risk, or as determined by the City Manager.	< 0.5%	Yes
1	Homeowner's Associations are prohibited from penalizing homeowners from reducing or eliminating the watering of vegetation or lawns during a declared drought emergency; and from requiring a homeowner to reverse or remove water-efficient landscaping that has been installed in response to a drought emergency once a drought emergency is concluded.	< 0.5%	Yes
2	Expand public information campaign.	15%-20%	No
2	All Stage 1 Demand Reduction Actions	Up to 5.5%	Yes
2	Implement Customer Demand Reduction Plan, as needed.	0-2%	Yes
2	Restaurants may only serve water upon request	< 0.5%	Yes
2	Irrigation of landscape with potable water limited to specific hours and days, as determined by the City Manager.	Up to 2%	Yes
2	Vehicle washing only at commercial facilities.	< 0.5%	Yes
2	Operators of hotels and motels to provide guest with option of choosing to have towels	< 0.5%	Yes

<b>Table 5-2 Shortage Response Action Effectiveness</b>			
<b>Shortage Level</b>	<b>Demand Reduction Action</b>	<b>How much is this going to reduce the shortage gap?</b>	<b>Penalty, Charge, or Enforcement?</b>
	and linens laundered daily. Hotel or motel shall display notice of this option in each guestroom.		
2	Recycled water must be used for dust control when available	< 0.5%	Yes
2	No new water hauler accounts permitted to purchase potable water, or as determined by City Manager.	< 0.5%	No
2	Pull inactive potable hydrant meters and potable water hauler accounts.	<0.5%	No
2	Water meters for construction will be evaluated on a case-by-case basis.	<0.5%	No
3	Expand public information campaign.	15%-20%	No
3	All Stage 1-2 Demand Reduction Actions	Up to 13%	Yes
3	Option to implement water shortage rate structure as adopted by the City's Water Rate Resolution. Most current rates apply.	Up to 5%	Yes
3	Frequency and type of landscape irrigation with potable water at parks, golf courses, landscape assessment districts, schools, medians, and frontages, and commercial, industrial, and institutional water accounts to be determined by City Manager.	Up to 6%	Yes
3	Operation of non-recirculating ornamental water fountains and water features prohibited.	< 0.5%	Yes
3	Pools and spas require covers by Water Waste Ordinance (PMC 15.17), always in effect.	< 0.5%	Yes
3	Moratorium on issuance of permits for new pools and spas.	0.5%	Yes
3	City Council may consider a prohibition on filling and/or topping off existing pools and spas.	<0.5%	Yes
3	Flushing of mains and hydrants may be limited as determined by City Manager.	< 0.5%	Yes



<b>Table 5-2 Shortage Response Action Effectiveness</b>			
Shortage Level	Demand Reduction Action	How much is this going to reduce the shortage gap?	Penalty, Charge, or Enforcement?
3	Potable water meters limited to use for water line hydrostatic testing, chlorination, and building/plumbing testing.	<0.5%	Yes
3	Current potable water hauler accounts will not be allowed to haul more than current allocation, and load accounts will be monitored for monthly usage. No new potable water hauler customers will be permitted, or as determined by City Manager.	<0.5%	Yes
3	City may implement water demand offset policy for new development as determined by Director.	0-4%	Yes
4	Expand public information campaign.	15%-20%	No
4	All Stage 1-3 Demand Reduction Actions	Up to 31.5%	Yes
4	- City Council may choose to implement a moratorium on the installation of landscaping that requires potable water for irrigation. Details of implementation to be determined upon entry into Stage 4.	0-1%	Yes
4	Street sweepers restricted to recycled water for street cleaning.	< 0.5%	Yes
5	Expand public information campaign.	15%-20%	No
5	All Stage 1-4 Demand Reduction Actions	Up to 33%	Yes
5	Operating all ornamental water fountains and water features prohibited.	<0.5%	Yes
5	- No landscape irrigation except for food gardens and mature trees, or as determined by City Manager. City Manager may eliminate all public irrigation depending on water shortage condition.	0-10%	Yes

<b>Table 5-2 Shortage Response Action Effectiveness</b>			
<b>Shortage Level</b>	<b>Demand Reduction Action</b>	<b>How much is this going to reduce the shortage gap?</b>	<b>Penalty, Charge, or Enforcement?</b>
5	City Council may consider moratorium on new water service connections.	Up to 2%	No
5	City Council may consider implementing restrictions on new water service connections for landscape installations using potable water.	Up to 1%	No
6	Expand public information campaign.	15%-20%	No
6	All Stage 1-5 Demand Reduction Actions	Up to 46.5%	Yes
6	No use of potable water for outdoor irrigation allowed. Exceptions to prohibition of all outdoor irrigation may be determined by City Council at time of implementation.	0-12%	Yes
6	Potable water shall be used for health and safety requirements only.	Up to 1%	Yes
6	No new water service connections shall be granted, or as determined by City Manager.	Up to 2%	No

## **6 Communication Protocols**

When a water shortage level is triggered by the Annual Assessment, or for any other reason, and a declaration of a water shortage emergency is made, the City will initiate a public information campaign. The City may trigger any of these communication protocols at any water shortage stage. The City will seek to coordinate outreach with Sonoma Water and the Sonoma-Marín Saving Water Partnership to ensure consistent messaging within the region. Public outreach during a water shortage will seek to inform the City’s residents, businesses, and water customers of current water shortage level, demand reduction targets and associated prohibitions and demand reduction actions and provide information about City’s water conservation program. Print and digital information will be made available in English and Spanish.

Public Information Campaign may include:

- Preparation and dissemination of outreach brochures, bill inserts and direct customer mailers.
- Contact the Two Rock USCG Training Center to discuss water shortage and targeted demand reduction.
- Dissemination of outreach to specific customer types.
- Informational booths at local events.
- Coordinated outreach in local newspaper, City newsletter, social media, and media releases.
- Update City's website to include current water shortage information.
- Conduct targeted outreach to the highest water users by direct mailings and letters.
- Conduct outreach to potable water haulers to communicate demand reduction actions associated with hauled water.
- Conduct targeted outreach to specific groups, such as property managers, landscape professionals, pool and spa companies, high use water customers, etc.
- Presentations and outreach to local groups, business, and schools.
- Presentations and workshops to City Council.

The public information campaign will be intensified as necessary, with each progressive water shortage stage, to communicate mandatory requirements and increased demand reduction actions.

## **7 Compliance and Enforcement**

This section describes how the City will ensure compliance with, and enforcement of, provisions of the Amended 2020 WSCP.

### **7.1 Water Shortage Warnings and Fees**

Water shortage warnings, violations, and fees can be applied to customers who are in violation of the Amended 2020 WSCP stage demand reduction actions, the City's Water Conservation Regulations defined in PMC Chapter 15.17, or to customers that are not meeting the requirements of their assigned Reduction Plan. The City will issue warnings, violations, and fines as necessary according to the following process:

1. Personal contact with the customer at the address of the water service in violation. Education and technical support provided.
2. If personal contact is unsuccessful, written notice of the violation, including date that violation must be corrected, may be left on the premises, with a copy of the notice sent by certified mail to the customer. Customer is given 72 hours or less as appropriate to mitigate violation.
3. As adopted by the City Council pursuant to PMC Section 1.16.030, current fines, as stated in Resolution No. 2008-212 N.C.S., are as follows. The most current fines apply as adopted by City Council:
  - i. First Violation: Fine of \$100
  - ii. Second Violation: Fine of \$500
  - iii. Third violation: Fine of \$1,000
4. Pursuant to PMC Chapter 15.17.100 Enforcement and fees, in addition to issuing a notice of violation, if appropriate, City may install a pressure reducing device in a service connection or disconnect service until verification of correction is made.
5. Customer will be charged \$250 for installation of a pressure reducing device, and \$250 for the removal of device. Device will not be removed until customer has paid all fines and outstanding account balances, and customer may be assigned a water budget.
6. Customer will be charged \$60 for service disconnection and \$60 for re-connection. Service will not be re-connected until customer has paid all fines and outstanding account balances, and customer may be assigned a water budget.

### **7.2 Appeal Process**

If a person or entity wishes to appeal a violation, that person or entity who was served the violation must obtain a "request for hearing" form from the City Clerk's office, located at Petaluma City Hall, 11 English Street, Petaluma, California, 94952, and return it to the city clerk's office, fully completed within fifteen days from the date of service of the violation.

At the time of returning the request for hearing form to the City Clerk's office, the person or entity requesting the appeal hearing shall deposit in advance the amount of any imposed fine. No appeal shall proceed without payment of the applicable fines at the time the appeal is filed; provided, that the City Manager may waive or defer the appeal fee upon written request for good cause shown. Good cause may include severe economic hardship, significant attempts to comply with the notice and order, and other factors indicating good faith attempts to comply.

Failure to timely submit a completed request for hearing form or to pay the advance deposit of any fine constitutes a waiver of the right to appeal and a failure to exhaust administrative remedies. Refer to PMC Chapter 1.14 Administrative Enforcement for appeal hearings and decision of the hearing officer.

## **8 Legal Authorities**

The City of Petaluma City Council, by resolution, shall declare a water shortage emergency and adopt the Amended 2020 WSCP. A draft of the Water Shortage Emergency Resolution is provided in Appendix B. In the event of a water shortage emergency when immediate action must be taken prior to the ability of the City Council to declare a water shortage emergency, the City Manager, or designee, is authorized to implement the Amended 2020 WSCP based on the reduction in water supply.

The City provides water service to the Two Rock United States Coast Guard Training Center (Training Center). The City shall coordinate with the Training Center, to which it provides water supply services for the possible proclamation of a local emergency.

## **9 Financial Consequences of Amended 2020 WSCP**

The City's tiered water rate structure is designed to encourage water conservation. The City's rate structure includes a fixed monthly service charge and a consumption charge. The fixed monthly charge is based on meter size. Consumption charges for commercial, industrial, and multi-family residential customers are based on a single rate, while single-family residential consumption charges are based on four tiers that increase in rate by volume.

The declaration of a water shortage emergency and adoption of the Amended 2020 WSCP with voluntary and mandatory demand reduction targets has the potential to reduce revenue to the water and wastewater utilities through reduced water sales and increased expenses as the City responds to the actions described in the Amended 2020 WSCP. The City does not have a water shortage rate structure to help cover water and wastewater utility costs.

In the upcoming 2022 utility rate study, the City will include an analysis of impacts of a prolonged drought on the water and wastewater utilities, develop options to meet short-term and long-term water shortage revenue reductions, and a water shortage rate structure may be established to consider for use in the event of a prolonged drought.

Depending on the water shortage level and duration of a water shortage emergency, mitigation actions may be taken to reduce financial impacts:

- Implementation of future water shortage rate structure.
- Use of financial reserves.
- Reduction of current and/or future operation and maintenance expenses.
- Deferment of capital improvement projects.

## **10 Monitoring and Reporting**

Monitoring and reporting water use is fundamental to water supply planning and management. Monitoring is also essential to ensure that the demand reduction actions are achieving the intended water use reduction, or if improvements or new action need to be considered. Monitoring for customer compliance tracking is also necessary for enforcement of the Reduction Plan.

The City's water system is fully metered, from its water supply sources to individual customer meters. During all water supply conditions, the City collects, tracks, and analyses water use data and submits a monthly urban water supplier monitoring report to the State Water Board. The City will prepare and submit monthly water shortage monitoring and reporting as required by the State Water Board.

During a water shortage emergency, a demand reduction target will be determined with a baseline year by which to achieve the targeted reduction. All water shortage stages are implemented as citywide targets, and do not target individual customers, unless a customer is assigned a Reduction Plan as a City action beginning in Stage 2 of the Amended 2020 WSCP. Citywide water demand will be tracked monthly and compared to the baseline year for compliance. Beginning in Stage 2, if a customer is assigned a Reduction Plan, the City will track customer water use monthly and compare the customer demand reduction target to the baseline year. Reduction Plan reduction target and baseline year are determined by the reduction target and baseline year implemented by the Amended 2020 WSCP, or by another reduction target and baseline as determined by the City and described in the Reduction Plan.

If the reduction targets defined by the implemented Amended 2020 WSCP are not being met, the Director will notify the City Council and additional action will be taken to achieve reduction targets. If additional action is necessary to realize a water shortage stage

that is not defined in the Amended 2020 WSCP, the City will revise the Amended 2020 WSCP according to the procedures discussed in Section 11 WSCP Refinement Procedures.

## **11 WSCP Refinement Procedures**

The WSCP is best prepared and implemented as an adaptive management plan, giving the City the ability to revise as necessary during a water shortage emergency to meet demand reduction targets. If it is determined that the WSCP needs revision to ensure shortage response actions are effective, the City will revise the WSCP and follow the procedures described in Section 12 Plan Adoption, Submittal and Availability.

Pursuant to Section 10632.2 of the Water Code, the City may take actions not specified in its WSCP, if needed, without having to formally amend its UWMP or WSCP.

## **12 Plan Adoption, Submittal and Availability**

The Amended 2020 WSCP will be adopted, submitted, and made available to the public with the Amended 2020 UWMP. The Amended 2020 WSCP may be amended independently of the Amended 2020 UWMP, and this section discusses how the City will adopt, submit, and make available a revised Amended 2020 WSCP.

### **12.1 Notice of Public Hearing**

City shall provide notice of the time and place of public hearing to any city or county within which the City provides water. The public hearing must be noticed in a local newspaper for two successive weeks, at least two times, with at least five days between publications. This notice must include time and place of hearing, and where plan is located for public access and review.

### **12.2 Public Hearing and Adoption**

In accordance with the Water Code, the City must provide an opportunity for the public to provide input on the WSCP and any amendments which may occur. The City must consider all public input prior to its adoption. After public hearing, the amended WSCP shall be adopted as prepared or as modified after hearing.

### **12.3 Plan Submittal**

The City shall submit an electronic copy of an amended WSCP to DWR through the WUE Data Portal within 30 days of its adoption. In addition to submitting amendments to DWR, copies of the amendments or changes to the WSCP will be submitted to the California State Library and any city or county within which the City provides water suppliers within 30 days after adoption.

### **12.4 Public Availability**

No later than 30 days after submittal to DWR, a copy of the amended WSCP shall be made available online. Hard copies of the amended WSCP shall be made available at the City's offices for public review during normal business hours.

The Amended 2020 WSCP was adopted concurrently with the City's Amended 2020 UWMP, by separate resolution. Prior to adoption, a duly noticed public hearing was conducted. A hard copy of this Amended 2020 WSCP will be submitted to DWR within 30 days of adoption, along with an electronic copy. No later than 30 days after submittal to DWR, copies of this Amended 2020 WSCP will be available online for public access and download. A copy will also be provided to the California State Library.



APPENDIX A:

City of Petaluma Local Hazard Mitigation Plan



# City of Petaluma Local Hazard Mitigation Plan



Final Plan Update | November 2020

**wood.**

Prepared for:  
City of Petaluma  
Public Works & Utilities Department  
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Prepared by:  
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## Executive Summary

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The purpose of hazard mitigation is to reduce or eliminate long-term risk to people and property from hazards. The City of Petaluma developed this Local Hazard Mitigation Plan (LHMP) update to make the City and its residents less vulnerable and more resilient to future hazard events. This plan was prepared pursuant to the requirements of the Disaster Mitigation Act of 2000 so that Petaluma would be eligible for the Federal Emergency Management Agency's (FEMA) Pre-Disaster Mitigation and Hazard Mitigation Grant programs.

The City followed a planning process prescribed by FEMA, which began with the formation of a hazard mitigation planning committee (HMPC) comprised of key City representatives, and other regional stakeholders. The HMPC conducted a risk assessment that identified and profiled hazards that pose a risk to the City of Petaluma, assessed the City's vulnerability to these hazards, and examined the capabilities in place to mitigate them. The City is vulnerable to several hazards that are identified, profiled, and analyzed in this plan. Floods, wildfires, severe weather, and earthquake hazards are among the hazards that can have a significant impact on the City.

Based on the risk assessment review and goal setting process, the HMPC identified the following five goals, which provide the direction for reducing future hazard-related losses within the City of Petaluma Planning Area:

- **Goal 1:** Minimize loss of life, property and economic damage, and protect people and property from hazards;
- **Goal 2:** Preserve and protect Petaluma's natural environment as an efficient resource to build; community resilience against natural hazards;
- **Goal 3:** Educate and build community awareness on natural hazard risks and the importance of resiliency and emergency preparedness;
- **Goal 4:** Enhance City staff coordination, training, and response during disasters and ensure City facilities and infrastructure are operational and provide safe places for the community to shelter during hazard events; and
- **Goal 5:** Implement and regularly update the LHMP as an integrated planning mechanism to prepare the City for natural, human-caused, and climate change-related hazards.

To meet identified goals, the plan recommends 34 mitigation actions, which are summarized in the table that follows. This plan has been formally adopted by the City and will be updated every five years at a minimum.





**Table ES.1: Mitigation Action Summary Table**

Mitigation Action Title	Priority	Addresses Current Development	Addresses Future Development
<b>Dam Incidents</b>			
Assess downstream impacts associated with dam incidents	Low	X	X
<b>Drought</b>			
Groundwater supply augmentation for drought resiliency	Medium	X	X
Sustainable Groundwater Management Planning	Low	X	X
<b>Cyber Threats</b>			
Develop a Water Infrastructure Vulnerability Risk and Resilience Plan and Emergency Response Plan that addresses cyber sufficiency	Low	X	X
<b>Earthquake</b>			
Implement Seismic Retrofits at Petaluma Historic Library and Museum	Medium	X	
Seismic Retrofit Analysis of City buildings	High	X	
<b>Flooding</b>			
Enhance structural flood mitigation projects to reduce near annual floods on north end of City	High	X	X
Floodplain property protection, acquisition, and relocation	Low	X	
Continue annual stream and creek channel maintenance	Low	X	X
Higher Regulatory Standards for Flood Protection	Medium	X	X
Improve National Flood Insurance Program Community Rating System Class Rating	Medium	X	X
<b>Hazardous Material Releases</b>			
Evacuation Planning	Low	X	X
<b>Sea Level Rise</b>			
Explore natural protection with wetland enhancement, marshland protection, and restoration project implementation in the Petaluma River and San Pablo Bay transition zone	Low	X	X
Continue Petaluma River Dredging Program to enhance flood resiliency	Medium	X	X
Open space preservation in areas prone to sea level rise along the Petaluma River	Medium	X	X





Mitigation Action Title	Priority	Addresses Current Development	Addresses Future Development
Map and assess vulnerability to sea level rise and integrate the information with the City GIS mapping capabilities to educate the community and help them gain awareness of the potential impacts and actions the City is taking to plan and adapt	Medium	X	X
Assess sea level rise modelling for use in the LHMP and how those projections can be routinely re-evaluated in subsequent climate adaptation planning efforts	Low	X	X
Update City Implementing Zoning Ordinance (IZO) to manage development in high risk areas	Low	X	X
<b>Severe Weather: Heavy Rains/Thunderstorms/Hail/Lightning/Dense Fog</b>			
Replace aging generator and plan for severe weather by obtaining backup generators at City critical facilities, including the Communications Center	Medium	X	
<b>Severe Weather: Extreme Heat</b>			
Establish a resiliency hub at City Community Center to be used during severe weather events involving heat waves and wildfires	Medium	X	X
<b>Severe Weather: High Wind</b>			
Enhance local building code to incorporate wind-resistant design features that address high wind hazards	Low	X	X
Develop a PSPS toolkit for local businesses	Low	X	X
<b>Wildfire</b>			
Defensible space funding program	Medium	X	X
Develop a City-wide Fire Suppression Master Plan	Medium	X	X
Evaluate the WUI Zone in the City Limits	Medium	X	X
Install Fire Protection System in all City facilities	Medium	X	
Wildland Urban Interface Pre-Fire Plan	High	X	X
<b>Multi-Hazard</b>			
Evacuation Alert and Warning System and Periodic Testing	High	X	X
Periodically assess the need for new or relocated fire or police stations and other emergency facilities, changes in staffing levels, and need for supplies, equipment, technologies, and in-service training classes	Low	X	
Develop and maintain a system of interoperable communications for first responders from local, state, and federal agencies	High	X	X





<b>Mitigation Action Title</b>	<b>Priority</b>	<b>Addresses Current Development</b>	<b>Addresses Future Development</b>
Update the City Emergency Operations Plan	High	X	X
Emergency Operations Center replacement and upgrades	High	X	X
Expand Community Emergency Pre Program	Low	X	X
Community Emergency Preparedness Webpage	Low	X	X





# Table of Contents

**Executive Summary ..... i**

**1 Introduction ..... 1-1**

    1.1 Background and Scope ..... 1-1

    1.2 Previous Plan ..... 1-1

    1.3 Regulatory Authority ..... 1-2

        1.3.1 Federal ..... 1-2

        1.3.2 State and Local ..... 1-3

    1.4 Plan Organization ..... 1-4

**2 Community Profile ..... 2-1**

    2.1 Location and Geography ..... 2-1

    2.2 Land Use Distribution ..... 2-1

    2.3 History ..... 2-5

    2.4 Demographics ..... 2-5

        2.4.1 Population and Growth Projections ..... 2-5

        2.4.2 Age ..... 2-7

        2.4.3 Housing ..... 2-9

        2.4.4 Race and Ethnicity ..... 2-8

        2.4.5 Income and Poverty ..... 2-9

    2.5 Social Vulnerability ..... 2-10

        2.5.1 Environmental Justice ..... 2-13

        2.5.2 Disadvantaged Communities ..... 2-14

    2.6 Economy and Employment ..... 2-17

    2.7 Commuter Population ..... 2-18

    2.8 Growth and Development Trends ..... 2-18

    2.9 Mitigation Capability Assessment ..... 2-21

        2.9.1 City of Petaluma’s Regulatory Mitigation Capabilities ..... 2-22

        2.9.2 City of Petaluma Administrative/Technical Mitigation Capabilities ..... 2-28

        2.9.3 City of Petaluma Fiscal Mitigation Capabilities ..... 2-30

        2.9.4 Mitigation Outreach and Partnership Capabilities ..... 2-31

        2.9.5 Opportunities for Enhancement ..... 2-35

**3 Planning Process ..... 3-1**





3.1 Background on Mitigation Planning in the City of Petaluma ..... 3-1

3.2 Local Government Participation..... 3-2

3.3 The 10-Step Planning Process ..... 3-3

    3.2.1 Phase 1: Organize Resources ..... 3-4

    3.2.2 Phase 2: Assess Risks ..... 3-23

    3.2.3 Phase 3: Develop the Mitigation Plan..... 3-23

    3.2.4 Phase 4: Implement the Plan and Monitor Progress ..... 3-23

**4 Risk Assessment..... 4-1**

    4.1 Hazard Identification: Natural Hazards ..... 4-2

        4.1.1 Methodology and Results ..... 4-2

        4.1.2 Overall Hazard Significance Summary ..... 4-7

        4.1.3 Disaster Declaration History ..... 4-8

        4.1.4 Climate Change Considerations Summary ..... 4-10

    4.2 Asset Summary ..... 4-11

    4.3 Hazard Profiles and Risk Assessment ..... 4-21

        4.3.1 Dam Incidents ..... 4-23

        4.3.2 Drought ..... 4-29

        4.3.3 Earthquakes ..... 4-40

        4.3.4 Wildfire..... 4-71

        4.3.5 Flood ..... 4-91

        4.3.6 Sea Level Rise ..... 4-114

        4.3.7 Severe Weather: General ..... 4-132

        4.3.8 Severe Weather: Extreme Heat..... 4-133

        4.3.9 Severe Weather: Heavy Rain/Thunderstorm/Hail/Lightning/Dense Fog..... 4-140

        4.2.10 Severe Weather: High Winds ..... 4-154

    4.4 Human-Caused Hazards ..... 4-159

        4.4.1 Hazardous Material ..... 4-160

        4.4.2 Cyber Threats..... 4-165

    4.5 Hazards Summary ..... 4-169

**5 Mitigation Strategy ..... 5-1**

    5.1 Goals and Objectives ..... 5-1

        5.1.1 Goals Development Process ..... 5-2







5.1.2 Objectives Development Process ..... 5-2

5.1.3 Incorporation into Existing Planning Mechanisms..... 5-3

5.2 Identification and Analysis of Mitigation Actions ..... 5-4

5.2.1 Prioritization Process ..... 5-5

5.4 Mitigation Action Plan ..... 5-7

5.3.1 Progress on 2010 City of Petaluma LHMP Annex Mitigation Actions ..... 5-7

5.3.2 Continued Compliance with National Flood Insurance Program ..... 5-8

5.3.3 Mitigation Action Plan ..... 5-8

**6 Plan Adoption ..... 6-1**

**7 Plan Implementation and Maintenance ..... 7-1**

7.1 Implementation ..... 7-1

7.1.1 Role of Hazard Mitigation Planning Committee in Implementation and Maintenance..... 7-2

7.2 Maintenance ..... 7-2

7.2.1 Maintenance Schedule ..... 7-2

7.2.2 Maintenance Evaluation Process ..... 7-3

7.2.3 Incorporation into Existing Planning Mechanisms ..... 7-4

7.2.4 Continued Public Involvement ..... 7-6

**Tables**

Table 2-1: City of Petaluma Land Uses by Acreage ..... 2-2

Table 2-2: City of Petaluma Populations Changes (counts), 2010-2019 ..... 2-6

Table 2-3: City of Petaluma’s Demographic and Social Characteristics, 2013-2017 ..... 2-6

Table 2-4: City of Petaluma Housing Tenure, 2013-2017 ..... 2-8

Table 2-5: City of Petaluma Race and Ethnicity, 2008-2012 vs. 2013-2017 ..... 2-8

Table 2-6: City of Petaluma’s Comparative Economic Characteristics, 2008, 2017, and 2018..... 2-9

Table 2-7: City of Petaluma’s Employment by Industry, 2013-2017 ..... 2-17

Table 2-8: City of Petaluma’s Major Employers..... 2-18

Table 2-9: City of Petaluma Land Use Acreages at Plan Buildout..... 2-21

Table 2-10: City of Petaluma’s Regulatory Mitigation Capabilities ..... 2-22

Table 2-11: City of Petaluma Public Facilities, Services, and Fire Protection Goals ..... 2-25

Table 2-12: City of Petaluma Flood and Stormwater Conveyance Goals..... 2-26

Table 2-13: City of Petaluma Natural Hazard and Emergency Preparedness and Management Goals ..... 2-26

Table 2-14: City of Petaluma’s Administrative and Technical Mitigation Capabilities ..... 2-28





Table 2-15: City of Petaluma’s Fiscal Mitigation Capabilities .....2-31

Table 2-16: City of Petaluma Credit Points under the Community Rating System Program .....2-35

Table 2-17: Cost Savings by Policy and by Community under CRS Class 5 .....2-36

Table 3-1: Mitigation Planning Processes Used to Develop the City of Petaluma’s LHMP ..... 3-4

Table 3-2: Local Hazard Mitigation Plan Schedule of Planning Activities ..... 3-5

Table 3-3: Schedule of Planning Meetings..... 3-7

Table 3-4: Public Workshops .....3-11

Table 3-5: Incorporated Planning Mechanisms.....3-22

Table 3-6: Summary of Comments Received during Public Review .....3-27

Table 4-1: Crosswalk with Other Hazard Mitigation Plans..... 4-3

Table 4- 2: City of Petaluma Hazard Significance Summary ..... 4-7

Table 4-3: City of Petaluma and Sonoma County State and Federal Disaster Declarations, 1950-2018 ..... 4-8

Table 4-4: City of Petaluma Total Improved Parcel Exposure by Parcel Type.....4-12

Table 4-5: Critical and City Facility Summary by Category and Type .....4-13

Table 4-6: City of Petaluma Historical Resources from the National Register of Historic Places.....4-17

Table 4-7: Threatened and Endangered Species in Sonoma County and the City of Petaluma Area .....4-19

Table 4-8: Characteristics of the Dams of Concern Upstream of the City of Petaluma .....4-24

Table 4-9: Petaluma’s Current Water Supply Sources and Projected Availability for 2025 .....4-30

Table 4-10: Disaster Declarations and Proclamations Related to Drought in Sonoma County.....4-35

Table 4-11: Magnitude and Mercalli Intensity Scale Measurements and Associated Characteristics .....4-49

Table 4-12: Expected Building Damage by Building Type (All Building Design Levels) .....4-56

Table 4-13: Casualty and Injury Estimates from Hazus Results.....4-58

Table 4-14: Building-Related Economic Loss Estimates (Millions of dollars) .....4-59

Table 4-15: Transportation System Economic Losses (Millions of Dollars) .....4-60

Table 4-16: Utility System Economic Losses (Millions of Dollars) .....4-61

Table 4-17: Expected Damage to the Transportation Systems .....4-62

Table 4-18: Expected Utility System Facility Damage .....4-63

Table 4-19: Expected Utility System Pipeline Damage (Site Specific) .....4-63

Table 4-20: Hazus 4.0 Deterministic M7.2 Earthquake Scenario Loss Estimations for Petaluma’s Census Tracts .....4-65

Table 4-21: Expected M7.2 Earthquake Scenario Building Damages by Occupancy Type .....4-68

Table 4-22: Expected Utility System Pipeline Damage (Site Specific) .....4-69

Table 4-23: Expected Potable Water and Electric Power System Performance.....4-70





Table 4-24: Summary of Fire History Near the City of Petaluma ..... 4-77

Table 4-25: Parcels in Fire Hazard Severity Zones within Local Responsibility Areas in Petaluma ..... 4-85

Table 4-26: The City of Petaluma’s Critical Facilities at Risk to Wildfire based on FHSZs in LRAs ..... 4-88

Table 4-27: FEMA’s Special Flood Hazard Area Zone Descriptions ..... 4-102

Table 4-28: City of Petaluma Parcels in Floodplains by Parcel Type and Flood Event ..... 4-106

Table 4-29: City of Petaluma Parcels in Floodplains by Parcel Type and Flood Event ..... 4-108

Table 4-30: City of Petaluma Flood Loss Estimates Summary by Parcel Type ..... 4-108

Table 4-31: The City of Petaluma’s Critical Facilities in the 100- and 500-Year Floodplains ..... 4-111

Table 4-32: Sea Level Rise Projections for San Francisco Bay Area ..... 4-117

Table 4-33: Parcels Exposed to Average Annual Tidal Inundation with Sea Level Rise ..... 4-121

Table 4-34: Parcels Exposed to 100-Year Coastal Storm Event Inundation with Sea Level Rise ..... 4-121

Table 4-35: Critical Facilities Exposed to Average Annual Tidal Inundation with Sea Level Rise ..... 4-126

Table 4-36: Critical Facilities Exposed to 100-Year Coastal Storm Event Inundation with Sea Level Rise ..... 4-127

Table 4-37: NCEI Hazard Event Reports for the Sonoma County\* 1950-2019 ..... 4-132

Table 4-38: Hail Measurements ..... 4-143

Table 4-39: Lightning Activity Level Scale ..... 4-144

Table 4-40: Atmospheric River Categories ..... 4-145

Table 4-41: Severe Weather Events recorded in Sonoma County (1950-2018) ..... 4-147

Table 4-42: Beaufort Wind Scale ..... 4-154

Table 4-43: Hazard Identification and Determination of Priority Hazard ..... 4-169

Table 5-1: Mitigation Action Summary Table ..... 5-10

## Figures

Figure 2-1: City of Petaluma Planning Area ..... 2-3

Figure 2-2: City of Petaluma Land Use Distribution ..... 2-4

Figure 2-3: City of Petaluma Current and Projected Age Distribution, 2010 – 2022 ..... 2-7

Figure 2-4: City of Petaluma Age Distribution vs. Sonoma County - Percentage of Population, 2017 ..... 2-7

Figure 2-5: Comparable Median Home Sales Price in Sonoma County, 2017 ..... 2-8

Figure 2-6: Disadvantaged Communities based on CDC ATSDR SVI Tool ..... 2-11

Figure 2-7: Overall Social Vulnerability in the City of Petaluma Planning Area based on SVI Data ..... 2-12

Figure 2-8: Disadvantaged Communities based on California DWR DAC Mapping Tool ..... 2-14

Figure 2-9: Petaluma Census Tract Scores based on OEHHA CalEnviroScreen Tool ..... 2-15





Figure 2-10: SCTA-Defined Disadvantaged Communities in Petaluma..... 2-17

Figure 2-11: City of Petaluma Major Development Projects – As of August 16, 2019..... 2-20

Figure 2-12: City of Petaluma Public Safety Power Shutoff Webpage..... 2-33

Figure 2-13: City of Petaluma Public Information on Public Safety Power Shutoffs ..... 2-34

Figure 3-1: Goal Development Brainstorm Session at HMPC Meeting #2..... 3-7

Figure 3-2: Mitigation Strategy Brainstorm Session at HMPC Meeting #3..... 3-8

Figure 3-3: City of Petaluma Local Hazard Mitigation Plan Website (Original)..... 3-9

Figure 3-4: City of Petaluma Local Hazard Mitigation Plan Website (Revised) ..... 3-10

Figure 3-5 1<sup>st</sup> Public Workshop ..... 3-10

Figure 3-6 2<sup>nd</sup> Public Workshop ..... 3-11

Figure 3-7: Example of Public Survey Response ..... 3-13

Figure 3-8: Example of Social Media Announcement on City’s Facebook Page..... 3-14

Figure 3-9: Notice of Public Workshop on City’s Nextdoor Page..... 3-15

Figure 3-10: Social Media Announcement on City’s Twitter Page on Availability of Draft LHMP ..... 3-15

Figure 3-11: Notice of Availability of Draft LHMP on City’s Facebook Page ..... 3-16

Figure 3-12: 1<sup>st</sup> Public Workshop Notice in the Petaluma-Argus Courier ..... 3-17

Figure 3-13: 2<sup>nd</sup> Public Workshop Notice in the Petaluma-Argus Courier ..... 3-18

Figure 3-14: Example of Newspaper Article published prior to 1<sup>st</sup> Public Workshop..... 3-19

Figure 3-15: Example of Newspaper Article published prior to 1<sup>st</sup> Public Workshop..... 3-20

Figure 4-1: Critical and City Facilities in Petaluma by Overall Category..... 4-14

Figure 4-2: City of Petaluma Historic Landmarks and Places..... 4-16

Figure 4-3: Dams of Interest Upstream of the City of Petaluma ..... 4-25

Figure 4-4: U.S. Drought Monitor Conditions for California, August 13, 2019 ..... 4-32

Figure 4-5: U.S. Drought Monitor Conditions for California, November 29, 2018..... 4-33

Figure 4-6: U.S. Drought Monitor for California: August 4, 2015..... 4-34

Figure 4-7: Drought Conditions in California – 2000 – 2019 ..... 4-34

Figure 4-8: Drought Impact Reporter Summarizing Impacts at the County Level in Sonoma County, 1950-2019 ..... 4-36

Figure 4-9: Potential Ground Shaking Probability in the City of Petaluma ..... 4-42

Figure 4-10: Liquefaction Susceptibility in the City of Petaluma..... 4-43

Figure 4-11: Landslide Susceptibility in the City of Petaluma and Its Planning Area..... 4-45

Figure 4-12: Earthquake Faults near the Planning Area..... 4-47





Figure 4-13: Hazus 2,500 Year Probabilistic Earthquake Scenario with Liquefaction Susceptibility – Total Losses by Census Tract.....4-53

Figure 4-14: Estimated Building Damage by General Occupancy Type and Damage Category .....4-55

Figure 4-15: Displaced Households and Persons Seeking Shelter Estimates .....4-57

Figure 4-16: Economic Loss Estimates by Loss Type and Occupancy Type .....4-59

Figure 4-17: USGS Generated ShakeMap Earthquake Scenario for the Hayward-Rodgers Creek Faults ..4-64

Figure 4-18: Hazus M7.2 ShakeMap Deterministic Earthquake Scenario (Hayward-Rodgers Creek Faults) in Petaluma with Liquefaction Susceptibility – Total Losses by Census Tract.....4-67

Figure 4-19: Fire Hazard Severity Zones in State Responsibility Areas (SRAs) Around the City of Petaluma ...  
.....4-73

Figure 4-20: Fire Hazard Severity Zones in Local Responsibility Areas (LRAs) in Petaluma .....4-74

Figure 4-21: Fire Threat Zones in and Near the City of Petaluma .....4-75

Figure 4-22: Fire History and Burn Perimeters near the City of Petaluma, 1878 to 2018.....4-79

Figure 4-23: Annual Fire Probability in the City of Petaluma for the Years 2026-2050.....4-81

Figure 4-24: Future Annual Average of Acres Burned in Petaluma under Low and High Emissions Scenarios  
.....4-83

Figure 4-25: Parcels in Fire Hazard Severity Zones in Local Responsibility Areas - City of Petaluma .....4-86

Figure 4-26: Critical Facilities and Infrastructure within Fire Threat Zones in the City of Petaluma.....4-89

Figure 4-27: City of Petaluma Water Service Areas and Flood Control Structures .....4-94

Figure 4-28: Watersheds in the City of Petaluma and Its Planning Area .....4-95

Figure 4-29: FEMA Special Flood Hazard Areas for the 1% and 0.2% Annual Chance Flood Events in the City of Petaluma.....4-99

Figure 4-30: Petaluma Flood Control Zone 2A and Stream Maintenance Program Focus Areas ..... 4-100

Figure 4-31: Repetitive Loss Properties in the City of Petaluma as of 2015 ..... 4-107

Figure 4-32: City of Petaluma Parcels in the 1% and 0.2% Annual Chance Floodplains..... 4-109

Figure 4-33: City of Petaluma Critical Facilities and Infrastructure in the 1% and 0.2% Annual Chance Floodplains..... 4-112

Figure 4-34: Tide Record and Sea Level Rise Trend from San Francisco Tide Gauge (NOAA Station 9414190) ..... 4-117

Figure 4-35: Parcels Exposed to Average Annual Tidal Inundation with Sea Level Rise..... 4-123

Figure 4-36: Parcels Exposed to 100-Year Coastal Storm Event Inundation with Sea Level Rise..... 4-124

Figure 4-37: Critical Facilities Exposed to Average Annual Tidal Inundation with Sea Level Rise..... 4-128

Figure 4-38: Critical Facilities Exposed to 100-Year Coastal Storm Event Inundation with Sea Level Rise .....  
..... 4-129





Figure 4-39: National Weather Service Heat Index..... 4-134

Figure 4-40: The City of Petaluma’s Daily Temperature Averages and Extremes ..... 4-135

Figure 4-41: California’s Statewide Mean Temperature Departure, 1900-2014..... 4-136

Figure 4-42: City of Petaluma – Future Extreme Heat Days in High and Low Emission Scenarios ..... 4-137

Figure 4-43: Cloud to Ground Lightning..... 4-142

Figure 4-44: Atmospheric River Strength and Land Distribution, February 2018 vs. February 2019 ..... 4-146

Figure 4-45: City of Petaluma’s Monthly Average Total Precipitation ..... 4-149

Figure 4-46: City of Petaluma’s Daily Average and Extreme Precipitation ..... 4-149

Figure 4-47: City of Petaluma – Future Precipitation Estimates in High and Low Emission Scenarios..... 4-151

Figure 4-48: Areas of Petaluma Potentially Affected by the PG&E Public Safety Power Shutoffs..... 4-158

Figure 4-49: Hazardous Materials Spills/ Accidents in the City of Petaluma Reported to Cal OES: 1999-2018 ..... 4-163

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## Appendices

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Appendix A: Planning Process

Appendix B: References

Appendix C: Mitigation Strategy

Appendix D: Adoption Resolution





## Acronyms

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ABAG	Association of Bay Area Governments
APG	Adaptation Planning Guide
ASCE	American Society of Civil Engineers
AWIA	America Water Infrastructure Act
BAAQMD	Bay Area Air Quality Management District
BCM	Basin Characterization Model
BFE	Base Flood Elevation
CAC	Climate Action Commission
CalARP	California Accidental Release Prevention Program
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
CDFW	California Department of Fish and Wildlife
CDPH	California Department of Public Health
CEQA	California Environmental Quality Act
CERT	Community Emergency Response Team
CIS	Community Information System
COPE	Citizens Organized to Prepare for Emergencies
CoSMoS	Coastal Storm Modelling System
CRHR	California Registry of Historic Resources
CUPA	Certified Unified Program Agency
CWD	Climate Water Deficit
CWPP	Community Wildfire Protection Plan
DHS	Department of Health Services
DOF	Department of Finance
DOT	Department of Transportation
DTSC	Department of Toxic Substances Control
DWR	Department of Water Resources
EAP	Emergency Action Plan
EIR	Environmental Impact Report





EOC	Emergency Operations Center
EOP	Emergency Operations Plan
ERP	Emergency Response Plan
FEMA	Federal Emergency Management Agency
FHSZ	Fire Hazard Severity Zone
FIRM	Flood Insurance Rate Map
FIS	Flood Insurance Study
FMP	Floodplain Management Plan
FRAP	Fire and Resource Assessment Program
GCM	Global Climate Model
GIS	Geographic Information Systems
GSA	Groundwater Sustainability Agency
GSP	Groundwater Sustainability Plan
HMBP	Hazardous Materials Business Plan
HMPC	Hazard Mitigation Planning Committee
HSC	Health and Safety Code
IBC	International Building Council
ICC	International Code Council
IPCC	Intergovernmental Panel on Climate Change
IVT	Integrated Water Vapor Transport
IZO	Implementing Zoning Ordinance
LAL	Lightning Activity Level
LHMP	Local Hazard Mitigation Plan
LOMA	Letter of Map Amendment
LOMR	Letter of Map Revision
LRA	Local Responsibility Area
MDD	Maximum Daily Demand
NBRP	North Bay Reuse Program
NEPA	National Environmental Policy Act
NFIP	National Flood Insurance Program
NFHL	National Flood Hazard Layer
NOAA	National Oceanic Atmospheric Association







NPMS	National Pipeline Mapping System
NRC	National Response Center
NRHP	National Registry of Historic Places
NWS	National Weather Service
OPC	Ocean Protection Council
OSHA	Occupational Safety and Health Administration
PG&E	Pacific Gas and Electric
PRC	Public Resources Code
PSPS	Public Safety Power Shutoff
RCPA	Regional Climate Protection Authority
RCRA	Resource Conservation and Recovery Act
RGMS	Residential Growth Management System
RMP	Risk Management Plan
RTK NET	Right-to-Know Network
SBA	Small Business Administration
SCAPOSD	Sonoma County Agricultural Preservation and Open Space District
SFHA	Special Flood Hazard Area
SGMA	Sustainable Groundwater Management Agency
SHMP	State Hazard Mitigation Plan
SLR	Sea Level Rise
SRA	State Responsibility Area
STAPLEE	Social, Technical, Administrative, Political, Legal, Economic, Environmental
UGB	Urban Growth Boundary
URM	Unreinforced Masonry
USDA	U.S. Department of Agriculture
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
UWMP	Urban Water Management Plan
WERC	Western Ecological Research Center
WRCC	Western Regional Climate Center
WRFPP	Water Recycling Funding Program





WSCP	Water Shortage Contingency Plan
WUI	Wildland Urban Interface





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# 1 Introduction

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The City of Petaluma prepared this Local Hazard Mitigation Plan (LHMP) to guide planning efforts to better protect the people and property of the City from the effects of hazardous events. It serves as a tool to help decision makers direct mitigation activities, to coordinate city resources, and to be eligible for State and Federal funding. This plan updates the City's previous hazard mitigation plan that was developed as part of a regional effort. This plan also demonstrates the City's commitment to reducing risks from hazards to the community.

## 1.1 Background and Scope

---

Each year in the United States, natural disasters take the lives of hundreds of people and injure thousands more. Nationwide, taxpayers pay billions of dollars annually to help communities, organizations, businesses, and individuals recover from disasters. These monies only partially reflect the true cost of disasters because additional expenses to insurance companies and nongovernmental organizations are not reimbursed by tax dollars. Many natural disasters are predictable, and much of the damage caused by these events can be alleviated or even eliminated.

Hazard mitigation is defined by FEMA as "any sustained action taken to reduce or eliminate long-term risk to human life and property from a hazard event." The results of a three-year, congressionally mandated independent study to assess future savings from mitigation activities provides evidence that mitigation activities are highly cost-effective. On average, each dollar spent on hazard mitigation saves society an average of \$6 in avoided future disaster costs (National Institute of Building Sciences 2018).

Hazard mitigation planning is the process through which hazards that threaten communities are identified, likely impacts of those hazards are determined, mitigation goals are set, and appropriate strategies to lessen impacts are determined, prioritized, and implemented. This plan documents the City of Petaluma's hazard mitigation planning process and identifies relevant hazards and vulnerabilities and strategies the City will use to decrease vulnerability, and increase resiliency and sustainability in Petaluma.

## 1.2 Previous Plan

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In 2005 the Association of Bay Area Governments (ABAG) prepared a regional multi-jurisdictional LHMP for the San Francisco Bay Area referred to as *Taming Natural Disasters*. In 2010 the plan was updated and covered numerous jurisdictions in the Bay Area consisting of seven counties, 76 cities including the City of Petaluma, five school districts, 12 transit agencies, 13 water districts, and five special-purpose districts. The goal of the regional multi-jurisdictional LHMP was to maintain and enhance a disaster-resistant region by reducing the potential loss of life, property damage, and environmental degradation from natural disasters, while accelerating economic recovery from those disasters. The City participated in the original plan and update by preparing an annex that was approved by FEMA and adopted by resolution in 2012 by the Petaluma City Council as the City of Petaluma 2010 LHMP Annex. Today ABAG is no longer managing the update of the multi-jurisdictional LHMP and the 2010 *Taming Natural Disasters* plan has expired.

The City's 2019 LHMP supersedes the 2010 LHMP Annex prepared by ABAG. This new LHMP is a single jurisdictional stand-alone plan for the City of Petaluma that geographically covers everything within the City of Petaluma's jurisdictional boundaries and its Urban Growth Boundary (UGB) (hereinafter referred to as the Planning Area). The single jurisdictional and stand-alone plan is tailored to better suit the needs





and capabilities of the City and their planning partners. The updated 2019 LHMP differs from the 2010 ABAG plan as follows:

- The single jurisdictional and stand-alone plan focuses only on the City of Petaluma rather than being a subset of a larger regional and multi-jurisdictional planning effort.
- The risk assessment addresses natural and human-caused hazards specific to the City and includes a vulnerability assessment that evaluated property within the City's Planning Area, critical facilities and infrastructure, and City-owned facilities and infrastructure, specifically water and wastewater systems.
- The plan integrates best available data and tools, including information on climate change impacts and sea level rise in a detailed risk and vulnerability assessment.
- The planning process was aligned with FEMA's National Flood Insurance Program (NFIP) Community Rating System (CRS) in order to maximize credits, improve the City's CRS rating, and ultimately reduce flood insurance premiums.
- The City and planning committee participants (referred to as the Hazard Mitigation Planning Committee) collaborated and involved the public through a coordinated outreach strategy targeted for both socially vulnerable and disadvantaged communities. The planning process involved the circulation of two online public surveys to better understand the community's perception of natural and human-caused hazard risks and to engage and solicit input on risk reduction through mitigation actions for the whole community.
- The planning process involved review of mitigation activities and strategies identified in various City planning documents, such as the 2025 General Plan, 2015 Floodplain Management Plan, and 2010 LHMP Annex.
- The plan includes a more detailed and tailored mitigation action strategy than the previous 2010 ABAG plan.
- The City and planning committee identified specific mitigation actions that are best suited for the City of Petaluma and can be funded under HMA grants and state funding programs in order to meet multiple objectives.

## 1.3 Regulatory Authority

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### 1.3.1 Federal

This plan was prepared pursuant to the requirements of the Disaster Mitigation Act of 2000 (Public Law 106-390) and the implementing regulations set forth by the Interim Final Rule published in the Federal Register on February 26, 2002, (44 CFR §201.6) and finalized on October 31, 2007. (Hereafter, these requirements and regulations will be referred to collectively as the Disaster Mitigation Act or DMA of 2000.) The DMA of 2000, also commonly known as "The 2000 Stafford Act Amendments," constitutes an effort by the Federal government to reduce the rising cost of disasters. The Act stresses the importance of coordinated mitigation planning and disaster preparedness prior to an event and emphasizes the need for mitigation planning.

Section 322 of the regulations established the requirements that LHMPs must meet in order for a local jurisdiction to be eligible for certain Federal disaster assistance and hazard mitigation funding under the Robert T. Stafford Disaster Relief and Emergency Act (Public Law 93-288). To facilitate implementation of the DMA 2000 and the Stafford Act Amendments, FEMA created an Interim Final Rule (the Rule), published in the Federal Register in February of 2002 in Section 201 of 44 CFR (44 CFR §201.6). The Rule spells out the mitigation planning criteria for States and local communities.





In March 2013 FEMA released *The Local Mitigation Planning Handbook* (Handbook) as the official guide for local governments to develop, update and implement local mitigation plans. The Handbook complements and references the October 2011, *FEMA Local Mitigation Plan Review Guide* (Guide) in order to help “Federal and State officials assess Local Mitigation Plans in a fair and consistent manner.” Local jurisdictions must demonstrate that proposed mitigation actions are based upon a sound planning process that accounts for the inherent risk and capabilities of the individual communities as stated in Section 201.5 of the Rule. The Handbook and Guide were routinely reviewed during the development of the City’s 2019 LHMP for the purpose of ensuring thoroughness, diligence, and compliance with the DMA of 2000 planning requirements. The City also reviewed the Adaptation Planning Guide (APG) among other state-focused planning guides to inform the climate vulnerability assessment and development of climate-specific adaptation goals and strategies.

This plan was also developed so the City can be eligible for certain federal disaster assistance, specifically, the FEMA Hazard Mitigation Assistance (HMA) grants including the Hazard Mitigation Grant Program (HMGP), Pre-Disaster Mitigation (PDM) program, and the Flood Mitigation Assistance (FMA) program. Additional FEMA mitigation funds include the HMGP Post Fire funding associated with Fire Management Assistance Grant (FMAG) declarations and the Building Resilient Infrastructure and Communities (BRIC) funding associated with the 2018 Disaster Recovery Reform Act (DRRA).

### 1.3.2 State and Local

During the development of the City’s LHMP, City staff initiated a review of their 2025 General Plan Health and Safety Element to ensure consistency with hazards and mutually reinforcing policies. Following approval of the City’s LHMP, the City intends to formally update the City’s 2025 General Plan Health and Safety Element. In addition to following the DMA requirements the development of the 2019 LHMP addressed California Government Code Section 65302 (g) and the following State of California legislation requirements that relate to the General Plan and LHMP:

- Senate Bill (SB) 379 requires inclusion of climate adaptation strategies in the General Plan Safety Element and encourages a climate change discussion in LHMP updates;
- SB 1000, the Planning for Healthy Communities Act requires environmental justice and social equity considerations in the General Plan update upon the next revision of two or more elements concurrently on or after January 1, 2018 or the next revision of a LHMP; these considerations were addressed in the social vulnerability and disadvantaged communities summary of the community profile in Chapter 2 and again in the mitigation action prioritization criteria detailed in Chapter 5.
- Assembly Bill (AB) 2140 requires adoption by reference or incorporation of the LHMP into the Safety Element of the General Plan, following LHMP approval.

Information in this plan will be used to guide and coordinate mitigation activities and decisions for local land use policy in the future. Proactive mitigation planning will help reduce the cost of disaster response and recovery to communities and their residents by protecting critical community facilities, reducing liability exposure, and minimizing overall community impacts and disruptions. The City of Petaluma’s Planning Area has been affected by hazards in the past and is committed to reducing future impacts from hazard events, building community resilience to future disasters, and becoming eligible for mitigation-related federal funding.





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## 1.4 Plan Organization

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The City of Petaluma's LHMP is organized as follows:

- Chapter 2: Community Profile
- Chapter 3: Planning Process
- Chapter 4: Risk Assessment
- Chapter 5: Mitigation Strategy
- Chapter 6: Plan Adoption
- Chapter 7: Plan Implementation and Maintenance
- Appendices





## 2 Community Profile

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The City of Petaluma is located approximately 40 miles north of San Francisco. Petaluma is a unique community, geographically defined by the surrounding hillsides and a reputation for maintaining a “small town” atmosphere as the City has grown in population.

Today the City’s proximity to the San Francisco Bay Area and the well-preserved historic downtown continues to make it an attractive place for home buyers. Petaluma has experienced steady growth since suburbanization in the 1950s and the adoption of the Urban Growth Boundary (UGB). In 2018 The City’s population was projected to reach 62,700 in four years, making Petaluma the seventh-fastest growing city of Sonoma County’s nine major cities (Sonoma County 2018).

### 2.1 Location and Geography

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The City of Petaluma is located at the southern end of Sonoma County. The City is comprised of 13.9 square miles of land and one-tenth of a square mile of water consisting mostly of the Petaluma River. U.S. Highway 101 bisects the City easily connecting locals and visitors to the surrounding Bay Area region.

Petaluma’s boundaries have been defined mostly by the surrounding natural landscape. The City is within the Petaluma River Valley, which is defined by Sonoma Mountain to the northeast and hills extending from Burdell Mountain on the west (City of Petaluma 2012). The City is surrounded by the unincorporated communities of Penngrove to the north and Lakeville to the south.

The City was built on the northern banks of the navigable end of the Petaluma River, a tidal estuary that flows south to the San Pablo Bay.

### 2.2 Land Use Distribution

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The City of Petaluma’s land use pattern has been defined by historical growth and land use regulations (City of Petaluma 2012). In 1998, Petaluma voters approved a 20-year UGB as part of Measure I. In 2010, voters approved the expansion of the UGB to include an additional 330 acres and extended the UGB until December 31, 2025. According to the City’s revised 2012 General Plan (2025 General Plan) the UGB has not affected growth management numbers but did confine the growth and physical development of the City until 2018. The Hazard Mitigation Planning Committee (HMPC) selected the UGB as the Planning Area for this plan because it represents the City’s boundaries at the planned buildout. This Planning Area is shown in Figure 2-1.

It should be noted that the “planning area” defined in the Local Hazard Mitigation Plan (LHMP) is different than the “planning area” defined in the City’s General Plan. State law allows cities to identify a planning area during their General Plan process. This is typically an area outside of city boundaries and generally outside the UGB. It is designed to act as a signal to the County and other nearby local authorities that Petaluma recognizes that development may occur within these areas. The most common land use classification in the City of Petaluma is residential with 50 percent of parcels being designated as residential single-family homes. The remaining land uses include primarily mixed-use, business parks and commercial (17 percent), multifamily (1 percent), open space (8 percent), education (3 percent), and agricultural (1 percent). A detailed breakdown of land use in the City is summarized in Table 2-1. These land uses are shown in Figure 2-2.







**Table 2-1: City of Petaluma Land Uses by Acreage**

Land Use Description	Acres	Percentage of Total
Right of Way Private	0.62	0.01%
Agriculture Support Industrial (CPSP)	7.91	0.09%
Proposed City Park	44.64	0.50%
Agriculture	46.13	0.52%
Right of Way	46.30	0.52%
River Dependent Industrial (CPSP)	47.95	0.54%
Neighborhood Commercial	91.59	1.04%
High Density Residential (18.1-30.0 hu/ac)	97.93	1.11%
Mobile Homes (8.0-18.0 hu/ac)	117.29	1.33%
Floodway	136.46	1.54%
Industry	180.56	2.04%
Community Commercial	198.36	2.24%
City Park	242.42	2.74%
Regional Park	255.93	2.89%
Rural Residential (0.1-0.5 hu/ac)	268.21	3.03%
Education	268.22	3.03%
Medium Density Residential (8.1-18.0 hu/ac)	360.62	4.08%
Diverse Low Density Residential (6.1-12.0 hu/ac)	369.39	4.18%
Business Park	516.09	5.84%
Mixed Use	536.55	6.07%
Very Low Density Residential (0.6-2.0 hu/ac)	568.87	6.43%
Open Space	737.72	8.34%
Public/Semi-Public	1,182.87	13.38%
Low Density Residential (18.1-30.0 hu/ac)	2,518.26	28.48%
<b>Total</b>	<b>8,840.89</b>	<b>100%</b>

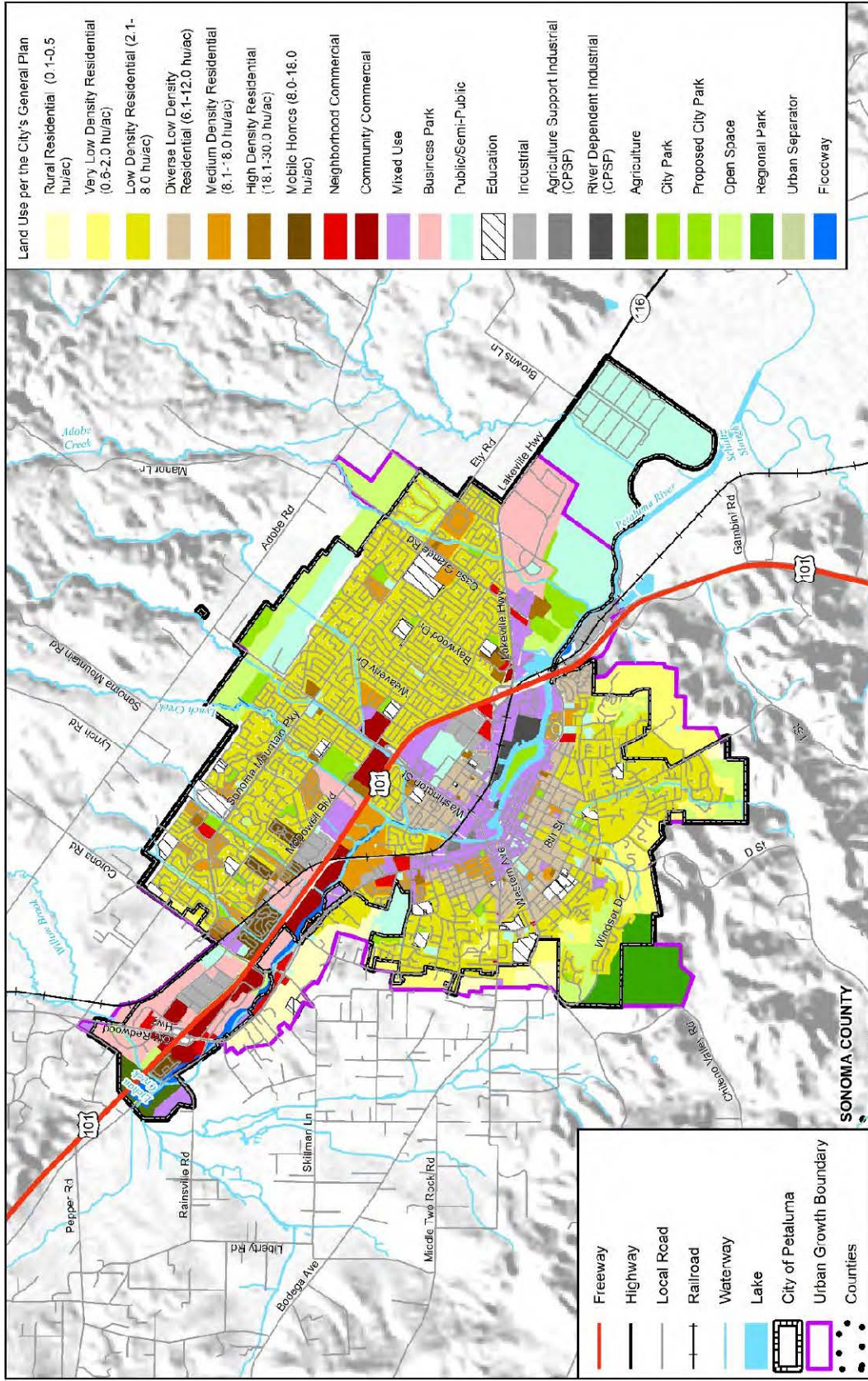
Source: City of Petaluma 2019







Figure 2-2: City of Petaluma Land Use Distribution



Map compiled 11/2019;  
intended for planning purposes only.  
Data Source: City of Petaluma and General  
Plan, CalTrans, US Census TIGER Database



## 2.3 History

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The Coast Miwok originally inhabited the area of modern day Petaluma and southern Sonoma County. The name "Petaluma" is a transliteration of the Coast Miwok phrase "péta lúuma," which means hill backside and was the original name of a Miwok village located east of the Petaluma River near the present day borders of the City. The City and the prominent waterways were also an attractive place for Mexican settlers in the early 1800s, and later settlers from Europe, Asia, and the Middle east in the mid-1800s.

In 1850 a group of hunters established a primitive hunting camp on the west of bank of the Petaluma River. The camp quickly developed along the Petaluma River and became a trading post for the growing San Francisco area. After incorporation of the City in 1858, downtown Petaluma began to develop along the southwest bank of the Petaluma River, along what is now Petaluma Boulevard North (City of Petaluma 2012). With the arrival of the railroad in 1870 the City became a thriving commerce center for the region. Agriculture dominated as an industry not only in Petaluma but throughout Sonoma County. By 1908, 75 percent of the county's population raised poultry (Visit Petaluma 2017). By the end of World War I, the City's egg industry was in trouble and in 1918 the City's Chamber of Commerce hired a well-known Public Relations consultant to rebrand Petaluma as "The World's Egg Basket" leading to a surge in industry until the 1940s when cost of production became too high for many farmers.

In 1937 with the completion of the Golden Gate Bridge, the City transformed into a bedroom community and experienced the post-World War II suburbanization similar to many small U.S. communities during that time. The completion of U.S. Highway 101 in the 1950's provided quick access to San Francisco which led to the arrival of families and the continued growth of Petaluma. In this timeframe residential and commercial areas expanded east of U.S. Highway 101. The City's proximity to the San Francisco Bay Area has consistently made it an attractive place for home buyers and the City has experienced steady growth since suburbanization in the 1950s.

The City of Petaluma was not impacted by the 1906 San Francisco Earthquake that devastated neighboring communities but served as a refuge for evacuees and survivors (Sommer 2017). Because of this many well-preserved historic buildings still exist in the Petaluma's downtown including several theaters and opera houses. Historic preservation of these building continues to be a priority for the City of Petaluma.

## 2.4 Demographics

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Comprehensive data on the City of Petaluma's demographics was obtained from the U.S. Census Bureau's American Community Survey (ACS) five-year estimates (2013-2017) and the California Department of Finance population estimates.

### 2.4.1 Population and Growth Projections

Between 2010 and 2018 the population of Petaluma increased by 4,310 persons (6.8 percent) (DOF 2019) as shown by Table 2-2 reported by the California Department of Finance Population Estimates. During the same time period, the state of California population increased by 6.2 percent and Sonoma County's population increased by 3.7 percent. This growth trend demonstrates that the City of Petaluma has grown at approximately the same pace State and slightly faster than the surrounding region (US Census 2010; California DOF 2018).

The Sonoma County Economic Development Board is projecting the City of Petaluma will grow by 3.2 percent by 2022, outpacing the state and nation in five-year growth projections. The City's General Plan buildout estimates an additional 15,500 residents in the City by 2025.





The key land use changes noted in the City’s General Plan buildout are increases in residential and mixed-use land areas. The City is estimating the buildout will result in 6,000 additional housing units for a total of 27,949 units, a 27 percent increase in housing units in the City (City of Petaluma 2012). The nonresidential growth is projected to increase by 36 percent with the addition of 6.1 million square feet of non-residential space and 23 million square feet of non-residential floor area by 2025 (City of Petaluma 2012).

**Table 2-2: City of Petaluma Populations Changes (counts), 2010-2019**

Year	Total Population
2019	62,247
2018	62,251
2017	61,124
2016	60,757
2015	60,237
2014	59,829
2013	59,241
2012	58,412
2011	58,123
2010	57,941

Sources: California DOF 2019

Table 2-3 breaks down Petaluma’s demographics for select characteristics.

**Table 2-3: City of Petaluma’s Demographic and Social Characteristics, 2013-2017**

Characteristic	
<b>Gender/Age</b>	
Median Age	41.8
Male, percentage	48.8%
Female, percentage	51.2%
Under 5 Years, percentage	5.6%
Under 18 Years, percentage	21.8%
65 Years and Over, percentage	16.1%
<b>Race/Ethnicity</b>	
	<b>Percentage</b>
White	78.8%
Hispanic or Latino (Any Race)	21.6%
Asian	6.2%
Some Other Race	12.4%
Black or African American	1.3%
American Indian/Alaska Native	1.3%
Native Hawaiian and Other Pacific Islander	0.6%
<b>Education**</b>	
	<b>Percentage</b>
High School Graduate or Higher	88.6%





Characteristic	
Bachelor's Degree or Higher	37.9%

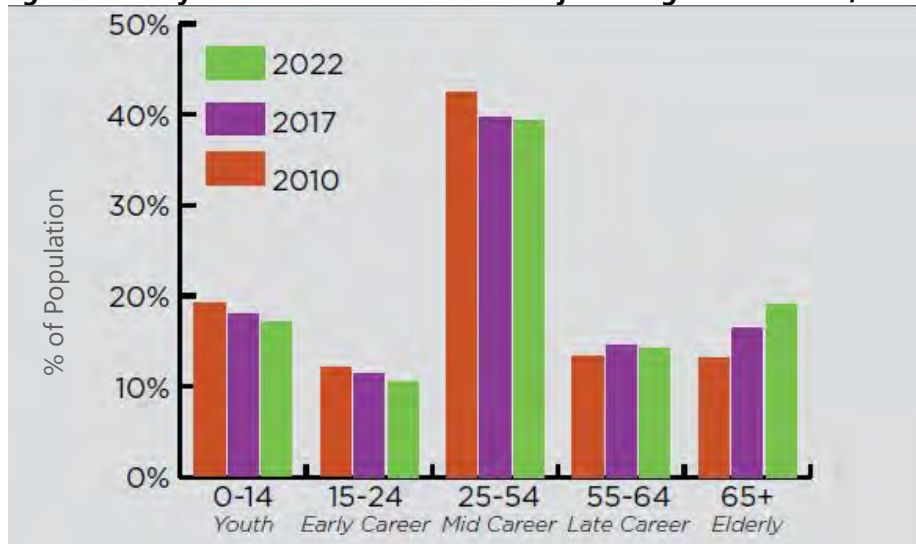
Source: U.S. Census Bureau American Community Survey, 2013-2017, [www.census.gov/](http://www.census.gov/)

\*\*California DOF estimates

### 2.4.2 Age

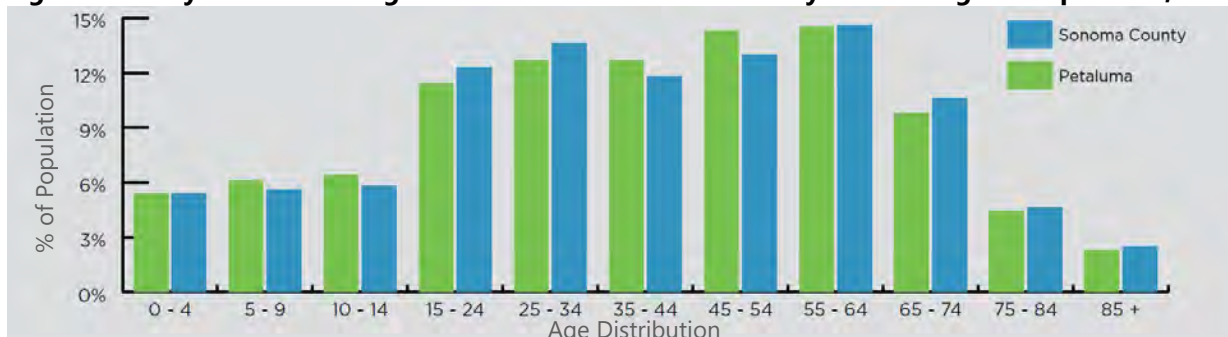
As noted in Table 2-3, the median age of Petaluma residents was 41.8 years old in 2017. According to the 2018 Petaluma City Profile Report from the Sonoma County Economic Development Board, Petaluma is ranked fifth of the County's nine incorporated cities in terms of age, and older than the median age of California (36). The City's labor force is older than the state but younger than the county overall. The City is projected to continue to age with the greatest increase by 2022 being individuals 65 years and older. Figure 2-3 and Figure 2-4 show the age distribution as of 2017 and projected for 2022.

**Figure 2-3: City of Petaluma Current and Projected Age Distribution, 2010 – 2022**



Source: Petaluma City Profile Report, Sonoma County Economic Development Board 2018

**Figure 2-4: City of Petaluma Age Distribution vs. Sonoma County - Percentage of Population, 2017**



Source: Petaluma City Profile Report, Sonoma County Economic Development Board 2018





### 2.4.3 Housing

Housing tenure for City of Petaluma was also obtained through the U.S. Census Bureau ACS and shows the majority of residents live in a home they own. Table 2-4 breaks down the differences in housing tenure.

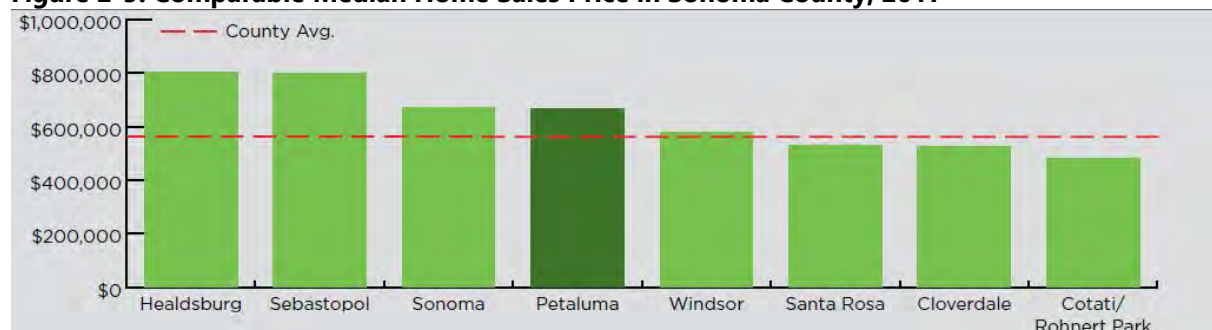
**Table 2-4: City of Petaluma Housing Tenure, 2013-2017**

Characteristic	Estimates
Occupied Housing Units	22,202
Owner Occupied	14,671
Renter Occupied	7,531

Source: U.S. Census Bureau American Community Survey, 2013-2017, [www.census.gov/](http://www.census.gov/)

Median home prices in the City of Petaluma as of 2017 was \$667,750, which is \$91,750 (or around 15.9%) higher than the County’s median home sales of \$576,000. Of the nine incorporated communities in Sonoma County, Petaluma has the fourth highest median home sale price in the county. In the past five years alone, Petaluma’s median home sales prices have risen by 76 percent (Sonoma County 2018). Figure 2-5 compares Petaluma’s median home sale prices to the other incorporated communities in Sonoma County.

**Figure 2-5: Comparable Median Home Sales Price in Sonoma County, 2017**



Source: 2018 Petaluma City Profile Report, Sonoma County Economic Development Board

The City of Petaluma Housing Department also manages an affordable housing program that has built or improved 1,336 housing units for low income families, which equates to 22 percent of all housing units built in the City over the past 15 years (City of Petaluma 2019). This program ensures affordable and stable housing services are provided to a broad spectrum of the community’s low and moderate-income residents.

### 2.4.4 Race and Ethnicity

Table 2-5 shows the comparative demographic estimates between 2008 and 2017. The racial and ethnicity makeup of the City is similar to the County. Petaluma is less diverse in terms of race and ethnicity compared to the state.

**Table 2-5: City of Petaluma Race and Ethnicity, 2008-2012 vs. 2013-2017**

Race/Ethnicity	2008-2012			2013-2017		
	Petaluma	County	California	Petaluma	County	California
White	69.1%	66.3%	40.1%	69.4%	63.8%	37.9%
Black	1.4%	1.5%	5.8%	0.7%	1.4%	5.5%
American Indian and Alaska Native	0.7%	0.7%	0.4%	0.1%	0.5%	0.4%
Asian	5.6%	4.0%	13.0%	4.2%	3.9%	13.9%





Native Hawaiian and Other Pacific	0.3%	0.3%	0.4%	0.0%	0.3%	0.4%
Other	0.3%	0.2%	0.2%	1.3%	0.5%	0.2%
Hispanic	20.7%	24.8%	37.6%	21.6%	26.4%	38.8%

Source: U.S. Census Bureau American Community Survey, Comparative Demographic Estimates, 2008-2012 and 2013-2017 estimates, [www.census.gov/](http://www.census.gov/)

### 2.4.5 Income and Poverty

Individual households are commonly expected to use private resources and funds to prepare for, respond to and recover from disasters. This means that households living in poverty are disadvantaged when confronting natural and human-caused hazards. Households living in poverty may also occupy poorly built or inadequately maintained housing. These housing types may be more susceptible to damage in earthquakes or flood events than other types of housing. In urban areas, such as the City of Petaluma, households living in poverty may also live in older houses and multi-family housing that is constructed of un-reinforced masonry, a building type that is susceptible to damage during earthquakes. Further, residents living below the poverty level are less likely to have insurance to compensate for the losses incurred from natural disasters.

Persons under 18 years old in Petaluma can also be disproportionately affected by poverty. According to the 2013-2017 ACS data, 9.6 percent of the City’s total residents under the age of 18 were living in poverty and 10.5 percent of the City’s total residents under the age of 18 were living in poverty based on the 2018 ACS data (see Table 2-6 below), compared to the 5.7 and 6.0 percent of all families in the City, respectively. As shown in Table 2-6, the percentage of residents in poverty in Petaluma has decreased between 2008 and 2017, but gradually increased in 2018. The income brackets of \$50,000 to \$75,000 is estimated to shrink by 2.2 percent while the income bracket of \$200,000 and more is estimated to grow by 2.1 percent by 2022 (Sonoma County 2018).

**Table 2-6: City of Petaluma’s Comparative Economic Characteristics, 2008, 2017, and 2018**

Characteristic	City of Petaluma		
	2008	2017	2018
Families below Poverty Level	5.6%	5.7%	6.0%
All People below Poverty Level (under 18 years)	12.8%	9.6%	10.5%
All People below Poverty Level (18 years and over)	7.9%	8.5%	8.9%
Median Household Income	\$82,259	\$84,949	\$87,708
Per Capita Income	37,450	40,784	\$42,868
Population in Labor Force	70%	66.2%	66.3%
Population Employed*	64.8%	62.9%	63.0%
Unemployment	7.2%	3.3%	11.9%**

Source: U.S. Census Bureau American Community Survey, 2013-2017, obtained by California Office of Finance. 2018 ACS data added in July 2020.

\*Excludes active duty armed forces

\*\*Unemployment rate is based on June 19, 2020 data.

The City of Petaluma also had the second-highest median household income in the County as the average household income in 2017 was \$84,949 and in 2018 increased to \$87,708 according to the California Department of Finance. During the 2017, the median household income in Sonoma County at \$71,769 while household incomes in nearby counties ranged higher from \$104,703 to \$79,637 (Marin and Napa counties). The median household income for the State in 2017 was \$67,169 and the 11.1 percent of families were living below the poverty line (DOF 2019; U.S. Census Bureau ACS 2017). Based on this comparison, while the City of Petaluma has a higher median household income than the County and State, there are small segments of the City’s population that are low income and disadvantaged, and in







turn socially vulnerable and expected to be more susceptible to natural disasters and less likely to recover at the same pace as the rest of the community.

Additional demographic data and information on income, social vulnerability, and disadvantaged communities in the Petaluma Planning Area are summarized below in Section 2.5 Social Vulnerability. Information on growth is summarized in Section 2.8 Growth and Development Trends.

## 2.5 Social Vulnerability

Social vulnerability considerations were included in the development of this plan to identify populations across the City's Planning Area that might be more vulnerable to hazard impacts based on a number of factors. Hazard events can have very different impacts for different segments of a community, even if the hazard effects the entire City of Petaluma. The combination of socioeconomic status, household composition, physical disabilities, age, race and ethnicity, education level, primary language, housing, and transportation barriers can alter the way communities prepare for and respond to hazard events. For example, as stated in the previous section, families with lower household incomes may not be able to renovate their home to be more resilient to flooding and earthquakes, and as a result these households may be disproportionately affected by a flood or earthquake event. The elderly population may have limited mobility due to age and physical disabilities, which could lead to less accessibility during hazard events. It may also be more time-intensive for this population to receive hazard information and respond in the event of a hazard. Similarly, for those segments of the population where English is not their native language, it may take these individuals and families more time to prepare and respond during a hazard event.

The social vulnerability considerations in this plan cover household income, ethnicity, English proficiency, senior population, disabled population, single-parent households metrics. The considerations in this plan are broad in scope and are based on best available data and mapping information from the following source:

- Center for Disease Control's (CDC) Agency for Toxic Substances and Disease Registry (ATSDR) Social Vulnerability Index (SVI).

### **CDC Agency for Toxic Substances and Disease Registry Social Vulnerability Index**

A social vulnerability index (SVI) was developed by the Center for Disease Control's (CDC) Agency for Toxic Substances and Disease Registry (ATSDR) and their Geospatial Research, Analysis & Services Program, as a way to portray communities' capacities to prepare for and respond to natural and man-made disasters. The SVI provides information on vulnerable populations to assist emergency response planners and public health officials in the identification of communities more likely to require additional support before, during, and after a hazardous event. The CDC's SVI includes county- and state-level maps that show relative vulnerability, provide key socially and spatially relevant information on communities' populations, and the maps compare the SVI based on Census Tracts. This SVI index combines four main themes of vulnerability: socioeconomic status; household composition and disability; minority status and language; and housing and transportation. The information from the SVI data informs the vulnerability of people, as qualitatively discussed in the vulnerability assessment for each hazard in Section 5.

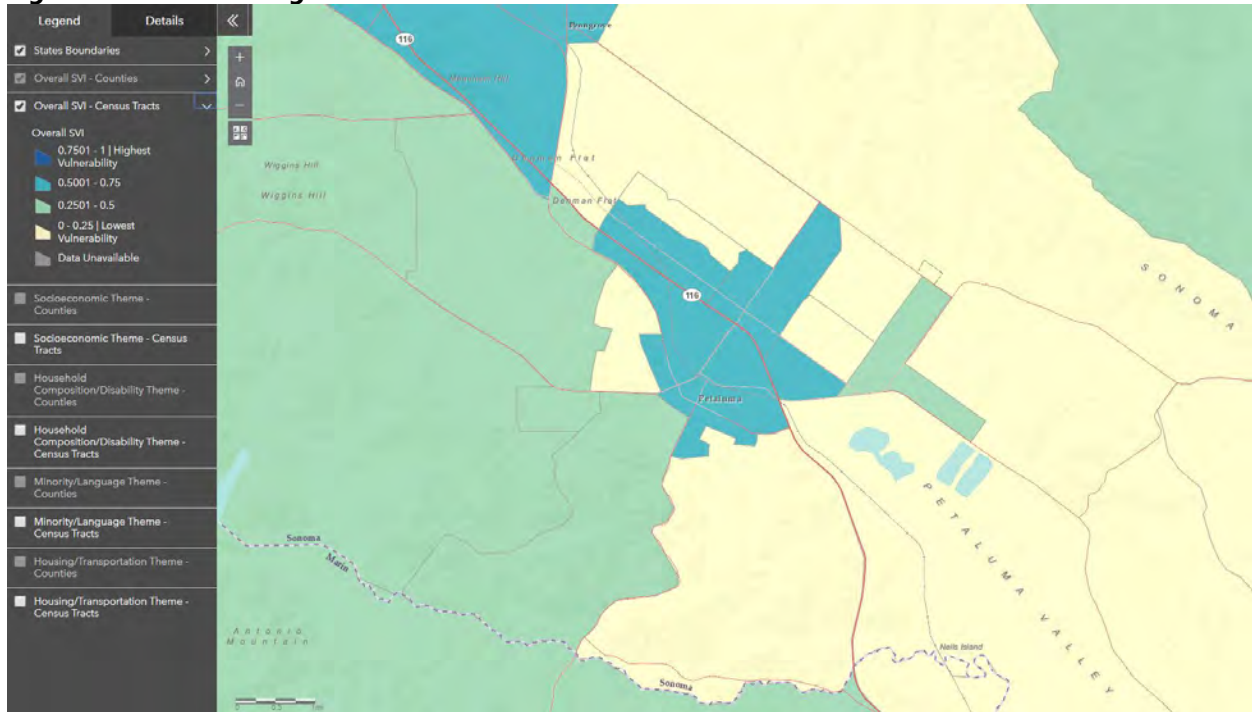
An overview of social vulnerability for the City's Planning Area is shown in Figure 2-6 based on CDC SVI data aggregated to Census Tracts. The SVI map depicts that within the City there is one census tract in the central portion with population with a higher vulnerability to disasters (in blue) and a portion of another census tract to the north with population with high vulnerability. The census tracts shaded in green and yellow have moderate to low vulnerability to disasters. The overall social vulnerability in the surrounding unincorporated portion of Sonoma County based on the SVI data is shown in Figure 2-7. Additional maps





using the four main vulnerability themes of the SVI, including socioeconomic vulnerability, household composition and disability, minority status, language vulnerability, and housing and transportation are provided on the CDC’s SVI online materials and maps at <https://svi.cdc.gov/>.

**Figure 2-6: Disadvantaged Communities based on CDC ATSDR SVI Tool**

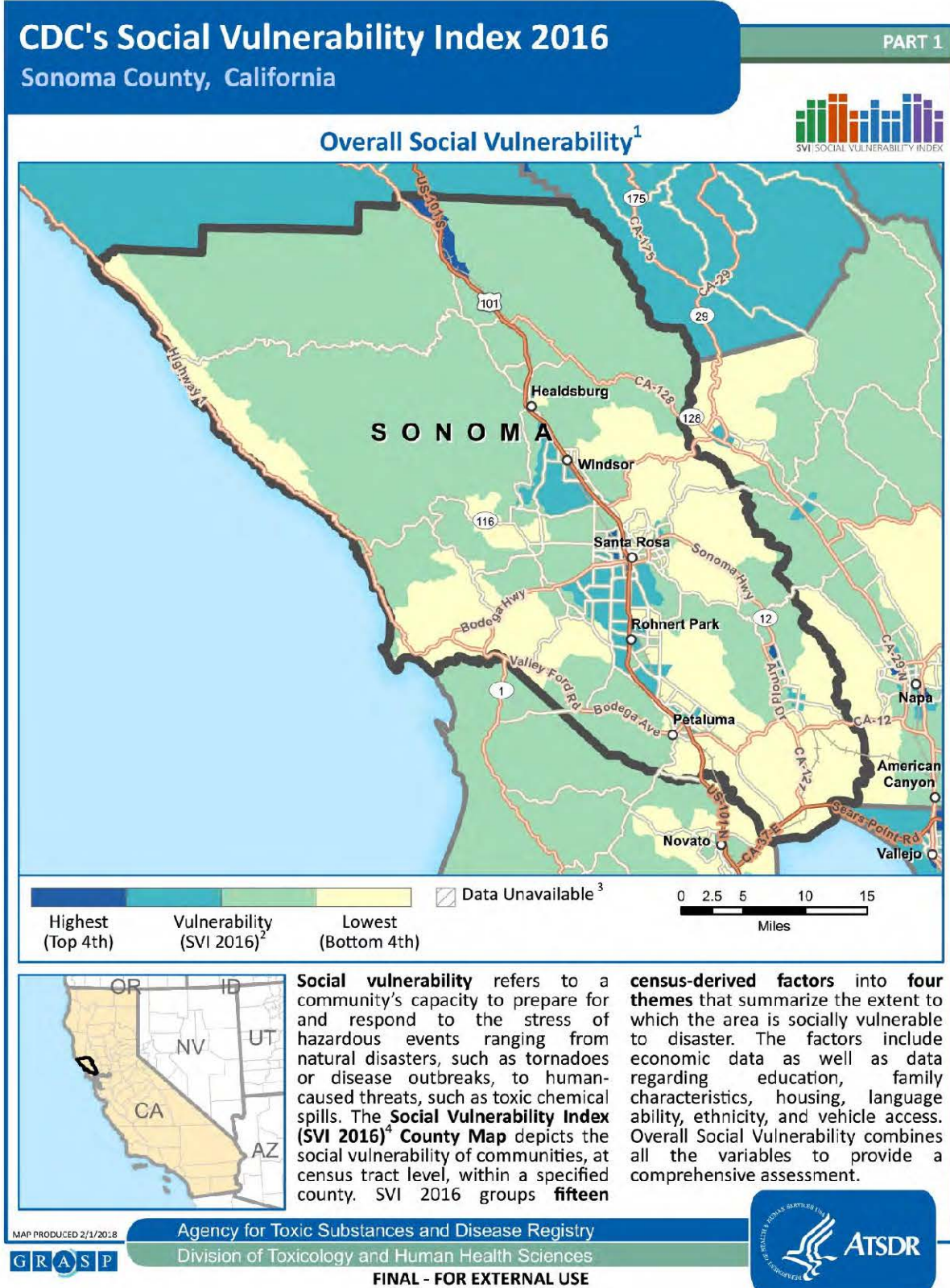


Source: CDC ATSDR 2019





Figure 2-7: Overall Social Vulnerability in the City of Petaluma Planning Area based on SVI Data





### 2.5.1 Environmental Justice

Certain low-income residents, communities of color, and immigrant communities in California have disproportionately experienced greater environmental burdens and related health problems than other communities. The inequity is a result of many factors, including, but not limited to inappropriate zoning, discriminatory housing, limited political and economic power among certain demographics, and development patterns that tend to concentrate pollution in certain communities (CEJA 2018). When combined with a lack of economic resources and unjust policy making, these residents and communities, also known as disadvantaged communities (DACs) or environmental justice (EJ) groups can face significant barriers to their overall health, livelihood, and resiliency to hazard events. With the support of community-based organizations, planners, local governments, and public health advocacy groups, recent legislation in California was developed to create healthier cities and counties and prioritize the needs of DACs.

#### **SB 1000 Requirements §65302(h)(1)**

*The environmental justice element, or related environmental justice goals, policies, and objectives integrated in other elements, shall do all of the following:*

- (A) Identify objectives and policies to reduce the unique or compounded health risks in disadvantaged communities by means that include, but are not limited to, the reduction of pollution exposure, including the improvement of air quality, and the promotion of public facilities, food access, safe and sanitary homes, and physical activity.*
- (B) Identify objectives and policies to promote civil engagement in the public decision making process.*
- (C) Identify objectives and policies that prioritize improvements and programs that address the needs of disadvantaged communities.*

In 2016 California passed Senate Bill 1000 (SB 1000), the Planning for Healthy Communities Act, which mandates that cities and counties to adopt EJ elements or integrate EJ goals and policies into the elements of their General Plans when they are updating two or more elements of their General Plan concurrently on or after January 1, 2018. Environmental justice is defined by state law as “the fair treatment of people of all races, cultures, and incomes with respect to the development, adoption, implementation, and enforcement of environmental laws, regulations, and policies” (Gov. Code § 65040.12(e)). According to the California Environmental Protection Agency (EPA), SB 1000, and pursuant to Section 39711 of the California Health and Safety Code a DAC is a low-income area that is disproportionately affected by environmental pollution and other hazards that can lead to negative health effects, exposure, or environmental degradation.

Cities and counties are individually responsible for identifying EJ communities within their jurisdictions and incorporating the SB 1000 requirements into their planning processes. The City of Petaluma incorporated these requirements into the LHMP, as this plan will be incorporated into their General Plan in accordance with Government Code Section 65302.10 (Assembly Bill [AB] 2140). The City meets these requirements by identifying DACs and socially vulnerable communities, promoting engagement in the public decision-making process and in socially vulnerable communities through the implementation of an outreach strategy, addressing EJ considerations to a degree in the vulnerability assessment, and by considering prioritization criteria, such as social equity during the development of mitigation actions. For example, during the HMPC meeting, prioritization criteria included social equity and the HMPC discussed applying a higher priority to actions that related to social equity that benefited DACs or socially vulnerable communities. The HMPC also broadly addressed vulnerable and sensitive populations. The following sections summarize additional information on DACs within the City of Petaluma Planning Area based on various state and local sources.



## 2.5.2 Disadvantaged Communities

DACs refer to areas in California that suffer the most from a combination of economic, health, and environmental burdens. These burdens include poverty, high unemployment, air and water pollution, the presence of hazardous wastes and the high incidence of asthma and other health diseases. DACs have been identified across the state, region, and Sonoma County using various criteria. The social equity considerations in this plan regarding DACs cover household income, ethnicity, English proficiency, senior population, disabled population, and single-parent households metrics. The considerations in this plan are broad in scope and are based on best available data and mapping information from the following state and local sources:

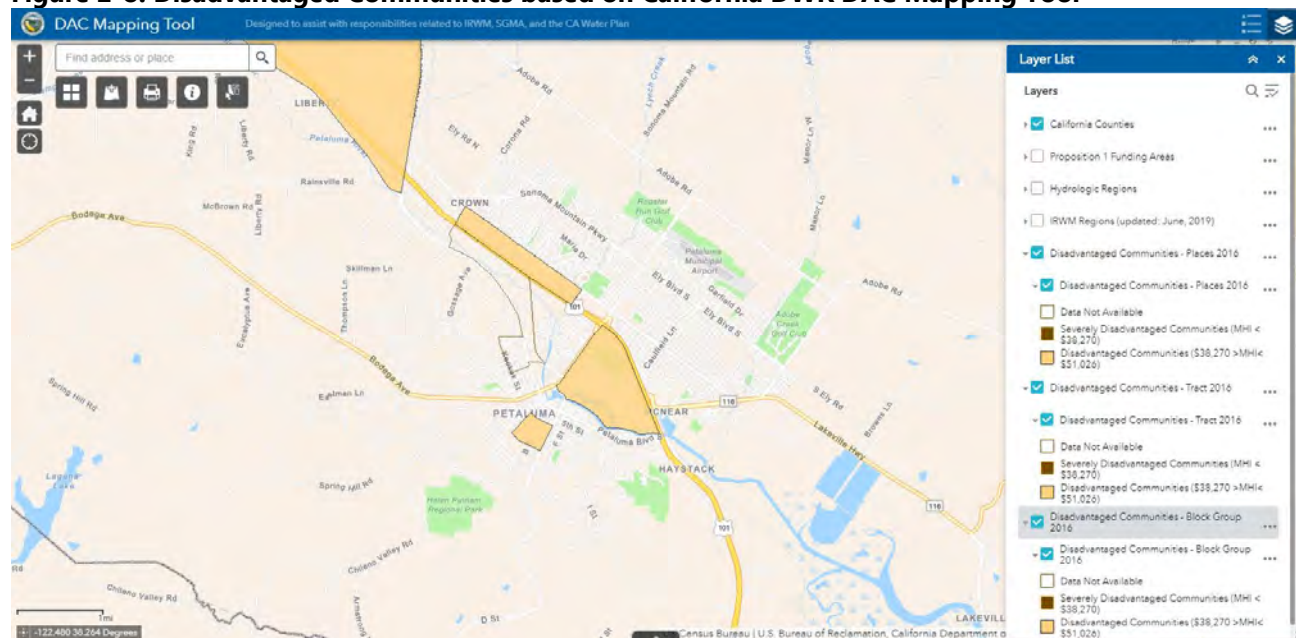
- California Department of Water Resources (DWR) Disadvantaged Communities (DAC) Mapping Tool,
- California Office of Environmental Health Hazard Assessment's (OEHHA) CalEnviroScreen Tool, and
- Sonoma County's Disadvantaged Communities Online Mapping Tool.

The metrics and methodology applied by each federal, state, and local source is summarized below, followed by a "snapshot" of the social vulnerability metrics and information available for the population in the City according to each tool.

### California DWR Disadvantaged Community (DAC) Mapping Tool

California DWR defines DACs as a community with an annual median household income (MHI) that is less than 80 percent of the statewide annual MHI (Public Resources Code 7500(g)). Census geographies within an annual MHI less than 60 percent of the statewide annual MHI are considered "severely disadvantaged communities." Figure 2-8 shows DACs within the City's Planning Area.

**Figure 2-8: Disadvantaged Communities based on California DWR DAC Mapping Tool**



Source: California DWR 2019

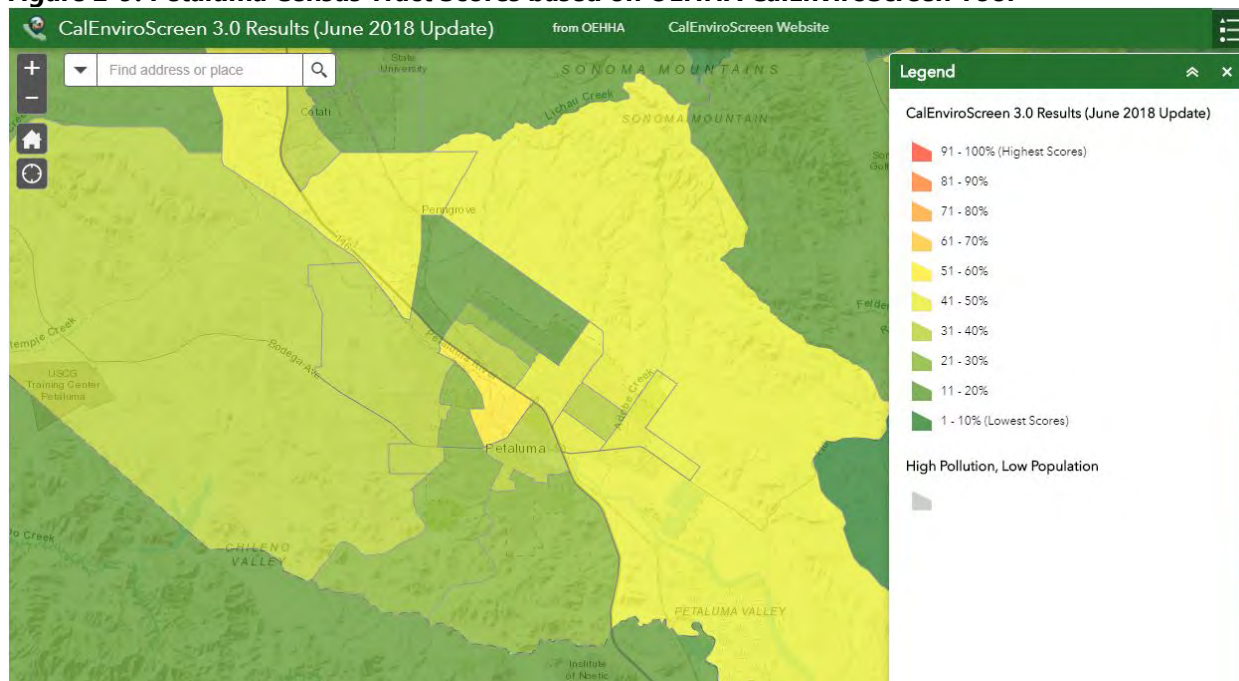
As shown in Figure 2-9 there is one census tract on the north end of Petaluma identified as a DAC that extends to Cotati and the western portion of Rohnert Park. There are three block groups identified in downtown Petaluma identified as a DAC with approximately 4,418 residents within 1,627 households.

### California OEHHA CalEnviroScreen Tool

California’s OEHHA uses the CalEnviroScreen Tool to identify California communities by census tract that are disproportionately burdened by, and vulnerable to, multiple sources of pollution. CalEnviroScreen is a science-based mapping tool that uses environmental conditions such as proximity to solid waste sites, clean-up sites, etc.; personal health (sensitive populations with asthma, cardiovascular disease, etc.), and socioeconomic (poverty, unemployment, educational attainment, etc.) information to produce a numerical score for each census tract in the state. A census tract with a high score (orange to red) is a community that experiences higher pollution burden and vulnerability than census tracts with low score (yellow to green).

California’s Global Warming Solutions Act of 2006 (Assembly Bill 32) implemented a cap-and-trade program as one of several strategies in California to reduce greenhouse gas emissions that cause climate change. In 2012 the Legislature passed Senate Bill 535 that directed 25 percent of the proceeds from the Greenhouse Gas Reduction Fund (GHGRF) go to projects that provide benefit to DACs. As a result, the legislation gave California’s EPA responsibility for identifying those communities. California EPA identified the 25 percent highest scoring CalEnviroScreen census tracts as DACs. The designation then lead to AB 1550 that requires 25 percent of the proceeds from the GHGRF be spent on project located in DACs. As shown in Figure 2-10 there are no environmentally burdened or vulnerable communities with high scores in the City of Petaluma.

**Figure 2-9: Petaluma Census Tract Scores based on OEHHA CalEnviroScreen Tool**



Source: California Office of Environmental Health Hazard Assessment 2018

### Sonoma County’s DAC Online Mapping Tool

The Sonoma County Transportation Authority (SCTA) functions as the countywide planning and fund programming agency for transportation projects. The SCTA was created in 1990 as a result of federal and state legislation to address regional planning, specifically the implementation of transportation improvement projects. The SCTA Board of Directors also coordinates countywide climate protection activities through its other role as the Sonoma County Regional Climate Protection Authority (RCPA).





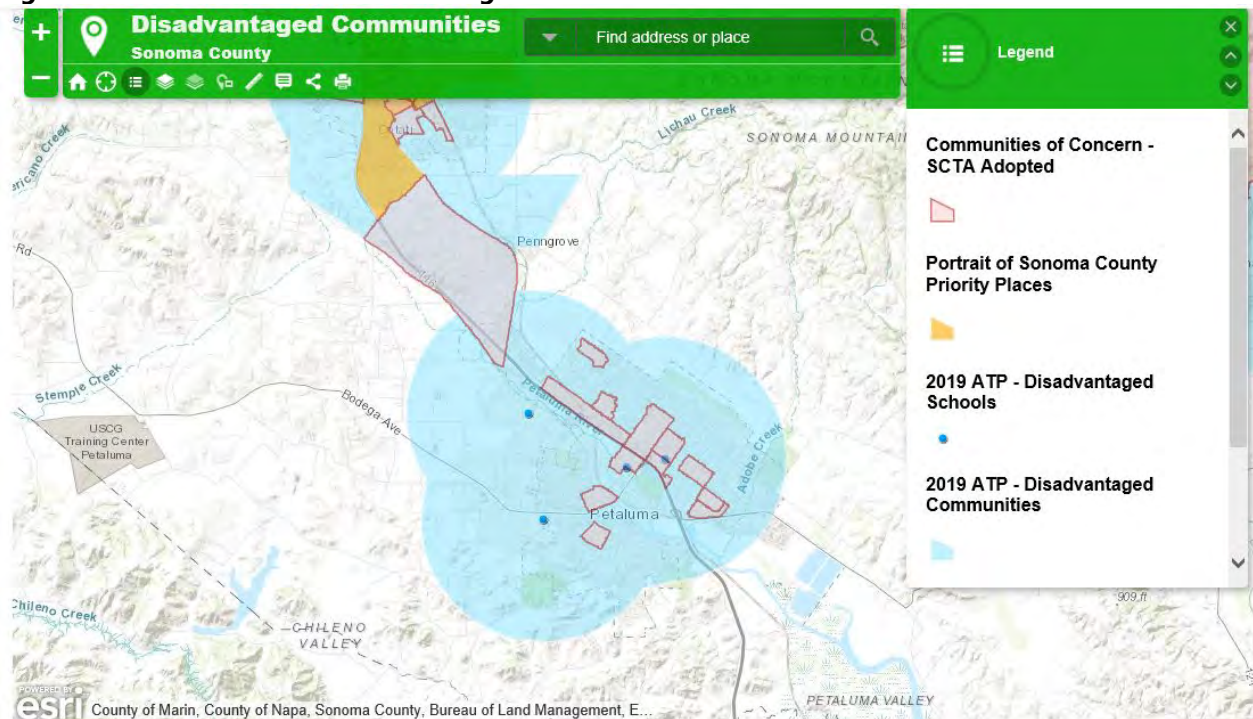
SCTA defines DACs using different identification criteria than the tools developed by other state agencies. The following DAC designations are defined in the SCTA Disadvantaged Communities mapping tool, including whether the DAC designations occur within the City of Petaluma:

- **MTC Adopted Communities of Concern (COC):** MTC identified regional COCs use demographic variables including ethnicity, income, English proficiency, senior population, disabled population, single-parent households, zero-vehicle households, and overburdened renters using Census Tract data from the 2005-2009 and 2010-2014 ACS 5-Year Average. These CoCs were adopted as part of Plan Bay Area and are currently being revised as part of the Plan Bay Area update that is underway. There are no MTC Adopted COCs within the City of Petaluma Planning Area.
- **SCTA Defined COCs:** SCTA Defined COCs use poverty level data (i.e., 30 percent of the census block group households earning 200 percent or less of the federal poverty level) and a more detailed level of census geography. Using census block groups allows better accuracy when identifying pockets of poverty in Sonoma County, especially in areas that are located in large census tracts, or that are adjacent to affluent areas. There are 12 census block groups that are within the City of Petaluma Planning Area, and a portion of a large census block group that intersects with the Planning Area towards the north end of the City. The 12 census block groups identified as SCTA-defined COCs comprise approximately 13,903 residents (22.3 percent of population) within 5,104 households.
- **2019 Caltrans Active Transportation Program (ATP) DACs:** The Caltrans ATP defines DACs using income, tribal lands, and proximity to disadvantaged schools. Disadvantaged schools are those where 75 percent of the students are eligible to receive free or reduced meals. The majority of the City's Planning Area was identified as a 2019 ATP DAC.
- **Portrait of Sonoma County Priority Places.** Portrait of Sonoma County considers life expectancy, education, and income of county residents and combines the variables into a single Human Development Index (HDI), which can be used to identify disadvantaged communities and disparities among Sonoma County neighborhoods. The 20 census tracts in the County with the lowest HDI are identified as DACs and included in the mapping tool. There were no census tracts that met this criteria in the City of Petaluma Planning Area.

Figure 2-10 shows the SCTA-defined COCs and 2019 Caltrans ATP DACs in the Planning Area.



**Figure 2-10: SCTA-Defined Disadvantaged Communities in Petaluma**



Source: SCTA 2019

## 2.6 Economy and Employment

The most comprehensive economic data available for the City of Petaluma comes from the U.S. Census Bureau ACS data and the California Department of Finance. Select estimates of economic characteristics for the City of Petaluma are summarized below.

As of 2017, Petaluma had the lowest unemployment rates of the cities in Sonoma County (Sonoma County 2018). The ACS 5-year estimates show a 3.3 percent unemployment rate, lower than the county (3.8 percent), and statewide rates (4.8 percent) and even nationwide (4.4 percent); this reflects an exceptionally strong economy and demand for labor in Petaluma. Table 2-6 above summarizes the City's general economic characteristics. Unemployment rates have increased in the past three years based on the most recent ACS data and California Department of Finance data.

Table 2-7 illustrates the breakdown of employment by industry in the City of Petaluma from 2013-2017, as well as the number of people employed by each industry, and Table 2-8 lists the City's major employers and approximate number of employees.

**Table 2-7: City of Petaluma's Employment by Industry, 2013-2017**

Industry	# Employed	% Employed
Agriculture, Forestry, Fishing, Mining	588	1.9
Construction	2,210	7.2
Manufacturing	2,146	7.0
Transportation and warehousing, and utilities	1,098	3.6
Information	931	3.1
Wholesale Trade	982	3.2
Retail Trade	3,539	11.6
Finance, Insurance, Real Estate and rental and leasing	2,094	6.9







Arts, entertainment, and recreation, and accommodation, and food services	3,267	10.7
Educational services and Health care and social assistance	6,781	22.2
Professional, scientific, and management, and administrative and waste management services	3,952	13.0
Other services	1,443	4.7
Public Administration	1,460	4.8
Totals	30,491	100

Source: U.S. Census Bureau American Community Survey, 2013/2017 [www.census.gov/](http://www.census.gov/)

\*Civilian population 16 or older

**Table 2-8: City of Petaluma's Major Employers**

Employer	# of Employees
Petaluma School District	1,347
Petaluma Poultry Processors	561
Petaluma Valley Hospital	507
City of Petaluma	372
Enphase Energy Inc.	338
Lagunitas Brewing Company	346
Santa Rose Junior College	300
Hansel Auto	268
Olde Adobe Union School District	256
Clover Stornetta Farms	256

Source: City of Petaluma, California Comprehensive Annual Financial Report For the Year Ended June 30, 2017, City of Petaluma Finance Department

<http://cityofpetaluma.net/finance/pdf/cafr/CAFR-FY2017.pdf>

## 2.7 Commuter Population

Based on ACS five-year estimates data for 2013-2017, nearly 33.7 percent of Petaluma's workforce travelled to another county for employment while 65 percent worked within Sonoma County. Of those traveling outside the county for work, nearly 36 percent drove alone while 41.5 percent carpooled. Nearly 72 percent of those traveling outside the county used public transportation compared to 22 percent of those who travel within Sonoma County for work. Commuting patterns can increase congestion on U.S. Highway 101 and local county and city roads. Commute congestion can also affect the City's transportation infrastructure, as well as how the City responds to hazard events that may limit the commuting population's ability to travel to work and safely return to Petaluma after an event.

## 2.8 Growth and Development Trends

By the 1960's, after years of post-World War II suburbanization that resulted in sprawling subdivisions, the City of Petaluma experienced pressures on city infrastructure, increasing environmental concerns, and the increasing pressures on the local economy as growth edged toward the agricultural and dairy lands. There were also increasing concerns over the divide between the growing commuter-oriented east side and the older west side of the city, as retail businesses began to move away from downtown to the east side. As a result of these growth pressures the City implemented a system of controls to slow the pace of the new residential construction. The City of Petaluma General Plan lists the following milestones in the City's growth management history:

- **1961 General Plan** - The 1961 General Plan recognized the importance of compact development patterns and cost-effective provision of public services and infrastructure. It provided a framework for





development within Downtown, expansion of industrial areas, new parks, residential neighborhoods, commercial areas, schools, and the roadway network.

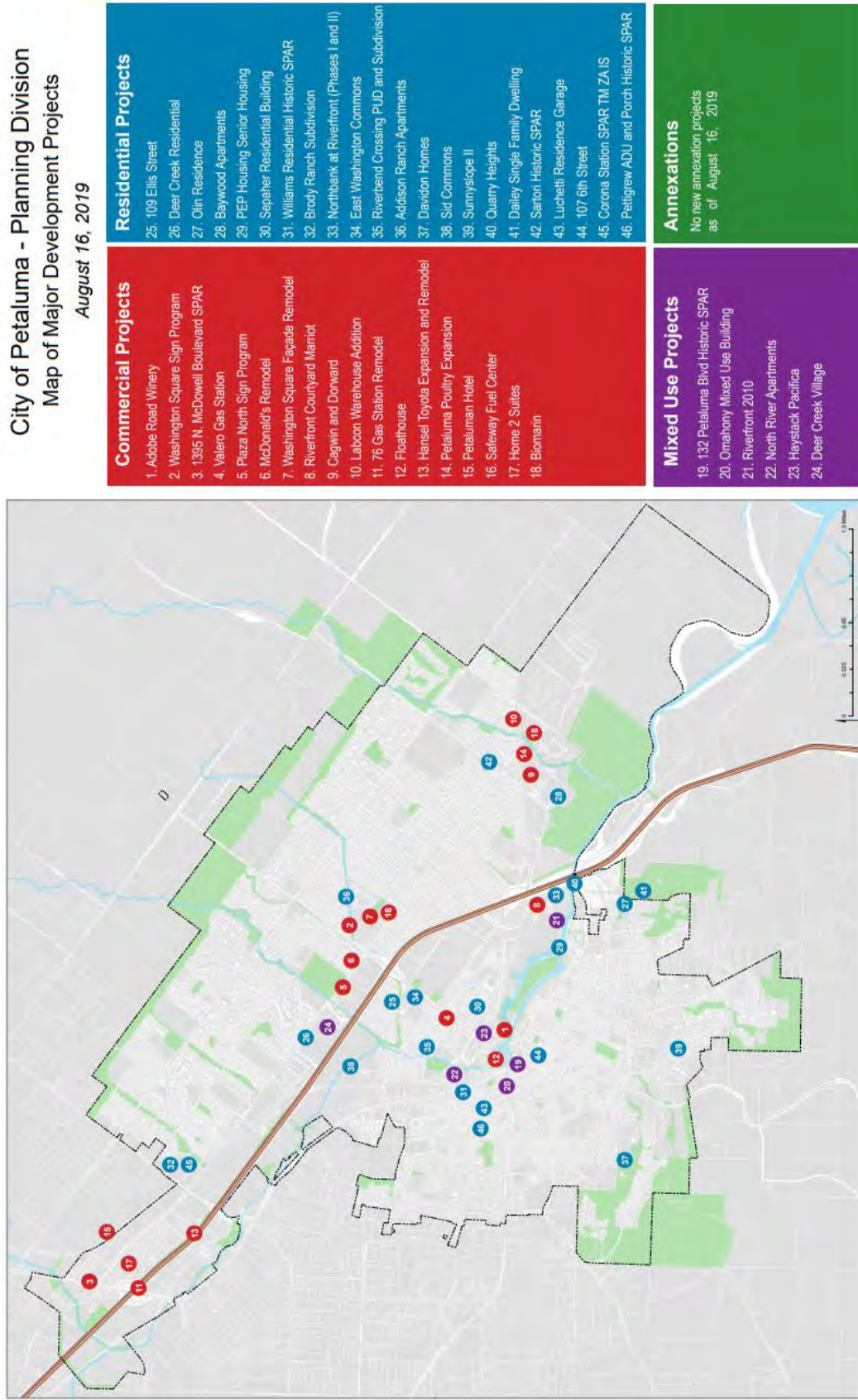
- **Environmental Design Plan of 1972** - This served as a short-range strategic plan, limiting housing construction to a not-to-exceed rate of 500 dwelling units per year for the five-year period 1972 to 1977. It also established an urban separator (then called greenbelt).
- **Residential Growth Management System (RGMS)** - As part of the 1972 Plan (see above), the RGMS established the criteria to distribute 500 annual housing unit permits. The review process included a Council appointed citizen committee to review all residential development proposals prior to the Council granting of allocations. Although the allocation process is no longer utilized, the cap of 500 housing units is still monitored.
- **Environmental Design Plan of 1978** - This reiterated the city's UGB (then called Environmental Design Plan boundary) and extended its effective date through 1985. It identified an optimum population of approximately 70,000 to 90,000 residents.
- **Urban Limit Line (ULL)** - The 1987 General Plan designated a ULL for the period 1987 to 2005 that identified the outer edge of allowable urban development, encompassing 10,300 gross acres. General Plan population projections for buildout were "between 60,000 and 67,000 persons." Buildout was, at the time, expected to be reached by 2008.
- **Urban Growth Boundary (UGB)** - Placed on the ballot by the City Council in 1998, city voters overwhelmingly adopted a fixed urban edge, which for the most part was coterminous with the 1987 ULL. Although the UGB did not affect the growth management numbers, it confined the growth and physical development of the City until 2018. In 2010, the City Council placed a ballot measure before the voters extending the UGB to 2025.

According to the General Plan, between 1985 and 2005 the City grew at an average annual rate of 1.8 percent. Currently the city has two growth management programs in place, the RGMS and the UGB. Development on the western side of the City is constrained by the hilly topography and the UGB, while the east side is constrained by the UGB until 2025. As of August 16, 2019, the City has forty-six major development projects going through the planning process with the Planning Division. A majority of the projects (22) are residential developments, followed by commercial projects (18), and mixed use (6) projects. The major development projects are located throughout the City with a majority being concentrated near downtown Petaluma. Figure 2-11 shows the location of each development project in the Planning Area.





Figure 2-11: City of Petaluma Major Development Projects – As of August 16, 2019



Source: City of Petaluma Planning Division 2019



Table 2-9 shows the City’s land use acreages at complete General Plan buildout.

**Table 2-9: City of Petaluma Land Use Acreages at Plan Buildout**

Land use	Land Area (acres)
<b>Residential Land</b>	<b>4,348</b>
Rural	268
Very Low Density	604
Low Density	2,520
Diverse Low	363
Medium Density	377
High Density	99
Mobile Homes	117
<b>Commercial Land</b>	<b>290</b>
Neighborhood Commercial	88
Community Commercial	202
<b>Mixed Use</b>	<b>542</b>
<b>Business Park</b>	<b>512</b>
<b>Industrial Land</b>	<b>188</b>
<b>Industrial</b>	<b>180</b>
Agricultural Support Industrial (CPSP)	8
<b>Public and Educational</b>	<b>1,447</b>
Public/Semi-Public	1,179
Education	268
<b>Parks and Open Space</b>	<b>1,594</b>
City Parks	308
County Parks	256
Agricultural	77
Open Space	953
<b>Total</b>	<b>8,921</b>

Source: City of Petaluma General Plan 2008-2025

Additional information on development trends in the City’s Planning Area can be found in the Future Development section of each hazard profile in the Section 5.

## 2.9 Mitigation Capability Assessment

During the development of this plan the City’s HMPC completed a mitigation capability assessment to understand what loss prevention mechanisms are already in place. When combined with the risk assessment the mitigation capability assessment this results in the City’s “net vulnerability” to disasters, and more accurately focuses the goals and proposed actions of this plan. For this planning effort, a representative from most departments where the City had in-house staff available, participated on the HMPC.

The HMPC used a two-step approach to conduct the capability assessment for the City. First, an inventory of common mitigation activities was made through the use of a matrix. The purpose of this effort was to identify policies and programs that were either in place, needed improvement, or could be undertaken if deemed appropriate. Second, the HMPC conducted an inventory and review of existing policies, regulations, plans, and programs to determine if they contributed to reducing hazard-related losses or if they inadvertently contributed to increasing such losses.

Similar to the HMPC’s effort to describe hazards, risks, and vulnerability of the City of Petaluma, this mitigation capability assessment describes the City’s existing capabilities, programs, and policies currently in use to reduce hazard impacts or that could be used to implement hazard mitigation activities. It also identifies select state and federal departments/agencies that can supplement the City’s mitigation





capabilities. This assessment is divided into four sections: regulatory mitigation capabilities, administrative and technical mitigation capabilities, fiscal mitigation capabilities, and mitigation outreach and partnerships.

### 2.9.1 City of Petaluma’s Regulatory Mitigation Capabilities

Table 2-10 lists planning and land management tools typically used by local jurisdictions to implement hazard mitigation activities and indicates those that are in place in the City of Petaluma. Excerpts from applicable policies, regulations, and plans and program descriptions follow to provide more detail on existing mitigation capabilities.

**Table 2-10: City of Petaluma’s Regulatory Mitigation Capabilities**

Regulatory Tool (ordinances, codes, plans)	Yes/No	Comments
General Plan	Yes	The City’s General Plan was last updated and amended in 2012. The Housing Element was last updated and amended in 2018. Both planning documents are the City’s most comprehensive land use and development tools. Together, they establish the vision for the buildout of the City of Petaluma through 2025. They also include a set of broad-based goals and objectives to guide development in the City. Upon adoption of the LHMP, the City should update the General Plan Safety Element and amend the General Plan to include the LHMP.
Zoning Ordinance	Yes	The City’s Implementing Zoning Ordinance (IZO) replaced the City’s 1973 zoning ordinance. It guides current development through standards and regulations relating to allowable land uses consistent with the General Plan, conditionally allowable land uses, height, setbacks, parking, and signage. The IZO also addresses Hillside Protection, Tree Preservation, Floodway and Floodplain districts.
Subdivision Ordinance	Yes	Title 20 of the Petaluma’s Municipal Code contains the City’s subdivision provisions and Chapter 4 of IZO has procedural requirements, tentative subdivision maps, parcels maps, dedications, and improvements. It also outlines streets, alleys, and other public right-of-way or easements for emergency access.
Growth Management Ordinance	Yes	The City adopted RGMS in 1972; an ULL was designated in 1987. An UGB was approved by voters in 1998 and then extended in 2010.
Floodplain Ordinance	Yes	Chapter 6 of the Petaluma IZO contains the City’s Floodplain Regulations. Special flood hazard areas in the City are based on the August 1979 Flood Insurance Study (FIS) for the City of Petaluma and recent Flood Insurance Rate Map (FIRM).  It limits development of projects in the flood hazard zone unless the project demonstrates flood management facilities will protect the project to the urban level of flood protection, implements conditions on the permit or project entitlement that protect the project to standard flood protection standards.





Regulatory Tool (ordinances, codes, plans)	Yes/No	Comments
		Chapter 6.070 summarizes the standards of construction for new projects, and new construction or substantial improvements shall have the lowest floor elevation, including basements, elevated at least 12 inches above the level of the base flood elevation (BFE). Upon completion of construction, the elevation of the lowest flood shall be certified by a registered professional engineer or verified by the community building inspector. The certification shall be provided to the Floodplain Administrator.
Other special purpose ordinance (e.g., stormwater, steep slope, wildfire)	Yes	<p>Chapter 16 Hillside Protection of the Petaluma’s IZO contains the City’s provisions for development and altering properties in hillside and ridgeline areas. The purpose is to preserve the essential scenic and natural resources that define the character of Petaluma and minimize potential for geologic failures, fires and floods. Section 16.070 ensures hillside subdivisions are designed to avoid development on steep slopes exceeding 10 percent as determined by the City’s Average Slope Formula.</p> <p>Title 17, section 17.30 provides information on Storm Drainage.</p> <p>The Unreinforced Masonry (URM) Building Ordinance, Petaluma Ordinance No. 1882, Section 17.34.110, contains details related to resolution No. 92-48 N.C.S. from the City, originally initiated in 1992. The URM Ordinance requires URM buildings in the City to be retrofitted by the year 2017. This retrofitting process should be complete as of 2019.</p>
Building Code	Yes	The City adopted the 2016 California Building Code (CBC). Adoption and reference to the 2016 CBC is outlined in Title 17, section 17.04.
Fire department Insurance Services Office (ISO) rating	Yes	ISO rating of 3
Erosion or Sediment Control Program	Yes	Title 17, section 31 of the Petaluma Municipal Code grading and erosion control and section 17.30 contains storm drainage.
Storm Water Management Program	Yes	They City complies with requirements under MS4 Order No. 2013-0001-DWQ, which was updated in 2013 as part of the second Phase II Small MS4 General Permit (adopted July 2013). They City is implementing a Storm Water Management Plan that contains processes that will be used to meet mandatory requirements under the updated order.
Site Plan Review Requirements	Yes	Discretionary projects involve site plan review as part of the planning and approval process conducted by the City’s Planning Divisions. The Development Engineering Division of the Public Works Department provides review and permit processing. This division reviews subdivision maps, construction plans, public improvement, and grading plans for all residential, commercial, and industrial projects.





Regulatory Tool (ordinances, codes, plans)	Yes/No	Comments
Capital Improvements Plan	Yes	<p>The Capital Improvement Division of the Public Works and Utilities Department is responsible for the planning, designing and renovating of all City of Petaluma CIP projects. These include projects, such as construction, repair, and improvements of public streets, utility pipelines, pump stations, bridges, bike paths, public buildings, and public parks.</p> <p>The Capital Improvement Division follows design standards, and standard plans and specifications for all street, utility, parks, streetscape, and storm water projects. The Division also maintains a Pavement Management System database of all the City street with a uniformly calculated numeric rating of the condition of pavement.</p>
Economic Development Plan	Yes	<p>The Economic Development Division contains various business development and incentive and program resources for commercial, retail, and property owners. Oversight of the Community Block Grant (CDBG) and Housing Program are functions of the City Manager's Office.</p>
Local Emergency Operations Plan	Yes	<p>The City of Petaluma adopted their Emergency Operations Plan (EOP) in 2007.</p>
Other special plans	Yes	<p>The City of Petaluma Floodplain Management Plan (FMP) (October 2015) describes the natural and magnitude of flooding the City has experienced in the past, floodplain management activities implemented, additional alternative remedies, and a plan for future action to address current floodplain problems. The City of Petaluma has participated in the CRS Program since 1991 and has a Class Rating 6.</p>
Flood Insurance Study or other engineering study for streams	Yes	<p>The City joined the NFIP on February 15, 1983. The City began implementing their NFIP floodplain regulations in 1980.</p> <p>The most recent FIS for the City was completed on March 7, 2017.</p>
Elevation certificates	Yes	<p>See Chapter 4 of this plan, and the City's 2015 Flood Management Plan.</p> <p>The City digitally tracks all of the elevation certificate records and has records dating back to 1991 when the City joined the CRS Program.</p>
Other	Yes	<p>Urban Water Management Plan (2015); River Enhancement Plan; Fire Sprinkler Ordinance for all new construction and existing building remodels.</p>

Source: HMPC Data Collection Guide

As indicated in the table above, the City of Petaluma has several plans and programs that guide the City's development in hazard-prone areas. Starting with the City of Petaluma's General Plan, which is the most comprehensive of the City's plans when it comes to mitigation, these relevant plans and programs are described in more detail below.





### **City of Petaluma General Plan 2025 (2008)**

The City's General Plan provides a comprehensive and long-term blueprint for the future by establishing a framework for how Petaluma should grow and change over the next two decades (Year 2025). The General Plan contains goals, objectives, policies, and actions that empower the City and community to achieve their future vision. The General Plan is the City's principal policy and planning document to guide future conservation, enhancement, and development in the City. It addresses all aspects of development organized in 12 chapters or elements, including six required by State Planning law and four elements prepared to meet local needs and concerns. The seven mandatory elements include the Land Use Element, Housing Element, Circulation Element (Mobility), Open Space Element, Conservation Element, Safety Element, and Noise Element. The five remaining elements include the Community Character Element, Economic Development Element, Public Facilities and Services Element, Water Resources Element, and Air Quality Element. The City of Petaluma's General Plan also has a section on Historic Preservation.

The following four elements have goals, policies, and implementation programs related to hazards and hazard mitigation, as detailed below:

- Community Facilities, Services, and Education Element
- Water Resources Element
- Health and Safety Element

Each of these elements include goal statements relating to different aspects of the issues addressed in the element. The summary below tracks the organization of each relevant element, with topically-focused goals.

#### ***Community Facilities, Services, and Education Element***

This element lists all city-owned public facilities in Petaluma, including those that will be assessed in the LHMP. It summarizes broad policies that ensure adequate public facilities and services exist and are maintained to meet the needs of the community. Relevant public facilities and services and fire protection goals are outlined in Table 2-11.

**Table 2-11: City of Petaluma Public Facilities, Services, and Fire Protection Goals**

<b>Goal</b>	<b>Goal Description</b>
Goal 7-G-1	Ensure adequate public facilities and services exist and are maintained to meet the needs of the community for an array of high-quality services and programs.
Goal 7-G-5	Protect lives, property, and the environment by providing the highest quality of service in prevention, fire protection, emergency medical services, and community preparedness.

#### ***Water Resources Element***

The water resources element summarizes four components: water supply and demand, recycled water, wastewater, and surface water. This element covers flood hazards, groundwater supply, and drought issues, as they relate to water conservation. Relevant flood and stormwater conveyance goals are outlined in Table 2-12.







**Table 2-12: City of Petaluma Flood and Stormwater Conveyance Goals**

Goal	Goal Description
Goal 8-G-8	Provide surface drainage and flood protection facilities to meet the community's needs of reducing flood hazards and potential property damage.
Goal 8-G-9	Preserve the design conveyance capacity of the surface water drainage system.

**Health and Safety Element**

Planning for growth and development requires the consideration of a wide range of public safety issues. Many of the safety risks associated with development, including risks to buildings and infrastructure, can be avoided through siting decisions made at the planning stages of development, while others may be lessened through the use of mitigation measures in the planning and land use review process. The City's Health and Safety Element aims to minimize risks posed by environmental hazards, including geologic and seismic hazards, noise, and hazardous materials and waste. The element also addresses emergency preparedness. Relevant natural hazard and emergency preparedness goals are outlined in Table 2-13.

**Table 2-13: City of Petaluma Natural Hazard and Emergency Preparedness and Management Goals**

Goal	Goal Description
Goal 10-P-1	Minimize risks of property damage and personal injury posted by natural hazards.
Goal 7-G-5	Protect lives, property, and the environment by providing the highest quality of service in prevention, fire protection, emergency medical services, and community preparedness.
Goal 10-P-2	Protect the community from risks associated with seismically induced surface ruptures, ground-shaking, ground failure, slope instability leading to mudslides and landslides, subsidence, liquefaction, and other seismic, geologic, and fire hazards.
Goal 10-P-3	Protect public health and welfare by eliminating or minimizing the effects of existing noise problems, and by minimizing the increase of noise levels in the future.
Goal 10-P-4	Minimize the risk to life and property from the production, use, storage, and transportation of hazardous materials and waste by complying with all applicable state and local regulations.

**City of Petaluma 2015 – 2023 Housing Element**

The City prepared the latest Housing Element in 2015 and revised it in 2018. The Housing Element is one of the seven mandatory elements of the General Plan. The Housing Element provides a long-term comprehensive plan to address the housing needs for all economic segments of the community. It addresses existing and projected housing demand and establishes goals, objectives, policies, and actions to assist the City in implementing the plan in accordance with other General Plan policies. The 2015-2023 Housing Element was prepared under a separate timeline and under different detailed State criteria.

**City of Petaluma Urban Water Management Plan (2015)**

The City's Urban Water Management Plan (UWMP) is prepared to meet the requirements of the California Water Code, which requires "every urban water supplier providing water for municipal purposes either directly or indirectly to more than 3,000 customers or supplying more than 3,000 acre-feet of water annually to adopt and submit an UWMP every five years" (City of Petaluma 2015). The purpose of the plan is to evaluate the required potable and recycled water system facilities required to serve the buildout of the City's General Plan. It includes several objectives designed to help the City meet their future water demands and develop performance and operational criteria. It also presents the City's capital improvement program for recommended potable and recycled water system facilities. These range from costs associated with land acquisition, storage reservoir development, groundwater wells, booster pump





stations, new pipelines, and interconnection facilities. Several of the objectives and the sustainability principles outlined in the plan will help the City minimize drought hazards.

### **Floodplain Management Regulations and NFIP Participation (1983)**

The City of Petaluma has participated in the National Flood Insurance Program (NFIP) since 1974 through emergency entry and regular entry since 1983 by administering floodplain management regulations that meet the minimum requirements of the NFIP. The purpose of these regulations is to promote the public health, safety, and general welfare and to minimize public and private losses due to flood conditions in specific areas. These regulations apply to all areas of special flood hazards within the jurisdiction of Petaluma identified in FEMA's most recent FIS completed for Sonoma County on March 7, 2017. The Special Flood Hazard Area (SFHA), also known as the base flood, 100 year flood (1 percent annual chance flood) in the City is mapped as Zone A or AE.

Floodplain management is administered through the City's Public Works and Utilities Department. The City maintains records of BFE certificates for the properties within the SFHA and the NFIP is administered by the City Engineer (Floodplain Administrator) within the Public Works and Utilities Department.

### **Community Rating System (CRS) Program Participation**

The City of Petaluma has participated in the Community Rating System (CRS) since 1991 as one of its efforts to reduce potential losses due to flooding for its citizens. This program, created by the NFIP, encourages communities to become proactive in their flood management planning activities. Under this program, participating communities, such as the City receive a point rating reflective of their efforts in undertaking these activities. The CRS ratings result in reduced flood insurance premiums to floodplain residents and property owners.

According to the 2015 FMP, the NFIP has conducted annual audits of the City's floodplain management efforts for over two decades and awarded the City a Class 6 rating, reducing flood insurance premiums to policy holders located in the SFHA throughout the City by approximately 20 percent and 10 percent for those who have standard X-Zone policies. According to FEMA, as of June 30, 2015, there were approximately 393 flood insurance policies currently in effect, with an annual premium of over \$418,774 (City of Petaluma 2015). It is estimated that the City's participation in the CRS program saves insured residents \$83,755 per year (City of Petaluma 2015). Potential opportunities to improve the City's class rating are described below in Section 3.1.5.

### **City of Petaluma Floodplain Management Plan (2015)**

The City of Petaluma FMP was developed in an open public process and is considered a living document that is subject to revisions that reflect the City's change in policy or the state and/or federal regulations. This plan describes the magnitude of past flood events in the City and its purpose is to describe floodplain management activities implemented to date; additional alternative remedies; and a plan for future action to address the current flooding problems. The objective of the plan is to quantify flooding problems and propose solutions when funding becomes available (City of Petaluma 2015). The specific mitigation actions described in FMP were integrated into this LHMP in the mitigation strategy.

### **City of Petaluma Storm Water Management Plan (2003)**

The City's Storm Water Management Plan describes actions and efforts that include best management practices that will address the reduction of nutrients, pathogens, and sediment in the City's stormwater. The plan also includes measurable goals and timetables for the minimum control measures. The City Water Resources and Conservation Division of the Public Works Department is responsible for implementing the plan and the City's Storm Water Program.

### **City of Petaluma Emergency Operations Plan (2007)**

The City's EOP was updated in 2007. It includes a basic plan that addresses the City of Petaluma's responsibilities in emergencies associated with natural disaster, human-caused emergencies, and





technological incidents. It provides a framework for coordination of response and recovery efforts within the City and in coordination with local, state, and federal agencies. The EOP contains the following goals:

- Provide effective life safety measures
- Reduce property loss and damage to the environment
- Provide for the rapid resumption of impacted government, community and business services;
- Provide accurate documentation and records required for cost recovery.

The plan establishes emergency organization staff to direct and control operations during a period of emergency by assigning responsibilities to specific personnel. The scope of the plan addresses earthquakes, hazardous materials emergencies, flooding, and wildfires. It includes procedures for emergencies that may or may not require the full or partial activation of an Emergency Operation Center (EOC). The City’s response to an emergency incident is coordinated through the EOC and the City Manager serves as the Emergency Operations Director. The EOC also utilizes the Incident Command System (ICS) and the Standardized Emergency Management System/National Incident Management System (SEMS/NIMS) for unity of command and span of control.

### 2.9.2 City of Petaluma Administrative/Technical Mitigation Capabilities

Table 2-14 identifies the City personnel responsible for activities related to mitigation and loss prevention in the City of Petaluma.

**Table 2-14: City of Petaluma’s Administrative and Technical Mitigation Capabilities**

Personnel Resources	Yes/No	Department/Position
Planner/engineer with knowledge of land development/land management practices	Yes	Community Development / Planning Manager
Engineer/professional trained in construction practices related to buildings and/or infrastructure	Yes	Community Development / Chief Building Official
Planner/engineer/scientist with an understanding of natural hazards	Yes	City Public Works and Utilities Department staff
Personnel skilled in GIS	Yes	Information Technology/GIS Technician
Full-time building official	Yes	Building Division / Chief Building Official
Floodplain manager	Yes	Public Works and Utilities Department / City Engineer
Emergency manager	No	Economic Development and Open Government Manager
Grant Writer	Yes	Handled within each department/program
GIS data—Hazard areas	Yes	GIS Specialist
GIS data—Critical facilities	Yes	GIS Specialist
GIS data—Building footprints	Yes	GIS Specialist
GIS data—Land use	Yes	GIS Specialist
GIS data—Assessor’s data	Yes	GIS Specialist
Warning Systems/Service (Reverse 911, cable override, outdoor warning signals)	Yes	Flood alert system; Nixle; WEA; EAS; IPAWS; SoCo Alert

Source: HMPC Data Collection Guide

### City Departments/Agencies

The City of Petaluma government consists of a City Council with six members and the Mayor. The City Council appoints the City Manager. The City Manager is the chief administrative officer for the City with all City employees with the exception of the City Attorney and City clerk reporting to the City Manager.





### City Attorney's Office

The City Council appoints a City Attorney, which is staffed by one Assistant City Attorney, one Deputy City Attorney, and one legal secretary. The City Attorney's office provides legal advice to the City Council, Commissions, and City staff. They attend all City Council and Planning Commission meetings. They also assist in the preparation of legal documents, ordinances, and resolutions; prepare negotiations and contracts, and prosecute code violations.

### City's Clerk Office

The City Clerk's office provides a variety of administrative services in support of the City Council. The office prepares City Council agendas and minutes, maintains the City's official records, recruits for City Council appointed boards and commissions, and the City Clerk serves as a filing officer.

### City Manager's Office

The City of Petaluma's City Manager's Office provides general management, oversight and direction to all the City's departments and programs and provides administrative support to the Mayor and Council. The City Manager is responsible for organizing the departments within the City for efficient and effective delivery of services. The Manager also acts as the City's Personnel, Budget, and Purchasing Officer and provides strategic planning for anticipated future needs.

The City Manager department provides oversight to the following five divisions.

- **Building Division.** The Building Division is dedicated to improving the safety of the residents of Petaluma through professional and technical services. This department implements and enforces building and fire codes, conducts site plan and building permit review, and coordinates daily development review, permit issuance, and inspections.
- **Planning Division.** The City's Planning Division is currently managed by an outsourced planning contractor. The contracting team is responsible for implementing City policies that direct the physical development and community character of the City. Implementation of City development policies involves analysis and establishing conformance to local implementing plans, including various Specific Plans, the Zoning Ordinance, the Growth Management Ordinance and Guidelines, PUDs, and the City's Design Guidelines. Project development and approvals also involve environmental analysis to determine environmental impacts, as required by the California Environmental Quality Act.
- **Economic Division.** The Economic Development Division promotes and pursues commercial, industrial, and office development within the City to create a diversified and sustainable economic base for the community. This base provides a stable tax revenue structure for the City, as well as a full range of retail shopping, services, and employment opportunities for its residents.
- **Housing Division.** The Housing Division implements the City's Housing Program and administers funding through two sources: the fee collected in-lieu of providing units and the commercial linkage fee collected to mitigate the housing impacts of new changed or expanded commercial retail or industrial development.
- **Information Technology Division.** This Division supports all systems and enterprise systems within the City. GIS is within the IT Division and created GIS web applications and updates all GIS data through Open Data Petaluma.

### Finance Department

The Finance Department is responsible for City budget preparation and compliance, accounting and financial reporting, debt issuance and management, accounts payable, City employee payroll preparation, utility billing, business licensing, accounts receivable, cashiering and sales. The department also ensures the fiscal foundation necessary to deliver community services.





### **Fire Department**

The City of Petaluma fire, rescue and emergency medical services provides services within the city limits of Petaluma, Southern Sonoma County and a portion of Marin County; covering 184 square miles and 70,000 persons. The Department consists of 58 personnel, with 48 divided among 3 platoons that work 24-hour rotating shifts.

### **Human Resources Department**

The Human Resources Department supports City training and development programs. The Department also oversees and manages the Risk Management Division.

### **Parks and Recreation Services Department**

The Parks and Recreation Department oversees the City's parks and community facilities, public transportation system and bikeways, library, and other recreational programs.

### **Police Department**

The Police Department ensures Petaluma is a safe place to live and work and is "proactive in Community Oriented Policing Philosophy" The Department covers 13 square miles and serves nearly 60,000 persons. There are 85 full time employees within the Department including three (3) K-9 Officers, Traffic Unit, Motorcycle Patrol, SWAT Team, Investigations Unit, FTP Program and Reserve Community Service Officer Program.

### **Public Works and Utilities Department**

The Public Works Department provides maintenance services for streets, trees, traffic control systems, parks, landscape maintenance districts, City buildings and vehicles, graffiti removal, solid waste, and recycling. The department also maintains water distribution, sewer collection and drainage systems. The Department oversees the operation and maintenance of several facilities including the Ellis Creek Water Recycling Facility and is responsible for maintenance, repairs, and replaces mechanical and electrical plant equipment. The Department is also responsible for administrating the City's floodplain regulations.

The Public Works and Utilities Department is comprised of the following seven divisions:

- Capital Improvements
- Environmental Services
- Transit
- Public Works Operations
- Airport/Marina
- Development Engineering
- Parks/Facilities Maintenance

### **2.9.3 City of Petaluma Fiscal Mitigation Capabilities**

Table 2-15 identifies financial tools or resources that the City could potentially use to help fund mitigation activities.





**Table 2-15: City of Petaluma’s Fiscal Mitigation Capabilities**

Financial Resources	Accessible/Eligible to Use (Yes/No)	Comments
Community Development Block Grants	Yes	The City is an Entitlement Jurisdiction under the CDBG Program. A majority of CDBG allocation is for housing development and housing-related services. Because of the Entitlement status the both HOME and Emergency Shelter funds are also available to the City. The funds, granted through the U.S. Department of Housing and Urban Development (HUD) target programs and/or projects geared towards assisting low and moderate-income persons by providing decent housing, a suitable living environment, and expanding economic opportunity.
Capital Improvements Project funding	Yes	Grants like FEMA or Cal OES
Authority to levy taxes and assessments for specific purposes	Yes	Tax assessment for a specific mitigation project
Fees for water, sewer, services	Yes	Utility fees can be used for hazard mitigation of water and sewer projects
Impact fees for new development	Yes	The City oversees a comprehensive development impact fee program.
Incur debt through general obligation bonds	Yes	
Incur debt through special tax bonds	Yes	
Incur debt through private activities	Yes	
Withhold spending in hazard prone areas	No	

**2.9.4 Mitigation Outreach and Partnership Capabilities**

**Sonoma County Community Wildfire Protection Plan (2016)**

The Sonoma County Community Wildfire Protection Plan (CWPP) consists of three components: a collaborative effort of input from various agencies and community members, the identification of prioritized treatment areas and mitigation strategies, and the recommendation of measures to reduce ignitability of structures. The plan was developed with Fire Safe Sonoma, Cal Fire, and Sonoma County. The Sonoma County Board of Supervisors unanimously approved the Fire Safe Sonoma’s 2016 CWPP.

**Regional Climate Protection Authority Climate Action Plan (2016)**

The Regional Climate Protection Authority (RCPA) is governed by a twelve member Board of Directors comprised of representatives from the Sonoma County Board of Supervisors and Council Members from each of the nine cities – Cloverdale, Cotati, Healdsburg, Petaluma, Rohnert Park, Santa Rosa, Sebastopol, Sonoma and Windsor. The RCPA coordinates climate protection activities countywide and performs a variety of important related functions including advocacy, project management, planning, finance, grant administration, and research. The Climate Action 2020 and Beyond, Sonoma County’s Regional Climate Action Plan published in 2016 was a collaborative effort between Sonoma County and all nine cities within the County. The Plan is specific to the reduction of countywide Greenhouse Gas (GHG) emissions. The Plan sets forth near-term actions to be implemented through 2020 to achieve a 25 percent reduction in countywide GHG emissions. Although this plan is still referenced as it relates to the County’s GHG emissions inventory and targets, it was not formally adopted by the County.





### **City of Petaluma Climate Emergency Resolution (2019)**

In May 2019 the Petaluma City Council became the first city in Sonoma County to pass a Climate Emergency Resolution. The goal of the resolution is to frame climate as an urgent crisis and to engage action at the local government level. During the planning process for this LHMP and for future planning efforts related specifically to the Climate Emergency Resolution, the City Council also appointed seven members to the newly formed Climate Action Commission (CAC) to discuss and make recommendations to the Petaluma City Council on climate policy.

### **Climate Action Commission (2019)**

The Petaluma City Council established a CAC through Ordinance No. 2689 on September 5, 2019. The City established the CAC in response to the declaration of the Climate Emergency Resolution enacted earlier in the year and to take action regarding climate change and to elevate climate change issues to the highest priority in its goal-setting process. This includes giving precedence to climate mitigation and adaptation when evaluating policies, planning projects, and allocating City resources. The CAC is also responsible for reducing citywide GHG emissions (in accordance with Executive Order [EO] B-55-18) and accelerating climate adaptation and resilience strategies.

The CAC consists of seven appointed Commissioners that will serve a four-year term. The CAC first convened in November 2019. Initial meetings held in 2019 focused on the establishment of ad-hoc committees, greenhouse gas (GHG) emission reduction activities, and review of the RCPA'S 2025 initiatives associated with decarbonization, carbon sequestration, and climate resilience, as outlined in Sonoma County's Regional Climate Action Plan (please note the formal plan was not adopted and review was for informational purposes only).

### **Sonoma County Operational Area Hazard Mitigation Plan (2016)**

The Sonoma County HMP assesses the County's vulnerabilities to hazards and presents a mitigation strategy of actions intended to reduce the disruption to life, property, and economy that might result from a natural disaster. The HMP focuses on earthquake, flood, wildland fire, and landslide hazards, as they were considered to constitute the greatest risk to the County based on past disaster events, future probabilities, and vulnerability. Within the HMP risk assessment, secondary and tertiary are addressed, such as winter storms, coastal erosion, bluff failure, tsunamis, and post fire erosion.

### **Sonoma Water Local Hazard Mitigation Plan (2018)**

Sonoma Water, previously referred to as Sonoma County Water Agency, is a wholesale provider of potable water that serves nine municipal customers in Sonoma and Marin counties. The water agency maintains a water transmission system that provides naturally filtered Russian River water, builds variety of flood protection projects, manages the county sanitation zones and districts that provide wastewater collection and treatment and recycled water distribution, and produces recycled water from its wastewater treatment plants to offset surface water drawn from the Russian River.

Sonoma Water also implements the Sustainable Groundwater Management Act (SGMA) in Sonoma County and is actively working to protect the basins throughout the region. The water agency adopted a LHMP in 2018 to comprehensively assess the natural hazard risks and vulnerabilities facing the agency's infrastructure, and to articulate a plan to address the vulnerabilities. The plan includes three tailored mitigation strategies focusing on water supply and distribution, sewer and sanitation, and flood control projects.

### **Petaluma's Power Shutoff Webpage (2019)**

Following the unprecedented 2018 wildfire season in California, Pacific Gas & Electric (PG&E) announced it will be conducting Public Safety Power Shutoffs (PSPS) when there are high winds and dry conditions and generally a heightened fire risk forecast. The outages could last several days, and PG&E has





suggested customers be prepared for outages that could last longer than 48 hours. A majority of Sonoma County could be affected by the power outages including almost the entirety of the City of Petaluma. PG&E has a plan in place to install a resource area at the Sonoma-Marin Fairgrounds within 24 hours of a PSPS, and will offer power, air conditioners and updates for local residents. In 2019 the City began planning for the shutoffs, including evaluating where vulnerable populations are located in the City, and how infrastructure and relationships with other agencies could be affected.

The first major shutoff occurred on October 8, 2019 impacting 30 counties in northern and central California including Sonoma County. Additional shutoffs took place throughout the month of October 2019 due to severe high winds and increasing fire danger. The City was proactive and created a website dedicated to share information on the PSPS, both before they took place and after PG&E announced the shutoffs. Snapshots of the City’s webpages are shown in Figure 2-12 and Figure 2-13. Information on the website is provided in both English and Spanish and includes information such as tips for citizens to prepare and make plans for their families, the opening of community shelters, school closures and which areas of the City are impacted.

**Figure 2-12: City of Petaluma Public Safety Power Shutoff Webpage**

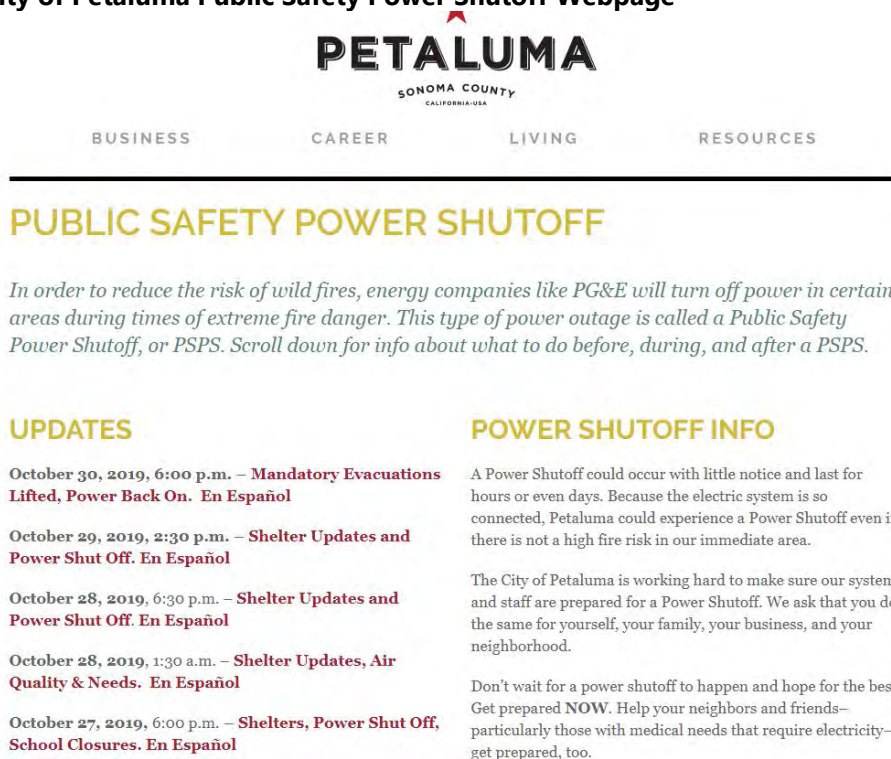






Figure 2-13: City of Petaluma Public Information on Public Safety Power Shutoffs

**PETALUMA**  
SONOMA COUNTY  
CALIFORNIA-USA

BUSINESS CAREER LIVING RESOURCES

## GET PREPARED FOR HISTORIC WIND EVENT COMING THIS WEEKEND

OCTOBER 25, 2019, 9:00 P.M.

### POTENTIAL POWER SHUTOFF IN SONOMA COUNTY SATURDAY (10/26) THROUGH MONDAY (10/28)

PG&E announced another likely power shutoff in Sonoma County on Saturday (10/26), Sunday (10/27), and Monday (10/28). Current maps indicate that Petaluma's west side will be most affected. Residents and businesses can visit PG&E's website to determine if they will be impacted by the power shut off by **looking up their addresses**. Even if you are not shown to be impacted by the planned power shutoff, we urge you to stay alert and prepare as the anticipated weather may damage infrastructure and lead to expanded power interruptions.

### WEATHER UPDATE

The National Weather Service (NWS) has issued a Fire Weather Red Flag Warning and a high wind watch in effect from 8pm on Saturday to 11am on Monday. This event is anticipated to reach historic levels. Winds are expected to reach 70 to 80 mile per hour in the mountain areas with winds at 40 to 50 miles per hour in the valley areas.

### LOCAL COOLING / CLEAN AIR / CHARGING CENTER

The Petaluma Community Center will be open for fresh air and cooling through 8pm this evening and from 8am to 8pm Saturday and Sunday.

### ADDITIONAL INFORMATION

City of Petaluma staff are monitoring the situation and preparing city facilities and infrastructure for potential power shutoffs and upcoming fire weather.

For up-to-date emergency information, tips for using generators, driving during a power shutoff, and other important safety and health information, visit the [Sonoma County Emergency Website](#) or review this [fact sheet](#). For support and information via phone dial 2-1-1.

## Community Shelters

On October 23, 2019 the Kincade Fire started in northeastern Sonoma County and once contained the fire had burned 77,758 acres. The fire did not directly impact the City of Petaluma, and because of this the City was able to open its community shelters from evacuees from neighboring communities in Sonoma County. Eight shelters were open in Petaluma, including the Sonoma-Marin Fairground which opened in partnership with the Red Cross. The Petaluma Community Center and the Veterans Building provided support for over 1,000 evacuees, as a total of 200,000 people were ordered to evacuate from northern Sonoma County (Argus Courier 2019).

## Other Planning Capabilities (Ongoing)

The HMPC noted the following additional mitigation outreach efforts during planning sessions:

- **Sonoma County Regional Water Supply Resiliency Plan.** The City has participating in planning process and outreach efforts for this plan.
- **Fire Department – COPE.** COPE stands for Citizens Organized to be Prepared for Emergencies. The Fire Department holds a quarterly seminar on preparedness and encouraging neighborhood organization through "Map Your Neighborhood."
- **Police Department.** The City's Police Department has participated in disaster preparedness education with the City's Fire Department and Sonoma County, especially since the 2017 wildfire events.





- **City’s Website.** The City of Petaluma’s website provides public information and resource. Including information on water conservation efforts and information related to the PG&E PSPS. The City’s social media accounts (Twitter, Facebook) are used to disseminate public information.

### 2.9.5 Opportunities for Enhancement

Based on the capabilities assessment, the City of Petaluma has several existing mechanisms in place that already help to mitigate hazards. In addition to these existing capabilities, there are also opportunities for the City to expand or improve on these policies and programs to further protect the community. Required future opportunities for enhancement comply with Assembly Bill 2140 include amending the City’s General Plan Health and Safety Element to include the LHMP. The City can update other plans, such as the City’s Capital Improvement 5 Year Plans to include hazard mitigation actions and climate adaptation strategies that relate to infrastructure resiliency. Other future improvements may include providing hazard training for staff or hazard mitigation grant funding in partnership with Sonoma County and Cal OES.

#### CRS Program Class Rating Improvements

The City of Petaluma currently has a Class 6 rating under the NFIP CRS Program. As previously mentioned, this Class 6 results in a 20 percent discount to policy holders in the SFHA and 10 percent reduction for those who have standard X-Zone policies. According to Table 2-16, the City currently has 2,125 credit points which are listed below by CRS activities.

**Table 2-16: City of Petaluma Credit Points under the Community Rating System Program**

Activity	Description	Year <sup>1</sup>	Total
C310	Elevation Certificates	2016	38
C320	Map Information	2016	90
C330	Outreach Projects	2016	96
C340	Hazard Disclosure	2016	15
C350	Flood Protection Information	2016	29
C360	Flood Protection Assistance	2016	55
C370	Flood Insurance Promotion	2016	0
C410	Floodplain Mapping	2016	0
C420	Open Space Preservation	2016	1137
C430	Higher Regulatory Standards	2016	241
C440	Flood Data Maintenance	2016	144
C450	Stormwater Management	2016	70
C510	Floodplain Management Planning	2016	177
C520	Acquisition and Relocation	2016	33
C530	Flood Protection	2016	0
C540	Drainage System Maintenance	2016	0
C610	Flood Warning and Response	2016	0
C620	Levees	2016	0
C630	Dams	2016	0

<sup>1</sup> – Year the City of Petaluma floodplain management activities were audited by the Insurance Services Office (ISO). ISO works on behalf of FEMA and insurance companies to review recertification applications and verify communities credit points under the CRS program. The next verification cycle will occur in 2021.

Source: FEMA Community Information System (CIS) 2019

The City will need 280 more points of credit to reach a CRS Class 5 and a 25 percent reduction in the cost of flood insurance. To reach a Class 5, the following activities of credit can be modified:

- Activity 330 Outreach Projects where a maximum of 200 points of credit are available for Outreach Projects. The City only has 96 points currently.





- Activity 510 Floodplain Management Planning where a maximum of 382 points are available and the City currently has 177 points for its current plan.
- Activity 540 Drainage System Maintenance where the maximum credit is 470 points and the City currently does not have any credit assigned. Taking credit for Problem Site Maintenance and the City's Capital Improvement Program could add 120 points under this activity.

Modifying these three activities may be enough credit for the City to reach a CRS Class 5 and savings of more than \$106,264 each year and an average annual policy discount of \$259. See Table 2-17 for savings.

**Table 2-17: Cost Savings by Policy and by Community under CRS Class 5**

CRS Class	Description	Total	SFHA	X-STD/AR/A99
9	Per Policy	\$55	\$97	\$40
	Per Community	\$22,628	\$20,336	\$2,292
8	Per Policy	\$105	\$195	\$40
	Per Community	\$42,964	\$40,672	\$2,292
7	Per Policy	\$154	\$292	\$40
	Per Community	\$63,300	\$61,008	\$2,292
6	Per Policy	\$210	\$389	\$79
	Per Community	\$85,928	\$81,344	\$4,584
5	Per Policy	\$259	\$487	\$79
	Per Community	\$106,264	\$101,680	\$4,584
4	Per Policy	\$309	\$584	\$79
	Per Community	\$126,600	\$122,016	\$4,584
3	Per Policy	\$358	\$681	\$79
	Per Community	\$146,936	\$142,352	\$4,584
2	Per Policy	\$408	\$778	\$79
	Per Community	\$167,272	\$162,688	\$4,584
1	Per Policy	\$458	\$876	\$79
	Per Community	\$187,608	\$183,024	\$4,584

<sup>1</sup> – SFHA includes Zones A, AE, A1-A30, V, V1-V30, AO, and AH; discount varies depending on class.

<sup>2</sup> – SFHA includes Zones A99, AR, AR/A, AR/AE, AR/A1-A30, AR/AH, and AR/AO; 10 percent discount for Classes 1-6; 5 percent discount for Classes 7-9

Source: CRS 2019

### Other Opportunities

Additional training opportunities will help to inform City staff members on how best to integrate hazard information and mitigation projects into their departments. Continuing to train City staff on mitigation and the hazards that pose a risk to the City of Petaluma will lead to more informed staff members who can better communicate this information to the public.





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## 3 Planning Process

*44 U.S. Code of Federal Regulations Requirements §201.6 Local Mitigation Plans (b) and §201.6(c)(1): An open public involvement process is essential to the development of an effective plan. In order to develop a more comprehensive approach to reducing the effects of natural disasters, the planning process shall include:*

- 1) An opportunity for the public to comment on the plan during the drafting stage and prior to plan approval;*
- 2) 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 nonprofit interests to be involved in the planning process; and*
- 3) Review and incorporation, if appropriate, of existing plans, studies, reports, and technical information.*

*[The plan shall document] the planning process used to develop the plan, including how it was prepared, who was involved in the process, and how the public was involved.*

### 3.1 Background on Mitigation Planning in the City of Petaluma

This multi-hazard, single-jurisdiction Local Hazard Mitigation Plan (LHMP) Update is a revised, detailed plan tailored for the City of Petaluma. The City's previous plan, "Taming Natural Hazards," adopted in 2005, was a regional, multi-jurisdictional LHMP for all nine counties within the Bay Area prepared on behalf of the City by the Association of Bay Area Governments (ABAG). The City annexed the regional plan in 2010 which has since expired in 2015. ABAG is no longer managing the update of the multi-jurisdictional LHMP which requires the City to create a single-jurisdiction update to the plan.

The increasing cost of disaster recovery in the nation and the State of California over the past decades, and specifically from the recent wildfires in 2017 and in 2019, has prompted a renewed interest in determining effective and holistic approaches to minimize natural hazards. Hazard mitigation planning plays an important role in building community resilience through the identification of hazards, assessment of vulnerabilities, and the development of mitigation actions. The City of Petaluma recognized the importance of developing a new, updated LHMP and was responsible for initiating its development in 2019. The goal of the LHMP is to develop practical, attainable, and cost-effective mitigation actions to reduce vulnerability to the identified hazards and reduce human, property, and economic losses from hazard events. The City contracted with Wood Environment & Infrastructure Solutions, Inc. (Wood) to facilitate and develop the plan. Wood's role was to:

- Assist in establishing the Hazard Mitigation Planning Committee (HMPC) as defined by the Disaster Mitigation Act (DMA) of 2000 (Public Law 106-390) commonly known as the 2000 Stafford Act Amendments;
- Meet the DMA requirements as established by federal regulations and follow the Federal Emergency Management Agency (FEMA) planning guidance;
- Facilitate the entire planning process based on a Community Engagement Strategy;
- Identify the data requirements for the HMPC and conduct the research and documentation necessary to augment that data;
- Perform risk assessments that identify, evaluate, and prioritize natural and human-caused hazards that could impact the City;





- Conduct a vulnerability assessment to identify the hazard’s impacts on the City’s critical facilities, infrastructure, property, and future development;
- Assist in facilitating the public input process;
- Integrate the risk and vulnerability assessment to help the City determine appropriate mitigation goals and objectives to minimize long-term vulnerabilities to the identified hazards;
- Produce draft and final plan documents; and
- Coordinate with California Office of Emergency Services (Cal OES) and FEMA Region IX plan reviews.

The original plan developed by ABAG broadly covered natural hazards and vulnerabilities in the City of Petaluma. This new, updated plan expands on the multi-jurisdictional LHMP and is tailored to address the natural and human-caused hazards in the City, the identified hazard impacts specific to Petaluma’s critical facilities and infrastructure, and the development of a locally attainable mitigation strategy. The new LHMP will involve adopting, implementing, assigning responsibility, monitoring, and reviewing the mitigation actions over time to ensure the goals and objectives of the plan are being achieved and the plan remains relevant. The remainder of this chapter provides a narrative of the steps taken to prepare the LHMP.

### **3.2 Local Government Participation**

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The LHMP Update is a single-jurisdictional plan that covers the City of Petaluma Planning Area, which is the same boundary as the City’s Urban Growth Boundary (UGB). The DMA planning regulations and guidance stress that each local government seeking FEMA approval of their mitigation plan must participate in the planning effort in the following ways:

- Participate in the process as part of the HMPC
- Identify potential mitigation actions; and
- Formally adopt the plan.

For the City of Petaluma’s HMPC, “participation” was defined at the outset of the planning process as the following:

- Providing facilities for meetings;
- Attending and participating in the HMPC meetings;
- Completing and returning the Wood Environment & Infrastructure Solutions, Inc. Data Collection Guide;
- Collecting and providing other requested data (as available);
- Managing administrative details;
- Engaging stakeholders and facilitating a formal Stakeholder’s Workshop;
- Making decisions on plan process and content;
- Identifying mitigation actions for the plan;
- Reviewing and providing comments on plan drafts;





- Informing the public, local officials, and other interested parties about the planning process and providing opportunity for them to comment on the plan;
- Advertising, coordinating, and participating in the public input process; and
- Coordinating the formal adoption of the plan by the City Council.

The City of Petaluma met all FEMA's requirements for plan participation. The City brought together a local planning team with representatives from each City of Petaluma department to help collect data, identify mitigation actions and implementation strategies, and review and provide data on plan drafts. The City engaged several federal, state, regional, and local stakeholder representatives from various agencies and municipalities in the region. In most cases, one or more representatives from each City department and each agency attended the HMPC meetings described in Table 3-2.

The preparation of the updated LHMP was also intended to assist the City of Petaluma in reducing its risk from natural and man-made hazards by identifying resources, information, and strategies for risk reduction. For the City's HMPC, the intention of the plan is to help guide and coordinate mitigation activities throughout the City's various departments, as this is their first stand-alone LHMP since the multi-jurisdictional regional LHMP prepared by ABAG. As a result, the HMPC set out to develop a plan that would meet the objectives summarized below.

- The plan would meet or exceed program requirements specified under the DMA of 2000.
- The plan would not only meet Cal OES and FEMA requirements, but also the needs of the City.
- The plan would coordinate existing and ongoing plans and programs already established at the City so that high priority initiatives and projects to mitigate possible disaster impacts would be funded and implemented.
- The plan would create a linkage between the LHMP and established plans such as the City's 2011 General Plan 2025, 2015 Floodplain Management Plan, Water and Infrastructure Master Plans, Capital Improvement Plans and projects, and the City's 2007 Emergency Operation Plan so that existing planning mechanisms can be integrated to help the City achieve successful mitigation.

Given plan integration is a key strategy in the success of LHMP implementation, the HMPC focused on consistency between plans and programs at the City of Petaluma, including the City Council's 2019-2020; 2020-2021 Goals and Priorities Strategic Plan. The HMPC also focused on ensuring each department representative consulted with their individual departments in between meetings to ensure existing capabilities were adequately documented in the LHMP and that mitigation actions were thoroughly reviewed and developed by a range of department leads throughout the City of Petaluma. Appendix A provides additional information and documentation of the planning process.

### **3.3 The 10-Step Planning Process**

Wood established the planning process for the City of Petaluma's LHMP Update using the DMA planning requirements and FEMA's associated guidance. This guidance is structured around a four-phase process:

- 1) Organize Resources
- 2) Assess Risks
- 3) Develop the Mitigation Plan
- 4) Implement the Plan and Monitor Progress





Into this process, Wood integrated a more detailed 10-step planning process used for FEMA’s Community Rating System (CRS) and Flood Mitigation Assistance (FMA) programs, as Petaluma participates in the CRS. Thus, the modified 10-step requirements of the Hazard Mitigation Assistance grants (HMA, including Hazard Mitigation Grant Program, HMGP; Pre-Disaster Mitigation program, PDM; Flood Mitigation Assistance, FMA), CRS, and the flood control projects authorized by the U.S. Army Corps of Engineers (USACE) are addressed. FEMA’s March 2013 Local Mitigation Planning Handbook recommends a nine step process within the four-phase process. Table 3.1 summarizes the four-phase DMA process, the detailed CRS planning steps and work plan used to develop the plan, the nine handbook planning tasks from FEMA’s 2013 Local Mitigation Planning Handbook, and where the results are captured in the Plan. The sections that follow describe each planning step in more detail, including information on the LHMP schedule and general timeframe of activities that took place to develop the plan.

**Table 3-1: Mitigation Planning Processes Used to Develop the City of Petaluma’s LHMP**

FEMA 4 Phase Guidance Phases	Community Rating System (CRS) Planning Steps	2013 FEMA Local Mitigation Planning Handbook Steps (44 CFR Part 201)	Location in LHMP
Phase 1: Organize Resources	Step 1. Organize Resources	1: Determine the Planning Area and Resources	Chapters 1, 2, and 3
		2: Build the Planning Team 44 CFR 201.6(c)(1)	Chapter 3, Section 3.3.1
	Step 2. Involve the public	3: Create an Outreach Strategy 44 CFR 201.6(b)(1)	Chapter 3, Section 3.3.1
	Step 3. Coordinate with Other Agencies	4: Review Community Capabilities 44 CFR 201.6(b)(2) & (3)	Chapter 2, Section 2.2; Chapter 3, Section 3.3.1
Phase 2: Identify Hazards and Assess Risks	Step 4. Assess the hazard	5: Conduct a Risk Assessment 44 CFR 201.6(c)(2)(i) 44 CFR 201.6(c)(2)(ii) & (iii)	Chapter 4, Sections 4.1 through 4.3
	Step 5. Assess the problem		Chapter 4, Sections 4.1 through 4.3
Phase 3: Develop a Mitigation Strategy	Step 6. Set goals	6: Develop a Mitigation Strategy 44 CFR 201.6(c)(3)(i); 44 CFR 201.6(c)(3)(ii); and 44 CFR 201.6(c)(3)(iii)	Chapter 5, Section 5.2
	Step 7. Review possible activities		Chapter 5, Section 5.3
	Step 8. Draft an action plan		Chapter 5, Section 5.4
Phase 4: Implement and Monitor the Plan	Step 9. Adopt the plan	8: Review and Adopt the Plan	Chapter 6, Appendix C
	Step 10. Implement, evaluate, and revise	7: Keep the Plan Current	Chapter 7
		9: Create a Safe and Resilient Community 44 CFR 201.6(c)(4)	Chapter 7

### 3.3.1 Phase 1: Organize Resources

#### Planning Step 1: Organize the Planning Effort

With the City’s commitment to develop the plan, Wood worked with the City’s Public Works and Utilities Department to establish the framework and organization for the planning process. Organizational efforts were initiated with the City to inform and educate the plan participants of the purpose and need for the City, single-jurisdictional LHMP update. Wood held an initial call on May 28, 2019 to discuss the organizational aspects of this planning process with City’s Public Works and Utilities Department project manager, who took the lead on this project. On June 12, 2019 the City circulated the HMPC invitee list. The schedule of subsequent planning activities is summarized in Table 3-2.







**Table 3-2: Local Hazard Mitigation Plan Schedule of Planning Activities**

Project Task	Meeting Date(s)
Project Kick-Off Meeting	May 28, 2019
Circulate Draft HMPC Invitee List	June 12, 2019
Submit HMPC Meeting #1 Agenda	July 2, 2019
HMPC Meeting #1	July 8, 2019
Submit Draft Community Engagement Strategy	July 30, 2019
City and HMPC Review of Community Engagement Strategy	August 9, 2019
Submit Final Community Engagement Strategy	August 12, 2019
HMPC Meeting #2	October 7, 2019
Prepare Hazard Identification and Risk Assessment	October 7, 2019
1 <sup>st</sup> Public Workshop	October 8, 2019
Develop Goals and Objectives	October 8, 2019
HMPC Meeting #3	October 8, 2019
Compile Mitigation Action Worksheets	December 1, 2019
Submit Sea Level Rise Vulnerability Assessment (part of Risk Assessment)	December 4, 2019
Submit 1 <sup>st</sup> Administrative Draft LHMP	January 17, 2020
City and HMPC provides consolidated comments on 1 <sup>st</sup> Administrative Draft LHMP	January 31, 2020
Submit 2 <sup>nd</sup> Administrative Draft LHMP	February 14, 2020
Complete FEMA Region IX Review Tool: Elements A through D	February 18, 2020
Circulate Public Review Draft LHMP	April 15, 2020
Public Review Ends (30-day public review)	May 15, 2020
HMPC Meeting #4	May 20, 2020
Submit Final Draft LHMP to Cal OES for review (45-day review period)	June 29, 2020
Submit Final Draft LHMP to FEMA Region IX for review	August 12, 2020
City Council Hearing*	TBD

\*City Council Meetings are held on the first and third Tuesdays of each month.

Invitations to the kick-off meeting were extended to key City departments, and federal and state agencies, Sonoma County, neighboring municipalities, and key stakeholders. Using FEMA planning guidance, representatives from each City of Petaluma department established the base membership for the HMPC stakeholder committee. The HMPC also included multiple representatives from federal, state, and local agencies, and stakeholders from local school districts, community hospitals, and other organizations. Key representatives from neighboring communities included staff from the Sonoma County Department of Emergency Management, City of Sebastopol, and Sonoma County Water Agency (Sonoma Water). The list of agencies and individuals invited to participate is included in Appendix A.

The HMPC was established as a result of this effort, as well as through interest generated through outreach conducted for this project, which is outlined in more detail in the Community Engagement Strategy. The HMPC collectively developed the plan with leadership from the City and facilitation by Wood. The HMPC meetings also had participation from other agency stakeholders with an interest in hazard mitigation, which are described in Planning Step 3. Representatives from the following City departments and other agencies participated on the HMPC:

**City of Petaluma**

- City Manager’s Office
  - Building Division
  - Planning Division





- Economic Division
- Housing Division
- Information Technology Division
- City Clerk Office
- City Attorney's Office
- Finance Department
- Fire Department
- Human Resources Department
- Parks and Recreation Services Department
- Police Department
- Public Works and Utilities Department
  - Capital Improvements
  - Environmental Services
  - Transit
  - Public Works Operations
  - Airport/Marina
  - Development Engineering
  - Parks/Facilities Maintenance

***Sonoma County***

- Department of Emergency Management

***Other Agency and Organization Stakeholders***

- City of Sebastopol
  - Building Department
  - Planning Department

A list of participating HMPC representatives is included in Appendix B. This list includes all HMPC members that attended one or more HMPC meetings detailed in Table 3-2. The City also utilized the support of other City staff in order to collect and provide requested data and to conduct timely reviews of draft documents. Note, that the core HMPC group was also supplemented by input from other government and stakeholder representatives that contributed to the planning process as identified in Planning Step 3: Coordinate with Other Department and Agencies.

The planning process officially began with a kick-off meeting on July 8, 2019. The meeting covered the scope of work and an introduction to the DMA requirements. Participants were provided with a Data Collection Guide, which included worksheets to facilitate the collection of information necessary to support development of the plan. Using FEMA guidance, Wood designed these worksheets to capture information on past hazard events, identify hazards of concern to the jurisdiction, quantify values at risk to identified hazards, inventory existing capabilities, and record possible mitigation actions. A copy of Wood's Data Collection Guide for this project is included in Appendix A. The City completed and returned the worksheets in the data collection guide to Wood staff for incorporation into the plan.



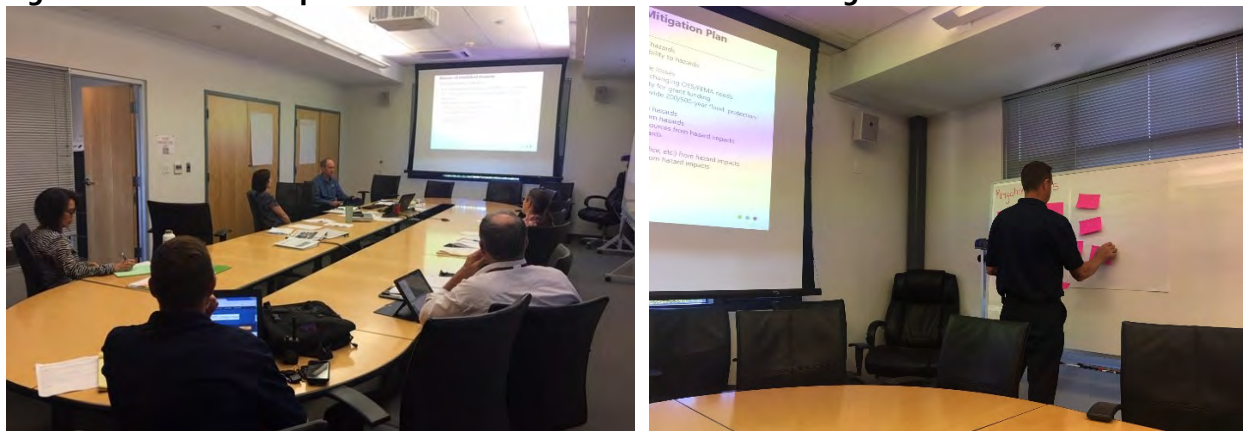
During the planning process, the HMPC communicated through face-to-face meetings, email, and monthly telephone conversations, and added information to the City’s LHMP Webpage. Draft documents were distributed via email to the City’s project manager and then distributed to the HMPC stakeholders. The HMPC met three times during the planning period (July 8, 2019 through October 8, 2019).

The dates and purposes of these meetings are described in Table 3-3. The HMPC also met internally in between meetings to help the City’s Public Works and Utilities Department project manager track deliverables, worksheet materials, and public outreach documentation. Agendas for each of the meetings and lists of attendees are included in Appendix A. Figure 3-1 is from HMPC Meeting #2.

**Table 3-3: Schedule of Planning Meetings**

Meeting Type	Meeting Topic	Meeting Date(s)
HMPC Meeting #1	Kick-off meeting: introduction to DMA, the planning process, and hazard identification	July 8, 2019
HMPC Meeting #2	Risk assessment overview and work session on goal development	October 7, 2019
HMPC Meeting #3	Development of mitigation actions; selection and prioritization of mitigation recommendations	October 8, 2019
HMPC Meeting #4	Discuss public comments received on the Public Review Draft LHMP	May 20, 2020

**Figure 3-1: Goal Development Brainstorm Session at HMPC Meeting #2**



At HMPC Meeting #1, the planning process scope and schedule were discussed, along with the list of hazards addressed in the plan, followed by a presentation that summarized hazard vulnerability. The group was asked what hazards presented the greatest concern. HMPC Meeting #2 focused on the findings from the Risk Assessment and the specific vulnerabilities to the City’s critical assets and infrastructure that need to be addressed in the mitigation strategy. The HMPC also developed broad goals and objectives during HMPC Meeting #2. This led to further discussion and the prioritization of mitigation actions developed at the HMPC Meeting #3. Figure 3-2 is from HMPC Meeting #3. Meeting #4 was held to review public comments and revise the Draft LHMP prior to submittal to Cal OES.



**Figure 3-2: Mitigation Strategy Brainstorm Session at HMPC Meeting #3**

### Planning Step 2: Involve the Public

Early discussions with the City of Petaluma established the initial plan for public involvement. At the kick-off meeting, the HMPC discussed options for public involvement and agreed to an approach using established public information mechanisms and resources within the community. This approach was outlined in the project's Community Engagement Strategy (Appendix C). The approach was also supported and implemented by the City's Public Works and Utilities Department project manager.

Public outreach was initiated during the plan development process with an informational press release to notify the public of the purpose of DMA and the hazard mitigation planning process for the City of Petaluma. The City Public Works and Utilities Department project manager coordinated an interview with the local newspaper, the Petaluma-Argus Courier prior to the first public workshop. Public involvement activities included the development of the project webpage, organization of public workshops, and circulation of press releases and an online survey. The City compiled public comments received during the first public workshop and based on the first online survey.

The City also compiled public comments on the planning process, hazard profiles, risk assessment, and the Draft LHMP during a second public workshop and based on a second online survey. During this time formal comments on the draft plan circulated during public review were compiled and organized. These comments were submitted by email and through the second online survey. The City received a total of four public comments on the plan. A summary of these comments and the comment-response matrix is included in Appendix A. The City incorporated public input by reviewing the comments and revising the LHMP prior to submittal to Cal OES and FEMA Region IX.

The City also took public comment during the second public workshop. The second public workshop was held as a virtual webinar. The City notified the project stakeholders and public about the second public workshop via email, the circulation of press releases, newspaper notices, and social media postings. The second public workshop was also advertised on daily and weekly City of Petaluma news updates. The City received one public comment during the second public workshop.

### ***Project Webpage***

At the beginning of the planning process, the City Public Works and Utilities Department and City Manager's Economic Division created a LHMP Webpage linked to the City's Main Website to keep the public informed on hazard mitigation, the development of the LHMP and the planning process, and as a place to solicit public input. The LHMP Webpage include a background section on hazard mitigation planning and the DMA. It also highlighted recent natural hazard events that have occurred in the City of Petaluma and adjacent unincorporated Sonoma County. The LHMP Webpage publicized on all media

releases, mailings, newsletters, surveys, and public meeting advertisements. It also has a sidebar with the meeting agenda's, minutes, sign-in sheets, and presentations from the various HMPC meetings and public workshops. The City also intends to keep the LHMP Webpage active after the plan is completed to keep the public informed about the status of the mitigation actions. Figure 3- and Figure 3-4 show the City of Petaluma LHMP Webpage at the time of the first public workshop and the second public workshop. The City of Petaluma website was being updated during the planning and outreach process for this project, and as a result the design of the project webpage changed. The City made the Public Review Draft LHMP available on the LHMP Webpage in April 2020 and was initially available here: <https://petalumastar.com/hazards/>.

**Figure 3-3: City of Petaluma Local Hazard Mitigation Plan Website (Original)**



The City also circulated the Public Review Draft LHMP on the updated LHMP Webpage here: <https://cityofpetaluma.org/hazard-mitigation-plan-2/>.

**Figure 3-4: City of Petaluma Local Hazard Mitigation Plan Website**



### **Public Workshops**

Public meetings were held during the draft-plan development process and prior to finalizing the plan as further described in Table 3-4. The first public workshop was held on October 8, 2019. Figure 3-5 is from the first public workshop.

**Figure 3-5: 1<sup>st</sup> Public Workshop**



The second public workshop was held via a livestream webinar workshop on April 30, 2020. Figure 3-6 are two screenshots of the second public workshop.

**Figure 3-6: 2<sup>nd</sup> Public Workshop**



Where appropriate, stakeholder and public comments were incorporated into the final plan, including the sections that address mitigation goals and strategies. Comments submitted during the first public workshop addressed the proposed mitigation actions, specifically the need to include actions related to human-caused hazards associated with hazardous material releases (e.g. natural gas pipelines), wildfire prevention, and emergency preparedness. Detailed comments are summarized below.

All press releases and website postings are on file with the City of Petaluma Public Works and Utilities Department (see Figure 3- for an example of a press release published in a local newspaper). The public outreach activities described here were coordinated and fully supported by the City of Petaluma. The two Public Workshops scheduled and organized by the City are detailed in Table 3-4.

**Table 3-4: Public Workshops**

Meeting Topic	Meeting Dates	Meeting Locations
1 <sup>st</sup> Public Workshop	October 8, 2019	Lucchesi Community Center
2 <sup>nd</sup> Public Workshop	April 30, 2020	Livestream Webinar Workshop

The first Public Workshop was held to solicit public and stakeholder input during draft development of the plan. Public outreach included an email distribution with a notice of the public meeting to the HMPC with direction to share with other associations, boards and committees and postings around the workplace. The meeting notice was also posted on the City of Petaluma LHMP Webpage. The City of Petaluma Public Works and Utilities Department project manager also interviewed with the local newspaper to spread the word about the LHMP and the first public workshop. Ten people attended the public workshop. Sign-in sheets and other workshop materials are included in Appendix A.

There were several clarification comments during a presentation on the need to update the existing LHMP regarding coordination with Sonoma County and how the plan relates to emergency preparedness. One participant asked for information about the existing plan prepared by ABAG, why it expired, and inquired on the timing for the new or updated plan. Another participant indicated there were several man-made hazards in the City, such as gas pipelines that need to be addressed in the updated LHMP. A third attendee asked about fire prevention activities that may benefit the City but are located outside the city limits. Given the timing of the public workshop, all participants were also provided the opportunity to review the mitigation actions developed at the HMPC Meeting #3 that occurred during the afternoon. They were provided colored dot stickers and asked to place a green sticker on mitigation actions they think should be prioritized and a red sticker on mitigation actions they think should not be carried forward for further consideration. They were also provided different color sticky notes and asked to share a mitigation action related to the various action categories (e.g. flooding, earthquakes) displayed across the wall.





Where appropriate, stakeholder and public comments and recommendations were incorporated into the final plan, including the risk assessment and sections that address mitigation goals and strategies.

Comments submitted during the second public workshop and during public review will be summarized in this chapter. A summary of the meeting will also be shared with the HMPC and is included in Appendix A.

Prior to finalization of the plan a draft will be made available on the City's LHMP Webpage for a 30-day public comment period. The Public Review Draft LHMP update was circulated on April 15, 2020 through May 15, 2020. The City posted an electronic form with the plan on the City's LHMP Webpage to capture electronic comments (see Appendix A).

### **Online Survey**

During the planning process and drafting stage, two web-based public surveys were developed as tools to gather public input. The survey was for the public to provide feedback to the HMPC on topics related to hazard concerns and reducing hazard impacts. The survey provided an opportunity for public input during the planning process and prior to finalization of the plan. The survey gathered public feedback on concerns about wildfires, floods, earthquakes, climate change, and other hazards and solicited input on strategies to reduce their impacts. The first survey was released as an online tool on October 22, 2019 and closed on May 15, 2019 (6-month comment period). The HMPC provided links to the public survey by distributing it using social media, email, posting the link on the City's LHMP Webpage, and making it available on tablets at informational booths. As of May 15, 2020, 30 responses were received on the first survey. This information was shared with the HMPC to inform the process.

The survey included a total of 18 questions. There was a short section of questions on demographics, specifically on whether participants were residents of the City or the unincorporated portion of Sonoma County. These questions also inquired about homeownership, insurance, and commute patterns. The next section included questions on ranking hazard significance. The results generally track with the significance levels noted in Chapter 4 of this plan, with earthquake, flooding, wildfires, and climate change being considered the most significant. Drought, sea level rise, and high wind events also ranked highly in significance based on the public input. The last section of the survey focused on questions related to mitigation actions that the City should consider in the plan. The results indicated that public education/awareness, planning/zoning, critical facilities protection, stormwater drainage improvements, indoor/outdoor warning systems, and wildland fuels treatment projects were popular topics to the public. These results were shared with the HMPC and considered during the planning process.

The second public survey was developed to gather public input specific to the Public Review Draft LHMP. This second public survey was posted on the City's LHMP Webpage on April 15, 2020. It included a total of five questions designed to solicit input and provide an electronic comment form and format for the public to submit comments on the Draft LHMP. Two responses were received on the second survey. This information was also shared with the HMPC to inform the process.

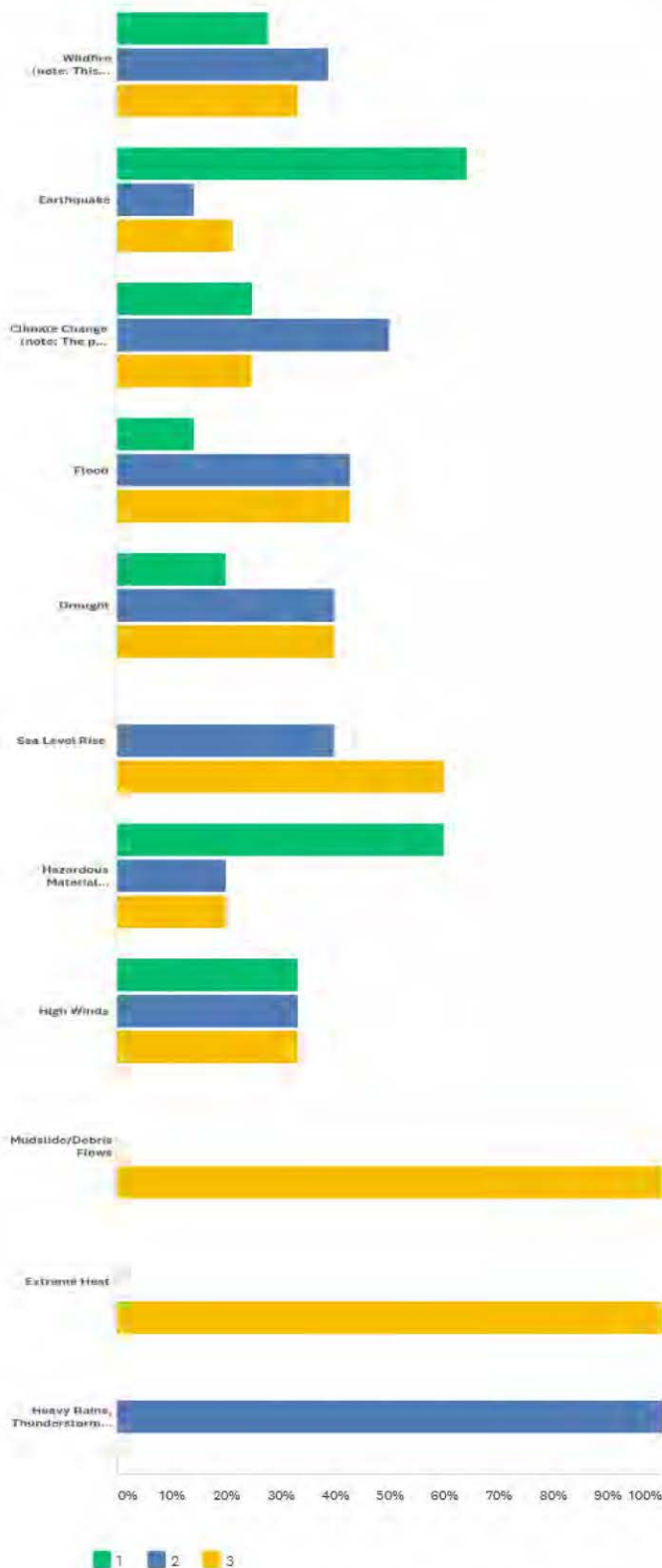
Figure 3- shows an example of one of the public survey responses from the survey. The full results of the survey are included in Appendix A.





**Figure 3-7: Example of Public Survey Response**

Q7 The hazards addressed in the Hazard Mitigation Plan are listed below. Please choose the top 3 hazards of most concern to you. Number 1 represents highest concern.



### Social Media

The City of Petaluma used the following social media platforms to circulate information on the LHMP:

- City Facebook (6,000+ followers);
- City Twitter (2,500+ followers); and
- City Nextdoor (1,500+ followers).

The three social media platforms announced the kick-off of the LHMP planning process, advertised the City's LHMP Webpage and other events, included a link to the online survey, notified the public about meetings and workshops, and announced the availability of the plan for public input and comment. Figure 3- and Figure 3-9 are examples of a news feed from two social media platforms: the City's Facebook and Nextdoor social media pages that advertise the first public workshop. 3-10 and Figure 3-11 advertise the availability of the Draft LHMP.

**Figure 3-8: Example of Social Media Announcement on City's Facebook Page**



Figure 3-9: Notice of Public Workshop on City's Nextdoor Page

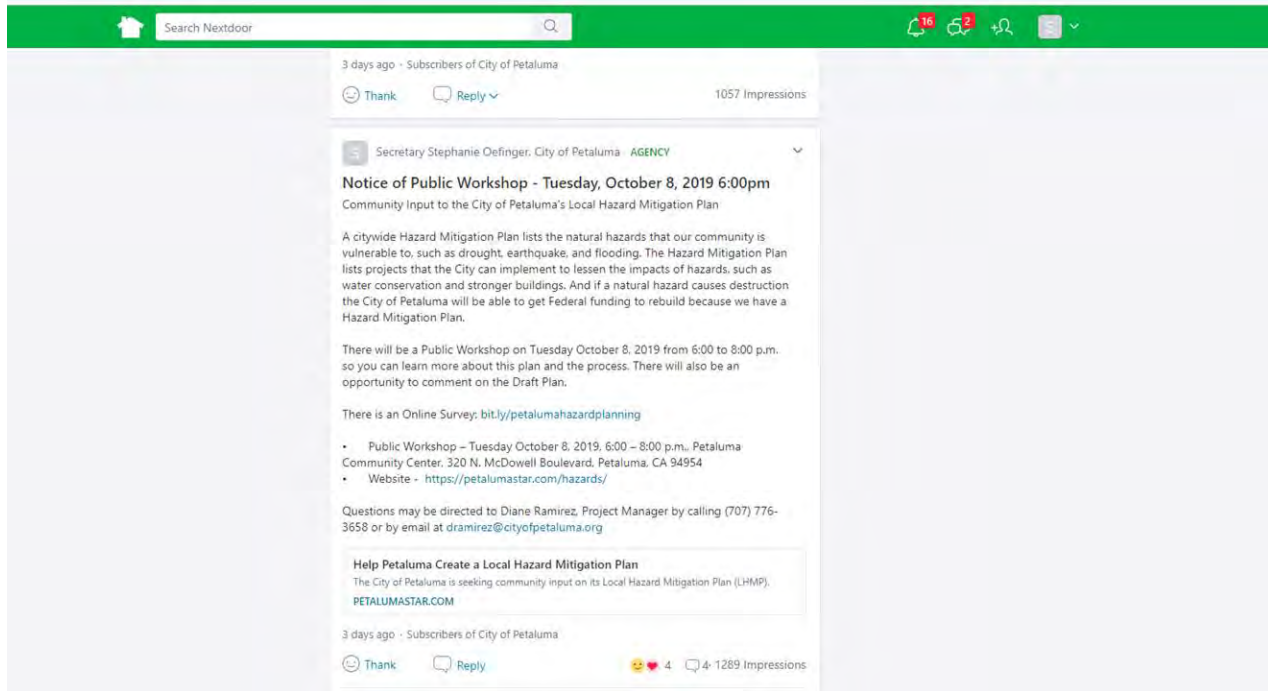
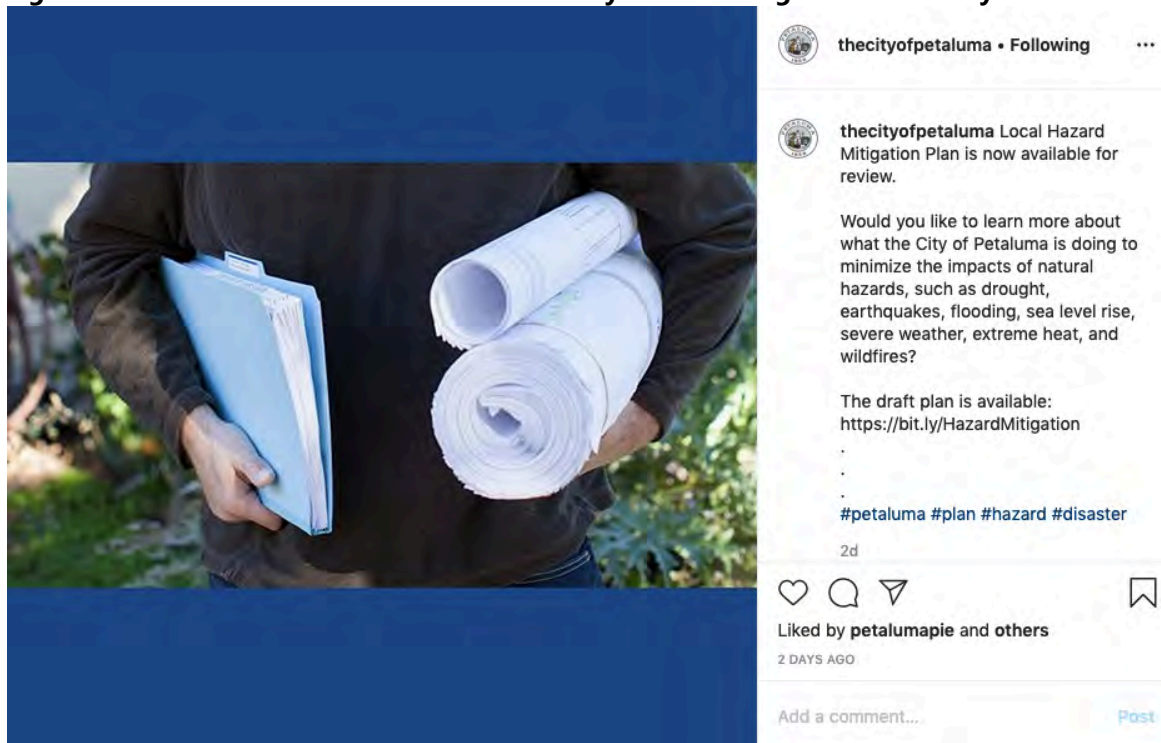


Figure 3-10: Social Media Announcement on City's Twitter Page on Availability of Draft LHMP



**Figure 3-11: Notice of Availability of Draft LHMP on City’s Facebook Page**



### ***Newspapers***

The following regional and local print newspapers were used to circulate and advertise information on the LHMP, specifically the announcement of the public workshop:

- Petaluma Star News
- Petaluma-Argus Courier
- Sonoma County Gazette
- Sonoma Index-Tribune
- Sonoma West Times & News; and
- Press Democrat.

Figure 3- and Figure 3-13 are examples of a press release published in the Petaluma-Argus Courier on the first and second public workshops.



Figure 3-12: 1<sup>st</sup> Public Workshop Notice in the Petaluma-Argus Courier

<p><b>PUBLIC NOTICE</b></p> <p><b>CITY OF PETALUMA</b> 1859</p> <p>City of Petaluma Notice of Administrative Action Minor Site Plan and Architectural Review Minor Planned Unit District (PUD) Modification Old Elm Village 339 West Payson Street ADWD#: 005-05-046, SD-053 File No.: PLR-10-009</p> <p>What: An application for Administrative Site Plan and Architectural Review (SPAR) has been submitted by Charles Pick of East Architecture and Consulting, on behalf of the property owners, Burbank Housing Development, to construct a new, gateway entry main structure with signage and to make facade alterations to existing buildings at 339 West Payson Street, located in the Old Elm Village Planned Unit Development (PUD). Specifically, the proposed gateway will bridge over the existing vehicular entry between the existing buildings facing West Payson Street. Additionally, improvements to the existing building facades will occur at the commercial level, with new energy efficient storefronts and awnings, below the existing transoms windows. The proposal does not include any changes to the existing building size or scale, or propose a change to the existing uses or residential units.</p> <p>The project also requires a minor modification to the Old Elm Village PUD to allow an entry cause because the existing PUD guidelines do not address signs of this type of structure. The Project is exempt from the California Environmental Quality Act (CEQA) as a Class 1 (Existing Facilities) and Class 2 (New Small Structures) categorical exemption (153203d).</p> <p>Comments: Please send comments in the Planning Division City of Petaluma, 11 English Street, Petaluma, California 94952. You may also hand deliver comments prior to the decision date referenced below or email comments to <a href="mailto:tblord@cityofpetaluma.org">tblord@cityofpetaluma.org</a>.</p> <p>When: On or after October 14, 2019 the Planning Manager will consider all comments and decide whether to approve, conditionally approve, or deny the project.</p> <p>For More Information: Contact Britany Bendis, Deputy Planning Manager Planner, at 707 778-4514 or <a href="mailto:tblord@cityofpetaluma.org">tblord@cityofpetaluma.org</a>. You may also come to the Planning Division to review the application. The office is open Monday through Thursday from 8:00 a.m. to 5:00 p.m. City Hall is closed on Fridays.</p> <p>Appeal: The applicant, or any other interested party, may appeal any part of the administrative decision to the Planning Commission. Such appeal must be filed in writing with the City Clerk no later than fourteen (14) days following the date of the decision. The appeal shall state specifically the grounds for the appeal and the relief sought by the applicant. Said appeal shall be accompanied by the appeal fee as specified by Resolution 2019-020 N.C.S. as adopted by the City Council.</p> <p>20266 - Pub Oct 3, 2019 1H</p>	<p><b>PUBLIC NOTICE</b></p> <p>against the real property only. Date: Quality Loan Service Corporation 2763 Camino Del Rio South San Diego, CA 92108 619-444-7711 For NDN SALE information only. Sale Lines 916-699-0723 Or Login to <a href="https://www.qualityloan.com">https://www.qualityloan.com</a>. Refinancing Lines: 888-945-7711 Ext 2919 Quality Loan Service Corp. TS No: CA-14-619423-4P IDSP#D 40158711 5/20/2019</p> <p>17350 - Pub Sept 28, Oct 3, 10, 2019 3H</p> <p><b>NOTICE OF PUBLIC WORKSHOP FOR THE PREPARATION OF THE CITY OF PETALUMA'S LOCAL HAZARD MITIGATION PLAN</b></p> <p>The City of Petaluma has launched a planning effort to assess risks from natural and human-caused hazards and to identify ways to reduce those risks. The planning process will result in the preparation of the City's Local Hazard Mitigation Plan (LHMP). The preparation of a LHMP is required under the Federal Disaster Mitigation Act of 2000 to be eligible to receive federal disaster assistance and funding.</p> <p>Most people who live and work in the City of Petaluma are vulnerable to a wide range of natural hazards, including drought, earthquakes, extreme heat, flooding, severe weather, sea level rise, and wildfires. The community may be exposed to potential human-caused hazards associated with facilities and infrastructure that contain hazardous materials. The City is also vulnerable to cyber threats. The LHMP will provide the City with valuable tools to identify risks and mitigate hazards through future project-specific actions. The LHMP will assess the effects of climate change on natural hazards assessed in the plan and will incorporate climate adaptation strategies. The plan will also support the City's participation in the National Flood Insurance Program and includes recommendations to improve the City's Floodplain Management Plan policies and regulations.</p> <p>The City will be hosting a Public Workshop on Tuesday October 9, 2019 from 9:00 to 4:00 p.m. The Public Workshop will be an opportunity to learn more about the planning process and the natural and human-caused hazards that will be assessed in the LHMP. Following the Public Workshop, there will be an opportunity for the public to comment on the Draft LHMP, which is anticipated to be available for public review by early 2020. The community is encouraged to participate in the planning process and provide feedback by attending the Public Workshop, completing an Online Survey, visiting the City's webpage, and commenting on the Draft LHMP (links available). Information on how to participate is provided below:</p> <ul style="list-style-type: none"> <li>Public Workshop - Tuesday, October 9, 2019, 9:00 - 4:00 p.m., Petaluma Community Center, 322 N. McDowell Boulevard, Petaluma, CA 94954</li> <li>Online Public Survey - available here: <a href="https://www.woddclic.surveymonkey.com/PetalumaHMP">https://www.woddclic.surveymonkey.com/PetalumaHMP</a></li> </ul> <p>Additional information on the planning process and documents prepared to date can be found on the City's LHMP Website: <a href="http://www.cityofpetaluma.net/government/planning/projects.html">http://www.cityofpetaluma.net/government/planning/projects.html</a>. Questions may be directed to Diana Ramirez, Project Manager by calling 707 778-3636 or by email at <a href="mailto:dramirez@cityofpetaluma.org">dramirez@cityofpetaluma.org</a>.</p> <p>1947 - Pub Oct 3, 2019 1H</p>	<p><b>PUBLIC NOTICE</b></p> <p>Dated 8/11/2019 JENNIFER V. DOLLARD Judge of the Superior Court 17189 - Pub. Sept 19, 26, Oct 3, 10, 2019</p> <p><b>ORDER TO SHOW CAUSE FOR CHANGE OF NAME</b> SUPERIOR COURT OF CALIFORNIA FOR THE COUNTY OF SONOMA 3026 Cleveland Ave. Santa Rosa, CA 95403 Case No. SPR 003666</p> <p>Petitioner: MARK LAWRENCE ASMUSSEN for change of name. TO ALL INTERESTED PERSONS notice: MARK LAWRENCE ASMUSSEN filed a petition with this court for a decree changing name as follows: LAWRENCE MARK ASMUSSEN to MARK LAWRENCE ASMUSSEN.</p> <p>THE COURT ORDERS that all persons interested in this matter appear before this court at the hearing indicated below to show cause, if any, why the petition for change of name should not be granted. Any person objecting to the name change described above must file a written objection that includes the reasons for the objection at least two court days before the matter is scheduled to be heard and must appear at the hearing to show cause. Any petition should not be granted, no written objection is filed, and the court may grant the petition without a hearing.</p> <p>NOTICE OF HEARING 12/12/2019 at 2:30 p.m. in Dept. 16, located at 3055 Cleveland Ave. Santa Rosa, CA 95403. A copy of this Order to Show Cause will be published at least once each week for four successive weeks prior to the date set for hearing on the petition. In the following newspaper of general circulation, printed in the county of Yuba, California: JENNIFER V. DOLLARD Judge of the Superior Court 20618 - Pub. Oct. 3, 10, 17, 24, 2019</p> <p><b>FICTITIOUS BUSINESS NAME STATEMENT</b> FILE NO. 2019-02773 The following person (persons) is (are) doing business as: ROHRETT PARK PHARMACY located at 1500 STATE FARM DR. SUITE 200 ROHRETT PARK, CA 94929; Mailing Address 1170 N. MCDOWELL, PETALUMA, CA 94954 Sonoma County, is hereby registered by the following owner(s): PETALUMA HEALTH CENTER, INC., 1173 N. MCDOWELL, PETALUMA, CA 94954 This business is conducted by: A CA Corporation. The registrant commenced to transact business under the fictitious name or name above on N/A. I declare that all information in this statement is true and correct. Signed: PEDRO TOLEDO, CAO/CEO</p>
<p><b>NOTICE OF TRUSTEE'S SALE</b></p> <p>TS No. CA-18-19423-4P Order No.: 19-0034802-02 YOU ARE IN DEFAULT UNDER A DEED OF TRUST DATED 11/27/2006, UNLESS YOU TAKE ACTION TO PROTECT YOUR PROPERTY, IT MAY BE SOLD AT A PUBLIC SALE. IF YOU NEED AN EXPLANATION OF THE NATURE OF THE PROCEEDING AGAINST YOU, YOU SHOULD CONTACT A LAWYER. A public auction, set to the highest bidder for cash, cashier's check drawn on a state or national bank, check drawn by state or federal credit union, or a check drawn by a state or federal savings and loan association, or savings association, or savings bank specified in Section 5102 to the Financial Code and authorized to do business in this state, will be held by duly appointed trustee. The sale will be made, but without severance or warranty, expressed or implied, regarding title, possession, or encumbrances, to pay the remaining principal sum of the notes secured by the Deed of Trust, with interest and late charges thereon, as provided in the notes), advances, under the terms of the Deed of Trust, interest thereon, fees, charges and expenses of the Trustee for the total amount (at the time of the initial publication of the Notice of Sale) reasonably estimated to be paid by the borrower. The amount may be greater on the day of sale.</p>	<p><b>BID NUMBER 15-000</b></p> <p>The City of Petaluma is accepting bids for the purchase the following:</p> <p><b>Six (6) Utility Service Trucks</b></p> <p>Inquiries regarding specifications should be directed to: Mike Melmorin, Assistant Operations Manager City of Petaluma Department of Public Works and Utilities Phone: 707.778.4496 E-mail: <a href="mailto:melmorin@cityofpetaluma.org">melmorin@cityofpetaluma.org</a></p> <p>Sealed bids will be accepted until Wednesday, October 23, 2019 at 3:00 p.m. in the City Clerk's Office. Bids received after this time and date will be rejected. Petaluma bids will not be accepted as proof of receipt.</p> <p>Bidders shall mail or hand-deliver bid packages to the City Clerk's Office, City of Petaluma, 11 English Street, Petaluma, CA 94952</p> <p>Claire Cooper City Clerk 19710 - Pub Oct 3, 2019 1H</p> <p><b>FICTITIOUS BUSINESS NAME STATEMENT</b> FILE NO. 2019-02535 The following person (persons) is (are) doing business as: I hereby certify that this copy is a correct copy of the original statement or file in my office. DEVA MARIE PROTO Sonoma County Clerk By /s/ Carol Lisk</p>	<p><b>BUSINESS NAME STATEMENT</b> FILE NO. 2018-03192 The following person (persons) is (are) doing business as: KTO CONSULTING SERVICES located at 1378 Barlas Lane, Petaluma, CALIF 94952; Mailing Address P.O. Box 1141, Novato, CA 94948 Sonoma County, is hereby registered by the following owner(s): Kristine Anne Tank-Crocketto, 1278 Barlas Lane, Petaluma, CAL 94952 This business is conducted by: An Individual. The registrant commenced to transact business under the fictitious name or name above on SEPTEMBER 1, 2019. I declare that all information in this statement is true and correct. Signed: Kristine Tank-Crocketto, Owner This statement was filed with the County Clerk of SONOMA COUNTY on 08/14/2019. I hereby certify that this copy is a correct copy of the original statement on file in my office. DEVA MARIE PROTO Sonoma County Clerk By /s/ Amanda King Deputy Clerk 9070 - Pub. Oct. 3, 10, 17, 24, 2019</p> <p><b>SONOMA COUNTY HISTORY</b></p> <p><b>In 1865</b> J.G. Wickersham &amp; Co. of Petaluma operated as a "private bank." Biggest lower Russian River mill started in Guerneville by J.W. Bagley, George Guerne, Tom Heald and W.H. Willets. Mill closed in 1901. Rosenberg &amp; Bush Department Store founded in Healdsburg by Wella Rosenberg.</p> <p>Copyright © 2010 Sonoma County Historical Society P.O. Box 1373, Santa Rosa, CA 95402 <a href="http://www.sonomacountyhistory.org">www.sonomacountyhistory.org</a></p> <p>To place</p>



Figure 3-13: 2<sup>nd</sup> Public Workshop Notice in the Petaluma-Argus Courier

relay. When she looked to lane five and saw Ference struggling to hold DeSalvo's head above water, the alarm bells went off. "I immediately said, 'It's his set and this kid's heart should be thumping pretty loud.' Nothing. "I think, 'Is that it?' No, that's me. That's my blood pressure has the AED," he said. "Things are in motion; it's not just us trying to get Morgan back." It should be noted that it was Okhubo, early in her tenure taking hold in Sonoma County. McCormick had to be cleared to enter the hospital. By the time she reached DeSalvo, he was alert, talking and, best yet, smiling. thing. It's written in the scar on this chest and it sounds in the beating of his heart. "Everything they did, they did perfectly," he said.

**PUBLIC NOTICE**

**INVITATION TO BID**

The City of Petaluma is seeking bids for the Petaluma Blvd South Water Main Replacement C67401918. Inquiries regarding specifications should be directed to:

Dan Herrera  
City of Petaluma  
Department of Public Works and Utilities  
11 English Street  
Petaluma, CA 94954  
Phone: 707.778.4589  
dherrera@cityofpetaluma.org

Site of Work: Various sections of Petaluma Boulevard South from 'D' Street to Mountain View Avenue, Petaluma, California, 94952.

**Description of Work:** The project will replace an existing 4-inch cast iron pipe along Petaluma Boulevard South with an 8-inch C900 pipe to meet current standards. In addition to the water main installation, the project will include installing new water services, new fire service laterals, and fire hydrants.

**Contract Documents:** The contract documents are entitled "Petaluma Blvd South Water Main Replacement C67401918." If you would like to receive the bid documents via our website at no cost, go to: <http://cityofpetaluma.net/subworks/bidding-opportunities.html> and fill out the Plan Holder's Form. Fill in all fields and click "submit" at the end of the form. Submitting the Plan Holder's form online automatically places you on our Bidder's List and you will be notified of any addendums or information pertaining to the bid by email.

If you would like purchase contract documents, they may be obtained between 8:00 a.m. and 4:00 p.m., Monday through Thursday, at the City of Petaluma Office of Public Works and Utilities, 202 North McDowell Boulevard, Petaluma, CA 94954, phone number 707.778.4585, Attention: Public Works & Utilities Secretary, upon payment of \$25.00 (non-refundable) for each set of contract documents (including technical specifications and accompanying reduced scale drawings). The scale of the reduced drawings is about one-half of the original scale. At the bidder's request and expense, the contract documents may be sent by overnight mail. If full-scale drawings are desired, they may be purchased at reproduction cost from Digitech, 1340 Commerce Street, Suite K, Petaluma, CA 94954, 707.769.0410.

**Pre-Bid Conference/Bids:** None are planned.

**Bid Submittal:** Sealed bids will be accepted until 2:00 p.m., Wednesday, May 13, 2020 in the City Clerk's Office, City Hall, 11 English Street, Petaluma, CA 94952 or P.O. Box 81, Petaluma, CA 94953. Bids received after this time and date will be rejected. Postmarks will not be accepted as proof of receipt. Bidders shall mail or hand-deliver bid packages to:

City Clerk  
City of Petaluma  
11 English Street  
Petaluma, CA 94952

Clairo Cooper, City Clerk  
April 16, 2020  
April 23, 2020  
April 30, 2020  
48540 - Pub Apr 16, 23, 30, 2020 3H.

**PUBLIC NOTICE**

**Public Notice Advertisement FOR IMMEDIATE RELEASE**

April 9, 2020

Contact: Diane Ramirez,  
City of Petaluma Project Manager (707) 776-3659

**CITY OF PETALUMA LOCAL HAZARD MITIGATION PLAN AVAILABLE FOR PUBLIC REVIEW AND COMMENT**

Would you like to learn more about what the City of Petaluma is doing to minimize the impacts of natural hazards, such as drought, earthquakes, flooding, sea level rise, severe weather, extreme heat, and wildfires. Would you also like to learn how the City will minimize impacts of human-caused hazards, such as hazardous material incidents? A Public Review Draft of the City's Local Hazard Mitigation Plan (LHMP) is now available for public review and comment.

The LHMP assesses risk posed by natural and human-caused hazards, identifies ways to reduce those risks, and allows the City and participating jurisdictions, such as Sonoma County to be eligible for mitigation grant funding from the Federal Emergency Management Agency (FEMA). The LHMP also supports the City's participation in the National Flood Insurance Program and Community Rating System and includes recommendations to improve the City's Floodplain Management Plan policies and regulations. A Hazard Mitigation Planning Committee (HMPC) that included participating stakeholders from various regional and local agencies, jurisdictions, and organizations developed the LHMP over the past nine months with assistance from a consultant. The City is now soliciting public comments on the plan before it is finalized and submitted to the California Office of Emergency Services (Cal OES) and FEMA for review and approval.

The community is encouraged to participate in the planning process and provide feedback by visiting the City's webpage and commenting on the Public Review Draft LHMP. The plan can be accessed at the following website: <https://cityofpetaluma.org/capital-improvements-program/>. An electronic comment form is available on the webpage for online submittal.

The public comment period will be for 30 days from Wednesday April 15, 2020, through Friday May 15, 2020. The City will also be hosting the 2nd Public Workshop within the next month as a live webinar; details on the webinar will be available soon: <https://cityofpetaluma.org/capital-improvements-program/>.

Questions may be directed to Diane Ramirez, Project Manager by email at [dramirez@cityofpetaluma.org](mailto:dramirez@cityofpetaluma.org).  
49544 - Pub Apr 16, 2020 1H.

**PUBLIC NOTICE**

**FICTITIOUS BUSINESS NAME STATEMENT FILE NO. 2020-01024**

The following person (persons) is (are) doing business as:  
YOUNGSTOWN MOBILE HOME PARK located at 911 N. MCDOWELL BOULEVARD PETALUMA, CA 94954. Mailing Address 16 TREETOP WAY KENTFIELD, CA 94904 Sonoma County, is hereby registered by the following owner(s): PRINCETON PACIFIC ESTATES LLC 16 TREETOP WAY KENTFIELD, CA 94904

This business is conducted by: A CA Limited Liability Company

The registrant commenced to transact business under the fictitious name or names above on December 20, 2019.

I declare that all information in this statement is true and correct. Signed: MICHAEL YOUNG, MANAGER

This statement was filed with the County Clerk of SONOMA COUNTY on 03/25/2020

I hereby certify that this copy is a correct copy of the original statement on file in my office.  
DEVA MARIE PROTO  
Sonoma County Clerk  
By /s/ Norma Gonzalez  
Deputy Clerk  
SEAL  
48286 - Pub. Apr 2, 9, 16, 23, 2020 4H.

**SONOMA COUNTY HISTORY**

In 1792 Englishman George Vancouver surveyed Bodega Bay.

Copyright © 2010 Sonoma County Historical Society  
P.O. Box 1373, Santa Rosa, CA 95402  
[www.sonomacountyhistory.org](http://www.sonomacountyhistory.org)

To place a Legal/Public Notice, Please call Stefanie Puckett at: 707-526-8508

**NOTICE OF ASSESSMENT CALIFORNIA STATEWIDE COMMUNITIES DEVELOPMENT AUTHORITY**

**ASSESSMENT DISTRICT NO. 20-01 (NORTHBANK AT RIVERBANK) CITY OF PETALUMA, COUNTY OF SONOMA STATE OF CALIFORNIA**

On April 2, 2020, special assessments for the financing of public improvement districts in the California Statewide Communities Development Authority (the "Authority") Assessment District No. 20-01 (Northbank at Riverbank) City of Petaluma, County of Sonoma (the "District"), were recorded in the office of the Superintendent of Streets of the Authority. The property owners within the District have waived their entitlement to pay all or any portion of the assessments levied upon their property in cash within thirty days after the recording of the assessments in the office of the County Recorder of the County of Sonoma. These assessments affect only certain property the names of which are listed in the Authority's

**FICTITIOUS BUSINESS NAME STATEMENT FILE NO. 2020-01093**

The following person (persons) is (are) doing business as:  
OIANA DESIGN located at 338 FIERLEY LANE, SEBASTOPOL, CA 95472 Sonoma County, is hereby registered by the following owner(s): CINDY UMEKOTO 338 FIERLEY LANE SEBASTOPOL, CA 95472

This business is conducted by: An Individual

The registrant commenced to transact business under the fictitious name or names above on N/A.

I declare that all information in this statement is true and correct. Signed: CINDY UMEKOTO, OWNER

This statement was filed with the

**FICTITIOUS BUSINESS NAME STATEMENT FILE NO. 2020-01016**

The following person (persons) is (are) doing business as:  
SKY TYRANNOSAUR located at 128 GRAYLAWN AVE UNIT C PETALUMA, CA 94952 Sonoma County, is hereby registered by the following owner(s): MUR L FRIELAND 128 GRAYLAWN AVE UNIT C PETALUMA, CA 94952

This business is conducted by: An Individual

The registrant commenced to transact business under the fictitious name or names above on 1/1/2016.

I declare that all information in this statement is true and correct. Signed: MUR FRIELAND

This statement was filed with the

**FICTITIOUS BUSINESS NAME STATEMENT FILE NO. 2020-00706**

The following person (persons) is (are) doing business as:  
SAE CONSULTING located at 317 FIRST ST #107 PETALUMA, CA 94952; Mailing address 235 LIBERTY ST PETALUMA, CA 94952 Sonoma County, is hereby registered by the following owner(s): SAE CONSULTING 317 FIRST ST #107 PETALUMA, CA 94952

This business is conducted by: A CA Corporation

The registrant commenced to transact business under the fictitious name or names above on N/A.

I declare that all information in this statement is true and correct. Signed: SHONDRA EAMES, PRESIDENT

This statement was filed with the County Clerk of SONOMA COUNTY on 02/26/2020

I hereby certify that this copy is a correct copy of the original statement on file in my office.  
DEVA MARIE PROTO  
Sonoma County Clerk  
By /s/ Amanda King  
Deputy Clerk  
SEAL  
47812 - Pub. Mar 26, Apr 2, 9, 16, 2020 4H.

**FICTITIOUS BUSINESS NAME STATEMENT FILE NO. 2020-00672**

The following person (persons) is (are) doing business as:  
MUR FRIELAND

This statement was filed with the

### Press Releases

The City was encouraged to distribute and circulate press releases over the course of the LHMP development. The City's project manager and Wood staff also encouraged HMPC participants and stakeholders to distribute press releases during the project. Press releases were distributed as informational flyers, advertisements, posters, and public notices handed out during community events. These communication platforms were used to spread the news about the LHMP and invite the public to participate in the process.

Advertisements and press releases announced the kick-off of the LHMP planning process, advertised the City's LHMP Webpage and other events, included links to the public survey, notified the public about meetings and workshops, and announced the availability of the plan for public input and comment. Press releases were distributed to multiple print news agencies.

Figure 3- and Figure 3- are examples of a press releases and newspaper articles used to announce the public workshop in October 2019 and to notify the public about the LHMP update.

Figure 3-14: Press Release Newspaper Article published prior to the 1<sup>st</sup> Public Workshop



Figure 3-3: Newspaper Article published prior to 1<sup>st</sup> Public Workshop

PETALUMA ARGUS-COURIER • THURSDAY, OCTOBER 3, 2019

# Petaluma prepares for emergency

## On fire anniversary, city agencies drill for disaster with federal funding at stake

**By YOUSEF BAIG**  
ARGUS-COURIER STAFF

Petaluma officials have been addressing disaster readiness in earnest in recent weeks, starting the process for a new federal hazard plan that will help fortify the city in the future, while also undergoing annual operations training to prepare for a major crisis.

As the two-year anniversary of the North Bay fires approaches, officials are creating a local hazard mitigation plan that would assess what aspects of the city are susceptible to a broad range of natural disasters, like an earthquake or wildfire, or human-caused events like a cyberattack, and then identify ways to reduce those risks.

Once it's adopted, Petaluma would ostensibly become more competitive for grant funds to address those vulnerabilities. The city would also be eligible for the highest tier of federal assistance if an emergency occurred, said Diane Ramirez, project manager for the Public Works and Utilities Department.

She pointed to vital undertakings like the Denman Reach flood control projects that have used more than \$40 million in outside funding to strengthen one of Petaluma's most susceptible natural hazards.

"It's to get the city prepared in case something happens, and what can we do in advance that would mitigate anything that happens in the city," Ramirez said. "More preparation makes us more resilient and able to rebound more quickly."

Petaluma's previous hazard mitigation plan was adopted seven years ago as part of a regional consortium with the Association of Bay Area

Governments.

The rules for the plans have changed, though, and now federal regulators are calling for one in every jurisdiction, Ramirez said.

The scope of hazards officials believe the city is vulnerable to are broad, including drought, earthquakes, extreme heat, flooding, sea level rise and wildfires, according to a press release. Infrastructure contamination and cyber threats were also listed. So was climate change and its impact on natural hazards.

City officials are hosting a workshop at the Petaluma Community Center next week to get feedback on what hazards residents are seeing, and provide more information on the process for adopting the plan.

"We have a lot of base knowledge, but we want to hear from our community what they hear is important," Ramirez said. "There's some prioritization in terms of where we might put funding and projects first based on how the community responds to our preparation."

After the workshop, officials will create a draft that the public can comment on. It then has to get approved by FEMA and eventually the city council before it's adopted.

Ramirez anticipates it'll be in place by spring 2020, and would be subject to future amendments should the science or technology change, she said.

While the hazard plan would serve as a guiding document to reinforce the Petaluma's weaknesses in the future, city employees have to be ready for the worst right now.

Department heads and some of the senior-most public officials across the entire agency met for a mandatory, two-hour

training session last week at the Petaluma Police Department headquarters, the site of the city's emergency operations center in a disaster.

Petaluma's EOC was triggered in October 2017 when the city became a refuge for fire victims and a staging ground for the response efforts throughout Sonoma County.

With several new officials like City Manager Peggy Flynn and Director of Human Resources Charlie Castillo onboard, the city shuffled roles and drilled into the minutia of what was learned in the fire's aftermath.

Departments are sorted into sections like management, logistics, intelligence and operations with responsibilities doled out to ensure public safety and continuity of government, said Petaluma Assistant Fire Chief Jeff Schach.

City officials went over details like what sort of communication is possible with ham radios, record-keeping for federal reimbursement and the

nuances of volunteer activation. They later broke into groups to meet with their sections and go over their chain of command and what the new roles are when an EOC is activated.

"This is my favorite day of the year," Schach said. "When you raise your right hand" to serve as a government employee, "that's what comes with the territory."

Nancy Sands, Economic Development Specialist, described the collaboration across the city's divisions as an effective measure to help ensure every element of service is addressed.

"They are all connected in that they all affect the city's infrastructure," she said. "What I see as a city employee is that we're all working together cross-departmentally, and that's really helpful in making sure that nobody misses anything."

(Contact News Editor Yousef Baig at yousef.baig@arguscourier.com or 776-8461, and on Twitter @YousefBaig.)

CRISY PASCUAL / ARGUS-COURIER STAFF

**City officials, police and fire departments came together for disaster preparedness training.**

**MORE INFORMATION**

**What:** Public workshop for the preparation of Petaluma's Local Hazard Mitigation Plan

**When:** Tuesday, Oct. 8 from 6-8 p.m.

**Where:** Petaluma Community Center, 320 N. McDowell Blvd.

**More information:** visit [petalumastar.com/hazards](http://petalumastar.com/hazards). Residents who cannot attend the workshop are encouraged to participate in the online survey at [bit.ly/petalumahazardplanning](http://bit.ly/petalumahazardplanning)





### **Public Review and Comments on the Draft LHMP**

The City circulated the Public Review Draft LHMP for 30 days; it was posted on the City's LHMP Webpage and circulated from April 15, 2020 through May 15, 2020. The City solicited public input on the Draft LHMP by collecting and reviewing comments received during the public review period. Comments submitted during public review are summarized in this chapter and incorporated in the revised version of the Draft LHMP submitted to Cal OES and FEMA Region IX. A detailed comment-response matrix addressing the public comments is included in Appendix A. This matrix also summarizes how the Draft LHMP was revised based on public comments.

### **Planning Step 3: Coordinate with Other Departments and Agencies**

Early in the planning process, the HMPC determined that data collection, mitigation strategy development, and plan approval would be greatly enhanced by inviting state and federal agencies and organizations to participate in the process. Based on their involvement in hazard mitigation planning, their landowner status in the County, and/or their interest as a neighboring jurisdiction, representatives from the following agencies were invited to participate on the HMPC:

- U.S. Geological Survey Pacific and Coastal Marine Center
- Sonoma County Department of Emergency Management
- City of Sebastopol
- CAL FIRE
- Petaluma Health Care District
- Sonoma County Water Agency
- Petaluma Community Access
- Petaluma People Services
- Petaluma Visitor's Center
- Petaluma Chamber of Commerce
- City of Petaluma Climate Action Commission

Wood in coordination with the City and the HMPC also used technical data, reports, and studies from the following agencies and groups:

- American Red Cross
- California Department of Finance
- California Department of Fish and Game
- California Department of Forestry and Fire Protection (Cal Fire)
- California Department of Parks and Recreation Office of Historic Preservation
- California Department of Public Health
- California Department of Water Resources
- California Emergency Management Agency
- California Geological Survey
- Sonoma County Department of Health Services Environmental Health and Safety Division
- U.S. Army Corps of Engineers
- U.S. Center for Disease Protection
- U.S. Bureau of Land Management
- U.S. Bureau of Reclamation
- U.S. Fish and Wildlife Service
- U.S. Forestry Service
- U.S. Geological Survey
- U.S. Census Bureau
- Federal Emergency Management Agency
- National Weather Service
- National Oceanic and Atmospheric Administration, National Climatic Data Center
- National Resource Conservation Service





Several opportunities were provided for the above groups to participate in the planning process. At the beginning of the planning process, invitations were extended to the first group to actively participate on the HMPC and as a stakeholder representative to support the DMA planning process and to maximize credits under the NFIP CRS program. Specific participants from these groups are detailed in Appendix C.

The Sonoma County Department of Emergency Management staff worked closely with the City of Petaluma and HMPC. The City also provided various opportunities for Sonoma County and other neighboring communities, such as the City of Sebastopol to participate in the City of Petaluma LHMP development. Others assisted in the process by providing data directly as requested in the Data Collection Guide or through data contained on their websites or as maintained by their offices. These groups were also invited to participate through the public outreach process, which included public workshops as previously described. Further as part of the HMPC and public outreach processes, all groups were invited to review and comment on the plan during public review and prior to submittal to Cal OES and FEMA.

**Other Community Planning Efforts and Hazard Mitigation Activities**

Coordination with other community planning efforts is paramount to the success of this plan. Hazard mitigation planning involves identifying existing policies, tools, and actions that will reduce a community's risk and vulnerability to hazards. The City of Petaluma uses a variety of comprehensive planning mechanisms, such as general plans and ordinances, to guide growth and development. Integrating existing planning efforts and mitigation policies and action strategies into this plan establishes a credible and comprehensive plan that ties into and supports other community programs. The development of this plan incorporated information from the following existing plans, studies, reports, and initiatives listed in Table 3-5. Other related planning efforts were inventoried in the capability assessment in Chapter 2.

**Table 3-5: Incorporated Planning Mechanisms**

City of Petaluma Plans	How Plan is Incorporated in LHMP
FY 2019-2020; FY 2020-2021 City of Petaluma Goals and Priorities Strategic Plan	<ul style="list-style-type: none"> <li>• The City of Petaluma Goals and Priorities for 2019 through 2021 outline objectives and workplan items that ensure the City operates efficiently and sustainably and provides valued services promptly and professionally engages the community.</li> <li>• The goals and priorities include objectives and workplan items related to environmental stewardship, river and open space protection, and the encouragement of sustainable development.</li> <li>• There are numerous goals and priorities outlined as objectives and workplan items related to enhanced public safety, emergency preparedness, and resiliency in a section titled, "A Safe Community that Thrives."</li> <li>• Other workplan items that support hazard mitigation include maintaining current staffing levels and response times, evaluating city facilities for replacement, creating an EOC, assisting the community with special needs, improving public safety and fire prevention activities, promoting emergency preparedness and resiliency strategies, and promoting improved community engagement and multilingual outreach.</li> </ul>
City of Petaluma General Plan 2025 (2008)	<ul style="list-style-type: none"> <li>• Incorporated relevant hazard information from the Safety Element into the LHMP.</li> <li>• Reviewed the Community Facilities, Services and Education Element goals and objectives in HMPC Meeting #2 and integrated them into the LHMP</li> <li>• Reviewed the Water Resources Element goals and objectives in HMPC Meeting #2 and integrated them into the LHMP.</li> <li>• Reviewed the Health and Safety Element goals and objectives in HMPC Meeting #2 and integrated them into the LHMP.</li> </ul>





City of Petaluma Plans	How Plan is Incorporated in LHMP
	<ul style="list-style-type: none"> <li>• Reviewed the 5-year planning mechanisms for the General Plan to determine if plan updates occurred, when, how often, and whether the next update can integrate the LHMP into the Safety Element.</li> <li>• Discussed whether a General Plan Advisory Group (or GPAC) could participate and provide a consistency review with the City's General Plan Health and Safety Element (and other elements covering water resources and fire prevention).</li> <li>• Assembly Bill 2140 requires the adoption of LHMPs into the General Plan Safety Element after LHMP Approval; this topic was discussed during each HMPC meeting.</li> <li>• The LHMP emphasizes need to ensure General Plan is amended to include the LHMP after it is approved by City Council; this information is included in the chapter on the adoption process.</li> </ul>
NFIP Participation (1980)	<ul style="list-style-type: none"> <li>• The City of Petaluma has participated in the NFIP since 19780 by administering floodplain management regulations; the current effective map date is October 12, 2015.</li> <li>• The LHMP integrates information in the risk assessment on the most recent Flood Insurance Study (FIS) completed for Sonoma County on March 7, 2017.</li> <li>• Reviewed DFIRMS and base flood elevation (BFE) data for critical facilities and properties identified within the flood hazard zones.</li> <li>• Reviewed NFIP and CRS related audits of the City's floodplain management efforts over two decades; the City has a Class 6 rating in the CRS.</li> <li>• The City plans to maintain an electronic record of the base flood elevations (BFE) certificates for properties within the Special Flood Hazard Area (SFHA); this information was summarized in the risk assessment and taken into consideration during the development of the mitigation strategy.</li> </ul>
Community Rating System (1991)	<ul style="list-style-type: none"> <li>• This City has participated in the CRS program since 1991 as a way to reduce potential losses due to flooding.</li> <li>• As of July 10, 2019, there were approximately 415 flood insurance policies in effect in the City.</li> <li>• The LHMP discusses several potential opportunities to improve the City's class rating in the Capability Assessment.</li> <li>• The LHMP specifically discusses activities of credit the City could consider to reach a Class 5 rating, including outreach, floodplain management planning, and drainage system maintenance.</li> </ul>
Floodplain Management Plan (2015)	<ul style="list-style-type: none"> <li>• The LHMP summarizes the Floodplain Management Plan (FMP) in detail in the Risk Assessment (Chapter 4) and the Capabilities Assessment (Chapter 2).</li> <li>• The HMPC reviewed the goals and strategies from the 2015 FMP and cross-referenced them during the development of the LHMP goals and objectives.</li> <li>• The HMPC and City re-reviewed these goals again during the development of the mitigation actions, as several actions in the LHMP came from the FMP, as they related to flood control projects (i.e. floodwall) and climate adaptation strategies.</li> <li>• The HMPC provided updates on specific strategies from the FMP, as these were referenced as goals and strategies in the City of Petaluma 2010 Annex to the ABAG plan, and updates were required as part of the DMA planning process.</li> </ul>





City of Petaluma Plans	How Plan is Incorporated in LHMP
City of Petaluma Residential Growth Management System Ordinance (1972)	<ul style="list-style-type: none"> <li>• City's RGMS ordinance is summarized in the Community Profile in Chapter 2 and as it relates to growth and development trends in the City's Planning Area</li> <li>• The City's RGMS is also summarized in the City's Capability Assessment in Chapter 2 as a tool to ensure new development integrates appropriate site specific measures to reduce natural hazards</li> <li>• The LHMP also discussed the UGB as a tool to manage growth and development.</li> <li>• The discussion on growth management in the LHMP illustrates that most major commercial and residential development projects in the City are within the city limits.</li> </ul>
City of Petaluma Urban Water Management Plan (2015)	<ul style="list-style-type: none"> <li>• The UWMP evaluates the required potable and recycled water system facilities required to serve the buildout of the City's General Plan.</li> <li>• Integrates availability and reliability information on the City's existing and future water supplies into the LHMP.</li> <li>• Cross references goals and projects outlined in the UWMP, specifically those related to new groundwater water facilities as similar mitigation actions were prioritized by the HMPC</li> <li>• Incorporates information on a shift in water demand from mostly surface water supplies to groundwater supplies</li> <li>• Integrates water conservation principles and strategies developed in the plan related to the City's capital improvement program and plans for potable and recycled water system facilities.</li> </ul>
City of Petaluma Storm Water Management Plan (2003)	<ul style="list-style-type: none"> <li>• Describes actions that address the reduction of nutrients, pathogens, and sediment in the City's stormwater.</li> <li>• The LHMP addressed this plan broadly, as it relates to flood hazards.</li> </ul>
City of Petaluma Emergency Operations Plan (2007)	<ul style="list-style-type: none"> <li>• The EOP is a basic plan that addresses the City of Petaluma's responsibilities in emergencies associated with natural disaster, human-caused emergencies, and technological incidents. It also provides a framework for coordination of recovery efforts within the City.</li> <li>• The EOP was discussed at most HMPC meetings given it was last updated in 2007 and needs to address current hazard issues in the City, especially because the Emergency Operation Center (EOC) has been activated several times over the past few years due to wildfires and planned public safety shutoffs (PSPS).</li> </ul>
Sustainability Action Plan (2015)	<ul style="list-style-type: none"> <li>• HMPC discussed the Regional Climate Protection Authority (RCPA) during meetings as it relates to climate change priorities and sea level rise.</li> <li>• The Sustainability Action Plan summarizes goals to reduce municipal greenhouse gas (GHG) emissions, reduce solid waste diversion in the City, provide 780 million gallons of recycled water by 2025, convert waste to energy at the Wastewater Treatment Facility, and install LED streetlights among many other goals.</li> <li>• Discussions regarding the City's Sustainability Action Plan at the HMPC meetings were general, the consultant team reviewed the broad goals and various action measures outlined in the plan to ensure any measures related to the LHMP mitigation actions were cross-referenced</li> </ul>
Climate Emergency Resolution (2019)	<ul style="list-style-type: none"> <li>• In May 2019 the City joined over 500 jurisdictions worldwide and declared a climate emergency by passing a Climate Emergency Resolution.</li> <li>• The resolution demonstrated that sustainability was a top priority for the City of Petaluma, as it faces a growing population, aging infrastructure, and climate change impacts.</li> </ul>





City of Petaluma Plans	How Plan is Incorporated in LHMP
Climate Action Commission (2019 – 2022)	<ul style="list-style-type: none"> <li>The City Council appointed a seven-person Climate Action Commission (CAC) for a four-year term on September 5, 2019. The CAC is responsible for the development of a Climate Emergency Plan (now referred to as a Climate Action and Adaptation Plan [CAAP]) and establish ad-hoc committees to address climate mitigation, sequestration, and adaptation initiatives, engagement plan, and climate justice and equity goals and principles.</li> <li>The City provided the CAC the Draft LHMP and requested input and direction on the risk assessment and mitigation strategy. They provided comments on the LHMP that were focused on social equity, outreach, the risk assessment, and climate adaptation strategies.</li> </ul>
<b>Other Plans</b>	
Petaluma Municipal Services Review (2011)	<ul style="list-style-type: none"> <li>The City of Petaluma’s 2011 Municipal Services Review (MSR) identifies the future needs for the extension of infrastructure and the provision of services from the City to new development within the planning horizon.</li> <li>Wood reviewed this plan to ensure facility and infrastructure needs were integrated into the LHMP; the plan provides information on the City’s facilities and infrastructure and staff could compare facility lists to understand what is include in the LHMP and what facility was not included and why</li> <li>Based on findings from the City’s MSR, it is structured to meet the needs of the development that is proposed within the SOI and UGB.</li> <li>The LHMP notes that the City’s ability to serve the anticipated growth within the UGB and the SOI is not anticipated to have any adverse effects on the City, as there are several mechanisms in place to effectively expand facilities and services.</li> </ul>
Sonoma County Operational Area Hazard Mitigation Plan (2016)	<ul style="list-style-type: none"> <li>Hazard profile information from the 2016 Sonoma County Operational Area HMP was incorporated throughout the LHMP, where appropriate; this included information on flooding, landslides, and earthquake hazards.</li> <li>HMPC reviewed the Sonoma County Operational Area HMP goals during the development of the City of Petaluma LHMP goals and objectives.</li> <li>There are comparative tables on the hazards profiled in the state and county plan to those addressed in the Health and Safety Element of the City’s General Plan. This information was helpful for the HMPC to compare which hazards to address and which to prioritize.</li> <li>Sonoma County stakeholder from the Department of Emergency Management participated in the HMPC meetings and provided mitigation goals and action strategies to consider developing in the City’s LHMP.</li> <li>Sonoma County intends to update their plan in 2020; this provides the City with another opportunity to participate with hazard mitigation planning efforts in the region.</li> </ul>
California State Hazard Mitigation Plan (2018)	<ul style="list-style-type: none"> <li>Reviewed goals and objectives in the State Hazard Mitigation Plan (SHMP) and noted the new and revised hazards related to community resilience</li> <li>Reviewed the hazards profiled in the SHMP and compared those with the hazards summarized in the City’s 2011 Health and Safety Element and the 2016 Sonoma County Operational Area HMP.</li> <li>Integrated disaster declaration information and other key findings on major hazards from the SHMP into the City’s LHMP Update.</li> <li>Under 44 CFR Section 201.6, local hazard mitigation plans must be consistent with the state’s hazard mitigation plan. In updating this plan,</li> </ul>





City of Petaluma Plans	How Plan is Incorporated in LHMP
	<p>HMPC and consultant staff reviewed California’s SHMP to identify key relevant state plan elements.</p> <ul style="list-style-type: none"> <li>Climate change is expected to intensify existing hazards in the City. Consistent with the organization of the 2018 California SHMP, the City and HMPC integrated a discussion of climate change hazards and considerations throughout the hazard profiles in the Risk Assessment.</li> </ul>
<p>Petaluma Valley Groundwater Sustainability Agency Draft Groundwater Sustainability Plan (2020)</p>	<ul style="list-style-type: none"> <li>The 20-year Groundwater Sustainability Plan (GSP) ensures the sustainable use of groundwater within the Petaluma Valley Groundwater Basin.</li> <li>The plan establishes standard groundwater management tools.</li> <li>The plan also incorporates best available scientific and technical information by building on the technical foundation already established for the Petaluma Valley Basin.</li> <li>The plan integrates the interests of many users and uses of groundwater resources within the Petaluma Valley Basin through public and community engagement.</li> </ul>

Other documents were reviewed and considered, as appropriate, during the collection of data to support Planning Steps 4 and 5, which include the hazard identification, vulnerability assessment, and capability assessment. Appendix B References identifies additional documents and community planning efforts utilized in the development of this plan. Specific references relied on in the development of this plan are also sourced throughout the document as appropriate.

### 3.3.2 Phase 2: Assess Risks

#### Planning Steps 4 and 5: Identify the Hazards and Assess the Risks

Wood led the HMPC in a comprehensive research effort to identify and document all the hazards that have, or could, impact the City’s Planning Area. Data collection worksheets were developed and used in this effort to aid in determining hazards and vulnerabilities and where risk varies across the Planning Area. Geographic information systems (GIS) were used to display, analyze, and quantify hazards and vulnerabilities. The HMPC also conducted a capability assessment to review and document the Planning Area’s current capabilities to mitigate risk and vulnerability from hazards. By collecting information about existing government programs, policies, regulations, ordinances, and emergency plans, the HMPC could assess those activities and measures already in place that contribute to mitigating some of the risks and vulnerabilities identified. Using this information, Wood developed the risk assessment portion of the plan, which contained the hazard identification, the vulnerability assessment, and the capability assessment. Wood completed the risk assessment in October 2019 and the information was presented at the second HMPC meeting on October 7, 2019. A more detailed description of the risk assessment process and the results are included in Chapter 4 Risk Assessment. The risk assessment also included a vulnerability assessment on sea level rise and related flooding completed in November 2019.

### 3.3.3 Phase 3: Develop the Mitigation Plan

#### Planning Steps 6 and 7: Set Goals and Review Possible Activities

Wood facilitated brainstorming and discussion sessions with the HMPC on October 7, 2019, including a description of the purpose and process of developing planning goals, as well as discussion of a comprehensive range of mitigation alternatives, and a method of selecting and defending recommended mitigation actions using a series of selection criteria. Additional details of the process to develop goals





and actions is included in Chapter 5 Mitigation Strategy. Documentation on the process the HMPC used to develop the goals and strategy is in Appendix C.

**Planning Step 8: Draft an Action Plan**

Based on input from the HMPC during the October 8, 2019 and from subsequent review of the draft risk assessment and the goals and activities identified in Planning Steps 6 and 7, Wood produced a complete first draft of the plan. This complete draft was internally circulated for HMPC review and comment via email in January 2020. HMPC and agency comments were integrated into the second draft in February.

**Public Review Draft LHMP**

The Public Review Draft LHMP was advertised and distributed to collect public input and comments. The City circulated the Public Review Draft LHMP for 30 days from April 15, 2020 through May 15, 2020. During this time, Wood integrated comments and issues from the public and stakeholders, as appropriate, along with additional agency and other stakeholder internal review comments. During the public review period, the City received four comments from the public. Public comments are briefly summarized in Table 3-6. Detailed responses to public comments are included in Appendix A. This appendix also includes comments from the City’s CAC, which reviewed the Draft LHMP as a separate stakeholder group. The City’s CAC made comments regarding climate change impacts, climate adaptation, and social equity.

**Table 3-6: Summary of Comments Received during Public Review**

Comment	Response
Oral Comment #1 (Oral comment received during Public Workshop #2)	
<ul style="list-style-type: none"> <li>Commenter inquired about the process and schedule for finalizing the LHMP.</li> </ul>	<ul style="list-style-type: none"> <li>The City appreciates the inquiry about the public review process. The City and HMPC will review public comments after the close of the public review period on April 15, 2020 and update the Draft LHMP, if needed. Once updated, the City will submit the Draft LHMP to Cal OES for review. The State has 45 days to complete review. Once reviewed, Cal OES will forward the plan to FEMA Region IX for a 45-day review. City Council can consider the Draft LHMP for adoption once FEMA review is complete and they have approved the plan.</li> </ul>
Written Comment #1 (Emailed Letter dated May 7, 2020)	
<ul style="list-style-type: none"> <li>Commenter explained that the LHMP is strong in many areas, but fails to adequately respond to the imminent risk of climate change and flooding, sea level rise, and wildfire risk in the City. The letter contains recommendations for various sections in the LHMP where the City should emphasize the high hazard significance of flood, sea level rise, and wildfire risk hazards. The letter also suggests prioritizing several related mitigation actions that address flooding and wildfire hazards has “high” in the Mitigation Strategy and recommends a mitigation action related to the development of a climate action program.</li> </ul>	<ul style="list-style-type: none"> <li>The City appreciates the detailed comments on the Public Review Draft LHMP regarding flooding, climate change, and wildfire hazards. The Draft LHMP includes a discussion on climate change considerations in each hazard profile. The organization of this discussion aligns with the organization of the California State Hazard Mitigation Plan (SHMP), which discusses the effects of climate change within each hazard profile rather than a separate hazard profile.</li> <li>The City revised sections of the Draft LHMP, including Chapter 4 – Risk Assessment to clarify the hazard risks associated with climate change and flooding, and to emphasize that climate change will intensify these hazards. This City also revised the mitigation actions included in the Mitigation Strategy.</li> <li>The City’s recognizes the imminent threat of climate change and established a CAC to focus on developing plans and policies to address the issue. As part of the CAC’s workplan, they intend to prepare a CAAP in</li> </ul>





Comment	Response
	<p>coordination with the City. This plan will expand on the impacts of greenhouse gas (GHG) emissions and climate change, and will include climate adaptation strategies.</p> <ul style="list-style-type: none"> <li>The City is also in the process of initiating a comprehensive update to the General Plan 2025, which will include incorporate this LHMP and include a detailed update to the General Plan Public Health and Safety Element consistent with California Government Code Section 65302(g).</li> </ul>
Written Comment #2 (Electronic Comment Form dated May 11, 2020)	
<ul style="list-style-type: none"> <li>The commenter notes issues with prioritizing flood hazards as a medium priority, as flooding has been the biggest threat to the City based on historical flooding. The comment mentions development that has occurred in flood prone areas upstream of the Payran flood wall and states the City should incorporate higher regulatory standards for flood protection and prioritize the impacts of sea level rise and future flood hazards that would be more frequent due to climate change.</li> </ul>	<ul style="list-style-type: none"> <li>The City appreciates the comment regarding prioritizing the significance flood hazards and recognizes the long history of flooding in the Planning Area, specifically around the Payran neighborhood. The Draft LHMP includes a discussion on these flood hazards in Section 4.3.5 of Chapter – Risk Assessment and on the repetitive loss properties (and around the Payran neighborhood) (see subsection “Insurance Coverage and NFIP Claims and Losses for Repetitive Loss Properties”). The Draft LHMP also includes a discussion on the impacts of future development in flood hazards areas in the Vulnerability Assessment in Chapter 4.</li> <li>The City took these specific comments in to consideration and has revised the priority level of the mitigation actions included in Chapter 5 – Mitigation Strategy of the Draft LHMP. The City also revised the descriptions, alternatives, and timing of several of the mitigation actions.</li> </ul>
Written Comment #3 (Electronic Comment Form dated May 11, 2020)	
<ul style="list-style-type: none"> <li>The commenter refers the City to their May 7, 2020 comment letter. This letter is the first comment letter summarized in Table 3-6.</li> </ul>	<ul style="list-style-type: none"> <li>The City has reviewed the comments in the referenced May 7, 2020 comment letter. Please refer to the response to the May 7, 2020 comment letter in Table 3-6. This is the second letter summarized in this table.</li> </ul>

Wood produced a final draft LHMP in June 2020 for Cal OES and FEMA Region IX staff to review and approve, contingent upon final adoption by Petaluma City Council.

### 3.3.4 Phase 4: Implement the Plan and Monitor Progress

#### Planning Step 9: Adopt the Plan

In order to secure buy-in and officially implement the plan, the plan will be reviewed by the Planning Commission and adopted by the Petaluma City Council on the dates included in the corresponding resolution in Appendix D: Adoption Resolution.

#### Planning Step 10: Implement, Evaluate, and Revise the Plan

The true worth of any mitigation plan is in the effectiveness of its implementation. In the previous steps of the planning process the HMPC’s efforts have been directed at researching data, gathering information for the plan, and developing appropriate mitigation actions. Each recommended action includes key descriptors, such as a lead entity and possible funding sources, to help initiate implementation. An overall







implementation strategy for the City's LHMP is described in Chapter 7 Plan Implementation and Maintenance.

Finally, there are numerous organizations within the City of Petaluma's Planning Area whose goals and interests interface with hazard mitigation. Coordination with these other planning efforts, as addressed in Planning Step 3, is key to the ongoing success of this plan and mitigation in the City of Petaluma and is addressed further in Chapter 7. A plan update and maintenance schedule and a strategy for continued public involvement are also included in Chapter 7.





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## 4 Risk Assessment

*44 U.S. Code of Federal Regulations Requirement §201.6 Local Mitigation Plans (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.*

As defined by the Federal Emergency Management Agency (FEMA), risk is a combination of hazard, vulnerability, and exposure. “It is the impact that a hazard would have on people, services, facilities, and structures in a community and refers to the likelihood of a hazard event resulting in an adverse condition that causes injury or damage.”

The risk assessment process identifies and profiles relevant hazards and assesses the exposure of lives, property, and infrastructure to these hazards, as well as the vulnerabilities of a community. The process allows for a better understanding of a jurisdiction’s potential risk to hazards and provides a framework for developing and prioritizing mitigation actions to reduce risk from future hazard events.

This risk assessment followed the methodology described in the FEMA publication “Understanding Your Risks—Identifying Hazards and Estimating Losses” (FEMA 386-2, 2002), which breaks the assessment into a four-step process:

1. Identify hazards
2. Profile hazard events
3. Inventory assets
4. Estimate losses

In other words, this risk assessment evaluates potential loss from hazards by assessing the vulnerability of the City’s population; services; critical facilities; and buildings and infrastructure. Data collected through this process has been incorporated into the following sections of this chapter:

- **Section 4.1 Hazard Identification** profiles the natural hazards that threaten the City of Petaluma Planning Area (Planning Area) and describes why some hazards have been omitted from further consideration.
- **Section 4.2 Asset Summary** describes the methodology for determining vulnerability of the Planning Area to the identified hazards.
- **Section 4.3 Hazard Profiles and Risk Assessment** discusses the threat to the Planning Area and describes previous occurrences of hazard events and the likelihood of future occurrences. All the hazards identified in Section 4.1 are profiled and assessed individually in this section. Research and information from the City of Petaluma Hazard Mitigation Planning Committee (HMPC) is integrated into this section. This section also includes the identified vulnerability to each of the priority hazards, describing the impact that each hazard would have on the City. The vulnerability assessment quantifies (to the extent possible) using best available information, assets at risk to hazards and estimates potential losses.
- **Section 4.4 Human-Caused Hazards** identifies the hazards that threaten the Planning Area resulting from human actions.





- **Section 4.5 Hazards Summary** summarizes the results of the hazard identification and hazard profiles for the Planning Area based on the hazard identification data and input from the HMPC.

This risk assessment covers the entire geographical extent of the City of Petaluma, Urban Growth Boundary (UGB), and in some cases critical facilities within the City's water and wastewater service areas. This area is referred herein as the City's Planning Area. The HMPC agreed that the City's Planning Area for the Local Hazard Mitigation Plan (LHMP) should include the UGB.

This assessment qualitatively discusses critical facilities within the City's water and wastewater service areas to ensure that all the City's facilities are infrastructure are addressed in the risk assessment because some of these facilities were located outside the Planning Area. Given the location information of the City's water supply infrastructure is considered sensitive, this information was excluded from this assessment. Sensitive information included the City's water supply and distribution system (e.g. water pipelines, etc.). Instead the vulnerability of the potable water supply facilities is addressed more broadly and qualitatively compared to the level of detail considered for other facilities.

Additional information on the City's Planning Area as it pertains to this plan is provided in Chapter 2, Community Profile.

## 4.1 Hazard Identification: Natural and Human-Caused Hazards

*44 U.S. Code of Federal Regulations Requirement §201.6(c)(2)(i): [The risk assessment shall include a] description of the type...of all natural hazards that can affect the jurisdiction.*

The first step in developing a risk assessment is identifying the natural hazards. The HMPC conducted a hazard identification study to determine the hazards that threaten the Planning Area. The identification of human-caused hazards is summarized in Section 4.4.

### 4.1.1 Methodology and Results

Using existing natural hazards data and input gained through planning meetings, the HMPC agreed upon a list of natural and human-caused hazards that could affect the City of Petaluma. Hazards data was examined to identify and assess the significance of these hazards to the Planning Area. The sources of data included information from the California Office of Emergency Services (Cal OES), FEMA, the National Oceanic and Atmospheric Administration (NOAA), Sonoma County Office of Emergency Management, and other sources as referenced in this assessment. The assessment also relied on the City's 2010 LHMP "Taming Natural Disasters" plan prepared by the Association of Bay Area Governments (ABAG) (referred to as the City's 2010 LHMP Annex), relevant City planning documents, such as the City's General Plan 2025 Health and Safety Element and 2015 Floodplain Management Plan (FMP), and adopted hazard mitigation plans in the region.

Table 4-1 below provides a crosswalk of the hazards identified in the General Plan 2025, 2010 ABAG LHMP Annex, 2016 Sonoma County Operational Area Hazard Mitigation Plan, 2018 Sonoma County Water Agency LHMP, and 2018 California State Hazard Mitigation Plan (SHMP). Numerous hazards were identified in the state and county plan, including five natural hazards identified in the City's General Plan 2025 Community Facilities, Services, and Education Element; Water Resources Element, and Health and Safety Element. Natural hazards discussed in these elements included flooding, groundwater supply and drought, earthquake and other seismic-related hazards (e.g. surface rupture, ground shaking, ground failure, slope instability), wildfire, and noise issues. Human-caused hazards discussed in these elements





included the use, storage, and transport of hazardous materials. The crosswalk was used to develop a list of preliminary hazards for the HMPC to evaluate which were most relevant to the City’s Planning Area.

The significance of each hazard was measured in general terms and focused on key criteria such as frequency and resulting damage, which includes deaths, injuries, and property and economic damage. The natural and human-caused hazards evaluated as part of this plan include those that occurred in the past or have the potential to cause significant human and/or monetary losses in the future.

**Table 4-1: Crosswalk with Other Hazard Mitigation Plans**

Hazard	City of Petaluma General Plan 2025 (2011)	ABAG LHMP City of Petaluma Annex Plan (2010)	Sonoma County Operational Area HMP (2016)	Sonoma County Water Agency LHMP (2018)	California SHMP (2018)
<b>Natural, Human-Health, and Climate and Weather-Influenced Hazards</b>					
Agricultural and Silvicultural Pests and Diseases					√
Air Pollution	√				√
Aquatic Invasive Species					√
Avalanches					√
Dam Incidents		√		√	
Drought and Water Shortage	√			√	√
Climate Change			√	√	√
Earthquake and Geologic Hazards (liquefaction, subsidence, landslides)	√	√	√	√	√
Energy Shortage and Energy Resiliency					√
Epidemic/Pandemic/Vector-Borne Disease					√
Flood: 100-, 200-, 500-Year Events	√	√	√	√	√
Sea Level Rise				√	√
Severe Weather: Extreme Heat		√		√	√
Severe Weather: Heavy Rain/Thunderstorm/Lightning/Hail/Fog		√		√	√
Severe Weather: Wind		√		√	√
Tree Mortality					√
Tsunami				√	
Volcano					√
Wildfire	√	√	√		√
<b>Technological Hazards</b>					
Hazardous Materials Release	√				√
Oil Spills	√				√
Natural Gas Pipeline Hazards					√





Radiological Accidents					√
Transportation Accidents					√
<b>Threat and Disturbance Hazards</b>					
Terrorism				√	√
Cyber Threats				√	√
Civil Disorder					√

1. Hazards listed is based on the natural, technological, and human-caused hazards in the California SHMP.

In alphabetical order, the natural hazards identified and investigated for the City of Petaluma 2019 LHMP include:

- Dam Incidents
- Drought and Water Shortage
- Earthquake
  - Surface Rupture
  - Ground Shaking
  - Liquefaction
  - Subsidence
  - Landslides/Mudslides
- Flood: 100/500-Year Flood
- Sea Level Rise
- Severe Weather: Heavy Rain/Thunderstorm/Hail/Lightning
- Severe Weather: Extreme Heat
- Severe Weather: Wind
- Wildfire

The human-caused hazards identified and investigated for the City of Petaluma 2019 LHMP include:

- Hazardous Materials: Hazard Material Releases, Chemical Facilities, Gas Pipelines
- Cyber Threats: Malware, Ransomware

Based on discussions at the early planning meetings and preliminary analyses, the following natural and human-health hazards were eliminated from further consideration in this risk assessment because of a lack of past occurrences in the City of Petaluma at the time or based on minimal potential impacts. For example, natural, human-caused, and human-health hazards were prioritized well before the City was aware that human-health hazards, such as the COVID-19 pandemic became a local, domestic, and global health emergency. As a result, the City in close coordination with Sonoma County and state partners, has been working diligently on the COVID-19 pandemic since this plan was circulated for public review. These City and County resources, guidelines, and updates are available on the City's main website.

Certain hazards were also eliminated based on separate State and Sonoma County regulatory programs and planning documentation that thoroughly addresses the hazard profile.

- Agricultural Hazards
- Air Pollution





- Aquatic Invasive Species
- Avalanches
- Energy Shortage and Energy Resiliency (integrated in the Extreme Weather: Winds vulnerability assessment)
- Epidemic/Pandemic/Vector-Borne Disease
- Tree Mortality
- Tsunami
- Volcano

Petaluma is an urban city surrounded largely by rural land uses in the unincorporated portion of Sonoma County that consist of both agriculture and open space. According to the General Plan 2025 and Petaluma General Plan Update Draft Environmental Impact Report (EIR), as of 2005 there were approximately 77 acres of designated agricultural land within the UGB (City of Petaluma 2005). Most of the designated agricultural land outside the City's UGB is within the Sonoma County Agricultural Preservation and Open Space District (SCAPOS). Land within the SCAPOS is designated as greenbelt agriculture, priority greenbelt, priority riparian corridors, wetland priority areas, and priority recreation areas. While land uses include farms, dairies, livestock ranches, and vineyards, the greenbelt land uses function as a separation between urban areas and active farming areas, thereby minimizing agricultural hazards and nuisances in the City.

Air quality and emissions within the Bay Area are generated by a variety of sources, including stationary sources, such as fireplaces and heating systems to mobile sources, such as vehicles and truck traffic. The Bay Area Air Quality Management District (BAAQMD) is the regional agency with the authority to develop and enforce regulations for the control of air pollution throughout the Bay Area. The Clean Air Plan is the BAAQMD's triennial plan for reducing air pollutant emissions in the Bay Area. The Bay Area is considered in "attainment" for all of the national standards of carbon monoxide, nitrogen dioxide, sulfur dioxide, lead, and particulate matter, with the exception of ozone. Given there are federal, state, and local laws and regulations in place for controlling air pollution, in addition to air quality management plans administered by the California Air Resources Board and BAAQMD, air pollution hazards and programs are not addressed in this plan.

Aquatic invasive species are non-indigenous species transported to new environments through human activities. The introduction of non-indigenous species into Petaluma's marine, estuarine, and freshwater environment can cause economic, human health, and ecological impacts. Invasive aquatic plants, such as water hyacinth has clogged the waterways in the California Delta, and the Petaluma River has a high percentage of introduced aquatic species (CDFG 2009). Known past occurrences related to aquatic invasive species in the City were mostly identified at Port Sonoma along the Petaluma River, but outside the Planning Area (CDFG 2009). Algae, also known as cyanobacteria can be normally found in water environments such as Petaluma River. When high temperatures and increased nutrient levels in the water occur, algae and other invasive species can grow, and some algal blooms can produce toxins that can be harmful to humans and animals. This hazard is currently addressed by the Sonoma County Department of Health Services (DHS), Environmental Health and Safety Public Health Division. The Division regularly tests water bodies in the County for aquatic invasive species, and specifically algae blooms at various beach and river park locations throughout the County. Given County monitoring programs are in place, this hazard was not addressed in this plan.

Avalanches and volcano hazards were not addressed in this plan. The City does not receive snowfall to have avalanche hazards. According to the 2018 California SHMP, only ten volcanic eruptions have





occurred in California in the last 1,000 years and the likelihood of another eruption in the state is low (Cal OES 2018). Of the 20 volcanoes in the state, only a few are active and pose a threat (Cal OES 2018). Of these, the Clear Lake Volcano is the closest volcano to the City, and while it has been known for substantial geothermal activity, there are no past occurrences associated with the volcano. Given this volcanic field is approximately 80 miles to the north, volcano hazards were not addressed in this plan.

Energy shortage hazards can include energy disruptions related to electricity, renewable energy, natural gas, and gasoline and diesel fuels. Based on the energy types, electrical power outages, both planned and unscheduled disruptions can result in cascading hazards related to traffic, economic losses, other utility disruptions, and extreme heat and public health hazards. Climate change is also expected to bring more frequent and intense natural disasters, which could result in planned or unscheduled power outages or energy shortages. Given the PG&E's recent Public Safety Power Shutoff (PSPS) that began on October 9, 2019, energy shortage hazards are a major concern for the region and the City (City of Petaluma 2019c). Energy shortages are discussed as a secondary hazard impact and in the vulnerability assessment in the Severe Weather: Wind section of this chapter.

The City and the HMPC considered human-health hazards, such as epidemics, pandemics, and vector-borne disease hazards. Natural, human-caused, and human-health hazards were also prioritized well before the City was aware that human-health hazards, such as the COVID-19 pandemic would become a local, domestic, and global health emergency. These hazards are currently addressed by the Sonoma County Public Health Division Disease Control Unit, and the Safety Unit, Risk Management Division and therefore not addressed in this plan. Human-health concerns are also now addressed by the City's Emergency Operations Center.

Drought conditions can cause increased tree mortality associated with lack of moisture, pest infestations, and other drought-related issues. Tree mortality is discussed in more detail as a subsection of wildfire hazards and as a secondary hazard.

The City of Petaluma is situated approximately 15 miles upstream of the San Pablo Bay. Based on the U.S. Geological Survey (USGS) Tsunami Inundation Map for Emergency Planning (Cal EMSA, CGS, and USC 2009) the City Planning Area lies approximately three miles upstream from the northern extent of the tsunami inundation area along Twin House Ranch Road and the Petaluma River. Based on this information, tsunami and coastal erosion hazards were not further analyzed in this plan. Sea level rise is addressed in this chapter.

The City acknowledged natural gas pipeline hazards, oil spills, radiological incidents, as well as transportation accidents associated with these hazards. Gas pipeline hazards are addressed as a secondary hazard associated with earthquakes in the vulnerability assessment. Oil spill and radiological accidents were not further evaluated in this plan, as there are few oil pipelines or oil wells in the City, and few areas at risk to radiological accidents according to the HMPC. Other human-caused hazards, such as terrorism, and civil unrest or disturbances were considered and discussed during HMPC meetings, but because they are addressed in the Emergency Operations Plan (EOP), they were not discussed in detail in this plan.

The following technological and human-caused hazards were eliminated from further analysis in the City of Petaluma LHMP because they are either addressed as secondary impacts associated with other hazards (e.g. earthquakes) or because they are addressed in other City plan documents (e.g. General Plan 2025 Transportation Element):

- Natural Gas Pipeline Hazards
- Oil Spills
- Radiological Accidents







- Transportation Accidents
- Terrorism
- Civil Disorder

#### 4.1.2 Overall Hazard Significance Summary

Overall hazard significance was based on a combination of geographic extent, probability of future occurrences, and potential magnitude/severity. Climate change considerations are discussed qualitatively in each hazard profile, specifically on whether it is anticipated to have a low, medium, or high influence on future impacts. The individual ratings shown in Table 4- 2 are based on or interpolated from the analysis of the hazards in the sections that follow.

**Table 4- 2: City of Petaluma Hazard Significance Summary**

Hazard	Geographic Extent	Probability of Future Occurrences	Magnitude/Severity	Overall Significance
Dam Incident	Limited	Unlikely	Limited	Low
Drought	Extensive	Likely	Limited	Medium
Earthquake	Extensive	Likely	Catastrophic	High
Flood	Limited	Likely	Limited	Medium
Sea Level Rise	Limited	Occasional	Negligible	Low
Severe Weather: Extreme Heat	Extensive	Likely	Limited	Low
Severe Weather: Heavy Rain/Thunderstorms/Hail/Lighting	Extensive	Likely	Limited	Medium
Severe Weather: High Winds	Extensive	Likely	Limited	Medium
Wildfire	Significant	Occasional	Critical	Medium
Hazardous Material Releases	Significant	Likely	Limited	Medium
Cyber Threat	Extensive	Occasional	Critical	Low
<p><b><u>Geographic Extent</u></b>            Limited: Less than 10% of planning area            Significant: 10-50% of planning area            Extensive: 50-100% of planning area</p> <p><b><u>Probability of Future Occurrences</u></b>            Highly Likely: Near 100% chance of occurrence in next year or happens every year.            Likely: Between 10 and 100% chance of occurrence in next year, or a recurrence interval of 10 years or less.            Occasional: Between 1 and 10% chance of occurrence in the next year or has a recurrence interval of 11 to 100 years.            Unlikely: Less than 1% chance of occurrence in next 100 years or has a recurrence interval of greater than every 100 years.</p>		<p><b><u>Magnitude/Severity</u></b>            Catastrophic—More than 50 percent of property severely damaged; shutdown of facilities for more than 30 days; and/or multiple deaths            Critical—25-50 percent of property severely damaged; shutdown of facilities for at least two weeks; and/or injuries and/or illnesses result in permanent disability            Limited—10-25 percent of property severely damaged; shutdown of facilities for more than a week; and/or injuries/illnesses treatable do not result in permanent disability            Negligible—Less than 10 percent of property severely damaged, shutdown of facilities and services for less than 24 hours; and/or injuries/illnesses treatable with first aid</p> <p><b><u>Overall Significance</u></b>            Low: minimal potential impact            Medium: moderate potential impact            High: widespread potential impact</p>		





## FEMA’s Hazus 4.0 Loss Estimation Tool

Hazus Multi-Hazard Loss Estimation tool (Hazus-MH) is FEMA’s standardized method for modeling and estimating potential losses from earthquakes, floods, strong wind-caused events, and hurricanes. For the purposes of this plan, Hazus Version 4.0 was used with Geographic Information System (GIS) software to estimate economic and social impacts from the occurrence (or potential occurrence) of natural hazards (FEMA 2018a).

Hazus-MH provides tabular outputs as well as graphic and illustrative results of identified high-risk areas due to the profiled hazards of interest, with reports summarizing losses or damages from structures and critical facilities, populations affected or at risk, and debris generated from an event. Hazus 4.0 is a key component of the pre-disaster planning process and is used for mitigation and recovery, given its ability to estimate potential losses and damages on a city, county, and multi-regional context. For this LHMP, Hazus-MH was used to estimate effects from a probabilistic 2,500-year earthquake scenario as well as a USGS ShakeMap-based deterministic scenario, and the software is referenced in the dam incidents and flooding sections to point out methodologies applied to the vulnerability assessments as indicated in Hazus-MH loss calculation procedures (e.g. the FEMA flood depth damage functions per the Benefit Cost Analysis application) (FEMA 2018b). For more information on the earthquake scenarios processed with Hazus 4.0, refer to the Section 4.3.3 Earthquakes.

### 4.1.3 Disaster Declaration History

One method the HMPC used to identify hazards was researching past events that triggered federal and state emergency or disaster declarations in the Planning Area. Federal and state disaster declarations may be granted when the severity and magnitude of an event surpasses the ability of the local government to respond and recover. Disaster assistance is supplemental and sequential. When the local government’s capacity has been surpassed, a state disaster declaration may be issued, allowing for the provision of state assistance. Should the disaster be so severe that both the local and state governments’ capacities are exceeded, a federal presidential emergency or disaster declaration may be issued allowing for the provision of federal assistance to help disaster victims, business, and public agencies.

The federal government may issue a disaster declaration through FEMA, the U.S. Department of Agriculture (USDA), or the Small Business Administration (SBA). FEMA also issues emergency declarations which are more limited in scope and without the long-term federal recovery programs of major disaster declarations (Farm Service Agency 2018). The quantity and types of damage are the determining factors in the type of declaration issued. This section focuses on state and federal disaster and emergency declarations.

The City of Petaluma is among many communities in California that are susceptible to disaster. Details on federal and state disaster declarations were obtained by the HMPC, FEMA, and Cal OES and compiled in chronological order in Table 4-3.

**Table 4-3: City of Petaluma and Sonoma County State and Federal Disaster Declarations, 1950-2018**

Event/ Hazard	Year	Disaster #	Declaration Type
Heavy Rains and Flooding	1964	183	Major Disaster Declaration
Severe Storms and Flooding	1969	253	Major Disaster Declaration
Drought	1977	3023	Emergency Declaration
Flood	1982	651	Major Disaster Declaration
Coastal Storm	1983	677	Major Disaster Declaration
Flood	1986	758	Major Disaster Declaration





Event/ Hazard	Year	Disaster #	Declaration Type
Freeze	1991	894	Major Disaster Declaration
Flood	1993	979	Major Disaster Declaration
El Niño - Fishing Losses	1994	1038	Major Disaster Declaration
Severe Storm(s)	1995	1044	Major Disaster Declaration
Severe Storm(s)	1995	1046	Major Disaster Declaration
Cavedale Fire	1996	--	Local Emergency
Severe Storm(s)	1997	1155	Major Disaster Declaration
Severe Storm(s)	1998	1203	Major Disaster Declaration
Severe Storm(s)	1999	--	Local Emergency
Severe Storm(s)	2002	--	Local Emergency
Geysers Fire	2004	2554	Fire Management
Flood	2005	--	State and Federal Disaster Declaration
Severe Storm(s)	2006	1646	Major Disaster Declaration
SF Oil Spill	2007	--	Gubernatorial Declaration
H1N1 Influenza Pandemic	2009	--	Local Emergency
Great Tohoku Tsunami	2011	--	Gubernatorial Declaration
Drought	2014-2016	--	Gubernatorial Declaration
South Napa Earthquake	2014	4193	Major Disaster Declaration
Severe Storm(s)	2014	--	Local Emergency
Valley Fire	2015	4240	Major Disaster Declaration
Severe Storm(s)	2017	4301	Major Disaster Declaration
Flood	2017	4308	Major Disaster Declaration
Wildfires	2017	4344	Major Disaster Declaration

Source: 2018 California State Hazard Mitigation Plan, FEMA, 2016 Sonoma County Hazard Mitigation Plan

Most disaster declarations are issued on a county-wide basis. In some limited instances a city or area within a county is specifically designated. Sonoma County has received 29 declarations between 1964 and 2017, 18 of which received federal disaster declarations, 4 received a Gubernatorial Declaration, 6 were local emergency declarations and 1 for fire management assistance. Of the 29 disaster declarations, 12 were associated with severe storms and heavy rain (also includes the 1 coastal storm event), 5 associated with flooding, and 4 declarations related to wildfires; freeze, earthquake and pandemic all received 1 declaration. The County also received 1 declaration related to fishing losses, 1 related to the Cosco Busan oil spill in San Francisco Bay, and 1 related to the 2011 Japan Tsunami.

Since 2012, there have been 13 drought declarations issued by the Secretary of Agriculture for Sonoma County, 8 of which were “Fast Track Secretarial Disaster” designations; refer to Section 4.3.2 on drought hazards for more details on previous occurrences of drought events. According to the Secretary of Agriculture, a Fast Track designation is for a severe drought and provides an automatic designation when any portion of the county meets the severe drought intensity value for eight consecutive weeks during the growing season.

This combined federal and state disaster history suggests that Sonoma County (and the City of Petaluma) experiences a major event worthy of a disaster declaration every 1.8 years. The County has a 55 percent chance of receiving a disaster declaration in any given year. Further, a review of these events helps the City identify risk reduction targets and ways to improve their capabilities to avoid large-scale hazard events in the future.





#### 4.1.4 Climate Change Considerations Summary

Climate change is an increasingly important factor now affecting all phases of the disaster management cycle. The City of Petaluma and Sonoma County acknowledge that climate change is occurring and began to plan for it when the City Council declared a climate emergency in May 2019 and drafted the Climate Emergency Resolution. The City's focus on addressing climate policy was further underscored by the establishment of a Climate Action Commission (CAC) in October 2019. The Commission is an appointed seven-member body designated to address the City's impact on climate change, develop climate policies, and make recommendations to the Council.

Sonoma County initiated climate change efforts in 2009 by the establishment of a Regional Climate Protection Authority (RCPA). The RCPA was formed through locally sponsored state legislation to coordinate countywide climate protection efforts among Sonoma County's nine cities and multiple county agencies. The RCPA focuses on efficient buildings, clean energy, alternative transportation, and conservation and adaptation. In 2014, the RCPA prepared a climate hazard and vulnerability assessment, known as *Climate Ready Sonoma County: Climate Hazards and Vulnerabilities*. In 2016, the RCPA prepared Sonoma County's *Regional Climate Action Plan: Climate Action 2020 and Beyond* (referred to as the County's CAP). Although not formally adopted by the County, climate change projections summarized in the CAP are based on the Basin Characterization Model (BCM) prepared by scientists from the USGS and the University of California, Davis Center for Environment. The projections were developed by applying scaled-down models that identify watershed-level climate change impacts specific to Sonoma County; the projections represent the best available climate data for the County (RCPA 2016). The BCM projections and recent studies indicate that climate change could affect Sonoma County (and the City of Petaluma) in the following ways:

- **Higher Average Temperature and More Extreme Heat Events:** For scenarios with mitigated emissions, summer high temperatures are expected to rise by 1 to 2°F; scenarios with unmitigated emissions project average summer high temperatures will increase by up to 9 to 11°F by 2100.
- **More Frequent and Intense Droughts:** Three of the four climate scenarios examined indicate a rising climate water deficit (CWD), a numeric measure of drought stress, over this century, producing 10 to 20 percent drier soil conditions in the summer months. The greatest increases in soil dryness are projected to occur in the south and southeastern portions of the County (including Petaluma).
- **More Frequent and Intense Wildfire:** Wildfire risk will continue to rise due to increased dryness of vegetation compounded by the productivity of plants in the spring. By the end of the century, the chances of one or more fires during a 30-year period are projected to increase from 15 to 20 percent to 25 to 33 percent in the mountainous areas of the County.
- **Fewer Winter Nights that Freeze.** Projected winter low temperatures are expected to rise in the future. For scenarios with mitigated emissions, winter low temperatures are expected to rise by 1 to 2°F. In the two scenarios with unmitigated emissions, average winter low temperatures are projected to increase by up to 7 to 9°F by 2100.

#### What is Climate Change?

Climate change refers to distinct changes in weather conditions that result from increased atmospheric greenhouse gas (GHG) emissions. Monthly mean GHG levels now exceed 400 parts per million (ppm) for the first time in recorded history. This GHG increase has trapped heat in the atmosphere and is linked to an increase in average global temperature and these global temperature and GHG increases are resulting in a series of changes to the global climate. These changes include shifts in seasonal temperature patterns; altered precipitation timing, amount, and location; sea level rise due to melting glaciers and ice caps; ocean acidification due to increased carbon dioxide (CO<sub>2</sub>) absorption; and altered wind and storm event frequency and severity, including more frequent and intense storms, droughts, and heat waves. Climate change is not a discrete event, but a long-term hazard that already affects communities in California.

Sources: NOAA 2017; IPCC 2018; SHMP 2018





- **Increased Risk of Extreme Floods:** Climate scenarios project increased seasonal variability of precipitation, runoff, and stream flows for Sonoma County, along with increased likelihood of “extreme” precipitation and drought events. There may be more years with more frequent storm events and occasional events that are much stronger than historical ones and the length of season over which storm events occur is predicted to increase.
- **More Frequent Coastal Flooding, Increased Erosion, and Saltwater Intrusion:** Sea levels are projected to rise between 16.5 and 65.8 inches by 2100. Rising sea levels combined with increased storm surge will lead to more frequent inundation of the low-lying areas, and flooding of homes, infrastructure, agricultural land, and natural areas on the shores of San Pablo Bay. The greatest impacts are anticipated during winter storms.

The important consideration for hazard mitigation is that climate change is exacerbating the hazards which are already identified and profiled in this plan. For example, it can be expected that coastal storm and wave surge and coastal flooding and erosion along the Petaluma River will become more of a threat as sea level rises. The City and California are also already experiencing the impacts of climate change including prolonged drought, increased flooding, increased average temperatures, shifts in the water cycle, and changes to precipitation patterns and the intensity of extreme events resulting from hazards, such as wildfires. Climate change not only results in progressive changes, such as shifting weather patterns, but also affects the frequency and severity of hazard events (SHMP 2018). Climate change also results in an increase in the variance of climate patterns and this increased variance creates challenges for hazards planning, which previously used historic recurrence rates to predict future events, and now must incorporate changes to the frequency, severity, and location due to climate change.

Risk assessment for hazards is built upon the frequency of past events and the assumption that historic occurrence rates are a good predictor of future event probability. With climate change; however, history is not an adequate predictor of the probability of future occurrences (SHMP 2018). Planning for climate change (and understanding the probability of future occurrences [see Section 4.3 below]) is therefore now based on understanding and integrating evolving climate change science and modeled projections that account for shifts in historic conditions due to climate change (SHMP 2018) into hazard mitigation planning.

Additional specifics associated with the hazards are discussed in the Climate Change Considerations subsection of each hazard profile. This section also summarizes whether climate change is anticipated to have a low, medium, or high influence on future hazards.

## 4.2 Asset Summary

As a starting point for analyzing the Planning Area’s vulnerability to identified hazards, the HMPC used a variety of data, including data provided by Sonoma County (e.g. structure values, assessor data) to define a baseline against which all disaster impacts could be compared. If a catastrophic disaster were to occur in the Planning Area, this section describes significant assets exposed or at risk in the Planning Area. Data used in this baseline assessment included:

- Total assets at risk;
- Critical facility inventory;





- Cultural, historical, and natural resources; and
- Population statistics, land use, and growth/development trends.

## Total Assets at Risk

A spatial parcel dataset containing attributes such as structure values and year of property construction was provided by the City of Petaluma GIS Department, alongside a building outline layer useful in counting buildings per parcel. Property type, valuation details, and other information contained in this plan are based on data from the Sonoma County Assessor’s Office. This data provided the baseline for an inventory of the total exposure of developed properties within the City of Petaluma. This data helps to ensure that the LHMP can be updated over time to reflect changes in development. It is important to note that depending on the nature and type of hazard event or disaster, it is generally the value of the infrastructure or improvements to the parcels that are of concern or at risk. Generally, the land itself is not a total loss, but may result in a reduction in value. Thus, the parcel analysis excludes land value.

Once the dataset was reviewed and organized, the parcel layer was clipped to the boundaries of the City of Petaluma UGB. For the purpose of parcel analysis and exposure calculations only parcels with improved values were used, except for exempt or government properties (which may not include an improvement value per its categorization and is one limitation that results in the total improvement values underestimating the actual value). “Improved” parcels have an improvement value greater than zero. Contents values were also estimated, as a percentage of building value based on their property type, using FEMA/Hazus guidelines. Content value estimates are based on 100 percent of the structure value for commercial and agriculture structures, 150 percent of the structure value for industrial structures, and finally 50 percent for residential structures. Improvement values were added to contents values to calculate the total structure values for all properties in the parcel layer. The parcel layer, originally in the form of polygons, was then converted into points based on the center (or centroid) of a parcel to then used in overlay analysis with those hazards profiled in this plan that are available in spatial format (i.e. flood and fire). These outputs summarize the count and value of improved properties, contents, and total values for the property inventory, and the exposure values by property type for the City of Petaluma.

Table 4-4 summarizes the total improved parcel exposure by parcel type for the City of Petaluma.

**Table 4-4: City of Petaluma Total Improved Parcel Exposure by Parcel Type**

Parcel Type	Total Parcels	Improved Value	Content Value	Total Value
Agricultural	2	\$12,473	\$12,473	\$24,946
Commercial	1,029	\$1,268,444,699	\$1,268,444,699	\$2,536,889,398
Multi-Family	295	\$525,362,102	\$262,681,051	\$788,043,153
Residential	17,569	\$4,368,066,096	\$2,184,033,048	\$6,552,099,144
TOTAL	18,895	\$6,161,885,370	\$3,715,171,271	\$9,877,056,641

Source: Wood analysis based on City of Petaluma and Sonoma County Assessor’s Office Data 2019

## Critical and City Facility Inventory

A critical facility is defined (within the context of this plan) as a facility that is essential in providing utilities or support either during the response to an emergency or during a recovery operation. The following four categories were used to differentiate critical assets and facilities in Petaluma based on FEMA’s Hazus-MH program and other FEMA guidelines:





- **Emergency Services** – Facilities or centers aimed at providing for the health and welfare of the whole population (e.g., hospitals, police, fire stations, emergency operations centers, evacuation shelters, schools).
- **Lifeline Utility Systems** – Facilities and structures such as potable water, wastewater, oil, natural gas, electric power and communications systems.
- **Transportation Systems** – These may include railways, highways, waterways, airways and city streets to enable effective movement of services, goods and people. Particular examples for Petaluma include airports, historic drawbridges, and train or other transportation stations.
- **High Potential Loss Facilities** – These include nuclear power plants, dams, and levees.

The City of Petaluma also provided key facilities that it deems essential. Table 4-5 lists both critical facilities obtained from the Homeland Infrastructure Foundation-Level Data (HIFLD 2018), a federal dataset, as well as the City-provided structure data. Table 4-5 shows the City’s critical facilities.

**Table 4-5: Critical and City Facility Summary by Category and Type**

Overall Category	Critical Facility Type	Total Critical Facilities
Emergency Services	Emergency Medical Service Station	2
	Fire Station	3
	Hospitals	1
	Law Enforcement	4
	Nursing Homes	4
	Senior Center	2
	Shelter Home	1
<b>TOTAL</b>		<b>17</b>
High Potential Loss Facilities	Community/Recreation Center	8
	Day Care Facilities	13
	Government/Admin	16
	Private School and Day Care	2
	Private Schools	4
	Public School and Day Care	4
	Public Schools	19
Supplemental Colleges	2	
<b>TOTAL</b>		<b>68</b>
Lifeline Utility Systems	AM Transmission Towers	1
	Electric Substations	3
	Microwave Service Towers	3
	Water Facility	8
	Wastewater Treatment Plant	2
<b>TOTAL</b>		<b>17</b>
Transportation Systems	Airport	1
	Historic Drawbridge	1
	Train Station	1
<b>TOTAL</b>		<b>3</b>
<b>GRAND TOTAL</b>		<b>105</b>

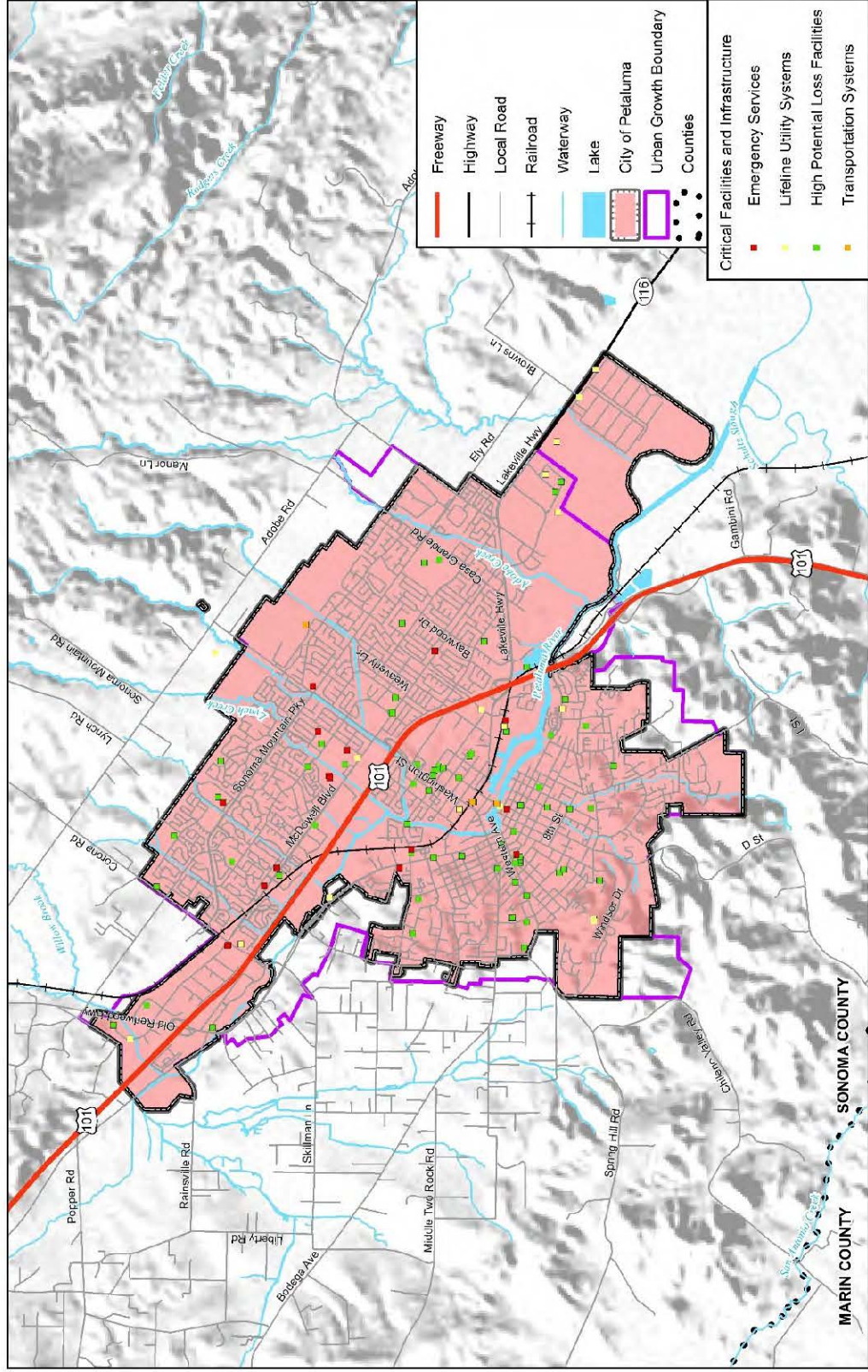
Sources: City of Petaluma, Homeland Infrastructure Foundation-Level Dataset

NOTE: The SMART Rail at Haystack Bridge in the City of Petaluma was not included as a critical facility because it is not owned by the City. This facility is owned and operated by Sonoma-Marín Area Rail Transit District.





Figure 4-1: Critical and City Facilities in Petaluma by Overall Category



0 2 4 Miles



Map compiled 10/2019;  
intended for planning purposes only.  
Data Source: City of Petaluma, CalTrans,  
US Census TIGER Database, HIFLD







## Cultural, Historical, and Natural Resources

Assessing the City of Petaluma's vulnerability to disaster also involves inventorying the natural, historical, and cultural assets of the area. This step is important for the following reasons:

- The community may decide that these types of resources warrant a greater degree of protection due to their unique and irreplaceable nature and contribution to the overall economy.
- In the event of a disaster, an accurate inventory of natural, historical and cultural resources allows for more prudent care in the disaster's immediate aftermath when the potential for additional impacts is higher.
- The rules for reconstruction, restoration, rehabilitation, and/or replacement are often different for these types of designated resources.
- Natural resources can have beneficial functions that reduce the impacts of natural hazards, for example, wetlands and riparian habitat which help absorb and attenuate floodwaters and thus support overall mitigation objectives.

### Cultural Resources

Historical resources are buildings, structures, objects, places, and areas that are eligible for listing in the National Register of Historic Places (NRHP), the California Register of Historic Resources (CRHR), or the City's List of Historic Resources, have an association with important persons, events in history, or cultural heritage, or have distinctive design or construction method.

For purpose of federal actions, a qualified historic resource is defined as a property listed in or formally determined eligible for listing in the NRHP before a disaster occurs. The NRHP is part of a national program to coordinate and support public and private efforts to identify, evaluate, and protect historic and archeological resources. Properties listed include districts (i.e. Petaluma Historic Commercial District), sites, buildings, structures, and objects that are significant in American history, architecture, archeology, engineering, and culture. The National Register is administered by the U.S. Department of the Interior National Park Service. Local and state agencies may consider a broader definition of qualified historic properties in the review, evaluation, and treatment of properties damaged during a disaster.

The State of California Office of Historic Preservation can provide technical rehabilitation and preservation services for historic properties affected by a natural disaster. Depending on the hazard, protection could range from emergency preparedness, developing a fire safe zone around sites susceptible to wildfires, or seismically strengthening or structurally reinforcing structures.

State and local registers of historic resources provide designated Historical Landmarks, Points of Historical Interest, and Historic Buildings. These resources include, but are not limited to:

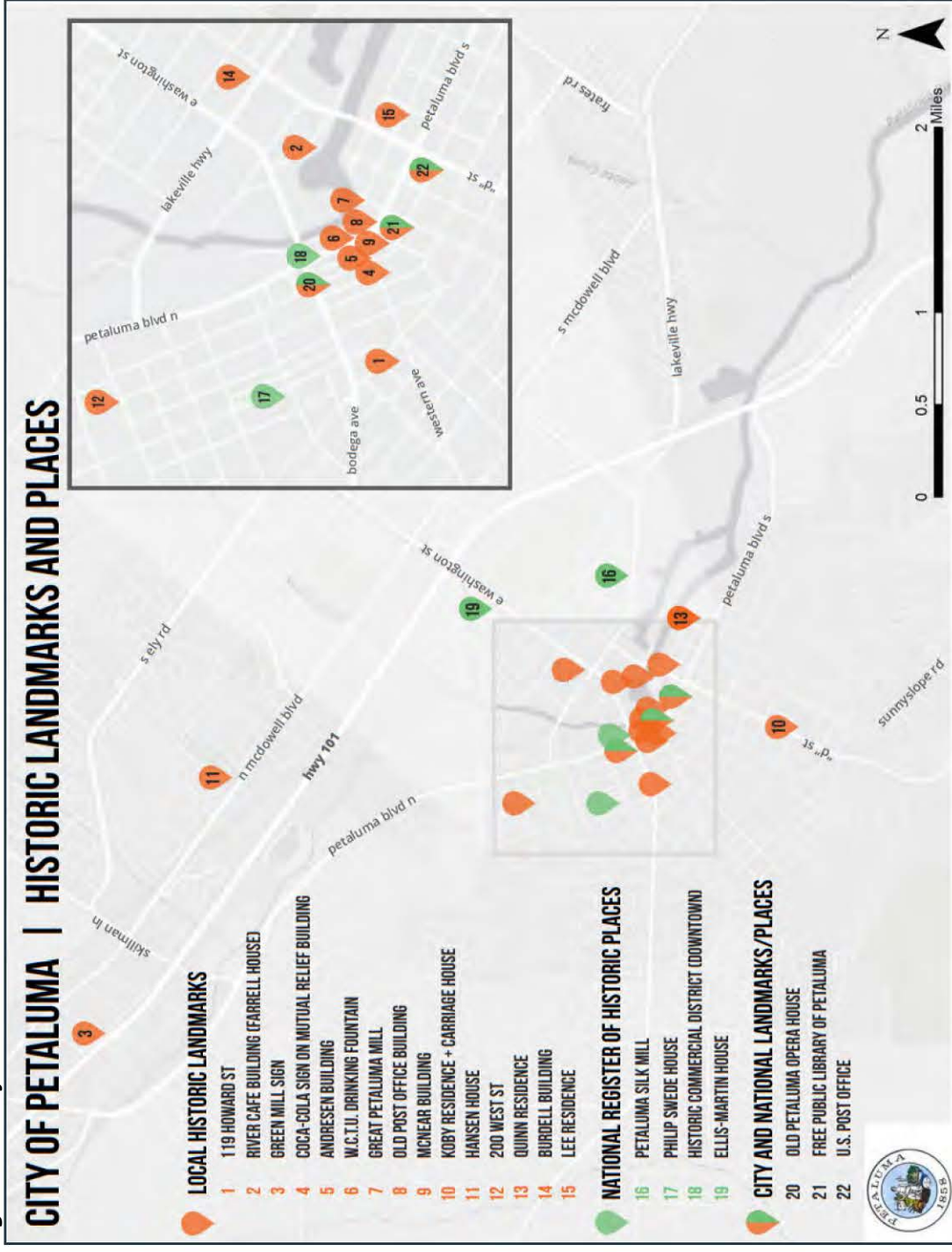
- The California Register of Historical Resources (CRHR)
- The California Historical Landmarks
- The California Inventory of Historical Resources
- The California Points of Historical Interest

Historical resources designated by the City of Petaluma's Planning Division and Historic and Cultural Preservation group/chapter are provided in Figure 4-2. Table 4-6 summarizes the historic and cultural resources found in the National Register of Historic Places for the Petaluma area. Some of these historic and cultural places are duplicative in both the City and National databases and hence table and map.





Figure 4-2: City of Petaluma Historic Landmarks and Places



Source: City of Petaluma Planning Division – Historical and Cultural Preservation Division 2019



**Table 4-6: City of Petaluma Historical Resources from the National Register of Historic Places**

Historical Resource Name	Listed Date	Location	Other Names or Description
Petaluma Adobe	4/15/1970	4 miles East of Petaluma on Casa Grande Rd.	Rancho Petaluma Adobe
Old Petaluma Opera House	12/22/1978	147--149 Kentucky St.	The Maclay Building
US Post Office--Petaluma	1/11/1985	120 4th St.	Petaluma USPS Post Office; US Post Office in California 1900-1941 TR
Petaluma Silk Mill	3/6/1986	420 Jefferson St.	Carlson-Currier Silk Mfg. Co.; Belding-Heminway-Corticelli
Free Public Library of Petaluma	6/23/1988	20 Fourth St.	Old Carnegie Library; Petaluma Historical Library and Museum
Swede, Philip, House	6/18/1992	301 Keokuk St.	--
Petaluma Historic Commercial District	3/31/1995	Along Petaluma Blvd., between B and Prospect Streets	Old Petaluma Opera House
Ellis--Martin House	10/4/2006	1197 E. Washington St.	Martin House; Ellis, John D., House

Source: National Register of Historic Places, 2019

Lists of designated historical resources change periodically, and they may not include those currently in the nomination process and not yet listed. Additionally, as defined by the National Environmental Policy Act (NEPA), any property over 50 years of age is considered a historic resource and is potentially eligible for listing on the National Register. Thus, in the event that the property is to be altered, or has been altered, as the result of a major federal action, the property must be evaluated under the guidelines set forth by NEPA. Structural mitigation projects are considered alterations for the purpose of this regulation.

Cultural resources defined in California Environmental Quality Act (CEQA) Section 15064.5 include prehistoric and historic archaeological resources; historic-period resources (buildings, structures, area, place, or objects). Archaeological resources reflect past human activity extending from Native American prehistoric cultures throughout the early 20<sup>th</sup> century. The artifacts left by previous occupants may be encountered in small to large residential sites, or special use areas.

Many cultural and historical resources in the City are vulnerable to several hazards due to location and the nature of their construction. Some of these risks include earthquakes, wildfires, coastal storms, or adverse weather.

### **Tribal Cultural Resources**

Tribal cultural resources are defined in Public Resources Code (PRC) Section 21074.1 as a site, feature, place, cultural landscape that is geographically defined in terms of the size and scope of the landscape, sacred place, or object with cultural value to a California Native American tribe. A Native American tribe is defined as "a federally recognized California Native American tribe or a non-federally recognized California Native American tribe that is on the contact list maintained by the Native American Heritage Commission". Traditional tribal cultural places are defined in PRC Sections 5097.9 and 5097.993 to include sanctified cemeteries, places of worship, religious or ceremonial sites, or sacred shrines, or any historic, cultural, or sacred site that is listed on or eligible for the CRHR including any historic or prehistoric ruins, burial grounds, or archaeological site. Cultural and tribal resources are governed primarily by federal, state, and local laws that regulate potential impacts to such resources. State regulations that were established to encourage the preservation and protection of traditional tribal cultural resources include:





- **Assembly Bill 52** (PRC Section 21080.3.1) mandates early tribal consultation prior to and during CEQA review to consider tribal cultural values in determination of project impacts and mitigation.
- **Senate Bill 18** (Government Code 655352.3) requires cities and counties to consult with Native American tribes early during broad land use planning efforts on both public and private lands, prior to site- and project-specific land use decisions. Consultation is intended to encourage preservation and protection of traditional tribal cultural places by developing treatment and management plans that might include incorporating the cultural places into designated open spaces.
- **State Executive Order B-10-11 (2011)** established the Governor's Tribal Advisor position and established Administration Policy to encourage State Agencies to communicate and consult with Californian tribes regarding tribal cultural resources.

### **Natural Resources**

The City of Petaluma contains diverse in natural resources, exemplified by the creeks and rivers and salt marshes within its watershed that drain inland mountains to the confluence of the Petaluma River and San Pablo Bay.

Natural resources are important to include in benefit/cost analyses for future projects and may be used to leverage additional funding for mitigation projects that also contribute to community goals for protecting sensitive natural resources. Inventory and awareness of natural resource assets is vital to meeting conservation objectives. For example, protecting wetland areas provides sensitive habitat protection as well as floodwater conveyance and storage, which further enhances public safety.

Natural resources also exhibit varied levels of resiliency to anthropogenic impacts, climate change, and natural hazards such as flooding, drought, coastal storms or wildfire. Climate change is one of the most substantial threats to conserving the biodiversity and ecological habitat of the County (OPR 2019). Habitat resiliency is exemplified in coastal habitat migration to inland areas as a result to sea level rise, and recovery of burn areas following a wildfire.

### **Special Status Species**

To further understand natural resources that may be particularly vulnerable to a hazard event, as well as those that need consideration when implementing mitigation activities, it is important to identify at-risk species (endangered and threatened species) potentially located in the City of Petaluma and its Planning Area. The US Fish and Wildlife Service (USFWS) maintains a list of federally-listed threatened and endangered species for the country, which can be queried at the state and county levels. The California Department of Fish and Wildlife (CDFW) also maintains species lists and accounts for threatened and endangered species. State and federal laws protect the habitat of these species through the environmental review process. Species of special concern may additionally include species that meets the State definition of threatened or endangered but has not been formally listed, experiences seriously population declines or habitat decline, or has naturally small populations exhibiting high susceptibility to population decline (CDFW 2019). Table 4-7 summarizes those special status animal species as indicated in the USFWS database that are located in Sonoma County and likely the areas surrounding the City of Petaluma Planning Area.





**Table 4-7: Threatened and Endangered Species in Sonoma County and the City of Petaluma Area**

Common Name	Scientific Name	Group	Status
California tiger Salamander	<i>Ambystoma californiense</i>	Amphibians	Endangered
California red-legged frog	<i>Rana draytonii</i>	Amphibians	Threatened
Short-tailed albatross	<i>Phoebastria (=Diomedea) albatrus</i>	Birds	Endangered
California least tern	<i>Sterna antillarum browni</i>	Birds	Endangered
California clapper rail	<i>Rallus longirostris obsoletus</i>	Birds	Endangered
Yellow-billed Cuckoo	<i>Coccyzus americanus</i>	Birds	Threatened
Western snowy plover	<i>Charadrius nivosus</i>	Birds	Threatened
Northern spotted owl	<i>Strix occidentalis caurina</i>	Birds	Threatened
Marbled murrelet	<i>Brachyramphus marmoratus</i>	Birds	Threatened
California freshwater shrimp	<i>Syncaris pacifica</i>	Crustaceans	Endangered
Conservancy fairy shrimp	<i>Branchinecta conservatio</i>	Crustaceans	Endangered
Vernal pool fairy shrimp	<i>Branchinecta lynchi</i>	Crustaceans	Threatened
longfin smelt	<i>Spirinchus thaleichthys</i>	Fishes	Candidate
Sonoma alopecurus	<i>Alopecurus aequalis var. sonomensis</i>	Flowering Plants	Endangered
Clara Hunt's milk-vetch	<i>Astragalus clarianus</i>	Flowering Plants	Endangered
White sedge	<i>Carex albida</i>	Flowering Plants	Endangered
Vine Hill clarkia	<i>Clarkia imbricata</i>	Flowering Plants	Endangered
Baker's larkspur	<i>Delphinium bakeri</i>	Flowering Plants	Endangered
Yellow larkspur	<i>Delphinium luteum</i>	Flowering Plants	Endangered
Contra Costa goldfields	<i>Lasthenia conjugens</i>	Flowering Plants	Endangered
Pitkin Marsh lily	<i>Lilium pardalinum ssp. pitkinense</i>	Flowering Plants	Endangered
Few-flowered navarretia	<i>Navarretia leucocephala ssp. pauciflora (=N. pauciflora)</i>	Flowering Plants	Endangered
Many-flowered navarretia	<i>Navarretia leucocephala ssp. plieantha</i>	Flowering Plants	Endangered
Slender Orcutt grass	<i>Orcuttia tenuis</i>	Flowering Plants	Threatened
Lake County stonecrop	<i>Parvisedum leiocarpum</i>	Flowering Plants	Endangered
Calistoga allocarya	<i>Plagiobothrys strictus</i>	Flowering Plants	Endangered
Napa bluegrass	<i>Poa napensis</i>	Flowering Plants	Endangered
Kenwood Marsh checker-mallow	<i>Sidalcea oregana ssp. valida</i>	Flowering Plants	Endangered
Sonoma sunshine	<i>Blennosperma bakeri</i>	Flowering Plants	Endangered
Sonoma spineflower	<i>Chorizanthe valida</i>	Flowering Plants	Endangered
Marin dwarf-flax	<i>Hesperolinon congestum</i>	Flowering Plants	Threatened
Burke's goldfields	<i>Lasthenia burkei</i>	Flowering Plants	Endangered
Sebastopol meadowfoam	<i>Limnanthes vinculans</i>	Flowering Plants	Endangered
Showy Indian clover	<i>Trifolium amoenum</i>	Flowering Plants	Endangered
Loch Lomond coyote thistle	<i>Eryngium constancei</i>	Flowering Plants	Endangered
Clover lupine	<i>Lupinus tidestromii</i>	Flowering Plants	Endangered
Pennell's bird's-beak	<i>Cordylanthus tenuis ssp. capillaris</i>	Flowering Plants	Endangered
Myrtle's silverspot butterfly	<i>Speyeria zerene myrtleae</i>	Insects	Endangered
San Bruno elfin butterfly	<i>Callophrys mossii bayensis</i>	Insects	Endangered
Callippe silverspot butterfly	<i>Speyeria callippe</i>	Insects	Endangered
Behren's silverspot butterfly	<i>Speyeria zerene behrensii</i>	Insects	Endangered
Salt marsh harvest mouse	<i>Reithrodontomys raviventris</i>	Mammals	Endangered
Point Arena mountain beaver	<i>Aplodontia rufa nigra</i>	Mammals	Endangered
Leatherback sea turtle	<i>Dermochelys coriacea</i>	Reptiles	Endangered
Leatherback sea turtle	<i>Dermochelys coriacea</i>	Reptiles	Endangered
Olive ridley sea turtle	<i>Lepidochelys olivacea</i>	Reptiles	Threatened
Short-tailed albatross	<i>Phoebastria (=Diomedea) albatrus</i>	Birds	Endangered
California least tern	<i>Sterna antillarum browni</i>	Birds	Endangered
California clapper rail	<i>Rallus longirostris obsoletus</i>	Birds	Endangered
Yellow-billed Cuckoo	<i>Coccyzus americanus</i>	Birds	Threatened

Source: USFWS – Environmental Conservation Online System, 2019





## **Population, Growth, and Development Trends**

Between 2010 and 2018 the population of Petaluma increased by 4,310 persons (DOF 2019). The Sonoma County Economic Development Board is projecting the City of Petaluma will grow by 3.2 percent by 2022, outpacing the state and nation in five-year growth projections. The City's General Plan buildout plan also estimates an additional 15,500 residents in the City by 2025 and much of the growth is projected to occur within the UGB.

With the City's two growth management programs in place, the Regional Growth Management System and the UGB, development in the City has been managed or constrained to some degree. Development on the western side of the City is constrained by the hilly topography and the UGB, while the east side is constrained by the UGB until 2025. As discussed in Chapter 2, as of August 16, 2019, the City has forty-six major development projects going through the planning process with the Planning Division. A majority of the projects are residential projects with commercial projects the next most common. These major development projects are located throughout the City and most are located near downtown Petaluma. Additional information on population and growth and development trends are in Section 2.4 and Section 2.8 in Chapter 2.





### 4.3 Hazard Profiles and Risk Assessment

*Requirement §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.*

*Requirement §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) of this section. This description shall include an overall summary of each hazard and its impact on the community.*

*Requirement §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 areas.*

*Requirement §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) of this section and a description of the methodology used to prepare the estimate.*

*Requirement §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.*

The hazards identified in Section 4.1 Hazard Identification: Natural Hazards are profiled individually in this section. In general, information provided by HMPC is integrated into this section with information from other data sources. These profiles set the stage for the vulnerability assessment for each natural hazard that follow the detailed hazard profiles.

Each hazard is profiled in the following format:

- **Hazard Description** - This section gives a description of the hazard and associated issues followed by details on the hazard specific to the City of Petaluma Planning Area.
- **Location** – This section provides a spatial description of the potential locations or geographic areas in the City of Petaluma of where the hazard is expected to impact.
- **Extent (Magnitude/Severity)** - This section gives a description of the potential strength or magnitude of the hazard as it pertains to the City of Petaluma. Different hazards may have different measures of extent.
- **Previous Occurrences** - This section contains information on historical incidents, including impacts where known. The extent or location of the hazard within or near the Planning Area is also included in this subsection. Historical incident worksheets and other data sources were used to capture information on past occurrences.
- **Probability of Future Occurrence** - The frequency of past events is used in this section to gauge the likelihood of future occurrences. Where possible, frequency was calculated based on existing data. Frequency was determined by dividing the number of events observed by the number of years on record and multiplying by 100. This gives the percent chance of an event happening in any given year (e.g., three droughts over a 30-year period equates to a 10 percent chance of a drought in any given year). The likelihood of future occurrences is categorized into one of the following classifications:
  - **Highly Likely** - Nearly 100 percent chance of occurrence in next year or happens every year.
  - **Likely** - Between 10 and 99 percent chance of occurrence in next year or has a recurrence interval of 10 years or less.





- **Occasional** - Between 1 and 10 percent chance of occurrence in the next year or has a recurrence interval of 11 to 100 years.
- **Unlikely** - Less than 1 percent chance of occurrence in next 100 years or has a recurrence interval of every 100 years or greater.

The risk assessment for most hazards is built upon the frequency of past events and the assumption that historic occurrence rates are a good predictor of future event probability. With climate change; however, history is not an adequate predictor of the probability of future occurrences (SHMP 2018). Planning for climate change is based on understanding and integrating evolving climate change science and modeled projections that account for shifts in historic conditions due to climate change into hazard mitigation planning (SHMP 2018). For these reasons, the likelihood of future occurrences for climate change and sea level rise impacts is categorized into one of the four classifications, but this classification is based on climate change science and modeled projections.

- **Climate Change Considerations** – Climate change refers to a long-term change in the earth’s temperature, precipitation, humidity, and seasons. This section addresses the probable effects of climate change qualitatively and as a secondary impact for each identified hazard. In other words, it describes the potential for climate change to affect the frequency and severity of natural hazards. Impacts can include water supply shortages, changes in the frequency, intensity, and extent of drought and extreme heat events, more precipitation and flooding risks, and increasing temperatures. This section also concludes whether climate change is anticipated to have a low, medium, or high influence on future hazard impacts.

The discussion relies on information from the Fifth Assessment Report from the Intergovernmental Panel on Climate Change (IPCC) *Climate Change 2013: The Physical Science Basis Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change* (IPCC 2018). It also relies on numerous California publications on climate change and climate adaptation including:

- *California’s Fourth Climate Assessment* (California Natural Resources Agency 2018a);
- *Safeguarding California Plan: 2018 Update – California’s Climate Adaptation Strategy* (Cal-Adapt 2018);
- *2014 Safeguarding California: Reducing Climate Risk* (California Natural Resources Agency 2014); and
- *2009 California Climate Adaptation Strategy* (CAS) (California Natural Resources Agency 2009).

The discussion integrates climate information from Cal-Adapt, a website that gathers data on how climate change might affect California at the local level based on the state’s scientific and research community (CEC 2018). The climate change considerations subsections also summarizes climate change modelling and findings from the following two RCPA-prepared documents: *Climate Ready Sonoma County: Climate Hazards and Vulnerabilities* (2014) and *Sonoma County’s Regional Climate Action Plan: Climate Action 2020 and Beyond* (2016). Climate change projections summarized in Sonoma County’s CAP are based on BCM projections, which as previously mentioned were developed by applying scaled-down models that identify watershed-level climate change impacts specific to Sonoma County (RCPA 2016). Climate change is addressed in the plan as a secondary impact for each hazard.

**Vulnerability Assessment** – The vulnerability of the Planning Area to a specific natural hazard is assessed through the study of potential impacts to specific sectors:

- Property







- People
- Economy
- Critical Facilities and Infrastructure
- Historic, Cultural, and Natural Resources
- Future Development

**Risk Summary** – This is a summary of key findings and risk based on threat, vulnerability and consequences to the Planning Area from the specific hazard.

The significance of each hazard was determined based on the hazard profile, focusing on key criteria such as frequency and resulting damage, including deaths/injuries, and property and economic damage. This assessment was used by the HMPC to prioritize those hazards of greatest significance to the Planning Area thereby allowing the City to focus resources where they are most needed. The following sections provide profiles of the natural hazards, listed alphabetically that the HMPC identified in Section 4.1 Identifying Hazards. Human-caused hazards are addressed in Section 4.4.

#### 4.3.1 Dam Incidents

##### Hazard Description

Dams are manmade structures built for a variety of uses, including flood protection, power generation, agriculture, water supply, and recreation. When dams are constructed for flood protection, they usually are engineered to withstand a flood with a computed risk of occurrence. For example, a dam may be designed to contain a flood at a location on a stream that has a certain probability of occurring in any one year. If prolonged periods of rainfall and flooding occur that exceed the design requirements, that structure may be overtopped and fail. Overtopping is the primary cause of earthen dam incidents and failure in the United States. Dam incidents can also result from any one or a combination of the following causes:

- Earthquake
- Inadequate spillway capacity resulting in excess overtopping flows
- Internal erosion caused by embankment or foundation leakage or piping or rodent activity
- Improper design
- Improper maintenance
- Negligent operation
- Failure of upstream dams on the same waterway

Water released by a failed dam generates tremendous energy and can cause a flood that is catastrophic to life and property. A catastrophic dam incident or failure could challenge local response capabilities and require evacuations to save lives. Impacts to life safety will depend on the warning time and the resources available to notify and evacuate the public. Major loss of life could result as well as potentially catastrophic effects to roads, bridges, and homes. Associated water quality and health concerns could also be issues. Factors that influence the potential severity of a full or partial dam failure or dam incident are the amount of water impounded; the density, type, and value of development and infrastructure located downstream; and the speed of failure.

Controlled release or spillway flooding: inadequate spillway capacity often results in excess overtopping flows, though the potential for flooding as a result of discharge from dam outlet structures or spillways





could be expected during excessive rain events. However, controlled releases of water from dams is a measure that can prevent or minimize spillway flooding or structure failure, by regulating capacity in a managed way. Even controlled releases can lead to unwanted or unpredicted flooding, depending on environmental and weather conditions, or even human error.

In general, there are three types of dams: concrete arch or hydraulic fill, earth-rockfill, and concrete gravity. Each type of dam has different failure characteristics. A concrete arch or hydraulic fill dam can fail almost instantaneously: the flood wave builds up rapidly to a peak then gradually declines. An earth-rockfill dam fails gradually due to erosion of the breach: a flood wave will build gradually to a peak and then decline until the reservoir is empty. And, a concrete gravity dam can fail instantaneously or gradually with a corresponding buildup and decline of the flood wave.

### Location

According to the U.S. Army Corps of Engineers’ National Inventory of Dams database, last updated in 2018, there are three potential dams of concern upstream of the City of Petaluma. These and other nearby dams may have been constructed for flood control, irrigation storage, recreation, and stock watering purposes. Of these dams of concern, one is considered to pose a high hazard, one is of significant hazard, and the last is rated as posing a low hazard.

The La Crema Winery Dam is an earth-material structure located just east of the City of Petaluma, about a half mile away and north of the City’s wastewater treatment facility. The dam storage capacity is 103 acre-feet. This is a high hazard dam owned by the Jackson Family Wines entity, with no active EOP, or Emergency Action Plan (EAP) in place. The Pinheiro Dam is in the significant hazard category and was built in 1967. It is owned by a private entity and is located just over two miles east of the City, along a tributary to the Petaluma River. The dam storage capacity is 83 acre-feet. Finally, the Lawler Dam is located close to North Creek, about three miles northeast of Petaluma. This is a low hazard dam owned by the City, built in 1910 on the north part of the Petaluma Reservoir and with a primary use of providing water supply. It has a storage capacity of 227 acre-feet.

Table 4-8 below details these dams that could potentially affect the City of Petaluma given their close proximity and potential to inundate if either were to fail. **Figure 4-3** illustrates the locations of the two identified dams of concern near the City.

**Table 4-8: Characteristics of the Dams of Concern Upstream of the City of Petaluma**

Hazard Rating	Dam Name	River Drainage	Downstream Community	Dam Type	Dam Height (in Feet)	Storage Capacity (Acre-Feet)	Emergency Operations Plan	Dam Owner
Significant	Pinheiro	Tributary of Petaluma River	Petaluma	Earth	26	83	No	Private Entity
High	La Crema Winery	--	Petaluma	Earth	32	103	No	Jackson Family Wines
Low	Lawler	North Creek	Petaluma	Earth	40	227	No	City of Petaluma

Source: U.S. Army Corps of Engineers’ National Inventory of Dams, 2018  
Note: 1 acre-foot = 325,851 gallons







### **Extent (Magnitude/Severity)**

**Limited** – Standard practice among federal and state dam safety offices is to classify a dam according to the potential impact a dam failure (breach) or mis-operation (unscheduled release) would have on downstream areas. The hazard potential classification system categorizes dams based on the probable loss of human life and the impacts on economic, environmental, and lifeline facilities. Dams are classified into the following three categories which identify their potential hazard to life and property:

- High hazard indicates that a failure would most probably result in the loss of life;
- Significant hazard indicates that a failure could result in appreciable property damage;
- Low hazard indicates that failure would result in only minimal property damage and loss of life is unlikely; and
- Undetermined hazard dams have not been rated or their hazard rating is not known.

Since there are two potentially hazardous dams upstream of the City (one significant- and one high-rated hazard dam), there is some, though limited, potential for loss of life and/or property damage. Adjacent unincorporated portions of Sonoma or Marin Counties could also be affected by a dam failure upstream of the City, although the specific extent of impacts would depend on the nature of the failure, local emergency response capabilities, people and property found in the path of the dam inundation areas, and other such factors. However, based on the dam capacities of these the dams upstream of the Planning Area, it is unlikely that much risk would be imposed on those areas near Petaluma. Because the dam inundation maps are not currently available for the La Crema Winery and Pinheiro dams, it is difficult to determine the particular populations or properties at risk of a potential dam failure event on the City of Petaluma.

### **Previous Occurrences**

There is no history of dam incidents or failures affecting the City.

### **Probability of Future Occurrences**

**Unlikely** – The City remains at risk to upstream dam failures or incidents, particularly from the two that are classified as high or significant hazard structures. However, based on the lack of previous dam inundation events, HMPC input, and the fact that the dams posing risk to the City have relatively low storage capacities, dam failure and dam incidents are unlikely in the area. Nevertheless, the potential exists for future dam incidents in the City or portions of it, but the likelihood of this is low. Uncontrolled or controlled release flooding as well as spillway flooding below dams due to excessive rain or runoff are more likely to occur than failures.

### **Climate Change Considerations**

The potential for climate change to affect the likelihood of dam failure and incidents is not fully understood at this point in time. With a potential for more extreme precipitation events a result of climate change, this could result in large inflows to reservoirs. However, this could be offset by generally lower reservoir levels if storage water resources become more limited or stretched in the future due to climate change, drought and/or population growth. For these reasons, climate change would have a “low” influence on dam incidents.



## Vulnerability Assessment

A dam incident can range from a small, uncontrolled release to a catastrophic failure. Vulnerability to dam failures is confined to the areas and populations subject to inundation downstream of the facility. Secondary losses would include loss of the multi-use functions of the dam itself and associated revenues that accompany those functions, including potential potable water uses or critical irrigation for crops.

## Property

In general, communities located below a high or significant hazard dam and along a waterway are potentially exposed to the impacts of a dam failure. For reference, high hazard dams threaten lives and property, significant hazard dams threaten property only. Inundation maps that identify anticipated flooded areas (which may not coincide with known floodplains) are often produced for all high hazard dams and are contained in the EAP required for each dam. The potential magnitude of a dam incident depends on the time of year and the base flow of the river when the incident or failure occurs. During the winter months, when the river flows are higher, the impact to the area would be much greater and evacuation times even shorter.

Due to the lack of dam inundation mapping for the dams upstream of the City, as well as the lack of EAPs, it is not well known how a potential dam failure could affect the City's property and infrastructure. Based on the location of the one high hazard dam and one significant hazard dam on the outskirts of the City in a sparsely populated area it appears the potential impacts to buildings and infrastructure downstream are minimal.

## People

Persons located underneath or downstream of a dam are at risk of a dam failure, though the level of risk can be tempered by topography (specifically where populations are located within the inundation path of a dam but at higher elevations), amount of water in the reservoir/damming structure, and time of day of the breach. Injuries and fatalities can occur from debris, bodily injury, and drowning. Once a dam has breached, standing water presents all the same hazards to people as floodwater from other sources. People in the inundation area may need to be evacuated, cared for, and possibly permanently relocated. Impacts could include hundreds or thousands of evacuations and likely casualties, depending on the dam involved.

Due to the lack of dam inundation mapping for the three dams upstream of the City, as well as the lack of EAPs, it is not well known to what extent a potential dam failure could affect the City's population, nor the specific impacts on socially vulnerable or sensitive populations in the City's Planning Area.

## Economy

Extensive and long-lasting economic impacts could result from a major dam failure including the long-term loss of water in a reservoir after a failure event. A major dam failure or incident and loss of water from the associate reservoir could include direct business and industry damages and indirect disruption of the local economy, including the disruption of irrigation water for crops or even water for livestock which may be key components of the local economy and its sectors.

## Critical Facilities and Infrastructure

A total dam failure can cause catastrophic impacts to areas downstream of the water body, including critical infrastructure and essential facilities. Dam incidents may result in less severe downstream impacts, depending on the severity of the incident. Any critical asset located under the dam in an inundation area





would be susceptible to the impacts of a dam incident. Of particular risk would be roads and bridges that could be vulnerable to washouts, further complicating response and recovery by cutting off impacted areas. Risk to specific facilities could be considered sensitive information, especially those such as water treatment facilities or water delivery systems which may provide potable water for the local population. Due to the lack of dam inundation mapping for the dams upstream of the City, as well as the lack of EAPs, it is not well known the extent to which a potential dam failure could affect the City's property and infrastructure. Based on location alone it does appear that the failure or a major incident at the La Crema Winery Dam, a high hazard dam could potentially impact the City's wastewater treatment infrastructure located downstream and near the drainage areas, but the actual risk is unknown due to data limitations.

### **Historic, Cultural, and Natural Resources**

Dam failure effects on the environment would be similar to those caused by flooding from other causes. Water could erode stream channels and topsoil and cover the environment with debris. For the most part the environment is resilient and would be able to rebound from whatever damages occur, though this process could take years. Historic and cultural resources could be affected just as housing or critical infrastructures would, were a dam to fail and cause downstream inundation that could further erode surfaces or cause scouring of structural foundations. Given the high hazard dam outside the City lacks inundation mapping or an EAP, risks to historical and cultural resources is unknown.

### **Future Development**

Areas slated for future development should take into consideration potential impacts from dam failure risk upstream and should attempt to overlay the existing dam inundation maps (if available) with proposed future development. In the case of a dam failure, inundation would likely follow some existing FEMA mapped floodplains, which contains development restrictions for areas in the one percent annual chance floodplain, but it could exceed those floodplains and affect areas that are not regulated for flood hazards. Also, development below a low or undetermined hazard dam such as the Lawler dam could increase its hazard rating. Finally, added development could compromise dams and reservoir resources if populations depend on them for critical needs such as potable water during or after a dam failure event.

### **Risk Summary**

- The overall significance of dam inundation in the City of Petaluma is **Low**.
- There are three dams of concern that fall upstream of the City: La Crema Winery Dam, Pinheiro Dam, and Lawler Dam.
- La Crema Winery Dam is considered a high hazard dam and owned by the Jackson Family Wines entity. It is located about half a mile east of the City and its storage capacity of 103 acre-feet.
- The second dam of concern is the Pinheiro Dam and considered significant hazard dam and located just over 2 miles east of the City. It is owned by a private entity and located along a tributary of the Petaluma River. This significant hazard dam has a storage capacity of 83 acre-feet.
- The last potential dam of interest is the Lawler Dam, a low significance structure with a capacity of 227 acre-feet.
- All three of these dams are of earthen-constructed structures, and none have a current EAP on file
- Due to the lack of historic occurrence data on dam inundation, no dam inundation mapping available, and lack of EAPs, it is not well known how a potential failure of any of these dams could affect the City's populations, property, and critical infrastructure.





### 4.3.2 Drought

#### Hazard Description

Drought is a gradual phenomenon. Although droughts are sometimes characterized as emergencies, they differ from typical emergency events. Most natural disasters, such as floods or forest fires, occur relatively rapidly and afford little time for preparing for disaster response. Droughts occur slowly, many times over a multi-year period, and it is often not obvious or easy to quantify when a drought begins and ends.

Drought is a complex issue involving many factors; it occurs when a normal amount of moisture is not available to satisfy an area's usual water-consuming activities. Drought can often be defined regionally based on its causes or effects:

- **Meteorological** drought is usually defined by a period of below average water supply.
- **Agricultural** drought occurs when there is an inadequate water supply to meet the needs of the state's crops and other agricultural operations such as livestock.
- **Hydrological** drought is defined as deficiencies in surface and subsurface water supplies. It is generally measured as streamflow, snowpack, and as lake, reservoir, and groundwater levels.
- **Socioeconomic** drought occurs when a drought impacts health, well-being, and quality of life, or when a drought starts to have an adverse economic impact on a region.

The California Department of Water Resources (DWR) says the following about drought:

"One dry year does not normally constitute a drought in California. California's extensive system of water supply infrastructure—its reservoirs, groundwater basins, and inter-regional conveyance facilities—mitigates the effect of short-term dry periods for most water users. Defining when a drought begins is a function of drought impacts to water users. Hydrologic conditions constituting a drought for water users in one location may not constitute a drought for water users elsewhere, or for water users having a different water supply. Individual water suppliers may use criteria such as rainfall/runoff, amount of water in storage, or expected supply from a water wholesaler to define their water supply conditions."

The drought issue in California is further compounded by water rights. Water is a commodity possessed under a variety of legal doctrines. The prioritization of water rights between farming and federally protected fish habitats in California is part of this issue.

Drought impacts are wide-reaching and may be economic, environmental, or societal. Also, during a drought, allocations go down, which results in reduced water availability. Voluntary water conservation measures are typically implemented during extended droughts. A reduction of electric power generation and water quality deterioration are also potential problems. Drought conditions can also cause soil to compact and not absorb water well, potentially making an area more susceptible to flooding.

#### Location

Drought is a regional hazard, and during severe drought conditions, it can affect the entire state of California with varying levels of dryness. In other words, drought affects all aspects of the economy and environment and the community simultaneously. The most significant impacts associated with drought in the City's Planning Area are those related to water intensive activities such as municipal usage and general water supply (e.g. irrigation for parks and open spaces), wildfire protection (including relief and response activities), commerce, agriculture, and tourism.





According to City of Petaluma’s General Plan and the City’s Water and Sewer Rate Study (City of Petaluma 2017), the City obtains its water from a mix of sources including water from the Russian River purchased from the Sonoma County Water Authority (SCWA) (also known as Sonoma Water), recycled water, and groundwater. The City also conserves water supplies through a standard management program and practices. These water supply sources and projected acre-feet (AF) available by 2025 are displayed in Table 4-9.

**Table 4-9: Petaluma’s Current Water Supply Sources and Projected Availability for 2025**

<b>Water Supply</b>	<b>2005 Usage</b>	<b>2025 Projected Availability</b>
SCWA	11,799 AF	13,397 AF
Recycled Water	0	1,425 AF
Water Conservation	0	767 AF
Groundwater	0	186 AF
<b>TOTAL</b>	<b>11,799 AF</b>	<b>15,775 AF</b>

Sources: City of Petaluma General Plan 2008.

**Notes:**

2. One Acre-Foot = 43,560 cubic feet.
3. SCWA: Sonoma County Water Authority

The City purchases over 95 percent of its water supply on a wholesale basis from Sonoma Water and less than 5 percent is supplied by groundwater production from City wells. To aid in the overall conservation of water and reduction of use in the City for the coming years, the City built its first recycled water system in 1984 for irrigation of agricultural properties outside the City limits. The Ellis Creek Water Recycling Facility, built in 2009, takes wastewater subjected to additional high-level treatment and distributes the treated water for agricultural or landscape irrigation uses. The Ellis Creek recycled water facility treated 581 million gallons in 2019, but this amount varies year to year. The City is preparing to expand the recycled water treatment capacity in 2020, while increasing the distribution of recycled water incrementally through 2025. This City also applies a four-stage rationing plan during declared water shortages. This plan applies to catastrophic losses of water (City of Petaluma 2015). The rationing plan determines a consumption reduction of over 35 percent of the normal consumption depending on the cause, severity, and anticipated duration of the water supply shortage. Stage 1 involves minimal reductions of up to 15 percent of water supply conditions, stage 2 involves moderate reductions of 15 to 25 percent, stage 3 involves severe reductions of 25 to 35 percent, and stage 4 involves critical reductions greater than 35 percent (City of Petaluma 2015).

***Sustainable Groundwater Management Act of 2014***

Groundwater resources plays a significant role in the development, growth, and sustainability of the Petaluma Valley. Groundwater is the primary source for domestic and agricultural use by rural property owners in the Petaluma Valley Basin, while urban water supply to the City is primarily imported from Russian River surface water. The residents of Petaluma and all of California have been experiencing significant drought and water shortages since 2011 and only recently did the City and the majority of the state come out of drought. In January 2014 the Governor declared an emergency proclamation due to multiple years of drought. The proclamation called on citizens to reduce water use by 20 percent; with a subsequent executive order that directed urban water agencies to reduce water use by 25 percent. In September 2014, the Governor signed a three-bill package (California Senate Bills 1168 and 1319, and Assembly Bill 1739), known as the Sustainable Groundwater Management Act of 2014 (SGMA). The SGMA







establishes local Groundwater Sustainability Agencies (GSAs) to manage groundwater sustainability within the groundwater sub-basins defined by DWR.

There are three GSAs in Sonoma County: Santa Rosa Plain, Sonoma Valley, and the Petaluma Valley. The Petaluma Valley groundwater basins spans 46,000 acres within the larger 93,440-acre Petaluma Valley watershed. Groundwater flows generally move from recharge areas in the mountains surrounding Petaluma Valley toward the City and then south towards San Pablo Bay. While groundwater data is currently being studied in the Petaluma Valley Basin, current groundwater elevation data suggests that elevations are relatively stable in the southern to central areas of Petaluma Valley, but exhibiting long-term declines in the northwest portion of the basin (Petaluma Valley GSA 2019). Historical occurrences of nitrate concentrations have been documented in the western portion of the Basin (DWR 1982). There have been other areas with poor water quality in the southern portion of the basin and saltwater intrusion from the tidally influenced portion of the Petaluma River (Petaluma Valley GSA 2019).

### **Extent (Magnitude/Severity)**

**Limited** – Extent can be measured according to a scale developed by the United States Drought Monitor, which measures drought in five categories: “abnormally dry,” “moderately dry,” “severely dry,” “extremely dry,” and “exceptionally dry”. The City of Petaluma is vulnerable to all levels of drought, which are further subject to the effects of climate change, precipitation trends, and wet and dry periods. Drought can have a widespread impact on the environment and economy in the Planning Area, but it typically does not result in loss of life or damage to property. Rather drought may have an impact on agriculture, business, and the movement of goods and services related to agricultural, commodities, tourism and recreation, and water supply sectors.

Given that the City of Petaluma’s water users fall within the categories of residential (68 percent of water users) and commercial/office, industrial, and institutional (non-residential represents 32 percent of water users), it can be assumed that three main factors have an effect on water demands: climatic, demographic, and economic. These are described below and are expected to influence water demands in the future, as they have in the past.

- **Climatic.** The weather in Petaluma is mild with a mean annual temperature of 70 degrees Fahrenheit. Average annual precipitation is about 25 inches. Climate has the most dramatic annual effect on water demands, and severe deviations from normal temperatures and average rainfall can increase or decrease annual water demands. Although Petaluma’s municipal supply doesn’t fully rely on surface water sources, precipitation shortages can have negative effects on what the City receives and can process for potable and other key uses.
- **Demographic.** Since water use is related to demographics and population change, an accurate description of population and housing stock in the service area serves as a basis for water planning activities described in the City’s 2015 Urban Water Management Plan (UWMP) or other planning mechanisms. According the American Community Survey, the City’s population was 60,210 in 2017. Population projections for the City indicate an increase from to 73,350 by 2040, or an increase of about 13,140 people per year (City of Petaluma 2015).
- **Economic.** Commercial water users have the second highest water demand after residential users (both single family and multi-family). According to the City’s 2015 UWMP, commercial water users demand for potable and raw water is projected to increase from a volume of 930 to 1,048 by 2040.



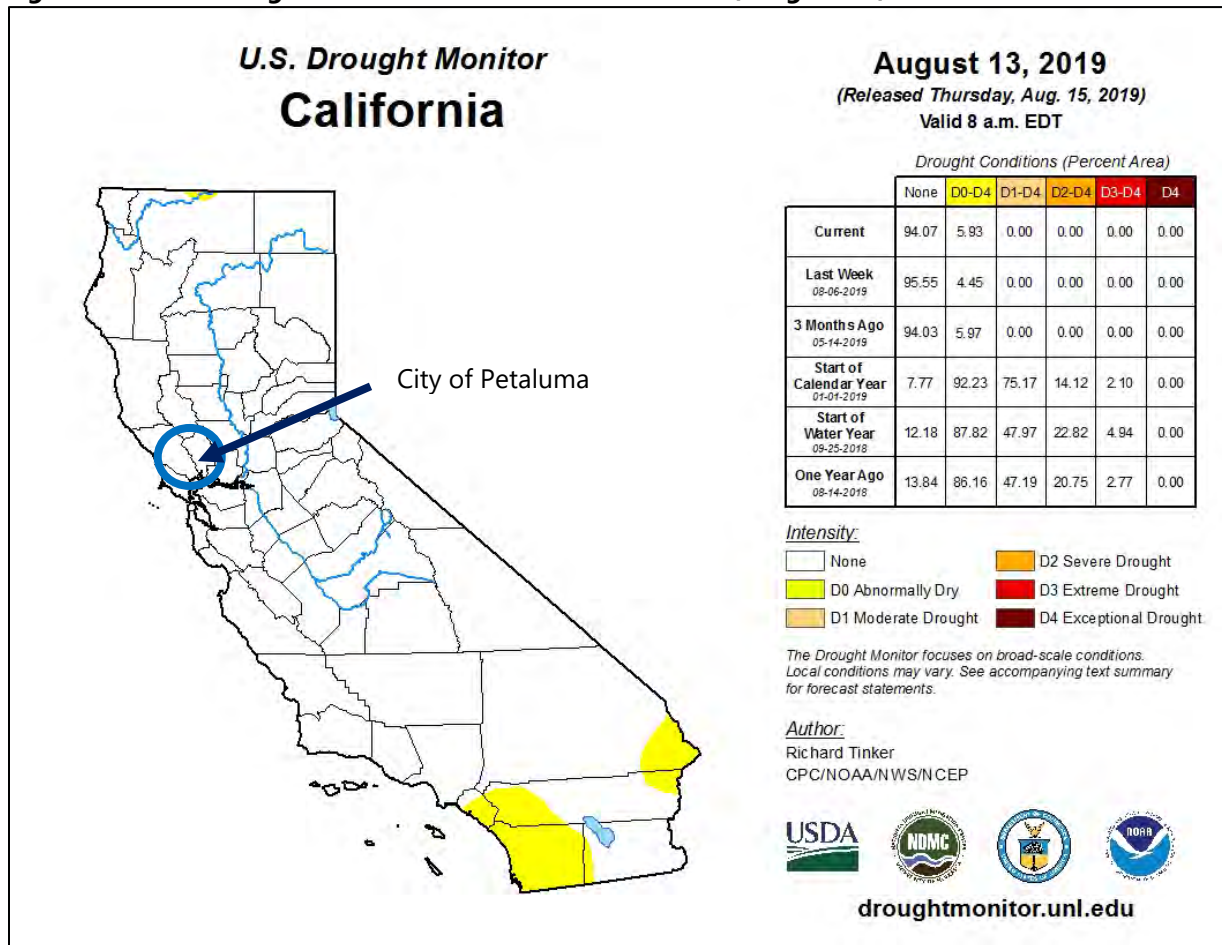


Industrial users are expected to increase their demand for water by 64 percent by 2040. Although agricultural areas are outside of Petaluma, the City does supply recycled water to these areas with plans to expand services in the future.

The magnitude or severity of a drought across the City could vary and is difficult to predict. However, understanding the total population affected as well as economy and resources vulnerable provides insight on how to estimate potential losses and damages to the City’s assets; drought related information can be obtained and measured from the National Drought Mitigation Center’s Impact Reporter and Drought Monitor tools (United States Drought Monitor 2018; United States Drought Impact Reporter 2018).

Figure 4-4, Figure 4-5, and Figure 4-6 provide “snapshots in time” of the drought conditions in California as of August 2019, November 2018, and August 2015 (during the period of the last multi-year drought in the state, from 2012- 2017). The snapshots selected are instrumental in depicting both the historic and potential change in drought’s geographic range and severity in Sonoma County (circled in blue). These maps were extracted from the National Drought Mitigation Center and consider several factors including the Palmer Drought Index, Soil Moisture Models, U.S. Geological Survey (USGS) Weekly Streamflows, Standardized Precipitation Index, and Satellite Vegetation Health Index (United States Drought Monitor 2018).

**Figure 4-4: U.S. Drought Monitor Conditions for California, August 13, 2019**

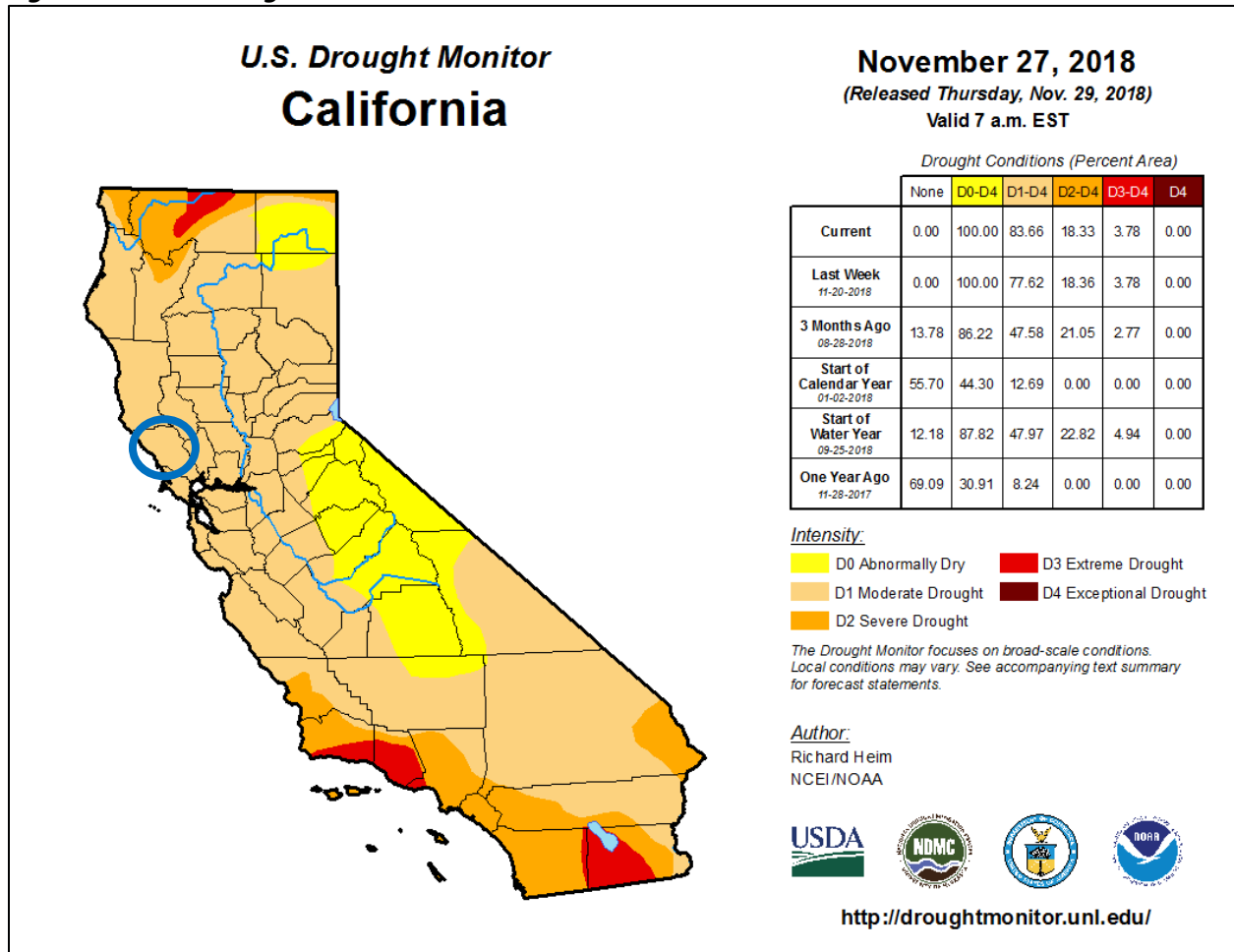


Source: National Drought Mitigation Center, 2018





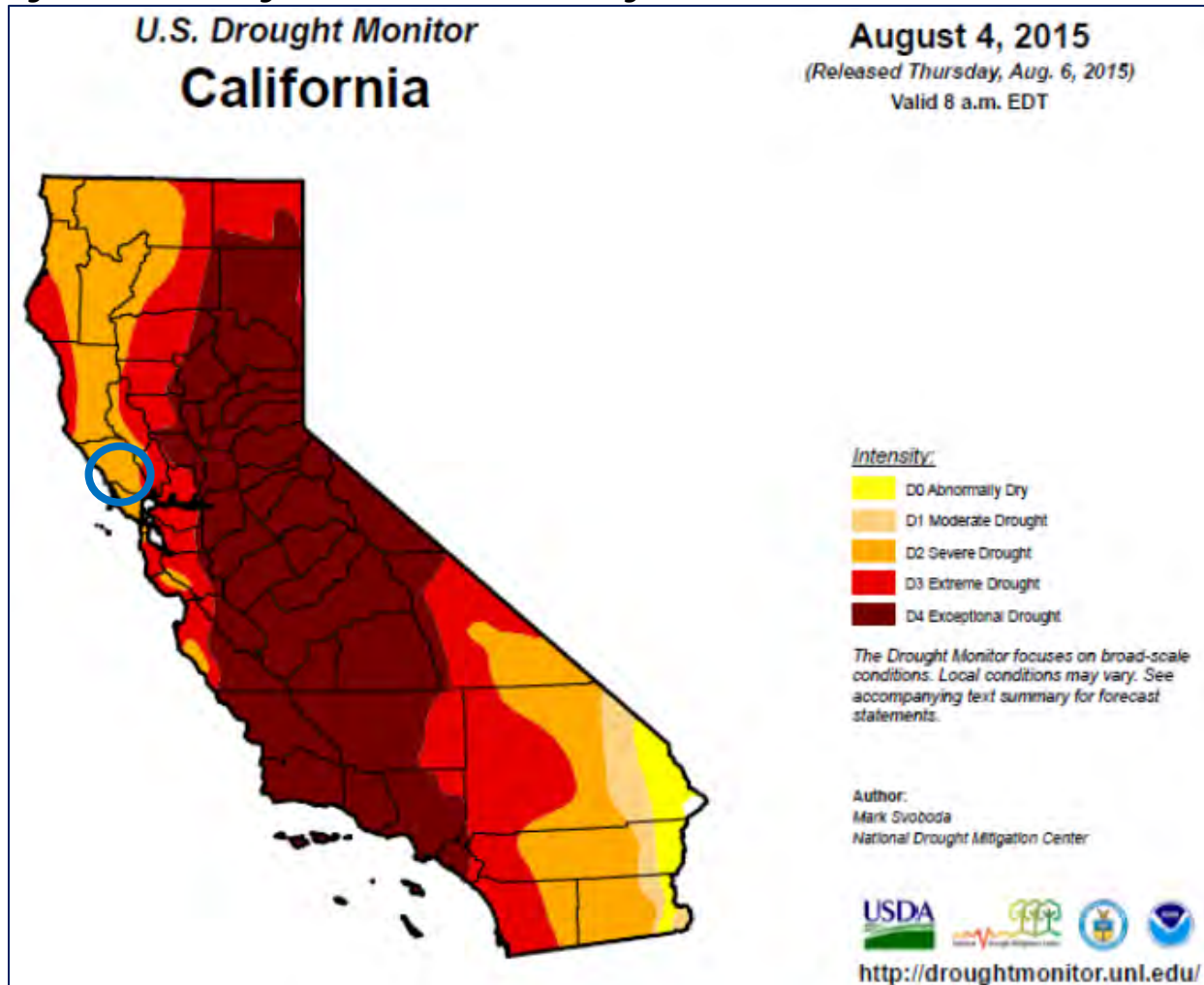
Figure 4-5: U.S. Drought Monitor Conditions for California, November 29, 2018



Source: National Drought Mitigation Center, 2018



**Figure 4-6: U.S. Drought Monitor for California: August 4, 2015**

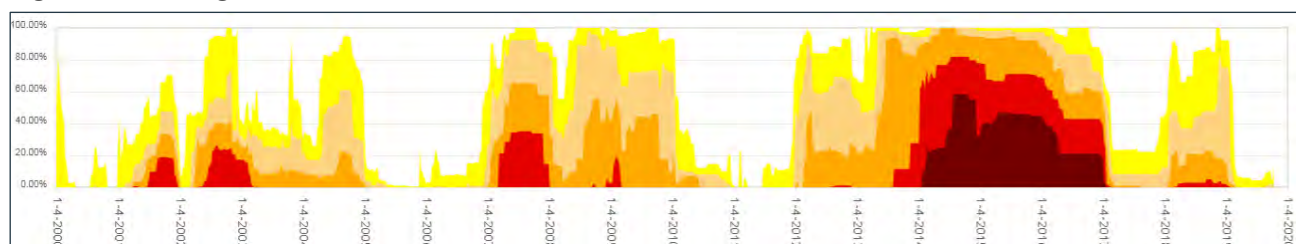


Source: National Drought Mitigation Center, 2018

### Previous Occurrences

Historically, California has experienced multiple severe droughts. According to California’s DWR, droughts exceeding three years are relatively rare in Northern California, the source of much of the state’s developed water supply. The 1929-34 drought established the criteria commonly used in designing storage capacity and yield of large Northern California reservoirs. Figure 4-7 depicts California’s multi-year historical dry periods from 2000-2019.

**Figure 4-7: Drought Conditions in California – 2000 – 2019**



Source: [U.S. Drought Monitor https://droughtmonitor.unl.edu/Data/Timeseries.aspx](https://droughtmonitor.unl.edu/Data/Timeseries.aspx)



Since the year 2000 there have been several cases of multi-year droughts across California; these are described below:

**2007-2009** – Water years 2007-2009 were the seventh driest three-year period in the measured record for state-wide precipitation and the fifteenth driest three-year period for DWR 8-station precipitation index (a rough indicator of potential water supply available to the State Water Project and Central Valley Project).

**2012-2017** – The water years of 2012-14 stand out as California’s driest three consecutive years in terms of statewide precipitation. The drought occurred at a time of record warmth in California, with new climate records set in 2014 for statewide average temperatures. On January 17, 2014, California declared a drought state of emergency and during this time the state assisted farmers and communities that were most impacted by the drought conditions and helped with drinking water shortages. The state also directed all state agencies to use less water and expand their water conservation campaigns. During this time, these factors have led to excessively dry conditions in the City of Petaluma and the surrounding areas than in past years, often requiring disaster declarations to be enacted to combat drought conditions. Sonoma County declared a Proclamation of Local Emergency Due to Drought Conditions from February 2015 to the end of 2015. On June 1, 2015 the Petaluma City Council imposed Stage 2 (mandatory) restrictions . From June 2015 to February 2016, the City as a whole was required to reduce its overall water use by 16 percent compared to 2013 consumption.

This drought period now marks the second time a statewide proclamation of emergency has been issued for this hazard. On April 17, 2017 Executive Order B-40-17 was issued, which officially ended the drought state of emergency in California, except for Fresno, Kings, Tulare, and Tuolumne counties. Table 4-10 summarizes the drought-related disaster declarations proclaimed for Sonoma County from 1976 through 2019. These declarations include those from FEMA, the USDA’s Secretary of Agriculture, and events noted in the State of California’s 2018 State Hazard Mitigation Plan.

**Table 4-10: Disaster Declarations and Proclamations Related to Drought in Sonoma County**

Declaration or Order	Date
1976 Drought (State)	1976
EM-3023 (FEMA)	1/20/1977
S3248 (Secretary of Agriculture)	2012
S3452 (Secretary of Agriculture)	2012
S3565 (Secretary of Agriculture)	2013
S3569 (Secretary of Agriculture)	2013
S3637(Secretary of Agriculture)	2014
S3743 (Secretary of Agriculture)	2014
S3797 (Secretary of Agriculture)	2014
S3784 (Secretary of Agriculture)	2015
S3943 (Secretary of Agriculture)	2015
S3952 (Secretary of Agriculture)	2016
S3964 (Secretary of Agriculture)	2016
S4163 (Secretary of Agriculture)	2016-2017
S4144 (Secretary of Agriculture)	2017

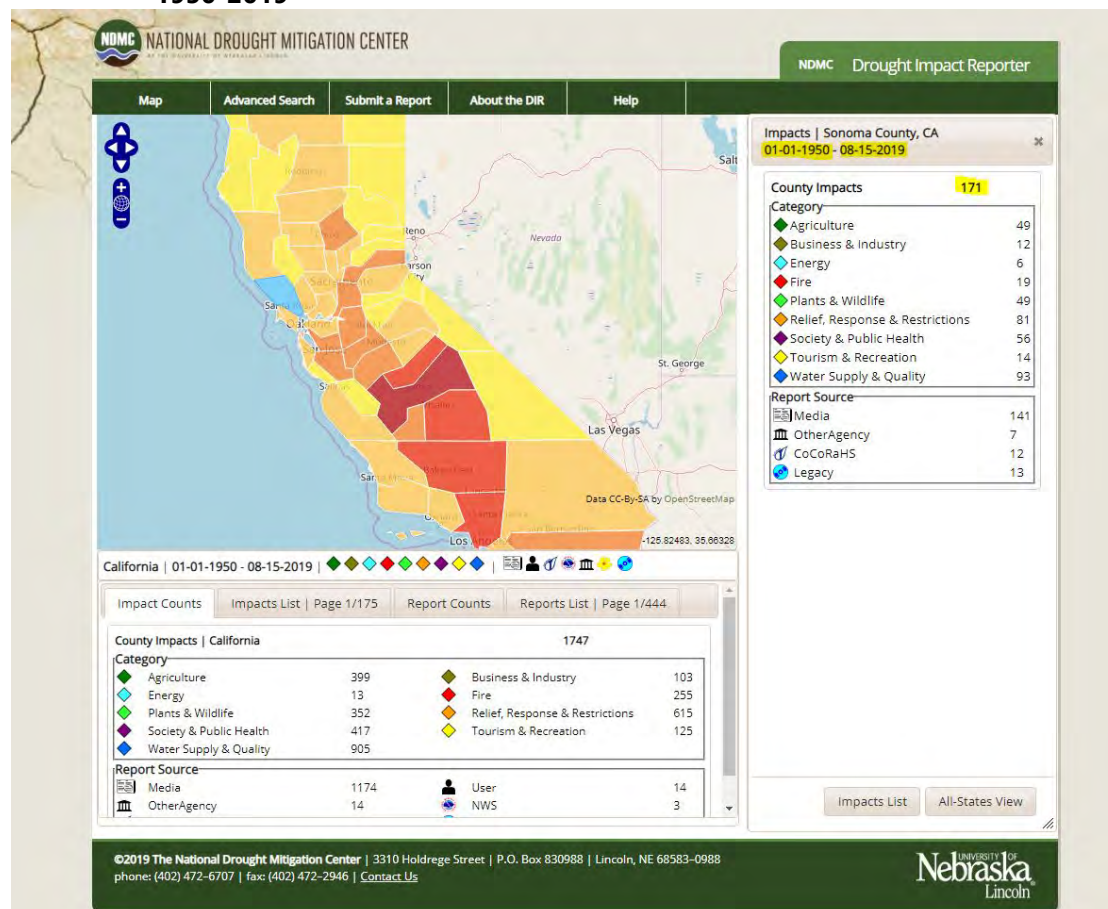
Source: USDA Disaster Designations 2019; California SHMP 2018; FEMA

Figure 4-8 graphically displays the amount of drought-related reported impacts to Sonoma County (United States Drought Impact Reporter 2019). While it is difficult to extract the impacts specifically affecting Petaluma, a total of 171 reports were made within Sonoma County between January 1, 1950 and August 15, 2019. It is assumed that these drought-related impacts for areas across Sonoma County are



likely to have also affected Petaluma at some point or to some extent. Based on the summary of negative effects to Sonoma County since 1950, the categories of water supply/quality have had the most reports, followed by relief, response, and restrictions operations and society and public health. Agriculture and plants and wildlife have also suffered the effects of drought, but to a lesser extent.

**Figure 4-8: Drought Impact Reporter Summarizing Impacts at the County Level in Sonoma County, 1950-2019**



Source: National Drought Mitigation Center Drought Impact Reporter, 2019

### Probability of Future Occurrences

**Likely** – Historical drought data for California and more particularly the Sonoma County municipalities indicate there have been significant droughts and negative effects from water shortages in the past and the present. Based on this data, droughts are likely to affect the City’s Planning Area and surrounding parts approximately every ten years; some of these droughts may persist for multiple years.

### Climate Change Considerations

Scientific studies prepared for various California climate assessments and adaptations strategies show that drought conditions in California are likely to become more frequent and persistent over the next century due to climate change. Temperatures are warming, heat waves are more frequent, and precipitation has become increasingly variable (Natural Resources Agency 2018a). Water resources are also already experiencing the following stresses: population growth, poor water quality, groundwater overdraft, and aging water infrastructure.





The recent drought conditions over the past decade underscore the need to examine water supply and distribution management, conservation, and use policies. California and Sonoma County have experienced a succession of dry spells, and with warmer temperatures the impacts of drought conditions have increased (OEHHA 2018). In an average year, approximately 40 percent of the state's total water supply comes from groundwater, and during a dry year this increases to more than half of the state's water supply, with groundwater acting as a critical buffer against the impacts of drought and climate change (Natural Resources Agency 2018a). The City of Petaluma only uses groundwater in emergencies, but the Petaluma Valley Groundwater Basin has shown to have a reduction in groundwater levels due to the 2012-2015 drought period (City of Petaluma 2015).

According to California's Climate Adaptation Strategy, also referred to as *Safeguarding California Plan: 2018 Update*, climate change is likely to significantly diminish California's future water supply. As a result, the state must change its water management, as climate change will create greater competition for limited water supplies (California Natural Resources Agency 2018b). Similarly, as summarized in the Sonoma County CAP, climate change could result in hotter and drier weather, and more frequent and intense droughts. The CWA (numeric measure of drought stress that quantifies the extent to which plants need for water exceeds moisture available in soil) for the region is projected to increase over this century, producing 10 to 20 percent drier soil conditions in the summer months, leaving less water available for groundwater recharge or runoff into rivers and creeks (RCAP 2016). The greatest increases in soil dryness are projected in the south and southeastern portions of the County, near Petaluma (RCAP 2016). These water management concerns will also impact Sonoma Water, the City's main water supplier. For these reasons, climate change would have a "high" influence on drought hazards, as well as water shortages.

## **Vulnerability Assessment**

### **Property**

Drought impacts are wide-reaching and may be economic, environmental, and societal. The most significant impacts associated with drought in the City's Planning Area are those related to water intensive activities, such as agriculture, municipal water use, commerce, tourism, and recreation. The vulnerability of a water intensive activity to the effects of drought usually depends on its water demand, whether the demand is met, and what water supplies are available to meet the demand. For the City of Petaluma, water allocations go down during a drought, and the City's contractual surface water entitlements may be reduced. According to the 2015 UWMP, because the City relies more on surface water supplies from the Russian River they can also use available groundwater supplies as a buffer during drought conditions. Water restrictions and other conservation measures are typically implemented during extended droughts, and these can result in economic impacts on water utilities managed by the City of Petaluma. Drought conditions can also cause soil to compact and not absorb water efficiently, potentially making areas more susceptible to flooding.

According to the Drought Impact Reporter the Sonoma County recorded a total of 171 impacts to drought in the survey period between 1/1/1950 and 8/15/2019 (69-year period). Of these, the majority of the impacts were associated with Water Supply and Quality; and Relief, Response, and Restrictions. These statistics are shown in Figure 4-8 (above). While the Drought Impact Reporter data reflects impacts at the county-level, the data should be used to develop an ongoing record of drought impacts that can be more specifically tied to events that occur within the City's Planning Area to better understand city-specific vulnerable sectors and impacts.





## People

According to the California Department of Finance (DOF) as of 2017 the City population was around 60,210. The City supplies a majority of its water (95 percent) to residential users. The population is expected to continue to increase in the future. This projected population growth would add additional strain to the surface water supplies. There are also several initiatives in the UWMP (and water contingency plan and groundwater management policies) that emphasize water conservation, and its planned expansion of the City's recycled water system is expected to reduce the water demand for irrigation water in the summer months. Water conservation will also ensure that the existing groundwater remains operational during severe drought conditions and readily available during emergencies.

Drought can also cause public health problems related to poor water quality, and health problems can become exacerbated due to dust. Generally, drought may require conservation of water resources, which means that water use is restricted to essential uses, which may reduce watering for landscaping. The community may also exhibit a range of abilities to prepare for, respond to, and recover from drought hazards, as these conditions impact populations with health-related issues related to heat-related illness, respiratory problems, and people who work outdoors. These conditions can also impact lower-income populations, as food and water prices increase. There are sensitive and socially vulnerable populations residing near the downtown area of the Planning Area that may be the most susceptible to water restrictions, and health-related illnesses. Socially vulnerable populations may also be sensitive to increases in water rates and in turn, food prices.

## Economy

Drought impacts to the local and regional economy can be difficult to quantify but can be extensive and long-lasting depending on the circumstances during and after a severe drought event. If water resources are limited, effects would be more severe for industries that rely on large amounts of water, and any prolonged drought would intensify these impacts. Sectors critical to the economy such as commerce, distribution, agriculture, tourism, related environmental resources, municipal and industrial water supply, key city assets, energy generation, and even socioeconomic aspects can be affected due to lack of or reduced quality of water resources.

While there are few water intensive agricultural uses within the City's Planning Area, the City does supply agricultural areas outside the City with recycled water and plans to expand services in the future. Long lasting droughts can be indirectly detrimental to the City's water supply but may be mitigated through the expansion of the recycled water facility.

## Critical Facilities and Infrastructure

The most direct impact of drought will be on the City's water supply. Drought can also directly affect the water storage, treatment, and distribution and conveyance systems. Landscaping around city facilities may no longer be maintained during water restrictions, but the risk within the Planning Area will be largely aesthetic.

## Historic, Cultural, and Natural Resources

Severe, prolonged drought can impact the natural environment. Wildlife and natural habitats including the Petaluma River can be affected, including the shrinkage of habitat, habitat fragmentation, reduced food supply for wildlife, and possibly the migration of species in the nearby hillsides that define the City of Petaluma. Prolonged drought can also cause poor soil quality, loss of wetlands, tree mortality (along the periphery of the City's Planning Area), and increased soil erosion.







Tree mortality is identified as a cascading impact that can affect (or worsen) other hazards, such as wildfire and wind conditions. For example, drought-impacted trees can become susceptible to diseases and insect infestations that further exacerbate the risk of tree mortality. One of the most prevailing impacts of drought to the natural environment is the increased risk of wildfires, as seen during the 2017-2018 wildfire seasons. Wildfires now burn larger and more intensely during dry conditions and are happening outside the typical fire season. Lastly, drought conditions can cause soil to compact and not absorb water well, potentially making an area more susceptible to flooding.

Impacts to the City's historic and cultural building inventory may be negligible. The City's open spaces and park and public lands can suffer during droughts, though the ability of the City to use recycled water for irrigation purposes can offset this vulnerability.

### Future Development

Future development and water conservation are the focus of each update to the City of Petaluma's UWMP and this planning process specifically address drought conditions and water contingencies. In 2015, the City of Petaluma provided water to more than 61,798 customers, and the UWMP describes how current and future water resources and demands within the City's service area will be managed to provide adequate and reliable water supply.

As the population grows over time the City will have to revise their reliability and supply projections from the Sonoma Water. Sonoma Water may reduce water deliveries as water levels in major reservoirs decrease. Therefore, as new development occurs in the City's Planning Area it will be important to assess the availability and reliability of multiple water sources, such as groundwater and recycled water. The City currently supplies a majority of water supply to single family residents and is expecting demand for potable and raw water to increase by 70 percent by 2040. Consistent with Senate Bill 610, any proposed developments in the City are mandated to estimate future water uses and identify water supplies that may be used to meet their uses. This water supply assessment process is intended to ensure that adequate water supplies exist to support new growth.

### Risk Summary

- There have been six multi-year droughts since 1950, three of which have occurred since 2000. The most recent drought lasted from 2012 to 2017 and resulted in a declared state of emergency.
- 171 drought impact reports were made within Sonoma County between 1950 and 2019.
- As of 2015, the City of Petaluma was supplying 6,744 acre-feet of water, the majority of which is supplied to single family residential properties. The City's 2015 UWMP projects that demand for potable and raw water will increase to 9,623 acre-feet, or by 70 percent by the year 2040.
- Population is expected to increase to 73,350 by 2040, or an increase of about 13,140 people per year; this projected growth would add additional strain to the water supply, particularly during future severe drought events.
- Climate change projections indicate the region will experience more frequent and intense droughts due to drier soil conditions in the summer months, leaving less water available for groundwater recharge.
- The enforcement of water conservation policies, regular updates to the UWMP, and the expansion of the City's recycled water facility will help ensure the City of Petaluma is more resilient to drought events in the future.
- Overall, the significance of extreme drought is **Medium**.





### 4.3.3 Earthquakes

#### Hazard Description

An earthquake is caused by a sudden slip on a fault. Stresses in the earth's outer layer push the sides of the fault together. Stress builds up, and the rocks slip suddenly, releasing energy in waves that travel through the earth's crust and cause the shaking that is felt during an earthquake. The amount of energy released during an earthquake is usually expressed as a magnitude and is measured directly from the earthquake as recorded on seismographs. Another measure of earthquake severity is intensity. Intensity is an expression of the amount of shaking at any given location on the ground surface (see discussion in the Extent section). Seismic shaking is typically the greatest cause of losses to structures during earthquakes.

#### Seismic Hazards

Earthquakes can cause structural losses, injury, and possibly death, as well as damage to infrastructure such as water, power, gas, communication, and transportation networks and systems. The degree of damage depends on many interrelated factors. Among these are the magnitude, focal depth, distance from the causative fault, source mechanism, duration of shaking, high rock accelerations, type of surface deposits or bedrock, degree of consolidation of surface deposits, presence of high groundwater, topography, and the design, type, and quality of building construction.

Primary hazards associated with seismic activity include surface rupture along faults, ground shaking, and associated building failure. Secondary hazards result from the interaction of ground shaking with existing ground instabilities or facilities and include liquefaction, settlement, debris flows, landslides, tsunamis and seiches, and perhaps flooding or wildfires from broken pipelines, gas, or electrical infrastructure.

#### Ground Shaking

When movement occurs along a fault, the energy generated is released as waves, which cause ground shaking. Ground shaking intensity varies with the magnitude of the earthquake, the distance from the epicenter, and the type of rock or sediment through which the seismic waves move. The geological characteristics of an area can be a greater hazard than the area's distance to the earthquake epicenter.

The City of Petaluma is situated within an area of high potential seismic activity (the San Francisco Bay Region), and so the fault systems within and around the City have the potential to produce earthquakes that could impact the City of Petaluma significantly (e.g. the San Andreas Fault System which is currently active). A high-magnitude earthquake on one of these faults could cause moderate to high ground shaking in the City. Figure 4-9 below is an earthquake shaking map for the City of Petaluma that is based on the two percent probability of occurrence in 50 years, per the USGS analyses of nearby faults. The probability of occurrence map represents a worst-case shaking scenario and shows that the City of Petaluma will experience strong ground shaking, which has the potential to be damaging.

#### Liquefaction Susceptibility

Liquefaction can be defined as the loss of soil strength or stiffness due to a buildup of pore-water pressure during a seismic event, and is associated primarily with relatively loose, saturated fine to medium-grained unconsolidated soils. Seismic ground shaking of relatively loose, granular soils that are saturated or submerged can cause the soils to liquefy and temporarily behave as a dense fluid. If this layer is at the surface, its effect is much like that of quicksand for any structure located on it. If the liquefied layer is in the subsurface, the material above it may slide laterally depending on the confinement of the unstable mass. Liquefaction is caused by a sudden temporary increase in pore-water pressure due to





seismic densification or other displacement of submerged granular soils. Liquefiable soil conditions are not uncommon in alluvial deposits in moderate to large canyons and could also be present in other areas of alluvial soils where the groundwater level is shallow (i.e. 50 feet below the surface). Bedrock units, due to their dense nature, are unlikely to present a liquefaction hazard.

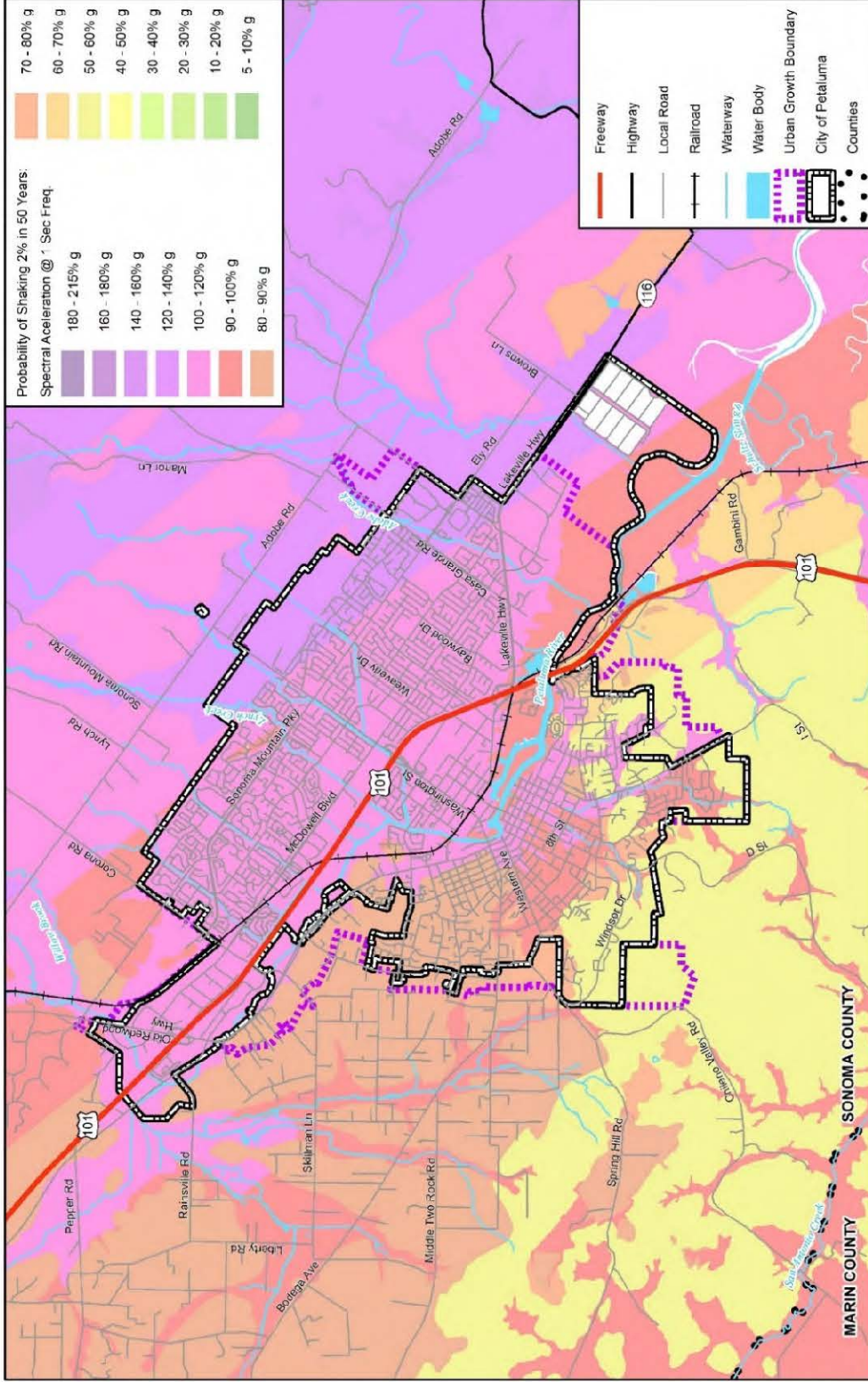
According to the USGS Earthquake Hazards Program data for liquefaction susceptibility, there are several areas of liquefaction susceptibility in the City of Petaluma and its Planning Area (see Figure 4-10 below). The majority of the city is in the moderate liquefaction susceptibility zone, while parts of it in the center and close to Highway 101 (near Washington Street and Western Avenue) are within more severe liquefaction susceptibility zones. Approximately 1,851 acres fall in the high liquefaction susceptibility areas within Petaluma and 559 acres in the very high liquefaction susceptibility areas. Most of these highly susceptible categories follow the Northwestern Pacific railroad, which is similar to the Petaluma River's general location as it flows from the northwest of the City, though the center and downtown area, then out through the center-east.

Earthquakes can also lead to secondary hazards including flooding, building structure failure, debris flows, and fire (among others). The City is at risk of flooding from dam or levee failure as well as risk of broken pipelines and critical structures such as the water treatment facility on the east of the City.





**Figure 4-9: Potential Ground Shaking Probability in the City of Petaluma**



0 2 4 Miles

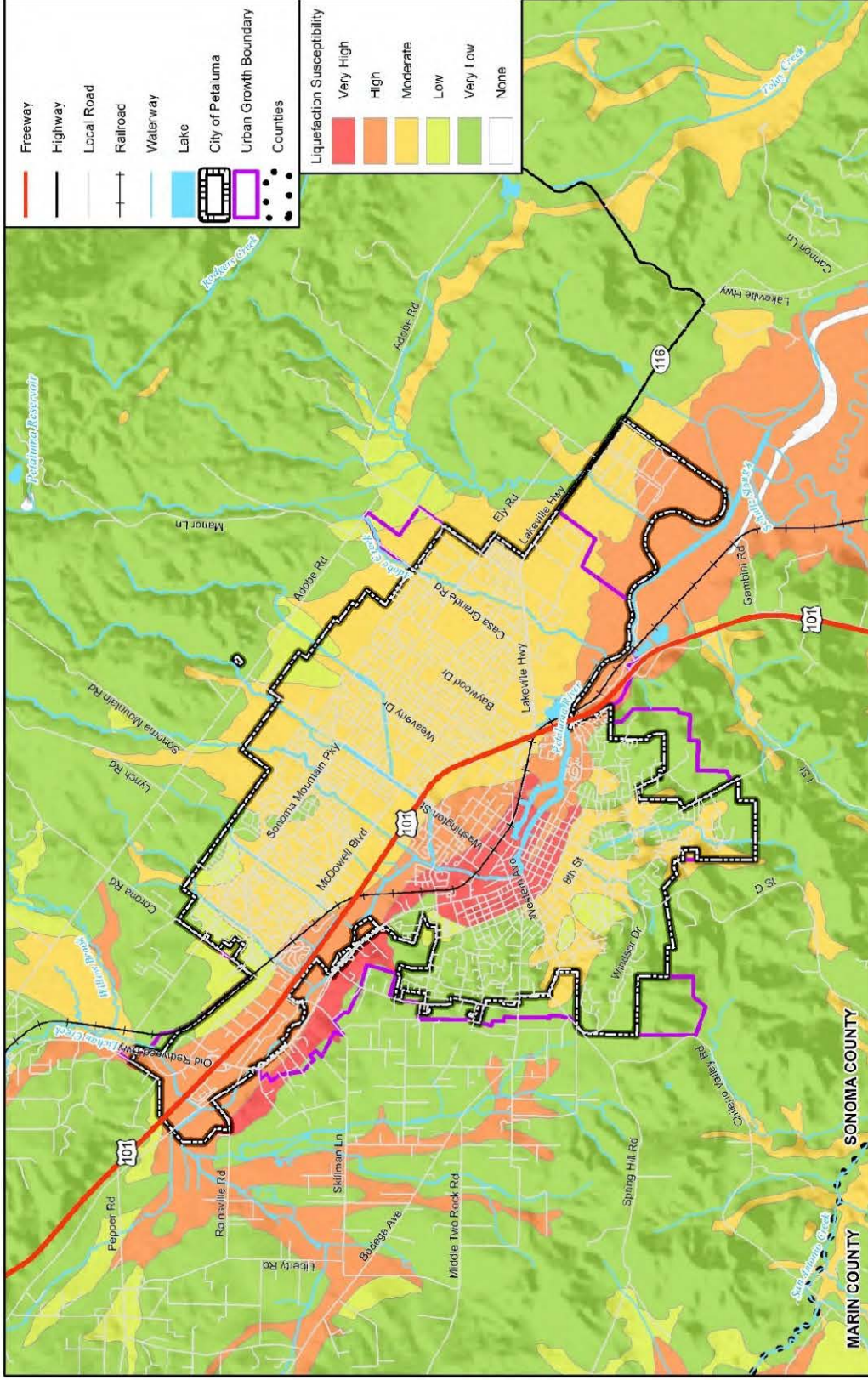


Map compiled 10/2019;  
intended for planning purposes only.  
Data Source: City of Petaluma, CalTrans,  
US Census TIGER Database, CGS, USGS





Figure 4-10: Liquefaction Susceptibility in the City of Petaluma



Map compiled 10/2019;  
intended for planning purposes only.  
Data Source: City of Petaluma, CalTrans,  
US Census TIGER Database, USGS





## Landslide Potential and Susceptibility

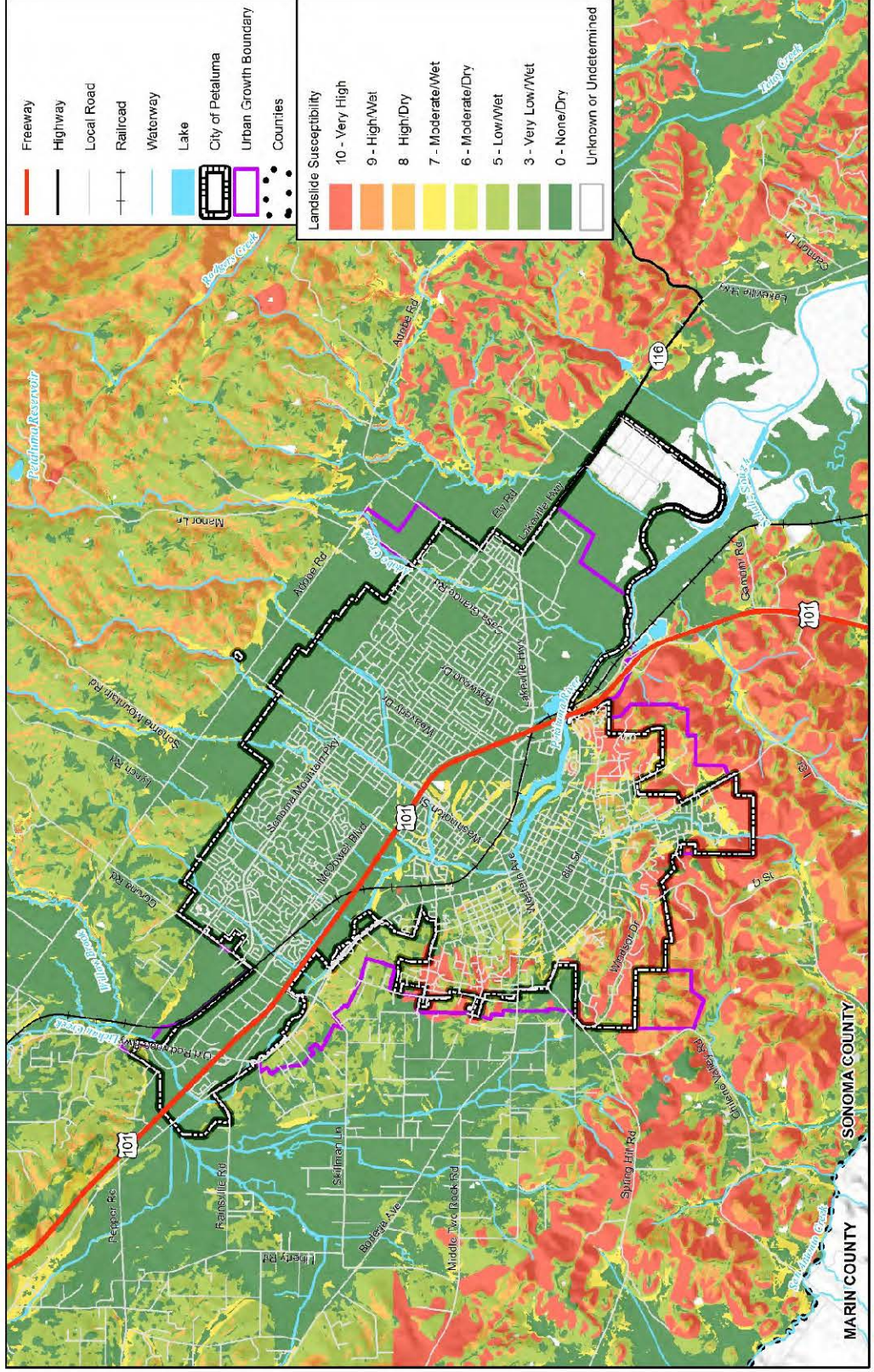
A landslide is a geologic hazard where the force of gravity combines with other factors to cause earth material to move or slide down an incline. Some landslides move slowly and cause damage gradually, whereas others move so rapidly that they can destroy property and take lives suddenly and unexpectedly. Slopes with the greatest potential for sliding are between 34 degrees and 37 degrees. Although steep slopes are commonly present where landslides occur, it is not necessary for the slopes to be long.

There are predictable relationships between local geology and landslides. The down-slope movement of earth material as a landslide is part of the continuous, natural process of erosion. This process, however, can be influenced by a variety of causes that change the stability of the slope. Slope instability may result from natural processes, such as the erosion of the toe of a slope by a stream, or by ground shaking caused by an earthquake. Slopes can also be modified artificially by grading, or by the addition of water or structures to a slope. Landslide problems can be caused by land mismanagement, particularly in mountain, canyon, and coastal regions. In areas burned by forest and brush fires, a lower threshold of precipitation may initiate landslides and debris flows. As human populations expand over more of the land surface, these processes become an increasing concern. As such, development that occurs on a slope can substantially increase the frequency and extent of potential slope stability hazards. Knowledge of these relationships can improve planning and reduce vulnerability. Slope stability is dependent on many factors and their interrelationships, including rock type, moisture content, slope steepness, and natural or man-made undercutting.

The California Geological Survey (CGS) along with the California Department of Conservation have generated a landslide dataset that classifies susceptibility in California to various degrees, from Very High (the most potentially dangerous) to a none or dry category (the least risk). Unknown or undetermined areas exist as well, as displayed in Figure 4-11 below. In Petaluma the majority of the Planning Area is in the lower risk categories of landslide susceptibility, meaning that the local soils and geology are not very likely to lead to landslide activity. However, some higher landslide susceptibility areas fall inside the Planning Area's boundary, such as in the west and south of the City where there is hilly terrain. During heavy rainfall events, added precipitation in soil can result in increased landslide potential and susceptibility in these higher landslide susceptible areas in the City.



Figure 4-11: Landslide Susceptibility in the City of Petaluma and Its Planning Area



0 2 4 Miles

Map compiled 10/2019;  
intended for planning purposes only.  
Data Source: City of Petaluma, CalTrans,  
US Census TIGER Database, CGS/CA  
Dept. of Conservation





## Faults

California is a seismically active area with numerous faults throughout the region. An active fault is defined by CGS as a fault that has had surface rupture or displacement within the last 11,000 years (Holocene times). This does not mean, however, that faults having no evidence of surface displacement within the last 11,000 years are necessarily inactive. Potentially active faults are those that have shown displacement within the last 1.8 million years (Quaternary period) but have not moved within the Holocene times. Any fault older than Pleistocene (> 1.8 million years) is considered inactive and dormant. Although based on the history of fault movement and seismic activity in the area, it is known that the main faults posing risk to the City are the San Andreas Fault system and the Healdsburg-Rodgers Creek Fault (see the Location section of this chapter for additional details).

As shown in Figure 4-12, there are several earthquake faults classified as Quaternary (those which are recognized at the surface and which have shown activity in the past 1.6 million years, or during the geologic Quaternary epoch) in the Planning Area. Additional faults are present which are located farther from the City of Petaluma than is shown in the map (and could cause seismic activity in the future). The faults illustrated in Figure 4-12 are summarized below:

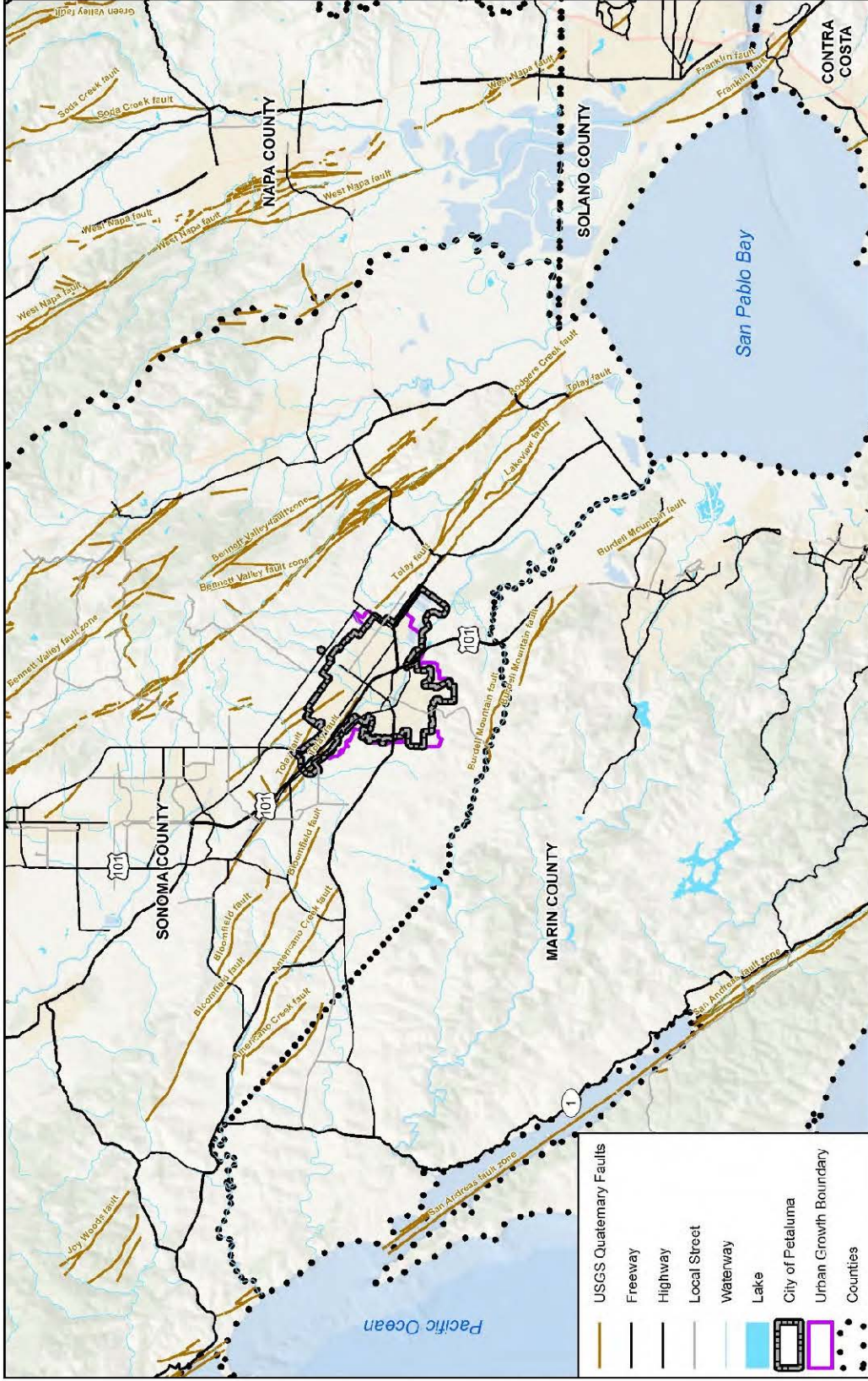
- Lakeview fault on the southeast of the City;
- Part of Tolay fault on the southeast of the City boundary, as well as reaching on the northwest portion of the City;
- Bennett Valley fault zone, to the northeast of the City but outside of its limits; and
- The Rodgers Creek fault, along Rodgers Creek to the northeast of the City but outside of the limits.







Figure 4-12: Earthquake Faults near the Planning Area



20 Miles

10

0

Map compiled 10/2019;  
intended for planning purposes only.  
Data Source: City of Petaluma, CalTrans,  
US Census TIGER Database, CGS, USGS





## Location

There are two notable faults adjacent to the City of Petaluma, which are discussed in more detail below. Additional faults nearby the Planning Area are illustrated in Figure 4-12. There is one active fault (the San Andreas Fault) and potentially active fault (such as the Healdsburg-Rodgers Creek Fault) that fall outside the Planning Area but have historically been the source of earthquakes felt in Petaluma. These local and regional faults are described in more detail below based on information summarized in the Sonoma County Hazard Mitigation Plan from 2016 as well as the City of Petaluma General Plan.

**San Andreas Fault.** The San Andreas Fault is located approximately 20 miles west of the Planning Area. It is a shallow fault and is considered the most active fault in California. Historically, the San Andreas Fault system is the main fault responsible for earthquakes felt in the City and is also expected to continue being the source of future earthquake activity.

**Healdsburg-Rodgers Creek Fault.** The Healdsburg-Rodgers Creek Fault is an active fault associated with the Santa Rosa Plain, in Sonoma County. It is a strike slip fault, measuring around 117 kilometers in length. The most notable earthquake activity along this fault took place in 1969 during the Santa Rosa Earthquakes. These were a magnitude 5.6 and 5.7 strikes early October of that year, in Santa Rosa County to the north of the City of Petaluma.

## Extent (Magnitude/Severity)

**Catastrophic** – Extent (meaning the severity of an earthquake) refers to the amount of energy released during an earthquake and is usually expressed in terms of intensity or magnitude. These metrics are measured directly from the earthquake as recorded on seismographs.

Intensity represents the observed effects of ground-shaking at any specified location, and earthquake shaking decreases with distance from the earthquake epicenter. Intensity is an expression of the amount of shaking at any given location on the ground surface based on felt or observed effects. Seismic shaking is typically the greatest cause of losses to structures during earthquakes. Intensity is measured with the Modified Mercalli Intensity (MMI) scale (see Table 4-11).

Magnitude represents the amount of seismic energy released at the hypocenter of an earthquake and is based on the amplitude of the earthquake waves recorded. Seismologists have developed several magnitude scales; one of the first was the Richter Scale, developed in 1932 by Dr. Charles F. Richter of the California Institute of Technology. The Moment Magnitude Scale is the current scale used to quantify the magnitude or strength of the seismic energy released by an earthquake.

Table 4-11 below compares magnitude and the felt effects associated with the MMI scale. Damage typically occurs in MMI of VII or above and based on Figure 4-9. The majority of the City is found in areas where spectral acceleration is expected to surpass the 70 percent g (or gravitational velocity); this means that there is a high probability of the City experiencing strong seismic movements in the next few decades.



**Table 4-11: Magnitude and Mercalli Intensity Scale Measurements and Associated Characteristics**

Magnitude	Mercalli Intensity	Effects	Frequency
Less than 2.0	I	Micro-earthquakes, not felt or rarely felt; recorded by seismographs.	Continual
2.0-2.9	I to II	Felt slightly by some people; damages to buildings.	Over 1M per year
3.0-3.9	II to IV	Often felt by people; rarely causes damage; shaking of indoor objects noticeable.	Over 100,000 per year
4.0-4.9	IV to VI	Noticeable shaking of indoor objects and rattling noises; felt by most people in the affected area; slightly felt outside; generally, no to minimal damage.	10K to 15K per year
5.0-5.9	VI to VIII	Can cause damage of varying severity to poorly constructed buildings; at most, none to slight damage to all other buildings. Felt by everyone.	1K to 1,500 per year
6.0-6.9	VII to X	Damage to a moderate number of well-built structures in populated areas; earthquake-resistant structures survive with slight to moderate damage; poorly designed structures receive moderate to severe damage; felt in wider areas; up to hundreds of miles/kilometers from the epicenter; strong to violent shaking in epicentral area.	100 to 150 per year
7.0-7.9	VIII <	Causes damage to most buildings, some to partially or completely collapse or receive severe damage; well-designed structures are likely to receive damage; felt across great distances with major damage mostly limited to 250 km from epicenter.	10 to 20 per year
8.0-8.9	VIII <	Major damage to buildings, structures likely to be destroyed; will cause moderate to heavy damage to sturdy or earthquake-resistant buildings; damaging in large areas; felt in extremely large regions.	One per year
9.0 and Greater	VIII <	At or near total destruction - severe damage or collapse to all buildings; heavy damage and shaking extends to distant locations; permanent changes in ground topography.	One per 10-50 years

Source: USGS



## Previous Occurrences

Earthquakes have occurred nearby the Planning Area in the past (within Sonoma County and adjacent areas). According to the USGS, a recent earthquake event of a magnitude of 6.0 took place near South Napa, about 23 miles to the east of the City of Petaluma Planning Area. This event occurred the morning of August 24, 2014 and had a reported intensity of VII in the Mercalli scale. The earthquake was on the West Napa Fault, which was not mapped under the Alquist-Priolo earthquake fault hazard zone and was the largest event of this kind in the San Francisco Bay area since the 1989 Loma Prieta earthquake. The seismic activity of this event had an estimated 11.1 kilometers of depth. Thousands of structures across Sonoma County were damaged, and hundreds of people were injured during the quake across the affected areas in the County. One person was reported as being killed during the earthquake. Because of the extensive damages, the California Governor issued an emergency proclamation on August 24, 2014, and the U.S. President declared the incident a major disaster on September 11, 2014. Total economic losses were around \$400 million, and state and federal assistance surpassed the \$30 million mark. The Small Business Administration granted over \$21 million in low-interest disaster loans to local businesses and other agencies affected by the event.



In 2014 a 6.0 magnitude earthquake occurred in the southern portion of the City of Napa on the West Napa Fault. The event was the largest earthquake in the San Francisco Bay Area since the 1989 Loma Prieta earthquake. Total damage in the southern Napa and Vallejo areas ranged from \$362 million to \$1 billion. Photo Credit: LA Times 2014

Other recent earthquake events in the area include smaller magnitude earthquakes such as:

- A magnitude 2.8 earthquake with reported intensity of III, on December 24, 2017. This event's epicenter was about 6 kilometers west of Temelec, near Sonoma. The depth of the event was of 1 kilometer.
- A magnitude 2.7 earthquake with reported intensity of II, on November 17, 2013. The epicenter of this incident was about 5 kilometers east-southeast of Penngrove, north of Petaluma. The depth of the event was of 4.4 kilometers.
- A magnitude 3.3 earthquake took place on July 25, 2011 and had a reported intensity of IV. Its depth was of 6.7 kilometers and the epicenter was located a few kilometers north-northwest of Petaluma.

## Probability of Future Occurrences

**Likely** – Given the information presented herein as well as recent quake activity history, earthquake hazards are expected to be a likely occurrence in the City of Petaluma as well as in Sonoma County. It is estimated that similar seismic activity events may occur every 20 to 30 years in the Planning Area and the overall San Francisco Bay region (State of California Seismic Safety Commission).

The USGS noted in 2008 that there was a 63 percent probability of a strong earthquake (of magnitude 6.7 or greater) striking the San Francisco Bay Region (of which Petaluma is part) by 2032. The probability of having a strong earthquake (of this magnitude 6.7 or greater) generated from the Healdsburg-Rodgers Creek Fault was then estimated at about 27 percent while the San Andreas Fault had an estimated 21 percent chance of causing a strong earthquake by 2032 (USGS 2003). However, more recent information released in 2015 by the USGS new Uniform California Earthquake Rupture Forecast 3, or UCERF3, considers additional parameters and data. This new criteria and advanced technology, the updated results



estimate that the actual chance of a strong earthquake of magnitude 6.7 or above is around 72 percent in the San Francisco Bay Region. The San Andreas fault now has a 33 percent chance of rupturing and causing earthquake activity, though the Rodgers Creek fault system's probability has decreased to about 15 percent chance of rupture (Uniform Earthquake Rupture Forecast Version 3 2014).

### **Climate Change Considerations**

While climate change is not expected to directly affect earthquake frequency or intensity it could exacerbate indirect or secondary impacts of earthquakes. For example, climate change could increase the frequency and intensity of extreme precipitation events, in turn increasing the probability of landslides and liquefaction events during an earthquake if the earthquake coincided with a wet cycle. Increased precipitation due to climate change will also result in increased frequency of landslide potential, as the added weight of rain-saturated soils on steeper hill slopes and the weakening of slopes caused by the pressure groundwater exerts on porous hillsides could trigger slope failure (SHMP 2018). These impacts are more likely to occur along the southwestern edge of the City's Planning Area where there is higher landslide potential. For these reasons, climate change would have a "medium" influence on earthquake hazards, but specifically landslide susceptibility within the City.

### **Vulnerability Assessment**

Ground shaking is the primary hazard related to earthquake activity. Many factors affect the survivability of structures and systems from earthquake-caused ground motions. These factors include proximity to the fault, direction of rupture, epicentral location and depth, magnitude, local geologic and soils conditions, types and quality of construction, building configurations and heights, and comparable factors that relate to utility, transportation, and other network systems. Ground motions become structurally damaging when average peak accelerations reach 10 to 15 percent of gravity, average peak velocities reach 8 to 12 centimeters per second, and when the MMI Scale is about VII, which is considered to be very strong (general alarm; walls crack; plaster falls).

Fault rupture itself contributes very little to damage unless the structure or system element crosses the active fault. In general, newer construction is more earthquake resistant than older construction because of improved building codes and enforcement. Manufactured housing is very susceptible to damage because rarely are the foundation systems braced for earthquake motions. Locally generated earthquake motions, even from very moderate events, tend to be more damaging to smaller buildings, especially those constructed of unreinforced masonry.

The HMPC noted that the City of Petaluma's unreinforced masonry building (URM) inventory was initiated in 1992 based on a resolution to strengthen and upgrade the City's URM buildings as required by local and state regulations (with more details available in the Petaluma Ordinance No. 1882, Section 17.34.110). The URM reinforcement resolution (No. 92-48 N.C.S. of the City of Petaluma), required the URM buildings to be retrofitted by the year 2017 (for Group IV, which was the last priority group), though the time limits varied by group types. Group I URM structures were at highest risk of failure, with Groups II, III, and IV to follow in terms of risk category so that Group IV was at lowest risk of failure. Based on the resolution, it was noted that 22 buildings in the City were categorized under Group I; 17 buildings were categorized under Group II; 27 buildings were categorized under Group III; and, 32 buildings were categorized under Group IV, for a total of 98 URM inventoried structures. Given this URM retrofit process, it is unlikely that the City of Petaluma continues to have URM structures susceptible to seismic movement events, which in turn reduces the City's overall structure exposure and risk.





Other common impacts from earthquakes include damage to infrastructure and buildings (e.g., crumbling of unreinforced masonry, failure of architectural facades, rupturing of underground utilities, and road closures). Earthquakes also frequently trigger secondary hazards, such as dam and levee failures, flooding, and fires that can become disasters themselves.

FEMA's loss estimation software, Hazus-MH (which originally stood for 'Hazards U.S. '), was used to analyze the City's vulnerability to earthquakes, at the census tract level (for 15 tract units that cover the City of Petaluma, displayed in Figure 4-13 below). Note that these census tract boundaries do not neatly line up with the City's boundary, and as such a slightly larger area than that covered in this planning context was necessary to include Petaluma. Because of these boundary differences, the damage and loss estimates may be slightly exaggerated (given the larger coverage of structures and population).

### **2,500-Year Probabilistic Earthquake Scenario**

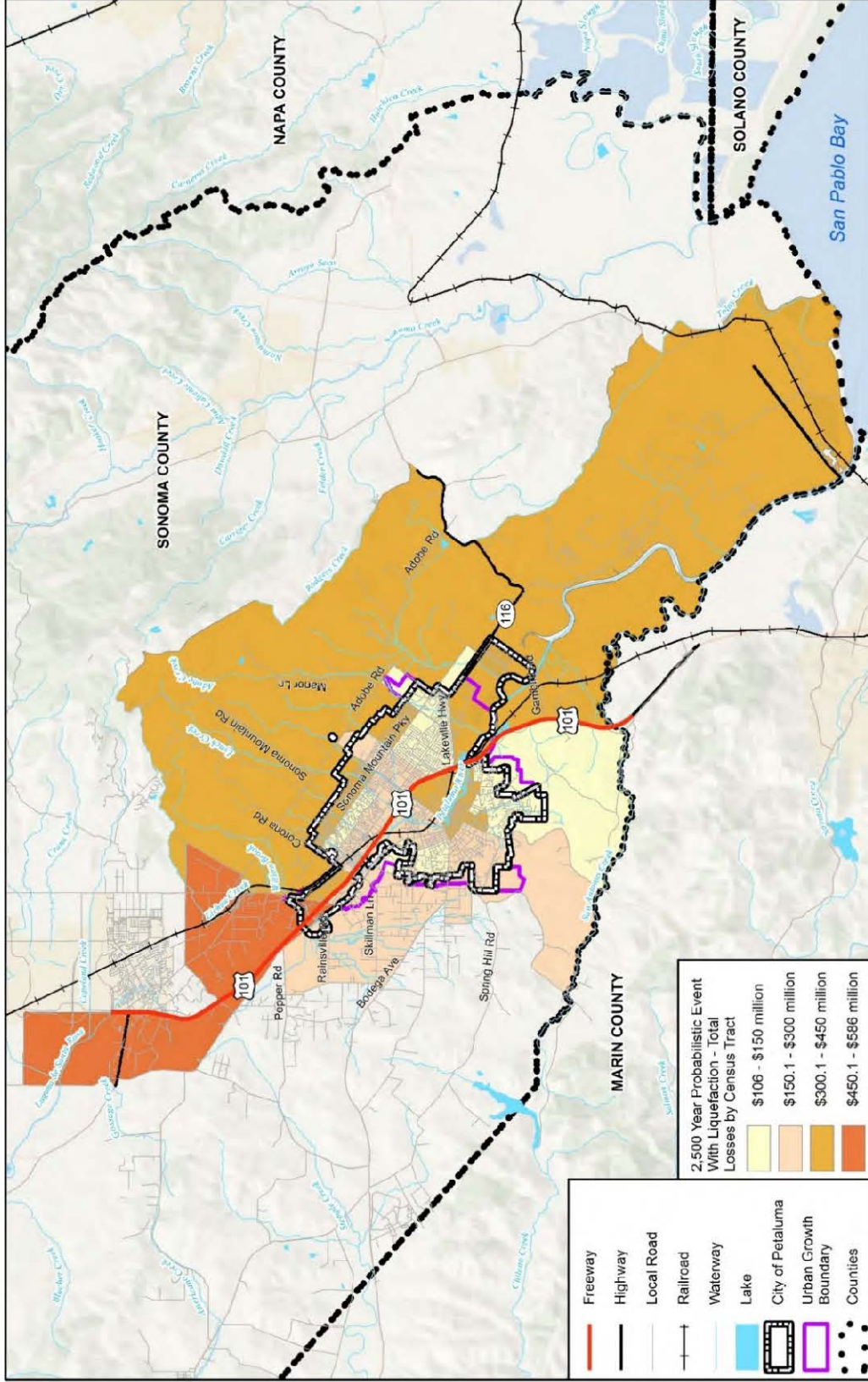
The 2,500-year probabilistic Hazus-based earthquake scenario results include liquefaction susceptibility. Loss estimates and vulnerability assessment discussions are based on the following subsections: property; people; the local economy; critical facilities and infrastructure; historic, cultural, natural resources; and future development in the Planning Area.

The total losses by census tract are shown in Figure 4-13. Refer to Section 4.1.1 and FEMA's Hazus 4.0 Loss Estimation Tool for more information on the Hazus tool and its analysis functions. This methodology was selected to support the vulnerability assessment, as it is a national standard for modelling earthquake loss. To evaluate potential losses associated with earthquake activity in the Planning Area, a Hazus 2,500-year probabilistic scenario including liquefaction susceptibility was run for the City's 15 census tracts, using a Magnitude of 7.0 as the parameter that would simulate a strong earthquake. Due to these inputs, this 2,500-year scenario with liquefaction susceptibility represents a worst-case level of shaking that considers multiple faults in the region. Hazus estimates the number of people displaced, the number of buildings damaged and their type (e.g. construction material, occupancy class), the number of casualties, and the damage to transportation systems and utilities (e.g. critical facilities).





**Figure 4-13: Hazus 2,500 Year Probabilistic Earthquake Scenario with Liquefaction Susceptibility – Total Losses by Census Tract**



Map compiled 10/2019;  
intended for planning purposes only.  
Data Source: City of Petaluma, CalTrans,  
US Census TIGER Database, Hazus 4.0





A summary of the key losses based on the Hazus earthquake analysis results included the following:

- Total economic loss estimated for the earthquake was \$3.63 billion, which includes building losses and lifeline related losses based on the Hazus inventory for the Planning Area.
- Building-related losses, including direct building damages and business interruption losses, totaled \$3.47 billion.
- \$484.9 million in losses came from income related losses from wage-related, capital-related, rental properties, and relocation costs, while almost \$3 billion came from capital stock losses related to structural, contents-based, and inventory property categories.
- 14 percent of the estimated losses were related to business interruptions.
- 14,179 buildings (53 percent of total in the region) would be at least moderately damaged; 2,545 of those buildings would be damaged beyond repair.
- Residential structures made up 47 percent of the total earthquake-induced losses.
- \$78.8 million in losses are associated with transportation system economic damages and losses (e.g. highways, buses, airport facilities and related infrastructure).
- \$89.4 million in losses are associated with utility and lifeline system economic damages and losses (e.g. potable water, wastewater, natural gas, oil systems, communications, and related infrastructure).
- The mid-day earthquake (2 p.m.) caused the most injuries and casualties: 2,131 injuries and 162 casualties.
- The model estimates that a total of 740,000 tons of debris will be generated. Brick and Wood structures comprise 31 percent of the total, with the rest being Reinforced Concrete and Steel materials.
- Around 25,875 households are expected to suffer from potable water or electric power losses, or both, in the first day of the earthquake event.
- Of the total 41 essential facilities considered by the Hazus earthquake scenario for the planning area (hospitals, schools, emergency operations centers, police stations, and fire stations), 7 will be at least moderately damaged.
- Before the earthquake, the region had 82 hospital beds available for use. On the day of the earthquake, the model estimates that only 23 hospital beds (28 percent) would be available for use by patients already in the hospital and those injured by the earthquake.

## Property

Significant earthquakes can cause damages to buildings, private and public property, and other infrastructure. The number of properties at risk is also based on when the majority of development was constructed in the City's Planning Area and whether that development was developed after the City adopted the latest state seismic code. The California State Building Code (CBC) was modified several times since 1960, which resulted in code requirements that directly affected the structural integrity of development in California. According to the HMPC, the City of Petaluma adopted the 2016 CBC, which included the building and seismic code improvements, and most redevelopment in the City's Planning Area occurred during the past 40 years when the City enforced these new code requirements. The Hazus earthquake results also accounted for the improved seismic codes in the model.

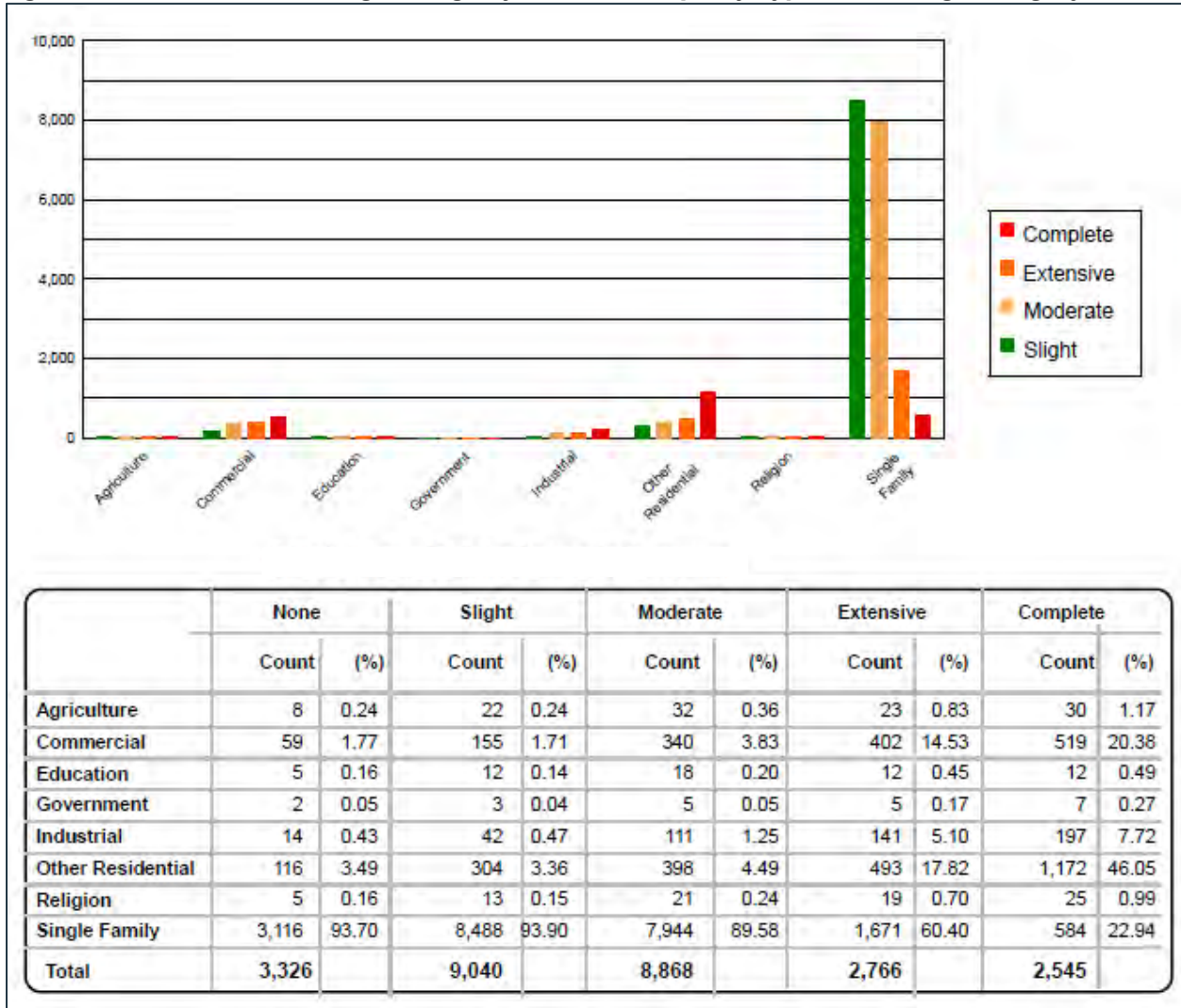
Hazus estimates that 14,179 buildings (53 percent of the total buildings in the region) would be at least moderately damaged, while 2,545 of those buildings would be damaged beyond repair by the earthquake scenario. A majority of the buildings experiencing damage are residential structures, and wood frame





construction makes up the majority of building/structure material in the planning area’s inventory. Figure 4-14 summarizes the specific estimated damages to buildings based on occupancy and damage category.

**Figure 4-14: Estimated Building Damage by General Occupancy Type and Damage Category**



Source: Hazus 4.0

With a majority of the buildings in the Planning Area being residential, the Hazus model estimates that over 47 percent of the total losses incurred by this earthquake scenario are single family homes and other residential categories. The building inventory in the region varies in terms of construction types. A large number of buildings are also constructed of wood materials, though the building inventory includes URM buildings and manufactured housing. These types of wood, masonry, and manufactured housing structures are particularly vulnerable to ground shaking in an earthquake event. Table 4-12 describes the Hazus results of expected building damage by building type. Most buildings/structures found are expected to sustain slight to moderate damages.





**Table 4-12: Expected Building Damage by Building Type (All Building Design Levels)**

	None		Slight		Moderate		Extensive		Complete	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Wood	3,246	97.61	8850	97.90	8,283	93.40	1,742	62.97	623	24.47
Steel	8	0.23	23	0.25	91	1.03	158	5.69	212	8.33
Concrete	19	0.58	54	0.60	94	1.06	100	3.60	139	5.47
Precast	10	0.30	33	0.36	100	1.12	126	4.57	170	6.69
RM	41	1.25	68	0.75	171	1.93	214	7.73	233	9.14
URM	1	0.03	4	0.04	18	0.20	30	1.08	74	2.92
MH	1	0.02	8	0.09	111	1.25	397	14.35	1,094	42.98
<b>Total</b>	<b>3,326</b>		<b>9,040</b>		<b>8,868</b>		<b>2,766</b>		<b>2,545</b>	

\*Note:  
 RM Reinforced Masonry  
 URM Unreinforced Masonry  
 MH Manufactured Housing

Source: Hazus 4.0

## People

Hazus estimates the number of people that would be injured or killed by the 2,500-probabilistic earthquake scenario, which includes liquefaction susceptibility. The casualties are broken down into four severity levels. Level 1 means that injuries occur but do not need hospitalization (i.e. the lowest level, causing the least damages or injuries), through to Level 4, where victims are killed by the earthquake (i.e. the highest, or worst, of the levels). The estimates are also provided for three times of the day which represent the periods of a standard working day when different sectors of the community are likely at their peak occupancy loads (e.g. in business/office settings versus residing at home). As shown in Table 4-13 below, the highest number of injuries and casualties are estimated to occur in the early afternoon (2 p.m.) with the greatest impacts on the commercial and educational sectors when those sector loads are considered to be at their maximum. The 2 p.m. time has the greatest potential for fatalities, with an estimate of 162, followed by the 5 p.m. scenario which estimates 108 fatalities (more information below).

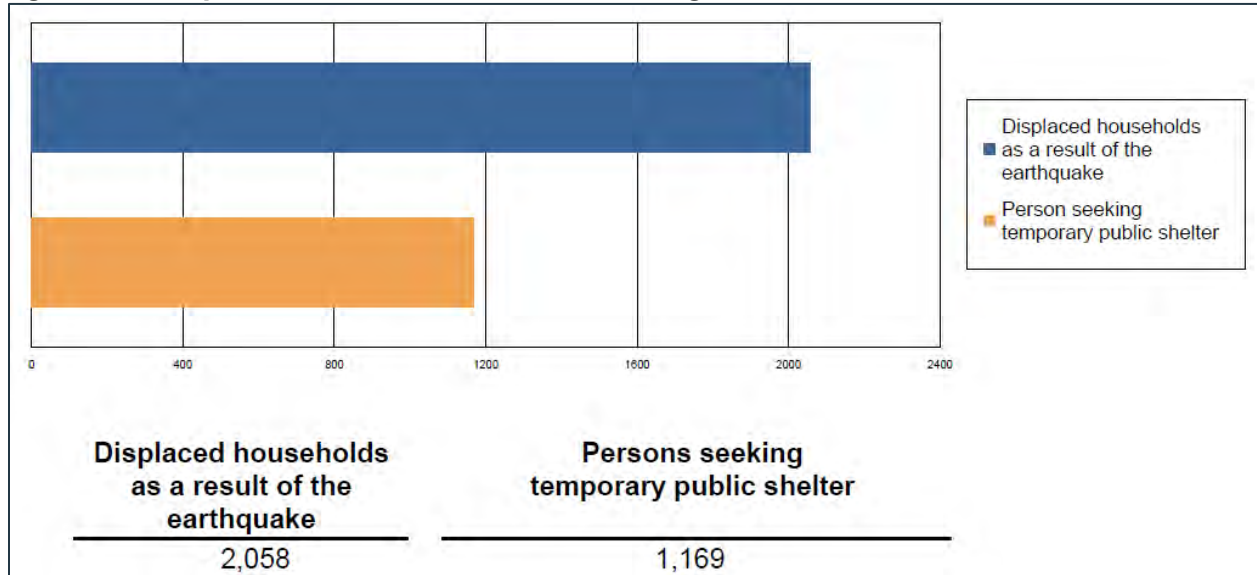
Some populations in the Planning Area may be more vulnerable to an earthquake event than others. For example, those with mobility issues as well as the elderly may have challenges with evacuating or traveling to a shelter without assistance if they cannot stay in their homes. Other vulnerable populations may be individuals whom English is not their native language. Of these socially vulnerable populations and according to the census tracts and block groups in the City, several of these populations are anticipated to reside within central Petaluma and within older housing that may have been constructed prior to the seismic code improvements.

According to 2013-2017 American Community Survey estimates, 24.3 percent of individuals in the City of Petaluma speak a language other than English in their home. These individuals may not receive or understand evacuation information including where shelters are located or where to receive resources to aid in the recovery process. These same individuals and households are designated as socially vulnerable populations, many which reside in the downtown Petaluma area. Figure 4-15 shows the Hazus report estimates for the total number of households expected to be displaced as result of the earthquake. The report estimates 2,058 households to be displaced, and of those, 1,169 individuals will be seeking temporary shelter. This does not take into account future population growth or other variables, such as populations increases due to tourism.





**Figure 4-15: Displaced Households and Persons Seeking Shelter Estimates**



Source: Hazus 4.0

Table 4-13 shows the Hazus estimates for total casualties and injuries.





**Table 4-13: Casualty and Injury Estimates from Hazus Results**

		Level 1	Level 2	Level 3	Level 4
<b>2 AM</b>	Commercial	18	6	1	2
	Commuting	0	0	0	0
	Educational	0	0	0	0
	Hotels	0	0	0	0
	Industrial	25	8	1	3
	Other-Residential	205	56	6	11
	Single Family	208	39	3	5
	<b>Total</b>	<b>456</b>	<b>108</b>	<b>11</b>	<b>20</b>
<b>2 PM</b>	Commercial	994	317	54	107
	Commuting	2	2	4	1
	Educational	297	96	17	33
	Hotels	0	0	0	0
	Industrial	184	57	9	18
	Other-Residential	39	11	1	2
	Single Family	40	7	1	1
	<b>Total</b>	<b>1,555</b>	<b>490</b>	<b>86</b>	<b>162</b>
<b>5 PM</b>	Commercial	694	220	38	74
	Commuting	32	43	72	14
	Educational	29	9	2	3
	Hotels	0	0	0	0
	Industrial	115	36	6	11
	Other-Residential	76	21	2	4
	Single Family	82	15	1	2
	<b>Total</b>	<b>1,027</b>	<b>345</b>	<b>120</b>	<b>108</b>

Source: Hazus 4.0

## Economy

Earthquakes can have a severe impact on local and regional economies. Impacts can be both direct, such as damages to commercial and residential structures, as well as indirect such as cascading effects involving business interruptions due to employees being displaced from their homes. Another secondary or cascading impact an earthquake could have is causing damages to transportation infrastructure that is critical to employees and business activity. Based on the Hazus results, a magnitude 7.0 earthquake could



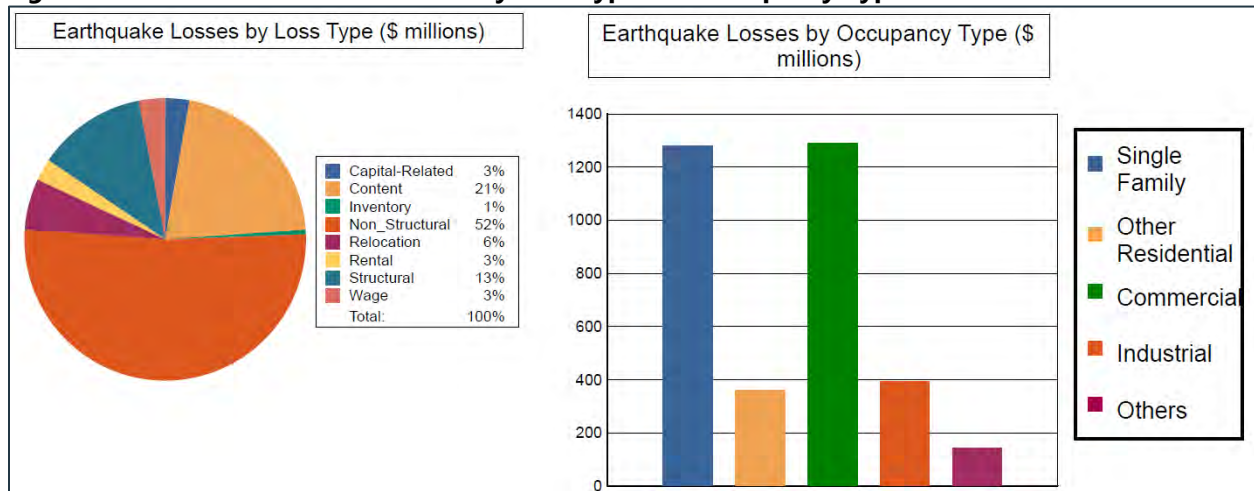


potentially cause a total of \$3.63 billion in economic losses. This amount includes both income losses (estimated to be \$484.9 million) as well as capital stock losses (\$3 billion).

Another secondary impact of an earthquake is business disruption and the resulting economic loss as a result of that disruption. Hazus describes business interruption losses as those losses associated with the inability to operate a business because of the damage sustained by the earthquake and includes the temporary living expenses for individuals displaced from their homes.

Hazus also estimates the total building-related losses. This includes business interruption losses and direct building losses (the estimated costs to repair or replace the damage caused to buildings and its contents) at \$3.47 billion, 14 percent of which are related to business interruption in the region. As shown in Figure 4-16 and Table 4-14 below, the largest loss in this scenario was sustained by residential occupancies, making up 47 percent of total loss. The following figures and tables report the estimate of losses by loss type, occupancy type, and building-related loss.

**Figure 4-16: Economic Loss Estimates by Loss Type and Occupancy Type**



Source: Hazus 4.0

**Table 4-14: Building-Related Economic Loss Estimates (Millions of dollars)**

Category	Area	Single Family	Other Residential	Commercial	Industrial	Others	Total
<b>Income Losses</b>							
	Wage	0.00	6.87	89.86	4.87	3.06	104.65
	Capital-Related	0.00	2.93	87.85	2.88	0.87	94.53
	Rental	27.10	16.57	43.85	1.82	1.26	90.60
	Relocation	96.75	14.22	63.65	8.40	12.12	195.14
	<b>Subtotal</b>	<b>123.85</b>	<b>40.58</b>	<b>285.21</b>	<b>17.97</b>	<b>17.31</b>	<b>484.92</b>
<b>Capital Stock Losses</b>							
	Structural	152.54	42.73	171.91	44.77	22.41	434.36
	Non_Structural	750.88	223.21	559.75	189.94	66.80	1,790.58
	Content	252.10	55.19	266.41	123.72	34.14	731.56
	Inventory	0.00	0.00	6.68	16.22	0.78	23.69
	<b>Subtotal</b>	<b>1,155.52</b>	<b>321.13</b>	<b>1,004.75</b>	<b>374.65</b>	<b>124.13</b>	<b>2,980.19</b>
	<b>Total</b>	<b>1,279.37</b>	<b>361.71</b>	<b>1,289.96</b>	<b>392.62</b>	<b>141.44</b>	<b>3,465.10</b>

Source: Hazus 4.0





In addition to economic losses experienced by building-related losses, Hazus estimates the economic losses as a result of transportation and utility lifeline losses and the direct repair cost for each component. As shown in Table 4-15 and Table 4-16 below it is estimated that \$78.8 million will be lost as a result of damages to transportation components and \$89.4 million are expected to be lost as result of utility system damages. The information in this table does not take into account an appraisal for the Ellis Creek Water Recycling Facility, which was recently appraised at \$173 million (Walker 2020).

**Table 4-15: Transportation System Economic Losses (Millions of Dollars)**

System	Component	Inventory Value	Economic Loss	Loss Ratio (%)
Highway	Segments	761.20	\$42.98	5.65
	Bridges	69.16	\$22.13	32.01
	Tunnels	0.00	\$0.00	0.00
	Subtotal	830	65.10	
Railways	Segments	50.25	\$2.98	5.93
	Bridges	0.00	\$0.00	0.00
	Tunnels	0.00	\$0.00	0.00
	Facilities	0.00	\$0.00	0.00
	Subtotal	50	3.00	
Light Rail	Segments	0.00	\$0.00	0.00
	Bridges	0.00	\$0.00	0.00
	Tunnels	0.00	\$0.00	0.00
	Facilities	0.00	\$0.00	0.00
	Subtotal	0	0.00	
Bus	Facilities	2.57	\$1.85	72.09
	Subtotal	3	1.90	
Ferry	Facilities	0.00	\$0.00	0.00
	Subtotal	0	0.00	
Port	Facilities	0.00	\$0.00	0.00
	Subtotal	0	0.00	
Airport	Facilities	10.65	\$7.75	72.80
	Runways	37.96	\$1.11	2.92
	Subtotal	49	8.90	
<b>Total</b>		<b>931.80</b>	<b>78.80</b>	

Source: Hazus 4.0





**Table 4-16: Utility System Economic Losses (Millions of Dollars)**

System	Component	Inventory Value	Economic Loss	Loss Ratio (%)
Potable Water	Pipelines	0.00	\$0.00	0.00
	Facilities	0.00	\$0.00	0.00
	Distribution Line	54.10	\$20.56	38.01
	<b>Subtotal</b>	<b>54.08</b>	<b>\$20.56</b>	
Waste Water	Pipelines	0.00	\$0.00	0.00
	Facilities	78.60	\$49.77	63.33
	Distribution Line	32.40	\$14.73	45.40
	<b>Subtotal</b>	<b>111.03</b>	<b>\$64.51</b>	
Natural Gas	Pipelines	0.00	\$0.00	0.00
	Facilities	0.00	\$0.00	0.00
	Distribution Line	21.60	\$4.23	19.53
	<b>Subtotal</b>	<b>21.63</b>	<b>\$4.23</b>	
Oil Systems	Pipelines	0.00	\$0.00	0.00
	Facilities	0.00	\$0.00	0.00
	<b>Subtotal</b>	<b>0.00</b>	<b>\$0.00</b>	
Electrical Power	Facilities	0.00	\$0.00	0.00
	<b>Subtotal</b>	<b>0.00</b>	<b>\$0.00</b>	
Communication	Facilities	0.10	\$0.08	68.64
	<b>Subtotal</b>	<b>0.12</b>	<b>\$0.08</b>	
	<b>Total</b>	<b>186.86</b>	<b>\$89.37</b>	

Source: Hazus 4.0

### Critical Facilities and Infrastructure

Large seismic events could have catastrophic effects on the City and surrounding areas, possibly damaging transportation and utility lifelines, bridges, railroads, and other critical facilities and infrastructure. Hazus estimates impacts to essential facilities including hospitals, schools, Emergency Operations Centers (EOCs), police stations, and fire stations. The Hazus analysis also takes into account four hazardous material sites, though zero nuclear power plants and zero military installations fall within the study area.

According to the earthquake analysis, there is one hospital with a total capacity of 82 beds, 32 schools, zero emergency operations facility, one police station, and seven fire stations in the study area. Hazus





estimates that seven of these essential facilities are expected to suffer moderate damage. With regards to transportation systems, 65 will suffer at least moderate damage, and 5 will suffer complete damage. However, only two of the utility system facilities will suffer at least moderate damage, but zero of these types of facilities will suffer complete damage.

Table 4-17, Table 4-18, and Table 4-19 summarize the expected damages generated by the Hazus scenario for each type of transportation system and utility system, including pipelines in the area. Based on personal communication with the HMPC, the Ellis Creek Water Recycling Facility is expected to be able to resume operation within one week after an earthquake event (Walker 2020).

**Table 4-17: Expected Damage to the Transportation Systems**

System	Component	Locations/ Segments	Number of Locations_			
			With at Least Mod. Damage	With Complete Damage	With Functionality > 50 %	
					After Day 1	After Day 7
Highway	Segments	63	0	0	62	62
	Bridges	64	62	5	2	7
	Tunnels	0	0	0	0	0
Railways	Segments	16	0	0	16	16
	Bridges	0	0	0	0	0
	Tunnels	0	0	0	0	0
	Facilities	0	0	0	0	0
Light Rail	Segments	0	0	0	0	0
	Bridges	0	0	0	0	0
	Tunnels	0	0	0	0	0
	Facilities	0	0	0	0	0
Bus	Facilities	2	2	0	0	0
Ferry	Facilities	0	0	0	0	0
Port	Facilities	0	0	0	0	0
Airport	Facilities	1	1	0	0	0
	Runways	1	0	0	1	1

Source: Hazus 4.0







**Table 4-18: Expected Utility System Facility Damage**

System	# of Locations				
	Total #	With at Least Moderate Damage	With Complete Damage	with Functionality > 50 %	
				After Day 1	After Day 7
Potable Water	0	0	0	0	0
Waste Water	1	1	0	0	0
Natural Gas	0	0	0	0	0
Oil Systems	0	0	0	0	0
Electrical Power	0	0	0	0	0
Communication	1	1	0	0	0

Source: Hazus 4.0

**Table 4-19: Expected Utility System Pipeline Damage (Site Specific)**

System	Total Pipelines Length (kms)	Number of Leaks	Number of Breaks
Potable Water	2,704	3867	1282
Waste Water	1,622	2771	919
Natural Gas	1,082	795	264
Oil	0	0	0

Source: Hazus 4.0

### Historic, Cultural, and Natural Resources

An earthquake in the City’s Planning Area or in the surrounding region could cause cascading (secondary) effects, including dam or pipeline failure that would impact the natural environment in different ways, depending on the extent of the cascading hazard. For example, earthquake-induced landslides or debris flows could significantly damage habitat and re-route streams and waterways, causing water quality impacts. Other types of ground deformation could also result.

### Future Development

The Hazus scenario only estimates damage and casualties for existing building inventory and populations and does not take into account future development plans. The City of Petaluma has experienced growth in the past eight years (2010-2018) that is not expected to slow (Refer to Chapter 2 Community Profile for further discussion on demographics and population changes). The latest U.S. Census estimates show that 6.9 percent is the average percent change of population in the City, which went from having a little over 57,000 people in 2010 to almost 62,000 in 2018.

As more portions of the City and its vicinity are developed and infill areas in the City are redeveloped, it will be important for the City of Petaluma to meet its stated goal and objectives and ensure that risk reduction in the community is taken into account, particularly when dealing with earthquakes and other

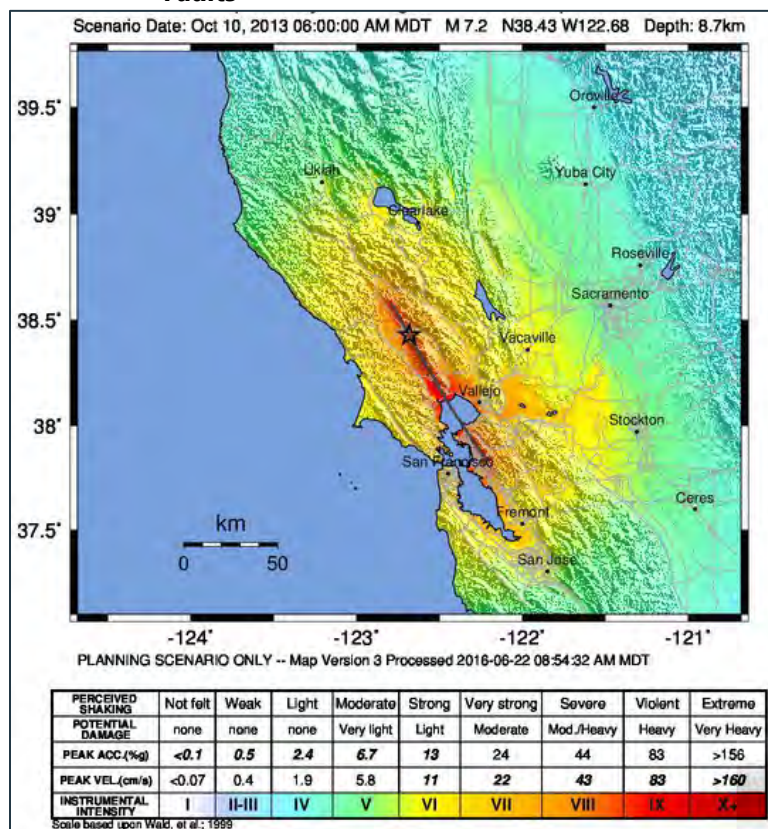


geologic hazards. The City of Petaluma General Plan of 2025 (adopted in 2008 and revised in 2012) and its Health and Safety Element establish standards and requirements for the protection from geologic and seismic hazards. Building and development will also be regulated through building standards.

### Magnitude 7.2 Deterministic ShakeMap Earthquake Scenario

A second Hazus-based earthquake scenario was run for the Petaluma Planning Area using census tract units that was based on a deterministic model. A deterministic scenario relies on seismic data to predict the outcome of a specific earthquake event. This deterministic scenario used USGS provided ShakeMap datasets to model what a Magnitude 7.2 earthquake of the Hayward Rodgers Creek Faults would generate in terms of damages and losses for the chosen area of interest (i.e. the Petaluma Planning Area). These faults were selected because they are known to have caused seismic activity and pose a risk to the Petaluma and nearby communities. The M7.2 ShakeMap scenario datasets used to import into Hazus 4.0 include four USGS-provided key data layers in spatial format: peak ground velocity, peak ground acceleration, peak spectral acceleration for 0.3 seconds (0.3 % g, or gravitational velocity), and peak ground acceleration for 1.0 seconds (1.0 % g). The epicenter of this USGS modeled scenario is located at latitude 38.43 North and 122.68 West and had a depth of 8.7 kilometers. A fifth layer of liquefaction susceptibility was also included in the Hazus model, which is the same utilized in the previous 2,500-year probabilistic scenario to enhance the model with more accurate ground and soil conditions. Figure 4-17 includes the general location of the scenario’s epicenter (marked with a star northeast of the San Francisco Bay area) as well as intensity information and reference to the USGS ShakeMap data.

**Figure 4-17: USGS Generated ShakeMap Earthquake Scenario for the Hayward-Rodgers Creek Faults**



Source: USGS 2016, Weld, et al 1999





For more information on the USGS generated ShakeMap scenarios, modeling criteria, manual information, and overall catalog of available data refer to the [USGS Earthquake Hazards Program ShakeMap information page](#).

This deterministic M7.2 scenario results included liquefaction susceptibility. Loss estimates and vulnerability assessment were completed based on the following subsections, similar to the previous scenario: property; people; the local economy; critical facilities and infrastructure; historic, cultural, natural resources; and future development of the Planning Area. The total losses by census tract from this M7.2 scenario are shown in Figure 4-18 and summarized in Table 4-20 below. Refer to Section 4.1.1 and FEMA’s Hazus 4.0 Loss Estimation Tool for more information on the Hazus tool and its analysis functions. As stated in the previous section, Hazus is a loss estimation tool which derives totals on the number of people displaced, the number of buildings damaged and their type (e.g. construction material, occupancy class), the number of casualties, and the damage to transportation systems and utilities (e.g. critical facilities) given the input parameters, scenario type, and region/area of interest.

**Table 4-20: Hazus 4.0 Deterministic M7.2 Earthquake Scenario Loss Estimations for Petaluma’s Census Tracts**

Type of Impact	Impacts to Planning Area
Total Buildings Damaged	Slight: 9,144 Moderate: 1,772 Extensive: 286 Complete: 25
Building and Income Related Losses	\$ 395.2 million 54 % of damage related to residential structures 12 % of loss due to business interruption
Total Economic Losses (Includes building, income, and lifeline/critical facility losses)	\$ 449.9 million
Casualties (Based on a 2 a.m. time of occurrence)	Without requiring hospitalization: 29 Requiring hospitalization: 2 Life threatening: 0 Fatalities: 0
Casualties (Based on a 2 p.m. time of occurrence)	Without requiring hospitalization: 58 Requiring hospitalization: 9 Life threatening: 2 Fatalities: 2
Casualties (Based on a 5 p.m. time of occurrence)	Without requiring hospitalization: 48 Requiring hospitalization: 17 Life threatening: 20 Fatalities: 5
Damage to Transportation Systems	0 damages to highway or bridges 0 damages to airport facilities or runways 0 damages to bus facilities 0 damages to light rail 0 damages to ferry and port facilities
Damage to Essential Facilities	0 damages to schools, police stations, fire stations, emergency operations centers, or hospitals
Damage to Utility Systems	0 of the following facilities will suffer damages: potable water; wastewater; natural gas; oil systems; electrical power; and communications. Potable water breaks: 277 Wastewater breaks: 198 Natural gas breaks: 57 Oil pipeline breaks: 0
Households without Power/Water Service (Based on 26,824 total households)	Power loss, Day 1: 1,028 Power loss, Day 3: 557





Type of Impact	Impacts to Planning Area
	Power loss, Day 7: 187 Power loss, Day 30: 30 Power loss, Day 90: 2 Water loss, Day 1: 12,510 Water loss, Day 3: 9,792 Water loss, Day 7: 3,352 Water loss, Day 30: 0 Water loss, Day 90: 0
Displaced Households	72
Persons Seeking Temporary Shelter	42
Debris Generation	60,000 tons

Source: Hazus 4.0, USGS ShakeMap M7.2 Scenario for Hayward-Rodgers Creek







### Property

The Hazus results for this M7.2 scenario indicate 2,082 buildings will be at least moderately damaged. This is over 8 percent of the total buildings in the region. However, approximately 25 buildings will be completely destroyed. The majority of these at least moderately damaged buildings are residential in nature, followed by commercial buildings and lastly industrial buildings. With a majority of the buildings in the Planning Area being residential, the Hazus model estimates that over 54 percent of the total losses incurred by this earthquake scenario are single family homes and other residential categories. Table 4-21 provides a detailed breakdown of these expected building damages based on the occupancy types.

**Table 4-21: Expected M7.2 Earthquake Scenario Building Damages by Occupancy Type**

	None		Slight		Moderate		Extensive		Complete	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Agriculture	56	0.37	36	0.40	17	0.98	4	1.49	1	2.34
Commercial	700	4.57	455	4.98	267	15.08	48	16.97	3	13.54
Education	34	0.22	18	0.19	7	0.40	1	0.46	0	0.33
Government	11	0.07	5	0.06	4	0.21	1	0.36	0	0.39
Industrial	209	1.36	157	1.72	112	6.30	25	8.77	2	9.39
Other Residential	688	4.49	794	8.68	817	46.11	173	60.42	11	45.82
Religion	44	0.29	25	0.28	12	0.69	3	0.90	0	0.89
Single Family	13,577	88.63	7,653	83.69	536	30.23	30	10.62	7	27.30
<b>Total</b>	<b>15,318</b>		<b>9,144</b>		<b>1,772</b>		<b>286</b>		<b>25</b>	

Source: Hazus 4.0, USGS ShakeMap M7.2 Scenario for Hayward-Rodgers Creek

The building inventory in the region varies in terms of construction types. A large number of buildings are also of wood materials, though the building inventory also includes unreinforced masonry buildings and manufactured housing. These types of wood, masonry, and manufactured housing structures are particularly vulnerable to ground shaking in an earthquake event. Most buildings/structures found are expected to sustain slight to moderate damages, with the wood and manufactured housing materials making up the largest percentages of the damaged building materials category.

### People

Hazus estimates the number of people that would be injured or killed by the M7.2 ShakeMap earthquake scenario which includes liquefaction susceptibility. The casualties are broken down into four severity levels as described in the previous Hazus model summary (2,500-year probabilistic scenario). The estimates are provided for three times of the day which represent the periods of a standard working day when different sectors of the community are likely at their peak occupancy loads. The highest number of injuries and casualties are estimated to occur in the late afternoon (5 p.m.) with the greatest impacts on commercial sectors followed by commuting activities and residential areas as these sector loads are considered to be at their maximum in the late afternoon/early evening times. This 5 p.m. time has the greatest potential for fatalities, with an estimate of 5, followed by the 2 p.m. scenario which estimates 2 fatalities.

Some populations in the Planning Area may be more vulnerable to an earthquake event than others. Most vulnerable individuals who may not receive or understand evacuation information including where shelters are located or where to receive resources to aid in the recovery process would be at high risk of earthquakes. The Hazus report estimates 72 households to be displaced, and of those, 42 individuals will





be seeking temporary shelter. It should be noted that this does not take into account future population growth or any other variables such as seasonal or weekend tourism to the region. An earthquake would have a disproportionate impact on socially vulnerable populations residing in the downtown area of Petaluma.

### Economy

Earthquakes can have a severe impact on local and regional economies as previously discussed in the 2,500-year probabilistic Hazus analysis sub-section. Based on this Hazus M7.2 scenario, the modeled earthquake could potentially cause a total of \$449.9 million in economic losses. This amount includes both income losses (estimated to be \$46 million) as well as capital stock losses (\$395.2 million).

Another secondary impact of an earthquake is business disruption and the resulting economic loss as a result of that disruption. Hazus describes business interruption losses as those losses associated with the inability to operate a business because of the damage sustained by the earthquake and includes the temporary living expenses for individuals displaced from their homes. Of the total \$395.2 million in building-related losses, 12 percent are related to business interruptions in the region.

In addition to economic losses experienced by building-related losses, Hazus estimates the economic losses as a result of transportation and utility lifeline losses and the direct repair cost for each component. It is estimated that \$30.7 million will be lost as a result of damages to transportation components while almost \$24 million are expected to be lost as result of utility system damages from the M7.2 modeled ShakeMap scenario.

### Critical Facilities and Infrastructure

Large seismic events could have catastrophic effects on the City and surrounding areas, possibly damaging transportation and utility lifelines, bridges, railroads, and other critical facilities and infrastructure. Hazus estimates impacts to essential facilities including hospitals, schools, EOCs, police stations, and fire stations. The Hazus analysis also takes into account four hazardous material sites. No nuclear power plants or military installations fall within the study area.

According to the earthquake analysis, there is one (1) hospital with a total capacity of 82 beds, thirty-two (32) schools, zero (0) emergency operations facility, one (1) police stations, and seven (7) fire stations in the study area. This M7.2 Hazus earthquake scenario estimates that none of these essential facilities are expected to suffer moderate or complete damage. With regards to transportation systems, no major roadways or other transportation infrastructure will suffer moderate or complete damage.

The only utility systems or structures that are expected to suffer site specific damages are shown in Table 4-22 and Table 4-23. These damage estimates are also summarized in the overall scenario summary table at the beginning of the section (Table 4-20).

**Table 4-22: Expected Utility System Pipeline Damage (Site Specific)**

System	Total Pipelines Length (kms)	Number of Leaks	Number of Breaks
Potable Water	2,704	671	277
Waste Water	1,622	481	198
Natural Gas	1,082	138	57
Oil	0	0	0

Source: Hazus 4.0, USGS ShakeMap M7.2 Scenario for Hayward-Rodgers Creek





**Table 4-23: Expected Potable Water and Electric Power System Performance**

	Total # of Households	Number of Households without Service				
		At Day 1	At Day 3	At Day 7	At Day 30	At Day 90
Potable Water	26,824	12,510	9,792	3,352	0	0
Electric Power		1,028	557	187	30	2

Source: Hazus 4.0, USGS ShakeMap M7.2 Scenario for Hayward-Rodgers Creek

### Historic, Cultural, and Natural Resources

The same general impacts, potential risk, and cascading or secondary issues discussed for the 2,500-year probabilistic scenario’s would apply to the Planning Area’s historic, cultural, and natural resources based on this M7.2 modeled ShakeMap scenario which uses the Hayward-Rodgers Creek faults.

### Future Development

The same general impacts, potential risk, and cascading or secondary issues discussed in the 2,500-year probabilistic scenario’s would apply to the Planning Area’s future development based on this M7.2 modeled ShakeMap scenario which focuses on the Hayward-Rodgers Creek faults as causing the seismic movements.

### Risk Summary

- The overall risk significance of earthquake hazards to the City of Petaluma is **High**.
- Earthquakes and seismic activity are expected to have a probability of occasional occurrence in the future, given the local seismic conditions, past history, and input from the City.
- Two earthquake faults of concern can affect the City: the San Andreas Fault and the Healdsburg-Rodgers Creek Fault, although only the first is considered to be currently active and the fault that may lead to more damages or losses in the future.
- The majority of the Planning Area is found in moderate, high, or very high liquefaction susceptibility zones, with the downtown area being in high and very high liquefaction zones (and hence at high risk of potential seismic activity).
- Based on the first Hazus earthquake analysis, it is expected that a 2,500-year probabilistic earthquake with a magnitude of 7.0 and liquefaction susceptibility taken into account would cause \$ 3.63 billion in total economic losses, and mostly affect residential buildings (since an estimated 14,179 buildings would be at least moderately damaged, with 2,545 completely destroyed).
- The Hazus scenario resulted in \$78.8 million of losses to the transportation systems, while \$89.4 million would be incurred in damages and losses to the utility and lifeline systems. Around 25,875 households would be affected by potable water or electric power losses from this earthquake scenario.
- The Hazus scenario also estimates that around 740,000 tons of debris would be generated, with brick and wood structures suffering the most.
- The potential for casualties during the worst-case scenario for which time of day of the earthquake might hit (the 2 p.m. scenario) would lead to 162 casualties and 2,131 injuries.
- Based on the second Hazus earthquake analysis, it is expected that a Magnitude 7.2 deterministic earthquake using the Hayward-Rodgers Creek faults and liquefaction susceptibility taken into account







would cause \$ 449.9 million in total economic losses, and mostly affect residential buildings (since an estimated 2,082 buildings would be at least moderately damaged, with 25 completely destroyed).

- The Hazus scenario resulted in \$ 30.7 million of losses to the transportation systems, while \$24 million would be incurred in damages and losses to the utility and lifeline systems. Around 12,510 households would be affected by potable water or electric power losses from this earthquake scenario.
- The Hazus scenario estimates that around 60,000 tons of debris would be generated, with brick and wood structures suffering the most.
- The potential for casualties during the worst-case scenario for which time of day of the earthquake might hit (the 5 p.m. scenario) would lead to 5 casualties and 85 injuries.

#### 4.3.4 Wildfire

##### Hazard Description

Wildfires are any uncontrolled fires that occur most often on undeveloped land and require fire suppression. They are caused by lightning or by human-activities such as smoking, arson, equipment misuse, and from electrical infrastructure. Wildfires are a significant concern throughout California. In recent years wildfires have occurred in vegetated areas in the vicinity of the City of Petaluma. Wildfires in surrounding areas, even a few counties away, can create significant impacts to the City such as those stemming from intense smoke, which can then lead to poor air quality, traffic visibility issues, and public health concerns. Generally, the fire season extends from June through October of each year during the hot, dry months. Fire conditions arise from a combination of high temperatures, intense sunlight, low rainfall, an accumulation of vegetation, and high winds.

Throughout California, communities are increasingly concerned about wildfire safety as increased development in the foothills and mountain areas and subsequent fire control practices have affected the natural cycle of the ecosystem. While wildfire risk is predominantly associated with wildland-urban interface (WUI) areas, significant wildfires can also occur in heavily populated areas. The WUI is a general term that applies to development adjacent to landscapes that support wildfire.

##### Location

Wildfires affect grass, forest, and brushlands, as well as any structures populations located within or surrounding them. Where there is human access to wildland areas the risk of fire increases due to a greater chance for human carelessness and historical fire management practices. In other areas, large concentrations of highly flammable brush and grasslands located in flat open spaces are also susceptible to wildfire.

The California Department of Forestry and Fire Protection's (CAL FIRE) Fire and Resource Assessment Program (FRAP) models map wildfire hazards using a science-based approach and computerized techniques to classify moderate, high, and very high fire severity zones in a Fire Hazard Severity Zone (FHSZ) dataset. The model uses existing CAL FIRE data and hazard information based on fuel, weather, and terrain, explained in more detail in the Extent (Magnitude/Severity) section below.

Figure 4-19 displays the fire hazard severity zones falling within State Responsibility Areas, or SRAs, around the City of Petaluma. Figure 4-20 shows these hazard severity zones but within Local Responsibility Areas, or LRAs, in and surrounding the City. Fire threat zones are displayed in Figure 4-21.



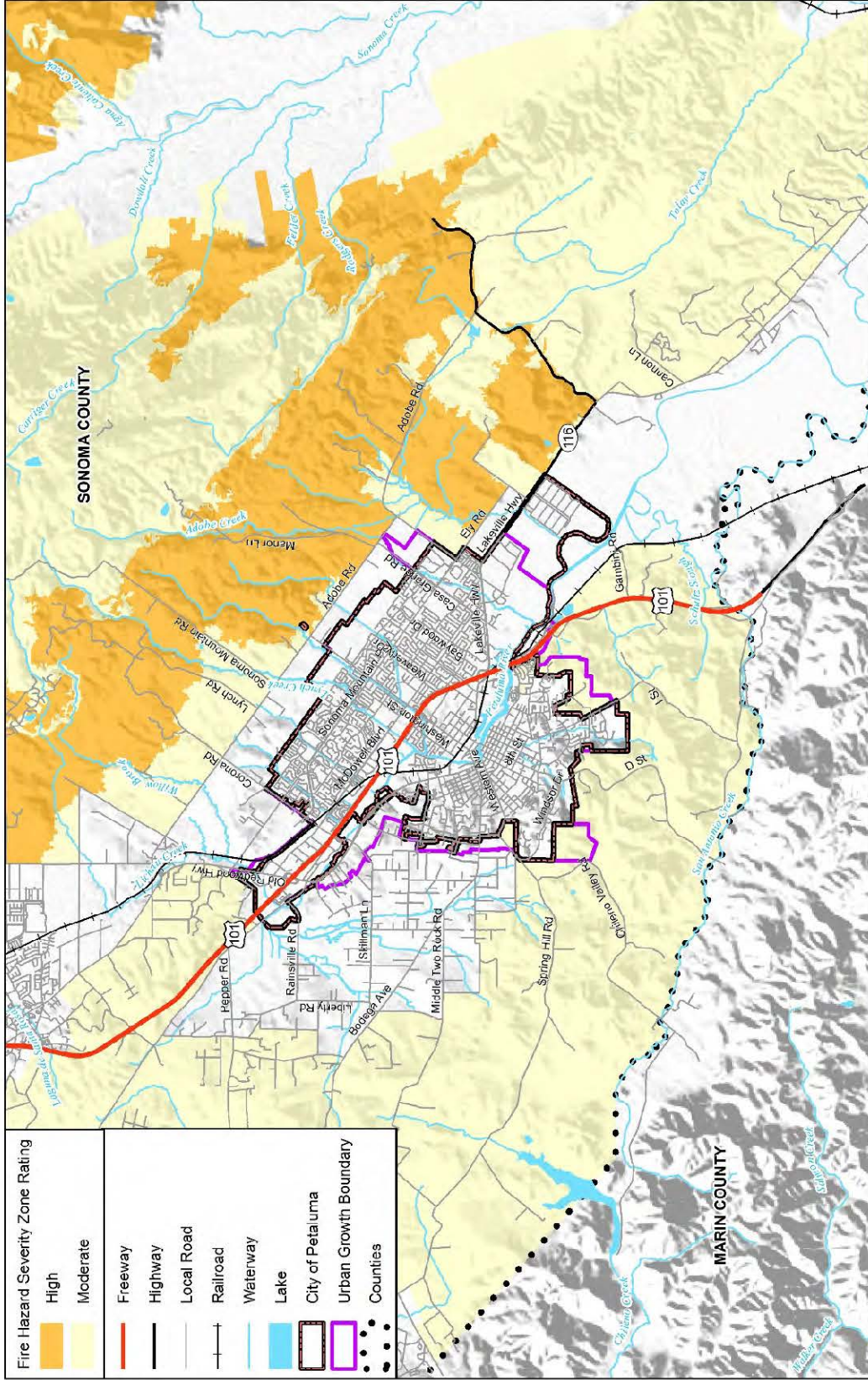


These three maps provide general indications of potential future fire behavior as well as where fire occurrence might take place. The south portions of the City, particularly south of the Petaluma River and near Windsor Drive show wildfire hazard areas based on fire threat data and the FHSZs mapped at both the SRA and LRA levels. Other potential areas of concern are along the edges of the City boundary, on the eastern and northern sides where moderate and high severity zones intermingle.





**Figure 4-19: Fire Hazard Severity Zones in State Responsibility Areas (SRAs) Around the City of Petaluma**



0 3 6 Miles

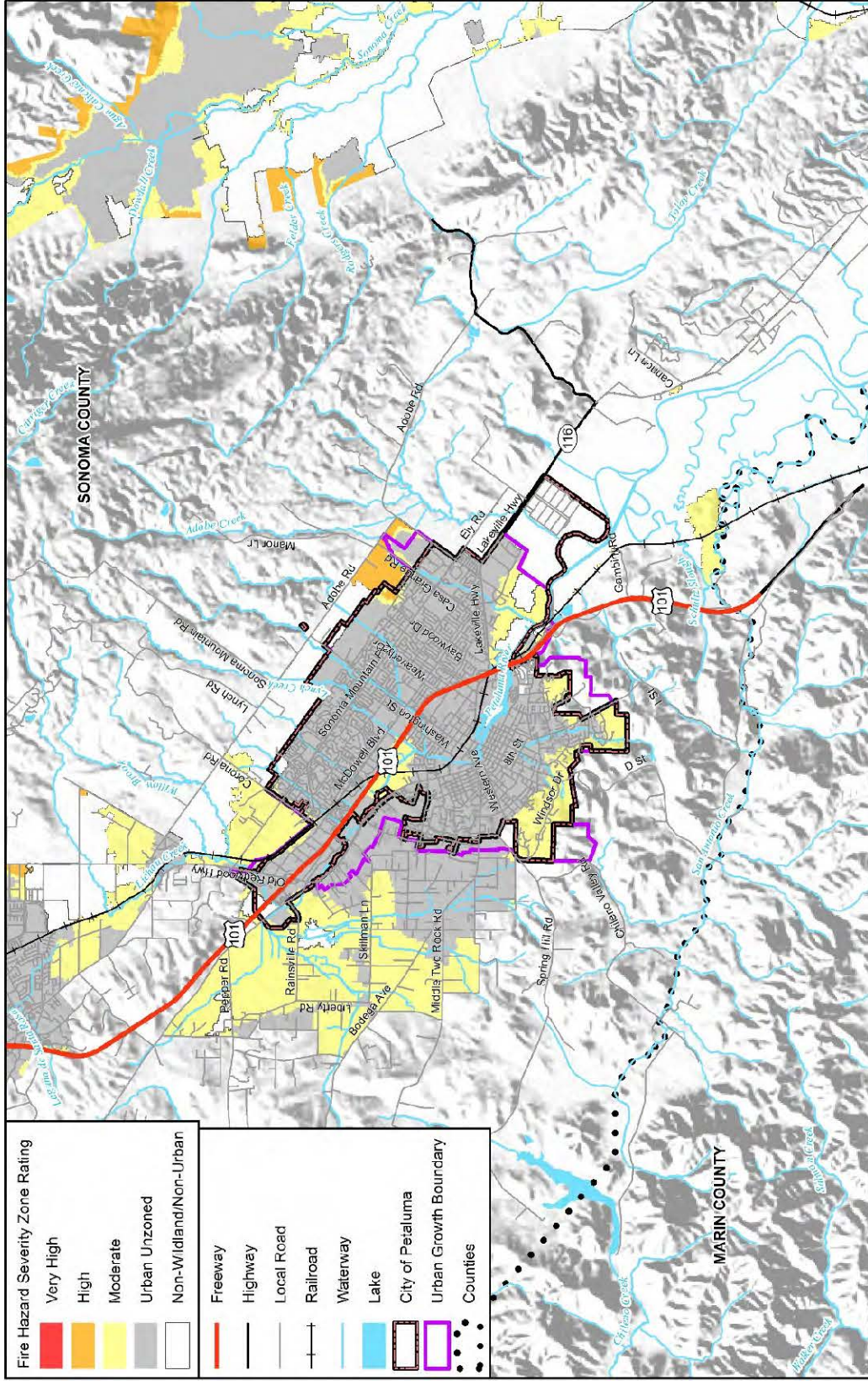


Map compiled 10/2019;  
intended for planning purposes only.  
Data Source: City of Petaluma, CalTrans,  
US Census TIGER Database, CalFire FRAP





Figure 4-20: Fire Hazard Severity Zones in Local Responsibility Areas (LRAs) in Petaluma



0 3 6 Miles

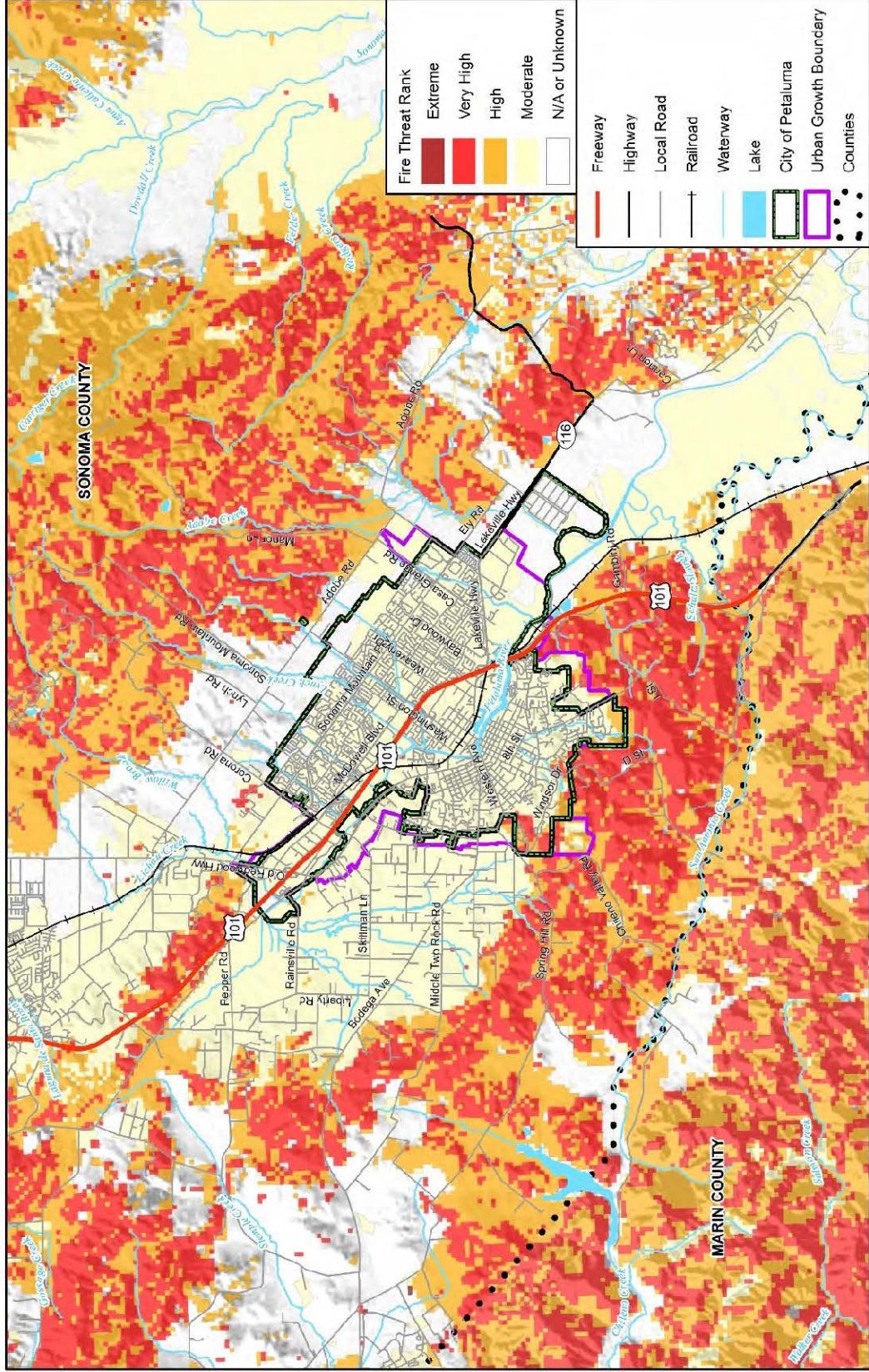


**wood.**  
 Map compiled 10/2019.  
 intended for planning purposes only.  
 Data Source: City of Petaluma, CalTrans,  
 US Census TIGER Database, CalFire FRAP





Figure 4-21: Fire Threat Zones in and Near the City of Petaluma



0 3 6 Miles

Map compiled 10/2019;  
intended for planning purposes only.  
Data Source: City of Petaluma, CalTrans,  
US Census TIGER Database, CalFire FRAP





### Extent (Magnitude/Severity)

**Critical** – Potential losses from wildfires include human life, structures and other improvements, natural and cultural resources, quality and quantity of water supplies, cropland, timber, recreational opportunities, and impacts to the community’s way of life. Economic losses could also result from reduced tourism and visitation and generally impacted economic sectors. Smoke and air pollution from wildfires can be a severe health hazard. In addition, catastrophic wildfire can create favorable conditions for other secondary hazards such as flooding, landslides, and erosion during the rainy season. Typically, the potential for significant damage to life and property exists in areas designated as “wildland-urban interface” areas, or WUIs, where development is adjacent to densely vegetated area.

Generally, there are three major factors that sustain wildfires and predict a given area’s potential to burn. These factors are fuel, topography, and weather, as described below.

- **Fuel** - Fuel is the material that feeds a fire and is a key factor in wildfire behavior. Fuel is generally classified by type and by volume. Fuel sources are diverse and include everything from dead tree leaves, twigs, and branches to dead standing trees, live trees, brush, and cured grasses. Manmade structures, such as homes and other associated combustibles are also fuel sources. The type of prevalent fuel directly influences the behavior of wildfire. Fuel is the only factor that is under human control. Fuel types within the City include seasonal grasses, and mature landscaping, such as deciduous and evergreen oaks, and conifers. Fuel types surrounding the City Planning Area include mainly seasonal grasslands and brush.
- **Topography** - An area’s terrain and land slopes affect its susceptibility to wildfire spread. Both fire intensity and rate of spread increase as slope increases due to the tendency of heat from a fire to rise via convection. The arrangement of vegetation throughout a hillside can also contribute to increased fire activity on slopes.
- **Weather** - Weather components such as temperature, relative humidity, wind, and lightning also affect the potential for wildfire. High temperatures and low relative humidity dry out fuels that feed wildfires, creating a situation where fuel will more readily ignite and burn more intensely. Thus, during periods of drought, the threat of wildfire increases. Wind is the most treacherous weather factor. The greater a wind, the faster a fire will spread and the more intense it will be. Lightning can also ignite wildfires, often in difficult to reach areas for firefighters.

However, fires in the broader region (Sonoma County and bordering counties such as Mendocino or Napa) in recent years have resulted in the loss of property as well as human injuries or even deaths. The smoke and air pollution from wildfires are also severe health hazards particularly for sensitive populations including the elderly, children, and people with respiratory and cardiovascular diseases. Wildfires can also threaten the health and safety of those fighting the fires, so the overall magnitude or severity of fires can be wide-reaching and incur many types of impacts. Overall, wildfire severity can usually be quantified in terms of acres burned during an event, number and cost of properties/structures damaged (including critical facilities), money lost from disruption of services, and population affected by the fires (e.g. people displaced, injured or killed).





### Previous Occurrences

Wildfires are a significant concern throughout California. According to CAL FIRE under the CAL FIRE system, vegetation fires occur across California on a regular basis; most can be controlled and contained early with limited damage. The foothills and mountain areas of California have experienced numerous devastating fires over the last 100 years, with the fire risk significantly increasing in recent years due to high fuel loads and expansion of development into the WUI areas. For those ignitions that are not readily contained and become wildfires, damage can be extensive. There are many causes of wildfire, from naturally caused lightning fires to human-caused fires linked to activities such as smoking, campfires, debris burning, equipment use, and arson. Recent studies conclude that the greater the population density in an area, the greater the chance of an ignition from human sources, as well as powerlines or other electrical or utility infrastructure.

Although not fully representative of annual fire activity, data from CAL FIRE supplemented with the Wildland Fire Occurrence databases from USGS (e.g. the Geospatial Multi-Agency Coordination, or GeoMAC) reported 26 fires affecting the vicinity of the City from 1941 to 2019. Table 4-24 below summarizes these fires that occurred around Petaluma, while Figure 4-22 displays the fires that have occurred close to the City. The fires have been organized in chronological order, with the oldest fire taking place in 1941 and the most recent of record in October 2019. In terms of largest fires, the Nuns Fire occurred in 2017 and burned 55,798 acres. The 37 Fire, which also took place in 201 burned 1,657 acres. Most recently, the Kincade Fire (not mapped) in Sonoma County north of Geyserville burned 77,758 acres.

The NOAA National Centers for Environmental Information (NCEI) database was also queried for past wildfire events in or near Petaluma. This NCEI query yielded a record of a “Dense Smoke” event related to the 2018 Camp Fire, dated November 9, 2018. This record specifically calls out Petaluma. As such, even events that take place elsewhere can affect the planning area as noted herein.

**Table 4-24: Summary of Fire History Near the City of Petaluma**

Fire Name	Year	Cause of Fire	Acres Burned	Details/Agency in Charge
Unknown	1941	Unknown / Unidentified	278	Contract County
--	1945	Unknown / Unidentified	602	California Department of Forestry and Fire Protection
--	1945	Unknown / Unidentified	526	California Department of Forestry and Fire Protection
--	1945	Unknown / Unidentified	500	California Department of Forestry and Fire Protection
P.G.&E. #5	1961	Unknown / Unidentified	825	California Department of Forestry and Fire Protection
Lanzi	1963	Unknown / Unidentified	377	California Department of Forestry and Fire Protection
Nuns Canyon	1964	Unknown / Unidentified	9,808	California Department of Forestry and Fire Protection
Anderson	1965	Unknown / Unidentified	4,954	California Department of Forestry and Fire Protection
P.G.& E.#5	1965	Unknown / Unidentified	3,250	California Department of Forestry and Fire Protection
Les Corda Ranch	1966	Unknown / Unidentified	588	Contract County





Fire Name	Year	Cause of Fire	Acres Burned	Details/Agency in Charge
--	1968	Unknown / Unidentified	4,554	California Department of Forestry and Fire Protection
D Street	1968	Unknown / Unidentified	63	Contract County
Olympali	1981	Unknown / Unidentified	212	Contract County
Les	1983	Unknown / Unidentified	57	Contract County
Dump	2001	Arson	144	California Department of Forestry and Fire Protection
Redhill	2001	Unknown / Unidentified	19	Contract County
Dolcini	2004	Unknown / Unidentified	365	California Department of Forestry and Fire Protection
Grade 2	2007	Unknown / Unidentified	60	California Department of Forestry and Fire Protection
Antonio	2012	Vehicle	95	Contract County
Lakeville	2013	Equipment Use	178	California Department of Forestry and Fire Protection
Nuns	2017	Unknown / Unidentified	55,798	California Department of Forestry and Fire Protection
37 Fire	2017	Unknown / Unidentified	1,657	California Department of Forestry and Fire Protection
Bodega	2017	Unknown / Unidentified	18	California Department of Forestry and Fire Protection
Spring	2017	Unknown / Unidentified	12	California Department of Forestry and Fire Protection
Unknown	--	Unknown / Unidentified	2,927	Contract County
Unknown	--	Unknown / Unidentified	303	Contract County
Kincade	2019	Unknown/Unidentified	77,758	California Department of Forestry and Fire Protection

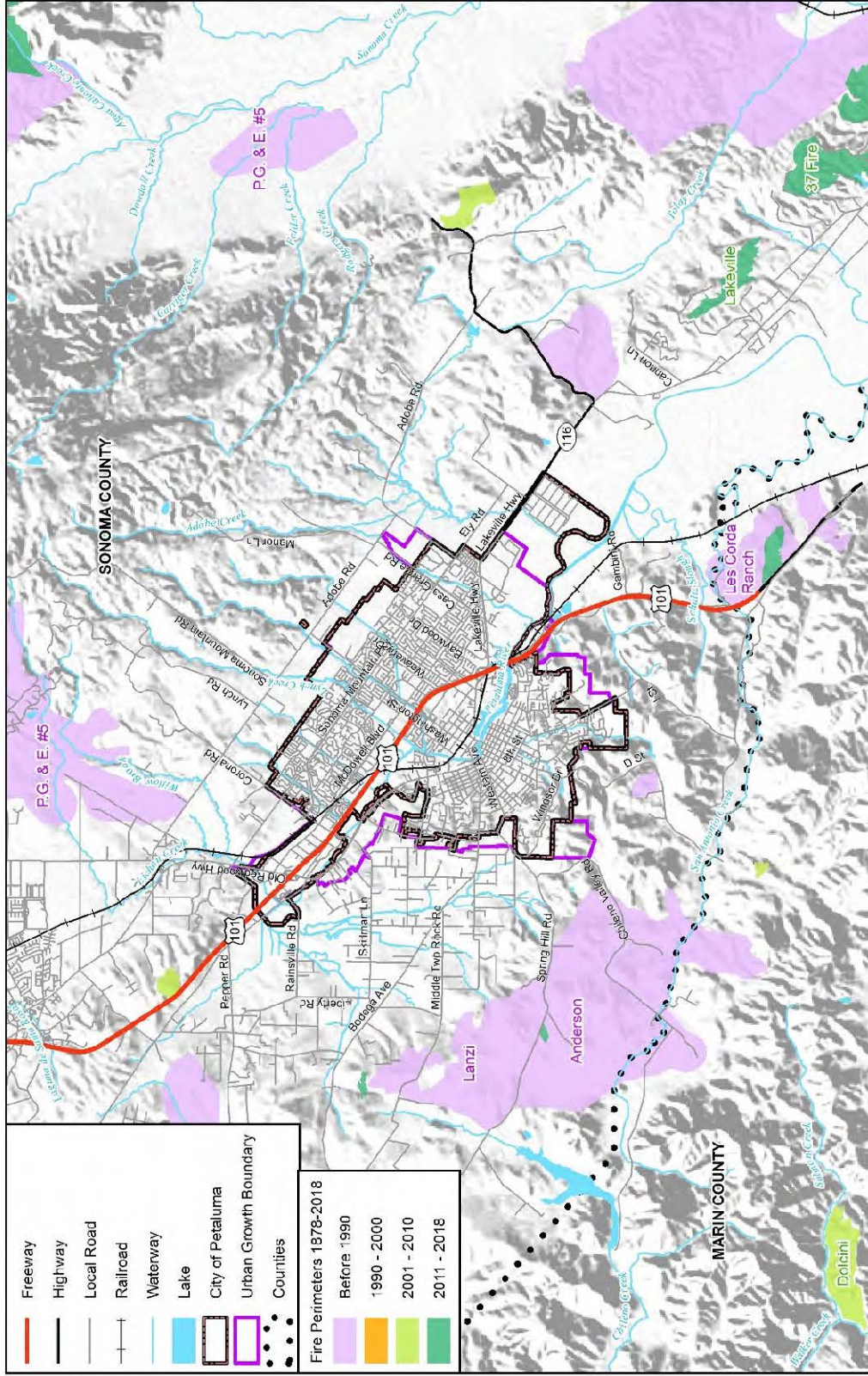
Source, CalFire 2018, USGS/BLM/BIA/FS/NPS (from Federal Wildland Fire Occurrence database, 2019)







Figure 4-22: Fire History and Burn Perimeters near the City of Petaluma, 1878 to 2018



Map compiled 10/2019;  
intended for planning purposes only;  
Data Source: City of Petaluma, CalTrans,  
US Census TIGER Database, CalFire FRAP,  
GeoM/AC/USGS, BLM, FS, NPS





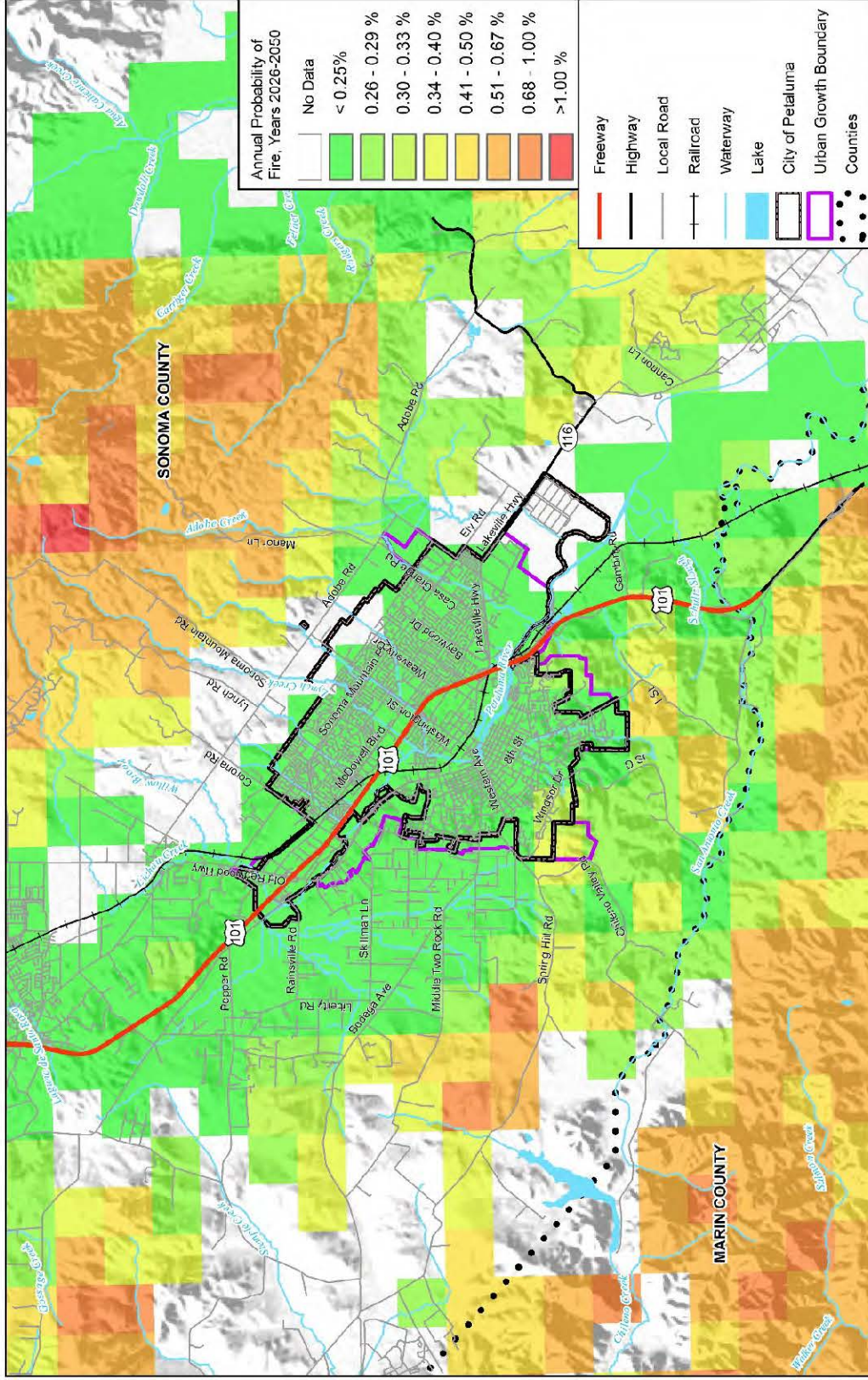
## Probability of Future Occurrences

**Occasional** – Considering the local fuels, weather conditions, and the flat topography in the area combined with a lack of extensive WUI development means that fires may only occur occasionally in or immediately surrounding the City. A widely damaging wildland fire within the City is considered to be more unlikely, although changing issues and increasing record-high temperatures accompanied by low humidity, strong winds, and drought conditions could worsen the likelihood of fires in the Planning Area in the future. Based on the CAL FIRE Probability and Carbon Accounting mapping, which is based on Mann et al.'s projections for the years 2026-2050 (shown on Figure 4-23 below), the annual probability of fire occurrence is rather low for the most the City (CAL FIRE 2019). The south-southwest corner has a slightly higher probability, though based on the range of values shown in the figure even those 0.4-0.5 percent probabilities remain low compared to areas north and south of the City, within unincorporated portions of Sonoma and Marin Counties. However, due to the effects of climate change and because the probability of future occurrences outside the City's Planning Area ranges from likely to high likely, the City recognizes the probability of future occurrences of wildfires in the City's Planning Area would increase when taking into consideration climate change and wildfire risk in the region. Recent wildfires in various parts of Sonoma County and in the region have had significant impacts on the City, and in some instances required City residents to evacuate. These recent wildfires also caused many residents to temporarily evacuate due to poor air quality and smoke. For more information on this CAL FIRE probability mapping methodology and related resources, visit <https://frap.fire.ca.gov/frap-projects/fire-probability-and-carbon-accounting/>





Figure 4-23: Annual Fire Probability in the City of Petaluma for the Years 2026-2050



Map compiled 10/2019;  
intended for planning purposes only.  
Data Source: City of Petaluma, CalTrans,  
US Census TIGER Database, CalFire





## Climate Change Considerations

Increases in greenhouse gases coupled with population growth and development are expected to continue impacting California's forests and natural resources. Likewise, the effects of climate change will impact wildfire behavior, the frequency of ignitions, fire management, and fuel loads. Increasing temperatures will intensify wildfire threat and susceptibility to more frequent wildfires in the grasslands that surround the Planning Area, in addition to wildlands throughout Sonoma County.

Uncertainty exists in how climate change will affect total precipitation, but models suggest that there is a tendency for wetter conditions in the northern part of the state and drier conditions in the south (California Natural Resources Agency 2018). Forests are also sensitive to variable precipitation events, and damaging droughts such as the multi-year event from 2012-2017 contributed to widespread tree mortality as warmer temperatures stressed trees and made them more susceptible to pests and pathogens (California Natural Resources Agency 2018). While the surrounding hillsides near the City's Planning Area consist of mostly grasslands, there are emerging studies that indicate that hot and dry winds can influence shrubland and grassland fires. Studies noted in California's Fourth Assessment report indicate climate change impacts on wind patterns may strongly affect forests, potentially serving as a trigger mechanism for conversion of forest to other types of vegetation (California Natural Resources Agency 2018).

Cal-Adapt conducted wildfire risk projections based on statistical modeling from historical data of climate, vegetation, population density, and fire history. The wildfire risk simulations were used in California's Fourth Climate Change Assessment and based on four models that produced a warm/dry simulation (HadGEM2-ES), cooler/wetter simulation (CNRM-CM5), average simulation (CanESM2), and a simulation that is most unlike the first three for the best coverage of different possibilities (MIROC5). These wildfire risk simulations are shown in Figure 4-24. The upper chart shows the modeled annual averages of area burned in Petaluma under the RCP 8.5 scenario, while the lower chart shows modeled annual averages of area burned for Petaluma under the RCP 4.5 scenario.





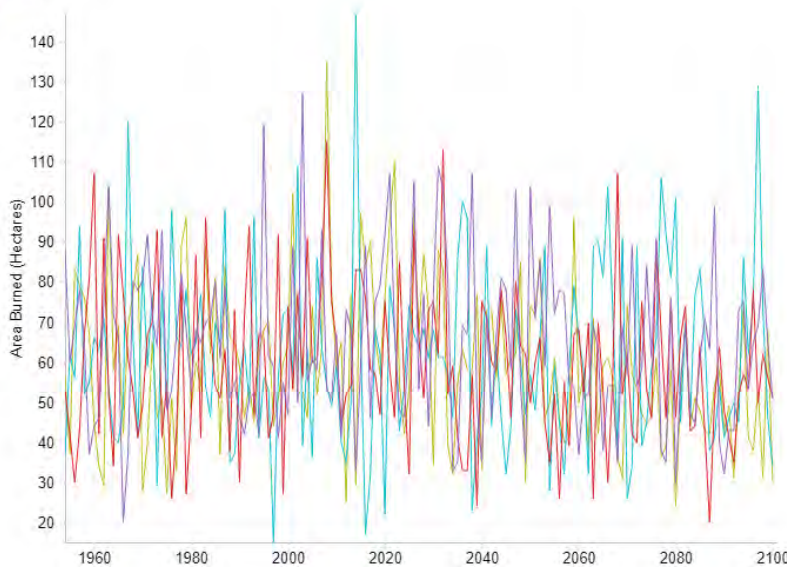
**Figure 4-24: Future Annual Averages of Acres Burned in Petaluma under Low and High Emission Scenarios**

**Petaluma**

Emissions continue to rise strongly through 2050 and plateau around 2100 (RCP 8.5). Central Population Growth Projections.

Modeled Data (2006–2099)

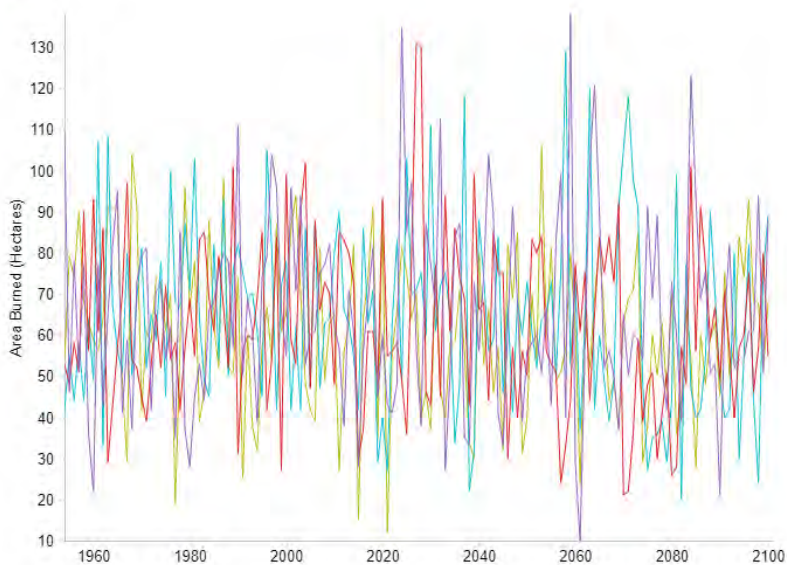
- CanESM2
- CNRM-CM5
- HadGEM2-ES
- MIROC5



Emissions peak around 2040, then decline (RCP 4.5). Central Population Growth Projections.

Modeled Data (2006–2099)

- CanESM2
- CNRM-CM5
- HadGEM2-ES
- MIROC5



Source: Cal-Adapt 2019





According to the Sonoma County's 2016 Regional CAP, climate change is expected to result in more frequent and intense wildfires. These risks are expected to continue to rise due to increased dryness of vegetation compounded by the productivity of plants in the spring. Based on the Regional CAP data, by the end of the century, the chances of one or more fires during a 30-year period are projected to increase from 15 to 20 percent to 25 to 33 percent in the mountainous areas of the County.

While the CAL FIRE program actively collaborates with state, local, and national agencies to reduce climate change impacts, current scientific models expect California will be affected by increased numbers of forest fires with added intensity due to longer warmer seasons, reduced distribution of biodiversity, lack of moisture, changes in ecosystems, drought impacts (e.g. pest diseases and continued spread of invasive species), and other such impacts in coming years. Due to these increasingly worsening and recurring issues, wildfire hazards should be carefully studied by the City with regards to future negative effects in or near the City Planning Area related to wildfire risk. For these reasons, climate change would have a "high" influence on wildfire hazards.

### **Vulnerability Assessment**

The City's wildfire risk and vulnerability is a medium concern. Wildfires can affect major transportation roads, such as U.S. Highway 101 and Highway 116 by impeding commuters to get to and from their destinations (e.g. to the Bay Area), as well as potentially block emergency responders. As previously mentioned, wildfire can also damage or destroy property and infrastructure, injure people or even cause death. During the May to October fire season, the dry vegetation and hot sometimes windy weather, combined with a growing population, results in an increase in the number of potential ignitions. Any fire, once ignited, has the potential to quickly become a large, out-of-control fire. Fires that prevent essential goods or services from entering or leaving the City could negatively affect local residents and businesses by impacting the local economy and the community's livelihood (e.g. limited access to jobs, daycare, schools, resources, and residences).

The CAL FIRE-produced FHSZs within LRAs displayed in Figure 4-24 were used to assess general wildfire risk in the Planning Area, using methodology detailed below. The results are summarized in the tables and maps that follow.

The City's parcel layer was used as the basis for the inventory of parcels, while the CAL FIRE FHSZs in LRAs, ranked by severity, was used to intersect the parcels and determine general risk based on the severity rank categorization, all in GIS. Centroids were generated for each parcel for simpler overlay analysis, so that a parcel was either "in" a fire threat layer of type "moderate severity," "high severity," or "very high severity," or "out" of any of these fire threat categories (e.g. in Urban Unzoned or Non-Wildland/Non-Urban areas). For purposes of this analysis, it was assumed that every parcel with an improved value greater than zero was developed in some way, even those stated as "vacant." This specification ensures parcels such as rights-of-way are discarded for the purposes of determining vulnerability to fire, and to be able to aggregate valuations based on each parcel type (e.g. residential, commercial, agricultural). The assessor's office data calculates improved values based on the "annual structure value" which relates to the improvements of the parcel; this was the field used to determine improved values for each parcel.

Once parcels in the form of centroids are categorized by property type, next the content values were calculated as follows: a) residential and multi-family properties received contents valued at 50 percent of the parcel improved value; b) commercial and agricultural properties' contents were valued at 100 percent of the parcel improved value; and, c) vacant parcels (if applicable) received 0 percent content values. These valuation assignments are based on FEMA's methodology for estimating contents within their loss estimation software, Hazus-MH.





Properties falling in the FHSZs are listed in Table 4-25, along with a summary of all improved structure values, contents values, total values (which are the aggregated improved structure values plus the content values), loss estimates (equal to 100 percent of the total parcel values) and population at risk. As Figure 4-25 illustrates, the areas with parcels exposed to the FHSZs within the LRAs are found along the south, east of the Urban Growth Boundary, and near the central-west portions of the City (along Highway 101, northwest of Washington St. and south of McDowell Blvd.)

### Property

The fire severity zones and parcel overlay analysis yielded the following results below. The highest number of parcels at risk fall under the Residential category (with a total of 917 parcels), followed by the Commercial category (with 93 parcels), Multi-family (with 3 parcels), and finally Agricultural (with 2 parcels at risk). A total of \$937.8 million in parcel value is at risk of being affected by potential fires, based on a \$572.3 million improved structure value combined between all the parcel types, and \$365.5 million in content values. The moderate fire hazard severity category contains all the parcels at risk, with 1,015. No parcels fall in the high or very high FHSZ areas. Figure 4-25 displays parcels located in the FHSZ areas.

**Table 4-25: Parcels in Fire Hazard Severity Zones within Local Responsibility Areas in Petaluma**

Fire Threat Ranking	Parcel Type	Total Parcels	Improved Structure Value	Contents Value	Total Value	Loss Estimate (100% of the Total Value)	Population at Risk
Moderate	Agricultural	2	\$12,473	\$12,473	\$24,946	\$24,946	--
	Commercial	93	\$158,660,345	\$158,660,345	\$317,320,690	\$317,320,690	--
	Multifamily	3	\$49,818,964	\$24,909,482	\$74,728,446	\$74,728,446	8
	Residential	917	\$363,846,182	\$181,923,091	\$545,769,273	\$545,769,273	2,458
<b>TOTAL</b>		<b>1,015</b>	<b>\$572,337,964</b>	<b>\$365,505,391</b>	<b>\$937,843,355</b>	<b>\$937,843,355</b>	<b>2,466</b>

Source: City of Petaluma GIS, Sonoma County Assessor’s Office; CalFire; Wood Parcel Analysis; U.S. Census Bureau







## People

Wildfire risk is of greatest concern to populations residing in the moderate, high, and very high wildfire threat zones. The 2018 U.S. Census estimates were used to show the average persons per household in the City of Petaluma, so that total persons at risk of each fire threat category could be calculated, based on property type. For each residential property type (i.e., general residential, multifamily), an average household value of 2.68 people per parcel was applied to roughly estimate potential population at risk. Table 4-25 above summarized the estimated population residing in each fire threat zone along with the parcel analysis summary by fire threat type. The results were estimated by multiplying the average persons per household in Petaluma times the number of residential parcels in each fire threat zone. Based on the analysis, the moderate FHSZ has 2,466 potential people at risk.



The Kincadee Fire in northern Sonoma County started on October 23, 2019 and was not fully contained until November 6, 2019. It started near Geyserville and spread smoke toward Petaluma Valley and the surrounding Bay Area. The City opened the Petaluma Community Shelter for fire evacuees. During the same time, part of the City was without electricity due to the planned power shutoffs.

*Photo Credit: San Francisco Chronicle 2019*

Based on HMPC feedback, the Petaluma Fire Department has a program called Citizens Organized to be Prepared for Emergencies, or COPE, which holds quarterly seminars on preparedness. The COPE program stresses the importance of encouraging neighborhood organization through efforts such as the “Map Your Neighborhood.” In future wildfire events this program could be useful in effectively engaging the local populations in avoiding damages to fires or evacuating before a fire, hence preventing injuries and losses. The City website also contains information and resources regarding these recent projects and efforts.

## Economy

Wildfires can be incredibly destructive depending on the circumstances of the event, particularly the type of resources and populations they affect due to fire size, location, length of the burn, and ongoing or existing weather or hazard conditions. For example, damages to structures and properties are obvious impacts to the economy due to fire, though cascading negative effects on the economic sectors include road closures, lower revenue to the City based on reduced tourism and visitation, or excessive costs of firefighting and relocating people or natural and man-made resources (thus indirectly impacting city revenues). Transportation lifelines being closed and/or damaged could impede a majority of the population’s ability to commute to nearby cities and the Bay Area. Additional direct or indirect impacts to the economy could be further exacerbated by existing hazard issues such as earthquakes, drought, or severe weather, if those make it difficult to control the fires or reestablish the economic drivers in the Planning Area.

## Critical Facilities and Infrastructure

Critical facilities are those community components that are most needed to withstand the impacts of a disaster. An overlay analysis using GIS was performed to determine where critical facilities are located within FHSZs ranked moderate, high, or very high (within the LRAs as defined by CAL FIRE). Only those facilities located in these zones are noted as being at risk. Figure 4-25 shows those critical facilities located in the City that fall in the FHSZs, while Table 4-26 describes the facilities. Based on these results, a total of



six critical facilities are found in zones of the type “moderate.” No other fire threat zones contain critical facilities in the Planning Area. From these facilities, three are High Potential Loss Facilities, and the other three fall under the Lifeline Utility Systems category.

**Table 4-26: The City of Petaluma’s Critical Facilities at Risk to Wildfire based on FHSZs in LRAs**

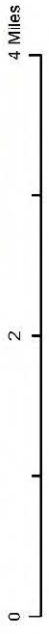
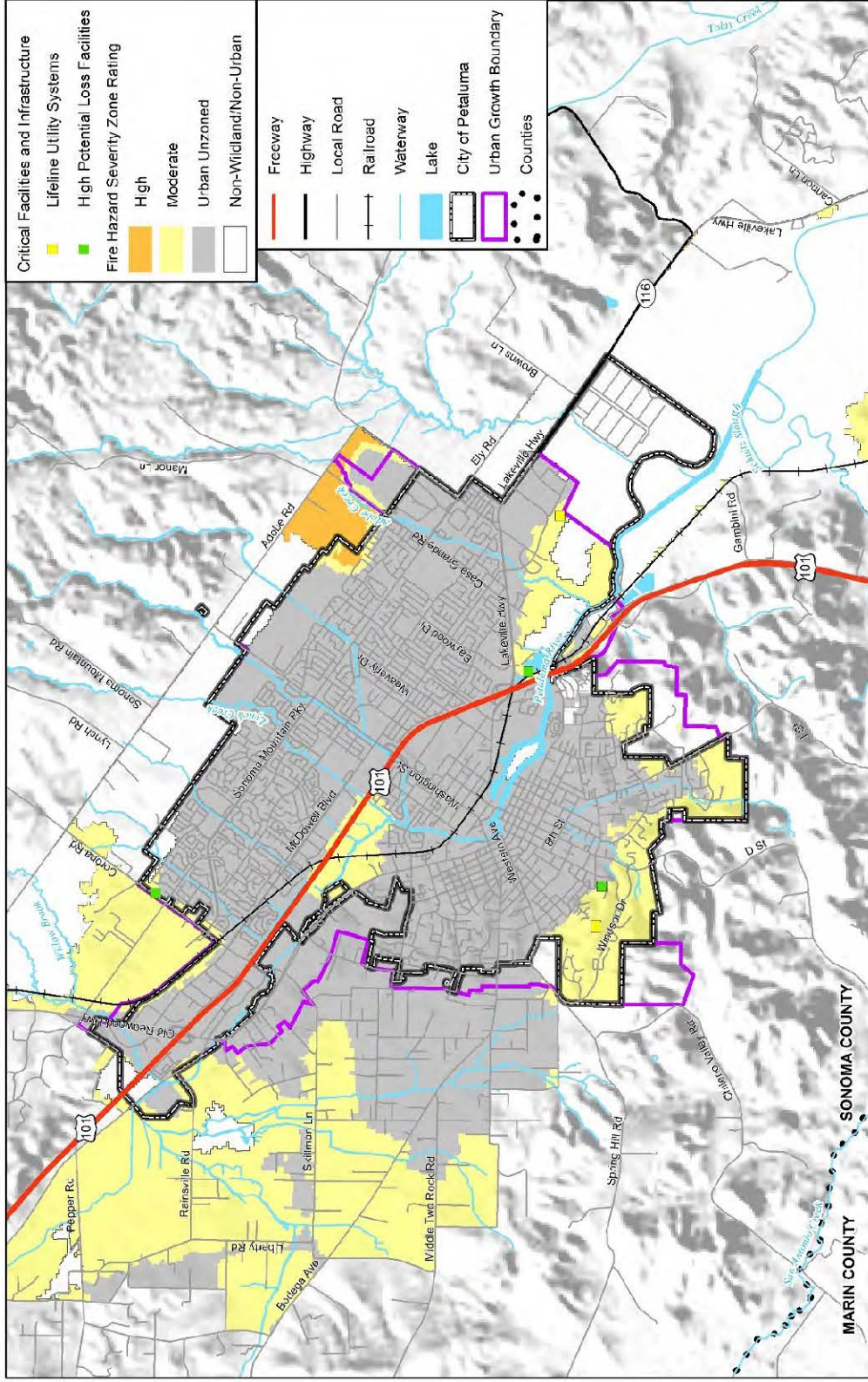
Fire Threat Zone	Critical Facility Category	Critical Facility Type	Critical Facility Total	
Moderate	High Potential Loss Facilities	Community/Recreation Center	1	
		Day Care Facilities	1	
		Public Schools	1	
	<b>TOTAL</b>			<b>3</b>
	Lifeline Utility Systems	Microwave Service Towers	1	
		Water Facility	2	
		<b>TOTAL</b>		
	<b>GRAND TOTAL</b>			<b>6</b>

Source: City of Petaluma GIS; HIFLD; CalFire FRAP; Wood GIS Analysis





Figure 4-26: Critical Facilities and Infrastructure within Fire Threat Zones in the City of Petaluma



Map compiled 11/2016;  
intended for planning purposes only.  
Data Source: City of Petaluma, CalTrans,  
US Census TIGER Database, HIFLD, CalFire  
FRAP. Note: FHSZ = Fire Hazard Severity Zone;  
LRA = Local Responsibility Area





According to California’s Fourth Climate Assessment, wildfire may be the biggest immediate threat to California’s transportation system, as vegetation fuel accumulation continues to increase (California Natural Resources Agency 2018). Wildfires can also lead to mudslides and debris flows, later resulting in the temporary transportation system closures or other key impacts to the community. Studies cited in the most recent climate assessment also found that a considerable amount of infrastructure is exposed to wildfire risk, with the highest risk being roads and highways, such as U.S. Highway 101 and Highway 116. Railroads may also be at risk of warping during wildfires, and transportation or freight activity disrupted, while smoke and fire-fighting operations can lead to temporary service disruptions that can additionally affect movement of goods and services (California Natural Resources Agency 2018).

### **Historic, Cultural, and Natural Resources**

The City has eight cultural and historic resource places, as summarized under Section 4.2 of this plan. Since these structures are sensitive in nature and may not have been built according to the latest building codes due to their age, it is expected that they might be at risk of wildfires (e.g. because of their potential inability to withstand significant heat). However, other areas such as parks or natural spaces could also be at risk of a wildfire, but these places would need to be further studied to determine vulnerability and risk more specifically.

### **Future Development**

Population growth and development in the City of Petaluma is increasing, as noted on the Petaluma City Profile Report released in 2018. Petaluma is expected to grow 3.2 percent by the year 2022, which results in an increase of 62,700 residents. The increasing urbanization of the Planning Area makes wildfire vulnerability a growing issue, as future development in the WUI will increase risk to this hazard citywide. WUI related risks can however be managed with strong land use regulations and building code requirements. For example, development in the WUI can be limited, or where permitted can require firebreaks between development and grasslands, as well as enforce that building construction be compliant with CBC Chapter 7A: Materials and Construction Methods for Exterior Wildfire Exposure. The City’s General Plan 2025 and IZO can also be amended to address these land use regulations.

### **Risk Summary**

- The overall risk significance of wildfire hazards to the City of Petaluma is **Medium**.
- The level of wildfire risk will likely increase in the future due to the effects of climate change, and as the City assesses and monitors the level of risk, they will adjust the emergency preparedness and hazard mitigation efforts accordingly.
- Wildfires are expected to have a probability of occasional occurrence in the future, given the local fuel, topography, and weather conditions and the extent of the WUI. Based on recent CAL FIRE future fire occurrence probability mapping, the City of Petaluma is mostly expected to have a low likelihood of fire from years 2026 to 2050.
- The areas of the City with high or very high fire threat, which in turn pose the highest risk to life and property, are located on the south- of the Planning Area, near Windsor Drive. However, all of the City’s parcels falling fire hazard severity zones are in the “moderate” zone, with 1,015 parcels vulnerable to wildfire (within LRA as defined by CAL FIRE).
- Although the probability of future occurrence of wildfire risk is occasional within the City’s Planning Area, the future occurrence outside the City is ranges from likely to highly likely, and must account for





areas where future occurrence of major wildfires will significantly affect the City through mandated evacuation and poor air quality, among other impacts.

- Approximately 2,466 people may be at risk of the moderate FHSZs within the LRA.
- Six critical facilities are in moderate fire threat areas within the City of Petaluma (no other facilities fall in any additional fire threat zones).
- Eight historic and cultural properties and places are exposed to wildfire risks, based on the NRHP database.
- Population growth is expected to be at 3.2 percent by 2022 in the City of Petaluma, so WUI development may become a larger issue into the future. Building to the current code with regards to materials and structures is recommended based these development trends.

### 4.3.5 Flood

#### Hazard Description

Floods are among the most frequent and costly natural disasters in terms of human hardship and economic loss. Flooding is usually the result of, or often exacerbated by, weather events. Floods can cause substantial damage to structures, landscapes, and utilities as well as life safety issues. Certain health hazards are also common to flood events; standing water and wet materials in structures can become breeding grounds for microorganisms such as bacteria, mold, and viruses. Standing water or affected infrastructure can in turn cause disease, trigger allergic reactions, and damage materials long after the flood. When floodwaters contain sewage or decaying animal carcasses, infectious disease also becomes a concern. Direct impacts such as drowning can be limited with adequate warning and public education about what to do during floods. Where flooding occurs in populated areas, warning and evacuation will be of critical importance to reduce life and safety impacts.

Floodplains are defined as the areas immediately adjacent to a channel from a river, stream, or other waterway. Floodplains are illustrated on inundation maps, which show areas of potential flooding and water depths. In its common usage and based on FEMA guidelines, the floodplain most often refers to the area that is inundated by the 100-year flood, or the flood that has a one percent chance in any given year of being equaled or exceeded. The 100-year flood is the national minimum standard to which communities regulate their floodplains through the FEMA National Flood Insurance Program (NFIP). The 500-year flood is the flood that has a 0.2 percent chance of being equaled or exceeded in any given year. A 500-year flood event would be slightly deeper and cover a greater area than a 100-year flood event. The potential for flooding can change and increase through various land use changes and changes to land surface, which then may result in a change to the floodplain. A change in environment can create localized flooding problems inside and outside of natural floodplains by altering or confining natural drainage channels. These changes are most often created by human activity.

The City of Petaluma is susceptible to various types of flood events as described below.

- **Riverine Flooding** - Riverine flooding, defined as the condition when a watercourse (e.g. river or channel) exceeds its "bank-full" capacity, generally occurs as a result of prolonged rainfall, or rainfall that is combined with already saturated soils from previous rain events. This type of flood occurs in river systems whose tributaries may drain large geographic areas and include one or more independent river basins. The onset and duration of riverine floods may vary from a few hours to many days. Factors that directly affect the amount of flood runoff include precipitation amount,





intensity and distribution, the amount of soil moisture, seasonal variation in vegetation, snow depth, and water-resistance of the surface due to urbanization. In the Planning Area, flooding is largely caused by heavy and continued rains, increased outflows from upstream dams, and heavy flow from tributary streams. Local intense storms can overwhelm nearby waterways as well as the integrity of flood control structures. The warning time associated with slow rise floods assists in life and property protection.

- **Localized Flooding** - Flash flooding describes localized floods of great volume and short duration. This type of flood usually results from a heavy rainfall on a relatively small drainage area. Precipitation of this sort usually occurs in the winter and spring. Flash floods often require immediate evacuation. Related to this type of flooding is also localized flooding, which is often caused by flash flooding, severe weather, or an unusual amount of rainfall. Flooding from these intense weather events occurs in areas experiencing an increase in runoff from impervious surfaces associated with development and urbanization as well as inadequate storm drainage systems.
- **Dam or Levee Failure Flooding** – Potential inundation caused by failure or mis-operation of one or more upstream dams or water control structures such as levees is also a concern to the City of Petaluma. A catastrophic flood control or water retention structural failure could easily overwhelm local response capabilities and require evacuations towards the east of the City, which is in closest proximity to the two dams identified in this plan. Impacts to life safety will depend on the warning time and the resources available to notify and evacuate the public, as well as the magnitude of the event. Loss of life could potentially result, however, and there could be associated health concerns as well as negative effects to local buildings and infrastructure. Dam failure is addressed in more detail under Section 4.3.1 Dam Incidents, while levee failures and other aspects related to localized flood problem areas are discussed throughout this chapter.

## Location

Flooding of various types may occur anywhere within the City's Planning Area. Details on local water features, watersheds, and flood control structures and systems are provided below.

## City of Petaluma Watersheds and Waterways

The City of Petaluma is primarily located within the San Pablo Bay and the Petaluma River-Frontal San Pablo Bay Estuaries watersheds (under Hydrologic Unit Codes 1805000208 and 1805000206, respectively), both of which are part of the greater San Pablo Bay Watershed (Hydrologic Unit Code 18050002).

The City is located in the Petaluma Valley, a fairly flat alluvial plain with elevation ranging from sea level along the Petaluma River, to over 400 feet in the nearby hills. This valley is characterized by a Mediterranean climate with long and dry summers, followed by cool and wet winters. The mean annual precipitation over the valley is approximately 26 inches (City of Petaluma 2015).

The main waterways in the City include the Petaluma River, Adobe Creek, Lynch Creek, Lichau Creek, and smaller branches or tributaries such as Willow Brook. The Petaluma River is historically important due to its key role in enabling exploration activities, settlement, and the development of the Petaluma and San Pablo Bay watersheds. Over the years, inundation and overtopping of the banks of the Petaluma River have caused siltation of the streambed, which in turn has had an effect on the water-carrying capacity and also navigability of the waterway (causing problems for many decades on the surrounding communities). The City's two watersheds are described below.



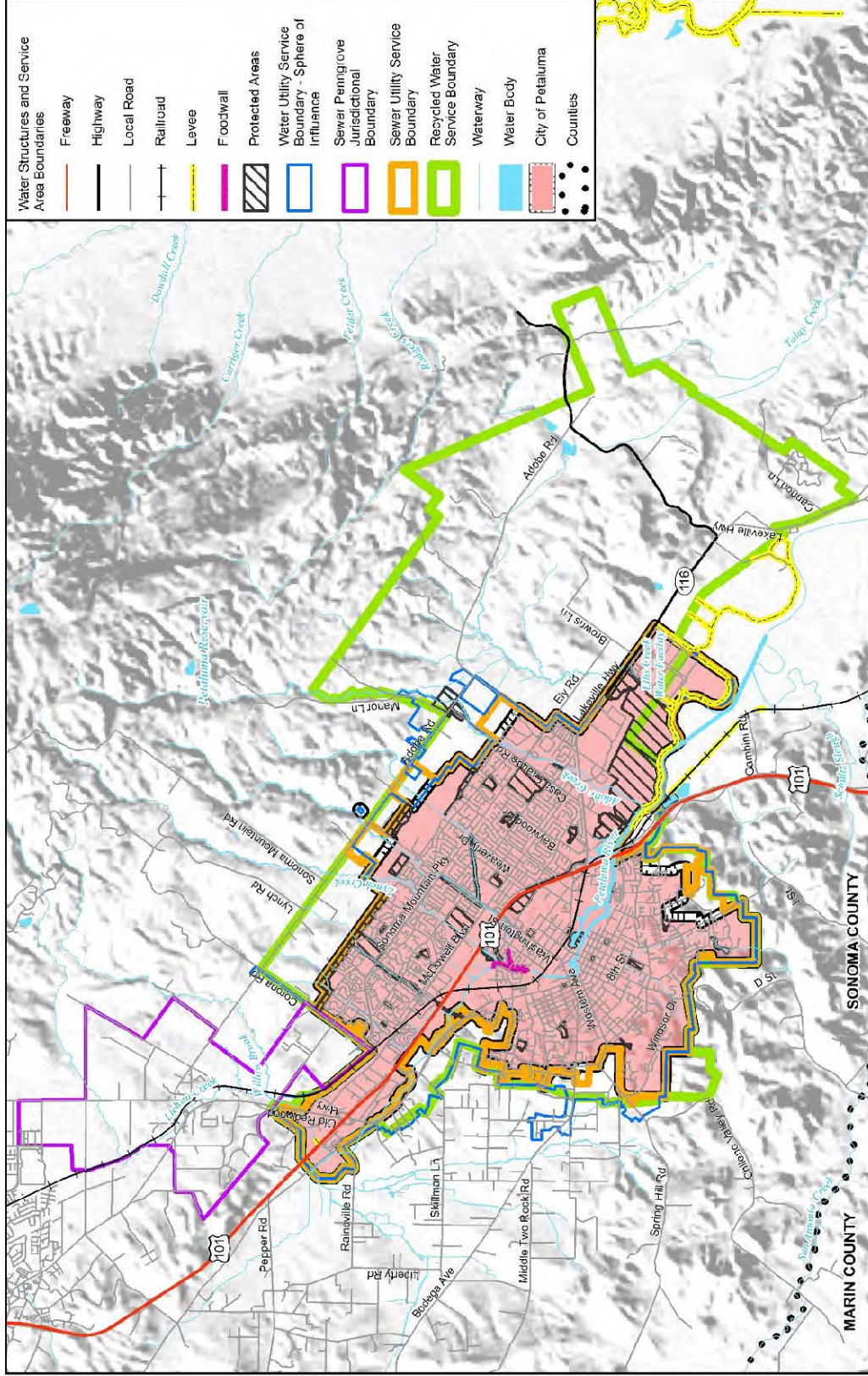
**San Pablo Bay Watershed (HUC 18050002)** - The larger San Pablo Bay Watershed covers approximately 1,227 square miles and spans the counties of Sonoma, Marin, Napa, Alameda, Contra Costa, San Francisco, and Solano, all within California. The San Pablo Bay watershed drains into the San Pablo and San Francisco Bays, and the main tributaries of this watershed are the Napa River, Petaluma River, and Sonoma Creek.

Figure 4-26 below illustrates general waterways and water features in the City, including FEMA NFHL levee centerlines and water service area boundaries (e.g. utilities, sewer, etc.). The main river present in the City is the Petaluma River, and the largest levee structure covers part of this river on the southern portion of the boundary, near the Ellis Creek Water Facility. Small portions of the Petaluma River and Lynch Creek are leveed, on the center and western portion of the City north of Washington Street. Some protected areas are also present on the south-southeast of the City, as portrayed in the Figure 4-26 with dark grey hash marks. The smaller San Pablo Bay Watershed, associated with HUC 1805000208, is displayed alongside the Petaluma River watershed (with HUC 1805000206) in Figure 4-27.

**Petaluma River-Frontal San Pablo Bay Estuaries Watershed (HUC 1805000206)** – This smaller watershed is located in the southern portion of Sonoma County, with some parts falling in Marin County. It is approximately 126,518 acres in size and it is the watershed which covers the majority of the City and its Planning Area. Tidal influences extend into the City and the watershed, with the confluence of Lynch Creek on the north-central portion of the City. The watershed contains salt marshes and wetlands.



**Figure 4-27: City of Petaluma Water Service Areas and Flood Control Structures**



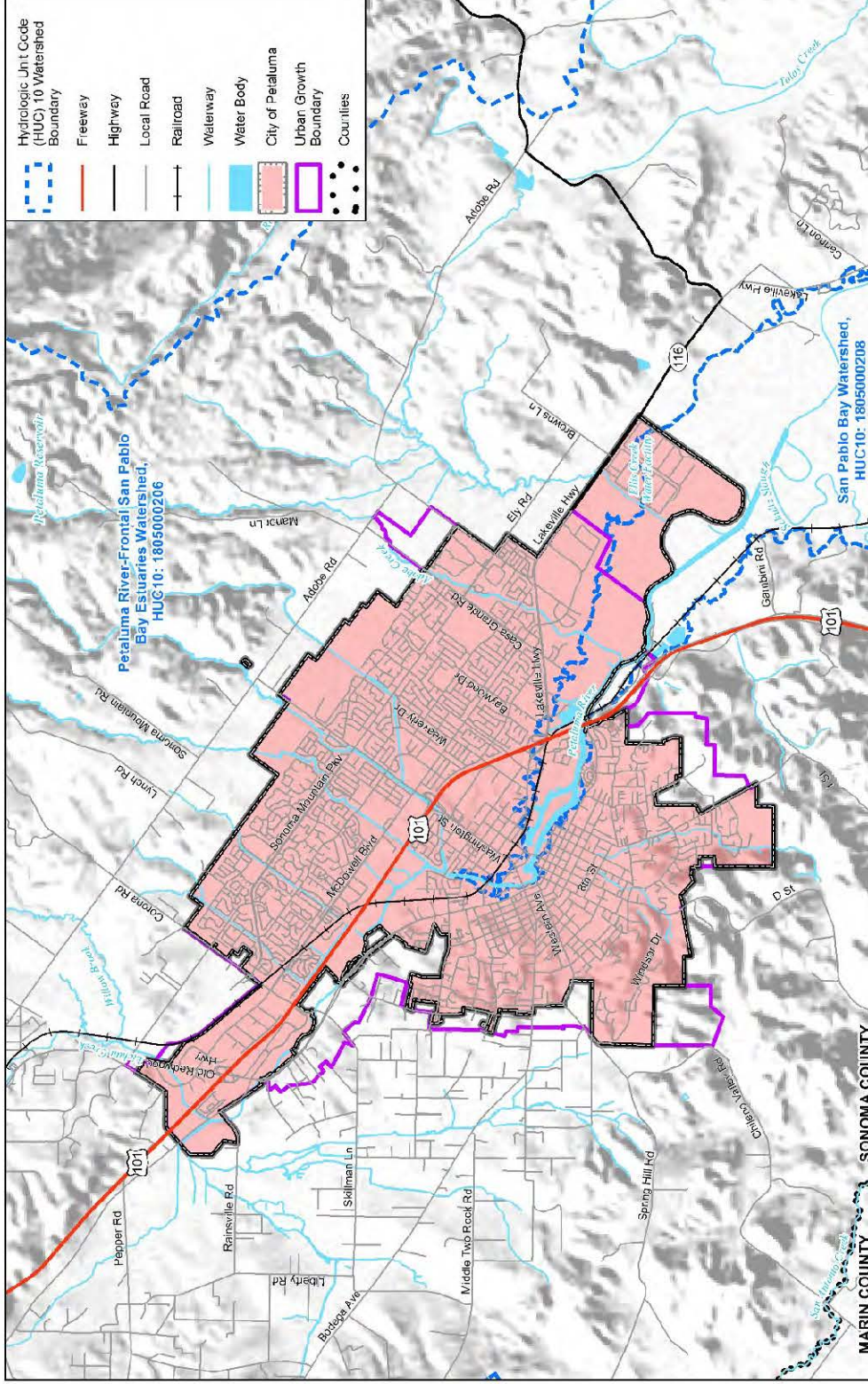
Map compiled 9/2019;  
intended for planning purposes only.  
Data Source: City of Petaluma, CalTrans,  
US Census TIGER Database, FEMA NFHL,  
USGS







Figure 4-28: Watersheds in the City of Petaluma and Its Planning Area



Map compiled 10/2019;  
intended for planning purposes only.  
Data Source: City of Petaluma, CalTrans,  
US Census TIGER Database, FEMA NFHL,  
USGS/NHD





## Local and Regional Drainage Facilities

Major drainage features within the Planning Area or managed by the City of Petaluma include:

- Petaluma River
- Adobe Creek
- Lynch Creek
- Lichau Creek
- Willow Brook
- Small unnamed branches and tributaries in the San Pablo Bay and Petaluma River-Frontal San Pablo Bay Estuaries watersheds
- Petaluma Water Aqueduct
- The Lawler structure/dam
- City and County stormwater drainage facilities (e.g. as indicated in the Petaluma Storm Water Management Plan)
- City water weir
- City pumps, tanks, lift, ditches, and other water structures/stations

## Floodplain Mapping and Studies

FEMA established standards for floodplain mapping studies as part of the NFIP (FEMA 2019). The NFIP makes flood insurance available to property owners in participating communities adopting FEMA-approved local floodplain studies, maps, and regulations. Floodplain studies that may be approved by FEMA include federally funded studies; studies developed by state, city, and regional public agencies; and technical studies generated by private interests as part of property annexation and land development efforts. Such studies may include entire stream reaches or limited stream sections depending on the nature and scope of a study. A general overview of floodplain mapping and related components is provided in the following paragraphs.

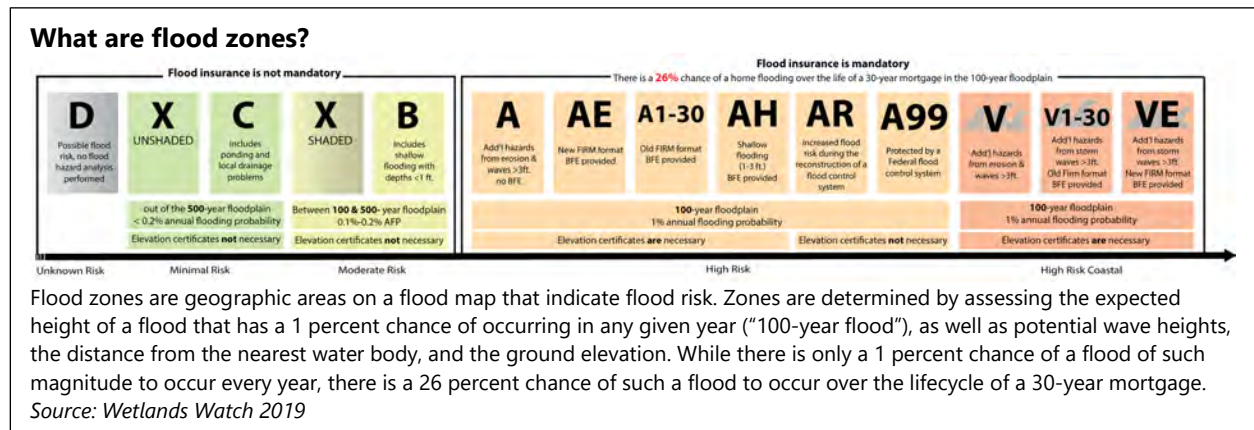
**Flood Insurance Study (FIS)** - The FIS develops flood-risk data for various areas of a community that are used to establish flood insurance rates and assist the community in its efforts to promote sound floodplain management. The latest FIS applicable to the City of Petaluma was included in a five-volume report along with other incorporated jurisdictions and unincorporated areas studied in Sonoma County; this recent report was last revised March 7, 2017.

**Flood Insurance Rate Map (FIRM)** - The FIRM is designed for flood insurance and floodplain management applications. For flood insurance, the FIRM designates flood insurance rate zones to assign premium rates for flood insurance policies. The designated flood zones are based on flood risk in the area. For floodplain management, the FIRM delineates 100- and 500-year floodplains, floodways, and the locations of selected cross sections used in the hydrology and hydraulic analyses and local floodplain regulations

Land areas that are high risk within the 100-year floodplain (meaning they have a one percent annual chance of flooding), are called Special Flood Hazard Areas (SFHAs) and are mapped as A or AE zones. The difference between A and AE zones are the level of detail in analysis and mapping, so that A zones are more general while AE contain additional detail and also display Base Flood Elevations, or BFEs. In



communities that participate in the NFIP, mandatory flood insurance purchase requirements apply to Zones A and AE (i.e., those areas subject to a 100-year flood event).



The City of Petaluma FIRMs, as with most portions of California and larger developments across the U.S., have been replaced by new digital flood insurance rate maps (or DFIRMS) as part of FEMA’s Risk Map and Map Modernization programs. DFIRMS and related datasets (e.g. cross sections used in floodplain studies and analyses, BFEs, etc.) are now delivered via National Flood Hazard Layer (NFHL) databases, accessible for free online at FEMA’s Flood Map Service Center site.

These digital DFIRMS achieve the following purposes:

- Incorporate the latest flood study updates (LOMRs and LOMAs)
- Utilize community supplied data
- Verify the currency of the floodplains and refit them to community supplied base maps and base data
- Upgrade the FIRMs to a GIS database format to set the stage for future updates and to enable manipulation, storage, and support for GIS analyses and other digital applications
- Solicit community participation

The most current DFIRMS for the City of Petaluma and other jurisdictions or unincorporated areas within Sonoma County are included in the County’s NFHL database. The latest effective date for studies in the County is March 7, 2017. The spatial features available in this NFHL database, such as floodplains and levees, were used for the analyses and mapping in this plan as they relate to flooding hazards.

**Letter of Map Revision (LOMR) and Letter of Map Amendment (LOMA)** - LOMRs and LOMAs represent separate floodplain studies dealing with individual properties or limited stream segments that update the FIS and FIRM data (as revisions or amendments) between periodic FEMA publications of the FIS and FIRM products.

### Major Sources of Flooding

General rainfall floods, primarily associated with seasonal storms and thunderstorms, can occur in the City during winter and spring months. This type of flood results from prolonged heavy rainfall over tributary areas and is characterized by high peak flows of moderate duration. Flooding is more severe when antecedent rain has resulted in saturated ground conditions.

In the more urbanized areas of Petaluma, flood problems intensify because the immediate areas are developed and contain mostly impervious surfaces such as roads and paved structures. Because of this, the nearby open land available to absorb rainfall and runoff is often limited or difficult to access naturally.





In other words, the decrease in the amount of open land that can absorb precipitation increases the volume of water that must be carried away by waterways and developed infrastructure, causing localized flash flooding and stormwater issues.

The latest FEMA NFHL data indicate that 100- and 500-year floodplains are predominantly located on the south-southeast and north-northwest of the City, along the Petaluma River (see Figure 4-28). Other smaller flooding areas are also expected to occur along Lakeville Highway and Casa Grande Road, on the confluence of Adobe Creek with the Petaluma River, as well as east of Washington Street and McDowell Boulevard, on the confluences of Lynch Creek and nearby tributaries associated with the Petaluma River. The more upstream portions of Lynch Creek, near the north-northeast of the City are also affected by flooding, towards Adobe Road north of Sonoma Mountain Parkway.

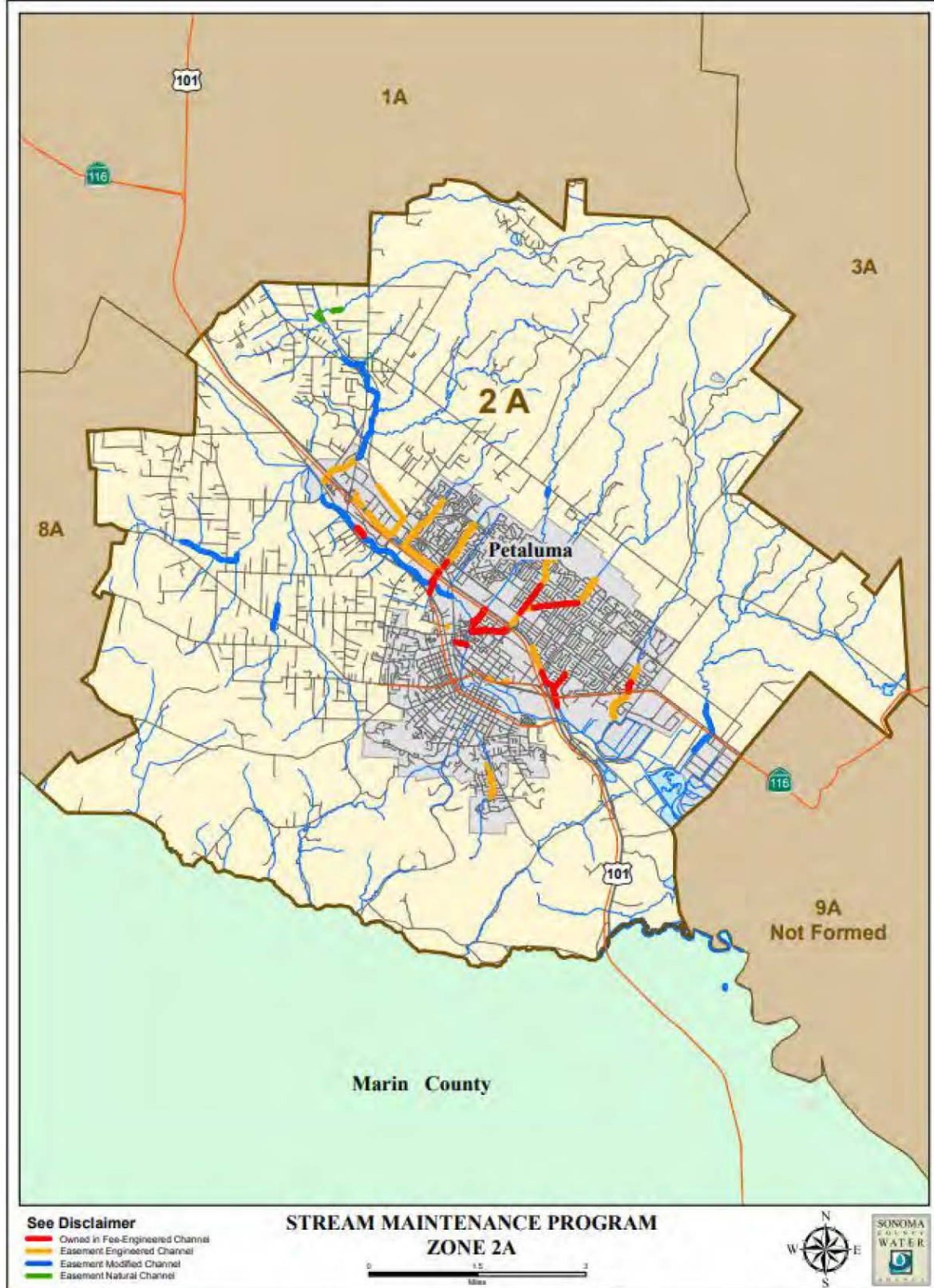
The Sonoma Water authority was enabled, in 1958, to create several geographic zones encompassing major watersheds in the county, in order to finance development and maintenance of flood protection projects as flood control zones. The City of Petaluma falls in Zone 2A, named the Petaluma River Watershed area. Zone advisory committees exist which are in charge of prioritizing, managing, and approving zone related capital improvement plans and projects such as flood protection and drainage facility works, natural waterway maintenance, plan development, erosion and sedimentation control activities, and others also pertaining to Sonoma Water's goals and objectives. Petaluma's Zone 2A flood control area is represented in Figure 4-28 below including the zone's stream maintenance program focus areas along major waterways (i.e. primary sources of flooding) in the City.







Figure 4-30: Petaluma Flood Control Zone 2A and Stream Maintenance Program Focus Areas





## Localized Flooding Problem Areas

Based on historical occurrence data, the Payran neighborhood and nearby areas have been severely impacted by flooding from storms and flash floods compared to other communities in the City's Planning Area. This is the area where the two worst floods for Petaluma occurred and resulted in millions of dollars in damages and losses (i.e. the floods of 1982 and 2005). More information on heavily flood-affected areas is summarized in the Previous Occurrences subsection and the Vulnerability Assessment (including the Insurance Coverage and NFIP Claims and Losses subsection, information on repetitive loss properties and Community Information System records for Petaluma).

The Petaluma River Flood Control project is currently nearing completion, and the Payran levee project is part of this larger flood control project. Once constructed, this flood control project is expected to relieve flood risk and historic and repetitive flooding impacts to the Payran area. According to the City's FMP, the Petaluma has already been noticing a significant reduction in flooding related issues due to project implementation and construction (City of Petaluma 2015b).

## Levees

In many locations in California, levees and flood control facilities have been built and are maintained by various public and private entities, including water, irrigation, and flood control districts; other state and local agencies; and private interests (National Levee Database 2018). Some of these facilities were constructed with flood control as secondary or incidental to their primary purpose. The City of Petaluma owns, operates, and maintains two floodwalls within the Planning Area, were both shown in Figure 4-30 as dark pink line features. The two flood control structures are located west of Washington Street along the Petaluma River, in the center-west portion of the Planning Area. However, other levees contained in the latest FEMA NFHL database cover the boundaries of the City and Planning Area; these are also located along the Petaluma River, but on the south-southeast portion of the Planning Area. The City of Petaluma pledged to pursue certification of several of these existing levees in order to better protect the City's infrastructure, including the wastewater treatment plant and wetland areas.

### What is Levee Certification?

Levee certification is the process that deals specifically with the design and physical condition of levees, and is the responsibility of the levee owners or community in charge of the levee's operation and maintenance. Certification must be completed for the levee to be eligible for accreditation by FEMA. Certification consists of documentation signed and sealed by a registered Professional Engineer, as defined in 44 CFR Section 65.2. This documentation must state the levee meets the requirements of 44 CFR Section 65.10, the data is accurate to the best of the certifier's knowledge, and the analyses are performed correctly and in accordance with sound engineering practices. Levee certification does not guarantee performance, as it is the responsibility of the levee owner to ensure the levee is being maintained and operated properly.

Source: FEMA 2012 [www.fema.gov/rm-main](http://www.fema.gov/rm-main)

A small portion of a Zone A99 is located in the Planning Area, as shown in Figure 4-29 by the purple polygon. This special flood designation is located in the Payran residential neighborhood, a few streets west of Washington Street and to the east of the railroad, in the central and western portion of the City. These A99 flood zones are 100-year floodplains that will be protected by federal flood control systems or structures, as their construction methods have reached specified legal requirements. The City of Petaluma submitted this A99 flood zone determination application in 2013, and on June 10, 2014 a LOMR using this flood zone classification became effective. It is expected that when construction has been fully completed the Payran levee project will be certified by the U.S. Army Corps of Engineers, and this zone will switch to a flood zone of type "X" (i.e. areas of minimal flood hazard) (City of Petaluma 2015b).





### Extent (Magnitude/Severity)

**Limited** – Flood maps can be used as an indicator of flood extent. Flood depth and velocity also affect the extent of flood hazards and resulting damage. The deeper and faster flood flows become, the more damage they can cause in a community. However, shallow flooding with high velocities (e.g., such as a flash flood event caused by precipitation) can cause as much damage as deep flooding with a slow velocity (e.g., from a riverine flood event). This typically happens when a channel migrates over a floodplain and redirects flows and transports debris and sediment.

While cities can implement measures to prevent or reduce the severity and magnitude of flood hazards, some level of risk often remains. These types of threats include upstream dam failure, infrastructure failure, and severe flood events that exceed flood design standards or drainage capacity, leading to flash flooding. Flood severity can be determined by logging peak discharge flows. This information is tracked by both FEMA and the USGS. FEMA’s BFE depth curve datasets can provide further insight as to how much gets flooded of a community and where exactly, enhancing the level of detail on the magnitude of flooding that can affect a particular community. Based on the most recent NFHL database from FEMA (which includes these BFEs), the City of Petaluma and its Planning Area is expected to experience the worst flooding conditions across the northeast and southeast, with pockets of deep inundation across the central portions of the Petaluma River near the downtown area, and north-northwest of Washington Street and north-northeast of Western Avenue (near the Payran neighborhood).

Based on a flood depth grid indicating the amount of feet that areas of the City could experience in terms of flooding amount, the City of Petaluma may experience one to two feet of flooding near Wickersham Park and the Theater District area, and two to four feet of flooding in small pockets of roads or lawn/field areas near the Norcal Paintball Park north of Payran Street. Other portions of the City may face deeper flooding (over 5 feet), such in the residential neighborhood’s paved areas located between Caulfield Lane and S. McDowell Boulevard, east of U.S. Highway 101.

Other localized flooding from existing stormwater infrastructure, for example, is more difficult to estimate but could happen anywhere in the Planning Area and could be severe depending on the flood event itself and the conditions of the existing infrastructure. Table 4-27 below summarizes the general FEMA-available flood zones for context. Overall, while the historic extent of flooding hazards was likely critical, today, flooding hazards were rated by the City and HMPC as being limited in terms of magnitude or severity for the City of Petaluma. In other words, where flood hazards were previously expected to impact approximately 25 to 50 percent of the properties in the City’s Planning Area, because of the construction of flood control projects, now approximately 10 to 25 percent of the property could be severely damaged.

**Table 4-27: FEMA’s Special Flood Hazard Area Zone Descriptions**

Flood Zone	Definition
<b>FEMA Special Flood Hazard Areas (SFHA) Subject to Inundation by the 100- or 500-Year Floods</b>	
Zone A	100-year floodplain, or areas with a 1% annual chance of flooding. Because detailed analyses are not performed these areas, no depths or base flood elevations are shown in Zone A areas.
Zone AE	Detailed studies for the 100-year floodplain. The base floodplain where base flood elevations are provided. AE Zones are now used on new format FIRMs instead of A1-A30 zones.
Zone AH	Areas with a 1% chance of shallow flooding, usually in the form of a pond with an average depth ranging from 1 to 3 feet. These are flood elevations derived from detailed analyses.
Zone AO	River or stream flood hazard areas and areas with a 1% or greater chance of shallow flooding each year, usually in the form of sheet flow, with an average depth ranging from 1 to 3 feet. Average flood depths derived from detailed analyses.







Flood Zone	Definition
Zone A99	100-year floodplain, areas with a 1% annual chance of flooding that will be protected by a federal flood control system where construction has reached specified legal requirements. No depths or base flood elevations are shown within these zones.
<b>Other Flood Areas</b>	
Floodway	A regulatory floodway is the channel of a river or other watercourse and the adjacent land areas that must be reserved in order to discharge the base flood without cumulatively increasing the water surface elevation more than a designated height.
Zone X (shaded)	Areas with a 0.2% annual chance flooding (1 in 500 chance), between the limits of the 100-year and 500-year floodplains. This zone is also used to designate base floodplains of lesser hazards, such as areas protected by levees from the 100-year flood, shallow flooding areas with average depths of less than one foot, or drainage areas less than 1 square mile.
Zone X (unshaded)	500-year floodplain (0.2% annual chance). Area of minimal flood hazard.

Source: FEMA Flood Map Service Center, 2018

### Previous Occurrences

The City of Petaluma has historically been impacted by flooding from sources such as general riverine and flash flooding from winter storms. Historical records are described below, but may not represent all historical events. The records below are from several sources, including: the NCEI database, which is managed by NOAA; 2016 Sonoma County Operational Area HMP; the 2018 California SHMP, 2015 Petaluma FMP; the U.S. Department of Agriculture’s Secretarial Disaster Designations; and, the OpenFEMA Disaster Declaration dataset.

**January 3-5, 1982** – This is the largest flood of record in the City. It led to approximately \$28 million in damages, and the storm that caused the flooding is documented in an Army Corps of Engineers post-flood event report, reading as follows: “During the January 1982 storm, flooding occurred over a 50+ block area on both sides of the river through the City of Petaluma. Most of the 500 homes and the 100 commercial-industrial establishments in this area incurred flood damage. In many cases, water depth reached two to three feet inside the structure. The most severely hit area appears to be along Jess Avenue where most homes had four to five feet inside. Payran Street was also an area of major damage in which flooding reached over three feet inside the structure.” (City of Petaluma 2015b).

**February 14-17, 1986** - \$1 million in damages were caused in the Petaluma River urbanized sections between the Lynch Creek confluence with the Lakeville Street Bridge. An article in the San Francisco Chronicle headlined “Petaluma Takes to the Boats” published February 15, 1986· noted how 400 homes were evacuated due to this flood in the Linda Del Mar subdivision, and how flood waters reached a depth of about 5 feet (City of Petaluma 2015b).

**March 9, 1995** – This flood event led to about \$9,000 of damage to the Petaluma Wastewater Treatment Plant as flood control structures were severely impacted. Hopper Street also experienced damage. In addition, seven schools were closed, and over 300 homes had to be evacuated for safety reasons. Another article in the San Francisco Chronicle was published on March 10, 1995 on this event, titled “Soggy Anger on the Street That Always Floods.” The article discussed how Payran Street was impacted during this event and how that particular street and area commonly get flooded over the years.

**February 1998** – The winter of 1997-1998 felt the effects of the El Niño storms, which caused great storms in the west coast that lead to the major flooding in Petaluma among other California coastal areas. Approximately \$6 million were incurred from damages in the City, from both the early February event (2<sup>nd</sup>-3<sup>rd</sup> of the month) as well as the February 29, 2019 storms. State and federal governments declared



the events as disasters (under the FEMA DR 1203 declaration). The Payran neighborhood and businesses in the Industrial Ave/Auto Center Drive area saw the worst effects, and oxidation ponds the City's wastewater treatment facility also were badly damaged. The San Francisco Chronicle published an article on February 20, 1998 titled "More Rain, More Havoc" about this event. The article reported that the Payran community got hit for the third time in three weeks with storms and flooding, and almost 50 homes needed evacuation. Around 30 seniors required evacuation as well, from a mobile home park north of the City.

**December 31, 2005** – The middle and northern areas of the City experienced significant flooding due to this New Year's Eve event, incurring \$56 million in structural damages (affecting 53 structures). Flood waters also damaged streets and river channel banks, particularly within the Petaluma Factory Outlets, and at several commercial structures and mobile homes. This flood event led to a State and Federal Disaster Declaration.

**January 25-26, 2008** - Very heavy rain caused flash flooding around Petaluma late Friday night, January 26, 2008. The Petaluma River near Corona Road went over its flood stage of 25.5 feet reaching nearly 30 feet. At least a dozen homes were flooded as were several businesses. A nearly stationary frontal band hung over parts of the Bay Area bringing intense rainfall for several hours. It is estimated that \$800,000 was incurred in overall damages across all the storm-affected areas in the Bay Area (particularly coastal sections of Marin, San Francisco, and San Mateo Counties).

**December 2, 2012** – Minor flooding was observed around Petaluma Sky Ranch/airport area, as water levels on Willow Brook were overtopped. Penngrove Park was also affected.

**December 11, 2014** – The northern and southern portions of the City were affected by flooding, and waters inundated Industrial Avenue and nearby areas. Road closures were necessary along that Avenue as well as Auto Center Drive. Evacuations of businesses ensued. Residential neighborhoods near Corona Creek and near Ellis Creek were also hit. There were no reported damaged structures.

**December 15, 2016** - Northbound State Route 121 closed due to flooding near the Junctions of Route 116 and 121 in Petaluma, though overall the flood event was minor.

### Probability of Future Occurrences

**Likely** - The 100-year flood is the flood that has a one percent chance in any given year of being equaled or exceeded, while the 500-year flood is expected to have a 0.2 percent chance of occurring (or being exceeded) in any year, respectively. As such, it is likely that riverine flooding will occur in the future, though localized stormwater flooding and general flash flooding is also expected to take place especially during the wet months and heavy rain or storm events.



The north end of the City of Petaluma experienced significant flooding on December 30, 2005 through December 31, 2005. Streets and buildings in the north end of the City had up to five feet of flooding and several houses and mobile homes were damaged on Petaluma Boulevard North and North McDowell Boulevard. The City also noted damage to business along Industrial Drive and Corona Road, near the Petaluma Outlets, and on Old Redwood Highway  
*Photo Credit: City of Petaluma Fire Department 2019*



## Climate Change Considerations

Emerging findings from California's Fourth Climate Assessment show that costs associated with direct climate change impacts by 2050 will be dominated by human mortality, coastal damage, and the potential for droughts and mega-floods (California Natural Resources Agency 2018). Scientific studies outlined in the same assessment also indicated shifts in California's precipitation regime, which show more dry days, more dry years, a longer dry season, mixed with increases in occasional heavy precipitation events and floods (i.e. a shift towards potentially less frequent but more extreme precipitation events). Studies also project great storm intensity with climate change, resulting in more direct runoff and flooding due to the flash flooding or precipitation nature of these expected events. As a result of fewer but more violent precipitation events, high frequency flood events will increase with climate change. Also, with wildfires already being a problem in California, increasing periods of drought and lack of precipitation are expected to exacerbate conditions for fires to occur, and in turn worsen the potential for runoff and flooding associated with burned areas due to increased impermeability and damage terrain and soils.

This Fourth Climate Assessment indicates that climate change is expected to alter built water supply systems, so that current management practices for flood control and water supplies across the state of California may need to be revised. Future revisions should aim to account for subsidence-prone infrastructure (e.g. levees), which coupled with rising sea levels and worsening storm conditions can lead to overtopping or failure of these flood control structures (California Natural Resources Agency 2018).

Based on Sonoma County's 2016 CAP and GHG emission modelling, climate change is projected to result in an increased risk of extreme flood, and an increased seasonal variability of precipitation, runoff, and stream flows for Sonoma County, along with increased likelihood of "extreme" precipitation and drought events. There may be more years with more frequent storm events and occasional events that are much stronger than historical ones and the length of season over which storm events occur is predicted to increase (SCTA 2016). Also, according to the CAP, more frequent coastal flooding and increased erosion is anticipated. In addition to flooding, sea levels are projected to rise between 16.5 and 65.8 inches by 2100. Rising sea levels combined with increased storm surge is anticipated to lead to more frequent inundation of the low-lying areas, and flooding of homes, infrastructure, agricultural land, and natural areas on the shores of San Pablo Bay. The greatest impacts are anticipated during winter storms. For these reasons, climate change would have a "high" influence on flooding hazards.

## Vulnerability Assessment

Historically, the Planning Area has been at risk to flooding primarily on the north-northwest and south-southeast portion of the City. Normally, storm floodwaters are kept within defined limits by a variety of storm drainage and flood control measures (e.g. levees). But, occasionally, extended heavy rains result in floodwaters that exceed local drainage infrastructure capacity and cause damage.

Flooding has occurred in the past: within the 100-year floodplain and in other localized areas. In addition to damage to area infrastructure and City facilities, other problems associated with flooding include erosion, sedimentation, degradation of water quality, loss of environmental resources, certain health hazards, and the inconvenience or potential financial and accessibility issues that come with road closures and other such effects.

The City of Petaluma has mapped flood hazard areas as portrayed in the figures contained throughout this section. For the following vulnerability assessment, GIS was used to identify and quantify the possible impacts of flooding within the City's Planning Area. The following methodology was followed in creating these flood vulnerability maps and determining values at risk to the 100- and 500-year flood events.



### Insurance Coverage and NFIP Claims and Losses for Repetitive Loss Properties

The City of Petaluma joined the NFIP (regular entry) on February 15, 1980. The current effective map date is from October 12, 2015. The City currently participates in the Community Rating System (CRS), holding a class rating of 6 as of May 1, 2019 (leading to a 20 percent discount rate for SFHAs). NFIP Community Information System (CIS) insurance data indicates that as of July 10, 2019 there were 415 policies in place in the City, resulting in \$145,671,200 of insurance in effect. Since the City began participating in the NFIP there have been 373 total closed losses, amounting to \$8,703,708 in payments. According to the 2018 California SHMP, in 2017, Sonoma County was the top-ranking county in state for Repetitive Losses, accounting for more than 48 percent of the total top 10 repetitive losses. The City of Petaluma’s latest CIS report, released July 10, 2019, shows 30 Repetitive Loss buildings (13 of which are insured) as defined by FEMA. Repetitive loss properties have incurred 89 total losses, 43 of which were insured cases, and these accrued to \$3,179,133 in payments from both building- and contents-related losses. The majority of these repetitive loss properties fell within AE, A, A1-A30, AO, AH flood hazard areas (FEMA 2019c). Table 4-28 below summarizes the repetitive loss information detailed in the City’s latest CIS report, while Figure 4-31 displays the locations of these repetitive loss properties.

**Table 4-28: City of Petaluma Parcels in Floodplains by Parcel Type and Flood Event**

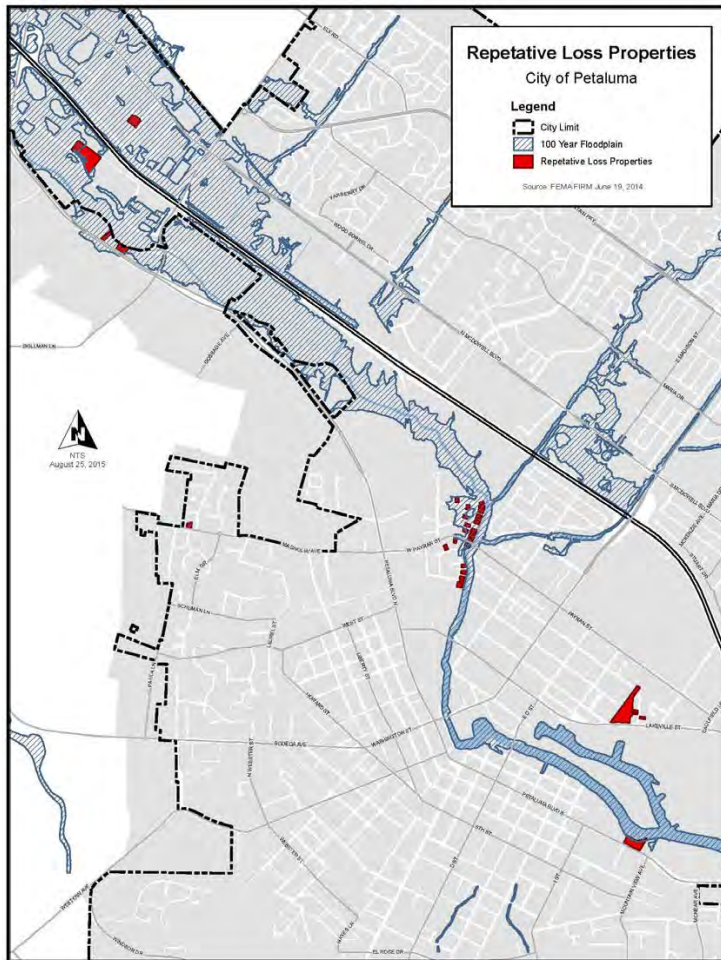
Repetitive Loss Component	Zones AE, A, A1-30, AO, AH	Zones B, C, X	Total
Total Buildings	28	2	30
Insured Buildings	13	0	13
Total Losses	84	5	89
Insured Losses	43	0	43
Total Payments	\$3,119,975	\$59,158	\$3,179,133
Building related losses	\$2,480,047	\$43,565	\$2,523,612
Contents related losses	\$639,927	\$15,593	\$655,520
Insured Payments	\$2,464,996	\$0	\$2,464,996
Building related payments	\$2,019,948	\$0	\$2,019,948
Contents related payments	\$445,048	\$0	\$445,048

Source: CIS Repetitive Loss report for the City of Petaluma (FEMA) 2019

Note: No repetitive loss information was noted for Zones VE, V, or V1-30; as such that column was excluded.



**Figure 4-31: Repetitive Loss Properties in the City of Petaluma as of 2015**



Source: City of Petaluma 2015

### Property

This section summarizes the vulnerabilities to parcels and values at risk in the City. According to the information obtained via the GIS analysis, where the number and types of parcels falling in the 100- and 500-year floodplains was aggregated, Petaluma has 820 parcels with total values equating to \$1.12 billion in both floodplains. A 25 percent damage factor was applied to the total value column of the tables below to estimate potential losses from flood related hazards to the City's parcels. 25 percent is the typical loss ratio associated with a 2-foot-deep flood, based on FEMA and Army Corp of Engineer depth-damage relationships. The total values were calculated by adding up the improved structure values of the parcels in the floodplains with the content values. These values were then estimated with the following formulas: a) residential and multi-family properties received contents valued at 50 percent of the parcel improved value; b) commercial and agricultural properties' contents were valued at 100 percent of the parcel improved value; and, c) vacant parcels received 0 percent content values. These valuation assignments are founded on FEMA's methodology for estimating contents within their loss estimation software, Hazus-MH.

Table 4-29 and Table 4-30 summarize the values at risk in the City's 100- and 500-year event floodplains. Figure 4-32 displays the location of these parcels in the flood areas. Overall, Petaluma has 200 parcels



valued at roughly \$424.4 million in the 100-year floodplain, \$106 million of which is estimated to be a potential loss if a flood of this nature were to take place. 620 parcels valued at roughly \$699.2 million are found in the 500-year floodplain, \$174.8 million of which is estimated to be a potential loss if an event of this magnitude were to take place. Combined, the potential losses estimated from both events would total \$280.9 million.

**Table 4-29: City of Petaluma Parcels in Floodplains by Parcel Type and Flood Event**

Flood Event	Parcel Type	Total Parcels	Improved Value	Contents Value	Total Value	Loss Estimate (25% of the Total Value)	Population at Risk
100-year	Residential	54	\$9,994,745	\$4,997,373	\$14,992,118	\$3,748,029	145
	Multi-Family	1	\$63,059	\$31,530	\$94,589	\$23,647	3
	Commercial	145	\$204,698,304	\$204,698,304	\$409,396,608	\$102,349,152	--
<b>TOTAL</b>		<b>200</b>	<b>\$214,756,108</b>	<b>\$209,727,206</b>	<b>\$424,483,314</b>	<b>\$106,120,829</b>	<b>147</b>
500-year	Residential	510	\$118,374,972	\$59,187,486	\$177,562,458	\$44,390,615	1,367
	Multi-Family	11	\$122,909,517	\$61,454,759	\$184,364,276	\$46,091,069	29
	Commercial	99	\$168,655,657	\$168,655,657	\$337,311,314	\$84,327,829	--
<b>TOTAL</b>		<b>620</b>	<b>\$409,940,146</b>	<b>\$289,297,902</b>	<b>\$699,238,048</b>	<b>\$174,809,512</b>	<b>1,396</b>
<b>GRAND TOTAL</b>		<b>820</b>	<b>\$624,696,254</b>	<b>\$499,025,108</b>	<b>\$1,123,721,362</b>	<b>\$280,930,340</b>	<b>1,544</b>

Sources: City of Petaluma GIS, Sonoma County Assessor's Office, FEMA NFHL, Wood Parcel Analysis

**Table 4-30: City of Petaluma Flood Loss Estimates Summary by Parcel Type**

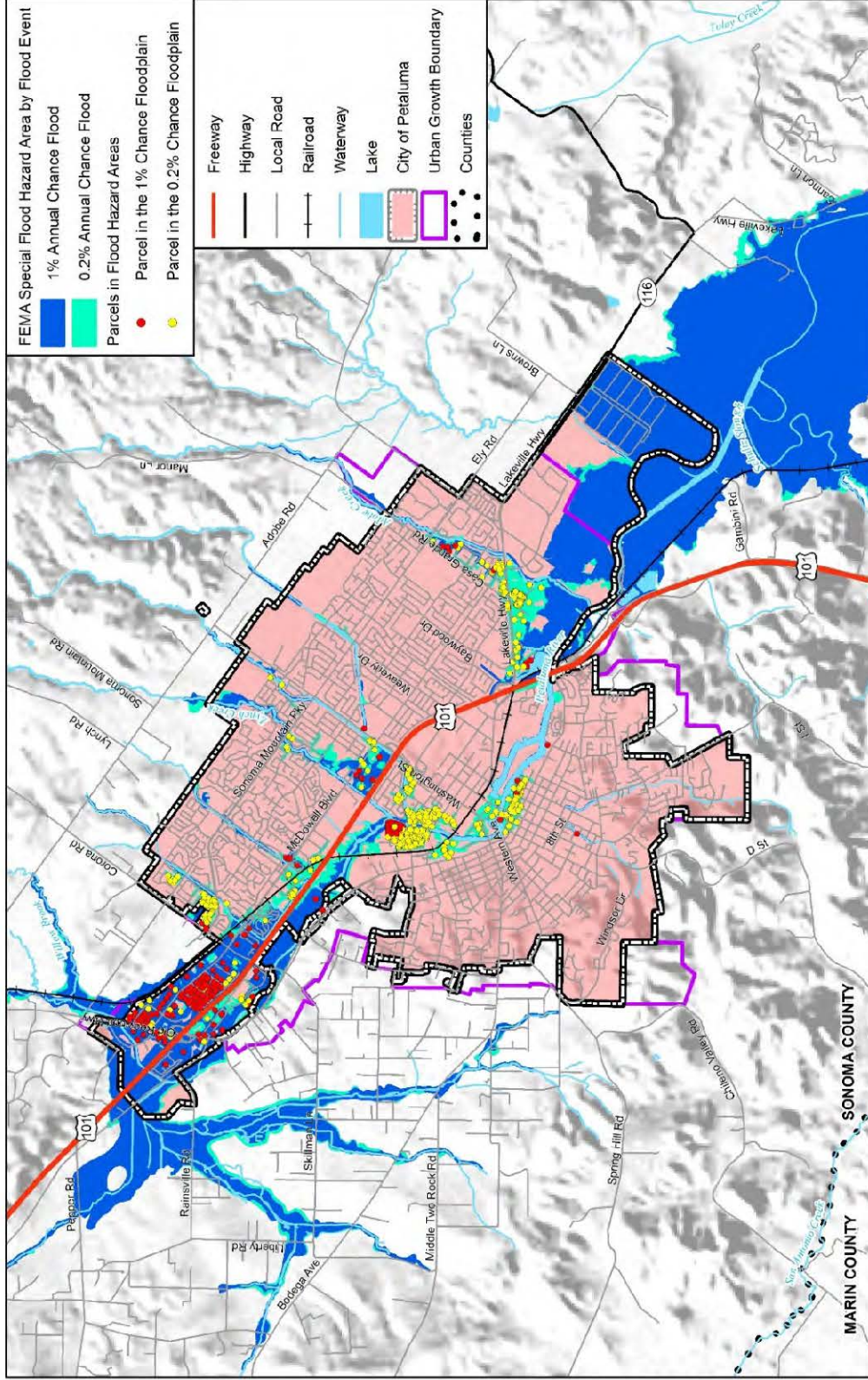
Parcel Type	Total Parcels	Improved Value	Contents Value	Total Value	Loss Estimate (25% of the Total Value)	Population at Risk
Commercial	244	\$373,353,961	\$373,353,961	\$746,707,922	\$186,676,981	--
Residential	564	\$128,369,717	\$64,184,859	\$192,554,576	\$48,138,644	1,512
Multi-Family	12	\$122,972,576	\$61,486,288	\$184,458,864	\$46,114,716	32
<b>TOTAL</b>	<b>820</b>	<b>\$624,696,254</b>	<b>\$499,025,108</b>	<b>\$1,123,721,362</b>	<b>\$280,930,340</b>	<b>1,544</b>

Sources: City of Petaluma GIS, Sonoma County Assessor's Office, FEMA NFHL, Wood Parcel Analysis





Figure 4-32: City of Petaluma Parcels in the 1% and 0.2% Annual Chance Floodplains



Map compiled 10/2019;  
intended for planning purposes only.  
Data Source: City of Petaluma, CalTrans,  
US Census TIGER Database, FEMA NFHL,  
Sonoma County Assessor's Office





## People

Of greatest concern in the event of a flooding event is the potential for injury or loss of life. City of Petaluma 2018 U.S. Census Bureau estimates were obtained, which indicate the average persons per household for the City. The City's average household size is 2.68, and this metric was multiplied by the number of parcels of residential nature at risk of flooding to determine the total potential affected population. Population at risk estimates are summarized in the last column of Table 4-29 and Table 4-30 in the pages above, by flood event type and parcel type. The results were totaled for all the flood hazard zones. As the previous two tables indicate, there are around 1,544 people at risk of flooding caused by any of the flood events overlapping with residential properties, where 147 people are found in the 100-year floodplain and 1,396 people in the 500-year floodplain. Given the number of households and populations identified as socially vulnerable, disadvantaged, or sensitive in the City's planning area and the proximity of these census tracts and block groups to the flood zones, it is assumed that a portion of this population segment may also be disproportionately impacted during a flood event.

## Economy

Similar to a dam inundation event which would affect infrastructure (e.g. roads), homes, and populations (possibly displacing families), impacts to the local economy could include business interruptions, lost or reduced wages from potential relocation of populations, infrastructure and resource downtime costs, and reduced city revenues from lack of tourism or inability to run/maintain certain services (like potable water based utilities). Other secondary hazard impacts such as reduced water quality or resource availability, which could in turn raise costs of water processing and distribution are also possible results from a severe flooding event, whether from riverine flooding, flash flooding, or an event caused by local stormwater/drainage infrastructure failures. Based on the history of flooding in Petaluma, the Payran neighborhood and nearby areas have historically been affected the most in terms of economic losses, which largely encompass damages to property (including disruption to business and commerce operations) and City infrastructure.

## Critical Facilities and Infrastructure

Critical facilities are those community components that are most needed to withstand the impacts of disaster as previously described. GIS was used to determine what City facilities and infrastructure occur within Petaluma's mapped flood hazard areas. The NFHL flood layers previously discussed were used to identify where the 100- and 500-year floodplains intersected with critical facilities. Figure 4-33 illustrates the locations of these critical facilities relative to the floodplains. Table 4-31 provides an inventory of the 15 facilities that occur within the floodplains. The impact to the community could be substantial if these critical facilities were damaged or destroyed during a flood event, particularly those which provide lifeline utilities or health/medical services. Overall, there are a total of five Emergency Service facilities in flooding areas, four High Potential Loss Facilities, five Lifeline Utility Systems, and one Transportation System found at risk in FEMA SFHAs.





**Table 4-31: The City of Petaluma’s Critical Facilities in the 100- and 500-Year Floodplains**

Flood Event	Critical Facility Category	Critical Facility Type	Total Critical Facilities
100-year flood event	High Potential Loss Facilities	Day Care Facilities	1
		Government/Admin	1
	Lifeline Utility Systems	Electric Substations	1
		Water Facility	2
	Transportation Systems	Historic Drawbridge	1
<b>TOTAL</b>			<b>6</b>
500-year flood event	Emergency Services	Emergency Medical Service Station	2
		Fire Station	2
		Nursing Homes	1
	High Potential Loss Facilities	Community/Recreation Center	1
		Government/Admin	1
	Lifeline Utility Systems	Electric Substations	1
		Water Facility	1
<b>TOTAL</b>			<b>9</b>
<b>GRAND TOTAL</b>			<b>15</b>

Source: The City of Petaluma GIS, HIFLD, FEMA NFHL, Wood GIS Analysis







## Historic, Cultural, and Natural Resources

The City of Petaluma has eight natural, historic, or cultural resources located in or nearby the Planning Area boundaries as previously described in Section 4.2 Asset Summary and Section 4.3.4 Fire: Urban and Wildland Fires, under the Historic, Cultural, and Natural Resources subsection. Climate change studies at the county and regional level indicate the likelihood that increasingly unpredictable flash flooding and uncertainty in storm occurrence will lead to a worsening in erosion and sedimentation conditions. However, natural areas within the floodplain often benefit from periodic flooding as a naturally recurring phenomenon, and these natural areas often reduce flood impacts by allowing absorption and infiltration of floodwaters. Nevertheless, other cultural or historical resources such as older buildings or districts may be more affected by these flooding hazards, given their likely older construction methods, weaker materials, and potential failure to meet current building code standards.

## Future Development

The development trend in the City of Petaluma Planning Area is steady. The Petaluma City Profile Report published in 2018 notes the predicted population changes through the year 2022. The City is expected to grow around 3.2 percent in the next 5 years, to an estimated total of 62,700 people. Given these projections it is likely that the City will keep diversifying and expanding its economic base due to proximity to the San Francisco Bay area.

The potential for flooding may increase as stormwater is channelized due to land development. Such changes can create localized flooding problems inside and outside of natural floodplains by altering or confining natural drainage channels. Floodplain modeling and master planning should be based on buildout land use to ensure that all new development is properly designed and remains safe from future flooding. While certain local floodplain management and water quality regulations and policies exist, as well as specific regulatory control of building codes, flood insurance requirements, and other such aspects at the federal or state level, the cumulative effects of flood related hazards can have a negative impact on the floodplain and the community into the future. Water and flood control infrastructure such as dams and levees can additionally be stressed due to increased development and municipal water supply needs coupled with a changing environment which causes environmental and weather conditions to become more and more unpredictable (e.g. through storm events, climate change).

City floodplain management ordinances require that new construction be built with two feet of freeboard for first floor elevations above the BFE (per the General Plan 2025 Policy 8-P-37F). New development that complies with the mandated elevation requirements in addition to other requirements for maintaining elevation certificates, implementing stormwater program elements, and complying with erosion or sediment controls for all new development in the floodplain may protect new constructions from 100-year and possibly other floods events (refer to Section 2.9 Mitigation Capabilities in Chapter 2 – Community Profile for more information on the City’s existing floodplain standards and regulations).

The amount of growth in the City and nearby communities can also strain the capacity of the water management system, which includes water supply in addition to water control. When flood drainage and control structures are overwhelmed, the result is not only severe flooding. Significant losses to the water supply system may also occur.

## Risk Summary

- Overall the significance of flood hazards is **Medium**.



- Floods impacts will vary by location and severity and will likely only affect certain areas of the City Planning Area at any one time.
- Based on the risk assessment, floods will continue to have economic impacts to certain areas of the City's Planning Area, and the estimated losses for properties amounts to \$280.9 million (with a total of 1,544 potential people at risk), in addition to the 15 critical facilities which fall in the floodplains.
- 200 properties valued at roughly \$424 million are located in the 100-year floodplains. 620 properties were found at risk of the 500-year (0.2 percent annual chance) floodplain, roughly valued at \$699 million.
- Six noteworthy flooding events have taken place in Petaluma since 1982. These caused significant damages and several required evacuations, though other minor flooding cases have taken place. The worst two events to record for the City are the January 1982 flood, which caused \$28 million in damages, and New Year's Eve flood of December 2005, which led to an estimated \$56 million in damages. Based on the history of flooding in Petaluma, the Payran neighborhood and nearby areas have historically been affected the most in terms of economic losses which encompass damages to property (including disruption to business and commerce operations) and City infrastructure.
- Impacts that are not directly quantified but could be anticipated in large future events include: 1) injury and loss of life; 2) disruption of and damage to public infrastructure; 3) disruption to trade, commerce, commuting, mobility, and other activities that may rely on the road networks; 4) health hazards associated with mold and mildew; 5) significant direct and indirect economic impact (jobs, sales, tax revenue) upon the community; and 6) negative impact on commercial and residential property values.
- The 2018 California SHMP noted that Sonoma County was the top-ranking area in California to log NFIP repetitive loss cases, accounting for more than 48 percent of the total top 10 repetitive losses (Cal OES 2018)
- NFIP CIS insurance data indicates that as of July 10, 2019 there were 415 policies in place in the City, resulting in \$145,671,200 of insurance in effect. Since the City began participating in the NFIP there have been 373 total closed losses, amounting to \$8,703,708 in payments. There are 30 Repetitive Loss buildings (13 of which are insured) in Petaluma. Repetitive loss properties have incurred 89 total losses, 43 of which were insured cases, and these accrued to \$3,179,133 in payments from both building- and contents-related losses

#### 4.3.6 Sea Level Rise

##### Hazard Description

Sea level rise is defined as the relative average rise in mean sea level. Global sea level rise refers to the long-term gradual increase of sea levels driven by the expansion of ocean waters as they warm, the addition of freshwater to the ocean from melting land-based ice sheets and glaciers, and extractions from groundwater. Regional and local factors such as tectonics and ocean and atmospheric circulation patterns result in relative sea level rise rates that can be higher or lower than the global average. Sea level rise also contributes to increased coastal flooding and more frequent and severe tidal inundation because there is less of a buffer between the ocean and coastal areas and infrastructure within these areas. This can exacerbate existing flood hazards from severe storms, as well as alter the function of the salt marsh and tidal flats near the confluence of Petaluma River and San Pablo Bay. Unlike flooding caused by severe storms, tidal inundation





when combined with sea level rise would occur with predictable high tides and with some regularity. Tidal inundation and sea level rise combined with coastal storm events could also occur and result in greater impacts. Over time, existing low-lying tidal flat areas near the southern portion of Petaluma's Planning Area are expected to be semi-permanently inundated as a result of sea level rise.

## Location

The southern portion of the City of Petaluma, the protected open space and marsh and tidal lands within Petaluma Marsh Wildlife Area, the areas located along Petaluma River, and existing urban development and natural resources in the City are already exposed to riverine and localized flooding, which will be exacerbated by sea level rise. The hazards in these areas are projected to become more severe when combined with sea level rise. The creeks and rivers that drain to the Petaluma River in confluence with San Pablo Bay result in an ecologically diverse range of low-lying habitats including coastal wetlands, tidal salt marsh, and mudflats. These ecological areas extend from the southern portion of the City Planning Area along Petaluma River and between U.S. Highway 101 and Highway 116 to outside the Planning Area near Point Sonoma and San Pablo Bay. The portion within the Planning Area where sea level rise may occur over time under the more extreme projections includes downtown Petaluma and a number of open space and recreation areas, such as Steamer Landing Park and Shollenberger Park. The southern portion of the City also contains the Petaluma Marina and Ellis Creek Water Recycling Facility. In summary, the geographic area of the City exposed to sea level rise is limited to a small portion of the entire planning area.

## Extent (Magnitude/Severity)

**Negligible** – USGS, in collaboration with the Our Coast, Our Future (OCOF) project, has developed the Coastal Storm Modelling System (CoSMoS) to make detailed predictions of coastal storm (wave-driven) flooding, beach and cliff erosion, and sea level rise over a large geographic scale. In the City of Petaluma, sea level rise is projected to expand the flood zone under varying scenarios, but specifically in the low-lying areas along the Petaluma River and the coastal areas located south of downtown. The potential extent of flooding associated with sea level rise and various storm scenarios, such as the average annual tidal conditions, and 100-year wave event are summarized and depicted in the vulnerability assessment. It is worth noting that sea level rise modeling used for the vulnerability assessment assumes some level of shoreline protection or adaptation strategies, such as large-scale levees are in place (e.g. CoSMoS includes levee structures that are visible on LiDAR data and can be included in digital elevation models).

The California Ocean Protection Council (OPC) summarized the best available science on sea level rise in *Rising Seas in California: An Update on Sea Level Rise* report released in 2017, which was later used to update the OPC's guidance on sea level rise in 2018. This guidance is also referenced as the best available science in the California Coastal Commission (CCC) *Sea Level Rise Policy Guidance: Interpretive Guidelines for Addressing Sea Level Rise in Local Coastal Programs and Coastal Development Permits* document last updated in November 2018 (CCC 2018).

The OPC Guidance projects sea level rise for various emission scenarios and uses a probabilistic approach to generate a range of projections at a given time horizon (Kopp et al. 2014). The CCC Sea Level Rise Policy Guidance recommends using projections associated with a high emissions scenario given that worldwide emissions are currently following the high emissions trajectory, whereas the OPC Guidance provides a risk decision framework that explains when to use a low or a high risk aversion in the planning process (CCC 2018; OPC 2018). With these frameworks, probabilistic projections inform decision-making processes regarding the likely extent of sea level rise rather than trying to estimate the exact rate or occurrence of sea level rise based on an individual scenario or projection.





For the 2050 time horizon the likely range of sea level rise is between 0.6 to 1.1 feet and there is a 66 percent probability that sea level rise will fall within this likely range (Kopp et al. 2014). The likely range of sea level rise at 2100 is 1.6 to 3.4 feet for a high emissions scenario. The upper end of the likely range is recommended to use as a projection for low-risk tolerance situations, where sea level rise impacts can be easily mitigated. The CCC recommends the high-risk tolerance range to be used when considering resources where the consequences of sea level rise are limited in scale. In other words, this would apply where there would be minimal disruption and where there would be a low impact on communities and critical infrastructure.

For medium-high risk tolerance situations, more conservative projections for sea level rise are recommended by the OPC Guidance. The medium-high risk aversion scenario projects 1.9 feet of sea level rise could occur by 2050, and 6.9 feet of sea level rise could occur by 2100. These projections have a 0.5 percent probability of occurring, or a 1 in 200 chance, at a given time horizon. These projections would be appropriate for projects where damage from coastal flood hazards exacerbated by sea level rise would result in higher consequences, or the community or project would have less ability to adapt. The medium-high risk tolerance situation may be applicable to residential and commercial development in Petaluma.

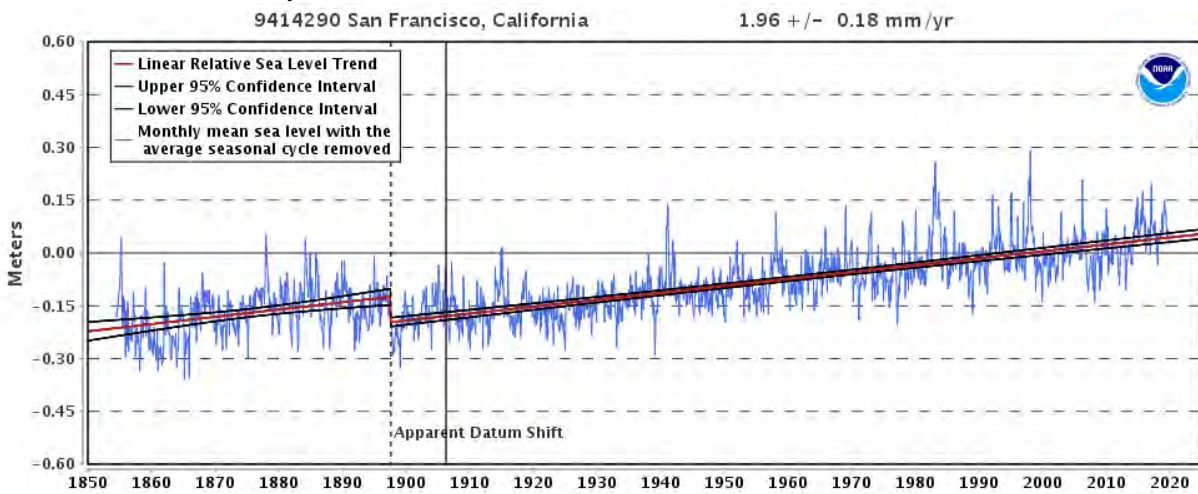
The OPC Guidance also includes a specific stand-alone scenario, referred to as H++, where up to 6.6 feet of sea level rise could occur by 2080, and 10.2 feet of sea level rise could occur by 2100. This scenario is based on scientific studies that predict the instability of the Antarctic ice sheet could make extreme sea-level rise outcomes more likely than predicted by other studies (Griggs et al., 2017). Based on the extreme uncertainty of the H++ scenario, it is most appropriate to consider when planning development that poses a high risk to public health and safety, natural resources, and critical infrastructure (OPC 2018).

### Previous Occurrences

Sea levels are rising at different rates in different regions of the California due to local differences in tectonic uplift/subsidence and other factors such as tidal and wetland zones. Typically, the highest sea level readings along California's coastline and within the San Pablo Bay occur during periods of heavy rain that coincide with high tides, causing coastal flooding, such as those experienced during the 1982 to 1983 and 1997 and 1998 El Niño events. Sea level rise in the San Francisco Bay Area has risen seven to eight inches in the past century (NRC 2012; Heberger et al 2012). Sea level at the San Francisco tide gauge has also risen eight inches over the past century (NOAA 2018). While the Petaluma River already experiences flooding, sea level rise will exacerbate these natural events. The San Francisco Tide Gauge located north of Chrissy Field in the City of San Francisco reports the local sea level rise rate at approximately 1.96 (+/- 0.18) millimeters per year (mm/year) based on mean sea level data from 1897 to 2018. This is equivalent to a change of 0.64 feet in 100 years (NOAA 2018), which equates to roughly 1.95 mm/year (see Figure 4-34). This rate compares to the global average annual rate of 3.2 mm/year (Griggs et. al. 2017) and the rate near the mouth of San Francisco Bay that has recorded approximately 7 inches in sea level rise variation over the past 100 years. The growth trend is projected to increase in future years (NOAA 2017).



**Figure 4-34: Tide Record and Sea Level Rise Trend from San Francisco Tide Gauge (NOAA Station 9414190)**



Source: NOAA 2018

### Probability of Future Occurrences

**Likely** - Scientific understanding of sea level rise is advancing at a rapid pace; projections of future sea level rise continue to change as new studies become available. Future climate change is projected to particularly affect sea levels as the glaciers, polar ice packs, and ice sheets retreat. The predicted sea level rise over the course of this century varies widely. Since 1992, trends in sea level rise have been monitored by satellites and recorded by tide gauges. Given the variables involved, it is not yet possible to determine the actual rate of sea level increase. The OPC suggests that sea level rise in the San Francisco Bay Area could occur on the order of 0.5 to 1.0 foot by 2030, 1.1 to 2.7 feet by 2050, and 2.4 to 10.2 feet by 2100 (Table 4-32). In the next 5 years, or the timeframe until the next update of the City’s LHMP this could equate to an “occasional” to “likely” probability of future occurrence that depends on the climate change models and sea level rise scenarios considered in this plan. The likely ranges discussed above fall within these sea level rise scenarios because they are based on various projections of global GHG emissions. The probabilities also take into account uncertainties related to each of these scenarios.

As previously discussed, the *Rising Seas in California: An Update on Sea-Level Rise Science* guidance document identifies an extreme sea level rise scenario (H++). This scenario projects 10.2 feet of sea level rise by 2100 based on a trajectory of high GHG emissions and an accelerated rate of Arctic and Antarctic ice sheet loss (Griggs et. al. 2017). There is a high level of uncertainty associated with the H++ scenario (as well as all the sea level rise projections and timing) and given the emerging nature of sea level rise science, these estimates are intended to be used as a guide only and are subject to refinement over time. If this extreme sea level rise scenario were to occur, the modeled elevations of sea level rise and associated hazards could be experienced substantially sooner than the projected horizon year.

**Table 4-32: Sea Level Rise Projections for San Francisco Bay Area**

Projected Horizon Year / Time	66% Probability SLR meets or exceeds	0.5% Probability SLR meets or exceeds	H++ Extreme SLR Scenario (no probability assigned)
2030	0.5 ft	0.8 ft	1.0 ft
2050	1.1 ft	1.9 ft	2.7 ft
2080	2.4	4.5	6.6 ft



2100	2.4-3.4 ft	5.7-6.9 ft	10.2.ft
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Note: Probabilities based on projections by the OPC for both low and high GHG emissions scenarios at the San Francisco tide gauge (Griggs et. al. 2017).

Taking the current and best available climate science and projection information into account, the probability of future occurrence of rising sea levels is expected to increase over time from a 1 and 10 percent chance occurrence in the next year to between a 10 and 100 percent chance of occurrence in the subsequent planning cycle for this LHMP, particularly as the modelled and actual levels of sea level rise more rapidly in the next half century.

### Climate Change Considerations

As ocean temperatures warm as a result of climate change, the water in the ocean expands and occupies more volume, resulting in a rise in sea levels. In addition, global sea levels rise from the additional volume of water added to the oceans from the melting of mountain glaciers and ice sheets on land. The rate at which sea levels will rise is largely dependent on the melting of the ice, which changes the land cover from a reflective ice surface to open ocean water; the ocean continues to absorb more of the sun’s energy and subsequently increases the rate of ice melt. In other words, sea level rise is a direct consequence of climate change. However, the uncertainties associated with the rate at which ice melt occurs is largely responsible for the wide variation in sea level rise projections in the latter half of this century (i.e., between 2050 and 2100) and explain the H++ scenario.

The time scales for sea level rise are related to complex interactions between the atmosphere and the oceans, delays in stabilizing GHG levels in the atmosphere, and the dissolution of those gases into the ocean. The Intergovernmental Panel on Climate Change (IPCC) has published scientific evidence that sea levels will be rising for the next several thousand years due to the GHGs that have already been released into the atmosphere. Much of the scientific advancement in recent years has been in understanding the contribution and rate of ice melt to global sea levels. Studies also show the potential for extreme sea level rise resulting from rapid acceleration of ice melt as noted under the H++ scenario. In general, the higher the GHG emissions, the higher the temperature, the more rapid the ice melt, and the higher the rate of sea level rise. For these reasons, climate change would have a “high” influence on future sea level rise.

### Vulnerability Assessment

The vulnerability to sea level rise within the City of Petaluma Planning Area relies on the best available science and modeling and methodology from a range of sources including FEMA and the *OPC 2018 State of California Sea-Level Rise Guidance Update* (OPC 2018). Data was derived from the USGS CoSMoS Version 2.1 model, and previous studies that quantify historic rates of coastal storms and provide evidence for future trends (NOAA 2019b; USGS 2018). This assessment is further guided by FEMA’s *Local Mitigation Planning Handbook* (2013), which provides strategies to describe and quantify hazards risk in the context of individual jurisdictions. As previously discussed, sea level rise modeling used for the vulnerability assessment assumes some level of shoreline protection or adaptation strategies, such as levees or floodwalls are in place. Additional adaptation actions, such as floodplain management and engineering solutions could substantially change the flood extent associated with sea level rise.

For the vulnerability assessment, the City of Petaluma HMPC wanted to model the 30-year and 50-year sea level rise scenarios both with and without the 100-year coastal storm event. Given sea level rise projections linked to planning horizons can change with new scientific data, the sea level rise scenarios were selected based on sea level rise elevation. The probabilistic projections based on the high emissions scenario (business as usual) for 2050 and 2070 translates to 1.1 foot by 2050 and 1.9 feet by 2070 (or 2.4 feet by 2080 as shown in Table 4-31), both which have a 66 percent probability of occurrence. The







conservative approach for 2050 and 2070 have a 0.5 percent probability of occurrence and translate to 1.9 feet by 2050 and 4.0 feet by 2070 (or 4.5 feet by 2080 as shown in Table 4-31). The City HMPC also considered one conservative scenario to assess potential future impacts to critical infrastructure. These projection recommendations roughly convert to the 25 cm (1 foot or 0.25 meters), 75 cm (2.7 feet or 0.75 meters), and 200 cm (6.6 feet or 2 meters) sea level rise datasets provided in the CoSMoS 2.1 model. As shown in Table 4-31, these can these three elevations could apply to a range of sea level rise projections and associated planning years.

A GIS overlay analysis was performed to determine parcels and critical facilities that may be affected by sea level rise based on three inundation layers from the CoSMoS 2.1 model. The GIS analysis conducted follows the same methodology used with other hazard layers assessed in this plan, where the hazard layer is overlaid with critical facilities or parcel centroids, all of which are shown as points. The parcel centroids are determined based on developed parcel polygons, so that each parcel or critical facility either falls in or outside of each hazard area based on the spatial analysis intersection performed.

For this overlay analysis the 25 cm, 75 cm, and 200 cm datasets of sea level rise inundation data were used, based upon currently available (November 2019) modeling representative of the best available science and on the CoSMoS Version applicable to the City of Petaluma area, which is version 2.1 (USGS CoSMoS 2.1). This dataset provides detailed projections of tidal inundation, which refers to the predicted average annual tidal inundation conditions. It also includes detailed projections of coastal flood hazards, which refers to the 100-year coastal flood event that accounts for coastal wave and storm surge intervals, for the area north of Golden Gate Bridge in San Francisco Bay.

Scenarios within this area of interest are consistent with the full spectrum of sea level rise (0 to 2 meters, 5 meters) and storms (daily to 100-year return) used on the outer coast. However, storm events used inside the Bay were derived from numerically modeled wind-wave heights driven by wind projections from one Global Climate Model (GCM) known as the Geophysical Fluid Dynamics Laboratory Earth System Model 2M (USGS 2019). These scenario and specification options allow flexibility for managers to specify degrees of risk tolerance based on future projections as well as geographic variability in the study areas on the coast. CoSMoS models all relevant physics of a coastal storm, such as tides, waves, and storm surges, which are then scaled down to local flood projections for use in community-level coastal planning and decision-making processes (USGS 2019). Also, rather than relying on historic storm records, the CoSMoS model uses wind and pressure from GCMs to project coastal storms under changing climatic conditions during the 21<sup>st</sup> century (USGS 2019).

CoSMoS Version 2.1 is the most recent version of the program modeling to date, and is based on GCMs developed by the IPCC which considers region-specific factors such as oceanographic conditions, backshore types (beach, bluff or estuarine), long-term changes in the shoreline, river and stream drainages, wind patterns, and seasonal changes. The CoSMoS modeling identifies areas along the coast where significant flooding may occur under both a non-storm scenario (i.e. average spring tide inundation) and 100-year coastal storm scenario (i.e. coastal wave-driven 100-year flooding). With CoSMoS data, for each modeled increase in sea level elevation, there is a minimum, average and maximum range of uncertainty that is accounted for in the model. The maximum uncertainty scenario was modeled, which includes conservative assumptions for marsh accretion, subsidence, and vegetation. The H++ scenario was also used for the purposes of this analysis, and effectively models a worst-case scenario for each given sea level rise scenario.

The analysis includes three ranges of sea level rise across the two scenarios used: one with 100-year coastal storm event flooding and one without it (i.e. no storm, equivalent to the average annual tidal inundation), to take into account the high degree of uncertainty associated with predicting when and at





what rate sea level rise will occur. Sea level rise scenarios selected for the analysis are based on projections for the City of Petaluma and according to the OPC's *State of California Sea Level Rise Guidance* (OPC 2018) under a worst case, or extreme risk aversion scenario (H++ scenario within Table 4-32 above). The scenarios were selected for analysis as the intent is to identify infrastructure and critical facilities that could be irreversibly damaged by sea level rise, or would be significantly costly to repair, and hence carry considerable impacts to public safety, health, or environmental resources. The first phase of analysis models property and critical facility exposure to an average annual tidal inundation at the following increments:

- Area extent of average annual tidal inundation with 25cm (approximately 1.0 ft) increase in sea level rise
- Area extent of average annual tidal inundation with 75cm (approximately 2.7 ft) increase in sea level rise
- Area extent of average annual tidal inundation with 200cm (approximately 6.6 ft) increase in sea level rise<sup>1</sup>

These hazard zones show the projected maximum extent of what will be regularly flooded by average annual tidal movements under the selected sea level rise elevations. The three elevations in sea level rise (25, 75, and 200 cm) were also selected to apply to a range of sea level rise projections and their associated planning year.

The second scenario of analysis uses the same sea level rise elevations previously described but on top of it models the area extent of inundation associated with a 100-year coastal storm event (or 1 percent annual chance of a coastal flood, based on a wave storm surge event). The addition of the flooding worsens the extent of the overall inundation and represents how coastal and estuarine flooding will be exacerbated by sea level rise in the future.

- Area extent of flooding from 100-year coastal storm event with 25cm (approximately 1.0 ft) increase in sea level rise
- Area extent of flooding from 100-year coastal storm event with 75cm (approximately 2.7 ft) increase in sea level rise
- Area extent of flooding from 100-year coastal storm event with 200cm (approximately 6.6 ft) increase in sea level rise

An exposure analysis was performed to identify the counts of improved properties, values of those properties, and critical facilities located within the six scenarios. The number of parcels and critical facilities were then aggregated by parcel type or critical facility type and category. Improved value totals for parcels in Petaluma were calculated by adding the improved values of the parcels of each type, as summarized in the following tables. As a clarification, improved values are the values of the developments in the parcels, or improvements, not land value. The analysis does not predict damage loss, as property and content values may change in the future, and it is assumed that some property will eventually be relocated or removed prior to permanent inundation. The analysis also does not account for undeveloped parcels that might be permanently inundated by sea level rise in the future since there are not improvements accounted for with those parcels. The inundation events become progressively more extensive with the addition of the deeper sea level rise levels, thus a property or critical facility that is

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<sup>1</sup> 6.6 feet of sea level rise under the H++ scenario is not projected to occur until 2080.





inundated in the 25 cm and 75 cm scenarios is also inundated in the 200 cm scenario (if applicable), and is totaled as such unless noted otherwise.

### General Property

Public and private property vulnerable to sea level rise generally includes buildings and infrastructure built within the salt marshes in the central and eastern portions of the City’s Planning Area. Vulnerable private development primarily includes residential and commercial buildings in, as well as some agricultural lands along Highway 116 towards the unincorporated community of Lakeville.

Table 4-33 and Table 4-34 depict the count of exposed parcels and values of improvements within the City’s Planning Area on those parcels for the sea level rise scenarios, both with and without the 100-year coastal storm event for the 75 cm and 200 cm scenarios. There were no risks to parcels within the Planning Area under the 25 cm scenario with the average annual tidal inundation or the 100-year coastal storm event. Those parcels inundated by the provided scenarios are depicted in Figure 4-35 and Figure 4-36.

**Table 4-33: Parcels Exposed to Average Annual Tidal Inundation with Sea Level Rise**

Sea Level Rise Event	Parcel Type	Total Parcels	Improved Value	Content Value	Total Value	Population at Risk
25 cm	NA	0	0	0	0	0
75 cm	Commercial	1	\$4,481,126	\$4,481,126	\$8,962,252	--
<b>TOTAL</b>		<b>1</b>	<b>\$4,481,126</b>	<b>\$4,481,126</b>	<b>\$8,962,252</b>	<b>0</b>
200 cm	Commercial *	32	\$64,260,591	\$64,260,591	\$128,521,182	
	Residential	56	\$18,030,947	\$9,015,474	\$27,046,421	150
	Multi-Family	2	\$26,118,842	\$13,059,421	\$39,178,263	5
<b>TOTAL</b>		<b>90</b>	<b>108,410,380</b>	<b>86,335,486</b>	<b>\$194,745,866</b>	<b>155</b>
<b>GRAND TOTAL</b>		<b>90</b>	<b>\$112,891,506</b>	<b>\$90,816,612</b>	<b>\$203,708,118</b>	<b>155</b>

\* The 75 cm Commercial parcel is considered in the 200 cm category as well, since it overlaps with the larger inundation layer (meaning that this same parcel is inundated by both scenarios). Therefore, the grand total is the same as the total under the average annual tidal inundation with 75 cm of sea level rise scenario.

Source: CoSMoS v2.1, City of Petaluma, Sonoma County Assessor, U.S. Census, Wood Plc analysis

**Table 4-34: Parcels Exposed to 100-Year Coastal Storm Event Inundation with Sea Level Rise**

Sea Level Rise Event	Parcel Type	Total Parcels	Improved Value	Content Value	Total Value	Population at Risk
25 cm	NA	0	0	0	0	0
75 cm	NA	0	0	0	0	0
200 cm	Commercial	138	\$197,452,315	\$197,452,315	\$394,904,630	--
	Multi-Family	17	\$77,390,564	\$38,695,282	\$116,085,846	46
	Residential	228	\$51,627,780	\$25,813,890	\$77,441,670	611
<b>TOTAL</b>		<b>383</b>	<b>\$326,470,659</b>	<b>\$261,961,487</b>	<b>\$588,432,146</b>	<b>657</b>

Source: CoSMoS v2.1, City of Petaluma, Sonoma County Assessor, U.S. Census, Wood Plc analysis

According to the parcel analysis, there was little to no risk to existing development under both the 25 cm and 75 cm scenarios. The majority of the risk impacts were under the 200 cm scenario, which is considered the high-risk aversion situation. This scenario also did not account for adaptation actions in the analysis. For the risks under the 200 cm scenario, the greatest vulnerability from the sea level rise





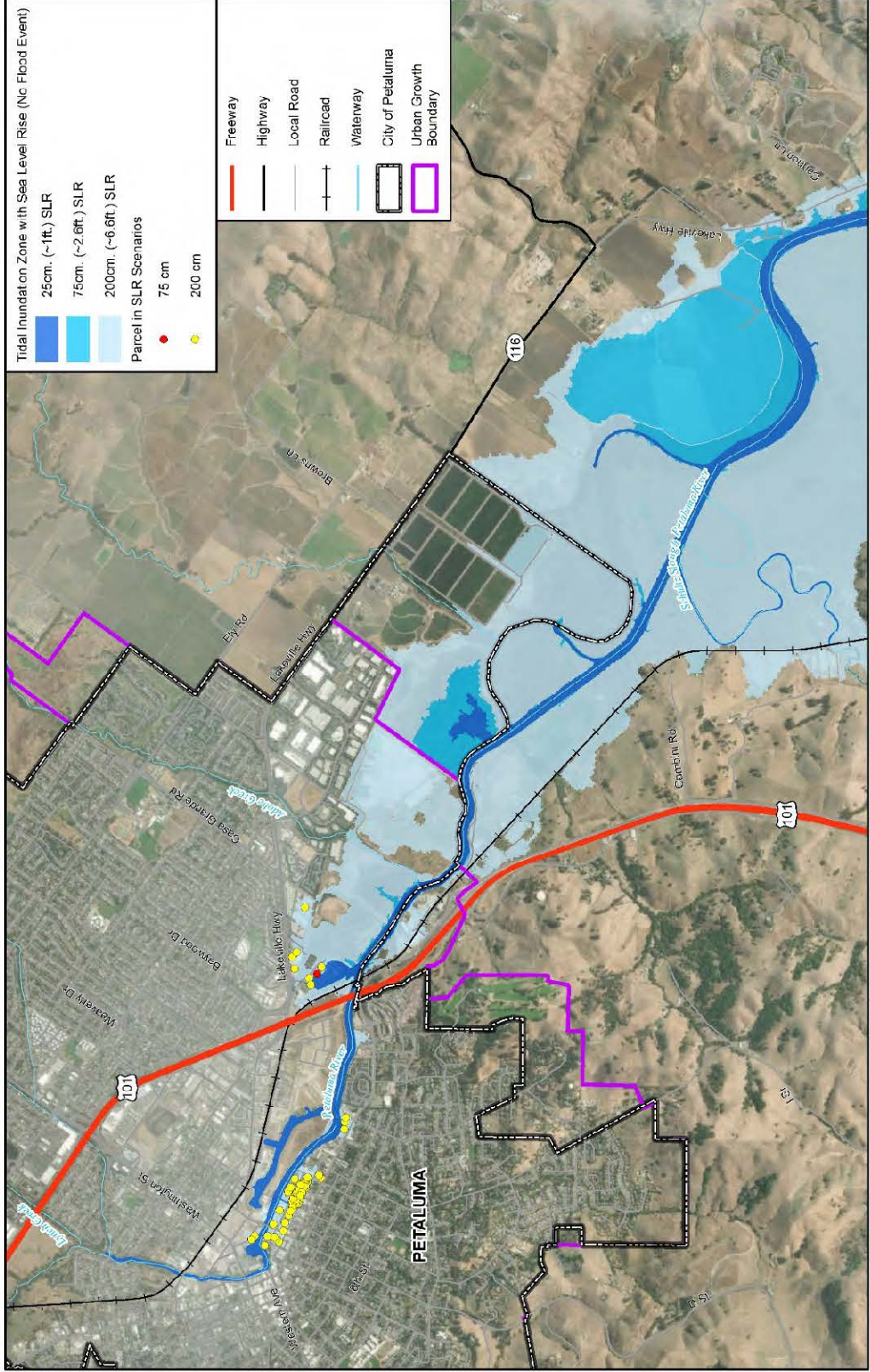
scenarios occurs along the Petaluma River in the central and eastern portions of the Planning Area and within downtown Petaluma. The highest number of parcels exposed to this hazard are residential (with a total of 58 of type "residential" and "multi-family" in the tidal inundation analysis, and 245 in the sea level rise plus the 100-year coastal storm event), followed by 32 commercial parcels in the tidal inundation scenario (1 of which falls in both 75cm and 200cm flooding extents), and 138 in the sea level rise plus the 100-year coastal storm event. The commercial parcels account for the highest total values at risk of sea level rise, with around \$532 million between both tidal inundation and sea level rise plus the 100-year coastal storm event scenarios. Overall, there are \$203.7 million at risk in the tidal inundation scenario, and \$588 million at risk in the sea level rise plus the 100-year coastal storm event from parcel total values, as summarized in Table 4-33 and Table 4-34 above. As displayed in Figure 4-35 and Figure 4-36 below, there are parcels exposed to the sea level rise plus 100-year coastal flood event in the City's downtown area, to the east of Western Avenue, south of the Petaluma River.

The results of the parcel analysis are projected estimates based on available data and modeling results, which are subject to change according to the actual rate of sea level rise and the frequency and duration of coastal storms. They also do not account for the implementation of future adaptation actions, such as floodplain management activities or the construction of structural projects, such as floodwalls and levees. Sea level rise alone is not anticipated to be the primary cause of damage, but rather sea level rise as it exacerbates existing flood and coastal hazards, including damage caused by severe storms and the frequency, duration, and extent of tidal flooding. The implementation of future mitigation strategies may minimize these impacts.





**Figure 4-35: Parcels Exposed to Average Annual Tidal Inundation with Sea Level Rise**



2 Miles

0

1

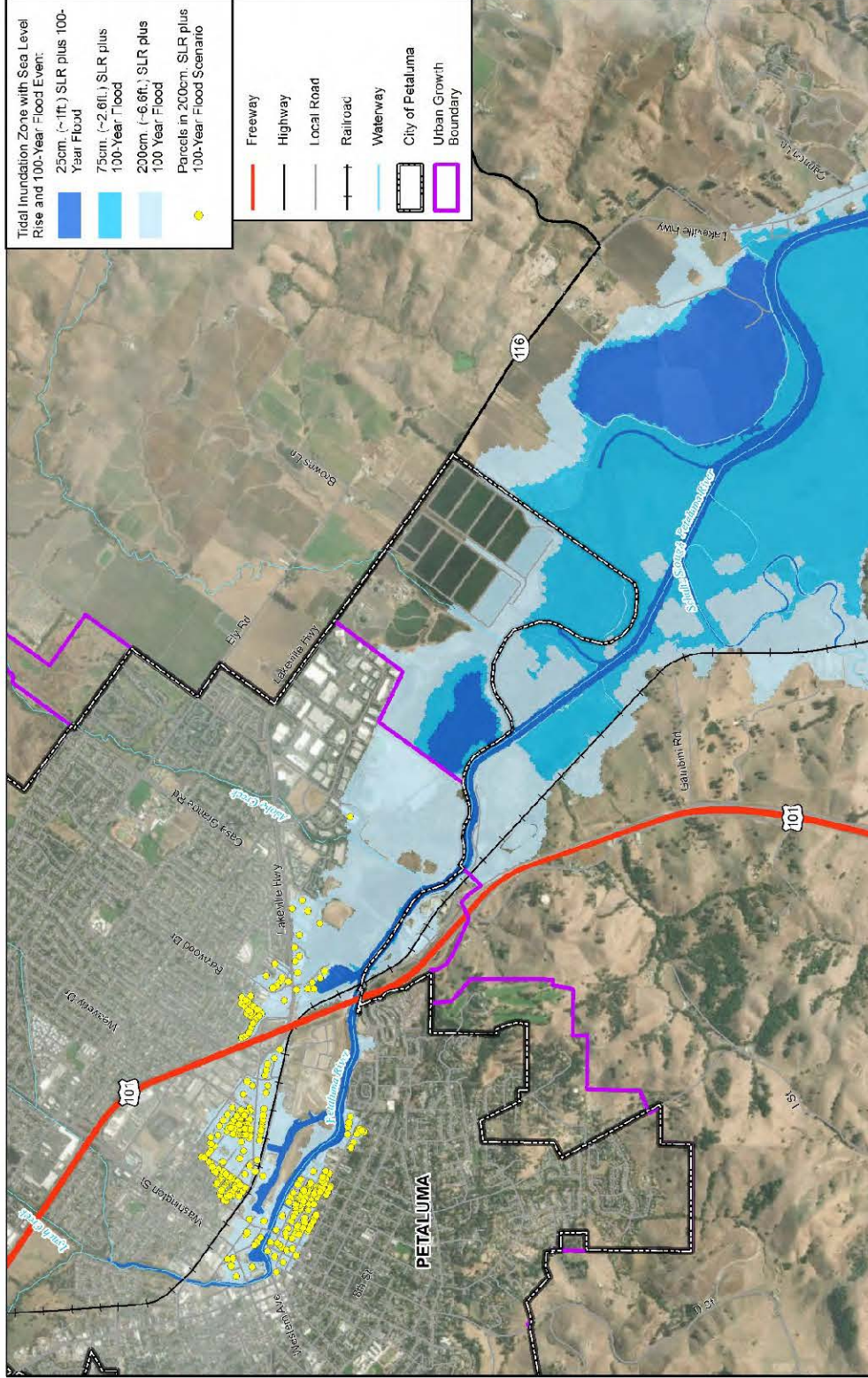
2 Miles

Map compiled 11/1/2019;  
intended for planning purposes only.  
Data Source: USGS CoSMoS v2.1  
City of Petaluma, CalTrans, US Census  
TIGER Database, HIFLD





**Figure 4-36: Parcels Exposed to 100-Year Coastal Storm Event Inundation with Sea Level Rise**



0 1 2 Miles

Map compiled 11/2019;  
intended for planning purposes only.  
Data Source: USGS CoSMoS v2.1  
City of Petaluma, CalTrans, US Census  
TIGER Database, Sonoma County Assessor





## People

Some populations are more vulnerable to flooding and sea level rise impacts due certain sensitivities, an increased likelihood of exposure, or a lower adaptive capacity (Public Health Institute Center for Climate Change and Health 2016). Demographic characteristics including health conditions that affect physical ability, or socioeconomic factors that amplify risk factors for poor health conditions, may affect the abilities of individuals or households to prepare for, respond to, and recover from coastal hazards (EPA 2017). Specific attributes may create additional stresses on individuals and communities resulting in reduced resiliency in the event of a flooding hazard event. Many of these factors may also be exacerbated by the specific, localized nature of flooding, erosion, and other impacts associated with sea level rise.

Based on the parcel analysis summarized in Table 4-33 and Table 4-34 above for the 75 and 200 cm scenarios, it estimated that a total of 155 people may be exposed to the tidal inundation with sea level rise scenario, while 657 people may be at risk under the 100-year coastal storm event with sea level rise. These population totals were estimated by multiplying the average persons per household value based on current U.S. Census figures (which is 2.68 per home) by the total parcels of residential nature in the City. Two people are at risk based on the "multi-family" category in the tidal inundation scenario, and 17 in the 100-year coastal storm event with sea level rise scenario; the remaining exposed populations fall under the general "residential" category, and 56 of those are found in parcels within the tidal inundation extents, while 228 fall in the 100-year coastal storm event with sea level rise scenario extents.

The downtown area of the City of Petaluma and areas along the Petaluma River with a high Social Vulnerability Index (SVI) inform which communities are more susceptible to adverse impacts of flooding and sea level rise. Based on the SVI data presented and discussed in Subsection 2.5, populations in downtown Petaluma are expected to be highly vulnerable to the hazards discussed herein. Again, these results do not account for adaptation actions under consideration by the City.

## Critical Facilities and Infrastructure

Critical facilities that are vulnerable to sea level rise may include assets related to public transportation, wastewater treatment and water supply infrastructure, schools, law enforcement facilities, and community centers, among others. Essential education facilities such as the Valley Oaks Elementary and High School or the San Antonio High School may be subject to flooding exacerbated by future sea level rise. Law enforcement facilities in close proximity to the Petaluma River also prove vulnerable to flooding.

Regional and local-serving public and utility infrastructure vulnerable to sea level rise include roads, bridges, railroad lines and crossings, wastewater treatment plants, culverts, water lines, communication line and towers, stormwater outlets, bike lanes, bike facilities, airports, and fiber optic lines. Utility infrastructure containing hazardous materials that are vulnerable to sea level rise include hazardous material facilities, underground tanks, and the City's Wastewater Treatment Plant (Hopper Street Sewer Plant). Facilities that are impacted by flood hazards that may be exacerbated by sea level rise could also result in a release of hazardous materials or deteriorating water or air quality, as well as disruption to key public and utility services to the wider community. Low-lying transportation infrastructure is vulnerable to the impacts of sea level rise, including City roads and state highways in the unincorporated portion of Sonoma County. Vulnerable roads may include short sections of U.S. Highway 101 and State Highway 116.

Based on the GIS overlay analysis conducted with the critical facility layer, the following nine facilities and structures were found to be vulnerable under the 200 cm sea level rise scenario with the 100-year coastal storm event (though several of those are also vulnerable to the average annual tidal inundation with sea level rise scenario, as indicated in the subsequent tables):



- Petaluma Fire Department Station Number 1 & Emergency Medical Service Station
- Fire Station 1 (Headquarters)
- San Antonio High School
- Valley Oaks Elementary and High School
- Petaluma Marina
- Parks and Recreation Maintenance Building
- Petaluma Station C
- Hopper Street Sewer Plant (specifically two of the storage ponds)
- D Street Bridge House

However, the inundation extent shown in the following two maps (Figure 4-37 and Figure 4-38) shows that the Ellis Creek Water Recycling Facility ponds and other property assets may also be at risk of potential future damages. Wastewater treatment plants and related infrastructure located in low-lying areas along the Petaluma River and near the southern portion of the City’s Planning Area may be vulnerable to projected sea level rise, but according to the HMPC only the Ellis Creek Water Recycling Facility storage ponds would be affected and the plant is expected to remain operation during flooding (Walker 2020). In the tidal inundation with sea level rise scenario there are five exposed facilities, including the Historic Drawbridge, which also falls in the 75 cm extent, and the others in the 200 cm event. In the 100-year coastal storm event plus sea level rise scenario there are nine facilities falling in the 200 cm extent, falling under all four of the facility categories (2 in the Emergency Services, 4 in the High Potential Loss Facilities, 2 in the Lifeline Utility Systems, and 1 in the Transportation Systems category). Results are displayed in Figure 4-37 and Figure 4-38.

Table 4-35 summarizes the critical facilities in the average annual tidal inundation with sea level rise extent for both the 75 cm and 200 cm scenarios, while Table 4-36 summarizes those nine facilities within the 100-year coastal storm event with sea level rise for both the 75 cm and 200 cm scenarios (which were previously included in the bullet list above, based on the facility name). No critical facilities were within the average annual tidal inundation with 25 cm of sea level rise or the 100-year coastal storm event with sea level rise scenarios.

**Table 4-35: Critical Facilities Exposed to Average Annual Tidal Inundation with Sea Level Rise**

Sea Level Rise Event	Critical Facility Category	Critical Facility Type	Total Critical Facilities
25 cm	NA	NA	0
75 cm	Transportation Systems	Historic Drawbridge	1
<b>TOTAL</b>			<b>1</b>
200 cm	Emergency Services	Emergency Medical Service Station	1
		Fire Station	1
	High Potential Loss Facilities	Community/Recreation Center	1
	Lifeline Utility Systems	Electric Substations	1
	Transportation Systems	Historic Drawbridge	1
<b>TOTAL</b>			<b>5</b>
<b>GRAND TOTAL</b>			<b>5</b>

Source: CoSMoS v2.1, City of Petaluma, HIFLD, Wood Plc analysis







**Table 4-36: Critical Facilities Exposed to 100-Year Coastal Storm Event Inundation with Sea Level Rise**

Sea Level Rise Event	Critical Facility Category	Critical Facility Type	Total Critical Facilities
25 cm	NA	NA	0
75 cm <sup>1</sup>	NA	NA	0
200 cm	Emergency Services	Emergency Medical Service Station	1
		Fire Station	1
	High Potential Loss Facilities	Community/Recreation Center	1
		Government/Admin	1
		Public Schools	2
	Lifeline Utility Systems	Electric Substations	1
		Wastewater Treatment Plant	1
	Transportation Systems	Historic Drawbridge	1
<b>TOTAL</b>			<b>9</b>

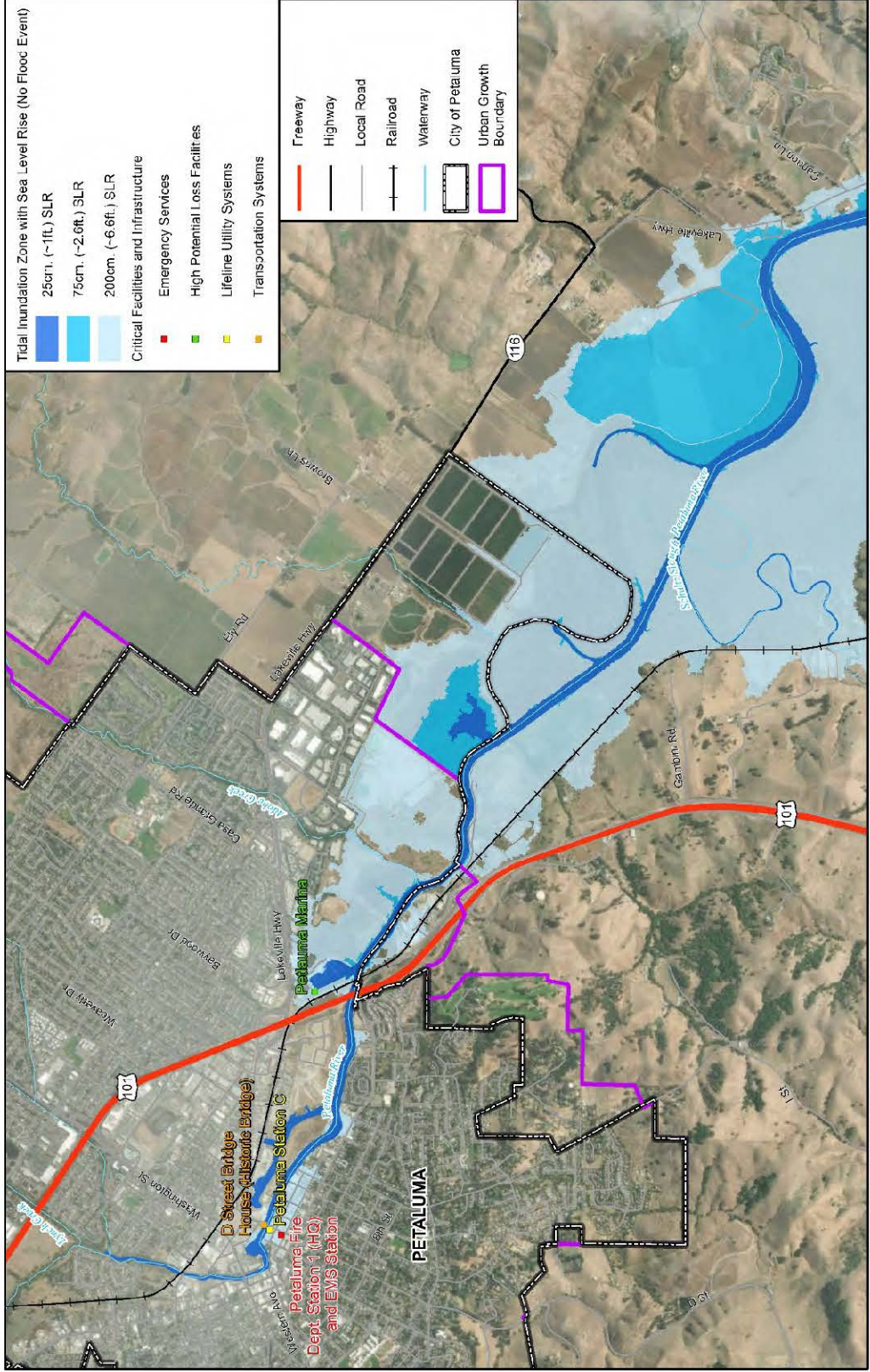
<sup>1</sup> - The Historic Drawbridge was subject to tidal inundation with 75 cm of sea level rise, but because the 75 cm with the 100-year coastal storm event is based on different CoSMoS model inputs the Historic Drawbridge was not within this sea level projection.

Source: CoSMoS v2.1, City of Petaluma, HIFLD, Wood Plc analysis





**Figure 4-37: Critical Facilities Exposed to Average Annual Tidal Inundation with Sea Level Rise**



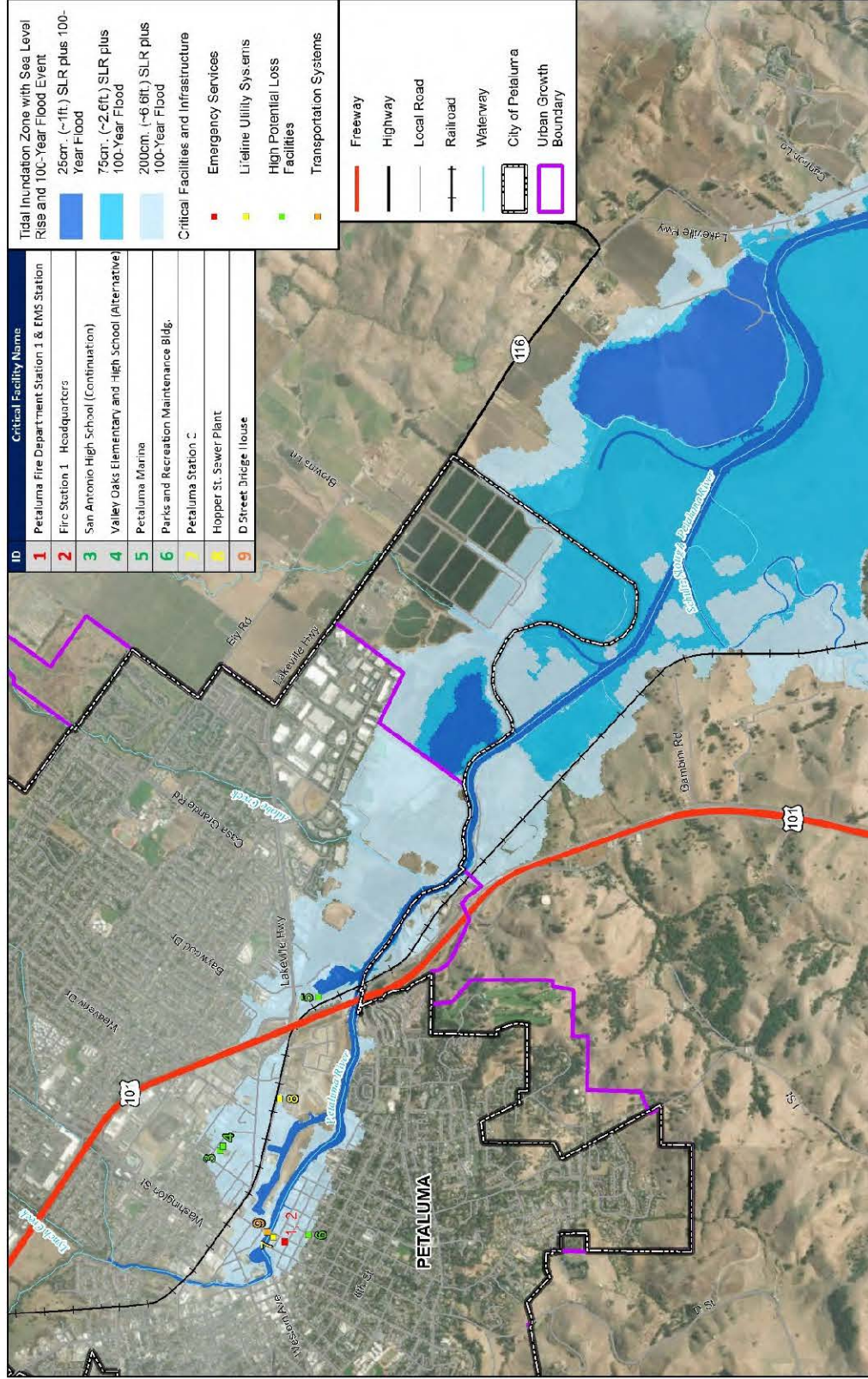
0 1 2 Miles

Map compiled 11/2019;  
intended for planning purposes only.  
Data Source: USGS CoSMoS v2.1  
City of Petaluma, CalTrans, US Census  
TIGER Database, HIFLD





**Figure 4-38: Critical Facilities Exposed to 100-Year Coastal Storm Event Inundation with Sea Level Rise**



0 1 2 Miles

Map compiled 11/2019;  
intended for planning purposes only.  
Data Source: USGS CoSMoS v2.1  
City of Petaluma, CalTrans, US Census  
TIGER Database, HIFLD



## Economy

The major economic industries in the City include retail; arts, entertainment, tourism accommodations and food services; and construction and manufacturing (ACS 2017). Developed areas in the City of Petaluma that are important to tourism include the historic downtown, as well as the Petaluma Marina. Undeveloped areas that are important to tourism include the park and open space areas, such as Steamer Landing Park and Shollenberger Park. Many Petaluma businesses depend on tourism and sales tax revenues. Flooding impacts to the historic downtown, to the north end of the City, and around the marina that are exacerbated by projected sea level rise could decrease economic activity and affect the local economy.



The Petaluma Marina is a popular access point for recreation activities, such as boating, water skiing, and fishing and may be impacted by rising sea levels, which could in turn also impact the local economy.  
*Photo Credit: Petaluma Star*

## Historic, Cultural, and Natural Resources

Historic resources within Petaluma's downtown, include locally designated historic landmarks, nationally registered historic sites and landmarks, the historic commercial district, and important habitat resource areas. Historic resources close to Petaluma River include the historic commercial district, local historic residential homes, the Old Petaluma Opera House, and Public Library.

While sea level rise may have little effect on historic and cultural resources, the combination of sea level rise, shifting precipitation patterns, and the frequency and intensity of storms can have effects on coastal ecosystems, including salt marshes located within the southern portion of the City's Planning Area. However, the salt marshes located within the southern portion of the City are currently designated as open space and parks and restricted from future urban development. While these salt marshes may be semi-permanently inundated in the future, they will also provide a beneficial value, such as functioning as a natural buffer from tidal inundation that may reduce sea level rise impacts within the City. Nonetheless, the combined influence of sea level rise and flood hazards may also result in species and habitat impacts, specifically the migration of species to different elevations, or a transition to different habitat types, but more resilient species may adapt.

A study underway by USGS and Western Ecological Research Center (WERC) research ecologists has begun modeling sea level rise in the San Francisco Bay Estuary, including the San Pablo Bay National Wildlife Refuge. In 2009 and 2010, elevation and vegetation points survey points were collected in the salt marsh at 12 study sites around San Francisco Bay providing land owners with informative baseline data on current sea levels. Two of the twelve study sites are located along the Petaluma River, including the Gambinini and Petaluma marshes. Currently the percent of time the Gambinini and Petaluma Marsh is inundated varies throughout the year by season, with the most inundation during the winter (USGS 2018).

As part of the study, a marsh accretion model, referred to as WARMER, was developed to assess risk of sea level rise to salt marshes in San Francisco Bay. According to the WARMER model most salt marsh around San Francisco Bay could transition from high to mid marsh by 2040, to low marsh by 2060 and to mudflat by 2080, but the model accounts for variation around the Bay Area.



## Future Development

The vulnerability of future development to rising sea levels would be similar to the vulnerability assessment findings discussed in flood hazards in Section 4.3.5. As mentioned in that section, the development trend in the City of Petaluma Planning Area is steady. The City is expected to grow by 3.2 percent in the next 5 years, to an estimated total of 62,700 people.

The potential for flooding may increase as stormwater is channelized due to land development, and it may be intensified due to sea level rise. Floodplain modeling should account for sea level rise projections and infill development and master planning should be based on buildout land use to ensure that all new development remains safe from future flooding. While certain local floodplain management and water quality regulations and policies exist, as well as specific regulatory control of building codes, flood insurance requirements, and other such aspects at the federal or state level, the cumulative effects of flood and sea level rise related hazards can have a negative impact on the floodplain and the community into the future. Water and flood control infrastructure such as dams, floodwalls, and levees and local storm drainage systems can become stressed due to increased development. Future development may also stress the municipal water supply needs when coupled rising sea levels and changing weather conditions that become more unpredictable.

## Risk Summary

- Overall, the significance of sea level rise is **Medium** based on current and best available science that currently indicates this hazard is already a prominent hazard now and in the next half century.
- Future sea level rise may exacerbate flood hazards in the City's Planning Area and is projected based on the best available science and modeling.
- There is no risk to very low risk under the average annual tidal inundation with 25 cm and 75 cm of sea level rise and no risk to very low risk under the 100-year coastal storm event with 25 cm and 75 cm of sea level rise scenarios. This is largely due to the protection of the salt marshes located within the southern portion of the City's Planning Area.
- Average annual tidal inundation in combination of up to 200 cm in sea level rise would put 90 parcels at risk, with one falling in the 75 cm of sea level rise extent and the other 89 within the 200 cm of sea level rise extent, which is more extreme projection scenario. Most of these exposed parcels are residential in nature. The total values at risk amount to \$203.7 million. The model and analysis assumed no adaptation strategies such as levees, floodwalls, or other floodplain management or engineering solutions would be in place. The implementation of adaptation actions would minimize impacts.
- Under the 100-year coastal storm event with 200 cm of sea level rise scenario, 228 single family residential and 17 multi-family parcels would be impacted by rising sea levels, followed by 138 commercial parcels (all of which fall in the 200 cm event extent). The commercial parcels account for the highest total values at risk of sea level rise, with \$394.9 million. Overall there are \$588.4 million at risk in parcel total values, including the residential and multi-family parcels.
- Approximately 155 people may be at risk under the average annual tidal inundation in combination with up to 200 cm of sea level rise scenario.
- A total of 657 people may be at risk of inundation under the 100-year coastal storm event with 200 cm of sea level rise scenario; these totals are based on multiplying the average persons per household value by the total parcels of residential nature in the City.



- Five critical facilities are exposed to the average annual tidal inundation with up to 200 cm of sea level rise, and nine would be exposed to flooding with a 100-year coastal storm event when combined with up to 200 cm of sea level rise. Facilities at risk include emergency services, high potential loss facilities, lifeline utility facilities, and transportation systems.
- Rising sea levels alone are not anticipated to be the primary cause of vulnerabilities and potential damages to resources, property and infrastructure within the City; rather impacts may be caused by severe coastal storm patterns that may increase in frequency and duration as a result of sea level rise and climate change.
- If sea levels continue to rise at higher projected rates, flooding impacts that already occur during large coastal storm events could become more frequent, as predictable high tides may regularly inundate low-lying tidal marsh areas located within the southern portion of the City Planning Area.
- Given the sea level rise vulnerability assessment does not account for the incorporation of adaptation actions, floodplain management programs and the implementation of structural adaptation projects, such as levees and floodwalls should minimize impacts.

#### 4.3.7 Severe Weather: General

Severe weather is generally any destructive weather event, but usually occurs in the Planning Area as localized thunderstorms that bring heavy rain, hail, lightning, high winds, and dense fog. Severe weather can also include extreme heat events.

The NOAA NCEI has been tracking severe weather since 1950. Their Storm Events Database tracks severe weather events on a county basis and contains data on the following: all weather events from 1993 to current (except from 6/1993-7/1993); and additional data from the Storm Prediction Center, which includes tornadoes (1950-1992), thunderstorm winds (1955-1992), and hail (1955-1992). This database contains 225 severe weather events that occurred in Sonoma County between January 1, 1950, and July 31, 2019. Table 4-37 summarizes these events.

**Table 4-37: NCEI Hazard Event Reports for the Sonoma County\* 1950-2019**

Type	# of Events	Property Loss (\$)	Crop Loss (\$)	Deaths	Injuries
Debris Flow	49	25,916	20,000	1	0
Dense Fog	3	100,000	0	0	2
Dense Smoke	3	0	0	0	0
Extreme Cold/Wind Chill	2	0	0	1	0
Flash Flood	44	8,018,000	164,000	1	1
Flood	169	208,097,400	6,150,000	1	0
Frost/Freeze	3	60,000	3,000,000	0	0
Funnel Cloud	1	0	0	0	0
Hail	15	0	0	0	0
Heat	5	0	0	1	0
Heavy Rain	22	383,500	20,000,000	1	2
High Wind	71	713,500	0	2	0
Landslide	6	1,132,000	0	0	0
Lightning	2	1,000,000	0	0	0
Strong Winds	140	3,141,200	0	3	5
Tornado	13	1,558,500	500	0	1
Wildfire	10	505,000	5,000	0	1





Type	# of Events	Property Loss (\$)	Crop Loss (\$)	Deaths	Injuries
<b>Total**</b>	<b>558</b>	<b>\$224,735,016</b>	<b>\$29,339,500</b>	<b>11</b>	<b>12</b>

Source: NOAA’s National Centers for Environmental Information <https://www.ncdc.noaa.gov/stormevents/>

\*Note any reference to a coastal type weather event for Sonoma County has been excluded from this table.

\*\*Losses reflect totals for all impacted areas, inclusive of Sonoma County

The NCEI table above summarizes severe weather events that have occurred in Sonoma County. Only a few of the events resulted in state and federal disaster declarations. While the HMPC recognizes these inconsistencies, this data provides value in depicting the County’s “big picture” hazard environment.

As previously mentioned, several state and federal disaster declarations including the City of Petaluma have been a result of severe weather. For this plan, severe weather is broken down as follows:

- Extreme Heat
- Heavy Rain/Thunderstorm/Hail/Lightning/Dense Fog
- High Winds

#### 4.3.8 Severe Weather: Extreme Heat

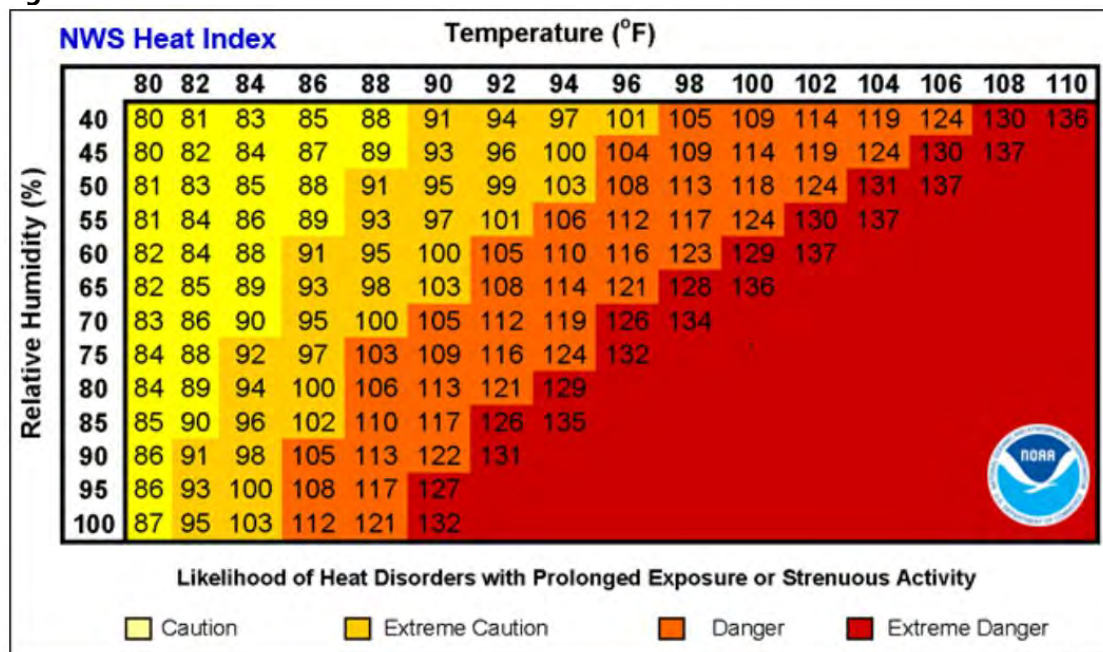
##### Hazard Description

Extreme heat events can have severe impacts on human health and mortality, natural ecosystems, the agriculture sector and other economic sectors. According to information provided by FEMA, extreme heat is defined as temperatures that hover 10 degrees or more above the average high temperature for the region and last for several weeks. Heat kills by taxing the human body beyond its abilities. In a normal year, about 175 Americans succumb to the demands of summer heat. According to the National Weather Service (NWS), among natural hazards, only the cold of winter takes a greater toll nationally — not lightning, hurricanes, tornadoes, floods, or earthquakes. However, there are a lack of cold weather and extreme cold temperatures events in Sonoma County. During the 40-year period from 1936 through 1975, nearly 20,000 people were killed in the United States by the effects of heat and solar radiation. In the heat wave of 1980, more than 1,250 people died. The 2018 California SHMP notes the heat wave during the summer of 2006 lead to 650 deaths in a 13-day period (Cal OES 2018), and in the past 15 years heat waves have claimed more lives in California than all other declared disaster events combined (California Climate Adaptation Strategy 2018).

Heat disorders generally have to do with a reduction or collapse of the body’s ability to shed heat by circulatory changes and sweating or a chemical (salt) imbalance caused by too much sweating. When heat gain exceeds the level the body can remove, or when the body cannot compensate for fluids and salt lost through perspiration, the temperature of the body’s inner core begins to rise, and heat-related illness may develop. The elderly, small children, patients with chronic medical conditions, those on prescription medication therapy, and people with weight or alcohol problems are particularly susceptible to heat reactions, especially during heat waves in areas where moderate climate usually prevails. Figure 4-39 illustrates the relationship of temperature and humidity to heat disorders.



**Figure 4-39: National Weather Service Heat Index**



Source: National Weather Service

Note: Since heat index values were devised for shady, light wind conditions, exposure to full sunshine can increase heat index values by up to 15°F. Also, strong winds, particularly with very hot, dry air, can be extremely hazardous.

**Location**

Severe weather events have the potential to happen anywhere in the Planning Area. According to the City and HMPC, extreme heat, occasional heavy rain and thunderstorms, and wind events have occurred in the City.

**Extent (Magnitude/Severity)**

**Limited** – The City of Petaluma begins to experience hot weather in June or July of each year, and the heat continues throughout the summer months. According to the Western Regional Climate Center (WRCC), the average high temperature for the City of Petaluma in July is 81.8°F. Temperatures that are 10 degrees above normal are considered excessive. The California OES Contingency Plan for Excessive Heat Emergencies (2014) indicates that through the use of historical weather and mortality data, the NWS and the California Department of Public Health (CDPH) have identified five major types of climate regions within California to account for climate differences among regions in order to recognize what constitutes an excessive heat event in each of the regions. When temperatures spike for two or more consecutive days without an adequate drop in nighttime temperature to cool the outdoor and indoor environments, there is a significant increase in the risk to vulnerable populations.

The NWS has in place a system to initiate alert procedures (advisories, watches, and warnings) when high temperatures are expected to have a significant impact on public safety. The expected severity of the heat determines which type of alert is issued. During past heat waves, the City of Petaluma has designated facilities as Cooling Centers. In 2017 the Petaluma Community Center at Lucchessi Park was designated as a City Cooling Center. The Center also accepted cats and dogs on leashes or inside appropriate pet carriers. In summary, extreme heat impacts would likely be limited in the Planning Area, with 10 to 25







percent of the Planning Area affected. Extreme heat will have an impact on vulnerable populations and could also impact livestock and crops if the event occurs during certain times of the year.

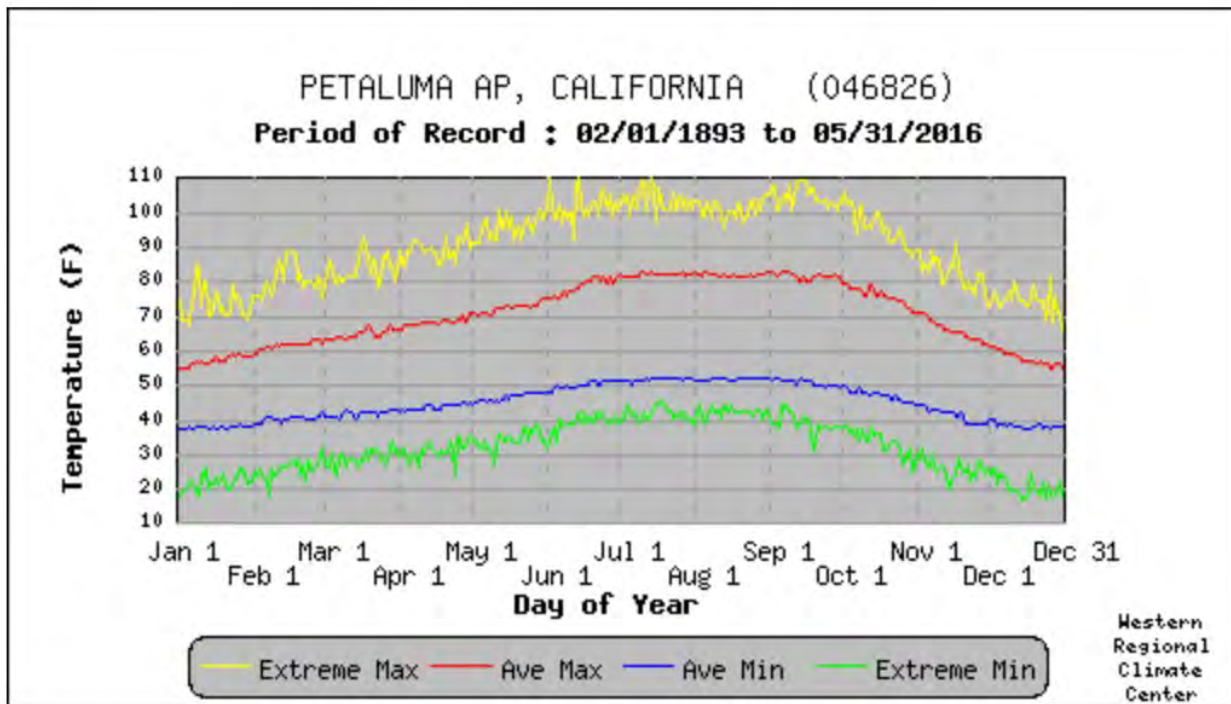
### Previous Occurrences

Information from the closest weather station with the most comprehensive data, the Petaluma Fire Station 3 Weather Station (046826), is summarized below and in Figure 4-40 to illustrate daily temperature averages in the City's Planning Area.

### The City of Petaluma (Petaluma Fire Station 3 Weather Station, Period of Record 1893 to 2016)

In the City of Petaluma, monthly average maximum temperatures in the warmest months (May through October) range from the mid-70s to the upper 80s. Monthly average minimum temperatures from November through April range from the upper 50s to mid-60s. The highest recorded daily extreme was 110°F on June 2, 1960. The lowest recorded daily extreme was 16°F on December 14, 1932. In a typical year, maximum temperatures do not exceed 81°F and minimum temperatures do not fall below 40°F.

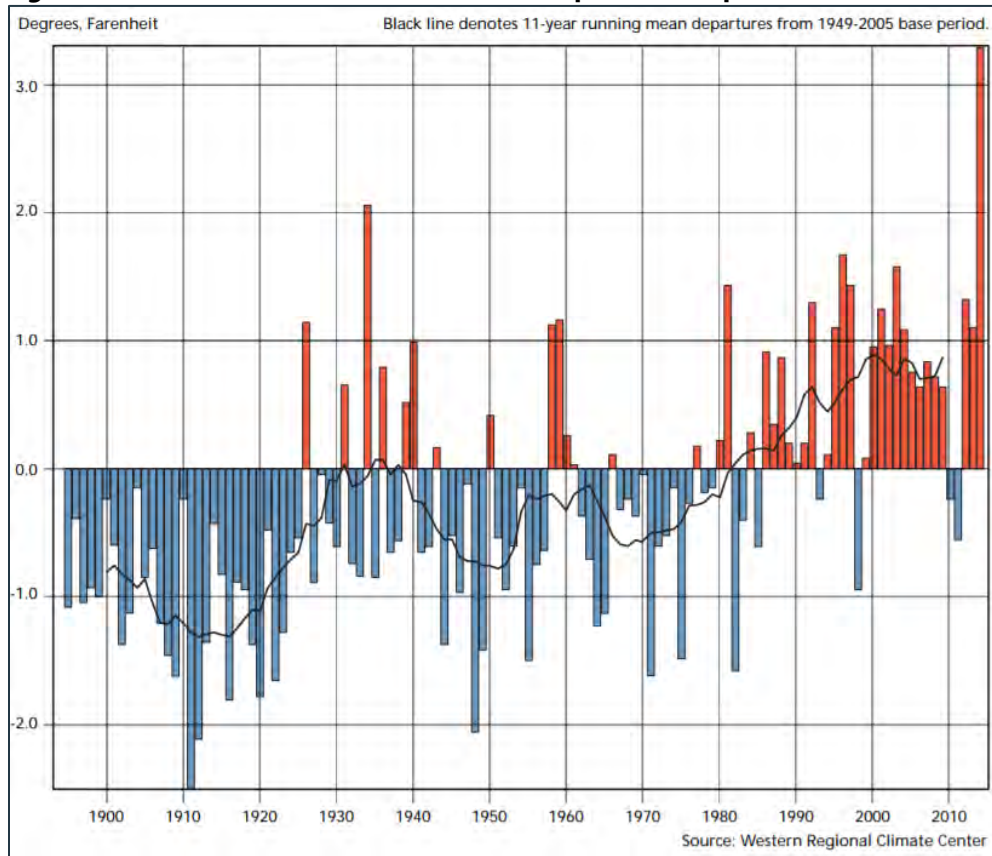
**Figure 4-40: The City of Petaluma's Daily Temperature Averages and Extremes**



Source: Western Regional Climate Center, [www.wrcc.dri.edu/](http://www.wrcc.dri.edu/)

The California statewide mean temperature departures from the 1900s to mid-2010s are displayed in Figure 4-41. This graphically highlights the general warming trend across the state, and how climate change can have significant implications in future water supply availability, higher mean temperatures.

**Figure 4-41: California’s Statewide Mean Temperature Departure, 1900-2014**



Source: Drought in California Report (CA DWR; Natural Resources Agency; State of California, 2015)

### Probability of Future Occurrences

**Likely** – Temperatures of extreme heat are likely to continue to occur annually in the Planning Area.

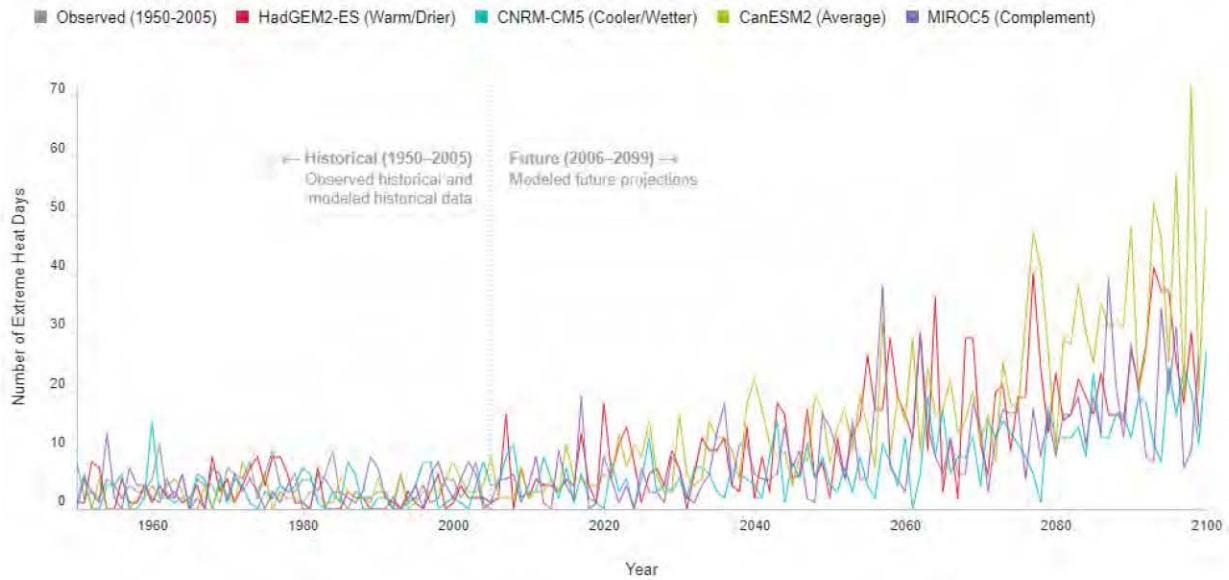
### Climate Change Considerations

Heat waves are likely to become more frequent, which will have direct impacts on human health in terms of heat related illness. With the general trend of increased warming of average temperatures, extreme high temperatures will likely also increase. Cascading impacts include increased stress on water quantity and quality, degraded air quality, and increased potential for more severe or catastrophic natural events such as heavy rain, droughts, and wildfire. Another cascading impact includes increased duration and intensity of wildfires with warmer temperatures. According to the 2013 document, *Preparing California for the Extreme Heat*, Cal-Adapt projects that throughout California urban and rural population centers will experience an average of 40 to 53 extreme heat days by 2050 and an average of 40 days by 2099 (Cal-Adapt 2013). This compares to a historical average of four days per year (Cal-Adapt 2013). Cal Adapt also projects that overall temperatures are expected to rise substantially throughout this century. Future temperature estimates from Cal Adapt for the City of Petaluma under high and low emission scenarios are shown in Figure 4-42. The top graph shows the number of days per year when daily maximum temperature is above the extreme heat threshold of 98°F under the RCP 8.5 scenario (business as usual). The bottom graph shows the number of days per year when daily maximum temperature is above the extreme heat threshold of 103.9°F under the RCP 4.5 scenario.

**Figure 4-42: City of Petaluma – Future Extreme Heat Days in High and Low Emission Scenarios**

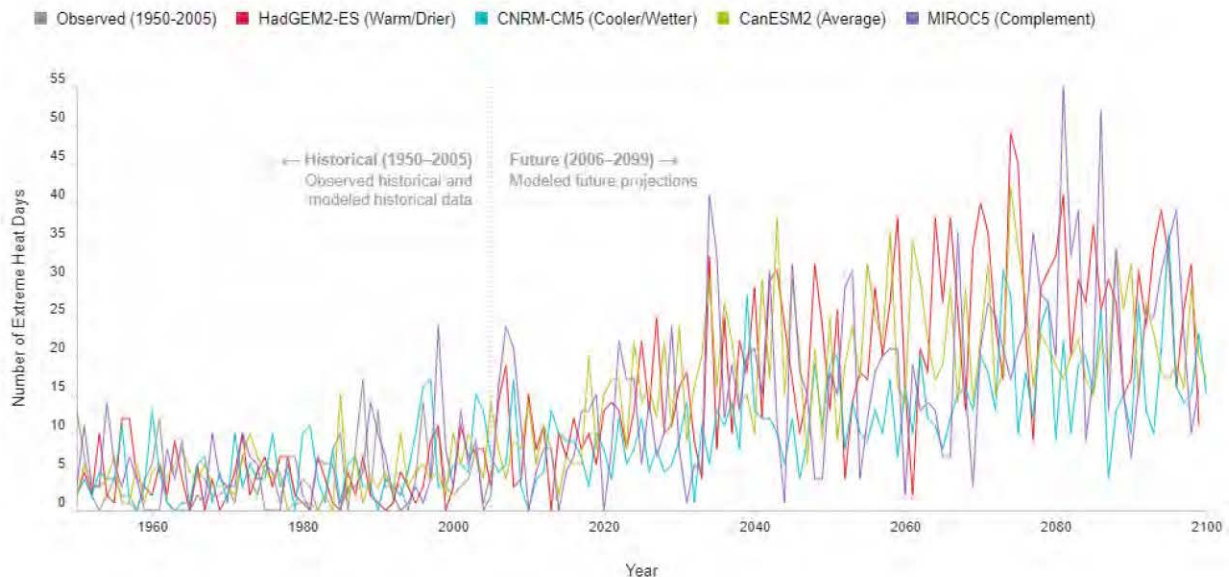
**Number of Extreme Heat Days by Year**

This chart shows number of days in a year when daily maximum temperature is above the extreme heat threshold of 98 °F. Data is shown for Petaluma under the RCP 8.5 scenario in which emissions continue to rise strongly through 2050 and plateau around 2100.



**Number of Extreme Heat Days by Year**

This chart shows number of days in a year when daily maximum temperature is above the extreme heat threshold of 103.9 °F. Data is shown for Grid Cell (38.58, -121.46) under the RCP 4.5 scenario in which emissions peak around 2040, then decline.



Source: Cal-Adapt 2019

Extreme heat has also been shown to accelerate wear and tear on the natural gas and electrical infrastructure (California Natural Resources Agency 2018). Projected increases in summer demand



associated with rising temperatures may increase risks to energy infrastructure and may exceed the capacity of existing substations and distribution line infrastructure and systems.

A recent study on extreme heat released by the Union of Concern Scientists in July 2019 analyzed three global climate scenarios associated with different levels of heat-trapping emissions and future warming. The results of the analysis showed that with no actions taken to reduce heat-trapping emissions by midcentury (2036-2065) the average number of days per year in the United States with a heat index above 100°F will double, while the number of days per year above 105°F will quadruple. The modeling completed for the study showed that the most dramatic transformations will be felt in areas where the climate has been temperate. The City of Petaluma could experience up to 11 more times as many days per year in which the heat feels like 90 degrees (KQED 2019). According to Cal-Adapt Climate Projections for the Bay Area Region as stated in the 2017 Climate Change Health Profile Report for Sonoma County, by 2100 the number of heat waves in the Bay Area Region is expected to be between 6 to 10 heatwaves per year.

Based on Sonoma County's 2016 CAP, climate change is also expected to result in higher average temperature and more extreme heat events. If future GHG emissions are mitigated or reduced over time, summer high temperatures are expected to rise by 1 to 2°F. Whereas, if GHG emissions are not mitigated average summer high temperatures will increase by up to 9 to 11°F by 2100 (RCAP 2016). For these reasons, climate change would have a "high" influence on extreme heat hazards.

## Vulnerability Assessment

### Property

Recent research indicates that the impact of extreme heat, particularly on populations, has been historically under-represented. The risks of extreme heat are often profiled as part of larger hazards, such as drought or wildfire. However, as temperature variances may occur independent of other hazards or outside of the expected seasons, but still incur large costs, it is important to examine them as stand-alone hazards. Extreme heat can overload demands for electricity to run air conditioners in homes and businesses during prolonged periods of exposure and presents health concerns to individuals who are outside.

Extreme heat may also be a secondary effect of droughts or may cause temporary drought-like conditions. For example, several weeks of extreme heat increases evapotranspiration and reduces moisture content in vegetation, leading to higher wildfire vulnerability for that time period even if the rest of the season is relatively moist. Extreme heat can cause infrastructure damage to roads. In summary, all property is vulnerable from extreme heat.

### People

Traditionally, the very young and very old are considered at higher risk to the effects of extreme heat, but any populations outdoors during periods of extreme temperatures are exposed, including otherwise young and healthy adults and homeless populations. While everyone is vulnerable to extreme heat incidents, some populations are more vulnerable than others. Extreme heat poses the greatest danger to outdoor laborers, such as highway crews, police and fire personnel, and construction workers. The elderly, children, people in poor physical health, and the homeless are also vulnerable to exposure. Arguably, the young-and-otherwise-healthy demographic may also experience a higher vulnerability of exposure, due to the increased likelihood that they will be out in temperatures of extreme heat, whether due to



commuting for work or school, conducting property maintenance such as lawn care, or for recreational reasons.

It is difficult to isolate the City's specific vulnerability to this hazard, as the impacts from extreme heat can be spread across an entire state or region. In general, all the population of the City can be considered at-risk to this hazard.

## **Economy**

Extreme heat impacts on the economy may be more indirect compared to other hazards. Infrastructure such as roads could be damaged and lead to increased need for repaving. Critical facilities may be vulnerable to the indirect impact of prolonged excessive heat (i.e., electrical power outages), which may impact response capabilities or care capabilities for hospitals and clinics. Hospitals and clinics may see a surge in patients during the heat event as the exposed population suffers from the effects of the heat, but it is not anticipated that these increases will overwhelm the capacities of hospitals and clinics in Petaluma. Essential infrastructure, especially the electrical distribution system, is also posed to be stressed during extreme heat events as demand increases to run air conditioning. Peak demand exceeding the local utility's capacity for supply can lead to blackout or brownout conditions.

## **Critical Facilities and Infrastructure**

Extreme heat can affect road infrastructure, but direct impacts to critical infrastructure is expected to be minimal. Critical infrastructure that relies on public utility systems that could be overloaded may result in impacts during extreme heat events. The loss of utilities or power outages during extreme heat events could also result in adverse secondary impacts to sensitive populations.

## **Historic, Cultural, and Natural Resources**

Extreme heat may cause temporary drought-like conditions. For example, several weeks of extreme heat increases evapotranspiration and reduces moisture content in vegetation, leading to higher wildfire vulnerability for that time period even if the rest of the season is relatively moist. Changing heating and cooling patterns globally can have destructive secondary impacts, intensifying a variety of weather-related disasters that directly impact jurisdictions.

## **Future Development**

Since structures are not usually directly impacted by severe temperature fluctuations, continued development is less impacted by this extreme heat than others in the plan. Continued development implies continued population growth, which raises the number of individuals potentially exposed to temperature variations. Public education efforts should continue to help the population understand the risks and vulnerabilities of outdoor activities, property maintenance, and regular exposures during periods of extreme heat.

## **Risk Summary**

- The highest recorded temperature in Planning Area is 110°F on June 2, 1960.
- Extreme heat can have severe impacts on human health, the natural environment, and the economy.
- The very young, the elderly, people with poor physical health, and the homeless are more susceptible to the impacts of extreme temperatures.



- The average number of days per year in the United States with a heat index above 100°F will double, while the number of days per year above 105°F will quadruple if no actions to reduce heat-trapping emissions are taken.
- Climate change is expected to result in higher average temperature and more extreme heat events. In other words, climate change will have a “high” influence on the number of extreme heat days.
- Overall, the significance of extreme heat is **Medium**.

#### 4.3.9 Severe Weather: Heavy Rain/ Thunderstorm/ Hail/ Lightning/ Dense Fog

##### Hazard Description

Severe storms in the Planning Area are generally characterized by heavy rain accompanied by strong winds, and lightning. Approximately 10 percent of the thunderstorms that occur each year in the United States are classified as severe. A thunderstorm is classified as severe when it contains one or more of the following phenomena: hail that is three-quarters of an inch or greater, winds in excess of 50 knots (57.5 mph), or a tornado.

##### Heavy Rain

Atmospheric rivers, a climate pattern that leads to adverse weather in the City, are responsible for up to 50 percent of California’s precipitation annually and 65 percent seasonally (Arcuni, 2019). An atmospheric river (AR) is a long, narrow region of the atmosphere, like a river in the sky, that transports most of the water vapor outside of the tropics. ARs can be 300 miles wide, a mile deep and more than 1,000 miles long and carry an amount of water vapor roughly the same as the average flow of water at the mouth of Mississippi River (NOAA 2015). Warm water storms over the Pacific Ocean lead to evaporation and create a high concentration of moisture in the air, while prevailing winds create the distinctive river shape, which is often compared “to a fire hose pointed at California” (Arcuni 2019). When an atmospheric river reaches land, it releases the water vapor in the form of rain or snow. Atmospheric rivers play an important role in the global water cycle and are closely tied to both water supply and flooding risk.

Research suggests that atmospheric rivers contributed to the collapse of both Orville Dam spillways in February 2017 (NASA Global Hydrology Resource Center 2018), as well as the winter flooding in 1861-1862, which inundated Sacramento and is considered the worst flood event in California’s history (Ingram 2013). When an atmospheric river forms in the tropical regions of the Pacific near Hawaii it is known as a “Pineapple Express”. This type of atmospheric river can produce as much as five inches in one day (NOAA 2018). In 2018, two Pineapple Express ARs hit California causing significant heavy precipitation events throughout state.

Sonoma Water entered into a cooperative agreement with Scripps Institution of Oceanography and the Center for Western Extremes (CW3E) to advance the research in ocean science and meteorology. Three projects have come from the initial agreement: 1) research to help define the role of atmospheric rivers in filling Lake Mendocino and potentially offering predictability in retaining water without increasing flood risk; 2) a NOAA-funded climate program project to study the role of atmospheric rivers in ending droughts on the Russian River; and 3) cooperation in developing a feasibility assessment for potential use of forecast-informed reservoir operations for Lake Mendocino in cooperation with the U.S. Army Corps of Engineers.





## Hail

Hail is formed when water droplets freeze and thaw as they are thrown high into the upper atmosphere by the violent internal forces of thunderstorms. Hail is sometimes associated with severe storms within the Planning Area. Hail falls when it becomes heavy enough to overcome the strength of the updraft and is pulled by gravity towards the earth. Hailstorms occur throughout the spring, summer, and fall in the region, but are more frequent in late spring and early summer. Hailstones are usually less than two inches in diameter and can fall at speeds of 120 mph. Hail causes nearly \$1 billion in damage to crops and property each year in the United States. Hail is also one of the requirements which the NWS uses to classify thunderstorms as 'severe.' If hail more than  $\frac{3}{4}$  of an inch is produced in a thunderstorm, it qualifies as severe. Severe hailstorms can be quite destructive, causing damage to roofs, buildings, automobiles, vegetation, and crops.

The NWS classifies hail by diameter size, and corresponding everyday objects to help relay scope and severity to the population. Table 4-38 under the Extent subsection below indicates the hailstone measurements utilized by the NWS.

## Dense Fog

Fog results from air being cooled to the point where it can no longer hold all of the water vapor it contains. For example, rain can cool and moisten the air near the surface until fog forms. A cloud-free, humid air mass at night can lead to fog formation, where land and water surfaces that have warmed up during the summer are still evaporating water into the atmosphere. This is called radiation fog. A warm moist air mass blowing over a cold surface also can cause fog to form, which is called advection fog.

Sonoma County is made up of three major climactic zones, with the major climatic influence being the Pacific Ocean. The City of Petaluma falls within the marine zone, which is under direct ocean influence. The prevailing weather and winds tend to come from the Pacific Ocean from the northwest. Areas such as Petaluma tend to receive more precipitation in the fall and winter and more wind and fog in early morning of the summer months.

## Lightning

Lightning is an electrical discharge between positive and negative regions of a thunderstorm. A lightning flash is composed of a series of strokes with an average of about four. The length and duration of each lightning stroke vary, but typically average about 30 microseconds.

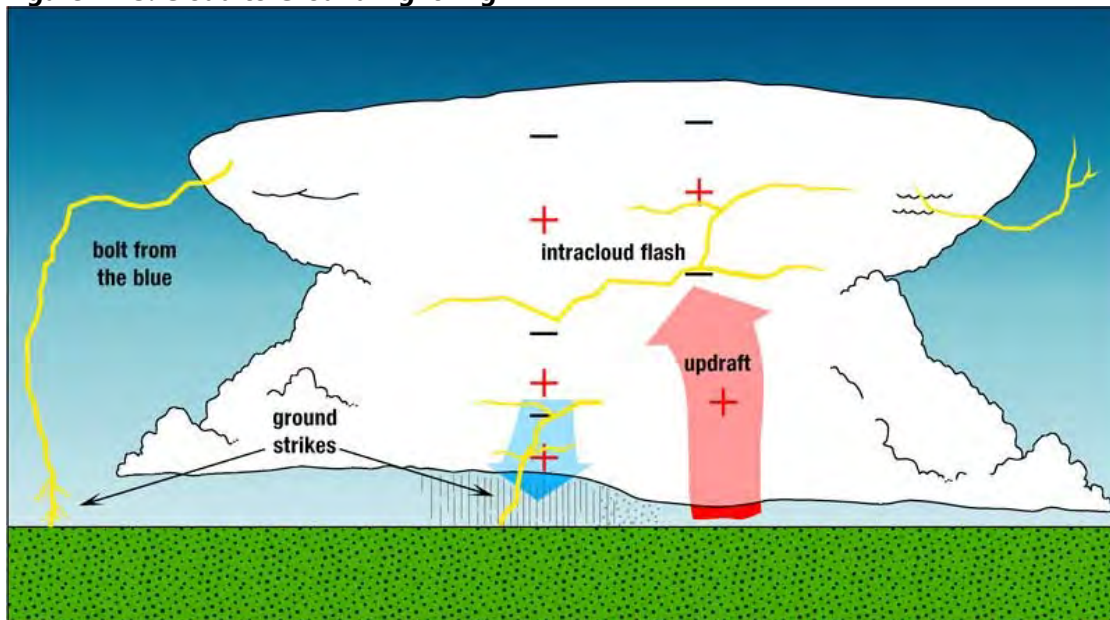
Lightning is one of the more dangerous weather hazards in the United States. Each year, lightning is responsible for deaths, injuries, and millions of dollars in property damage, including damage to buildings, communications systems, power lines, and electrical systems. Lightning also causes forest and brush fires, and deaths and injuries to livestock and other animals. According to the National Lightning Safety Institute, lightning causes more than 26,000 fires in the United States each year. The Institute estimates property damage, increased operating costs, production delays, and lost revenue from lightning and secondary effects to be in excess of \$6 billion per year. Impacts can be direct or indirect. People or objects can be directly struck, or damage can occur indirectly when the current passes through or near it.

Intra-cloud lightning is the most common type of discharge. This occurs between oppositely charged centers within the same cloud. Usually it takes place inside the cloud and looks from the outside of the cloud like a diffuse brightening that flickers. However, the flash may exit the boundary of the cloud, and a bright channel, similar to a cloud-to-ground flash, can be visible for many miles.



Cloud-to-ground lightning is the most damaging and dangerous type of lightning, though it is also less common. Most flashes originate near the lower-negative charge center and deliver negative charge to earth. However, a large minority of flashes carry positive charge to earth. These positive flashes often occur during the dissipating stage of a thunderstorm's life. Positive flashes are also more common as a percentage of total ground strikes during the winter months. This type of lightning is particularly dangerous for several reasons. It frequently strikes away from the rain core, either ahead or behind the thunderstorm. It can strike as far as 5 or 10 miles from the storm in areas that most people do not consider to be a threat (see Figure 4-43). Positive lightning also has a longer duration, so fires are more easily ignited. And, when positive lightning strikes, it usually carries a high peak electrical current, potentially resulting in greater damage.

**Figure 4-43: Cloud to Ground Lightning**



Source: National Weather Service Pueblo Office

The ratio of cloud-to-ground and intra-cloud lightning can vary significantly from storm-to-storm. Depending upon cloud height above ground and changes in electric field strength between cloud and earth, the discharge stays within the cloud or makes direct contact with the earth. If the field strength is highest in the lower regions of the cloud, a downward flash may occur from cloud to earth.

### Location

Heavy rains and severe storms have the potential to occur anywhere in the Planning Area.

### Extent (Magnitude/Severity)

**Limited** – Extent for severe weather, particularly severe storms that involve heavy rain and hail, can be measured according to hail by diameter size, as it corresponds to everyday objects to define the severity to the population (Table 4-38).

Common problems associated with severe storms include the loss of utilities or immobility. Loss of life is uncommon but can occur during severe storms. Immobility can occur when roads become impassable due to dense fog, flooding, downed trees, ice, or a landslide. Fog specifically poses a risk to commuters and driving conditions as fog typically forms rapidly in the early morning hours. Nighttime driving in the





fog is dangerous and multi-car pileups have resulted from drivers using excessive speed for the conditions and visibility.

Loss of utilities can occur when severe thunderstorms cause trees or tree limbs to fall and damage power lines. Lightning can also cause severe damage and injury, particularly when it causes wildfires.

The NWS classifies hail by diameter size, and corresponding everyday objects to help relay scope and severity to the population. Table 4-38 indicates the hailstone measurements utilized by the NWS.

**Table 4-38: Hail Measurements**

Average Diameter	Corresponding Household Object
.25 inch	Pea
.5 inch	Marble/Mothball
.75 inch	Dime/Penny
.875 inch	Nickel
1.0 inch	Quarter
1.5 inch	Ping-pong ball
1.75 inch	Golf-Ball
2.0 inch	Hen Egg
2.5 inch	Tennis Ball
2.75 inch	Baseball
3.00 inch	Teacup
4.00 inch	Grapefruit
4.5 inch	Softball

Source: National Weather Service

There is no clear distinction between storms that do and do not produce hailstones. Nearly all severe thunderstorms probably produce hail aloft, though it may melt before reaching the ground. Multi-cell thunderstorms produce many hailstones, but not usually the largest hailstones. In the life cycle of the multi-cell thunderstorm, the mature stage is relatively short so there is not much time for growth of the hailstone. Supercell thunderstorms have sustained updrafts that support large hail formation by repeatedly lifting the hailstones into the very cold air at the top of the thunderstorm cloud. In general, hail two inches (5 cm) or larger in diameter is associated with supercells (a little larger than golf ball size which the NWS considers to be 1.75 inch.). Non-supercell storms are capable of producing golf ball size hail.

In all cases, the hail falls when the thunderstorm's updraft can no longer support the weight of the ice. The stronger the updraft the larger the hailstone can grow. When viewed from the air, it is evident that hail falls in paths known as hail swaths. They can range in size from a few acres to areas 10 miles wide and 100 miles long. In some instances, piles of hail have been so deep that snow plows were required to remove them, and occasionally hail drifts have been reported.

Lightning is measured by the Lightning Activity Level (LAL) scale, created by the NWS to define lightning activity into a specific categorical scale. The LAL is a common parameter that is part of fire weather forecasts nationwide. The City of Petaluma is at risk to experience lightning in any of these categories. The LAL is reproduced in Table 4-39.





**Table 4-39: Lightning Activity Level Scale**

LAL 1	No thunderstorms
LAL 2	Isolated thunderstorms. Light rain will occasionally reach the ground. Lightning is very infrequent, 1 to 5 cloud to ground strikes in a five-minute period
LAL 3	Widely scattered thunderstorms. Light to moderate rain will reach the ground. Lightning is infrequent, 6 to 10 cloud to ground strikes in a five-minute period.
LAL 4	Scattered thunderstorms. Moderate rain is commonly produced. Lightning is frequent, 11 to 15 cloud to ground strikes in a five-minute period.
LAL 5	Numerous thunderstorms. Rainfall is moderate to heavy. Lightning is frequent and intense, greater than 15 cloud to ground strikes in a five-minute period.
LAL 6	Dry lightning (same as LAL 3 but without rain). This type of lightning has the potential for extreme fire activity and is normally highlighted in fire weather forecasts with a Red Flag warning.

Source: National Weather Service

The heavy precipitation that is possible in the City of Petaluma and all of California is often the result of an atmospheric river. Atmospheric rivers are categorized by a unit of measurement known as the Integrated Water Vapor Transport (IVT), which takes into account the amount of water vapor in the system and the wind that moves it around. For a storm to be classified as an atmospheric river it has to reach an IVT threshold of 250 units; 1,000 IVT or more is considered to be “extreme” (Arcuni, 2019). In 2019 a system for categorizing the strength and impacts of atmospheric rivers was developed by the Center for Western Weather and Water Extremes (CW3E), out of the Scripps Institution of Oceanography at the University of California San Diego. The newly developed scale ranks ARs into five categories from weak to exceptional. Unlike the Fujita scale for tornadoes that focuses on potential damages, the AR scale accounts for both storms that may be hazardous and storms that can provide benefits to the local water supply. A category one AR is considered to be primarily beneficial, generally lasting only 24 hours and produces modest rainfall. On the other end of the scale, a category five AR is considered “exceptional” and primarily hazardous, lasting for several days and associated with heavy rainfall and runoff that may cause significant damages. Table 4-40 describes the scale further. The Center developed the scale as a tool for officials with an operational need to assess flooding potential in their jurisdictions before the storms makes landfall.

In both February 2018 and 2019 the West Coast experienced six atmospheric rivers. But as Figure 4-44 from the Center for Western Weather and Water Extremes shows, California experienced vastly different precipitation totals due to the location of where the atmospheric river made landfall as well as each atmospheric river’s IVT. Using the AR scale developed by CW3E, the ARs in February 2019 were all considered to be moderate to extreme and concentrated more on California, resulting in heavy precipitation.





**Table 4-40: Atmospheric River Categories**

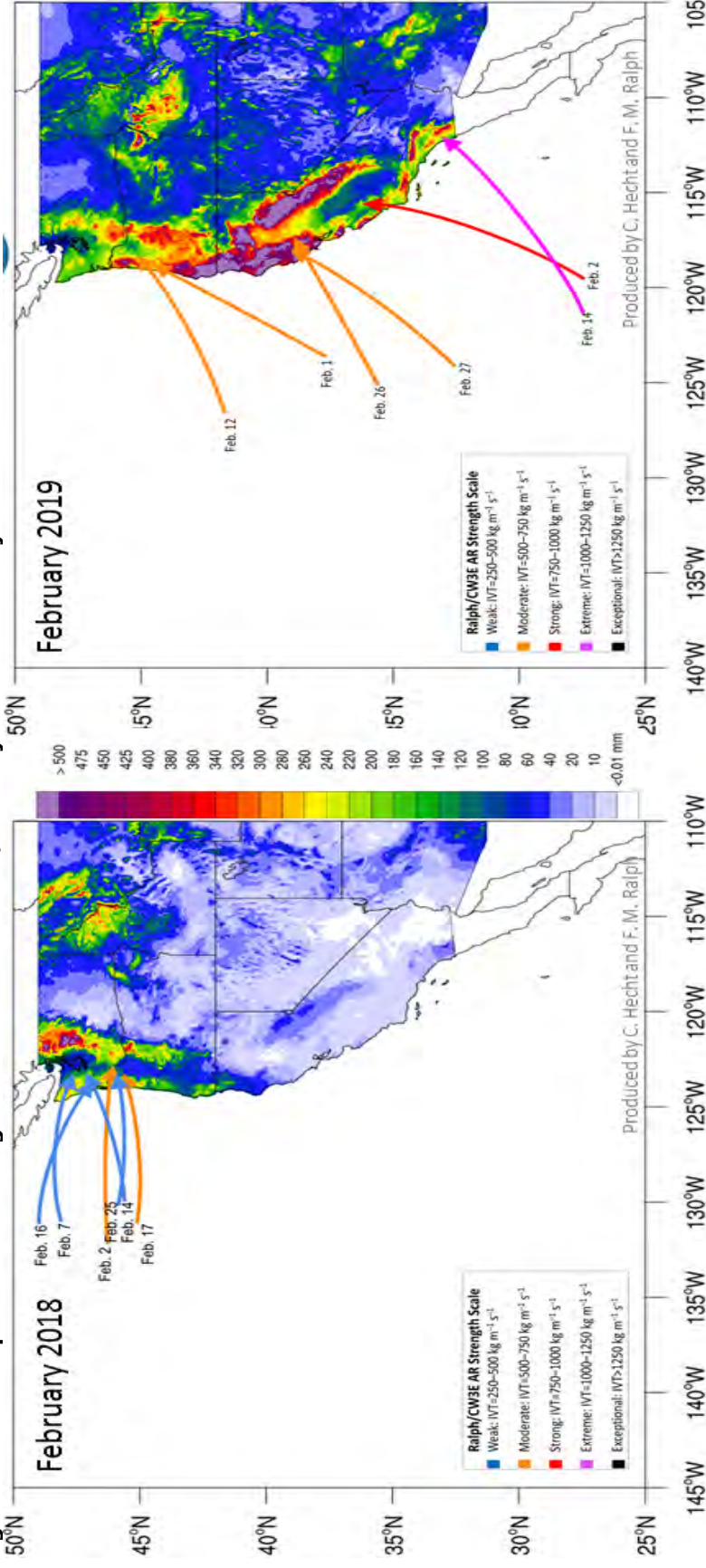
Category	Potential Impacts
AR Cat 1: Weak	Primarily beneficial. For example, a Feb. 2, 2017 AR hit California, lasted 24 hours at the coast, and produced modest rainfall.
AR Cat 2: Moderate	Mostly beneficial, but also somewhat hazardous. An atmospheric river on Nov. 19-20, 2016 hit Northern California, lasted 42 hours at the coast, and produced several inches of rain that helped replenish low reservoirs after a drought.
AR Cat 3: Strong	Balance of beneficial and hazardous. An atmospheric river on Oct. 14-15, 2016 lasted 36 hours at the coast, produced 5-10 inches of rain that helped refill reservoirs after a drought, but also caused some rivers to rise to just below flood stage.
AR Cat 4: Extreme	Mostly hazardous, but also beneficial. For example, an atmospheric river on Jan. 8-9, 2017 that persisted for 36 hours produced up to 14 inches of rain in the Sierra Nevada and caused at least a dozen rivers to reach flood stage.
AR Cat 5: Exceptional	Primarily hazardous. For example, a Dec. 29, 1996 to Jan. 2, 1997 atmospheric river lasted over 100 hours at the Central California coast. The associated heavy precipitation and runoff caused more than \$1 billion in damages.

Source: Center for Western Weather and Water Extremes, Scripps Institution of Oceanography at UC San Diego. Scale was developed by F. Martin Ralph Director of CW3E in collaboration with Jonathan Rutz of NWS





**Figure 4-44: Atmospheric River Strength and Land Distribution, February 2018 vs. February 2019**



Source: Center for Western Weather and Water Extremes, Scripps Institution of Oceanography at UC San Diego





## Previous Occurrences

Heavy rains and severe storms occur in the Planning Area primarily during the late fall and winter. According to information obtained from the WRCC the majority of precipitation is produced by storms during January and other winter months. Precipitation during the summer months is in the form of rain showers and is rare. Snowstorms and ice storms occur infrequently in the City of Petaluma. The Storm Events Database records one snow event in the City, January 28, 2002 with one to two inches of snow falling in the vicinity of Petaluma; the Database notes this was "quite a rare event". The NCEI records 42 hail, heavy rain, lightning and dense fog events that have taken place in Sonoma County in the past 68 years (1950 –2018). Table 4-41 is a summary of the most significant severe weather events for Sonoma County. An asterisk (\*) indicates events where the City of Petaluma was specifically mentioned.

**Table 4-41: Severe Weather Events recorded in Sonoma County (1950-2018)**

Hazard Type	Date	Hazard Description
Dense Fog	February 8, 2012	Dense fog is blamed in 11 crashes on Highway 37 near Skaggs Island Rd. There were 31 vehicles involved in the crashes. Two people suffered minor injuries. \$100,000 in property damages were recorded.
	December 10-11, 2018	Widespread dense fog impacted the Bay Area blanketing the Bay and interior valleys. Numerous reports of dense fog with visibility less than 1/4 mile. A Dense Fog Advisory was issued for the North and East Bay Valleys as well as the San Francisco Peninsula and surrounding bay coastline. Fog caused numerous diverts at KSFO.
Hail	Jan. 19, 2018*	A cold front swept through the region late on the 18th. Small scattered thunderstorms were generated behind the front bringing pea sized hail (0.25 in.) to the region.
	Jan. 25, 2018*	Isolated thunderstorms developed behind a cold front that passed through the area on the 25th. These thunderstorms caused minor roadway flooding and small hail (0.25 in.)
	March 14, 2018*	The Press Democrat in Santa Rosa showed multiple reports of accumulating small hail in downtown Petaluma (0.25 in.); An upper level disturbance moved through the area on the afternoon of the 14th. This disturbance created scattered thunderstorms that resulted in lightning and accumulating hail in the North and East Bay areas.
Lightning	March 14, 2018*	The Press Democrat in Santa Rosa reported that lightning struck a PG&E circuit at 11 am the morning of the 14th causing a power outage for 25 Petaluma residents lasting through the evening. An upper level disturbance moved through the area on the afternoon of the 14th. This disturbance created scattered thunderstorms that resulted in lightning and accumulating hail in the North and East Bay areas.
Heavy Rain	December 15, 2008	Heavy rain caused a fatality of a 32-year-old man when his vehicle collided with another vehicle. Highways 116 and 121 were closed for about three hours after the collision. A cold core low pressure system produced winter storm conditions causing low elevation snow, minor flooding and isolated strong wind through the period December 15 through 17, 2009. \$25,000 in property damages is recorded.
	December 22, 2012	A series of storm systems, part of a large Atmospheric River type of pattern, impacted the area during late December 2012. From the 21st through 26th of December, heavy rain, gusty winds, flooding, and mudslides occurred across the Bay Area in these consecutive events. Downed trees, powerlines, and flooded roadways impacted residents over





Hazard Type	Date	Hazard Description
		the Christmas holiday season. \$30,000 in property damages were recorded.
	December 11, 2014	An Atmospheric River event brought heavy rain and gusty winds with a strong winter storm that impacted the Bay Area for several days in mid-December. Many locations around the entire Bay Area had flooding: urban flooding of streets and highways, flooding of creeks and even one large river in the North Bay. Eventually the NCFR (narrow cold frontal rainband) slowed around the Big Sur Coast. The stalling was likely due to another 'wave' in the atmosphere, farther to the southwest, riding along the boundary. The end result was to have the weakened NCFR lift back northward, almost like a quasi-warm front, producing another round of moderate to locally heavy rainfall around the Bay Area, compounding flooding concerns. The event was followed by several weaker storm systems that week that brought additional rainfall, continued flooding and mudslide concerns to the area.
	January 16, 2019	A moderate to strong atmospheric river impacted much of California in the middle of the month. A weak surface low developed off the coast on January 15th bringing moderate to heavy rainfall to portions of the region. Over the next 24 to 36 hours a second strong low-pressure system moved to the north and east bringing heavy rain, destructive winds, high surf, flooding, and thunderstorms to the Bay Area. Numerous reports were received of downed trees and power lines. Winds were recorded between 60 and 100 mph. Downed trees resulted in two fatalities.

Source: National Centers for Environmental Information, Storm Events Database.

\*Notes events that were specific to the City of Petaluma

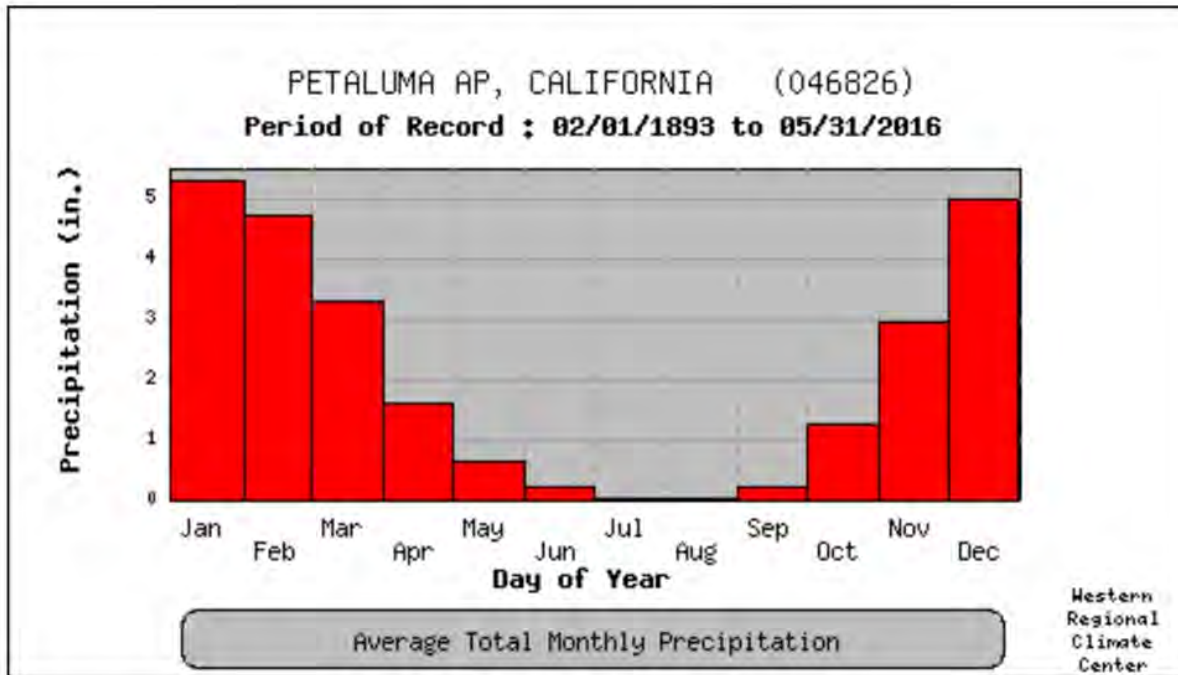
**City of Petaluma—Petaluma Fire Station 3 Weather Station (Period of Record 1893 to 2016)**

Information from the closest weather station with the most comprehensive data, the Petaluma Fire Station 3 Weather Station, is summarized below in Figure 4-45 and Figure 4-46. Average annual precipitation in the Planning Area is 24.89 inches per year. The highest recorded annual precipitation was 31.48 inches in 1998; the highest recorded precipitation for a 24-hour period is 4.29 inches on December 12, 2004. The lowest recorded annual precipitation was 8.98 inches in 1976.



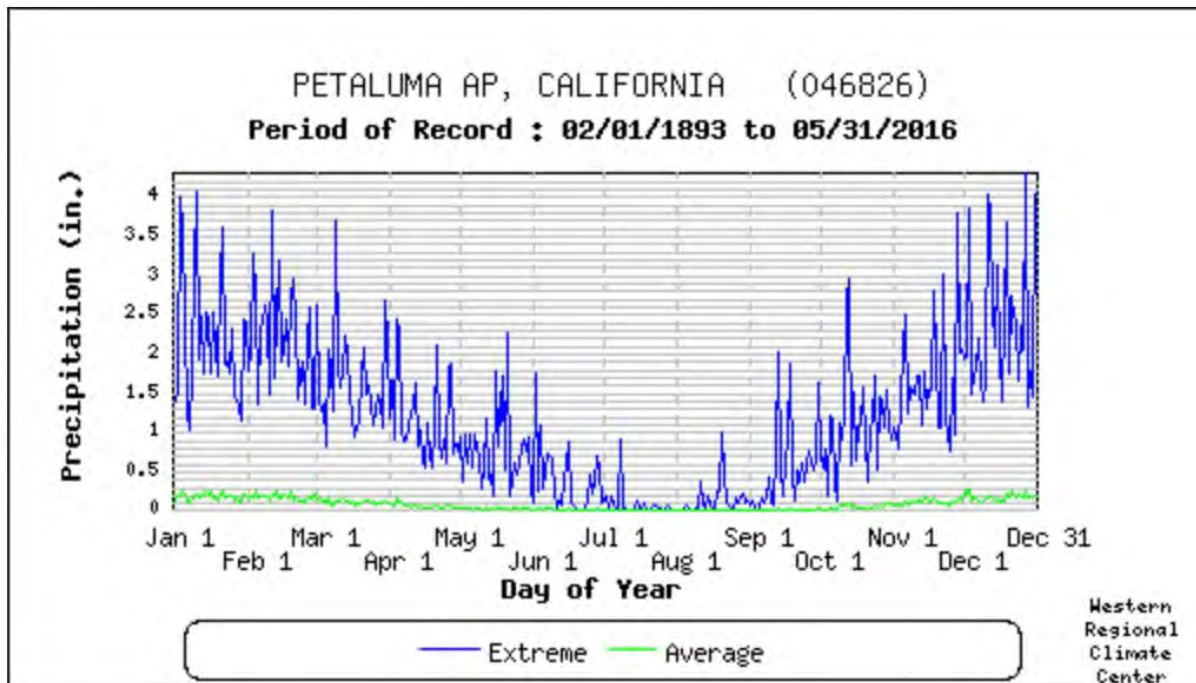


Figure 4-45: The City of Petaluma’s Monthly Average Total Precipitation



Source: Western Regional Climate Center, [www.wrcc.dri.edu/](http://www.wrcc.dri.edu/)

Figure 4-46: The City of Petaluma’s Daily Average and Extreme Precipitation



Source: Western Regional Climate Center, [www.wrcc.dri.edu/](http://www.wrcc.dri.edu/)





## Probability of Future Occurrences

**Likely** – Heavy rain, thunderstorms, hail, and lightning wind and fog events are well-documented seasonal occurrences that will continue to occur annually in the Planning Area.

## Climate Change Considerations

As average temperatures increase over time, this generally will result in higher extreme temperatures and more warming in the atmosphere can trigger climate changes, which could result in more frequent extreme weather events. According to California's Fourth Climate Change Assessment, the number of days each year on which the atmospheric rivers bring "extreme" amounts of rain and snow to the region are expected to increase under the projected climate change for the state, possibly increasing more than a quarter. Pacific Northwest National Laboratory researchers found that atmospheric rivers will reach the West Coast more frequently if GHG emissions continue to rise under business as usual conditions. Currently, the West receives rain or snow from these atmospheric rivers between 25 and 40 days each year. By the end of this century, days on which the atmospheric rivers reach the coast could increase by a third this century, between 35 and 55 days a year. Meanwhile, the number of days each year on which the atmospheric rivers bring "extreme" amounts of rain and snow to the region could increase by more than a quarter.

Cal-Adapt indicates that on average, projections show little change in total annual precipitation in California; however, the Mediterranean seasonal precipitation pattern is expected to continue, with most precipitation falling during the winter months from North Pacific storms. Cal-Adapt provides extreme future precipitation estimates that summarize the intensity and frequency of events. Future extreme precipitation estimates for the City of Petaluma are shown in Figure 4-47. The upper chart shows estimated intensity of extreme precipitation events under the RCP 8.5 scenario that are exceeded on average every 50 years and how it changes in a warming climate over historical, mid-century, and late-century time periods. This chart shows that emissions rise strongly through 2050 and plateau by 2100 and that extreme precipitation events are days during a water year (October – September) with 2-day rainfall totals above an extreme threshold of 1 inch. The lower chart also shows estimated intensity of extreme precipitation events but under the RCP 4.5 scenario that are exceeded on average every 50 years. This chart shows that emissions peak by 2040 and then decline and that extreme precipitation events are days during a water year (October – September) with 2-day rainfall totals above an extreme threshold of 1.53 inches.



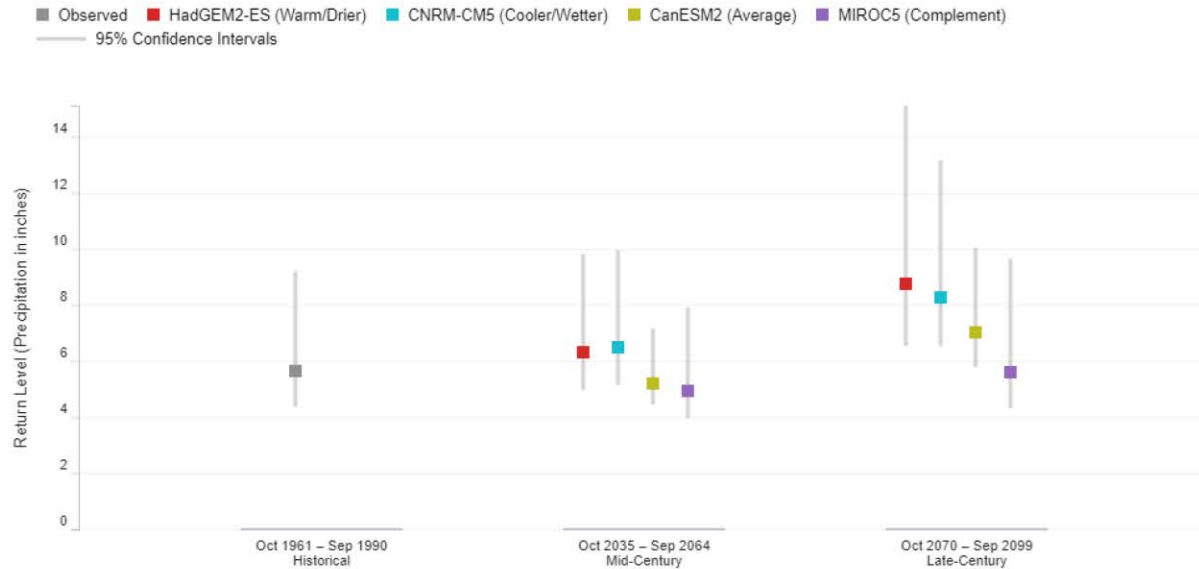


### Figure 4-47: City of Petaluma Future Precipitation Estimates in High and Low Emission Scenarios

#### Changes in Intensity of Extreme Precipitation Events

This chart shows estimated intensity (*Return Level*) of Extreme Precipitation events which are exceeded on average once every 50 years (*Return Period*) and how it changes in a warming climate over historical, mid-century and late-century time periods. Data is shown for Grid Cell (38.5937, -121.4687) under the RCP 8.5 scenario in which emissions continue to rise strongly through 2050 and plateau around 2100.

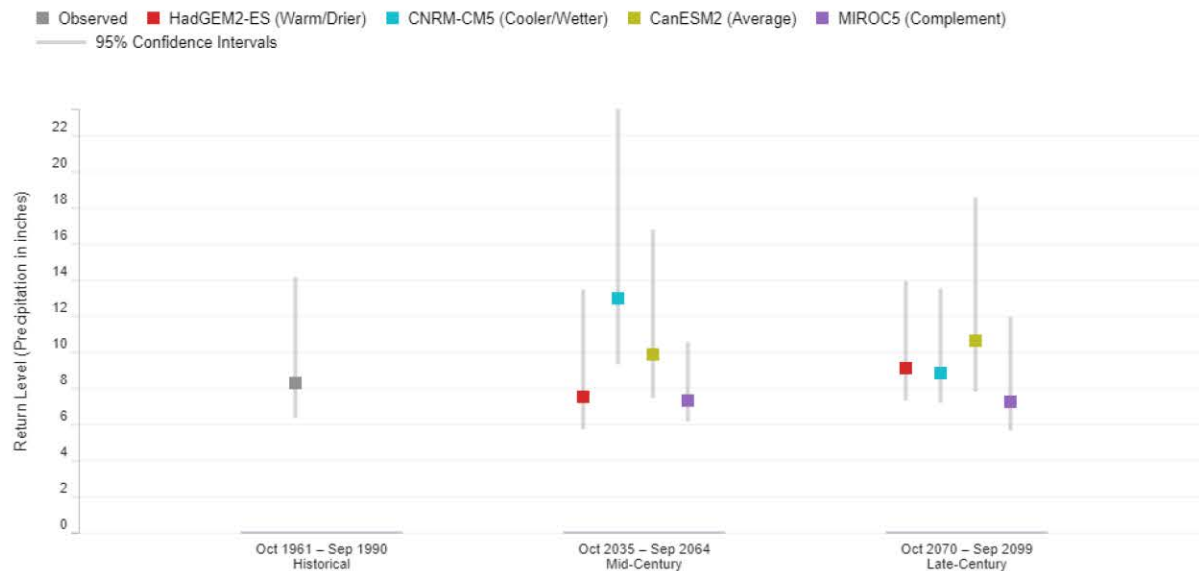
Extreme Precipitation events are days during a water year (Oct–Sep) with 2-day rainfall totals above an extreme threshold of 1 inches.



#### Changes in Intensity of Extreme Precipitation Events

This chart shows estimated intensity (*Return Level*) of Extreme Precipitation events which are exceeded on average once every 50 years (*Return Period*) and how it changes in a warming climate over historical, mid-century and late-century time periods. Data is shown for Petaluma under the RCP 4.5 scenario in which emissions peak around 2040, then decline.

Extreme Precipitation events are days during a water year (Oct–Sep) with 2-day rainfall totals above an extreme threshold of 1.53 inches.



Source: Cal-Adapt 2019





It is difficult at this point in time to predict the effects climate change will have on these hazards. However, as average temperatures increase over time, this generally will result in higher extreme temperatures. More warming in the atmosphere will trigger climate changes, which will result in more frequent extreme weather events. Much of the U.S. has already experienced prolonged periods of heavy downpours and severe flooding as a result of more extreme heavy rain and thunderstorm events. For these reasons, climate change would have a “high” influence on severe weather, specifically more heavy rainfall and precipitation events.

## **Vulnerability Assessment**

### **Property**

Based on historic information, these storms have not directly resulted in significant injury or damages to people and property, or the losses are typically covered by insurance. It is the secondary hazards caused by weather, such as floods, that have had the greatest impact on the City’s Planning Area. But while the primary effects may not result in significant injury or property damage, all property is vulnerable during severe weather events; properties in poor condition or closer to overhead power lines and large trees may be more vulnerable to damage.

### **People**

Exposure is the greatest danger to people from severe thunderstorms. People can be hit by lightning, pelted by hail, and caught in rising waters. However, serious injury and loss of human life is rarely associated with hailstorms.

Reduced visibility is the greatest risk to people when heavy fog is prevalent. Particularly when fog is dense, it can be hazardous to drivers, mariners, and aviators and contributes to numerous accidents each year. To reduce injury and harm, people should avoid driving when dense fog is prevalent, if possible. If driving is pertinent, emergency services advise driving with lights on low beam, avoiding stopping on highways, and avoiding crossing traffic lanes.

While national data shows that lightning causes more injuries and deaths than any other natural hazard except extreme heat, there does not seem to be any trend in the data to indicate that one segment of the population is at a disproportionately high risk of being directly affected. Anyone who is outside during a thunderstorm is at risk of being struck by lightning. Aspects of the population who rely on constant, uninterrupted electrical supplies may have a greater, indirect vulnerability to lightning. As a group, the elderly or disabled, especially those with home health care services rely heavily on an uninterrupted source of electricity. Resident populations in nursing homes, residential facilities, or other special needs housing may also be vulnerable if electrical outages are prolonged. If they do not have a back-up power source, rural residents and agricultural operations reliant on electricity for heating, cooling, and water supplies are also vulnerable to power outages. Thunderstorms have the potential energy and strong winds to topple dead trees and injure people. As a result, power outages that occur from severe weather can be life threatening and these populations could face more exposure and could experience greater secondary effects of the hazard. Refer to the Vulnerability Assessment for Severe Weather: High Winds hazards below for analysis related to electricity dependent populations in the City of Petaluma.

### **Economy**

Economic impacts of severe weather are typically short term. Lightning can cause power outages and fires. Hail can destroy exposed property; an example is car lots, where entire inventories can be damaged.





Generally, long-term economic impacts center around hazards that cascade from a severe thunderstorm, including wildfires ignited by lightning and flooding due to heavy rain.

### **Critical Facilities and Infrastructure**

Due to the unpredictability of severe thunderstorm strength and path, most critical infrastructure that is above ground is equally exposed to the storm's impacts. According to historical data the Planning Area has experienced power outages in the past due to severe storms, but due to the random nature of these hazards, a more specific risk assessment was not conducted for this plan. Heavy rain and thunderstorms, particularly those that result in hail could significantly impact motorists travelling along U.S. Highway 101 and State Highway 116. Depending on the severity of the storm, these events could slow traffic, reduce visibility, and increase the likelihood of vehicle accidents along the highway, which may result in greater traffic delays. These effects are also likely to occur along highway segments in adjacent counties.

Fog can have devastating effects on transportation corridors in the City and throughout the County. Dense fog may increase the potential for transportation accidents along U.S. Highway 101 and State Highway 116 which could in turn cause longer traffic delays and timely movement of goods and services. Multi-car pileups have resulted from drivers using excessive speed for the conditions and visibility.

These accidents can cause multiple injuries and deaths and could have serious implications for human health and the environment if a hazardous or nuclear waste shipment were involved. Other disruptions from fog include delayed emergency response vehicles and school closures.

### **Historic, Cultural, and Natural Resources**

Severe thunderstorms are a natural environmental process. Environmental impacts include the sparking of potentially destructive wildfires by lightning and localized flattening of plants by hail. As a natural process, the impacts of most severe thunderstorms by themselves are part of the overall natural cycle and do not cause long-term consequential damage.

### **Future Development**

New critical facilities, such as communication towers should be built to withstand heavy rain, lightning, and hail damage. Population and commercial growth in the City will increase the potential for complications with traffic accidents and commerce interruptions associated with dense fog. Future development projects should also consider severe weather hazards at the planning, engineering and architectural design stage with the goal of reducing vulnerability. Storm water master planning and site plan review should account for building to withstand severe weather events and be considered for all new development. Future development in the City is not expected to be vulnerable to the hazard, but all development will be affected by severe weather and storm events and population growth will increase potential exposure to hazards such as lightning and hail.

### **Risk Summary**

- Sonoma County has experienced 42 hail, heavy rain, lightning, and dense fog events in past 68 years.
- The average annual precipitation is 24.89 inches.
- The highest recorded annual precipitation was 31.48 inches in 1998.
- The highest recorded precipitation for a 24-hour period was 4.29 inches on December 12, 2004.
- Overall significance for severe weather hazards such as heavy rain, thunderstorms, hail, lightning, and dense fog is **Medium**.



### 4.3.10 Severe Weather: High Winds

#### Hazard Description

High winds, often accompanying severe thunderstorms, can cause significant property and crop damage, threaten public safety, and have adverse economic impacts from business closures and power loss. The wind patterns in Petaluma are strongly influenced by the Petaluma Gap, the region from the Estero Lowlands to San Pablo Bay (BAAQMD 2003). The predominant wind pattern is out of the northwest and tends to be light in the morning and windier in the afternoon when the sea breeze arrives.

Windstorms in the City of Petaluma are typically straight-line winds. Straight-line winds are generally any thunderstorm wind that is not associated with rotation (i.e., is not a tornado). These winds can exceed 100 miles per hour (mph) and are responsible for most wind damage related to thunderstorms. These winds can overturn mobile homes, tear roofs off houses, topple trees, snap power lines, shatter windows, and sandblast paint from cars. Other associated hazards include utility outages, arcing power lines, debris blocking streets, dust storms, and an occasional structure fire. Table 4-42 outlines the Beaufort scale, describing the damaging effects of wind speed.

**Table 4-42: Beaufort Wind Scale**

Wind Speed (mph)	Description—Visible Condition
0	Calm; smoke rises vertically
1-4	Light air; direction of wind shown by smoke but not by wind vanes
4-7	Light breeze; wind felt on face; leaves rustle; ordinary wind vane moved by wind
8-12	Gentle breeze; leaves and small twigs in constant motion; wind extends light flag
13-18	Moderate breeze; raises dust and loose paper; small branches are moved
19-24	Fresh breeze; small trees in leaf begin to sway; crested wavelets form on inland water
25-31	Strong breeze; large branches in motion; telephone wires whistle; umbrellas used with difficulty
32-38	Moderate gale whole trees in motion; inconvenience in walking against wind
39-46	Fresh gale breaks twigs off trees; generally, impedes progress
47-54	Strong gale slight structural damage occurs; chimney pots and slates removed
55-63	Whole gale trees uprooted; considerable structural damage occurs
64-72	Storm very rarely experienced; accompanied by widespread damage
73+	Hurricane devastation occurs

Source: NWS

High winds and tornadoes can cause damage to property and loss of life. Property damage can include damage to buildings, fallen trees and power lines, broken gas lines, broken sewer and water mains, and the outbreak of fires. Agricultural crops and industries may also be damaged or destroyed. Access roads and streets may be blocked by debris, delaying necessary emergency response.

#### Location

Strong winds have the potential to happen anywhere in the City’s Planning Area. The resulting damage from wind events may be most severe in the downtown area of the City where there are more large trees, infrastructure, and higher density development.





## Extent (Magnitude/Severity)

**Limited** – The prevailing winds in Petaluma come from the northwest and are strongly influenced by the Petaluma Gap helping to push marine air towards the City. Winds tends to be lighter in the morning and windier in the afternoon as the ocean air arrives.

Based on NCEI records between 1950 and July 31, 2019 there have been 211 high and strong wind events in Sonoma County, causing a total of \$3,854,700 in property damage. The most damaging event took place on December 27, 2006 and was a 30 mph wind event that resulted in over \$1 million of property damage to both commercial and residential structures. The highest magnitude event recorded occurred on February 14, 2019 and was in association with an atmospheric river that moved through the region. Recorded winds were as high as 80-mph and resulted in downed trees, power outages, and property damages.

High wind events in the County have led to five recorded fatalities and five injuries. Overall, high wind event impacts would likely be limited, with a majority of impacts being related to property damages caused by down trees as well as power outages. Overall, impacts from high wind events would likely be limited, with 10 to 25 percent of property severely damaged.

## Previous Occurrences

Despite being nearly 20 miles from the coast of the Pacific Ocean, Petaluma's climate tends to be similar to coastal communities. Similar to a community along the coast, the City of Petaluma tends to experience wind events regularly. High wind events in Petaluma have also led to downed trees and power outages throughout the City. The following events are recorded in the NCEI Storm Events Database that are specific to the City of Petaluma Planning Area.

**January 18, 2010** - Strong wind uprooted a large oak tree forcing it onto Bennett Valley Road near Enterprise Road in the hills east of Petaluma partially blocking one lane of traffic. The roots had grown under the roadway, and when they were torn out of the ground, they took about seven inches of asphalt with them leading to the closure of the eastbound lane. Also, in the hills east of Petaluma, another tree was reported to be uprooted on Sonoma Mountain Road at Pressley Road. Power outages across central Sonoma County numbered 3,584 customers.

**April 8, 2013** - Strong wind blew down small tree branches and debris onto streets in the City. Strong and gusty northwest winds impacted much of the Bay Area resulting in downed trees, downed power lines, rough seas and even broken windows. The rather strong northerly pressure gradient helped to produce widespread wind gusts in excess of 35 mph with a few locations over 60 mph. Numerous reports of downed trees and power lines were received as a result of the strong winds.

**November 21, 2013** - Strong winds gusted across the greater Bay Area during the evening and overnight hours of November 21 into the early morning of November 22. Numerous trees and power lines were knocked down by the winds, causing power outages for thousands of residents and even sparking wildfires across the North Bay. A tree was felled by strong winds onto a car driving on US Highway 101 in Petaluma, injuring the car's occupant.

**December 30, 2014** - A strong windstorm struck the Bay Area on December 30 during the afternoon and evening hours. Strong winds brought down numerous trees and power lines across the area. The combination of recent heavy rains earlier in the month brought weakened ground conditions. Additionally, there were numerous dead trees across the area from years of ongoing drought. Major disruptions to the evening commute due to downed trees and the accidents they caused were observed. Wind gusts of 40 to 55 mph were widespread across the area. Despite most areas not reaching 60 mph,



there was widespread wind damage and impacts due to the reasons above. A large tree was blown down and blocked both lanes of Old Redwood Highway near Petaluma.

**February 6, 2015** - A strong winter storm impacted California following on nearly a month and a half of no rain and the driest January on record. The storm brought heavy rain, gusty winds, and damage to trees and power lines along with some minor flooding of urban areas. Impacts to the planning areas included a tree blown down across the roadway at Magnolia Avenue and Thompson lane about three miles west of Petaluma. Winds gusted 50 to 70 mph with the highest gusts in the mountains of the region.

**October 23, 2019** - A series of offshore wind events plagued much of California towards the end of October 2019. Cut off lows (also known as insider sliders) moved into the Great Basin as an upper ridge sat over the eastern Pacific. Strong surface high pressure also building over the Great Basin and a trough along the California coast provided the set up for strong and dry offshore winds over the greater Bay Area. Two more events would go on to occur before the end of the month providing what would be historic critical fire weather conditions for the region. The first event brought strong north to northeast winds to the region, particularly the North Bay, where gusts of 50 to 70 mph were observed. Healdsburg Hills North Station had a peak gust of 76 mph the night of October 23<sup>rd</sup>. These conditions fed the rapid growth of the Kincade Fire that broke out late in the evening of October 23<sup>rd</sup>, and at the end of the month the Kincade Fire was still burning. Additionally, near record breaking high temperatures were observed in parts of the area on the 24th and 25th. Prior to the event on October 9<sup>th</sup> PG&E shut off power to roughly 1 million people across the state of California.

### Probability of Future Occurrences

**Likely** – A total of 211 combined high and strong wind events have occurred in Sonoma County over 68 years of record keeping, which equates to an average of three events in a typical year. Historical wind activity within the Planning Area indicates that the area will likely continue to experience high wind events during adverse weather conditions. The actual risk of a wind event to the City is dependent on the nature and location and the magnitude of a high wind event.

### Climate Change Considerations

There presently is not enough data or research to quantify the magnitude of change that climate change may have related to wind frequency and intensity. Studies referenced in California's Fourth Climate Assessment indicated that extreme fire weather, particularly in the form of hot and dry winds, can strongly influence shrub-land fire regimes. Strong winds have also been associated with severe forest fires in California, meaning climate change impacts on wind patterns may also affect forest health and wildfire susceptibility. Lastly, other ongoing research compiled in the recent climate assessment has resulted in different conclusions on the effect of climate change on wind regimes, particularly extreme wind events, such as the Santa Ana and Diablo winds that created some of the most devastating wildfires (California Natural Resources Agency 2018a). At this time, these changing factors are not well understood and are still being incorporated into state and regional research and risk analysis.

### Vulnerability Assessment

#### Property

General damages from high wind events can be both direct and indirect. Direct impacts refer to what the wind physically destroys, while indirect impacts includes additional costs, damages and losses attributed to secondary hazards spawned by the event, or resulting from the direct damages caused by the wind event. Construction practices and building codes can help maximize the resistance of the structures to damage.



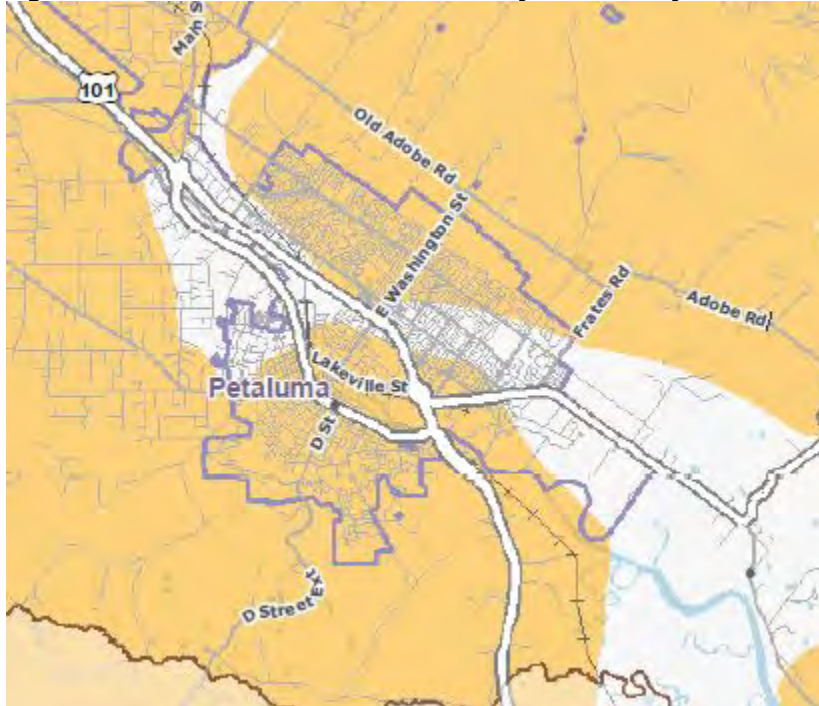
Secondary impacts of damage caused by wind events often result from damage to infrastructure. Downed power and communications transmission lines, coupled with disruptions to transportation, create difficulties in reporting and responding to emergencies. These indirect impacts of a wind event put tremendous strain on a community.

## People

Community members are the most vulnerable to high wind events. However, there are also segments of the population that are especially exposed to the indirect impacts of high winds, particularly the loss of electrical power. These populations include the elderly or disabled, especially those with medical needs and treatments dependent on electricity. Nursing homes, community-based residential facilities, other special needs housing facilities, and other socially susceptible populations are vulnerable if electrical outages are prolonged since backup power generally operates only minimal functions for a short period of time.

The U.S. Department of Health and Human Services ePOWER Mapping tool (<https://empowermap.hhs.gov/>) provides information on Medicare beneficiaries who rely on electricity-dependent medical equipment such as ventilators to live independently in their homes. According to the tool there are 13,631 Medicare beneficiaries located in the City of Petaluma (within the zip codes of 94952 and 94954). Of these individuals, 382 are considered electricity dependent and are highly vulnerable to power outages as a result a high wind event.

Following the unprecedented 2018 wildfire season in California, Pacific Gas & Electric (PG&E) announced it will be conducting Public Safety Power Shutoffs (PSPS) when there are high winds and dry conditions and generally a heightened fire risk forecasted. The outages could last several days, and PG&E has suggested customers be prepared for outages that could last longer than 48 hours. A majority of Sonoma County could be affected by the power outages including almost the entirety of the City of Petaluma. Figure 4-48 shows the areas (orange) in the City of Petaluma that could potentially be impacted by the power outages. PG&E does have a plan to install a resource area at the Sonoma-Marin Fairgrounds within 24 hours of a PSPS, and will offer power, air conditions and updates for local residents.

**Figure 4-48: Areas of Petaluma Potentially Affected by the PG&E Public Safety Power Shutoffs**

Source: The Press Democrat <https://www.pressdemocrat.com/news/9898428-181/pge-map-sheds-light-on?artslide=2>

### **Economy**

Winds typically don't have long-term impacts on the economy. The most common problems associated with high winds are loss of utilities. Downed power lines can cause power outages, leaving large parts of the City isolated, and without electricity, water, and communication. Damage may also limit timely emergency response and the number of evacuation routes.

In the event of a PSPS during red flag warnings, as described above, large portions of the City could be without power including several businesses. At this time, it is unclear what the economic impacts may be due to the PSPS, and it may depend on the length of the shutoff. However, given the recent planned PSPS in October 2019, economic impacts were reported across northern California as many businesses and restaurants and other tourism-based operations had to close due to limited to no power supply. In 2018, PG&E abruptly shut down the power in the Napa Valley region and the City of Calistoga reported that numerous small business lost tens of thousands of dollars in missed revenue and inventory (Argus-Courier 2019).

### **Critical Facilities and Infrastructure**

Public gathering places such as schools, community centers, shelters, nursing homes, and churches may have increased impacts at certain times of day. Due to the random nature of the hazard, a more specific risk assessment was not conducted for this plan.

### **Historic, Cultural, and Natural Resources**

High winds can cause massive damage to the natural environment, uprooting trees and other debris. This is part of a natural process, however, and the environment will return to its original state over time. Wind damage to historic or cultural resources on the other hand may result in more severe temporary and





permanent damage that could temporarily impact the historic aesthetic of downtown Petaluma or require extensive restoration and rehabilitation of certain structures.

### Future Development

As the City continues increasing in population, the number of people and housing developments exposed to the hazard increases. Proper education on building techniques and the use of sturdy building materials, basements, attached foundations, and other structural techniques may minimize the property vulnerabilities. Public shelters at parks and open spaces may help reduce the impacts of high wind events on the recreational populations exposed to storms.

### Risk Summary

- Increase in post-failure or secondary hazards such as flooding, mudslides, landslides, and long-term power outages can occur.
- The U.S. Department of Health and Human Services lists 382 individuals in the City as electricity dependent, and highly vulnerable to power outages due to high wind events.
- Damage to natural resource habitats and other resources may result from severe weather associated wind.
- Severe wind events could result in the loss of water, communication lines, or power; closures to roads and transportation lifelines, which could impact, strand, and/or impair mobility for emergency responders and/or area residents.
- Economic losses (jobs, sales, tax revenue) associated with loss of commercial structures and/or inability to move through transportation lifelines could occur.
- Severe wind hazards could result in loss or damages to historic and cultural resources, which could severely impact the social fabric downtown Petaluma;
- Timely removal of debris, specifically downed trees must be addressed, as this can impact the severity of the severe weather events and the secondary impacts (e.g. localized flooding, loss of power).
- Overall the significance of severe weather associated with wind is **Medium**.

## 4.4 Human-Caused Hazard Profiles and Risk Assessment

The DMA does not require an assessment of human-caused hazards, but the City of Petaluma and HMPC decided to include human-caused hazards in this LHMP to several reasons. First, the City wants to inform the public about all hazards, including both natural and human-caused hazards. The City is also interested in the impact human-caused hazards could have on their community and on the daily movement of goods and services through the City. The City intends to take a proactive approach to disaster preparedness, and the HMPC feels that preparation for and response to a human-caused disaster involves the same training and commitment of City resources as a natural hazard. Lastly, the City recognizes that the likelihood of some human-caused hazard events in the Planning Area is greater than several of the natural hazard events identified in the plan.

The City also recognizes that while Sonoma County has several hazardous material management and planning procedures in place through their Certified Unified Program Agency (CUPA) administered through their Environmental Health Department, it is equally important to highlight the hazardous material hazards present in the City's Planning Area in this plan for the purpose of public education and awareness. The City wants to ensure that these hazards do not exacerbate secondary impacts associated with natural hazard events.



The following human-caused hazards are discussed in this plan:

- Hazardous Materials
- Cyber Threats

Other potential human-caused hazards, such as human-health hazards and terrorism threats were dismissed from further study. The City and HMPC noted that human-health hazards are adequately covered by the planning mechanisms administered by Sonoma County's Fire Prevention Division and Environmental Health Department.

#### 4.4.1 Hazardous Materials

##### Hazard Description

Generally, a hazardous material is a substance or combination of substances which, because of quantity, concentration, or physical, chemical, or infectious characteristics, may either cause or significantly contribute to, an increase in mortality or an increase in serious, irreversible, or incapacitating reversible, illness. Hazardous materials may also pose a substantial present or potential hazard to human health or environment when improperly treated, stored, transported, disposed of, or otherwise managed.

Hazardous material incidents can occur while a hazardous substance is stored at a fixed facility, or while the substance is being transported along a road corridor or railroad line or via an enclosed pipeline or other linear infrastructure.

The U.S. Department of Transportation (DOT), U.S. Environmental Protection Agency (EPA) and the Occupational Safety and Health Administration (OSHA) all have responsibilities relating to the transportation, storage, and use of hazardous materials and waste. The Right-to-Know Network (RTK NET), maintained by the EPA's National Response Center (NRC), is a primary source of information on the use and storage of hazardous materials, as well as data regarding spills and releases. The California EPA and Department of Toxic Substances Control (DTSC) are authorized by the U.S. EPA to enforce and implement federal hazardous materials laws and regulations within the state. At the local level, Sonoma County's Fire Prevention Division and Hazardous Materials Division (also known as Permit Sonoma) is the approved CUPA responsible for administration of permitting, inspections, and enforcement for hazardous waste and hazardous materials programs. The CUPA administers the Hazardous Material Business Plan (HMBPs), California Accidental Release Prevention (Cal-ARP) program, and the Aboveground Storage Act, as well as permitting and inspection activities for hazardous waste generators, and onsite hazardous waste treatment facilities, and underground storage tanks.

Hazardous materials can be divided into the following classes:

- Explosives
- Compressed gases: flammable, non-flammable compressed, poisonous
- Flammable liquids: flammable (flashpoint below 141 degrees Fahrenheit) combustible (flashpoint from 141 - 200 degrees)
- Flammable solids: spontaneously combustible, dangerous when wet
- Oxidizers and organic peroxides
- Toxic materials: poisonous material, infectious agents
- Radioactive material
- Corrosive material: destruction of human skin, corrodes steel



It is also common to see hazardous materials releases as escalating incidents resulting from other hazards such as floods, wildfires, and earthquakes. The release of hazardous materials can greatly complicate or even eclipse the response to the natural hazards disaster that caused the spill.

The Safety Element of the City of Petaluma General Plan contains goals, policies, and implementation measures pertaining to hazardous materials. Additionally, Sonoma County has prepared and adopted the Sonoma County Operational Area Hazardous Materials Incident Response Plan, in accordance with the California Health and Safety Code (HSC) (Division 20, Chapter 6.95, §25500 et seq.) and California Code of Regulations (CCR) (Title 19, Article 3, §2270 et seq.). This plan describes the policies and procedures relating to hazardous materials emergency response throughout Sonoma County, and is reviewed and updated every three years.

## Location

Hazmat incidents can occur at a fixed facility or during transportation. Hazardous materials facilities are identified and mapped by the counties they reside in, along with the types of materials stored there; facilities generally reside in and around communities. The Petaluma Fire Department and Hazardous Materials Division manages the prevention, control and mitigation of dangerous conditions related to hazardous materials and enforces state and local laws regulating the storage, use, dispensing and handling of hazardous materials. The Division is responsible for the enforcement of the regulatory-based HMBP Program, Hazardous Waste Program, Underground Storage Tank Program, Above Ground Petroleum Storage Tank Program, Accidental Release Program, and the portions of the California Fire Code that address hazardous materials. Inspections of businesses are conducted on a routine basis, and the Division.

Under Chapter 6.95 of the California Health and Safety Code and the Federal Resource Conservation and Recovery Act (RCRA), any business storing quantities of hazardous materials greater than 55 gallons of liquid, 500 pounds of solid or 200 cubic feet of some compressed gasses must file a HMBP annually that establishes incident prevention measures, hazardous material handling protocols and emergency response and evacuation procedures.

CalARP is a statewide initiative to reduce the likelihood and severity of consequences of extremely hazardous materials releases. CalARP requires certain facilities (referred to as "stationary sources") which handle specified chemicals (termed "regulated substances") to take specified actions to proactively prevent and prepare for chemical accidents. Because the CalARP program is implemented at the local government level by the CUPAs, they can work directly with regulated facilities. The Petaluma Fire Department administers CUPA and provide response and mitigation services to the City.

Some facilities contain extremely hazardous substances; these facilities are required to generate Risk Management Plans (RMPs) and resubmit these plans every five years. According to the RTK NET, the City of Petaluma Wastewater Treatment Plant is the only RMP facility located in the planning area. This site stores 18,000 pounds of chlorine, used as part of the sewage treatment process.

In transit, hazardous materials generally follow major transportation routes, including road, rail and pipelines, creating a risk area immediately adjacent to these routes. The City's nearby transportation network, primarily U.S. Highway 101, has the potential for hazardous material incidents. Railroad lines (nearby Northwestern Pacific Railroad Authority lines) and the Petaluma Municipal Airport may also transport hazardous materials.

According to the Federal Motor Carrier Safety Administration and the National Hazardous Materials Route Registry, U.S. Highway 101 running through Petaluma is designated as a hazardous materials route. However, local deliveries of hazardous materials can be found on any of the City's major roads.



Hazardous materials releases can also result from natural disasters, such as floods or earthquakes that may cause containment systems to fail. In summary, hazardous material incidents have the potential to occur in business and industrial areas (where fixed facilities are located). Often these facilities are concentrated in the Planning Area due to their manufacturing operations. Hazardous material incidents are also located in agricultural areas surrounding the Planning Area; these types of facilities typically use pesticides, fertilizers, and other agricultural chemicals that are harmful to people and the environment. Illegal drug operations and dumping sites have also been known to pose a hazardous threat.

Lastly, pipelines can transport large quantities of hazardous materials. The National Pipeline Mapping System (NPMS) shows the approximate location of multiple pipelines passing through the City, primarily transporting gas or fuels.

### **Extent (Magnitude/Severity)**

**Limited** – Hazardous materials come in the form of explosives, flammable and combustible substances, poisons and radioactive materials. Hazards can occur during production, manufacturing, storage, transportation, use, or disposal. Numerous factors influence the impacts of a hazardous materials release, including method of release, the type of material, location of release, weather conditions, and time of day. This makes it difficult to predict precise impacts. Impacts from hazardous waste releases can include:

- Injury
- Loss of life (human, livestock, fish and wildlife)
- Evacuations
- Property damage
- Air pollution
- Surface or ground water pollution/contamination
- Interruption of commerce and transportation

CAL FIRE notes several additional factors that can contribute to the impact of hazardous materials releases from a fixed facility or transportation incident:

- Solid, liquid, and/or gaseous hazardous materials can be released from fixed or mobile containers either accidentally or on purpose.
- The resulting release can last for hours or for days.
- The substances released may be corrosive or otherwise damaging over time, and they may cause an explosion and/or fire.
- Contamination may be carried out of the incident area by people, vehicles, water, and/or wind.
- Weather conditions will directly affect how the hazard develops.
- The micrometeorological 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.
- Noncompliance 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.

The release or spill of hazardous materials also requires different emergency response depending on the amount, type, and location of the spill incident.

The Planning Area has energy pipelines, railroad tracks which carry many types of hazardous materials, and state highways running through its boundaries. A variety of hazardous materials originating in the Region or elsewhere are transported along these routes and could be vulnerable to accidental spills.



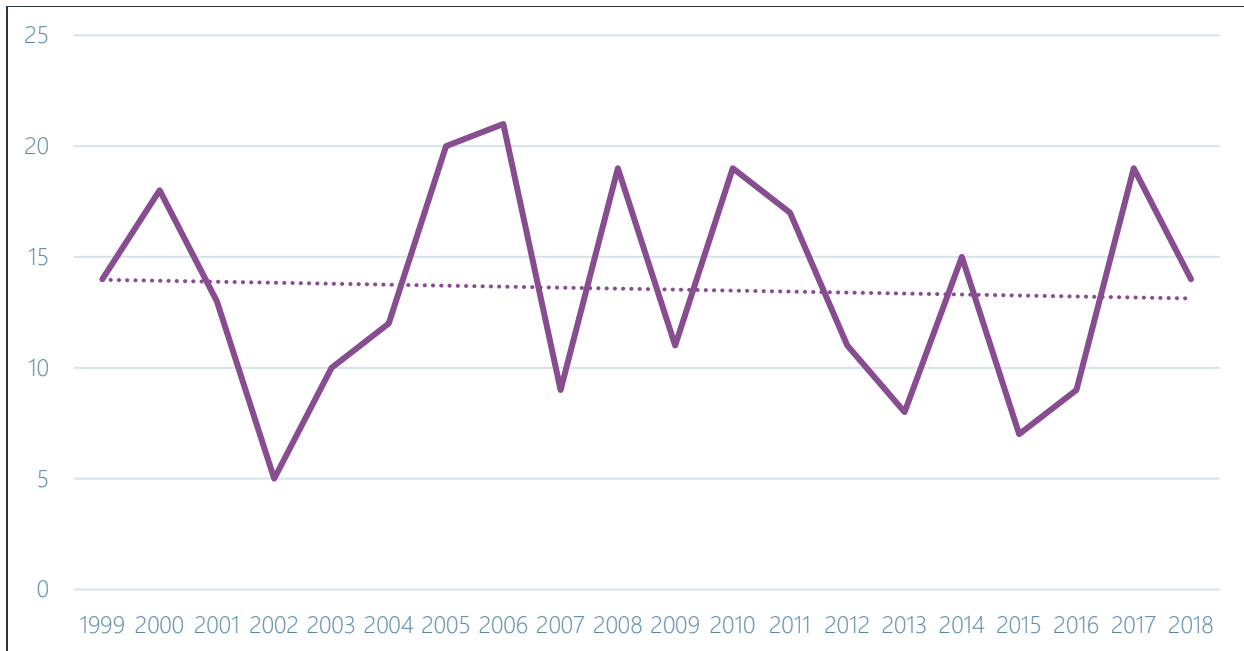
Consequences can vary depending on whether the spill affects a populated area versus an unpopulated but environmentally sensitive area.

Potential losses can vary greatly for hazardous material incidents. For even a small incident, there are cleanup and disposal costs. In a larger scale incident, cleanup can be extensive and protracted. There can be deaths or injuries requiring doctor’s visits and hospitalization, disabling chronic injuries, soil and water contamination can occur, necessitating costly remediation. Evacuations can disrupt home and business activities. Large-scale incidents can easily reach \$1 million or more in direct damages.

### Previous Occurrences

The City of Petaluma experiences multiple hazardous materials incidents every year. The vast majority of these incidents are minor with very localized impacts. The Cal OES Warning Center reports 271 hazardous materials incidents in Petaluma from 1999 through 2018; this works out to an average of 13.6 incidents per year. Even this total likely excludes a large number of unreported minor spills. Figure 4-49 below shows the number of incidents within the City limits reported to Cal OES over the last twenty years. While the number of incidents can vary considerably from year to year, the number of hazardous materials spills or accidents in the City has remained steady over the last twenty years. This is in contrast to the statewide trend, which has seen hazardous materials incidents increase by 30 percent during the same time period.

**Figure 4-49: Hazardous Materials Spills/ Accidents in the City of Petaluma Reported to Cal OES: 1999-2018**



Source: Cal OES Spill Release Reporting (<https://www.caloes.ca.gov/cal-oes-divisions/fire-rescue/hazardous-materials/spill-release-reporting>), analysis by Wood

The vast majority of hazardous materials incidents have only minimal life safety impacts. Of the 271 incidents reported above, only seven (3 percent) result in any injuries, fatalities, or evacuations. This translates to an average of one damaging hazardous materials incident roughly every three years. In all, Cal OES records seven injuries, one fatality, and one evacuation are associated with those 271 incidents.





## Probability of Future Occurrence

**Likely** – As discussed above, the City experiences anywhere from five to twenty reportable hazardous materials incidents per year, with various degrees of impact; there is effectively a 100 percent chance that the City will see a hazardous materials incident in any given year. However, hazardous materials incidents that cause deaths, injuries, or evacuations are far rarer, occurring once every three years on average. These can occur at any time and with little predictability given the presence of major transportation routes in the City's Planning Area.

## Climate Change Considerations

There are no known effects of climate change on human-caused hazards, such as hazardous material incidents. However, hazmat incidents may indirectly increase the risk by increasing the frequency, severity, or range of other hazards, such as severe storms or fires. It is possible that an increase in these other hazards may increase the likelihood of an accidental hazardous materials release.

## Vulnerability Assessment

### Property

The impact of a fixed hazardous facility, such as a chemical processing facility, will likely be localized to the property where the incident occurs. The impact of a small spill (i.e. liquid spill) may also be limited to the extent of the spill and remediated if needed. A blanket answer for potential impacts is hard to quantify, as different chemicals may present different impacts and issues. Property within a half mile in either direction of designated hazardous materials routes are at increased risk of impacts. While cleanup costs from major spills can be significant, they do not typically cause significant long-term impacts to property.

### People

People living near hazardous facilities in the Planning Area may be at a higher risk of exposure, however; few people live near these facilities as most industrial land uses are sited away from residential land uses. Still, people living downstream and downwind from a hazardous material facility (or hazardous material release) could be more vulnerable. For example, a toxic spill or a release of an airborne chemical in a populated area like the City of Petaluma could have a greater potential for loss of life, particularly if it spreads towards residential areas surrounding the downtown area.

In addition to the immediate health impacts of releases, a handful of studies have found long term health impacts such as increased incidence of certain cancers and birth defects among people living near certain chemical facilities. However, there has not been sufficient research done on the subject in the Planning Area to allow detailed analysis.

## Critical Facilities and Infrastructure

Impacts from hazardous material incidents on critical facilities would be localized. That is, they will be limited to the area or facility where they occurred, such as at a transit station, airport, fire station, hospital, or railroad. Whereas hazardous material incidents to major transportation infrastructure would be localized to some extent, they may also be further reaching if they result in major delays in the movement of goods and services and if they result in long-term traffic delays and road closures. These incidents would be more severe if they result in traffic delays or road closures along U.S. Highway 101.



## Economy

The primary economic impact of hazardous material incidents result in lost business, delayed deliveries, property damage, and potential contamination. Large and publicized hazardous material-related events can deter tourists and recreationists too. If incidents occur along major transportation corridors, they can temporarily close routes and result in traffic delays. Economic effects from major transportation corridor closures can be significant.

## Historic, Cultural, and Natural Resources

Hazardous material incidents may affect a small area at a regulated facility or cover a large area outside such a facility. Widespread effects occur when hazards contaminate the groundwater and eventually the municipal water supply, or they migrate to a major waterway or aquifer.

## Future Development

The City of Petaluma anticipates experiences the greatest growth in the downtown area. Future development in central Petaluma is close to major roads and local thoroughfares, as well as some operations that are known to store, handle, and transport hazardous materials. As a result, future development would be exposed to potential hazardous material releases to some extent. Careful review and management of HMBPs and implementation of Hazardous Materials Incident Response Plans during events should minimize major risks.

## Risk Summary

- There is one RMP facility located within the City limits.
- Over the last twenty years the City has averaged 13.6 hazardous materials incidents per year. However, hazardous materials incidents that cause deaths, injuries, or evacuations are far rarer, occurring once every three years on average.
- Incidents at hazardous facilities will likely be localized to the property where the incident occurs.
- People living near, downstream, or downwind of hazardous facilities could be more vulnerable to airborne or water quality related contamination associated with a hazardous material incident.
- Hazardous materials releases can complicate response to and recovery from natural disasters such as floods and earthquakes.
- Hazardous Materials incidents can cause injuries and fatalities, as well as long term health problems like increased cancer risks.
- Impacted properties and infrastructure can require cleanup, but the effects are usually localized to the site of the release.
- Extended road closures can result in economic losses and impact tourism.
- Overall significance level for hazardous materials is **Medium**.

### 4.4.2 Cyber Threats

#### Hazard Description

The California SHMP identifies cyber threats as “attempts by cyber criminals to attack a government, organization, or private party by damaging or disrupting a computer or computer network, or by stealing data from a computer or computer network for malicious use.” A recent survey by the United States Government Accountability Office (GAO) found that “agencies having high-impact systems identified cyber-attacks from nation-states as the most serious and most frequently-occurring threat to the security of their systems.”



There are many types of cyber-attacks. Among the most common is a direct denial of service, or DDoS attack. This is when a server or website will be queried or pinged rapidly with information requests, overloading the system and causing it to crash.

Cyber-attacks use malicious code to alter computer operations or data. The vulnerability of computer systems to attacks is a growing concern as people and institutions become more dependent upon networked technologies. The Federal Bureau of Investigation (FBI) reports that “cyber intrusions are becoming more commonplace, more dangerous, and more sophisticated,” with implications for private- and public-sector networks.

Malware, or malicious software, can cause numerous problems once on a computer or network, from taking control of users’ machines to discreetly sending out confidential information. Ransomware is a specific type of malware that blocks access to digital files and demands a payment to release them. Hospitals, school districts, state and local governments, law enforcement agencies, businesses, and even individuals can be targeted by ransomware. One 2017 study found ransomware payments over a two-year period totalled more than \$16 million. Even if a victim is perfectly prepared with full offline data backups, recovery from a sophisticated ransomware attack typically costs far more than the demanded ransom. However according to a 2016 study by Kaspersky Lab, roughly one in five ransomware victims who pay their attackers are still not able to retrieve their data.

Cyber spying or espionage is the act of illicitly obtaining intellectual property, government secrets, or other confidential digital information, and often is associated with attacks carried out by professional agents working on behalf of a foreign government or corporation. According to cybersecurity firm Symantec, in 2016 “...the world of cyber espionage experienced a notable shift towards more overt activity, designed to destabilize and disrupt targeted organizations and countries.”

Major data breaches - when hackers gain access to large amounts of personal, sensitive, or confidential information - have become increasingly common. The Symantec report says more than seven billion identities have been exposed in data breaches over the last eight years. In addition to networked systems, data breaches can occur due to the mishandling of external drives, as has been the case with losses of some state employee data.

Cybercrime can refer to any of the above incidents when motivated primarily by financial gain or other criminal intent. The most severe type of attack is cyber terrorism, which aims to disrupt or damage systems in order to cause fear, injury, and loss to advance a political agenda.

The adopted City of Petaluma budget for FY2019 notes an increase in spending on cyber security measures, specifically to combat malware and ransomware.

## Location

Cyber disruption events can occur or impact virtually any location where computing devices are used. Incidents may involve a single location or multiple geographic areas. A disruption can have far-reaching effects beyond the location of the targeted system; disruptions that occur far outside the state can still impact people, businesses, and institutions within the City of Petaluma.

## Extent (Magnitude/Severity)

**Critical** –The extent of a cyber disruption event is variable depending on the nature of the event. A disruption affecting a small, isolated system could impact only a few functions and processes. Disruptions of large, integrated systems could impact many functions and processes, as well as many individuals that rely on those systems.





There is no universally accepted scale to quantify the severity of cyber-attacks. The strength of a DDoS attack is sometimes explained in terms of a data transmission rate. One of the largest DDoS disruptions ever, which brought down some of the internet's most popular sites on October 21, 2016, peaked at 1.2 terabytes per second.

Data breaches are often described in terms of the number of records or identities exposed.

### Previous Occurrences

The City of Petaluma IT Department noted there are potential ransomware attacks on the City's IT system on a daily basis. Specific cyber incidents were not discussed.

Symantec reports there were a total of 1,209 data breaches worldwide in 2016, 15 of which involved the theft of more than 10 million identities. While the number of breaches has remained relatively steady, the average number of identities stolen has increased to almost one million per incident. The report also found that one in every 131 emails contains malware, and the company's software blocked an average of 229,000 web attacks every day.

The Privacy Rights Clearinghouse, a non-profit organization based in San Diego, maintains a timeline of 2,631 data breaches resulting from computer hacking incidents in the United States from 2005-2019. The database lists 522 data breaches in California during this timeframe, including attacks on private sector facilities, government agencies, schools and media entities. While none of those security breaches were specifically targeted at systems in the City of Petaluma, some of them included information on individuals who live in the community. Similarly, Petaluma residents were almost certainly affected by national and international data breaches.

While Petaluma itself has not been the victim of major cyber or ransomware attacks, examples from across the country show both the prevalence of cyber-attacks and potential impacts.

The City of Atlanta was also hit by a major ransomware attack in 2018, recovery from which cost a reported \$2.6M, significantly more than the \$52,000 ransom demand. A similar attack against the City of Baltimore in 2019 affected the city government's email, voicemail, property tax portal, water bill and parking ticket payment systems, and delayed more than 1,000 pending home sales.

### Probability of Future Occurrences

**Occasional** – Cyber-attacks occur daily, but most have negligible impacts at the city level and are blocked by the city's existing cyber security systems. The possibility of a larger disruption affecting the City exists at all times, but it is difficult to quantify the exact probability due to such highly variable factors as the type of attack and intent of the attacker. Minor attacks against business and government systems have become commonplace occurrences but are usually stopped with minimal impact. Similar data breaches impacting the information of residents are almost certain to happen in coming years. Major attacks or breaches specifically targeting systems in the county are less likely but cannot be ruled out.

### Climate Change Considerations

Climate change is not expected to have any direct impacts on the vulnerability of cyber systems to an attack.



## Vulnerability Assessment

### Property

While specific types of cyber-attacks can cause physical damage to systems and equipment, property damage from cyber-attacks is typically limited to computer systems.

### People

Cyber-attacks can have a significant cumulative economic impact. Symantec reports that in the last three years, businesses have lost \$3 billion due to spear-phishing email scams alone. A major cyber-attack has the potential to undermine public confidence and build doubt in their government's ability to protect them from harm.

Injuries or fatalities from cyber-attacks would generally be a cascading result of specific system failure ( i.e. injuries or fatalities caused by secondary incidents due to a compromised traffic light system) or a compromised electrical grid. Refer to the Vulnerability Assessment under Section 4.3.10 High Winds for details on the number of Medicare beneficiaries that are electricity dependent in the City of Petaluma.

### Economy

Economic impacts are entirely dependent on the types of successful attacks that occur, and what the specific attack's goals were. In an electronic-based commerce society, any disruption to daily activities can have disastrous impacts to the economy. Economic impacts from cyber threats around the world include disruptions in commerce, ransom demands, and restoration costs. McAfee notes that cyber threats cost the global economy as much as \$600 billion in 2017.

### Critical Facilities and Infrastructure

Critical facilities, infrastructure and systems can make inviting targets for cyber threats, with the potential to cause widespread and damaging impacts. Ultimate impacts of a cyber-attack depend on both the method and success of the attack, as well as the type of critical asset affected. Most attacks affect only data and computer systems. Sabotage of utilities and infrastructure from a major cyber terrorist attacks could potentially result in system failures that damage property on a scale equal with natural disasters. Facilities and infrastructure may become unusable as a result of a cyber-attack.

### Future Development

Traditionally, cyber threats should not have any bearing on future development. The prevalence and evolution of cyber threats does require continued City efforts to upgrade security systems to meet evolving threats.

### Risk Summary

- City systems are attacked multiple times a day; most attacks thwarted by existing security systems
- The City and surrounding county are proactive in cybersecurity and cyber prevention measures.
- Evolving cyber threats require a matching evolution in protection and deterrence techniques to match the threat.
- While the City of Petaluma hasn't suffered a specific, large-scale cyber infiltration, examples from around the world show how devastating these types of attacks can be on communities.
- Successful cyber incidents can have a variety of impacts, based on the targeted system(s), attack type, attack goals, and ultimate success of the attack.



- Overall the significance associated with cyber threats is **Medium**.

## 4.5 Hazard Summary

Table 4-43 summarizes the results of the hazard identification and hazard profiles for the Planning Area based on the hazard identification data and input from the HMPC. For each hazard profiled in Section 4.2 on natural hazards and in Section 4.3 on human-caused hazards, this table includes the likelihood of future occurrence and whether the hazard is considered a priority hazard for the Planning Area.

**Table 4-43: Hazard Identification and Determination of Priority Hazard**

Hazard	Priority Hazard
<b>Natural Hazard</b>	
Drought	Yes
Earthquake	Yes
Fire: Urban and Wildfire	Yes
Flood: 100-, 200-, and 500-Year Events	Yes
Sea Level Rise	Yes
Severe Weather: Extreme Heat	No
Severe Weather: Heavy Rain/Thunderstorm/ Hail/Lightning/Dense Fog	Yes
Severe Weather: Wind	No
<b>Human-Caused Hazards</b>	
Hazardous Materials	Yes
Cyber Threats	Yes

Source: HMPC 2018

The HMPC determined that drought, earthquake, flooding, sea level rise, heavy rain/thunderstorm/hail/lightning, and wildfire are the most significant hazards in the Planning Area. These hazards have also been categorized as priority hazards by the HMPC.





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## 5 Mitigation Strategy

*44 U.S. CFR Requirement §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.*

This section describes the process to develop the mitigation strategy and mitigation action plan for the City of Petaluma Local Hazard Mitigation Plan (LHMP) update. It describes how the City met the requirements for the Federal Emergency Management Agency (FEMA) 10-step planning process. This chapter specifically discusses:

- Planning Step 6: Set Goals
- Planning Step 7: Review Possible Activities
- Planning Step 8: Draft an Action Plan

The results of the planning process, the risk assessment, the goal setting, the identification of mitigation actions, and the participation of the Hazard Mitigation Planning Committee (HMPC) led to the action plan documented in Section 5.3 Mitigation Action Plan. Taking all the above into consideration, the HMPC developed the following overall mitigation strategy:

- **Communicate** the hazard information collected and analyzed through this planning process so that the community better understands what can happen where and what they can do to be better prepared.
- **Implement** the action plan recommendations of this plan.
- **Use** existing rules, regulations, policies, and procedures already in existence.
  - Given the flood hazards in the Planning Area, an emphasis should be placed on continued compliance with the National Flood Insurance Program (NFIP) and participation in the Community Rating System (CRS).
- **Monitor** multi-objective management actions so that funding opportunities may be shared, projects may be packaged, and broader constituent support may be garnered among neighboring communities.

### 5.1 Goals and Objectives

*Requirement §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.*

Up to this point in the planning process, the HMPC has organized resources, assessed hazards and risks, and documented mitigation capabilities. The resulting goals and mitigation actions were developed based on these tasks. The HMPC held a series of meetings and exercises designed to achieve a collaborative mitigation strategy as described further throughout this section.

During the initial goal-setting meeting, the HMPC reviewed the results of the hazard identification, vulnerability assessment, and capability assessment. This analysis of the risk assessment identified areas





where improvements could be made and provided the framework for the HMPC to formulate planning goals and objectives and the ultimate mitigation strategy for the City of Petaluma Planning Area.

### 5.1.1 Goals Development Process

Goals were defined for the purpose of this mitigation plan as broad-based public policy statements that:

- Represent basic desires of the community;
- Encompass all aspects of community, public and private;
- Are nonspecific, in that they refer to the quality (not the quantity) of the outcome;
- Are future-oriented, in that they are achievable in the future; and
- Are time-independent, in that they are not scheduled events.

Goals are stated without regard to implementation cost, schedule, and means. Goals are defined before considering how to accomplish them so that they are not dependent on the means or cost of achievement. The goal statements form the basis for objectives and actions that will be used as means to achieve the goals. Objectives define strategies to attain the goals and are more specific and measurable.

During the planning process, HMPC members were given a list of sample goals to consider from the California 2018 State Hazard Mitigation Plan (SHMP), the 2010 City of Petaluma LHMP Annex to the Association of Bay Area Government's (ABAG) *Taming Natural Disasters* regional multi-jurisdictional LHMP for the Bay Area, the City of Petaluma General Plan Health and Safety Element, the City Council's 2019-2020 Strategic Plan, and the 2016 Sonoma County Operational Area HMP. They were also provided a list of goal statements from neighboring city and county hazard mitigation plans (e.g. City of Santa Rosa LHMP). They were told that they could use, combine, or revise the statements provided or develop new ones, keeping the risk assessment in mind. Each member was each given three 3 by 5 inch sticky notes and asked to write a goal statement on each sticky note. Goal statements were collected and grouped into similar themes and pasted onto the wall of the meeting room. The goal statements from the HMPC were discussed until the team came to consensus. Some of the statements were determined to be better suited as objectives or actual mitigation actions and were set aside for later use.

### 5.1.2 Objectives Development Process

Next, the HMPC was asked whether they wanted to develop objectives that summarized strategies to achieve each goal. The HMPC agreed they would consider the development of objective statements as part of the goal development process and refine the objectives at the next meeting. The HMPC also reviewed the City Council's 2019-2020 Strategic Plan to look for opportunities to align the Strategic Plan with the LHMP goals and objectives. The HMPC revisited the goal statements prepared and categorized during the next HMPC meeting (HMPC Meeting #3). During this meeting, the Wood team explained that Wood staff and the City Project Manager reviewed each goal, re-arranged them by theme and removed duplicate goal statements. The remaining draft goals focused on loss of life and property prevention, resilience of the natural and built environment, emergency response coordination, public education, and plan implementation.

Based on the risk assessment review and goal setting process, the HMPC identified the following five goals, which provide direction for reducing future hazard-related losses within the City of Petaluma Planning Area. Statements that were more specific and measurable, but not as detailed as mitigation actions were categorized as objectives.





**Goal 1: Minimize loss of life, property, and economic damage and protect people and property from hazards.**

- **Objective 1.1:** Ensure public infrastructure and critical facilities are earthquake and flood safe and can withstand natural hazards through the implementation of mitigation projects for the built environment.
- **Objective 1.2:** Review land use regulations, development standards, and growth management programs to ensure future development exposure to natural and human-caused hazards is minimized.

**Goal 2: Preserve and protect Petaluma’s natural environment as an efficient resource to build community resilience against natural hazards.**

- **Objective 2.1:** Enhance the City’s natural environment capacity through mitigation projects designed to withstand hazards.
- **Objective 2.2:** Restore Petaluma river to improve water quality, expand economic opportunities, increase recreation accessibility, and enhance flood protection.

**Goal 3: Educate and build community awareness on natural hazard risks and the importance of resiliency and emergency preparedness.**

- **Objective 3.1:** Improve emergency preparedness awareness with an emphasis on outreach in vulnerable and socially disadvantaged populations by increasing coordination with these communities to ensure hazard risks, preparedness, and evacuation information is available and well understood.
- **Objective 3.2:** Develop outreach programs for the general public to increase awareness of hazards and to share ideas on hazard mitigation.
- **Objective 3.3:** Create partnerships with Sonoma Water to build awareness on water supply, drought, and conservation measures.

**Goal 4: Enhance City staff coordination, training, and response during disasters and ensure City facilities and infrastructure are operational and provide safe places for the community to shelter during hazard events.**

- **Objective 4.1:** Coordinate and share resources and information technology with neighboring jurisdictions and other agencies during disaster response and recovery training exercises.
- **Objective 4.2:** Develop contingency plans for critical facilities and infrastructure to maintain adequate water and wastewater services during hazard events.
- **Objective 4.3:** Upgrade and improve redundancy at critical facilities to ensure there are safe places and designated shelters during disasters.

**Goal 5: Implement and regularly update the LHMP as an integrated planning mechanism to prepare the City for natural, human-caused, and climate change-related hazards.**

- **Objective 5.1:** Schedule annual reviews of mitigation actions and regular 5-year updates of the LHMP to optimize funding opportunities and to efficiently track implementation progress.
- **Objective 5.2:** Continue to assess the effects of climate change on natural hazards, specifically sea level rise through annual review of scientific data and modelling.





### 5.1.3 Incorporation into Existing Planning Mechanisms

The information contained within this plan, including results from the vulnerability assessment, and the mitigation strategy will be used by the City to help inform updates and the development of local plans, programs and policies. The City Public Works and Utilities Department may utilize the hazard information when implementing the City's Infrastructure Master Plans and the Planning, Building, Housing, Fire, and Police Departments may utilize the hazard information when reviewing a site plan or other types of residential and commercial development applications. The City may incorporate information in this LHMP into future updates to the City's General Plan 2025 Health and Safety Element, 2015 Floodplain Management Plan (FMP), and River Access and Enhancement Plan. Information may include hazard profile information on climate change impacts and the incorporation of climate change adaptation strategies into other local and regional plans and outreach programs. The City will also incorporate this LHMP into the Health and Safety Element of the General Plan 2025, in accordance with California's Assembly Bill (AB) 2140.

Lastly, the HMPC representatives report on efforts to integrate the LHMP into local plans, programs and policies and will report on these efforts at the annual HMPC plan review meeting.

## 5.2 Identification and Analysis of Mitigation Actions

*Requirement §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.*

In order to identify and select mitigation actions to support the mitigation goals, each hazard identified in Section 4.1 Identifying Hazards: Natural Hazards was evaluated, as well as human-caused hazards identified in Section 4.4 Human-caused Hazards. Only those hazards that were determined to be a priority hazard were considered further in the development of hazard-specific mitigation actions.

The priority natural hazards are:

- Dam Incidents
- Drought
- Earthquake
- Flood: 100/200/500-Year, Localized Flooding
- Sea Level Rise
- Severe Weather: Extreme Heat
- Severe Weather: Heavy Rains/Thunderstorms/Hail/Lightning/Dense Fog
- Severe Weather: High Winds
- Wildfire

Hazardous materials incidents (releases from a fixed facility or transportation accidents) and cyber threats were also identified by the HMPC as priority hazards, as noted in Section 4.4 Human-caused Hazards. Climate change impacts are qualitatively discussed in each hazard profile section. Public Safety Power Shutoffs (PSPS), commonly associated with high wind and wildfire events, are addressed by the Severe Weather: High Wind actions.







Once it was determined which hazards warranted the development of specific mitigation actions, the HMPC analyzed viable mitigation options that supported the identified goals and objectives. The HMPC was provided with the following list of categories of mitigation actions, which originate from the CRS:

- **Prevention:** Administrative or regulatory actions or processes that influence the way land and buildings are developed and built to reduce hazard losses. This includes planning and zoning, floodplain regulations, capital improvement programs, open space preservation, and stormwater management regulations.
- **Property Protection:** Actions that involve the modification of existing buildings or structures to protect them from a hazard or remove them from the hazard area. This includes acquisition, elevation, relocation, structural retrofits, storm shutters, and shatter-resistant glass.
- **Structural:** Actions that involve the construction of structures to reduce the impact of a hazard.
- **Natural Resource Protection:** Actions that, in addition to minimizing hazard losses, also preserve or restore the functions of natural systems. This includes dams, levees, floodwalls, retaining walls, and safe rooms.
- **Emergency Services:** Actions that protect people and property during and immediately after a disaster or hazard event. This includes warning systems, emergency response services, and the protection of essential facilities.
- **Public Information/Education and Awareness:** Actions to inform and educate citizens, elected officials, and property owners about the hazards and potential ways to mitigate them. This includes outreach, real estate disclosure, hazard information kiosks, and education programs.

At the mitigation strategy meeting the HMPC was provided with a matrix showing examples of potential mitigation action alternatives for each of the above categories, for each of the identified hazards. The HMPC was also provided a handout that explains the categories and provided further examples. Another reference document titled "Mitigation Ideas" developed by FEMA was distributed to the HMPC during the mitigation strategy meeting. This document lists the common alternatives for mitigation by hazard. The HMPC was instructed to consider both future and existing buildings in considering possible mitigation actions. The HMPC was also asked to consider possible climate adaptation strategies in order to comply with California Government Code Section 65302 subsection (g)(4). This code section addresses Senate Bill 379 requirements related to the probable consequences of climate change and assessing how climate change may affect critical facilities, infrastructure, and land uses. The HMPC was provided the California Adaptation Planning Guide (APG), which is a set of four complementary documents that provide guidance to support communities in addressing the consequences of climate change. Specific climate adaptation strategies were discussed as they relate to the priority natural hazards. The HMPC also discussed which mitigation actions and strategies should be pursued first to address immediate community needs.

A facilitated discussion took place to examine and analyze the options. Appendix C provides the matrix of alternatives considered. Each proposed action was written on a large sticky note and posted on flip charts underneath the hazard it addressed.

### 5.2.1 Prioritization Process

Once the mitigation actions were identified, the HMPC was provided with several decision-making tools, including FEMA's recommended prioritization criteria, STAPLEE, to assist in deciding why one recommended action might be more important, more effective, or more likely to be implemented than another. STAPLEE stands for the following:





- **Social:** Does the measure treat people fairly? (e.g., social equity, different groups, different generations)
- **Technical:** Is the action technically feasible? Does it solve the problem?
- **Administrative:** Are there adequate staffing, funding, and other capabilities to implement the project?
- **Political:** Who are the stakeholders? Will there be political and public support for the project?
- **Legal:** Does the jurisdiction have the legal authority to implement the action? Is it legal?
- **Economic:** Is the action cost-beneficial? Is there funding available? Will the action contribute to the local economy?
- **Environmental:** Does the action comply with environmental regulations? Will there be negative environmental consequences from the action?

The HMPC also discussed prioritizing actions that focus on climate adaptation, social equity, and community resiliency. They reviewed planning materials and tools designed to assist local communities in the development of climate adaptation and social equity goals and strategies.

In accordance with the Disaster Mitigation Act requirements (44 CFR , Section 201.6(c)(3)), an emphasis was placed on the importance of a benefit-cost analysis in determining action priority. As part of this evaluation, the benefits of proposed actions were weighed against estimated costs as part of the prioritization process. Other criteria used to assist in evaluating the benefit-cost of a mitigation action included:

- Does the action address priority hazards or areas with the highest risk?
- Does the action protect lives?
- Does the action protect infrastructure, community assets or critical facilities?
- Does the action meet multiple objectives (Multiple Objective Management)?
- What will the action cost?
- What is the timing of available funding?

The mitigation categories, multi-hazard actions, and criteria are included in Appendix C: Mitigation Categories, Alternatives, and Selection Criteria.

At the mitigation strategy meeting the HMPC used STAPLEE to determine which of the identified actions were most likely to be implemented and effective. With these criteria in mind, team members were given a set of five green sticky-dot stickers. The team was asked to use the dots to prioritize projects with the above criteria in mind, essentially voting on the projects. The projects with the most dots became the higher priority projects. This process provided both consensus and priority for the recommendations.

The process of identification and analysis of mitigation alternatives allowed the HMPC to come to consensus and to collectively prioritize recommended mitigation actions. During the voting process, emphasis was placed on the importance of a benefit-cost review in determining project priority; however, this was not a quantitative analysis. Benefit-cost was considered in greater detail in the development of the Mitigation Action Plan detailed below in Section 5.3. For example, parameters were established for assigning subjective ratings (high, medium, low) to the benefits and costs of each mitigation action. Specifically, each action developed for this plan contains a description of the problem and proposed project, the entity with primary responsibility for implementation, any other alternatives considered, a cost estimate, expected project benefits, potential funding sources, and a schedule for implementation.





Development of these project details for each action led to the determination of an overall high, medium, or low priority for each action.

Recognizing the limitations in prioritizing actions from multiple departments and the regulatory requirement to prioritize by benefit-cost to ensure cost-effectiveness, the HMPC decided to pursue mitigation action strategy development and implementation according to the nature and extent of damages, the level of protection and benefits each action provides, political support, project cost, available funding, and jurisdiction and department priority. This process guided the development of a prioritized action plan for the City of Petaluma. Cost-effectiveness will be considered in greater detail through a formal benefit-cost analysis when seeking FEMA mitigation grant eligibility and funding (e.g. Hazard Mitigation Grant Program, Pre-Disaster Mitigation grant program) for eligible actions associated with this plan.

### 5.3 Mitigation Action Plan

*Requirement §201.6(c)(3)(iii): The mitigation strategy section shall include] an action plan describing 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.*

This action plan was developed to present the recommendations developed by the HMPC for how the City of Petaluma can reduce the vulnerability of people, property, infrastructure, and natural and cultural resources to future disaster losses. Over time, the implementation of these projects will be tracked as a measure of demonstrated progress on meeting the plan's goals.

#### 5.3.1 Progress on 2010 City of Petaluma LHMP Annex Mitigation Actions

The City of Petaluma has been implementing actions identified in the City of Petaluma LHMP Annex developed and last updated by the ABAG in 2010, and working steadily towards meeting the 2010 plan goals based on funding and staff availability. During the 2019 LHMP update process the City reported on the status of the 2010 actions. The City provided input on whether the action had been completed, was deferred (not yet implemented, but still relevant for the updated plan), was in progress, or should be deleted.

Given the City has historically been impacted primarily by flood hazards, all goals and objectives from the 2010 FMP were carried forward into the 2010 LHMP Annex, plus five new mitigation strategies. For this 2019 LHMP update, new flood hazard mitigation actions were developed, but only four of the five mitigation strategies from the 2010 LHMP Annex were carried forward into the 2019 LHMP. This includes Strategy #GOVT-b-14, Strategy #GOVT-b-15, Strategy #GOVT a-7, and Strategy #GOVT a-9. Strategy #GOVT-b-22 was completed. Other strategies listed in the 2010 LHMP Annex were not funded and are no longer relevant for the City of Petaluma. These four strategies were consolidated into three mitigation actions in the 2019 LHMP mitigation strategy.

Strategy #GOVT-b-14 included the installation of a warning system with outdoor sirens, and coordinating installation with neighboring jurisdictions. This mitigation strategy was deferred and carried forward into the 2019 LHMP. In the 2019 LHMP, this strategy is included as MH-1: Evacuation Alert and Warning System and Periodic Testing.





Strategy #GOVT-b-15 involved conducting periodic tests of the outdoor sirens once per month. This mitigation strategy was deferred and carried forward into the 2019 LHMP. In the 2019 LHMP, this strategy is also included as MH-1: Evacuation Alert and Warning System and Periodic Testing.

Strategy #GOVT a-7 included periodically assessing the need for new or relocated fire or police stations and other emergency facilities; changes in staffing levels; and additional or updated supplies, equipment, technologies, and in-service training classes. This mitigation strategy was not funded in the 2010 LHMP Annex, and therefore carried forward into the 2019 LHMP. In the 2019 LHMP, this strategy is included as MH-2: Periodically assess the need for new or relocated fire or police stations and other emergency facilities; changes in staffing levels; and need for supplies, equipment, technologies, and in-service training classes.

Strategy #GOVT-a-9 involved developing and maintaining a system of interoperable communications for first responders from cities, counties, special districts, state and federal agencies. This mitigation strategy was not funded in the 2010 LHMP Annex, and therefore carried forward into the 2019 LHMP. In the 2019 LHMP, this strategy is included as MH-3: Develop and maintain a system of interoperable communications for first responders from local, state, and federal agencies.

The fifth mitigation strategy in the 2010 LHMP Annex, Strategy #GOVT-b-22, involved investigating the use of phone-based warning systems for selective geographic areas. Strategy #GOVT-b-22 was funded, implemented, and completed at the County level. Sonoma County has a system in effect that has been used to broadcast messages across the County during recent flood and wildfire emergencies. The system is coordinated throughout the Sonoma County Operation Area and at the County Emergency Operations Center (ABAG 2010).

The majority of the flood hazard goals, objectives, and actions listed in the 2010 LHMP Annex are in progress and integrated into the 2019 LHMP update. Details are highlighted in the new flood action descriptions. Details on the progress of these actions since the 2010 LHMP Annex planning process can be found in subsection 5.3.3 and Table 5-1 below.

### **5.3.2 Continued Compliance with National Flood Insurance Program**

Recognizing the importance of the NFIP in mitigating flood losses, an emphasis will be placed on continued compliance with the NFIP by the City of Petaluma. As a NFIP participant, Petaluma will continue to make every effort to remain in good standing with NFIP. This includes continuing to comply with the NFIP's standards for updating and adopting floodplain maps and maintaining and updating the floodplain regulations. Other details related to NFIP participation are discussed in the flood vulnerability discussion in Chapter 4 and in the capability assessment in Chapter 2. Additional actions are related to participation with the CRS program. The City's participation in the CRS is further evidence of continued NFIP compliance.

### **5.3.3 Mitigation Action Plan**

This action plan presents the recommendations developed by the HMPC outlining how the City of Petaluma can reduce the risk and vulnerability of people, property, infrastructure, and natural and cultural resources to future disaster losses. The mitigation actions developed by the HMPC are summarized in Table 5.1 and listed in detail in the mitigation action worksheets that follow. Table 5.1 is a summary table for quick reference. It identifies the mitigation action title, lead agency/department, hazards mitigated, priority and if the action mitigates losses to existing or future development. The 'Related Goal' column notes which of the five goals in Section 5.2 that the action helps achieve. The action worksheets that





follow provide more background information, ideas for implementation, lead agency, partners, potential funding sources, cost estimates, benefits, and timeline for each identified action.

The City of Petaluma has other existing, detailed action descriptions in planning documents, such as General Plan 2025 Health and Safety Element, 2015 FMP, Infrastructure Master Plans, Capital Improvement Program and Budgets, and other planning mechanisms. These actions are considered to be part of this plan, and the details, to avoid duplication, should be referenced in their original source document. The HMPC also realizes that new needs, priorities, and adaptation strategies may arise as a result of a disaster or other circumstances and reserves the right to support new actions and strategies, as necessary, as long as they conform to the overall goals of this plan.

The actions included in this mitigation strategy are subject to further review and refinement; alternatives analyses; and reprioritization due to funding availability and/or other criteria. The City is not obligated by this document to implement any or all of these projects. Rather this mitigation strategy represents the desires of the City and the community to mitigate the risks and vulnerabilities from identified hazards.

Many of the action items included in this plan are also a collaborative effort among City of Petaluma departments, Sonoma County, Sonoma Water, City of Sebastopol, Climate Action Commission, and other state, regional, and local agencies and stakeholders in the City of Petaluma Planning Area and greater Sonoma Valley.





**Table 5- 1: Mitigation Action Summary Table**

Action ID	Action Title	New Action/2010 Action	Hazard(s) Mitigated	Responsible Office / Agency	Address Existing or Future Development	Priority	Related Goal
<b>Dam Incidents</b>							
DI-1	Assess downstream impacts associated with dam incidents	New	Dam Incidents, Flood Hazards	Public Works and Utilities Department	Both	Low	1, 3, 4
<b>Drought</b>							
DR-1	Groundwater supply augmentation for drought resiliency	New	Drought	Public Works and Utilities Department	Both	Medium	1, 2, 3, 4
DR-2	Sustainable Groundwater Management Planning	New	Drought	Public Works and Utilities Department	Both	Low	1, 3, 4, 5
<b>Cyber Threats</b>							
CT-1	Develop a Water Infrastructure Vulnerability Risk and Resilience Plan and Emergency Response Plan that addresses cyber sufficiency	New	Cyber Threats, Drought	Public Works and Utilities Department	Both	Low	1, 2, 3, 4, 5
<b>Earthquake</b>							
E-1	Implement Seismic Retrofits at Petaluma Historic Library and Museum	New	Earthquake Hazards	Building Department, Public Works and Utilities Department	Existing	Medium	1, 2, 3, 4
E-2	Seismic Retrofit Analysis of City buildings	New	Earthquake Hazards	Building Department, Public Works and Utilities Department	Existing	High	1, 2, 3, 4
<b>Flooding</b>							
F-1	Enhance structural flood mitigation projects to reduce near annual floods on north end of City	New	Flood Hazards	Public Works and Utilities Department	Both	High	1, 2, 3, 4, 5
F-2	Floodplain property protection, acquisition, and relocation	New	Flood Hazards, Sea Level Rise	Public Works and Utilities Department	Existing	Low	1, 3, 4





Action ID	Action Title	New Action/2010 Action	Hazard(s) Mitigated	Responsible Office / Agency	Address Existing or Future Development	Priority	Related Goal
F-3	Continue annual stream and creek channel maintenance	New	Flood Hazards	Public Works and Utilities Department	Both	Low	1, 2, 3, 4
F-4	Higher Regulatory Standards for Flood Protection	New	Flood Hazards	Building Department, City Engineer	Both	Medium	1, 3, 4
F-5	Improve National Flood Insurance Program Community Rating System rating	New	Flood Hazards	Public Works and Utilities Department	Both	Medium	1, 3, 4
<b>Hazardous Material Releases</b>							
HM-1	Evacuation Planning	New	Hazardous Material Releases, Multiple Hazards	Fire Department, Industrial Company	Both	Low	1, 3, 4, 5
<b>Sea Level Rise</b>							
SLR-1	Explore natural protection with wetland enhancement, marshland protection, and restoration project implementation in the Petaluma River and San Pablo Bay transition zone	New	Sea Level Rise, Flood Hazards	Public Works and Utilities Department	Both	Low	1, 2, 3, 4
SLR-2	Continue Petaluma River Dredging Program to enhance flood resilience	New	Sea Level Rise, Flood Hazards	Public Works and Utilities Department	Both	Medium	1, 2, 3, 4
SLR-3	Open space preservation in areas prone to sea level rise along the Petaluma River	New	Sea Level Rise, Flood Hazards	Parks and Recreation Department, City Engineer, Public Works and Utilities Department, Building Department	Existing	Medium	1, 2, 3, 4, 5





Action ID	Action Title	New Action/2010 Action	Hazard(s) Mitigated	Responsible Office / Agency	Address Existing or Future Development	Priority	Related Goal
SLR-4	Map and assess vulnerability to sea level rise and integrate the information with the City GIS mapping capabilities to educate the community and help them gain awareness of the potential impacts and actions the City is taking to plan and adapt	New	Sea Level Rise, Flood Hazards	Public Works and Utilities Department	Both	Medium	1, 3, 4
SLR-5	Assess sea level rise modelling for use in the LHMP and how those projections can be routinely re-evaluated in subsequent climate adaptation planning efforts	New	Sea Level Rise, Flood Hazards	Public Works and Utilities Department	Both	Low	1, 3, 4, 5
SLR-6	Update City Implementing Zoning Ordinance (IZO) to manage development in high risk areas	New	Sea Level Rise, Flood Hazards	Planning Department, City Engineer	Both	Low	1, 3, 4, 5
<b>Severe Weather: Heavy Rains/Thunderstorms/Hail/Lightning/Dense Fog</b>							
SW-1	Replace aging generator and plan for severe weather by obtaining backup generators at City critical facilities, including the Communications Center	New	Severe Weather: Heavy Rains/Thunderstorms/Hail/Lightning/Dense Fog; Earthquake; Extreme Heat; Wildfire; PSPS	Public Works and Utilities Department	Existing	Medium	1, 3, 4, 5
<b>Severe Weather: Extreme Heat</b>							
SW-2	Establish a resiliency hub at City Community Center to be used during severe weather	New	Severe Weather: Extreme Heat	Parks and Recreation Department, Public Works and Utilities Department	Both	Medium	1, 4, 5







Action ID	Action Title	New Action/2010 Action	Hazard(s) Mitigated	Responsible Office / Agency	Address Existing or Future Development	Priority	Related Goal
	events involving heat waves and wildfires						
<b>Severe Weather: High Wind</b>							
SW-3	Enhance local building code to incorporate wind-resistant design features that address high wind hazards	New	Severe Weather: High Wind; PSPS	Building Department	Both	Low	1, 3, 4, 5
SW-4	Develop a PSPS toolkit for local businesses	New	Severe Weather: High Wind; PSPS	Public Works and Utilities Department, Economic Development Department	Both	Low	1, 3, 4, 5
<b>Wildfire</b>							
W-1	Defensible space funding program	New	Wildfire	Fire Department	Both	Medium	1, 3, 4, 5
W-2	Develop a City-wide Fire Suppression Master Plan	New	Wildfire	Fire Department, Fire Prevention Bureau, Public Works and Utilities Department	Both	Medium	1, 3, 4, 5
W-3	Evaluate the WUI Zone in the City Limits	New	Wildfire	Fire Department, Fire Prevention Bureau	Both	Medium	1, 3, 4, 5
W-4	Install Fire Protection System in all City facilities	New	Wildfire	Public Works and Utilities Department, Fire Prevention Bureau, Building Department	Existing	Medium	1, 3, 4, 5





Action ID	Action Title	New Action/2010 Action	Hazard(s) Mitigated	Responsible Office / Agency	Address Existing or Future Development	Priority	Related Goal
W-5	Wildland Urban Interface Pre-Fire Plan	New	Wildfire	Fire Department	Both	High	1, 3, 4, 5
<b>Multi-Hazard Actions</b>							
MH-1	Evacuation Alert and Warning System and Periodic Testing	2010 Action	Multi-Hazard, Dam Incidents, Earthquake, Floods, Hazardous Material Releases	Fire Department, Police Department	Both	Low	1, 3, 4, 5
MH-2	Periodically assess the need for new or relocated fire or police stations and other emergency facilities, changes in staffing levels, and need for supplies, equipment, technologies, and in-service training classes	2010 Action	Multi-Hazard, Dam Incidents, Floods, Earthquake, Severe Weather, Wildfire	Police Department, Fire Department, Public Works and Utilities Department	Existing	Medium	1, 3, 4, 5
MH-3	Develop and maintain a system of interoperable communications for first responders from local, state, and federal agencies	2010 Action	Multi-Hazard, Dam Incidents, Floods, Earthquake, Severe Weather, Wildfire	Fire Department, Police Department	Both	High	1, 3, 4, 5
MH-4	Update the City Emergency Operations Plan	New	Multi-Hazard, Dam Incidents, Floods, Earthquake, Severe Weather, Wildfire	Fire Department	Both	High	1, 3, 4, 5
MH-5	Emergency Operations Center replacement and upgrades	New	Multi-Hazard, Dam Incidents, Floods, Earthquake, Severe Weather, Wildfire	Public Works and Utilities Department	Both	High	1, 3, 4, 5
MH-6	Expand Community Emergency Pre Program	New	Multi-Hazard, Dam Incidents, Floods,	Fire Department	Both	Low	1, 3, 4, 5





Action ID	Action Title	New Action/2010 Action	Hazard(s) Mitigated	Responsible Office / Agency	Address Existing or Future Development	Priority	Related Goal
MH-7	Community Emergency Preparedness Webpage	New	Earthquake, Severe Weather, Wildfire Multi-Hazard, Dam Incidents, Floods, Earthquake, Severe Weather, Wildfire	City Manager's Office	Both	Low	1, 3, 4, 5

The following mitigation actions provide project specific information and implementation details on each mitigation activity identified. They are grouped by the type of hazard(s) they address.





## **DI-1 Assess downstream impacts associated with dam incidents**

<b>Mitigation Project Title</b>	Assess downstream impacts associated with upstream dam incidents
<b>Hazard(s) Mitigated</b>	Dam Incidents, Flood Hazards
<b>Project Description, Issue/Background</b>	The City of Petaluma will assess downstream impacts anticipated from the breach or failure of existing dams located upstream of the City of Petaluma. There is currently one dam, La Crema Winery dam, located east of the City of Petaluma. While the likelihood of dam failure or breach for this dam is low, there may be impacts to downstream properties and critical facilities. This dam lacks available Geographic Information System (GIS)-based inundation mapping and an Emergency Action Plan (EAP). By analyzing the risks in detail, the City, in collaboration with the dam owners and operators, can determine whether there is risk. If there is a risk for a dam incident the City can prioritize planning, warning, and evacuation procedures to raise awareness of the hazard in targeted areas. If necessary, evacuation procedures can be integrated into Mitigation Action MH-1: Evacuation Alert and Warning System and Periodic Testing.
<b>Related planning mechanisms</b>	General Plan 2025, Evacuation Planning, 2007 Emergency Operations Plan
<b>Other Alternatives</b>	Partner with other agencies, such as Sonoma County for infrastructure improvements assessments on dams and levees and public awareness of potential dam and levee failure impacts.  Work with existing inundation mapping data based on water storage facility information.
<b>Responsible Office/ Agency</b>	Public Works and Utilities Department
<b>Partners</b>	Dam Owners (e.g. La Crema Winery), Reclamation Districts, Sonoma County, California Department of Water Resources (DWR)
<b>Priority (High, Medium, Low)</b>	Low
<b>Cost Estimate</b>	Varies, if dam inundation modelling is not available, modeling and inundation mapping costs depend on the size of the dam; \$25,000 - \$50,000 given existing upstream water storage facilities are small.
<b>Benefits (Avoided Losses)</b>	The risk to the City is low due to the distance between the downstream properties and dam locations. However, the downstream impacts should be further evaluated to confirm no City-owned critical facilities would be impacted. Also, if needed, educating home buyers of the upstream dams and flood protections should be considered in order to avoid loss of life and injuries if an event were to occur. Understanding the risk that could occur can improve warning and evacuation procedures. Currently, there is mainly open space and rural agricultural land located downstream of the La Crema Winery dam.





<b>Potential Funding</b>	Homeowners should be encouraged to purchase flood insurance in areas near the dams. FEMA High Hazard Potential Dam Grants, Dam Owners could partially fund studies
<b>Schedule</b>	2020-2024





## **DR-1      *Groundwater supply augmentation for drought resiliency***

<b>Mitigation Project Title</b>	Groundwater supply augmentation for drought resiliency
<b>Hazard(s) Mitigated</b>	Drought
<b>Project Description, Issue/Background</b>	<p>According to the City’s 2015 Urban Water Management Plan (UWMP), the City does not rely on groundwater as a significant portion of supply due to yield and water quality limitations. Groundwater is only used for peak water demand needs or to minimize short-term supply cost impacts and only half of the City’s existing wells are used due to low yields, poor water quality, and deteriorating well conditions. Instead, the City obtains the majority of its water supply from Russian River surface water deliveries from Sonoma Water.</p> <p>While the City currently relies on various groundwater management tools and studies are underway to better understand the groundwater basin, the City anticipates using more groundwater to meet demand during emergencies, when back-up supplies are necessary during drought conditions. As a result, the City of Petaluma has a 20 percent maximum daily demand (MDD) peak water usage goal.</p> <p>The City intends to achieve this 20 percent goal by relying on City groundwater supply through the rehabilitation and installation of additional groundwater wells and by expanding the existing recycled water system. Over the years, the increased reliance on City groundwater has been the result of rehabilitated well sites and studies to determine the actual production capabilities in the event of emergency use. The City is in the process of expanding the groundwater well system. The City recently expanded the recycled water distribution system in the urban area. Another phase is planned with the Maria Drive reconstruction within the next year. Future phases may be constructed through 2040.</p>
<b>Related planning mechanisms</b>	City’s Municipal Code, 2015 UWMP, City’s Water Shortage Contingency Plan (WSCP) (Chapter 8 of UWMP), Water Shortage Contingency Resolution
<b>Other Alternatives</b>	Ongoing water conservation efforts to mitigate the impacts to water supply; water conservation education and outreach
<b>Responsible Office/ Agency</b>	Public Works and Utilities Department
<b>Partners</b>	Sonoma Water, California DWR, North Bay Water Reuse Program (NBWRP)
<b>Priority (High, Medium, Low)</b>	Medium
<b>Cost Estimate</b>	\$25,000 - \$200,000 annually depending on well rehabilitation and installation costs and civil engineering associated with water recycling facility expansion.





<b>Benefits (Avoided Losses)</b>	<p>The City of Petaluma has cycle periods of wet and drought years. The last drought in California was longer and more devastating than prior droughts, due to both increased temperatures, and higher demand on public services.</p> <p>Well rehabilitation, new well installation, and recycled water use are long-term solutions for mitigating the impacts of drought years. Long-term City investment in an expanded recycled water and distribution system will provide a sustainable water solution to the City that promotes drought resiliency.</p>
<b>Potential Funding</b>	General Fund, California Proposition 1 Grants, California DWR Sustainable Groundwater Planning Grants Program, State’s Water Recycling Funding Program (WRFP), Integrated Regional Water Management (IRWM) Grant Programs, and funding from other agencies (i.e., Sonoma Water)
<b>Schedule</b>	2020-2022; Ongoing





## **DR-2 Sustainable Groundwater Management Planning**

<b>Mitigation Project Title</b>	Sustainable Groundwater Management Planning
<b>Hazard(s) Mitigated</b>	Drought
<b>Project Description, Issue/Background</b>	<p>The 46,000-acre Petaluma Valley Groundwater Basin is located within the larger 93,440-acre Petaluma Valley watershed. The City of Petaluma relies on local groundwater to supplement imported Russian River surface water supplies from Sonoma Water. While studies are underway to evaluate groundwater conditions in Petaluma Valley Groundwater Basin, current conditions suggest that groundwater elevations are relatively stable in southern and central Petaluma Valley, but areas in the northwest have exhibited long-term declines. The Basin has historical occurrences of serious nitrate contamination in the western portion of the Basin and evidence of saltwater intrusion from the tidally influenced portion of the Petaluma River. Other degradation of water quality impacts and loss of storage capacity continue to be evaluated through the installation of new groundwater monitoring wells and technical guidance from the California DWR.</p> <p>The Sustainable Groundwater Management Act (SGMA) provides for the establishment of local Groundwater Sustainability Agencies (GSAs) to manage groundwater sustainability within groundwater subbasins. The City of Petaluma is a local agency (as defined by §10723 of the Water Code) which overlays the Petaluma Valley Groundwater Basin, and as such the City has become part of the local GSA. The Petaluma Valley GSA was required to develop and implement, no later than January 31, 2022, a Groundwater Sustainability Plan (GSP) to ensure a sustainable yield of groundwater, without causing undesirable results. The GSP is a 20-year plan to ensure that groundwater will be used sustainably in the groundwater basin.</p> <p>The Petaluma Valley GSA is a multi-agency GSP consisting of Sonoma Resource Conservation District, Sonoma Water, Sonoma County, North Bay Water District, and the City of Petaluma formed to develop the GSP and sustainably manage groundwater in Petaluma Valley. As of 2017, the City of Petaluma participates in the groundwater management planning process. The development of the Petaluma Valley GSA and the implementation of a GSP will allow the City to maintain sustainable groundwater supplies, coordinate with other water agencies and districts, while providing insurance and resilience against periods of long-term drought.</p>
<b>Related planning mechanisms</b>	GSP, City's Municipal Code, 2015 UWMP, City's WSCP (Chapter 8 of UWMP),
<b>Other Alternatives</b>	None, compliance required by law, failure to meet requirements will result in State intervention and oversight.







<b>Responsible Office/ Agency</b>	Public Works and Utilities Department
<b>Partners</b>	Sonoma Water, Sonoma County, Sonoma Resource Conservation District, North Bay Water District
<b>Priority (High, Medium, Low)</b>	Low
<b>Cost Estimate</b>	Varies by GSA for preparation of the required GSP. Further expenses are anticipated to be accrued for the planning and construction of groundwater recharge or monitoring projects.
<b>Benefits (Avoided Losses)</b>	Preparation and implementation of the GSP will result in the management of groundwater in a manner that is sustainable and avoids undesirable results as defined by the California DWR.
<b>Potential Funding</b>	Property owner assessments along with grant funding opportunities from the State.
<b>Schedule</b>	GSAs must complete and submit the required GSP to DWR by January 31, 2022, which is to be fully implemented and result in sustainability of the groundwater basin, with no undesirable effects, by the year 2042.





**CT-1      *Develop a Water Infrastructure Vulnerability Risk and Resilience Plan and Emergency Response Plan that addresses cyber sufficiency***

<b>Mitigation Project Title</b>	Develop a Water Infrastructure Vulnerability Risk and Resilience Plan and Emergency Response Plan that addresses cyber sufficiency
<b>Hazard(s) Mitigated</b>	Cyber Threats, Drought
<b>Project Description, Issue/Background</b>	<p>Section 2013 of America’s Water Infrastructure Act of 2018 (AWIA) requires community water systems serving more than 3,300 people to develop or update risk and resilience assessments and emergency response plans (ERPs). The risk and resilience assessments must be conducted and certification submitted to the U.S. EPA by March 31, 2020 if the utility serves more than 100,000 people; December 31, 2020 if the utility serves 50,000 to 99,999 people; and June 30, 2021 if the utility services 3,301 to 49,999 people. The City must also develop or update ERPs and complete certification submittals to the U.S. EPA no later than six months after the risk and resilience assessments are certified.</p> <p>These risk and resilience assessments evaluate vulnerabilities, threats, and consequences from potential natural hazards and malevolent acts. They also assess the resilience of water facility infrastructure (pipe, water sources of collection, treatment, storage, distribution and electronic and computer systems), monitoring practices, chemical storage and handling, and operation and maintenance activities. ERPs include strategies and resources to improve resilience, including physical security and cybersecurity. ERPs also cover plans and procedures for responding to natural hazards or malevolent acts that threaten safe drinking water.</p> <p>Implementation of this action would ensure that City water supply wells and pump status are secure and appropriate site and cyber security is in place, thereby also minimizing impacts related to drought hazards.</p>
<b>Related planning mechanisms</b>	2007 Emergency Operations Plan, Draft Water Infrastructure Vulnerability Risk and Resilience Assessment, Facility Assessment
<b>Other Alternatives</b>	Existing Facility Vulnerability Assessments, LHMP Vulnerability Assessment (public water drinking water supply infrastructure assessment was included, but facilities were not mapped due to sensitivity of information)
<b>Responsible Office/ Agency</b>	Public Works and Utilities Department
<b>Partners</b>	Sonoma Water
<b>Priority (High, Medium, Low)</b>	Low
<b>Cost Estimate</b>	\$50,000 - \$100,000





<b>Benefits (Avoided Losses)</b>	The implementation of a detailed vulnerability risk and resilience assessment of the City's drinking water supply infrastructure would better prepare the City for natural and human-caused hazards. The assessment would also allow the City to prepare hazard-specific contingency plans and identify additional hazard mitigation actions.
<b>Potential Funding</b>	U.S. EPA grant funding
<b>Schedule</b>	June 30, 2020 based on federal AWIA legislation and population served by City water and wastewater services





## **E-1      *Implement seismic retrofits at Petaluma Historic Library and Museum***

<b>Mitigation Project Title</b>	Implement seismic retrofits at Petaluma Historic Library and Museum
<b>Hazard(s) Mitigated</b>	Earthquake
<b>Project Description, Issue/Background</b>	<p>In 1992 the City adopted a resolution establishing a list of unreinforced masonry buildings in the City for the purpose of setting a timeframe for strengthening the Unreinforced Masonry (URM) Building Ordinance. The resolution classified the buildings into four groups, with the first groups being potentially the highest risk and need for prioritized retrofitting. Higher occupancy buildings were also identified as higher risk structures that needed to be retrofitted, as well as other factors, such as the physical height of the building and the proximity to pedestrian activity.</p> <p>The classification included 98 buildings within the City that needed to be retrofitted within the next 20 years. As of early 2020, all of the classified buildings have been retrofitted with the exception of the Petaluma Historic Library and Museum located at 20 4th Street. This action involves seismically retrofitting the historic library and museum for earthquake, fire, and public safety hazards. Seismic modifications to the library and museum must also take into consideration the architectural integrity of the building to avoid compromising the building’s historical features.</p>
<b>Related planning mechanisms</b>	2016 California Building Code, URM Building Ordinance, 1992 URM Building Resolution
<b>Other Alternatives</b>	None
<b>Responsible Office/ Agency</b>	Building Department, Public Works and Utilities Department
<b>Partners</b>	Petaluma Museum Association
<b>Priority (High, Medium, Low)</b>	Medium
<b>Cost Estimate</b>	\$1,000,000 - \$5,000,000
<b>Benefits (Avoided Losses)</b>	Seismic retrofits of Petaluma’s historic library and museum would better preserve the historic and architectural integrity of the building, while also addressing seismic, fire, and public safety hazards.
<b>Potential Funding</b>	General funds, grant fund opportunities
<b>Schedule</b>	2022-2025





## **E-2      *Seismic Retrofit Analysis of City buildings***

<b>Mitigation Project Title</b>	Seismic Retrofit Analysis of City buildings
<b>Hazard(s) Mitigated</b>	Earthquake
<b>Project Description, Issue/Background</b>	<p>The City of Petaluma adopted the 2016 California Building Code (CBC), which governs the design, construction, and maintenance of buildings. In California, most cities adopt model building codes maintained by the International Building Code (IBC) and every few years the International Code Council (ICC) publishes new editions of the codes. The CBC requires specific tests for masonry to ensure that structures can adequately resist seismic forces during earthquakes. The City of Petaluma has already identified unreinforced masonry properties in their jurisdiction that are vulnerable to seismic risk and have removed or retrofitted most of the City-owned buildings and facilities, with the exception of the City’s historic museum and library.</p> <p>While most City-owned facilities have been seismically retrofitted, there are key critical facilities in the City where seismic retrofit analyses need to be conducted to better understand detailed vulnerabilities during major earthquakes. These buildings include the City police and fire stations, City Emergency Operations Center (EOC), and City’s Emergency Communication Center. This can include bracing of non-structural items to reduce damage potential to building contents and reduce risk of injury, ensuring continuity of operations during an incident.</p> <p>An earthquake retrofit analysis would include a structural and non-structural assessment of City buildings, as well as infrastructure, such as water tanks, sewer lines, bridges, and roads. Initial retrofitting analysis may involve a survey of the structural condition at critical facilities and prioritized surveys at buildings closer to major fault or liquefaction zones. Replacement and retrofits can then occur as funding becomes available. Various resources provided by FEMA and the American Society of Civil Engineers (ASCE) provide seismic retrofitting guidelines and techniques to strengthen the structural elements of buildings, and better protect non-structural components.</p>
<b>Related planning mechanisms</b>	Survey, evaluate, and prioritize existing structures and prioritize worst-case buildings and properties and repair these as funding becomes available.
<b>Other Alternatives</b>	<p>Completion of Unreinforced Masonry Retrofit Program (historic museum and library is only remaining City-owned facility that needs retrofitting)</p> <p>Update City’s building code to exceed current state seismic and safety standards in order to minimize earthquake damage for new buildings and structures.</p> <p>Voluntary seismic retrofitting and encouraging property owners to exceed state seismic standards.</p>





<b>Responsible Office/ Agency</b>	Building Department, Public Works and Utilities Department
<b>Partners</b>	None
<b>Priority (High, Medium, Low)</b>	High
<b>Cost Estimate</b>	\$200,000 - \$1,000,000 (varies depending on whether buildings have already been assessed and need retrofits)
<b>Benefits (Avoided Losses)</b>	Protection of life and property during an earthquake by removing the threat of loss, injury, and damage to people and property from building hazards.
<b>Potential Funding</b>	City General Fund, State funding
<b>Schedule</b>	Ongoing; 2020-2024





**F-1 Enhance structural flood mitigation projects to reduce near annual floods on north end of City**

<b>Mitigation Project Title</b>	Enhance structural flood mitigation projects to reduce near annual floods on the north end of the City
<b>Hazard(s) Mitigated</b>	Flooding
<b>Project Description, Issue/Background</b>	<p>For over the past 15 years, the City of Petaluma has been proactive to mitigate flood hazards within the Petaluma watershed. The City has worked on the Petaluma River Flood Control Project, as part of the joint effort with the U.S. Army Corps of Engineers, and has received state funding to implement four phases of the Petaluma River–Denman Reach flood mitigation project near the north end of the City along Industrial Avenue. Both projects help the City implement the 1996 Petaluma River Access and Enhancement Plan, General Plan 2025, and the 2015 FMP. These past and current structural projects increase the capacity of the historic floodplain and alleviate flood impacts to neighboring residences and businesses.</p> <p>The Petaluma River Flood Control Project included channel widening, floodwalls along Washington Creek and the Petaluma River, a concrete transition weir, two new pump stations, replacement of the Payran Street Bridge and the Lakeville Street Bridge, and the creation of a U-shaped channel along one reach of the river. This project was completed in late 2015.</p> <p>The first three phases of the Petaluma River–Denman Reach project were completed from 2005 to 2018 with California DWR grant funds. The first phases involved acquiring vacant parcels, developing a permanent trail easement, opening the river channel and extending a flood terrace along the top of the bank, widening the eastern bank of the River within the lower portion of Denman Reach (between Petaluma Boulevard North and Corona Road), and creating wetlands and riparian habitat. The final phase is currently under construction and funded by a California DWR grant award through coordination with Sonoma Water. Phase 4 is expected to be completed in early 2020. The completed project will lower the flood elevation for the 100-year storm up to one foot in areas around Industrial Avenue and Corona Road.</p> <p>The City will continue to pursue and implement future structural flood control projects under this mitigation action, as they relate to new projects developed in the FMP update.</p>
<b>Related planning mechanisms</b>	1996 River Access and Enhancement Plan, General Plan 2025, 2015 FMP
<b>Other Alternatives</b>	Other Flood Mitigation Projects, Non-Structural Projects
<b>Responsible Office/ Agency</b>	Public Works and Utilities Department





<b>Partners</b>	U.S. Army Corps of Engineers, Sonoma Water, Conservation Corps of the North Bay
<b>Priority (High, Medium, Low)</b>	High
<b>Cost Estimate</b>	\$1,000,000 - \$2,000,000 for implementation of all phases of each project
<b>Benefits (Avoided Losses)</b>	Structural flood control projects will ensure the City continues to provide adequate flood protection, which will minimize flood related losses associated with property damage.
<b>Potential Funding</b>	DWR grant funding (Urban Streams Restoration grant funds, Proposition 1E funds)
<b>Schedule</b>	Ongoing; Construction anticipated to be complete for Denman Reach Phase 4 in 2020







## **F-2 Floodplain property protection, acquisition, and relocation**

<b>Mitigation Project Title</b>	Floodplain property protection, acquisition, and relocation
<b>Hazard(s) Mitigated</b>	Flooding, Sea Level Rise
<b>Project Description, Issue/Background</b>	<p>Consistent with the General Plan 2025 and the 2015 FMP goals and property protection activities, the City of Petaluma has successfully undertaken efforts to acquire and relocate 13 properties in the floodplain. The City will continue to explore opportunities for property protection, acquisition, and relocation consistent with the General Plan 2025 Policy 8-P-37 and the 2015 FMP property protection activities. The City would seek acquisition and relocation funding using pre-disaster mitigation and flood mitigation assistance (FMA) program funding, with a focus on acquiring properties in the repetitive loss areas of the floodplain. These property acquisitions would increase floodplain capacity and reduce flood hazards.</p> <p>This action supports the preservation of open space and natural areas according to General Plan 2025 Policies 4-P-1 through 4-P-4 and the establishment of a 200-foot setback on both sides of the Petaluma River based on General Plan 2025 Policy 8-9-30. The action also involves exploring property protection projects and acquisitions in other portions of the floodplain, and is further supports Mitigation Action SLR-2 focused on open space preservation.</p>
<b>Related planning mechanisms</b>	General Plan 2025, 2015 FMP
<b>Other Alternatives</b>	Floodplain Regulation Enforcement, Enhancing Building Codes and Development Standards, Building Elevation Certification, CRS Program Participation
<b>Responsible Office/ Agency</b>	Public Works and Utilities Department
<b>Partners</b>	FEMA, Cal OES, California DWR
<b>Priority (High, Medium, Low)</b>	Low
<b>Cost Estimate</b>	Varies, depending on property relocation and acquisition effort
<b>Benefits (Avoided Losses)</b>	Relocation of buildings or structures in the floodplain or the acquisition of such properties would reduce repetitive losses related to flooding.
<b>Potential Funding</b>	Pre-Disaster Mitigation Grant Funds, FMA Funding
<b>Schedule</b>	Ongoing





### **F-3      *Continue annual stream and creek channel maintenance***

<b>Mitigation Project Title</b>	Continue annual stream and creek channel maintenance
<b>Hazard(s) Mitigated</b>	Flooding
<b>Project Description, Issue/Background</b>	<p>The City has worked with Sonoma County and Sonoma Water since the December 11, 2014 flood event to clear channels and creeks of debris, sediment, and overgrown vegetation within the parameters of existing environmental permits.</p> <p>This action would support floodplain management goals to continue annual stream and creek channel maintenance in accordance with established City, County, and Sonoma Water requirements. Permitted creek and stream channel maintenance activities would occur throughout the City and include structural channel modification projects referenced in the 2015 FMP.</p>
<b>Related planning mechanisms</b>	General Plan 2025 Surface Water Management Element, 2015 FMP, City's 5-year Capital Improvement Program (CIP), City-wide Expanded Channel and Creek Maintenance Program and Permit
<b>Other Alternatives</b>	Stormwater Management Program, Phase II Stormwater Management Plan, Storm Water Ordinance Petaluma River Watershed Drainage Master Plan
<b>Responsible Office/ Agency</b>	Public Works and Utilities Department
<b>Partners</b>	Sonoma County, Sonoma Water
<b>Priority (High, Medium, Low)</b>	Low
<b>Cost Estimate</b>	\$250,000 - \$500,000
<b>Benefits (Avoided Losses)</b>	Routine stream and creek channel maintenance activities, such as debris clearing and vegetation management would provide adequate flood conveyance capacity, improve stream and habitat restoration, and provide improved flood protection for the residents and business in the City of Petaluma. The maintenance activities are also creditable under the CRS.
<b>Potential Funding</b>	Sonoma Water funding, Urban Streams Restoration Program Grant (USR), Proposition 1 Funding
<b>Schedule</b>	2020-2025





### **F-4 Higher regulatory standards for flood protection**

<b>Mitigation Project Title</b>	Higher regulatory standards for flood protection
<b>Hazard(s) Mitigated</b>	Flooding
<b>Project Description, Issue/Background</b>	<p>Since the implementation of the 2010 LHMP Annex prepared by ABAG, the City of Petaluma has prioritized floodplain management activities in the General Plan 2025 and 2015 FMP. The City joined the NFIP in 1983 and adopted its first FMP in 1995, which was last updated in 2015. The City participates in the CRS program as one of its efforts to reduce potential losses due to flooding, and the NFIP has conducted annual audits of the City’s floodplain management efforts for over two decades and awarded the City a Class Rating 6.</p> <p>As part of this action, the City of Petaluma will continue to implement preventative activities summarized in the 2015 FMP that involve enforcing standards that provide more flood protection than the NFIP’s minimum requirements. These activities include:</p> <ul style="list-style-type: none"> <li>• Implement flood protection policies in the General Plan 2025;</li> <li>• Require two feet of freeboard for first floor elevations above the base flood elevation (General Plan 2025 Policy 8-P-37F);</li> <li>• Require foundation protection;</li> <li>• Require digital post-construction elevation certificates for new structures, additions and substantial improvements to structures in the floodplain to be organized into a GIS database;</li> <li>• Require zero net fill on all new developments in the floodplain;</li> <li>• Adhere to federal and state-mandated regulatory standards; and</li> <li>• Maintain adequate staffing in the City’s Building Department to continue to enforce building codes for new construction and improvements in the floodplain through the City.</li> </ul>
<b>Related planning mechanisms</b>	General Plan 2025, 2015 FMP, CRS Program participation
<b>Other Alternatives</b>	Site-Specific Development Review (case-by-case project site plan review); Building Code Enforcement
<b>Responsible Office/ Agency</b>	Building Department, City Engineer
<b>Partners</b>	None
<b>Priority (High, Medium, Low)</b>	Medium
<b>Cost Estimate</b>	\$100,000 annually (staffing costs for enforcement and site plan review)
<b>Benefits (Avoided Losses)</b>	The enforcement of higher regulatory standards will ensure the City continues to provide adequate flood protection, which will minimize flood related losses associated with property damage. This action is integral in maintaining a CRS Class 6 rating, which helps flood insurance be more affordable for City residents. The requirement for organizing digital post-construction elevation certificates in GIS would increase staff





	production time versus referencing paper copies, and ensure accurate flood prediction and mapping data is easily accessible and tracked electronically.
<b>Potential Funding</b>	General Fund
<b>Schedule</b>	Ongoing





### **F-5      *Improve National Flood Insurance Program Community Rating System rating***

<b>Mitigation Project Title</b>	Improve National Flood Insurance Program Community Rating System rating
<b>Hazard(s) Mitigated</b>	Flooding
<b>Project Description, Issue/Background</b>	This action involves improving the NFIP CRS Rating for City. Subsequent steps will involve tracking credit opportunities associated with the LHMP and completing the Activity Floodplain Coordinator Manual 510 steps and worksheets. This plan update is already aligned with the CRS planning process to maximize CRS points. Other opportunities to improve credits according to the latest CRS Coordinator’s manual will be evaluated.
<b>Related planning mechanisms</b>	General Plan 2025; 2015 FMP, NFIP Participation, CRS Participation
<b>Other Alternatives</b>	2015 FMP Implementation
<b>Responsible Office/ Agency</b>	Public Works and Utilities Department
<b>Partners</b>	None
<b>Priority (High, Medium, Low)</b>	Medium
<b>Cost Estimate</b>	\$15,000 - \$25,000 for consultant assistance with ISO Verification Process
<b>Benefits (Avoided Losses)</b>	Maximizing participation in the CRS program will reduce property losses and damage. If the City achieves a higher CRS rating, flood insurance policy holders will receive reduced premiums on their policies.
<b>Potential Funding</b>	General Fund
<b>Schedule</b>	Ongoing





## HM-1 Evacuation Planning

<b>Mitigation Project Title</b>	Evacuation Planning
<b>Hazard(s) Mitigated</b>	Hazardous Material Releases, Multi-Hazard
<b>Project Description, Issue/Background</b>	The City currently has several industrial sites that during an accident or disaster could release hazardous material that would negatively impact the health of persons in the community. It is important for those potentially affected to know, understand, and practice the best course of action, whether that be to shelter-in-place or evacuation procedures. Once initial action is taken, the community needs to understand the next steps and plan appropriately. This action can be implemented on a neighborhood-by-neighborhood level, and it would take into consideration socially vulnerable and disadvantaged populations in the City. For instance, additional and tailored outreach may be conducted to ensure socially vulnerable and disadvantaged populations in the City understand what actions need to occur during hazard events that may require shelter-in-place or evacuation procedures.
<b>Related planning mechanisms</b>	2007 Emergency Operations Plan
<b>Other Alternatives</b>	During an event, the City could continue a reactionary approach, which will not be as effective and require more effort from public safety officials to complete.
<b>Responsible Office/ Agency</b>	Fire Department, Industrial Company
<b>Partners</b>	Industrial Company
<b>Priority (High, Medium, Low)</b>	Low
<b>Cost Estimate</b>	\$20,000-\$70,000
<b>Benefits (Avoided Losses)</b>	A plan with an informed community will lead to less confusion and more timely reaction to any accident that requires a response from the community.
<b>Potential Funding</b>	General Fund
<b>Schedule</b>	2020-2024; City anticipates this may be a longer-term action





**SLR-1     *Explore natural protection with wetland enhancement, marshland protection, and restoration project implementation in the Petaluma River and San Pablo Bay transition zone***

<b>Mitigation Project Title</b>	Explore natural protection with wetland enhancement, marshland protection, and restoration project implementation in the Petaluma River and San Pablo Bay transition zone
<b>Hazard(s) Mitigated</b>	Flooding, Sea Level Rise
<b>Project Description, Issue/Background</b>	<p>The Petaluma River stretches for approximately 6.5 miles through the City from the upstream freshwater reaches to the downstream tidally-influenced portion of the river near San Pablo Bay, known as the “transition zone.” Natural protection of wetlands and marsh in the southern portion of the City's Planning Area near the confluence of Petaluma River and San Pablo Bay can help the City adapt to rising sea levels and tidal fluctuations in the Bay.</p> <p>Wetland protection would preserve undeveloped shorelines within San Pablo Bay and support ecosystem adaptation in areas where sea level rise may cause migration of species and habitat changes. Protecting the undeveloped shorelines along the Petaluma and San Pablo Bay transition zone would also maintain ecological values, provide increased flood protection, and support habitat resiliency.</p>
<b>Related planning mechanisms</b>	General Plan 2025, 2015 FMP, 1995 River Access and Enhancement Plan
<b>Other Alternatives</b>	Setback policies, Living Shoreline concept, Conservation programs, Improved Building Codes, Ecosystem preservation and restoration
<b>Responsible Office/ Agency</b>	Public Works and Utilities Department
<b>Partners</b>	General Fund, Army Corps of Engineers Funding, California DWR Grant Funding, Habitat Conservation Fund Grant, California Department of Fish and Wildlife (CDFW) Grants, National Fish and Wildlife Foundation Grants, In-Lieu Mitigation Fees, Local Non-Profits (Petaluma Water Ways, Petaluma River Access Partnerships – P-RAP)
<b>Priority (High, Medium, Low)</b>	Low
<b>Cost Estimate</b>	Varies by wetland restoration project planning, implementation and construction costs.
<b>Benefits (Avoided Losses)</b>	Reduced potential for repetitive flooding; preservation of marshland and habitat
<b>Potential Funding</b>	Local, regional, and state funding opportunities are available.
<b>Schedule</b>	2020-2030





**SLR-2      *Continue Petaluma River Dredging Program to enhance flood resilience***

<b>Mitigation Project Title</b>	Continue Petaluma River Dredging Program to enhance flood resilience
<b>Hazard(s) Mitigated</b>	Flooding, Sea Level Rise
<b>Project Description, Issue/Background</b>	Watershed runoff deposits silt within the waterway. Regular dredging is required to restore the original riverway capacity of Petaluma River to enhance floodwater carrying capacity and maintain adequate depth for boating.
<b>Related planning mechanisms</b>	2015 FMP, 1995 River Access and Enhancement Plan
<b>Other Alternatives</b>	Additional excavation of the Petaluma riverbed may mitigate sea level rise volume.  Dredge materials may be used to create earth berms to hold additional sea level volume.
<b>Responsible Office/ Agency</b>	Public Works and Utilities Department
<b>Partners</b>	U.S. Army Corps of Engineers Funding, California DWR Grant Funds
<b>Priority (High, Medium, Low)</b>	Medium
<b>Cost Estimate</b>	Varies phasing of dredging project, but costs could range from \$500,000 - \$1,000,000.
<b>Benefits (Avoided Losses)</b>	Reduced repetitive flooding; continued navigable access on Petaluma River between the City and San Pablo Bay.
<b>Potential Funding</b>	Local, regional, and state funding opportunities are available.
<b>Schedule</b>	Ongoing







### **SLR-3      *Open space preservation in areas prone to sea level rise along the Petaluma River***

<b>Mitigation Project Title</b>	Open space preservation in areas prone to sea level rise along the Petaluma River
<b>Hazard(s) Mitigated</b>	Flooding, Sea Level Rise
<b>Project Description, Issue/Background</b>	<p>The City of Petaluma anticipates planning for and adapting to risk from increased flooding due to sea level rise and coastal storm events along the Petaluma River. A portion of the properties located to south of downtown Petaluma and near the tidally-influenced portions of the Petaluma River consist of open space and park lands that make up the City's greenbelt. Given the open space land use designation, development is not permitted within these low-elevation properties where tidal flooding is common. Although building codes are enforced on adjacent developed commercial properties and flood insurance is required, these developed properties are at risk to future flooding that could be exacerbated by sea level rise.</p> <p>Traditional land management controls, like land use zoning and open space preservation could be used to limit development. The City could also improve interagency cooperation related to ecological conservation efforts within the lands susceptible to flooding and sea level rise by focusing on property acquisition, protecting natural areas, and improving habitat resiliency. Interagency coordination would enhance the overall connectivity of different open space preservation and habitat restoration projects within the San Pablo Bay transition zone.</p> <p>The City plans to continue efforts to keep vacant and floodplain land designated as open space. The City also plans to pursue additional open space acquisition opportunities pursuant to General Plan 2025 goals and policies and the 2015 FMP open space preservation preventative activities. Given the recreational amenities present within these open space areas, this action may also involve ensuring trailheads, trails, and signage are maintained and upgraded to withstand future flooding and erosion that may be associated with sea level rise.</p>
<b>Related planning mechanisms</b>	General Plan 2025, 2015 FMP, 1995 River Access and Enhancement Plan
<b>Other Alternatives</b>	In high hazard areas, building a sea wall at top of bank to protect existing structures. In high hazard areas, require raising first floor level elevation above predicted sea level rise.
<b>Responsible Office/ Agency</b>	Parks and Recreation Department, City Engineer, Public Works and Utilities Department, Building Department
<b>Partners</b>	California Coastal Conservancy, Sonoma County Agricultural Preservation and Open Space, U.S. Fish and Wildlife Service (USFWS), U.S. Army Corps of Engineers, San Francisco Bay Regional Water Quality Control Board (RWQCB), San Francisco Bay Conservation and Development Commission





	(San Francisco BCDC), Sonoma Land Trust, State and federal conservancy agencies, Community-Based Organizations
<b>Priority (High, Medium, Low)</b>	Medium
<b>Cost Estimate</b>	Varies by planning efforts and property acquisitions
<b>Benefits (Avoided Losses)</b>	<p>Land use zones, such as open space designation can be successfully used as a tool to limit development, and special flood hazard zones are now often added to comprehensive and general plan land use designations. These overlay designations, or “adaptation action areas” can be defined as areas below, at, or near the mean high water mark, or areas where there is a hydrological connection to coastal waters, such as Petaluma River.</p> <p>These open space overlay areas establish additional and stricter development standards or criteria for development. While an open space designation may limit development on properties prone to future flooding due to sea level rise, the City needs to carefully monitor the scientific data regarding sea level rise and understand the risk levels associated with projected inundation.</p>
<b>Potential Funding</b>	General Fund, Sonoma County Ag and Open Space Matching Grant Program 2020, Habitat Conservation Fund Grant, CDFW Grants, DWR Grant Funding,
<b>Schedule</b>	2020-2024; Ongoing





**SLR-4     *Map and assess vulnerability to sea level rise and integrate the information with the City GIS mapping capabilities to educate the community and help them gain awareness of the potential impacts and actions the City is taking to plan and adapt***

<b>Mitigation Project Title</b>	Map and assess vulnerability to sea level rise and integrate the information with the City GIS mapping capabilities to educate the community and help raise awareness of the potential impacts and actions the City is taking to plan and adapt
<b>Hazard(s) Mitigated</b>	Sea level rise, flooding
<b>Project Description, Issue/Background</b>	<p>GIS is an effective tool that can identify where climate-change related effects are likely to occur now and in the future. Mapping and overlaying climate information, such as projected sea level rise projections with critical facilities, parcel, infrastructure, and building footprints can help communities understand the expected extent of sea level rise, and also where flooding, wildfires, and other natural hazards are more likely to occur based on climate change.</p> <p>As of early 2020 the City of Petaluma has not engaged the community on the topic of sea level rise, nor have possible sea level rise scenarios have not been widely distributed to the community. The 2019 LHMP included a preliminary sea level rise vulnerability assessment that analyzed three sea level rise scenarios: 25 centimeters (cm), 75 cm, and 200 cm sea level rise inundation datasets based on best available science from the CoSMos Version 2.1 Model applicable to the City of Petaluma (see Section 4.3.6 Sea Level Rise in Chapter 4). This dataset provided detailed projections of tidal inundation, also referred to the predicted average annual tidal inundation conditions. It also included detailed projections of coastal flood hazards, also referred to the 100-year coastal flood event that accounts for coastal wave and storm surge intervals,. The preliminary vulnerability assessment is consistent with the full spectrum of sea level rise (0 to 2 meters, 5 meters) and storms (daily to 100-year return) used on the outer Sonoma coast and storm events used inside the Bay were derived from the Global Climate Model (GCM).</p> <p>Given sea level rise projections linked to planning horizons can change with new scientific data, the preliminary sea level rise scenarios selected by the City are based on sea level rise elevation. The probabilistic projections based on the high emissions scenario (business as usual) for 2050 and 2070 translates to 1.1 foot by 2050 and 1.9 feet by 2070, both which have a 66 percent probability of occurrence. The conservative approach for 2050 and 2070 have a 0.5 percent probability of occurrence and translate to 1.9 feet by 2050 and 4.0 feet by 2070. The City HMPC also considered one conservative scenario to assess potential future</p>





	<p>impacts to critical infrastructure. These projection recommendations roughly convert to the 25 cm (1 foot or 0.25 meters), 75 cm (2.7 feet or 0.75 meters), and 200 cm (6.6 feet or 2 meters) sea level rise datasets. These three elevations could apply to a range of sea level rise projections and associated planning years.</p> <p>This action considers the findings from the preliminary sea level rise vulnerability assessment included in the 2019 LHMP and determines whether a more detailed vulnerability assessment and Climate Adaptation Plan (CAP) is warranted. As part of this action, the City would select a most likely sea level rise scenario to present to the Climate Action Commission and the community (or a range of scenarios), as part of climate change initiatives. While the City may choose to select all three scenarios considered in the 2019 LHMP vulnerability assessment, the City could also select one scenario with the highest probability of occurrence within the current planning period (by 2030) and proceed with beginning outreach with the community regarding sea level rise science, scenarios, and adaptation planning. Outreach may including GIS mapping and the production of easily understandable maps to distribute within the community, as well as initiating discussions with the community on how to plan for and adapt to sea level rise.</p>
<p><b>Related planning mechanisms</b></p>	<p>Select an independent resource to share with community members interested in understanding sea level rise information. Implement base elevation modifications for development based on sea level rise.</p> <p>Maps could be created showing past flooding events and further enhanced with estimated sea level rise projections to identify City-owned buildings and infrastructure would be impacted in future flooding events.</p>
<p><b>Other Alternatives</b></p>	<p>Reliance on vulnerability assessment in 2019 LHMP, CAP, Adaptive Management Plan</p>
<p><b>Responsible Office/ Agency</b></p>	<p>Public Works and Utilities Department</p>
<p><b>Partners</b></p>	<p>Sonoma County</p>
<p><b>Priority (High, Medium, Low)</b></p>	<p>Medium</p>
<p><b>Cost Estimate</b></p>	<p>\$50,000 - \$75,000</p>
<p><b>Benefits (Avoided Losses)</b></p>	<p>Reduces repetitive flooding, preservation of the built environment, and helps the City develop long-term climate resilience</p>
<p><b>Potential Funding</b></p>	<p>General fund, Caltrans SB-1 Climate Adaptation Planning Grant, Sonoma County Transportation Authority (SCTA) Funding, ABAG Funding, California Ocean Protection Council Funding (from Prop 1 funds), California Resilience Challenge Grant Competition</p>
<p><b>Schedule</b></p>	<p>2020-2024, or within five years</p>





***SLR-5 Assess sea level rise modelling and how current and best available projections can be routinely re-evaluated in subsequent climate adaptation planning efforts***

<b>Mitigation Project Title</b>	Assess sea level rise modelling used in the LHMP and how those projections can be routinely re-evaluated in subsequent climate adaptation planning efforts
<b>Hazard(s) Mitigated</b>	Sea level rise, flooding
<b>Project Description, Issue/Background</b>	<p>Sea level rise science continues to evolve and the best available science on sea level rise projections will change. Given the uncertainty in the magnitude and timing of future sea level rise, the City should use scenario-based analysis to examine a range of possible shoreline changes and sea level risks. A similar approach to reviewing climate change scenarios as they relate to other natural hazards, such as extreme heat, flooding, and wildfire risk could also be part of the routine assessment</p> <p>Selection of sea level rise scenario modelling (current best available data for the City of Petaluma Planning Area includes 25 cm, 75 cm, 200 or 300 cm scenarios with and without 100-year coastal flood event) or scenarios based on planning horizons will help guide the City in sea level rise planning efforts.</p> <p>This action could also use sea level rise projections during routine review of applications for new development to ensure new development proposals incorporate adequate protection (e.g. setbacks, armoring) in site plans.</p>
<b>Related planning mechanisms</b>	General Plan 2025, 2015 FMP, Climate Action 2020 and Beyond: Regional Sonoma County CAP (not adopted)
<b>Other Alternatives</b>	City selects sea level rise scenario elevations and produces maps of impacted areas to share with the community.
<b>Responsible Office/ Agency</b>	Public Works and Utilities Department
<b>Partners</b>	Sonoma County, SCTA
<b>Priority (High, Medium, Low)</b>	Low
<b>Cost Estimate</b>	\$100,000
<b>Benefits (Avoided Losses)</b>	Avoiding damage and replacement needs of city buildings and infrastructure, as well as private property.
<b>Potential Funding</b>	General fund, Caltrans SB-1 Climate Adaptation Planning Grant
<b>Schedule</b>	2020-2024





## **SLR-6      *Update City Implementing Zoning Ordinance (IZO) to manage development in high risk areas***

<b>Mitigation Project Title</b>	Update City Implementing Zoning Ordinance (IZO) to manage development in high risk areas
<b>Hazard(s) Mitigated</b>	Sea level rise, flooding
<b>Project Description, Issue/Background</b>	The City of Petaluma sits mainly in the flattest portion of the watershed basin. The Petaluma River bisects the town and is the main waterway collecting all the runoff from the various streams in the watershed. The area around the river and larger streams are more prone to disaster from flooding. Sea level rise may increase the intensity and frequency of disaster from flooding. Updating zoning tools in these areas can minimize flooding related disasters. The City of Petaluma would also consider updating the IZO and Municipal Code for consistency with the LHMP and General Plan Health and Safety Element.
<b>Related planning mechanisms</b>	Update zoning tools, including the City of Petaluma IZO regardless of sea level rise impacts; General Plan 2025
<b>Other Alternatives</b>	Existing IZO Ordinance
<b>Responsible Office/ Agency</b>	Planning Department, City Engineer
<b>Partners</b>	None
<b>Priority (High, Medium, Low)</b>	Low
<b>Cost Estimate</b>	\$100,000
<b>Benefits (Avoided Losses)</b>	Reduce Repetitive flooding in flood hazard zones that may be exacerbated by sea level rise.
<b>Potential Funding</b>	General Fund
<b>Schedule</b>	2020-2024





**SW-1      *Replace aging generator and plan for severe weather by obtaining backup generators at City critical facilities, including the Emergency Communications Center***

<b>Mitigation Project Title</b>	Replace aging generator and plan for severe weather by obtaining backup generators at City critical facilities, including the Emergency Communications Center
<b>Hazard(s) Mitigated</b>	Severe Weather: Heavy Rains/Thunderstorms/Hail/Lightning/Dense Fog; Severe Weather: High Wind; Severe Weather: Extreme Heat; Earthquake; Severe Weather: Extreme Heat; Wildfire
<b>Project Description, Issue/Background</b>	Generator replacement can minimize the effects of power outages during earthquake, extreme heat, severe storms, wildfire, and high wind hazard events in the City, as they will supply back-up power during a power outage. City facilities will also need backup power during “planned” PSPS. The City will need reliable emergency backup power when Pacific Gas & Electric (PG&E) power lines are affected by natural hazard events.  This action would ensure the City obtains diesel powered generators in select locations at City critical facilities to ensure electrical power is provided for essential services, as well as the City’s primary evacuation shelter, the Petaluma Community Center. It would also ensure the City replaces aging generators at key locations, such as the City Police Department and Emergency Communications Center.
<b>Related planning mechanisms</b>	Coordination with EOC staff, 2007 Emergency Operations Plan
<b>Other Alternatives</b>	None
<b>Responsible Office/ Agency</b>	Public Works and Utilities Department
<b>Partners</b>	Police Department, Parks and Recreation Department, Fire Department, City Manager
<b>Priority (High, Medium, Low)</b>	Medium
<b>Cost Estimate</b>	\$20,000-\$50,000 per generator depending on power needs
<b>Benefits (Avoided Losses)</b>	Reliable and emergency backup power will reduce the risk of property damage and increased life safety.
<b>Potential Funding</b>	General Fund
<b>Schedule</b>	2022-2025





**SW-2      *Establish resiliency hub at City Community Center to be used during severe weather events involving heat waves and wildfires***

<b>Mitigation Project Title</b>	Establish resiliency hub at City Community Center to be used during severe weather events involving heat waves and wildfires. Resiliency hubs or cooling centers should also accommodate sensitive receptors that may be susceptible to poor air quality.
<b>Hazard(s) Mitigated</b>	Severe Weather: Extreme Heat
<b>Project Description, Issue/Background</b>	<p>Climate change is expected to result in longer droughts and longer days of extreme heat. Extreme heat can also disproportionately affect the health of vulnerable populations in the City of Petaluma.</p> <p>This action involves establishing the City Community Center and Petaluma Senior Center located at Lucchesi Park to function as a cooling center, or “resiliency hub” or “safe place” during severe weather events, involving heat waves, poor air quality, and wildfires. A resiliency hub would accommodate sensitive receptors that may be susceptible to poor air quality and respiratory illness. A central and well-used existing community-serving facility location for a cooling center or resiliency hub, such as the City Community Center and Petaluma Senior Center would ensure residents in the community can easily access the facility by public transit and alternative modes of transportation. The resiliency hub would also have other essential resources, such as food, water, ice, refrigeration, medical supplies, charging stations, and back-up power. Currently, neither of these facilities have back-up power and could not function as cooling centers during power outages; PSPS or actual power outages. This action would therefore also entail obtaining sufficient back-up power at each facility.</p> <p>This action involves associated outreach to ensure the vulnerable segments of the local population (e.g. people with disabilities, elderly, low-income) and the local homeless population are aware of the resiliency hub and are able to access it during extreme heat events. Outreach would specifically focus on making sure the public knows where to go to find relief from extreme heat events, poor air quality days, and wildfire events using social media, traditional media, and printed materials/handouts. This includes ensuring there is accessible transportation during extreme heat events, and an appropriate number of resiliency hubs in the City. The action would also involve coordination with local homeless services to ensure that the homeless population is aware of the City’s resiliency hub services.</p> <p>The City could work with Sonoma County Department of Health Services Public Health Division and Petaluma Valley Hospital to build outreach capacity to better engage vulnerable and disadvantaged segments of the</p>







	City's population that may need to rely on resiliency hubs or cooling centers and other facilities during extreme heat events.
<b>Related planning mechanisms</b>	General Plan 2025
<b>Other Alternatives</b>	Expand availability of cooling centers to include space for pets
<b>Responsible Office/ Agency</b>	Parks and Recreation Department, Public Works and Utilities Department
<b>Partners</b>	Sonoma County Department of Health Services Public Health Division, Sonoma County Homeless Services, Petaluma Valley Hospital
<b>Priority (High, Medium, Low)</b>	Medium
<b>Cost Estimate</b>	\$50,000
<b>Benefits (Avoided Losses)</b>	Protecting life, particularly sensitive receptors and vulnerable populations, such as elderly and residents with respiratory illness in the City of Petaluma during heat events
<b>Potential Funding</b>	City, County, state, and federal funds, Transformative Climate Communities Grant, Emergency Solutions Grants (ESG) Program (funds homeless and improves quality of emergency shelters for homeless), possible PG&E grant funds
<b>Schedule</b>	Ongoing, 2020-2024





### ***SW-3 Enhance local building code to incorporate wind-resistant design features that address wind hazards***

<b>Mitigation Project Title</b>	Enhance local building code to incorporate wind-resistant design features that address wind hazards
<b>Hazard(s) Mitigated</b>	Severe Weather: High Wind; Public Safety Power Shutdown PSPS
<b>Project Description, Issue/Background</b>	<p>Enhance local building codes and ordinances to ensure that new structures and remodels or improvements to buildings and structures incorporate wind-resistant design features to withstand high winds and tornadoes. This action would prevent wind damage through revisions to the existing building code and adopting standards for residential construction in high-wind regions.</p> <p>Construction techniques may include requiring structural bracing, straps and clips, anchor bolts, and impact-resistant glass, reinforced garage doors, window shutters, and interlocking roof shingles. Requiring tie-downs with anchors and ground anchors for manufactured homes may also be appropriate. There are also various site and building design standards that could be considered to minimize wind damage in new residential developments.</p>
<b>Related planning mechanisms</b>	City Building Code, Municipal Code
<b>Other Alternatives</b>	None
<b>Responsible Office/ Agency</b>	Building Department
<b>Partners</b>	PG&E
<b>Priority (High, Medium, Low)</b>	Low
<b>Cost Estimate</b>	\$50,000
<b>Benefits (Avoided Losses)</b>	Protecting life and property in the City of Petaluma
<b>Potential Funding</b>	City, County, state, and federal funds
<b>Schedule</b>	Ongoing, 2020-2024





## **SW-4      *Develop a Public Safety Power Shutdown (PSPS) Toolkit for local businesses***

<b>Mitigation Project Title</b>	Develop a Public Safety Power Shutdown (PSPS) toolkit for local businesses
<b>Hazard(s) Mitigated</b>	Severe Weather: High Wind; PSPS
<b>Project Description, Issue/Background</b>	<p>PG&amp;E is expected to conduct PSPS during high winds and dry conditions and generally a heightened fire risk forecast. The outages could last several days, and PG&amp;E has suggested customers be prepared for outages that could last longer than 48 hours. A majority of Sonoma County could be affected by the power outages including almost the entirety of the City of Petaluma.</p> <p>The City of Petaluma has been proactive with sharing information on the City PSPS website providing tips for citizens to prepare and make plans for their families. The City has opened community shelters, and coordinated with the school districts on school closures and which areas of the City are impacted. This action will expand the existing public information to provide resources and tips for local businesses to be able to continue business operations during PSPS events.</p>
<b>Related planning mechanisms</b>	Traditional outreach materials, including printed informational handouts and brochures that are available at the City offices.
<b>Other Alternatives</b>	Use City website
<b>Responsible Office/ Agency</b>	Public Works and Utilities Department, Economic Development
<b>Partners</b>	Chamber of Commerce, Petaluma Downtown Business Association
<b>Priority (High, Medium, Low)</b>	Low
<b>Cost Estimate</b>	\$10,000
<b>Benefits (Avoided Losses)</b>	Avoid economic losses
<b>Potential Funding</b>	General Fund
<b>Schedule</b>	2020-2022





**W-1      *Establish a Defensible Space Funding Program***

<b>Mitigation Project Title</b>	Establish a Defensible Space Funding Program
<b>Hazard(s) Mitigated</b>	Wildfire
<b>Project Description, Issue/Background</b>	<p>California has a long history of wildfire, and the destruction and effects are growing more intense, frequent, and developing into a year-round problem. California law requires landowners in areas with flammable groundcover to maintain defensible space around buildings that can help slow or prevent the spread of wildfire. Petaluma has an area within the City limits that is a designated wildfire urban interface (WUI) and high fire hazard severity zone (FHSZ). The City is also surrounded on the west side by moderate FHSZ and hilly topography, which currently consists of rural residential development and open space.</p> <p>The State of California has implemented specific requirements for new buildings within these zones that mandates fire safe building practices, landscaping, and design. Some jurisdictions throughout the State are implementing stricter codes and requirements specific to their jurisdiction. The City of Petaluma has minimally expanded those requirements. There may be a benefit to expanding those requirements further. Additionally, the limited staff and resources currently deployed in the Fire Prevention Bureau do not have the capacity for education, enforcement or assistance for the community to improve their defensible space.</p> <p>This action will establish a funding program for the City and the community to implement defensible space in the WUI. The program will include the identification of defensible space funding and grant opportunities, incentives for private landowners to conduct brush clearing and home hardening, project implementation tools (e.g. vegetation clearing), and a long-term management program for WUI areas around the City. The program will prioritize defensible space projects that may include brush removal and prescribed burns, while also working with the community to reduce fuel loads on private property. The City would also work with local fire protection agencies to promote structure hardening and retrofitting , and other mitigation techniques summarized in Cal FIRE’s Wildfire Mitigation Program.</p>
<b>Related planning mechanisms</b>	2007 Emergency Operations Plan, Community Wildfire Protection Plan
<b>Other Alternatives</b>	Remain status quo in minimal education, engineering and enforcement policies/programs for the WUI area.
<b>Responsible Office/ Agency</b>	Fire Department
<b>Partners</b>	Sonoma County, Cal FIRE
<b>Priority (High, Medium, Low)</b>	Medium





<b>Cost Estimate</b>	Depends on program
<b>Benefits (Avoided Losses)</b>	Limited/lesser wildfire damage, community engagement.
<b>Potential Funding</b>	General Fund, Cal FIRE Fuel Reduction Project Grants, Cal FIRE Forest Health Grants, FEMA HMPG, Wildfire Mitigation Financial Assistance Program (Fire Hardened Homes Revolving Loan Fund)
<b>Schedule</b>	2020-2024; Implementation depends on prioritization and resources





## **W-2      *Develop a City-wide Fire Suppression Master Plan***

<b>Mitigation Project Title</b>	Develop a City-wide Fire Suppression Master Plan
<b>Hazard(s) Mitigated</b>	Wildfire
<b>Project Description, Issue/Background</b>	<p>The City's fire suppression water system is an integral part of the Fire Department operations and Fire Prevention planning. There are several areas within the City's water system with low fire-flow. Currently, there is not a system, map, or other record retention system where the Fire Prevention Bureau or Fire Department staff can access fire flow data from each fire hydrant in the City.</p> <p>This action would involve the development of a comprehensive City-wide fire suppression water system Master Plan to assess fire flow water capacity and how to upgrade the water system to accommodate projected changes in water availability and provide adaptability. While the five-year updates to the UWMP address future conditions and community water demand, a City-wide Fire Suppression Master Plan would address water supply needs for fire suppression, assess water supply capacity for fire response within the City's Planning Area, and use the plan recommendations to upgrade the system to improve the City's water system's adaptability to urban fire and wildfire hazards. Appropriate retrofits to the City's water system, specific to fire suppression infrastructure can help the City and community be better prepared and ensure there is adequate water supply, suppression capabilities, and fewer disruptions to water services.</p>
<b>Related planning mechanisms</b>	2007 Emergency Operations Plan
<b>Other Alternatives</b>	2015 UWMP
<b>Responsible Office/ Agency</b>	Fire Department, Fire Prevention Bureau, Public Works and Utilities Department
<b>Partners</b>	Mutual Aid Providers, Sonoma County, California Department of Forestry and Fire (Cal FIRE)
<b>Priority (High, Medium, Low)</b>	Medium
<b>Cost Estimate</b>	\$150,000
<b>Benefits (Avoided Losses)</b>	A system where each fire hydrant fire flow and pressure is identified would provide valuable information for pre-planning for emergency incidents. This would also increase the City's ISO rating.
<b>Potential Funding</b>	General Fund, Capital Improvement Funds, Water and Wastewater Infrastructure Improvement Grants, State Water Resources Control Board: Clean Water State Revolving Fund, Water Enterprise
<b>Schedule</b>	2020-2024





### **W-3 Evaluate Wildland Urban Interface Zone in the City Limits**

<b>Mitigation Project Title</b>	Evaluate the WUI Zone in the City Limits
<b>Hazard(s) Mitigated</b>	Wildfire
<b>Project Description, Issue/Background</b>	<p>California has a long history of wildfire, and the destruction and effects are growing more intense, frequent, and developing into a year-round problem. Within the Petaluma city limits there is a designated WUI and high FHSZ. The City is also surrounded on the west side by a moderate FHSZ and hilly topography that consists of rural residential development, undeveloped hillsides, and open space (see Figure 4-19 and 4-20 in Chapter 4). Wildland fires west of the City could be exacerbated by prevailing winds.</p> <p>California has implemented specific requirements for new buildings within the WUI and FHSZs and some jurisdictions throughout the State are implementing stricter codes and requirements specific to their jurisdiction. The City of Petaluma has minimally expanded those requirements, but there may be a benefit to substantially expanding those requirements further. Government Code Sections 65302 subdivision (g)(3) and 65302.5 subdivision (b) require the General Plan Safety Element to address the risk of fire for land classified as SRAs and land classified as very high FHSZ. Additionally, the limited staff and resources currently deployed in the Fire Prevention Bureau do not have the capacity for education, enforcement or assistance for the community to improve their defensible space. The Petaluma Fire Department wildland apparatus is limited to a Type VI pick-up mounted pumper. It may be beneficial to have more wildland specific equipment to avoid wildfire hazards within the WUI. As wildland fire characteristics continue to change, the capabilities, resources, policies and programs need to be re-evaluated to assure the community has the most appropriate protection.</p> <p>This action involves an evaluation of the WUI zone and high and very high FHSZs in the City limits and surrounding areas to develop a comprehensive plan to protect City buildings and infrastructure (building codes, Type 3 Fire engine, water supply, access roads). The evaluation of the extent of the WUI within the City limits and the surrounding unincorporated areas will allow the City to develop a comprehensive plan to protect people, property, and infrastructure. The evaluation would identify the potential for fires to occur within and surrounding new and existing development. The evaluation would address wildfire probability using metrics, such as fire history, fire threat, response time, proximity to the WUI, fuel reduction projects, and mutual aid coordination. The evaluation would also address building codes, the need for a Type 3 fire engine, water supplies, and road accessibility.</p> <p>This action acknowledges the pending Cal FIRE mapping of the SRA and land use distribution within very high FHSZs within the City limits. The</p>





	<p>action would also involve review of construction methods for new facilities in SRAs and very high FHSZs (if applicable), safe access for emergency response (street signs, water supply, and fire suppression), and identification of a minimum of two evacuation routes for neighborhoods in the City of Petaluma.</p> <p>Upon adoption of the LHMP, the City shall align the General Plan Health and Safety Element (Chapter 10 of General Plan) with the LHMP and Government Code Sections 65302 subdivisions (g)(3) and Section 65302.5 that address state legislation, such as SB 2911, SB 1241, and pending Cal FIRE FHSZ map updates. This state legislation requires additional fire safe building practices and fire safe design, and pending changes to the Cal FIRE FHSZ maps may impose additional requirements in areas prone to wildfire. The City Fire Department and Fire Prevention Bureau should review the updated maps and policies to ensure they align with the new legislation.</p>
<b>Related planning mechanisms</b>	2007 Emergency Operations Plan, Community Wildfire Protection Plan
<b>Other Alternatives</b>	None
<b>Responsible Office/ Agency</b>	Fire Department, Fire Prevention Bureau
<b>Partners</b>	Mutual Aid Providers, Sonoma County, Cal FIRE
<b>Priority (High, Medium, Low)</b>	Medium
<b>Cost Estimate</b>	\$25,000
<b>Benefits (Avoided Losses)</b>	Less wildfire damage, improved understanding of revised Cal FIRE mapping should enable the City to better prepare for wildland fires, and increase capabilities to respond to wildfire events. .
<b>Potential Funding</b>	FEMA Hazard Mitigation Grant Program
<b>Schedule</b>	2020-2024







## **W-4      *Install Fire Protection System in all City facilities***

<b>Mitigation Project Title</b>	Install Fire Protection System in all City facilities
<b>Hazard(s) Mitigated</b>	Urban Fires, Wildfire
<b>Project Description, Issue/Background</b>	The City needs to install an updated fire protection system in accordance with current fire code within all City facilities. This action would provide funding for the installation of the required systems in all City-owned facilities. Fire system upgrades would first occur in designated critical facilities.
<b>Related planning mechanisms</b>	2007 Emergency Operations Plan
<b>Other Alternatives</b>	Build new facilities compliant with current fire code.
<b>Responsible Office/ Agency</b>	Public Works and Utilities Department, Fire Prevention Bureau, Building Department
<b>Partners</b>	None
<b>Priority (High, Medium, Low)</b>	Medium
<b>Cost Estimate</b>	Will depend on building being retrofitted
<b>Benefits (Avoided Losses)</b>	Prevention of injury or loss of life, prevention of facility and file destruction, and the prevention of delay in employee work status due to facility destruction.
<b>Potential Funding</b>	Homeland Security Grants
<b>Schedule</b>	Depends on facility replacement.





## **W-5 Wildland Urban Interface Pre-Fire Plan**

<b>Mitigation Project Title</b>	Wildland Urban Interface Pre-Fire Plan
<b>Hazard(s) Mitigated</b>	Wildfire
<b>Project Description, Issue/Background</b>	As wildland fires spread more rapidly with a drier climate, increased heat days, drought and strong north winds, pre-planning hazard areas, access points, and locations to fight fire are important to ensure a more efficient response and deployment of resources. Cal FIRE has created “pre-fire plans” for other areas of Sonoma County which were used during 2017 and 2019 to better plan and organize responses and tactics. The development of a WUI Pre-Fire Plan will help the City better prepare for future wildfires.
<b>Related planning mechanisms</b>	2007 Emergency Operations Plan, Existing Pre-Fire Plans used in 2017 and 2019 during wildfires, Community Wildfire Protection Plan
<b>Other Alternatives</b>	Continue to use standard mapping and be more reactionary to wildland threats once the fire has started.
<b>Responsible Office/ Agency</b>	Fire Department
<b>Partners</b>	Cal FIRE
<b>Priority (High, Medium, Low)</b>	High
<b>Cost Estimate</b>	General Fund, Staff time for Coordination time with Cal FIRE
<b>Benefits (Avoided Losses)</b>	This will increase effectiveness and coordination of response to wildland urban interface fires in or around the community.
<b>Potential Funding</b>	Cal FIRE funding, Proposition 84 Wildfire Resiliency and Recovery Planning Grants (administered through California’s Strategic Growth Council, Office of Planning and Research, and Department of Conservation)
<b>Schedule</b>	By 2020, specifically next fire season





## **MH-1      *Evacuation Alert and Warning System and Annual Testing***

<b>Mitigation Project Title</b>	Evacuation Alert and Warning System and Annual Testing <i>(Strategy #GOVT-b-14 and Strategy #GOVT-b-15 from 2010 LHMP Annex)</i>
<b>Hazard(s) Mitigated</b>	Multi-Hazard, Earthquake, Flood, Hazardous Materials, Wildfire
<b>Project Description, Issue/Background</b>	<p>The City currently has few routes leading out of downtown Petaluma. During an accident or disaster impacts on these transportation routes could negatively impact the health of persons in our community. It is important to be able to notify the public when they need to take action to protect themselves, whether sheltering-in-place, or evacuating. Emergency notification systems are a critical type of communication that let people know of potential and impending disaster events.</p> <p>The installation of an alert warning system with outdoor sirens and coordinating their use with neighboring jurisdictions was a mitigation action included in the 2005 and 2010 LHMP Annex. Previous studies showed that the City's warning systems are not an effective tool in Petaluma due to the nature of the natural disasters anticipated in the area. Sirens are a common warning device for coastal areas that have some, but little warning of a natural disaster, specifically with tsunamis. In Petaluma, the greatest major natural disaster threat: an earthquake has zero warning signs. Flood hazards usually have several days of warning notice. The City, however, has several other hazards that could result in regional disasters, as well as several industrial sites that during an accident or disaster could release hazardous material that would negatively impact the health of persons in the community and where an alert warning system would be beneficial.</p> <p>While the City currently notifies the public about how to best prepare for natural disasters before they occur through the radio, television, phone-based warning systems (i.e. Strategy #GOVT-b-22 in 2010 LHMP Annex), and other media outlets, it is important to be able to notify the public when they need to take action to protect themselves, whether sheltering-in-place or following evacuation procedures, and how they can make recovery easier.</p> <p>This action would consist of the installation of an evacuation alert and warning system that includes coordination with neighboring jurisdictions and effectively educating the community about the evacuation alert system. The evacuation and alert system would be designed and implemented so that it reaches the needs of segments of the community with functions needs, such as vision or hearing-related disabilities by ensuring there are alternative means for these people to receive information. Once installed, the alert and warning system would also involve conducting annual tests of the outdoor sirens (e.g. once per month). This periodic testing of the outdoor sirens was also part of a mitigation action included in the 2005 and 2010 LHMP Annex (Strategy #GOVT-b-15).</p>





<b>Related planning mechanisms</b>	2007 Emergency Operations Plan
<b>Other Alternatives</b>	Continued use of emergency alert phone calls, text messages, and social media to notify the community. Other alternatives include adding high-lo sirens to emergency vehicles.
<b>Responsible Office/ Agency</b>	Police Department, Fire Department
<b>Partners</b>	Sonoma County, Neighboring Jurisdictions, Community-Based Organizations
<b>Priority (High, Medium, Low)</b>	Low
<b>Cost Estimate</b>	\$25,000 Annually
<b>Benefits (Avoided Losses)</b>	A sure-fire way to notify the public when they need to immediately take action will lead to many more persons notified, a more rapid reaction, and decrease the number of people exposed to potential hazard events.
<b>Potential Funding</b>	General Fund
<b>Schedule</b>	2020-2022





**MH-2 Periodically assess the need for new or relocated fire or police stations and other emergency facilities, changes in staffing levels, and need for supplies, equipment, technologies, and in-service training classes**

<b>Mitigation Project Title</b>	Periodically assess the need for new or relocated fire or police stations and other emergency facilities, changes in staffing levels, and need for supplies, equipment, technologies, and in-service training classes <i>(Strategy #GOVT-a-7 from 2010 LHMP Annex)</i>
<b>Hazard(s) Mitigated</b>	Multi-Hazard, Flood, Earthquake, Wildfire, Sea Level Rise
<b>Project Description, Issue/Background</b>	As one of the high priority mitigation strategies from the 2010 LHMP Annex, this action ensures the City periodically assess the need for new or relocated fire and police stations, as well as other emergency facilities. Any upgrades associated with this action, as they relate to the EOC are detailed in MH-4.
<b>Related planning mechanisms</b>	2007 Emergency Operations Plan
<b>Other Alternatives</b>	Continued use of existing fire and police stations. Also assumed continued use of the existing EOC.
<b>Responsible Office/ Agency</b>	Police Department, Fire Department, Public Works and Utilities Department
<b>Partners</b>	Sonoma County
<b>Priority (High, Medium, Low)</b>	Medium
<b>Cost Estimate</b>	Based on need for new fire or police station, which can vary according to property values and construction costs.
<b>Benefits (Avoided Losses)</b>	New or relocated fire and police stations can ensure quick response times, which would reduce the loss of life and property associated with natural and human-caused hazards.
<b>Potential Funding</b>	General Fund
<b>Schedule</b>	2020-2024





### ***MH-3 Develop and maintain a system of interoperable communications for first responders from local, state, and federal agencies***

<b>Mitigation Project Title</b>	Develop and maintain a system of interoperable communications for first responders from local, state, and federal agencies <i>(Strategy GOVT-a-9 in 2010 LHMP Annex)</i>
<b>Hazard(s) Mitigated</b>	Multi-Hazard, Flood, Earthquake, Wildfire
<b>Project Description, Issue/Background</b>	As one of the high priority mitigation strategies from the 2010 LHMP Annex, this action involves developing and maintaining a system of interoperable communication for first responders to use to support disaster response and recovery efforts during disaster events. The communications system would be used by the EOC during disaster events and would be managed by the City's Fire Department.
<b>Related planning mechanisms</b>	2007 Emergency Operations Plan
<b>Other Alternatives</b>	Mutual Aid Agreements
<b>Responsible Office/ Agency</b>	Fire Department, Police Department
<b>Partners</b>	Sonoma County, Neighboring Jurisdictions
<b>Priority (High, Medium, Low)</b>	High
<b>Cost Estimate</b>	\$15,000
<b>Benefits (Avoided Losses)</b>	An effective and interoperable communication system would improve the execution of emergency procedures coordinated among federal, state, local agency and volunteer first responder staff.
<b>Potential Funding</b>	General Fund, staff time
<b>Schedule</b>	2020-2024





## **MH-4 Update the City Emergency Operations Plan**

<b>Mitigation Project Title</b>	Update the City Emergency Operations Plan
<b>Hazard(s) Mitigated</b>	Multi-Hazard; Dam Incidents; Earthquake; Severe Weather: Extreme Heat; Severe Weather: Heavy Rains/Thunderstorms/Hail/Lightning/Dense Fog; Severe Weather: High Winds; Wildfire; Hazardous Material Releases; Cyber Threat
<b>Project Description, Issue/Background</b>	The City's EOP was last updated in 2007. It includes a basic plan that addresses the City of Petaluma's responsibilities in emergencies associated with natural disaster, human-caused emergencies, and technological incidents. It provides a framework for coordination of response and recovery efforts within the City and in coordination with local, state, and federal agencies. The plan establishes emergency organization staff to direct and control operations during a period of emergency by assigning responsibilities to specific personnel. The scope of the plan addresses earthquakes, hazardous materials emergencies, flooding, and wildfires. The plan is now dated and does not address all potential hazards in today's world. A comprehensive update of the EOP would ensure it addresses all hazards covered in the General Plan 2025 Health and Safety Element and the 2019 LHMP and provides a more user-friendly plan document for the City.
<b>Related planning mechanisms</b>	General Plan 2025 Health and Safety Element, 2007 Emergency Operations Plan
<b>Other Alternatives</b>	2007 Emergency Operations Plan
<b>Responsible Office/ Agency</b>	Fire Department
<b>Partners</b>	Sonoma County Neighboring Jurisdictions, Mutual Aid Providers
<b>Priority (High, Medium, Low)</b>	High
<b>Cost Estimate</b>	\$80,000
<b>Benefits (Avoided Losses)</b>	An updated plan that consists of training all EOC staff on the plan would help us better identify, prepare, and respond to incidents in a more efficient and productive manner. An updated EOP would also reduce the negative impacts on our community and more rapidly returning City services to normal.
<b>Potential Funding</b>	General Fund
<b>Schedule</b>	2020-2022





## **MH-5      *Emergency Operations Center Replacement and Upgrades***

<b>Mitigation Project Title</b>	Emergency Operations Center Replacement and Upgrades
<b>Hazard(s) Mitigated</b>	Multi-Hazard; Dam Incidents; Earthquake, Extreme Heat, Flood; Severe Weather: Heavy Rains/Thunderstorms/Hail/Lightning/Dense Fog; Severe Weather: High Winds; Wildfire; Hazardous Material Releases; Cyber Threat
<b>Project Description, Issue/Background</b>	The City's EOC currently utilizes the police briefing room and surrounding normally occupied offices. Technology, including phones and computers need to be set-up, tables moved, supplies moved from a small towable trailer in the parking lot to inside, and normal police operations changed in order to utilize the EOC. The EOC needs to be in a more functional work-space that also has permanent phones, computers, and other technology.
<b>Related planning mechanisms</b>	2007 Emergency Operations Plan
<b>Other Alternatives</b>	Continued use of the current space in the police briefing room and operations as usual.
<b>Responsible Office/ Agency</b>	Public Works and Utilities Department
<b>Partners</b>	Sonoma County Neighboring Jurisdictions, Mutual Aid Providers
<b>Priority (High, Medium, Low)</b>	High
<b>Cost Estimate</b>	\$150,000
<b>Benefits (Avoided Losses)</b>	A more functional and permanent workplace would drastically speed up the time needed to make the EOC operational and would increase work efficiencies once in place. A new or upgraded EOC would also reduce the impacts on the police department personnel and operations.
<b>Potential Funding</b>	General Fund
<b>Schedule</b>	2020-2022







## **MH-6      *Expand Community Emergency Prep Program***

<b>Mitigation Project Title</b>	Expand Community Emergency Prep Program
<b>Hazard(s) Mitigated</b>	Multi-Hazard; Dam Incidents; Earthquake, Extreme Heat, Flood; Severe Weather: Heavy Rains/Thunderstorms/Hail/Lightning/Dense Fog; Severe Weather: High Winds; Wildfire; Hazardous Material Releases; Cyber Threat
<b>Project Description, Issue/Background</b>	<p>The City began expanding its community disaster preparation outreach following the 2017 fires to include four quarterly educational sessions per year. The program Citizens Organized to Prepare for Emergencies (COPE) is to encourage residents, families, and neighborhoods to become and remain better prepared to respond to and recover from emergency situations. It is a current program at the City and includes developing individual response plans, maintaining individual emergency supply kits, and ensuring neighbors get to know and plan with other neighbors in their community.</p> <p>The community would like more educational sessions and has expressed interest in a Community Emergency Response Team (CERT) type program. The City has held discussions with other emergency coordinators and Sonoma County about a county-wide program. The initial theory is to train persons that could later be used as volunteers, coordinated through the county volunteer center, to assist in non-operational responses during disaster such as shelter set-up/staffing.</p>
<b>Related planning mechanisms</b>	Existing public outreach and awareness programs
<b>Other Alternatives</b>	Existing COPE Program; CERT program; Continue provide quarterly awareness trainings
<b>Responsible Office/ Agency</b>	Fire Department
<b>Partners</b>	Sonoma County Neighboring Jurisdictions, Mutual Aid Providers
<b>Priority (High, Medium, Low)</b>	Low
<b>Cost Estimate</b>	\$25,000
<b>Benefits (Avoided Losses)</b>	An educated and prepared community will be less dependent on services when demand is high during disaster. By training and coordinating volunteers, staffing to provide essential services can be surged to meet the demand and improve support to community members.
<b>Potential Funding</b>	General Fund
<b>Schedule</b>	2020-2024





## **MH-7      *Community Emergency Preparedness Webpage***

<b>Mitigation Project Title</b>	Community Emergency Preparedness Webpage
<b>Hazard(s) Mitigated</b>	Multi-Hazard; Dam Incidents; Earthquake, Extreme Heat, Flood; Severe Weather: Heavy Rains/Thunderstorms/Hail/Lightning/Dense Fog; Severe Weather: High Winds; Wildfire; Hazardous Material Releases; Cyber Threat
<b>Project Description, Issue/Background</b>	<p>Members of Petaluma rely on the City for information related to how they can be better prepared for disaster. The City has substantial information currently on its website. The content should be better consolidated and streamlined to make it easier to read and understand. Not all people or businesses that need this information have access to the internet, including segments of the population that are considered social disadvantaged (e.g. low income, language barriers, etc.). The City should convey emergency preparedness information to a wide audience, including the business community, which means developing communication tools in many different formats and languages, if needed.</p> <p>Printed and digital material regarding all types of emergencies and disaster placed at important targeted sites in the City would help educate the community. The City would develop emergency preparedness outreach materials that address differences in adaptive capacity, as some community members in Petaluma may need financial assistance, or help accessing both printed and digital information. This action would involve developing an advisory group of community members who can address social equity issues and provide regular outreach within the community. It would also involve collaboration with regional partners that support resiliency through preparedness education and training.</p>
<b>Related planning mechanisms</b>	Traditional outreach materials, including printed informational handouts and brochures that are available at the City offices.
<b>Other Alternatives</b>	Continued referral to the City website
<b>Responsible Office/ Agency</b>	City Manager’s Office
<b>Partners</b>	Sonoma County, Neighboring Jurisdictions, Mutual Aid Providers, Community-Based Organizations, Community Foundation Sonoma County
<b>Priority (High, Medium, Low)</b>	Low
<b>Cost Estimate</b>	\$25,000
<b>Benefits (Avoided Losses)</b>	An educated and prepared community will be less dependent on services when demand is high during disaster. By training and coordinating volunteers, staffing to provide essential services can be coordinated to meet the demand and improve support to community members, particularly socially disadvantaged populations.
<b>Potential Funding</b>	General Fund
<b>Schedule</b>	2020-2024





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## 6 Plan Adoption

*44 U.S. CFR Requirement §201.6 Local Mitigation Plans (c)(5): The local hazard mitigation plan shall include] documentation that the plan has been formally approved by the governing body of the jurisdiction requesting approval of the plan (e.g., City Council, county commissioner, Tribal Council).*

The purpose of formally adopting this plan is to confirm support from the City of Petaluma, raise awareness of the plan, and formalize the plan's implementation. The adoption of this plan completes Planning Step 9 of the 10-step planning process: Adopt the Plan, in accordance with the requirements of DMA 2000. This adoption also establishes compliance with California Government Code Section 65302.6 (Assembly Bill 2140) requiring adoption by reference or incorporation into the safety element of the general plan. The Petaluma City Council has adopted this local hazard mitigation plan by passing a resolution. A copy of the generic resolution is included in Appendix D: Adoption Resolution. Once the plan is adopted, Appendix D will include the executed copies.





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## 7 Plan Implementation and Maintenance

*44 U.S. CFR Requirement §201.6 Local Mitigation Plans (c)(4): 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.*

Implementation and maintenance of the plan is critical to the overall success of hazard mitigation planning. This is Planning Step 10 of the 10-step planning process. This chapter provides an overview of the overall strategy for plan implementation and maintenance, and outlines the method and schedule for monitoring, updating, and evaluating the plan. The chapter also discusses incorporating the plan into existing planning mechanisms and how to address continued public involvement.

### 7.1 Implementation

Once adopted, the plan faces the test of its worth: implementation. While this plan contains many worthwhile actions, the City of Petaluma will need to decide which action(s) to undertake first. Two factors will help with making that decision: the priority assigned to each action and funding availability. Low or no-cost actions more readily demonstrate progress toward successful plan implementation. Mitigation is most successful when it is incorporated into the day-to-day functions and priorities of government and development.

Implementation will be accomplished by adhering to the schedules identified for each action (see Chapter 5 Mitigation Actions) and through constant and energetic efforts to update and highlight the multi-objective, win-win benefits of each project to the City of Petaluma community and its stakeholders. These efforts include the routine actions of monitoring agendas, attending meetings, and promoting a safe, sustainable, and resilient community. The four main components of implementation are:

- **Implement** the actions recommended by this plan;
- **Utilize** and enforce existing rules, regulations, policies and procedures;
- **Communicate** the hazard information collected and analyzed through this planning process so that the community better understands what and where hazards can occur, and what they can do themselves to be better prepared; and
- **Publicize** the “success stories” that are achieved through the Hazard Mitigation Planning Committee’s (HMPC) ongoing efforts.

An important implementation mechanism that is highly effective and low-cost is incorporation of the hazard mitigation plan recommendations and their underlying principles into other plans, such as the City of Petaluma General Plan 2025 and the Floodplain Management Plan (FMP). The City of Petaluma already implements policies and programs to reduce losses to life and property from hazards. This plan builds upon the momentum developed through previous and related planning efforts and mitigation programs, such as the FMP, and recommends implementing actions, where possible, through these other program mechanisms.

Simultaneously with these efforts, it is important to constantly monitor funding opportunities that can be leveraged to implement the more expensive recommended actions (for example, structural flood control projects). This will include creating and maintaining a bank of ideas on how to meet local match or





participation requirements. When funding does become available, the City of Petaluma will be in a position to capitalize on the opportunity. Funding opportunities to be monitored include special pre- and post-disaster funds, special district budgeted funds, state and federal earmarked funds, and other grant programs, including those that can serve or support multi-objective applications.

### **7.1.1 Role of Hazard Mitigation Planning Committee in Implementation and Maintenance**

With adoption of this plan, the City of Petaluma will be tasked with plan implementation and maintenance. The City of Petaluma agrees to:

- Provide a forum for hazard mitigation issues;
- Disseminate hazard mitigation ideas and activities to all participants;
- Pursue the implementation of high-priority, low/no-cost recommended actions;
- Keep the concept of mitigation in the forefront of community decision making by identifying plan recommendations when other community goals, plans, and activities overlap, influence, or directly affect increased community vulnerability to disasters;
- Monitor multi-objective cost-share opportunities to help the community implement the plan's recommended actions for which no current funding exists;
- Assist in implementation and update of this plan;
- Report on plan progress and recommended changes to Petaluma City Council; and
- Inform and solicit input from the public.

The primary duty of the City of Petaluma is to see the plan successfully carried out and to report to the City Council and the public on the status of plan implementation and mitigation opportunities. Other duties include reviewing and promoting mitigation proposals, considering stakeholder concerns about hazard mitigation, passing concerns on to appropriate entities, and posting relevant information on the City of Petaluma LHMP webpage (and others as appropriate). These activities can be achieved through reconvening the HMPC on an annual basis.

## **7.2 Maintenance**

Plan maintenance is defined as the ongoing effort to monitor and evaluate plan implementation, and to update the plan as progress, roadblocks, or changing circumstances are recognized.

The Petaluma City Council, will designate a Lead Hazard Mitigation Manager who will coordinate plan reviews in consultation with the City's Public Works and Utilities Department and other participating jurisdictions and stakeholders.

### **7.2.1 Maintenance Schedule**

In order to monitor progress and update the mitigation strategies identified in the action plan, the Lead Hazard Mitigation Manager and the HMPC will revisit this plan annually and within 45 days after a hazard event. The annual review will be conducted by the HMPC each year. The HMPC will review progress on the LHMP and complete an annual update to the Petaluma City Council.

This plan will be also updated, approved and adopted within a five-year cycle as per Requirement §201.6(c)(4)(i) of the Disaster Mitigation Act of 2000 unless disaster or other circumstances (e.g., changing regulations) require a change to this schedule. With the initial approval of this plan occurring in late 2020, the plan will need to be updated, reviewed and approved by Cal OES and by FEMA Region IX, and re-





adopted by the City of Petaluma by no later than December of 2024 (or within 5 years of the initial approval, which ever date occurs first).

The City will monitor planning grant opportunities from Cal OES and FEMA for funds to assist with the update.

### 7.2.2 Maintenance Evaluation Process

The HMPC will continually monitor the incorporation process, evaluation and update methodology, continued public participation, and completion of the actions/projects to assure that the plan is being implemented. By monitoring these processes, the HMPC will be able to regularly evaluate the effectiveness of the plan and facilitate necessary changes as needed.

Evaluation of progress can be achieved by monitoring changes in vulnerabilities identified in the plan. Changes in vulnerability may include:

- Decreased vulnerability as a result of implementing recommended actions,
- Increased vulnerability as a result of failed or ineffective mitigation actions,
- Increased vulnerability as a result of new development (and/or annexation) and/or,
- Increased vulnerability as a result of new hazards or circumstances.

The HMPC will use the following process to evaluate progress of any changes in vulnerability as a result of plan implementation.

- A representative from the department identified in each mitigation action will be responsible for tracking project status and reporting to the HMPC on an annual basis to provide feedback on whether the mitigation action as implemented meets the defined objectives and is likely to be successful in reducing vulnerabilities.
  - If the project does not meet identified objectives, or if the mitigation action is new, the HMPC will determine what alternate mitigation actions (or projects) may be implemented, and an assigned individual will be responsible for facilitating and overseeing the scope of action definition. The assigned individual will make any required modification recommendations of the plan to the HMPC, implement the action, monitor the results of the action, and report the findings to the HMPC.
- Projects that were not ranked high priority but were identified as potential mitigation strategies will be reviewed for feasibility and continued appropriateness during the annual monitoring period and the 5-year updating of this plan.
- Changes will be made to the plan to accommodate for mitigation action projects that have failed or are not considered feasible after a review for their consistency with established criteria, the time frame, priorities, and/or funding resources.

Updating of the plan will be by written changes and submissions, as the City of Petaluma deems appropriate and necessary, and as approved by the Petaluma City Council. Updates to this plan will:

- Consider changes in vulnerability due to action implementation;
- Document success stories where mitigation efforts have proven effective;
- Document areas where mitigation actions were not effective;







- Document any new hazards that may arise or were previously overlooked;
- Document hazard events and impacts that occurred within the five-year period;
- Incorporate new data or studies on hazards and risks, specifically on climate change and its effects on flooding, sea level rise, and wildfires;
- Incorporate new capabilities or changes in capabilities;
- Incorporate documentation of continued public involvement;
- Incorporate documentation to update the planning process that may include new or additional stakeholder involvement;
- Incorporate growth and development-related changes to building inventories;
- Incorporate new project recommendations or changes in project prioritization;
- Include a public involvement process to receive public comment on the updated plan prior to submitting the updated plan to Cal OES and FEMA Region IX; and
- Include adoption by Petaluma City Council following Cal OES/FEMA approval.

### Annual Review

As part of an annual review process, the City's HMPC will provide opportunities for public input on the LHMP. The City and HMPC will schedule formal LHMP updates at regularly scheduled public meetings to ensure routine maintenance and plan evaluation. The LHMP is designed to be a living document that can be annually updated. Review will involve the following planning processes to encourage public participation, evaluate the effectiveness of the plan, and track mitigation action progress:

- Circulate a press release announcement on the annual review meeting. The press release will advertise the date, time, and location of the public meeting and provide contact information of the Lead Hazard Mitigation Manager.
- Electronic mailings regarding the annual review meeting will be emailed to federal, state, and local agencies, the HMPC, and other representatives.
- Prior to the annual review meeting, the HMPC and City departments will provide an update on their mitigation actions.
- The Lead Hazard Mitigation Manager will announce the meeting using other forms of traditional and digital media platforms, such as newspaper notices, radio announcements, and social media posts.
- A summary of the annual review meeting will be posted on the City's LHMP Webpage and include an annual report on the status of the implementation of the mitigation actions.

The review process should also include information on changing conditions in the City. Specifically, the update should note growth and development changes, the number of retrofitted buildings, or improved buildings with new base elevation certificates, natural hazard events and damage information, and major capital improvement projects to utility infrastructure (e.g. water, sewer, storm water conveyance, roads, levees, gas and electric lines, etc.). The review process should also address changing legislation and new federal and state policies, so these policy updates can be incorporated into the LHMP.

#### 7.2.3 Incorporation into Existing Planning Mechanisms

Planning mechanisms are governance tools used to manage local land use development and community decision-making, such as general plans, floodplain management plans, building codes, emergency operation plans, capital improvement plans, or other long-range plans. Another important





implementation mechanism that is highly effective and low-cost is incorporation of the LHMP recommendations and their underlying principles into existing City plans and mechanisms. Federal regulations require that LHMPs describe a process by which local governments incorporate the requirements of the mitigation plan into other planning mechanisms, such as a general plan or capital improvement plan. An example of incorporating mitigation actions into other planning mechanisms would be to identify the goals and strategies of the LHMP and document how they have been used to further mitigation efforts in other planning documents.

As previously stated in Section 7.1 of this plan, mitigation is most successful when it is incorporated into the day-to-day functions and priorities of government and development. As described in this plan's capability assessment, the City of Petaluma already implements policies and programs to reduce losses to life and property from hazards. This plan therefore builds upon previous related planning efforts and mitigation programs and recommends implementing actions, where possible, through these other program mechanisms.

These existing mechanisms include (but are not limited to) the following:

- City General Plan 2025 (Health and Safety Element)
- 2015-2023 Housing Element (2017) (part of General Plan 2025)
- 2015 FMP
- 2007 Emergency Operations Plan
- Infrastructure Master Plans
- 2008 Sewer System Management Plan (General Waste Discharge Requirement Order No. 2006-003)
- 2008 Bicycle and Pedestrian Plan
- 1996 River Access and Enhancement Plan
- 2003 Central Petaluma Specific Plan
- 2013 Petaluma SMART Rail Station Areas: TOD Master Plan
- City of Petaluma Municipal Code
- Implementing Zoning Ordinance (IZO)
- Smart Code (Ordinance No. 2470 N.C.S)
- Central Petaluma Specific Plan
- National Flood Insurance Program participation
- Community Rating System participation
- Petaluma Valley Groundwater Sustainability Agency
  - Draft Groundwater Sustainability Plan
- Weed Abatement Program
- Hazardous Materials Business Plan
- Stormwater Master Plan
- 2015 Urban Water Management Plan
- Water Conservation Regional Partnerships
  - Sonoma-Marin Saving Water Partnership
  - Sonoma County Water Agency
  - State Water Resources Board
- Drought Management and Response Plans
- Sustainability Plans and Climate Action Plans
- Capital Improvement Plans and Budgets





- Other plans and policies outlined in the capability assessment
- Other plans, regulations, and practices with a mitigation focus

HMPC members involved in the updates to the planning mechanisms listed above will be responsible for integrating the findings and recommendations of this LHMP with these other plans, programs, and mechanisms as appropriate. As an action step to ensure integration with other planning mechanisms, the Lead Hazard Mitigation Manager will discuss this topic at the annual meeting (refer to Section 7.2.1, Maintenance Schedule) with the HMPC. The HMPC will discuss if there are opportunities to incorporate the plan into other planning mechanisms and who will be responsible for leveraging those opportunities. HMPC members representing local jurisdictions will work with their jurisdictional planning teams to integrate their identified mitigation actions into their own local plans, programs, and mechanisms. Efforts to integrate the hazard mitigation plan into local plans, programs, and policies will be reported during the annual HMPC plan review meeting. Successful integration efforts will be recorded during the meeting.

Specific examples of incorporation of the LHMP into existing planning mechanisms include:

- City adoption (by reference or incorporation) of this LHMP into the Safety Element of the City General Plan per the State of California Assembly Bill 2140 and California Government Code Section 65302.10.
- Integration of wildfire actions identified in this mitigation strategy with the actions and implementation priorities established in the Fire Safe Sonoma plan, the countywide Community Wildfire Protection Plan (CWPP). Key people responsible for development of Fire Safe Sonoma CWPP should participate in the future HMPC, as they can identify key projects in the CWPP and integrate them into the mitigation strategy of the City of Petaluma. Likewise, actual implementation of these wildfire projects will likely occur through the Cal Fire Units and Battalions, Sonoma County Fire and Emergency Services, Sonoma County Fire Chief's Association, and the California Fire Safe Council. The implementation process will be successful through the coordination and effort of individuals from these various organizations.
- Using the risk assessment information in this plan to update the hazard analysis in the current 2007 Emergency Operations Plan.
- Integration of this LHMP into the 2015 FMP. The 2015 FMP included and cross-referenced flood mitigation actions from the 2010 LHMP Annex prepared by the Association of Bay Area Governments.
- Integration of this LHMP into City Infrastructure Master Plans and the Capital Improvement Program. Information on 100-year flood hazards, stormwater flood hazards, and localized flooding can be integrated into the various City facility and infrastructure master plans.

Efforts should continuously be made to monitor the progress of mitigation actions implemented through these other planning mechanisms and, where appropriate, the priority actions should be incorporated into updates of this hazard mitigation plan.

#### **7.2.4 Continued Public Involvement**

Continued public involvement is imperative to the overall success of the plan's implementation and goal(s). Efforts will be made to involve the public in the plan maintenance, evaluation, and review process. This includes maintaining a digital version of the plan on the City of Petaluma LHMP webpage for public review. In addition, information on whom to contact within the City will be posted with the plan. The designated Lead Hazard Mitigation Manager at the City of Petaluma will maintain a file of comments received for reference during the next five-year update.





### **Annual LHMP Review**

Any revisions to the plan that may occur as a result of a disaster will also be made public and posted on the City's LHMP Webpage, social media sites, and local media platforms. The City's Lead Hazard Mitigation Manager will place an advertisement in the local newspaper, and also circulate electronic press releases that specify the date and time for review and public input. The City will also invite federal, state, and local agencies to participate, with the HMPC.

### **Five-Year LHMP Update**

The five-year update process provides an opportunity to solicit participation from new and existing stakeholders, to publicize success stories from plan implementation, and seek additional public comment. A public hearing(s) or survey to receive public comment on the plan will be held during the plan update period. When the HMPC reconvenes for the update, the planning process will involve all stakeholders participating in the planning process, including those who joined the HMPC after the initial effort, to update and revise the plan. Public participation will be encouraged and invited through, LHMP Webpage postings and press releases, in addition to email and social media announcements.

Continued public outreach and education is a mitigation strategy in Chapter 5 of this plan, emphasizing a multi-hazard public education and awareness program to be conducted on an annual basis. Activities related to public involvement during the 2019-2020 update are documented in Chapter 3 and Appendix A and C.





**wood.**

APPENDIX B:

DRAFT Water Shortage Emergency Resolution

**DRAFT Water Shortage Emergency Resolution**

**RESOLUTION AUTHORIZING THE CITY MANAGER TO IMPLEMENT THE CITY’S AMENDED 2020 WATER SHORTAGE CONTINGENCY PLAN, STAGE \_\_\_\_, WITHIN THE AREA SERVED BY THE CITY OF PETALUMA PUBLIC WATER SYSTEM.**

**WHEREAS**, the City of Petaluma is a City empowered to provide water service within certain boundaries; and

**WHEREAS**, the Sonoma County Water Agency (Sonoma Water) is a wholesaler of water to the City of Petaluma; and

**WHEREAS**, due to (Current condition- drought, contamination, etc.), water supply conditions indicates that a \_\_\_\_percent reduction demand is required to ensure adequate supply in 20\_\_(insert date); and

[**WHEREAS**, Sonoma Water has reduced delivery to the City and all water contractors by \_\_\_\_percent; and]

[**WHEREAS**, on \_\_\_\_ (date), Governor \_\_\_\_ (name) declared a drought state of emergency and directed state and local officials to take all actions necessary to conserve water; and]

[**WHEREAS**, on \_\_\_\_ (date), Governor \_\_\_\_ (name)/State Water Resources Control Board issued/adopted \_\_\_\_; and]

**WHEREAS**, the City of Petaluma has adopted a resolution, XXX-XXX-N.C.S., updating the schedule of penalties for violations of the PMC including violations of the water conservation ordinance; and

**WHEREAS**, the City of Petaluma has the authority and responsibility to adopt water demand reductions measures within its area of service; and

**WHEREAS**, the Public Works and Utilities staff is recommending the implementation of Stage \_\_ of the City’s Amended 2020 Water Shortage Contingency Plan; and

**WHEREAS**, this action is exempt from the California Environmental Quality Act (CEQA) because it is not a project which has the potential for resulting in either a direct physical change in the environment or a reasonably foreseeable indirect physical change in the environment, pursuant to CEQA Guideline section 15378 as Stage 1 is entirely voluntarily; Additionally, this action is exempt pursuant to CEQA Guideline sections 15307 and 15308 as the reduction of water is an action for the protection of the environment and natural resources; Moreover, this action is exempt pursuant to the “Emergency Exception” CEQA Guideline section 15269(c) as this action is necessary to mitigate an emergency.

**NOW, THEREFORE, BE IT RESOLVED** that the City Council of the City of Petaluma hereby:

1. Declares the above recitals are true and correct and hereby declared to be finding of the City Council of the City of Petaluma.
2. Finds that this action is exempt from the California Environmental Quality Act (CEQA) because it is not a project which has the potential for resulting in either a direct physical change in the environment or a reasonably foreseeable indirect physical change in the environment, pursuant to CEQA Guideline section 15378 as Stage 1 is entirely voluntarily. Additionally, this action is exempt pursuant to CEQA Guideline sections 15307 and 15308 as the reduction of water is an action for the protection of the environment and natural resources. Moreover, this action is exempt pursuant to the “Emergency Exception” CEQA Guideline section 15269(c) as this action is necessary to mitigate an emergency.
3. Directs the City Manager to implement a program of demand management as defined in the City of Petaluma Amended 2020 Water Shortage Contingency Plan to realize a city-wide water use reduction of \_\_\_\_percent.
4. Orders that this resolution shall become effective immediately.
5. Orders that under the water shortage conditions existing in Stage \_\_\_\_, of the City’s Amended 2020 Water Shortage Contingency Plan shall be implemented with the following (EXAMPLE) modifications:
  - a. Irrigation with potable water using automatic sprinkler systems shall be prohibited except on \_\_\_\_\_, \_\_\_\_\_, and \_\_\_\_\_(insert days of the week) between the hours of \_\_\_pm and \_\_\_am.
  - b. Recycled water must be used for dust control when available. The number of truckloads of potable water for dust control is limited to \_\_\_(insert number of trucks) trucks per \_\_\_(insert day or week) as determined by the City Manager.
  - c. Achieve \_\_\_(insert percent) percent reduction from \_\_\_\_\_(insert reference year) year’s usage of the same billing period.



## Appendix M

### Petaluma City Municipal Code Section 15.17: Water Conservation

## **CHAPTER 15.17**

### **WATER CONSERVATION REGULATIONS**

#### **15.17.010 Title and purpose.**

This chapter shall be known as and may be cited as the "City of Petaluma Water Conservation Regulations Ordinance." The purpose of this chapter is to promote the efficient use and reuse of water by all city of Petaluma water service customers by requiring that all new construction projects and existing customers use water as efficiently as possible and comply with new development standards, landscape water use efficiency standards and water waste prohibition regulations. (Ord. 2316 NCS §3 (part), 2009.)

#### **15.17.020 Definitions.**

A. Unless a provision in this chapter specifies otherwise, the following terms and phrases, as used in this chapter, shall have the meanings hereinafter designated:

1. "Applied water" means the portion of water supplied by the irrigation system to the landscape.
2. "Authorized representative" or "agent" means any person(s) with written authorization from the property owner to sign documents and bind the property owner to compliance with this chapter.
3. "Automatic irrigation controller" means a timing device used to remotely control valves that operate an irrigation system. Automatic irrigation controllers are able to self-adjust and schedule irrigation events using either evapotranspiration (weather-based) or soil moisture data.
4. "Backflow prevention device" means a safety device used to prevent pollution or contamination of the water supply due to the reverse flow of water from the irrigation system.
5. "Certificate of completion" means the document required in Section [15.17.050\(D\)](#).
6. "Certified irrigation designer" means a person certified to design irrigation systems by an accredited academic institution, a professional trade organization or other program such as the U.S. Environmental Protection Agency's WaterSense irrigation designer certification program and Irrigation Association's certified irrigation designer program.
7. "Certified landscape irrigation auditor" means a person certified to perform landscape irrigation audits by an accredited academic institution, a professional trade organization or other program such as the U.S. Environmental Protection Agency's WaterSense irrigation auditor certification program and Irrigation Association's certified landscape irrigation auditor program.

8. "Check valve" or "anti-drain valve" means a valve located under a sprinkler head or other location in the irrigation system, to hold water in the system to prevent drainage from sprinkler heads when the sprinkler is off.
9. "City" means the city of Petaluma. The city council of Petaluma may designate the position(s) or person(s) to whom responsibilities and authority of the city are delegated and may from time to time modify such delegations. Absent any further specific delegation by the city council, the authority and responsibility set forth in this chapter shall be delegated to the director of public works and utilities, including his or her designee(s).
10. "Compost" means the safe and stable product of controlled biologic decomposition of organic materials that is beneficial to plant growth.
11. "Conversion factor (0.62)" means the number that converts acre-inches per acre per year to gallons per square foot per year.
12. "Distribution uniformity" means the measure of the uniformity of irrigation water over a defined area.
13. "Drip irrigation" means any nonspray low-volume irrigation system utilizing emission devices with a flow rate measured in gallons per hour. Low-volume irrigation systems are specifically designed to apply small volumes of water slowly at or near the root zone of plants.
14. "Dwelling unit" means a room or group of internally connected rooms that have sleeping, cooking, eating and sanitation facilities, but not more than one kitchen, which constitutes an independent housekeeping unit, occupied or intended for one household on a long-term basis, or such other definition as may be subsequently adopted by the city as part of its implementing zoning ordinance and/or Smart Code.
15. "Ecological restoration project" means a project where the site is intentionally altered to establish a defined, indigenous, historic ecosystem.
16. "Effective precipitation" or "usable rainfall" (Eppt) means the portion of total precipitation which becomes available for plant growth.
17. "Emitter" means a drip irrigation emission device that delivers water slowly from the system to the soil.
18. "Established landscape" means the point at which plants in the landscape have developed significant root growth into the soil. Typically, most plants are established after one or two years of growth.
19. "Establishment period of the plants" means the first year after installing the plant in the landscape or the first two years if irrigation will be terminated after establishment. Typically, most plants are established after one or two years of growth. Native habitat mitigation areas and trees may need three to five years for establishment.
20. "Estimated total water use" (ETWU) means the total water used for the landscape as described in the water efficient landscape worksheet in Section [15.17.050\(C\)\(2\)](#).

21. "ET adjustment factor" (ETAF) means a factor of 0.55 for residential areas and 0.45 for nonresidential areas, that, when applied to reference evapotranspiration, adjusts for plant factors and irrigation efficiency, two major influences upon the amount of water that needs to be applied to the landscape. The ETAF for new and existing (nonrehabilitated) special landscape areas shall not exceed 1.0. The ETAF for existing nonrehabilitated landscapes is 0.8.
22. "ET controller" or "smart controller" means an irrigation system controller or timer that automatically adjusts irrigation run times and run days based on data received from local weather stations. ET stands for evapotranspiration, which is the amount of water that has evaporated from the soil and has transpired through the plant.
23. "Evapotranspiration rate" means the quantity of water evaporated from adjacent soil and other surfaces and transpired by plants during a specified time.
24. "Flow rate" means the rate at which water flows through pipes, valves and emission devices, measured in gallons per minute, gallons per hour, or cubic feet per second.
25. "Flow sensor" means an inline device installed at the supply point of the irrigation system that produces a repeatable signal proportional to flow rate. Flow sensors must be connected to an automatic irrigation controller, or flow monitor capable of receiving flow signals and operating master valves. This combination flow sensor/controller may also function as a landscape water meter or submeter.
26. "Friable" means a soil condition that is easily crumbled or loosely compacted down to a minimum depth per planting material requirements, whereby the root structure of newly planted material will be allowed to spread unimpeded.
27. "Graywater" means untreated wastewater that has not been contaminated by any toilet discharge, has not been affected by infectious, contaminated, or unhealthy bodily wastes, and does not present a threat from contamination by unhealthful processing, manufacturing, or operating wastes. "Graywater" includes, but is not limited to, wastewater from bathtubs, showers, bathroom washbasins, clothes washing machines, and laundry tubs, but does not include wastewater from kitchen sinks or dishwashers.
28. "Hardscapes" means any durable material (pervious and nonpervious).
29. "Head-to-head coverage" means coverage resulting from placement of irrigation sprinklers so that the water from one sprinkler throws all the way to adjacent sprinklers.
30. "Hydrozone" means a portion of the landscaped area having plants with similar water needs and rooting depth. A hydrozone may be irrigated or nonirrigated.
31. "Infiltration rate" means the rate of water entry into the soil expressed as a depth of water per unit of time (e.g., inches per hour).
32. "Invasive plant species" means species of plants not historically found in California that spread outside cultivated areas and can damage environmental or economic resources. Invasive species may be regulated by county agricultural agencies as noxious species. "Noxious weeds" means any weed as described in the Food

and Agricultural Code Section [5004](#). Lists of invasive plants are maintained at the California Invasive Plant Inventory and USDA invasive and noxious weeds database.

33. "Irrigation audit" means an in-depth evaluation of the performance of an irrigation system conducted by a certified landscape irrigation auditor. An irrigation audit includes, but is not limited to: inspection, system tune-up, system test with distribution uniformity or emission uniformity, reporting overspray or runoff that causes overland flow, and preparation of an irrigation schedule. The audit must be conducted in a manner consistent with the Irrigation Association's landscape irrigation auditor certification program or other U.S. Environmental Protection Agency "WaterSense" labeled auditing program.

34. "Irrigation efficiency" (IE) means the measurement of the amount of water beneficially used divided by the amount of water applied. Irrigation efficiency is derived from measurements and estimates of irrigation system characteristics and management practices. The irrigation efficiency for purposes of this chapter is 0.75 for overhead spray devices and 0.81 for drip systems.

35. "Irrigation season" means the time of year when irrigation first begins at a location and last occurs. The irrigation season in Petaluma is typically March/April through October/November.

36. "Landscape architect" means a person who holds a license to practice landscape architecture in the State of California Business and Professions Code Section [5615](#).

37. "Landscape area" means all the planting areas, turf areas, and water features in a landscape design plan subject to the maximum applied water allowance calculation. The landscape area does not include footprints of buildings or structures, sidewalks, driveways, parking lots, decks, patios, gravel or stone walks, other pervious or nonpervious hardscapes, and other nonirrigated areas designated for nondevelopment (e.g., open spaces and existing native vegetation).

38. "Landscape contractor" means a person licensed by the state of California to construct, maintain, repair, install, or subcontract the development of landscape systems.

39. "Landscape documentation package" means the documents required under Section [15.17.050\(C\)](#).

40. "Landscape project" means total area of landscape in a project as defined in "landscape area" for the purposes of this chapter.

41. "Landscape water meter" means an inline device installed at the irrigation supply point that measures the flow of water into the irrigation system and is connected to a totalizer to record water use.

42. "Lateral line" means the water delivery pipeline that supplies water to the emitters or sprinklers from the valve.

43. "Local agency" means a city or county, including a charter city or charter county, that is responsible for adopting and implementing this chapter. The local agency is also responsible for the enforcement of this chapter, including but not limited to, approval of a permit and plan check or design review of a project.

44. "Local water purveyor" means any entity, including a public agency, city, county, or private water company that provides retail water service.

45. "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, drip lines, and bubblers. Low-volume irrigation systems are specifically designed to apply small volumes of water slowly at or near the root zone of plants.
46. "Main line" means the pressurized pipeline that delivers water from the water source to the valve or outlet.
47. "Master shut-off valve" is an automatic valve installed at the irrigation supply point, which controls water flow into the irrigation system. When this valve is closed, water will not be supplied to the irrigation system. A master valve will greatly reduce any water loss due to a leaky station valve.
48. "Maximum applied water allowance" (MAWA) means the upper limit of annual applied water for the established landscaped area as specified in Section [15.17.050\(C\)\(2\)](#). It is based upon the area's reference evapotranspiration, the ET adjustment factor, and the size of the landscape area. The estimated total water use shall not exceed the maximum applied water allowance. Special landscape areas, including recreation areas, areas permanently and solely dedicated to edible plants such as orchards and vegetable gardens, and areas irrigated with recycled water are subject to the MAWA with an ETAF not to exceed 1.0.

$$\text{MAWA} = (\text{ETo})(0.62)[(\text{ETAF} \times \text{LA}) + ((1 - \text{ETAF}) \times \text{SLA})]$$

49. "Median" is an area between opposing lanes of traffic that may be unplanted or planted with trees, shrubs, perennials, and ornamental grasses.
50. "Microclimate" means the climate of a small, specific area that may contrast with the climate of the overall landscape area due to factors such as wind, sun exposure, plant density, or proximity to reflective surfaces.
51. "Mined-land reclamation projects" means any surface mining operation with a reclamation plan approved in accordance with the Surface Mining and Reclamation Act of 1975.
52. "Mulch" means any organic material such as leaves, bark, straw, compost, or inorganic mineral materials such as rocks, gravel, or decomposed granite left loose and applied to the soil surface for the beneficial purposes of reducing evaporation, suppressing weeds, moderating soil temperature, and preventing soil erosion.
53. "New construction," for the purposes of Section [15.17.050](#), means a new building with a landscape or other new landscape, such as a park, playground, or greenbelt without an associated building.
54. "Nonresidential landscape" means landscapes in commercial, institutional, industrial and public settings that may have areas designated for recreation or public assembly. It also includes portions of common areas of common interest developments with designated recreational areas.
55. "Operating pressure" means the pressure at which the parts of an irrigation system are designed by the manufacturer to operate.

56. "Overhead sprinkler irrigation systems" or "overhead spray irrigation systems" means systems that deliver water through the air (e.g., spray heads and rotors).
57. "Overspray" means the irrigation water which is delivered beyond the target area.
58. "Parkway" means the area between a sidewalk and the curb or traffic lane. It may be planted or unplanted, and with or without pedestrian egress.
59. "Permit" means an authorizing document issued by local agencies.
60. "Pervious" means any surface or material that allows the passage of water through the material and into the underlying soil.
61. "Plant factor" or "plant water use factor" is a factor, when multiplied by ETo, estimates the amount of water needed by plants. For purposes of this chapter, the plant factor range for very low water use plants is 0 to 0.1, the plant factor range for low water use plants is 0.1 to 0.3, the plant factor range for moderate water use plants is 0.4 to 0.6, and the plant factor range for high water use plants is 0.7 to 1.0. Plant factors cited in this chapter are derived from the publication "Water Use Classification of Landscape Species." Plant factors may also be obtained from horticultural researchers from academic institutions or professional associations as approved by the California Department of Water Resources (DWR).
62. "Precipitation rate" means the amount of water applied by an irrigation emission device measured in inches per hour.
63. "Project applicant" means the individual or entity submitting a landscape documentation package, to request a permit, plan check, or design review from the local agency. A project applicant may be the property owner or his or her designee.
64. "Rain sensor" or "rain-sensing shutoff device" means a component which automatically suspends an irrigation event when it rains.
65. "Record drawing" or "as-built" means a set of reproducible drawings which show significant changes in the work made during construction and which are usually based on drawings marked up in the field and other data furnished by the contractor.
66. "Recreational area" means areas, excluding private single-family residential areas, designated for active play, recreation or public assembly in parks, sports fields, picnic grounds, amphitheaters or golf course tees, fairways, roughs, surrounds and greens.
67. "Recycled water," "reclaimed water," or "treated sewage effluent water" means treated or recycled waste water of a quality suitable for nonpotable uses such as landscape irrigation and water features. This water is not intended for human consumption.
68. "Reference evapotranspiration" or "ETo" means a standard measurement of environmental parameters which affect the water use of plants. ETo is expressed in inches per day, month, or year, and is an estimate of the evapotranspiration of a large field of four- to seven-inch-tall, cool-season grass that is well watered.

Reference evapotranspiration is used as the basis of determining the maximum applied water allowances so that regional differences in climate can be accommodated.

69. "Rehabilitated project" means any project that requires a permit, plan check, or design review, and the modified landscape area is equal to or greater than two thousand five hundred square feet.
70. "Residential landscape" means landscapes surrounding single- or multifamily homes.
71. "Reverse osmosis" means a process by which a solvent such as water is purified of solutes by being forced through a semipermeable membrane through which the solvent, but not the solutes, may pass.
72. "Runoff" means water which is not absorbed by the soil or landscape to which it is applied and flows from the landscape area. For example, runoff may result from water that is applied at too great a rate (application rate exceeds infiltration rate) or when there is a slope.
73. "Soil moisture sensing device" or "soil moisture sensor" means a device that measures the amount of water in the soil. The device may also suspend or initiate an irrigation event.
74. "Soil texture" means the classification of soil based on its percentage of sand, silt, and clay.
75. "Special landscape area" (SLA) means an area of the landscape dedicated solely to edible plants, cemeteries, recreational areas, areas irrigated with recycled water, or water features using recycled water.
76. "Sprinkler head" or "spray head" means a device which delivers water through a nozzle.
77. "Static water pressure" means the pipeline or municipal water supply pressure when water is not flowing.
78. "State" means the state of California.
79. "Station" means an area served by one valve or by a set of valves that operate simultaneously.
80. "Swing joint" means an irrigation component that provides a flexible, leak-free connection between the emission device and lateral pipeline to allow movement in any direction and to prevent equipment damage.
81. "Submeter" means a metering device to measure water applied to the landscape that is installed after the primary utility water meter.
82. "Turf" means a groundcover surface of mowed grass. Annual bluegrass, Kentucky bluegrass, perennial ryegrass, red fescue, and tall fescue are cool-season grasses. Bermuda grass, kikuyu grass, seashore paspalum, St. Augustine grass, zoysia grass, and buffalo grass are warm-season grasses.
83. "Valve" means a device used to control the flow of water in the irrigation system.
84. "Water feature" means a design element where open water performs an aesthetic or recreational function. Water features include ponds, lakes, waterfalls, fountains, artificial streams, spas, and swimming pools (where water is artificially supplied).
85. "Watering window" means the time of day irrigation is allowed.



86. "WUCOLS" means the Water Use Classification of Landscape Species published by the University of California Cooperative Extension, and the Department of Water Resources 2014. (Ord. 2562 NCS §2, 2016.)

### **15.17.030 Development standards.**

The development standards established in this section apply to all new commercial, industrial, institutional, agricultural, single-family and multifamily residential construction, including tenant improvements or a change in use requiring any city entitlement or permit for existing commercial, industrial and institutional accounts. The development standards are intended to ensure that all installed water using fixtures, appliances, irrigation systems, and any other water using devices apply water as efficiently as possible.

A. *Indoor Water Use Development Standards—New Single-Family Residential Construction.* Any water using device installed in any new development shall meet the standards of the California Plumbing Code (Part 5, Title 24, California Code of Regulations), and the following.

B. *Standards for New Single-Family Residential Construction.*

1. Water closets must be an approved high efficiency toilet (HET) as designated on the city's list of qualifying HETs.
2. Showerheads must not use more than two gallons per minute. Where more than one showerhead exits in a shower unit, each showerhead must be plumbed so that each showerhead can be turned on and off independently from each other.
3. Any clothes washing machine provided with the residence must have a water factor of six or lower.
4. Lavatory and/or bar faucets must not exceed 1.5 gallons per minute.
5. Kitchen and/or utility sink faucets must not exceed 2.2 gallons per minute.
6. All dishwashers must have the EPA's Energy Star label.

C. *Standards for New Multifamily Residential Dwellings.*

1. Water closets must be an approved high efficiency toilet (HET) as designated on the city's list of qualifying HETs.
2. Showerheads must not use more than two gallons per minute. Where more than one showerhead exits in a shower unit, each showerhead must be plumbed so that each showerhead can be turned on and off independently from each other.
3. Any clothes washing machine installed on the premises must have a water factor of six or lower.
4. Lavatory and/or bar faucets must not exceed 1.5 gallons per minute.
5. Kitchen and/or utility sink faucets must not exceed 2.2 gallons per minute.

6. All dishwashers must have the EPA's Energy Star label.
7. Each dwelling unit must be separately metered or sub-metered.

D. Standards for New Commercial, Industrial, or Institutional (CII) Accounts and Tenant Improvements or Change of Use Requiring Any City Entitlement or Permit for Existing CII Accounts.

1. Water closets and/or urinals must be an approved high efficiency toilet (HET) as designated on the city's list of qualifying CII HETs.
2. Showerheads must not use more than two gallons per minute. Where more than one showerhead exists in a shower unit, each showerhead must be plumbed so that each showerhead can be turned on and off independently from each other.
3. Commercial clothes washing machines shall have a water factor of 4.5 or lower.
4. Lavatory faucets must be self-closing and not exceed 1.5 gallons per minute. All faucets must be equipped with an aeration device.
5. Kitchen and/or utility sink faucets must not exceed 2.2 gallons per minute. All faucets must be equipped with an aeration device.
6. Dishwashers must have the EPA's Energy Star and/or Water Sense designation and must recycle the final rinse into the next wash cycle.
7. Pre-rinse hand-held dish-rinsing wands must not exceed 1.6 gpm and must utilize positive shut-off valves.
8. Cooling towers (see Section [15.48.070](#) of this code, Sewer Use and Source Control Regulations).
9. Ice makers must be air-cooled.
10. Any other water-using apparatus not mentioned above must use or reuse water as efficiently as possible and must be approved by the city prior to installation. (Ord. 2316 NCS §3 (part), 2009.)

#### **15.17.040 Standards for new or renovated vehicle wash facilities.**

- A. Vehicle wash facilities using conveyORIZED, touchless, and/or rollover in-bay technology shall reuse a minimum of fifty percent of water from previous vehicle rinses in subsequent washes.
- B. Vehicle wash facilities using reverse osmosis to produce water rinse with a lower mineral content shall incorporate the unused concentrate in subsequent vehicle washes.
- C. Self-service spray wands shall emit no more than three gallons of water per minute. (Ord. 2316 NCS §3 (part), 2009.)

## 15.17.050 Landscape water use efficiency standards.

- A. *Applicability.* This chapter shall apply to all of the following projects:
1. New construction projects with an aggregate landscape area equal to or greater than five hundred square feet requiring a building permit, plan check or design review.
  2. Rehabilitated projects with an aggregate landscape area equal to or greater than two thousand five hundred square feet within one twelve-month period requiring a building permit, plan check, or design review.
  3. *Cemeteries.* Recognizing the special landscape management needs of cemeteries, new and rehabilitated cemeteries shall be designated as special landscape areas.
  4. Any project with an aggregate landscape area of two thousand five hundred square feet or less may comply with the performance requirements of this chapter or conform to the prescriptive measures of this section.
    - a. Prescriptive requirements may be used as a compliance option to the landscape water use efficiency standards.
    - b. Compliance with subsections [\(A\)\(4\)\(c\)](#) through [\(A\)\(4\)\(h\)](#) of this section is mandatory and must be documented on a landscape plan in order to use the prescriptive compliance option.
    - c. Submit a landscape documentation package (the director of public works and utilities will develop appropriate forms to carry out this section) which includes the following elements:
      - (1) Date.
      - (2) Project applicant.
      - (3) Project address (if available, parcel and/or lot number(s)).
      - (4) Total landscape area (square feet), including a breakdown of turf and plant material.
      - (5) Project type (e.g., new, rehabilitated, public, private, cemetery, homeowner-installed).
      - (6) Water supply type (e.g., potable, recycled, well) and identify the local retail water purveyor if the applicant is not served by a private well.
      - (7) Contact information for the project applicant and property owner.
      - (8) Applicant signature and date with statement, "I agree to comply with the requirements of the prescriptive compliance option to the Landscape Water Use Efficiency Standards."
    - d. Plant material shall comply with all of the following:
      - (1) For residential areas, install climate-adapted plants that require occasional, little or no summer water (average WUCOLS plant factor 0.3) for eighty percent of the plant area excluding edibles and

areas using recycled water; for nonresidential areas, install climate-adapted plants that require occasional, little or no summer water (average WUCOLS plant factor 0.3) for one hundred percent of the plant area excluding edibles and areas using recycled water.

(2) A minimum three-inch layer of mulch shall be applied on all exposed soil surfaces of planting areas except in turf areas, creeping or rooting groundcovers, or direct seeding applications where mulch is contraindicated.

e. Turf shall comply with all of the following:

(1) Turf shall not exceed twenty percent of the landscape area in residential areas, and there shall be no turf in nonresidential areas.

(2) Turf shall not be planted on sloped areas which exceed a slope of one foot vertical elevation change for every four feet of horizontal length.

(3) Turf is prohibited in parkways less than ten feet wide, unless the parkway is adjacent to a parking strip and used to enter and exit vehicles. Any turf in parkways must be irrigated by sub-surface irrigation or by other technology which creates no overspray or runoff.

f. Irrigation systems shall comply with the following:

(1) Automatic irrigation controllers are required and must use evapotranspiration or soil moisture sensor data and utilize a rain sensor.

(2) Irrigation controllers shall be of a type which does not lose programming data in the event the primary power source is interrupted.

(3) Pressure regulators shall be installed on the irrigation system to ensure the dynamic pressure of the system is within the manufacturer's recommended pressure range.

(4) Manual shut-off valves (such as a gate valve, ball valve, or butterfly valve) shall be installed as close as possible to the point of connection of the water supply.

(5) All irrigation emission devices must meet the requirements set in the ANSI standard, ASABE/ICC 802-2014, "Landscape Irrigation Sprinkler and Emitter Standard." All sprinkler heads installed in the landscape must document a distribution uniformity low quarter of 0.65 or higher using the protocol defined in ASABE/ICC 802-2014.

(6) Areas less than ten feet in width in any direction shall be irrigated with subsurface irrigation or other means that produces no runoff or overspray.

g. All nonresidential landscape projects shall install a private submeter(s) to measure landscape water use.

h. At the time of final inspection, the permit applicant must provide the owner of the property with a certificate of completion, certificate of installation, irrigation schedule and a schedule of landscape and irrigation maintenance.

5. *Properties Excluded from Applicability.* This chapter does not apply to registered local, state or federal historical sites; properties irrigated with recycled water; ecological restoration projects that do not require a permanent irrigation system; mined-land reclamation projects that do not require a permanent irrigation system; or existing plant collections, as part of botanical gardens and arboretums open to the public. Owners of these excluded properties are encouraged to implement efficient water use practices.

B. *Standards Applicable to All Projects.*

1. For residential projects, the percentage of the residential landscape area that can be planted with high water use plants including turf shall not exceed twenty percent.
2. For nonresidential projects, the use of high water use plants including turf is limited to special landscape areas.
3. All multifamily residential and nonresidential projects must install a dedicated irrigation meter(s).
4. The maximum amount of water that can be applied to a landscape is fifty-five percent of the reference evapotranspiration rate for residential projects and forty-five percent of the evapotranspiration rate for nonresidential projects. This water allowance reduces the landscape area that can be planted with high water use plants including turf.
5. Irrigation systems are required to have pressure regulators and master shut-off valves.
6. All irrigation emission devices must meet the national standard stated in this chapter to ensure that only high efficiency sprinklers are installed.
7. The irrigation efficiency of devices used to irrigate landscapes is one of the factors that goes into determining the maximum amount of water allowed.
8. Flow sensors that detect and report high flow conditions due to broken pipes and/or popped sprinkler heads are required for landscape areas greater than five thousand square feet.
9. The minimum width of areas that can be overhead irrigated is ten feet; areas less than ten feet wide must be irrigated with subsurface drip or other technology that produces no over spray or runoff.
10. Friable soil is required in planting areas.
11. For landscape installations, four yards of compost per one thousand square feet of area must be incorporated to a depth of six inches into the soil.
12. All landscape and/or irrigation systems shall be installed so as not to violate the city's water waste prohibition (Section [15.17.070](#)).

C. *Application Process.* Prior to commencing any construction activities related to implementation of the project, the applicant shall submit to the city a landscape documentation package consisting of the following information on forms prepared by the city's director of public works and utilities as described in further detail below:

1. *Project Application Form.* The project application form shall contain the following information:
  - a. Project information.
  - b. Date.
  - c. Project applicant.
  - d. Project address (if available, parcel and/or lot number(s)).
  - e. Total landscape area (square feet).
  - f. Project type (e.g., new, rehabilitated, public, private, cemetery, homeowner-installed).
  - g. Water supply type (e.g., potable, recycled, well) and identify the local retail water purveyor if the applicant is not served by a private well.
  - h. Checklist of all documents in landscape document package.
  - i. Project contacts to include contact information for the project applicant and property owner.
  - j. Applicant signature and date with statement, "I agree to comply with the requirements of the Landscape Water Use Efficiency Standards and submit a complete Landscape Documentation Package."
2. *Water Efficient Landscape Worksheet.*
  - a. The form shall contain information on the plant factor, irrigation method, irrigation efficiency, and area associated with each hydrozone. The worksheet shall include calculation methods to demonstrate that the ETAF for the landscape project does not exceed a factor of 0.55 for residential areas and 0.45 for nonresidential areas, exclusive of special landscape areas. The ETAF for a landscape project is based on the plant factors and irrigation methods selected. The MAWA is calculated based on the maximum ETAF allowed (0.55 for residential areas and 0.45 for nonresidential areas) and expressed as annual gallons required. ETWU is calculated based on the plants used and irrigation method selected for the landscape design. ETWU must be below the MAWA.
    - (1) For the purpose of determining ETWU, average irrigation efficiency is assumed to be 0.75 for overhead spray devices and 0.81 for drip system devices.
    - (2) In calculating the MAWA and ETWU, a project applicant shall use the ETo values from the Reference Evapotranspiration Table below:

Reference Evapotranspiration (ET<sub>o</sub>) Table for Petaluma, CA

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual ET <sub>o</sub>
1.2	1.5	2.8	3.7	4.6	5.6	4.6	5.7	4.5	2.9	1.4	0.9	39.6

b. Water budget calculations shall adhere to the following requirements:

- (1) The plant factor used shall be from WUCOLS or from horticultural researchers with academic institutions or professional associations as approved by the California Department of Water Resources (DWR). The plant factor ranges from 0 to 0.1 for very low water using plants, 0.1 to 0.3 for low water use plants, from 0.4 to 0.6 for moderate water use plants, and from 0.7 to 1.0 for high water use plants.
- (2) All water features shall be included in the high water use hydrozone and temporarily irrigated areas shall be included in the low water use hydrozone.
- (3) All special landscape areas shall be identified and their water use calculated.
- (4) ETAF for new and existing (nonrehabilitated) special landscape areas shall not exceed 1.0.
- (5) The surface area of water features is included in the high water use hydrozone of the landscape area. Constructed wetlands used for on-site wastewater treatment or stormwater best management practices that are not irrigated and used solely for water treatment or stormwater retention are not water features and, therefore, are not subject to the water budget calculation.

3. *Soil Management Report.* The purpose of the report is to facilitate reduction in runoff and encouragement of healthy plant growth, and shall be completed by the project applicant as follows:

a. *Submit soil samples to a laboratory for analysis.* Soil sampling shall be conducted in accordance with laboratory protocol, including protocols regarding adequate sampling depth for the intended plants.

- (1) The soil analysis shall include soil texture, infiltration rate determined by laboratory test or soil-infiltration rate table, pH, total soluble salts, sodium, percent organic matter, and recommendations.
- (2) In projects with multiple landscape installations (e.g., production home developments), a soil-sampling rate of at least fifteen percent of the lots will satisfy this requirement.

b. The director of public works and utilities or his/her designee shall determine the timing of the submission of the report based on the following:

- (1) If significant mass grading is not planned, the soil analysis report shall be submitted to the city as part of the landscape documentation package; or
- (2) If significant mass grading is planned, the soil analysis report shall be submitted to the city as part of the certificate of completion.

- c. The soil analysis report shall be made available, in a timely manner, to the professionals preparing the landscape design plans and irrigation design plans to make any necessary adjustments to the design plans.
  - d. The project applicant, or his/her designee, shall submit documentation verifying implementation of soil analysis report recommendations to the city with certificate of completion.
4. *Landscape Design Plan.* A landscape design plan meeting the following design criteria shall be submitted as part of the landscape documentation package:
- a. *Plant Material.* Plants selected for the landscape shall not cause the ETWU in the landscape area to exceed the MAWA.
    - (1) Methods to achieve water efficiency shall include the following: invasive species as listed by the California Invasive Plant Council are prohibited; selection of water-conserving plant, tree and turf species, especially local native plants; selection of plants based on local climate suitability, disease and pest resistance; selection of trees based on shading and size at maturity as appropriate for the planting area; and selection of plants from local and regional landscape program plant lists.
    - (2) Plants with similar water needs shall be grouped together in distinct hydrozones and where irrigation is required the distinct hydrozones shall be irrigated with separate valves.
    - (3) High water use plants shall not be mixed with very low, low or moderate water use plants in the same hydrozone.
    - (4) Plants shall be selected and planted appropriately based upon their adaptability to the climatic, geologic, and topographical conditions of the project site. Methods to achieve water efficiency shall include one or more of the following: use the Sunset Western Climate Zone System which takes into account temperature, humidity, elevation, terrain, latitude, and varying degrees of continental and marine influence on local climate; recognize the horticultural attributes of plants (i.e., mature plant size, invasive surface roots) to minimize damage to property or infrastructure (e.g., buildings, sidewalks, power lines); allow for adequate soil volume for healthy root growth; and consider the solar orientation for plant placement to maximize summer shade and winter solar gain.
    - (5) Turf and high water use plants characterized by a plant factor of 0.7 to 1.0 shall not be planted in the following conditions: slopes exceeding ten percent; street medians, traffic islands, planter strips or bulbouts of any size.
    - (6) Turf shall not be used in planting areas ten feet wide or less.
    - (7) High water use plants including turf shall occupy no more than a combined twenty percent of the total irrigated landscaped area in residential landscape projects. High water use plants including turf are limited to special landscape areas for all nonresidential landscape projects.



(8) The architectural guidelines of a common interest development, which include community apartment projects, condominiums, planned developments, and stock cooperatives, shall not prohibit or include conditions that have the effect of prohibiting the use of low-water use plants as a group.

(9) Landscape design shall be in compliance with Chapter [8.28](#), Heritage and Landmark Trees.

b. *Water Features.*

(1) Recirculating water systems shall be used for water features.

(2) Where available, recycled water shall be used as a source for decorative water features.

(3) Surface area of a water feature shall be included in the high water use hydrozone area of the water budget calculation.

(4) Pool and spa covers are required.

c. *Soil Preparation, Mulch and Amendments.* Prior to the planting of any materials, compacted soils shall be transformed to a friable condition. On engineered slopes, only amended planting holes need meet this requirement.

(1) Soil amendments shall be incorporated according to recommendations of the soil report and what is appropriate for the plants selected.

(2) For landscape installations, compost at a rate of a minimum of four cubic yards per one thousand square feet of permeable area shall be incorporated to a depth of six inches into the soil or per specific amendment recommendations from a soils report. Soils with greater than six percent organic matter in the top six inches of soil are exempt from adding compost and tilling.

(3) A minimum three-inch layer of mulch shall be applied on all exposed soil surfaces of planting areas except in turf areas, creeping or rooting groundcovers, or direct seeding applications where mulch is contraindicated. To provide habitat for beneficial insects and other wildlife, up to five percent of the landscape area may be left without mulch. Designated insect habitat must be included in the landscape design plan as such.

d. In addition, the landscape design plan, at a minimum, shall:

(1) Delineate and label each hydrozone by number, letter, or other method.

(2) Identify each hydrozone as very low, low, moderate, high water, or mixed water use. Temporarily irrigated areas of the landscape shall be included in the low water use hydrozone for the water budget calculation.

(3) Identify recreational areas.

(4) Identify areas permanently and solely dedicated to edible plants.

(5) Identify areas irrigated with recycled water.

- (6) Identify type of mulch and application depth.
- (7) Identify soil amendments, type, and quantity.
- (8) Identify type and surface area of water features.
- (9) Identify hardscapes (pervious and nonpervious).
- (10) Identify new and existing trees, shrubs, groundcovers, turf and any other planting areas.
- (11) Identify plant sizes and quantity.
- (12) Identify plants by botanical name and common name.
- (13) Identify property lines, new and existing building footprints, streets, driveways, sidewalks, and other hardscape features (pervious and nonpervious).
- (14) Identify location and installation details of any applicable stormwater best management practices that encourage on-site retention and infiltration of stormwater.
- (15) Identify any applicable rain harvesting or catchment technologies.
- (16) Identify any applicable graywater discharge piping, system components and area(s) of distribution.
- (17) Contain the following statement: "I have complied with the criteria of the ordinance and applied them for the efficient use of water in the landscape design plan."
- (18) Bear the signature of a licensed landscape architect, licensed landscape contractor, or any other person authorized to design a landscape. (See Sections [5500.1](#), [5615](#), [5641](#), [5641.1](#), [5641.2](#), [5641.3](#), [5641.4](#), [5641.5](#), [5641.6](#), [6701](#), [7027.5](#) of the Business and Professions Code, Section [832.27](#) of Title 16 of the California Code of Regulations, and Section [6721](#) of the Food and Agriculture Code.)

5. *Irrigation Design Plan*. This section applies to landscaped areas requiring permanent irrigation, not areas that require temporary irrigation solely for the plant establishment period. An irrigation design plan meeting the following design criteria shall be submitted as part of the landscape documentation package.

a. *System*.

- (1) For the efficient use of water, an irrigation system shall meet all the requirements listed in this section and the manufacturers' recommendations. The irrigation system and its related components shall be planned and designed to allow for proper installation, management, and maintenance.
- (2) Landscape water meters, defined as either a dedicated water service meter or private submeter, shall be installed for all multi-family residential landscape, nonresidential landscape and all residential irrigated landscapes of five thousand square feet or greater.
- (3) Automatic irrigation controllers utilizing either evapotranspiration or soil moisture sensor data utilizing nonvolatile memory shall be required for irrigation scheduling in all irrigation systems.

- (4) Pressure regulating devices shall be installed to ensure the dynamic pressure at each emission device is within the manufacturer's recommended pressure range for optimal performance.
- (5) Pressure regulating devices such as inline pressure regulators, booster pumps, or other devices shall be installed to meet the required dynamic pressure of the irrigation system.
- (6) Static water pressure, dynamic or operating pressure, and flow reading of the water supply shall be measured at the point of connection. These pressure and flow measurements shall be conducted at the design stage. If the measurements are not available at the design stage, the measurements shall be conducted at installation.
- (7) Sensors (rain, freeze, wind, etc.), either integral or auxiliary, that suspend or alter irrigation operation during unfavorable weather conditions shall be required on all irrigation systems, as appropriate for local climatic conditions. Irrigation should be avoided during windy or freezing weather or during rain.
- (8) Manual shut-off valves (such as a gate valve, ball valve, or butterfly valve) shall be required, as close as possible to the point of connection of the water supply, to minimize water loss in case of an emergency (such as a main line break) or routine repair.
- (9) Backflow prevention devices shall be required to protect the water supply from contamination by the irrigation system.
- (10) Flow sensors that detect high flow conditions created by system damage or malfunction are required for all nonresidential landscapes and residential landscapes of five thousand square feet or larger.
- (11) Master shut-off valves are required on all projects except landscapes that make use of technologies that allow for the individual control of sprinklers that are individually pressurized in a system equipped with low pressure shut down features.
- (12) Isolation valves shall be installed at the point of connection and before each valve or valve manifold.
- (13) The irrigation system shall be designed to prevent runoff, low head drainage, overspray, or other similar conditions where irrigation water flows onto nontargeted areas, such as adjacent property, nonirrigated areas, hardscapes, roadways, or structures.
- (14) Relevant information from the soil management plan, such as soil type and infiltration rate, shall be utilized when designing irrigation systems.
- (15) The design of the irrigation system shall conform to the hydrozones of the landscape design plan.
- (16) The irrigation system must be designed and installed to meet, at a minimum, the irrigation efficiency criteria regarding the MAWA.

- (17) All irrigation emission devices must meet the requirements set in the American National Standards Institute (ANSI) standard, American Society of Agricultural and Biological Engineers/International Code Council's (ASABE/ICC) 802-2014 "Landscape Irrigation Sprinkler and Emitter Standard." All sprinkler heads installed in the landscape must document a distribution uniformity low quarter of 0.65 or higher using the protocol defined in ASABE/ICC 802-2014.
- (18) The project applicant shall inquire with the local water purveyor about peak water operating demands (on the water supply system) or water restrictions that may impact the effectiveness of the irrigation system.
- (19) In mulched planting areas, the use of low volume irrigation is required to maximize water infiltration into the root zone.
- (20) Sprinkler heads and other emission devices shall have matched precipitation rates, unless otherwise directed by the manufacturer's recommendations.
- (21) Head-to-head coverage is required unless otherwise directed by the manufacturer's recommendations. Sprinkler spacing shall be designed to achieve the highest possible distribution uniformity.
- (22) Swing joints or other riser-protection components are required on all risers.
- (23) Check valves or anti-drain valves are required on all sprinkler heads where low point drainage could occur.
- (24) Areas less than ten feet in width in any direction shall be irrigated with subsurface irrigation or other means that produces no runoff or overspray.
- (25) Overhead irrigation shall not be permitted within twenty-four inches of any nonpermeable surface. Allowable irrigation within the setback from nonpermeable surfaces may include drip, drip line, or other low flow nonspray technology. The setback area may be planted or unplanted. The surfacing of the setback may be mulch, gravel, or other porous material. These restrictions may be modified if: The landscape area is adjacent to permeable surfacing and no runoff occurs; or the adjacent nonpermeable surfaces are designed and constructed to drain entirely to landscaping; or the irrigation designer specifies an alternative design or technology, as part of the landscape documentation package and clearly demonstrates strict adherence to irrigation system design criteria. Prevention of overspray and runoff must be confirmed during the irrigation audit.
- (26) Slopes greater than fifteen percent shall be irrigated with point source or other low-volume irrigation technology. Prevention of runoff and erosion must be confirmed during the irrigation audit.
- (27) Point source irrigation is required where plant height at maturity will affect the uniformity of an overhead system.

b. *Hydrozone.*

- (1) Each valve shall irrigate a hydrozone with similar site, slope, sun exposure, soil conditions, and plant materials with similar water use.
  - (2) Sprinkler heads and other emission devices shall be selected based on what is appropriate for the plant type within that hydrozone.
  - (3) Trees shall be placed on separate valves from shrubs, groundcovers, and turf to facilitate the appropriate irrigation of trees. The mature size and extent of the root zone shall be considered when designing irrigation for the tree.
  - (4) Individual hydrozones that mix plants of moderate and low water use, or moderate and high water use, may be allowed if: plant factor calculation is based on the proportions of the respective plant water uses and their plant factor; or the plant factor of the higher water using plant is used for calculations.
  - (5) Individual hydrozones that mix high and low water use plants shall not be permitted.
  - (6) On the landscape design plan and irrigation design plan, hydrozone areas shall be designated by number, letter, or other designation.
  - (7) The landscape design plan shall include a hydrozone table listing each hydrozone and the respective description, plant factor, irrigation method, landscape area in square feet, and percent of total landscape area.
- c. In addition, the irrigation design plan, at a minimum, shall contain:
- (1) Location and size of separate water meters for landscape.
  - (2) Location and size of irrigation system point of connection.
  - (3) Location, type and size of all components of the irrigation system, including controllers, main and lateral lines, master valves, valves, sprinkler heads and other application devices, moisture-sensing devices, rain sensors, check valves, quick couplers, flow sensors, pressure regulators, and backflow-prevention devices.
  - (4) Designate the areas irrigated by each valve, and assign a number to each valve.
  - (5) Static water pressure at the point of connection to the public water supply.
  - (6) Flow rate (gallons per minute), application rate (inches per hour), and design operating pressure (pressure per square inch) for each station.
  - (7) Recycled water irrigation systems (if applicable).
  - (8) The hydrozone table.
  - (9) The following statement: "I have complied with the criteria of the ordinance and applied them accordingly for the efficient use of water in the irrigation design plan"; and

(10) The signature of a licensed landscape architect, certified irrigation designer, licensed landscape contractor, or any other person authorized to design an irrigation system. (See Sections [5500.1](#), [5615](#), [5641](#), [5641.1](#), [5641.2](#), [5641.3](#), [5641.4](#), [5641.5](#), [5641.6](#), [6701](#), [7027.5](#) of the Business and Professions Code, Section [832.27](#) of Title 16 of the California Code of Regulations, and Section [6721](#) of the Food and Agricultural Code.)

6. *Grading Design Plan.* A comprehensive grading plan shall be submitted and include:

a. The grading design plan shall indicate finished configurations and elevations of the landscape area including:

- (1) Height of graded slopes.
- (2) Drainage patterns.
- (3) Pad elevations.
- (4) Finish grade.
- (5) Stormwater retention improvements, if applicable.

b. The grading design plan shall demonstrate:

- (1) That all irrigation and normal rainfall remains within property lines and does not drain onto nonpermeable hardscapes.
- (2) Avoids disruption of natural drainage patterns and undisturbed soil.
- (3) Avoids soil compaction in landscape areas.

c. The grading design plan shall contain the following statement: "I have complied with the criteria of the ordinance and applied them accordingly for the efficient use of water in the grading design plan" and shall bear the signature of a licensed professional as authorized by law.

d. A comprehensive grading plan prepared by a civil engineer for other local agency permits may satisfy this requirement.

D. *Certificate of Completion.* Prior to the final city permit being issued, the project applicant or applicant shall submit a completed certificate of completion on a form prepared by the director of public works.

1. The certificate of completion form shall include the following elements:

- a. Project information.
- b. Date.
- c. Project name.
- d. Project applicant name, telephone, and mailing address.

- e. Project address and location.
  - f. Property owner name, telephone, and mailing address.
  - g. Certification by either the signer of the landscape design plan, the signer of the irrigation design plan, or the licensed landscape contractor that the landscape project has been installed per the approved landscape documentation package.
2. The certificate of completion shall be submitted to the city for review with the following attachments:
- a. *Irrigation Schedule*. All irrigation schedules shall be developed, managed and evaluated to utilize the minimum amount of water required to maintain plant health. Irrigation schedules shall meet the following criteria:
    - (1) Irrigation scheduling shall be regulated by automatic irrigation controllers.
    - (2) For implementation of the irrigation schedule, particular attention must be paid to irrigation run times, emission device, flow rate, and current reference evapotranspiration, so that applied water meets the ETWU. Total annual applied water shall be less than or equal to MAWA. Actual irrigation schedules shall be regulated by automatic irrigation controllers using current reference evapotranspiration data or soil moisture sensor data.
    - (3) Parameters used to set the automatic controller shall be developed and submitted for each of the following:
      - (A) Plant establishment period.
      - (B) The established landscape.
      - (C) Temporarily irrigated areas.
    - (4) Each irrigation schedule shall consider for each station all of the following that apply:
      - (A) Irrigation interval (days between irrigation).
      - (B) Irrigation run times (hours or minutes per irrigation event to avoid runoff).
      - (C) Number of cycle starts required for each irrigation event to avoid runoff.
      - (D) Amount of applied water scheduled to be applied on a monthly basis.
      - (E) Application rate setting.
      - (F) Root depth setting.
      - (G) Plant type.
      - (H) Slope factor setting.
      - (I) Shade factor setting.

(j) Irrigation uniformity or efficiency setting.

b. *Landscape and Irrigation Maintenance Schedule.* A regular maintenance schedule shall be developed, which meets the following criteria:

- (1) Landscapes shall be maintained to ensure water use efficiency.
- (2) The schedule shall include, but not be limited to, routine inspection; auditing, adjustment and repair of the irrigation system and its components; aerating and dethatching turf areas; topdressing with compost, replenishing mulch; fertilizing; pruning; weeding in all landscape areas; and removing any obstructions to emission devices.
- (3) Operation of the irrigation system outside the normal watering window is allowed for auditing and system maintenance.
- (4) Repair of all irrigation equipment shall be done with the originally installed components or their equivalents or with components with greater efficiency.
- (5) An irrigation maintenance schedule timeline that includes routine inspections, adjustments and repairs to the irrigation system, aerating and dethatching turf areas, replenishing mulch, fertilizing, pruning and weeding.

c. *Landscape Irrigation Audit Report.* An audit report shall be developed which meets the following criteria:

- (1) Operating pressure of the irrigation system.
- (2) Distribution uniformity of overhead irrigation.
- (3) Precipitation rate of overhead irrigation.
- (4) Report of any overspray or broken irrigation equipment.
- (5) Irrigation schedule: plant establishment irrigation schedule and regular irrigation schedule by month that includes plant type, root depth, soil type, slope factor, shade factor, irrigation interval, irrigation runtimes, number of start times per irrigation day, gallons per minute for each valve, precipitation rate, distribution uniformity and monthly estimated water use calculations.
- (6) Verification that a diagram of the irrigation plan showing hydrozones is kept with the irrigation controller for subsequent management purposes.
- (7) All landscape irrigation audits shall be conducted by a certified landscape irrigation auditor. Landscape audits shall not be conducted by the person who designed the landscape or installed the landscape.
- (8) In large projects or projects with multiple landscape installations an auditing rate of fifteen percent is required.



d. Soil management report, if not submitted with the landscape documentation package, and documentation verifying implementation of soil report recommendations.

3. Copies of the approved certificate of completion shall be provided to the property owner or his or her designee.

E. *Public Education.* All model homes that are landscaped shall use signs that provide written information to demonstrate the principles of water efficient landscapes described in this chapter.

1. Signs shall be used to identify the model as an example of a water efficient landscape featuring elements such as hydrozones, irrigation equipment, and others that contribute to the overall water-efficient theme. Signage shall include information about the site water use as designed per the local ordinance; specify who designed and installed the water efficient landscape; and demonstrate low water use approaches to landscaping such as using native plants.

2. Information shall be provided about designing, installing, managing, and maintaining water-efficient landscapes. (Ord. 2562 NCS §3, 2016.)

### **15.17.060 Water budgets for new and existing dedicated irrigation accounts.**

The city shall provide any account with a dedicated irrigation meter(s) a landscape water budget. The water budget will be calculated by the city or its agent by measuring the total irrigated landscaped area and the plant type(s) that exist per water meter. Any account assigned a water budget may not exceed the water budget for that billing period by more than twenty percent during that billing period. Accounts that exceed their water budget by more than twenty percent will be notified by the city. The city will work with the property owner or its authorized representative to ensure corrective actions are taken. Exceeding an account's water budget by more than twenty percent more than two times in one twelve-month period and/or failure to cooperate with the city in taking corrective action after notification by the city of specific action(s) to be taken shall constitute a violation of this chapter. (Ord. 2316 NCS §3 (part), 2009.)

### **15.17.070 Water waste prohibitions.**

The purpose of this section is to promote water conservation and efficient use of potable water furnished by the city of Petaluma by eliminating nonessential water use and intentional or unintentional water waste when a reasonable alternative solution is available and by prohibiting the use of water equipment that is wasteful.

A. *Nonessential Uses Defined and Prohibited.* No customer of the city shall use or permit the use of potable water from the city for residential, commercial, institutional, industrial, agricultural, or other purpose for the following nonessential uses:

1. The washing of sidewalks, walkways, driveways, parking lots and other hard-surfaced areas by direct hosing not equipped with a shutoff nozzle, except as may be necessary to properly dispose of flammable or other dangerous liquids or substances and/or to prevent or eliminate materials dangerous to the public health and safety;
  2. The escape of water through breaks or leaks within the customer's plumbing or private distribution system for any substantial period of time within which such break or leak should reasonably have been discovered and corrected. It shall be presumed that a period of one hour to stop the flow of water from such break or leak after the consumer discovers such a break or leak or receives notice from the city, and seventy-two hours to correct such break or leak after the consumer discovers such a break or leak or receives notice from the city, is a reasonable time period;
  3. Irrigation in a manner or to the extent that allows runoff of water or over-spray of the areas being irrigated. Every customer is deemed to have their irrigation system under control at all times, to know the manner and extent of their water use and any runoff and overspray, and to employ available alternatives to apply irrigation water in an efficient manner;
  4. Application of potable water to outdoor landscapes during and within forty-eight hours after measurable rainfall;
  5. Washing cars, boats, trailers, or other vehicles, equipment and machinery directly with a hose not equipped with a hose-end shutoff nozzle;
  6. Using water for non-recycling water features;
  7. Using water for single pass evaporative cooling systems for air conditioning in all connections installed after July 1, 2001, unless required for health or safety reasons;
  8. Using water for new non-recirculating conveyor car wash systems; self-service car wash spray wands shall emit no more than three gallons of water per minute;
  9. Using water for new non-recirculating industrial clothes washing systems;
  10. Dedicated irrigation accounts exceeding the allocated water budget by more than twenty percent in any billing period.
- B. *Pressure Regulation.* A pressure-regulating valve shall be installed and maintained by the consumer if static service pressure at the meter exceeds eighty pounds per square inch. The pressure-regulating valve shall be located between the meter and the structure valve, and set at not more than sixty pounds per square inch when measured at the structure valve. This requirement may be waived if the consumer presents evidence satisfactory to the city that high pressure is necessary in the design and that no water will be wasted as a result of high-pressure operation.
- C. *Swimming Pool and Spa Covers.* Private outdoor swimming pools and spas are to be covered during non-business hours or while not in use. Public outdoor swimming pools and spas are to be covered if the swimming

pool or spa is scheduled to be unused for more than one day. A public pool that is closed for the season does not require covering.

D. *Exempt Water Uses.* All water use associated with the operation and maintenance of fire suppression equipment or employed by the city for water quality flushing and sanitation purposes shall be exempt from the provisions of this section. Use of water supplied by a private well or from properly authorized recycled water, gray water, or rainwater catchment system is also exempt. (Ord. 2579 NCS §2, 2016; Ord. 2316 NCS §3 (part), 2009.)

### **15.17.080 Exceptions.**

Any customer of the city may make written application for an exception to the water conservation regulations ordinance. Said application shall describe in detail why applicant believes an exception is justified:

A. The director of water resources and conservation may grant exceptions for use of water otherwise prohibited by this chapter if an exception is necessary to avoid an adverse impact on health, sanitation or safety of the applicant or the public, and/or to avoid undue hardship for the applicant or the public. Any exception granted shall not be broader than necessary, or of a duration longer than necessary to avoid the adverse effect on health, sanitation, fire protection or safety and/or to avoid the undue hardship.

B. The decision of the director of water resources and conservation may be appealed to the city council by submitting a written appeal to the city clerk within fifteen calendar days of the date of the decision. Upon granting any appeal, the council may impose any conditions it determines to be just and proper. Exceptions granted by the council shall be prepared in writing, and the council may require the exception be recorded at applicant's expense. (Ord. 2316 NCS §3 (part), 2009.)

### **15.17.090 Applicability of water shortage emergency regulations.**

In the event of conflict between the provisions of this chapter and the provisions of Chapter [15.18](#), the provisions of Chapter [15.18](#) shall supersede the provisions of this chapter from such time as the city council has determined and declared by resolution that a water shortage emergency exists pursuant to Chapter [15.18](#), as it may be subsequently amended, until such time as the declaration of emergency has been suspended by later resolution of the city council. (Ord. 2316 NCS §3 (part), 2009.)

### **15.17.100 Enforcement and fees.**

A. Depending on the extent of the water waste, the city may, after written notification to customer and a reasonable time to correct the violation as solely determined by the city, take some or all of the following actions. Seventy-two hours from notice of the violation shall be considered a reasonable time for correction, absent unusual circumstances that lengthen or shorten the reasonable time for correction. Penalties, fees and charges noted below shall be established by resolution of the city:

1. Personal contact with the customer at the address of the water service. If personal contact is unsuccessful, written notice of the violation including a date that the violation is to be corrected may be left on the premises, with a copy of the notice sent by certified mail to the customer.
  2. The city may install a flow-restricting device on the service line.
  3. The city may levy a water waste fine to the customer.
  4. The city may shut off water service, and the charge for same shall be billed to the customer. Except in cases of extreme emergency as solely determined by the city manager, service shall not be reinstated until verified by the city that the violation has been corrected and all charges and fees have been paid.
- B. Depending on the nature and extent of water waste and/or the condition creating water waste, the city may discontinue water services without notice, pursuant to Section [15.12.070](#), and/or discontinue water services pursuant to Section [15.12.080](#).
- C. In addition to discontinuance of water services, any violation of this chapter is subject to enforcement as specified in Chapters [1.10](#) through [1.16](#). (Ord. 2316 NCS §3 (part), 2009.)

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**The Petaluma Municipal Code is current through Ordinance 2738 NCS, passed June 15, 2020.**

Disclaimer: The city clerk's office has the official version of the Petaluma Municipal Code. Users should contact the city clerk's office for ordinances passed subsequent to the ordinance cited above.

**Note:** This site does not support Internet Explorer. To view this site, Code Publishing Company recommends using one of the following browsers: Google Chrome, Firefox, or Safari.

[City Website: cityofpetaluma.net](http://cityofpetaluma.net)

[Code Publishing Company](#)



## Appendix N

# 2020 Urban Water Management Plan Adoption Resolution

## Resolution No. 2021-085 N.C.S. of the City of Petaluma, California

### RESOLUTION ADOPTING THE CITY OF PETALUMA 2020 URBAN WATER MANAGEMENT PLAN

**WHEREAS**, the Urban Water Management Planning Act, Water Code Section 10610 et seq., (the Act) requires that every urban water supplier which provides 3,000 acre feet or more of water annually, or which directly or indirectly supplies water for municipal purposes to more than 3,000 customers, shall prepare an Urban Water Management Plan, the primary objective of which is to plan for the conservation and efficient use of water; and

**WHEREAS**, the Act also requires all urban water purveyors serving over 3,000 customers or over 3,000 acre feet of water annually to develop a Water Shortage Contingency Plan; and

**WHEREAS**, the Water Conservation Act of 2009, Senate Bill SBx7X7, requires a 20% reduction in per capita water use by 2020; and

**WHEREAS**, requirements of the Water Conservation Act of 2009 applicable to urban water suppliers may be incorporated into the Urban Water Management Plan; and

**WHEREAS**, the Urban Water Management Plan must be adopted after public review and a public hearing by the City, and after adoption by the City Council must be filed with the California Department of Water Resources and sent to the State Library; and

**WHEREAS**, the Petaluma City Council conducted a public hearing on the City of Petaluma 2020 Urban Water Management Plan, including the SBx7X7 20% by 2020 water use reduction goals, and the City of Petaluma Urban Water Shortage Contingency Plan 2020 on May 17, 2021; and

**WHEREAS**, in compliance with Section 10642 of the California Water Code and Government Code Section 6066, the City of Petaluma published a notice of the public hearing on April 15, 22, 29, May 6, and 13, 2021 in the Petaluma Argus Courier; and

**WHEREAS**, environmental review was previously analyzed under the California Environmental Quality Act (CEQA) as part of the City's General Plan Environmental Impact Report specifically policy 8-P-16; and

**WHEREAS**, this proposed action does not constitute a "project under CEQA Guidelines Section 15378(b)(4-5) because approving the UWMP constitutes an organizational or administrative activity that will not result in direct or indirect physical changes in the environment; and

**WHEREAS**, this action is exempt pursuant to California Water Code Section 10652 which explicitly exempts CEQA review to the preparation and adoption of Urban Water Management Plans or to projects which implement the Urban Water Management Plan pursuant to Water Code Section 10632; and

**WHEREAS**, implementation of the UWMP is categorically exempt from environmental review under CEQA Guidelines Sections 15301 and 15302 as it applies the already existing water systems which may require the installation of minor water system facilities involving either minor alterations to existing facilities, or repair or replacement of existing facilities involving negligible or no expansion of water capacity; and the adoption of the

UWMP is also exempt from environmental review pursuant to CEQA Guidelines Section 15308 because it requires the implementation of management operations programs and plans to enhance and protect the environment by limiting the occurrence of water waste in the City; and this action is exempt under the feasibility and planning studies exemption, CEQA Guidelines Section 15262 as this is a study for future sewer and water rates and there are no cumulative impacts, unusual circumstances, or other factors that would make the exemption inapplicable pursuant to CEQA Guidelines section 15300.2.

**NOW, THEREFORE, BE IT RESOLVED** by the City Council of the City of Petaluma as follows:


1. Declares the above recitals are hereby declared to be true and correct and are incorporated into this resolution as findings of the City Council.
2. Finds the proposed action is exempt from the requirements of the California Environmental Quality Act (CEQA) for the following reasons:
  - a. Environmental review was previously analyzed under the California Environmental Quality Act (CEQA) as part of the City’s General Plan Environmental Impact Report specifically policy 8-P-16.
  - b. This proposed action does not constitute a “project under CEQA Guidelines Section 15378(b)(4-5) because approving the UWMP constitutes an organizational or administrative activity that will not result in direct or indirect physical changes in the environment.
  - c. This action is exempt pursuant to California Water Code Section 10652 which explicitly exempts CEQA review to the preparation and adoption of Urban Water Management Plans or to projects which implement the Urban Water Management Plan pursuant to Water Code Section 10632
  - d. If this action did constitute a “project” under CEQA, the action would be categorically exempt under CEQA Guidelines Section 15262 as this is a study for future sewer and water rates pursuant to CEQA Guidelines Section 15300. Implementation of the UWMP is categorically exempt under CEQA Guidelines Sections 15301 and 15302 as it applies the already existing sanitary sewer collection systems which may require the installation of minor sewer system facilities involving either minor alterations to existing facilities, or repair or replacement of existing facilities involving negligible or no expansion of sewer capacity. The adoption of the UWMP is also exempt from environmental review pursuant to CEQA Guidelines Section 15308 because it requires the implementation of management operations programs and plans to enhance and protect the environment by limiting the occurrence of sanitary sewer overflows in the City; and there are no cumulative impacts, unusual circumstances, or other factors that would make the exemption inapplicable.
3. Approves the City of Petaluma 2020 Urban Water management plan in accordance with the requirements of the Urban Water Management Planning Act and the Department of Water Resources.
4. Directs staff to authorize and execute documents pertaining to the certification of the City’s 2020 UWMP and to submit and upload the UWMP to the California Department of Water Resources and the California State Library within 30 days of adoption of the Plan.

Under the power and authority conferred upon this Council by the Charter of said City.

**REFERENCE:**

I hereby certify the foregoing Resolution was introduced and adopted by the Council of the City of Petaluma at a Regular meeting on the 7<sup>th</sup> day of June 2021, by the following vote:

Approved as to

DocuSigned by:  
  
 5EF85AE94F3048D...  
 City Attorney


**AYES:** Mayor Barrett; Vice Mayor Barnacle; Fischer; Healy; King; McDonnell; Pocekay

**NOES:** None

**ABSENT:** None

**ABSTAIN:** None

**ATTEST:**

DocuSigned by:  
  
184689A429E4492...  
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City Clerk

DocuSigned by:  
  
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Mayor



## Resolution No. 2021-102 N.C.S. of the City of Petaluma, California

### RESOLUTION ADOPTING THE CITY OF PETALUMA 2020 WATER SHORTAGE CONTINGENCY PLAN

**WHEREAS**, the Urban Water Management Planning Act, Water Code Section 10610 et seq., (the Act) requires that every urban water supplier which provides 3,000 acre feet or more of water annually, or which directly or indirectly supplies water for municipal purposes to more than 3,000 customers, shall prepare an Urban Water Management Plan, the primary objective of which is to plan for the conservation and efficient use of water; and

**WHEREAS**, the Act also requires all urban water purveyors serving over 3,000 customers or over 3,000 acre feet of water annually to develop a Water Shortage Contingency Plan (WSCP); and

**WHEREAS**, the 2018 Water Conservation Legislation established long-term water conservation and drought planning to adapt to climate change and the resulting longer and more intense drought in California.

**WHEREAS**, requirements of the 2018 Water Conservation Legislation applicable to water shortage contingency planning must be incorporated into the WSCP; and

**WHEREAS**, the WSCP must be adopted after public review and a public hearing by the City, and after adoption by the City Council must be filed with the California Department of Water Resources and sent to the State Library; and

**WHEREAS**, in compliance with Section 10642 of the California Water Code and Government Code Section 6066, the City of Petaluma published a notice of the public hearing on April 15, 22, 29, May 6, and 13, 2021 in the Petaluma Argus Courier; and

**WHEREAS**, the Petaluma City Council conducted a public hearing on the City of Petaluma 2020 Urban Water Management Plan (UWMP), including the City of Petaluma 2020 WSCP on May 17, 2021; and

**WHEREAS**, the comments and requests received during the public hearing for the draft 2020 UWMP and WSCP were added to the final 2020 WSCP.

**WHEREAS**, environmental review was previously analyzed under the California Environmental Quality Act (CEQA) as part of the City's General Plan Environmental Impact Report specifically policy 8-P-16; and

**WHEREAS**, this proposed action does not constitute a "project under CEQA Guidelines Section 15378(b)(4-5) because approving the UWMP constitutes an organizational or administrative activity that will not result in direct or indirect physical changes in the environment; and

**WHEREAS**, this action is exempt pursuant to California Water Code Section 10652 which explicitly exempts CEQA review to the preparation and adoption of Urban Water Management Plans or to projects which implement the Urban Water Management Plan pursuant to Water Code Section 10632; and

**WHEREAS**, implementation of the UWMP is categorically exempt from environmental review under CEQA Guidelines sections 15301 and 15302 as it applies the already existing water systems which may require the


installation of minor water system facilities involving either minor alterations to existing facilities, or repair or replacement of existing facilities involving negligible or no expansion of water capacity; and the adoption of the UWMP is also exempt from environmental review pursuant to CEQA Guidelines Section 15308 because it requires the implementation of management operations programs and plans to enhance and protect the environment by limiting the occurrence of water waste in the City; and this action is exempt under the feasibility and planning studies exemption, CEQA Guidelines Section 15262 as this is a study for future sewer and water rates and there are no cumulative impacts, unusual circumstances, or other factors that would make the exemption inapplicable pursuant to CEQA Guidelines section 15300.2.

**NOW, THEREFORE, BE IT RESOLVED** that the City Council of the City of Petaluma hereby:

1. Declares the above recitals are hereby declared to be true and correct and are incorporated into this resolution as findings of the City Council.
2. Finds the proposed action is exempt from the requirements of the California Environmental Quality Act (CEQA) for the following reasons:
  - a. Environmental review was previously analyzed under the California Environmental Quality Act (CEQA) as part of the City’s General Plan Environmental Impact Report specifically policy 8-P-16.
  - b. This proposed action does not constitute a “project under CEQA Guidelines Section 15378(b)(4-5) because approving the UWMP constitutes an organizational or administrative activity that will not result in direct or indirect physical changes in the environment.
  - c. This action is exempt pursuant to California Water Code Section 10652 which explicitly exempts CEQA review to the preparation and adoption of Urban Water Management Plans or to projects which implement the Urban Water Management Plan pursuant to Water Code Section 10632
  - d. If this action did constitute a “project” under CEQA, the action would be categorically exempt under CEQA Guidelines Section 15262 as this is a study for future sewer and water rates pursuant to CEQA Guidelines Section 15300. Implementation of the UWMP is categorically exempt under CEQA Guidelines Sections 15301 and 15302 as it applies the already existing sanitary sewer collection systems which may require the installation of minor sewer system facilities involving either minor alterations to existing facilities, or repair or replacement of existing facilities involving negligible or no expansion of sewer capacity. The adoption of the UWMP is also exempt from environmental review pursuant to CEQA Guidelines Section 15308 because it requires the implementation of management operations programs and plans to enhance and protect the environment by limiting the occurrence of sanitary sewer overflows in the City; and there are no cumulative impacts, unusual circumstances, or other factors that would make the exemption inapplicable.
3. Approves the City of Petaluma 2020 Water Shortage Contingency Plan in accordance with the requirements of the Urban Water Management Planning Act and the Department of Water Resources.
4. Directs staff to authorize and execute documents pertaining to the certification of the City’s 2020 UWMP and to submit and upload the UWMP, including the WSCP, to the California Department of Water Resources and the California State Library within 30 days of adoption of the Plan.

Under the power and authority conferred upon this Council by the Charter of said City.

**REFERENCE:** I hereby certify the foregoing Resolution was introduced and adopted by the Council of the City of Petaluma at a Regular meeting on the 21<sup>st</sup> day of June 2021, by the following vote:

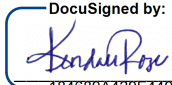
Approved as to  
DocuSigned by:  
  
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City Attorney

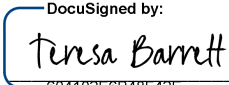
**AYES:** Mayor Barrett; Vice Mayor Barnacle; Fischer; Healy; King; McDonnell; Pocekay

**NOES:** None

**ABSENT:** None

**ABSTAIN:** None

**ATTEST:**   
184689A429E4492...  
City Clerk

  
604102E6B48F42E...  
Mayor

### **Concord**

1001 Galaxy Way, Suite 310  
Concord CA 95420  
925-949-5800

### **Davis**

2020 Research Park Drive, Suite 100  
Davis CA 95618  
530-756-5905

### **Eugene**

1650 W 11th Avenue, Suite 1-A  
Eugene OR 97402  
541-431-1280

### **Lake Forest**

23692 Birtcher Drive  
Lake Forest CA 92630  
949-420-3030

### **Lake Oswego**

5 Centerpointe Drive, Suite 130  
Lake Oswego OR 97035  
503-451-4500

### **Oceanside**

804 Pier View Way, Suite 100  
Oceanside CA 92054  
760-795-0365

### **Olympia**

825 Legion Way SE, Suite A6  
Olympia WA 98501  
360-350-4523

### **Phoenix**

4505 E Chandler Boulevard, Suite 230  
Phoenix AZ 85048  
602-337-6110

### **Pleasanton**

6800 Koll Center Parkway, Suite 150  
Pleasanton CA 94566  
925-426-2580

### **Sacramento**

8950 Cal Center Drive, Bldg. 1, Suite 363  
Sacramento CA 95826  
916-306-2250

### **San Diego**

11939 Rancho Bernardo Road, Suite 100  
San Diego CA 92128  
858-505-0075

### **Santa Rosa**

2235 Mercury Way, Suite 105  
Santa Rosa CA 95407  
707-543-8506