


## **APPENDIX A**

### **California Water Code**

With 2018 Legislative Updates For 2020 UWMPs



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**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 2.6. URBAN WATER MANAGEMENT PLANNING [10610 - 10657]** (*Part 2.6 added by Stats. 1983, Ch. 1009, Sec. 1.*)

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

**ARTICLE 1. General Provisions [10620 - 10621]** (*Article 1 added by Stats. 1983, 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) (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.

*(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 July 1, 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.)*



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**PART 2.6. URBAN WATER MANAGEMENT PLANNING [10610 - 10657]** (*Part 2.6 added by Stats. 1983, Ch. 1009, Sec. 1.*)

**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:

(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) 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) 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. 2019, Ch. 239, Sec. 8. (AB 1414) Effective January 1, 2020.)*

**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 606) 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 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.

*(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 July 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 July 1 of each year, whichever is later. *(Amended by Stats. 2019, Ch. 239, Sec. 9. (AB 1414) Effective January 1, 2020.)*

**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 664) 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.)*

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**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. 1.*)

**CHAPTER 3. Urban Water Management Plans [10620 - 10645]** (*Chapter 3 added by Stats. 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.)*



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**PART 2.6. URBAN WATER MANAGEMENT PLANNING [10610 - 10657]** (*Part 2.6 added by Stats. 1983, Ch. 1009, Sec. 1.*)

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

**ARTICLE 3. Adoption and Implementation of Plans [10640 - 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 606) Effective January 1, 2019.)

**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 606) Effective January 1, 2019.)

**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, 2019.)*

**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.)*

## **APPENDIX B**

### **California Water Code**

Changes Since 2015 UWMPs

**City of Patterson**  
**2020 UWMP Update Project**  
**New 2020 UWMP Requirements Summary**

DWR publishes its UWMP Guidebook each UWMP reporting cycle. The DWR 2020 UWMP Guidebook contains information that must be included as required when the City was preparing its 2015 UWMP as well as changes to the California Water Code from the 2018 legislative updates (SB 606 and AB 1668) that will inform the Final Guidebook and new requirements that must be addressed in 2020 UWMPs.

The table below summarizes the most important eleven (11) new/modified 2020 UWMP requirements which are addressed and incorporated into the City’s adopted 2020 UWMP.

ITEM	CATEGORY	CHANGE
1	Demands	Accounting for land use changes in water demand projections instead of a population based forecast only (triggering the need to use GIS, which also accommodates the analysis of potential change in occupancy rates of vacation homes due to long-term changes after the pandemic ends).
2	Conservation	Accounting for water savings from codes and standards.
3	Demand Management/Conservation	Identifying new demand management measures that translate to improved water use efficiency to meet new indoor water use standards of 55 gpcd and 50 gpcd by year 2030 and 2035, respectively.
4	Water Loss	Reporting on five years of water loss (instead of just reporting one water loss value) and assessing methods to reduce water loss to meet future water loss standards that are anticipated to go into effect for the 2025 UWMPs and beyond.
5	Water Supply Reliability	Analyzing water supply reliability monthly instead of annually.
6	Climate Change	Consideration of climate change impacts when assessing long-term supply availability for each supply source.
7	Drought Risk/Climate Change	Conducting a five-year drought risk assessment that evaluates water shortage risks for a drought lasting five years (increasing the multiple-dry-year analysis from three to five consecutive years).
8	Water Shortage Contingency Plan	Preparing a water shortage contingency plan with at least six levels of shortage (compared to the four levels included in the 2015 UWMP), including triggers, response actions, financial impacts, annual water budgets, monitoring protocols, and a communication strategy.
9	Resiliency	Incorporating potential, non-drought related, natural hazard-induced system vulnerabilities, including seismic risks.
10	Energy Consumption	Reporting on energy demands for water conveyance, treatment, and distribution of water throughout the District’s service area.
11	Groundwater Management	Reporting on Groundwater Sustainability Plan Development, as applicable.

## **APPENDIX C**

### **Public Notices and Resolutions**

Public Notifications To Interested Agencies

Public Notices Prior To Public Hearing and Adoption

2020 UWMP and WSCP Adoption Resolutions

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## NOTICE

### CITY OF PATTERSON 2020 URBAN WATER MANAGEMENT PLAN UPDATE

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**DATE:** February 9, 2021  
**TO:** All Interested Parties  
**FROM:** Maria Encinas, Water Resources Manager



**SUBJECT:** 2020 Urban Water Management Plan Update

Existing state law requires each urban water supplier to prepare and adopt an urban water management plan at least once every five years. The City of Patterson (City) is currently preparing an update to its 2015 Urban Water Management Plan (UWMP). The UWMP documents the City's plans to ensure adequate water supplies to meet existing and future demands for water under a range of water supply conditions, including water shortages.

As part of the UWMP process, the City is required to notify those agencies which the City receives water from, sells water to, or the County in which water is delivered (California Water Code § 10621 (b)). Additionally, the City is notifying those agencies listed in the Northern Delta-Mendota Management Committee. If you are receiving this letter, the City is either required to notify you or has chosen to do so voluntarily.

We anticipate having a draft plan available for public review in late February/early March 2021. The final plan will be submitted to the California Department of Water Resources by July 1, 2021. I will send a follow-up letter on how to obtain a draft of the plan and how to submit comments. If you have any questions, please contact me at the number below:

Maria Encinas,  
Water Resources Manager  
City of Patterson  
PO Box 667  
Patterson, CA 95363  
(209) 895-8061  
[mencinas@ci.patterson.ca.us](mailto:mencinas@ci.patterson.ca.us)

Sincerely,

A handwritten signature in blue ink, appearing to read "Maria Encinas".

Maria Encinas  
City of Patterson

West Stanislaus Irrigation District  
Bobby Pierce  
PO Box 37  
Westley, CA 95387

Del Puerto Water District  
Anthea Hansen  
PO Box 1596  
Patterson, CA 95363

Patterson Irrigation District  
Vince Lucchesi  
PO Box 685  
Patterson, CA 95363

Oak Flat Water District  
Anthea Hansen  
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Patterson, CA 95363

Stanislaus County, Environmental  
Resources  
Walt Ward  
3800 Cornucopia Way, Suite C  
Modesto, CA 95358

Merced County  
Department of Water Resources  
Lacey Kiriakou  
2222 M Street  
Merced, CA 95340

SLDMWA  
Scott Petersen  
P.O. BOX 2157  
Los Banos, CA 93635

Stanislaus County  
Housing Authority  
Barbara Kauss  
1701 Robertson Road  
Modesto, CA 95351

Stanislaus County  
Department of Public Works  
David Leamon  
1716 Morgan Road  
Modesto, CA 95357

Western Hills Water District  
General Manager  
9521 Morton Davis Drive  
Patterson, CA 95363

City of Turlock  
Department of Municipal Services  
Allison Van Guilder  
156 S. Broadway, Suite 270  
Turlock, CA 95380

City of Riverbank  
Department of Public Works  
Michael Riddell  
6707 3rd Street  
Riverbank, CA 95367

City of Oakdale  
Department of Public Works  
Jack Grabel  
455 S. 5th Street  
Oakdale, CA 95361

City of Newman  
Department of Public Works  
Kathryn Reyes  
PO Box 787  
Newman, CA 95360

City of Modesto  
Department of Public Works  
Bill Sandhu  
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City of Hughson  
Department of Comm. Development  
Lea Simvoulakis  
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Hughson, CA 95326

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Department of Public Works  
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2720 2nd Street  
Ceres, CA 95307

City of Waterford  
Department of Public Works  
Lonnie Statzer  
PO Box 199  
Waterford, CA 95386

Stanislaus County  
Grayson Community Services District  
Connie Payan  
254 Sperry Avenue  
Patterson, CA 95363

Stanislaus County  
Crowslanding Comm. Services District  
Connie Payan  
254 Sperry Avenue  
Patterson, CA 95363

**Alternative contacts below:**

Stanislaus County, Environmental  
Resources  
Jami Aggers  
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Centinella Water District  
General Manager  
600 N. 2<sup>nd</sup> Street  
Patterson, CA 95363

Eastin Water District  
General Manager  
3500 Shiells Road  
Newman, CA 95360

Twins Oaks Irrigation District  
General Manager  
2012 Apple Avenue  
Patterson, CA 95363

## **APPENDIX D**

### **Regional Water Planning and Reporting**

SGMA – Groundwater Sustainability Plan

IRWM – Integrated Resource Water Management Plan

SWRCB Water Conservation Reporting



NORTHERN &  
CENTRAL  
DELTA-  
MENDOTA

# Executive Summary - Final Draft Groundwater Sustainability Plan

For the Northern and Central Delta-Mendota Regions

November 2019



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# EXECUTIVE SUMMARY

## ES-1. Introduction

In 2014, the California legislature enacted the Sustainable Groundwater Management Act (SGMA) in response to continued overdraft of California’s groundwater resources. The Delta-Mendota Subbasin (Subbasin) is one of 21 alluvial basins and subbasins identified by the California Department of Water Resources (DWR) as being in a state of critical overdraft. SGMA requires the preparation of a Groundwater Sustainability Plan (GSP) to address measures necessary to attain sustainable conditions in the Subbasin by 2040. Within the framework of SGMA, sustainability is generally defined as the long-term reliability of groundwater supply to meet the needs of uses and users of groundwater in the Subbasin with the absence of undesirable results.

### Critical Dates for the Delta-Mendota Subbasin

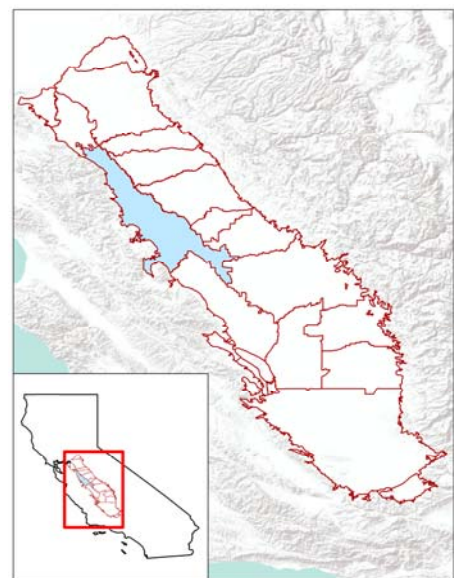
- 2020 By January 31: Submit GSPs to DWR
- 2025 Review and update GSPs
- 2030 Review and update GSPs
- 2035 Review and update GSPs
- 2040 Achieve sustainability for the Subbasin

Within the Delta-Mendota Subbasin, six (6) GSPs have been developed in a coordinated fashion with the goal of achieving sustainability for the Subbasin as a whole. The GSP Groups preparing the coordinated GSPs include: the Aliso Water District GSP Group, Farmers Water District GSP Group, Fresno County GSP Group, Grassland GSP Group, Northern & Central Delta-Mendota Region GSP Group, and San Joaquin River Exchange Contractors GSP Group. This GSP has been developed for the Northern and Central Delta-Mendota Regions, which are comprised of the following eight Groundwater Sustainability Agencies (GSAs): Central Delta-Mendota, City of Patterson, DM-II, Northwestern Delta-Mendota, Oro Loma Water District, Patterson Irrigation District, West Stanislaus Irrigation District, and Widren Water District. The Northern & Central Delta-Mendota Region GSP has been developed by these GSAs to meet SGMA regulatory requirements while reflecting local needs and preserving local control over water resources. This GSP provides a path to achieve and document sustainable groundwater management within 20 years following adoption, promoting the long-term sustainability of locally-managed groundwater resources now and into the future.

SGMA requires development of a GSP that achieves groundwater sustainability in the Plan area and Subbasin as a whole by 2040. This GSP outlines the need to address overdraft and related conditions and has identified projects and management actions for implementation to offset increasing reliance on groundwater and to meet current and future groundwater demands in a sustainable fashion. While no regulatory actions are anticipated to occur during the first five years of GSP implementation, additional efforts will be taken during this period to fill data gaps, to confirm benefits provided by projects and management actions implemented in the first five years, and to assess the need to modify the projects or management actions, or identify additional projects and management actions required, to achieve sustainability.

As previously stated, the Northern & Central Delta-Mendota Region GSP is one of six GSPs developed for implementation in the Delta-Mendota Subbasin under SGMA. Coordinated efforts required under SGMA regulations in basins and subbasins developing more than one GSP are documented in the *Delta-Mendota Subbasin Groundwater Sustainability Plan Common Chapter*, which is included as a supplemental document to this GSP (**Appendix B**).

Figure ES-1. Delta-Mendota Subbasin within the San Joaquin Valley



## ES-2. Plan Area

The Delta-Mendota Subbasin is defined by DWR's 2003 Bulletin 118 and subsequently updated in 2016 and 2018. The Delta-Mendota Subbasin is one of 19 subbasins that comprise the San Joaquin Valley Groundwater Basin and neighbors the following subbasins: Tracy, Eastern San Joaquin, Modesto, Turlock, Merced, Chowchilla, Madera, Kings and Westside (**Figure ES-1**). The Northern & Central Delta-Mendota Region GSP generally encompasses the area along the western boundary of the Delta-Mendota Subbasin and lies within five counties: San Joaquin, Stanislaus, Merced, Fresno, and San Benito (**Figure ES-2**).

Agriculture is the primary land use type within the Northern and Central Delta-Mendota Regions, with the City of Patterson and several communities (including Grayson, Westley, Crows Landing, Santa Nella, and Volta) comprising the urban sector of the Plan area. The predominant land use planning entities in the Plan area include the overlying counties, the City of Patterson, the City of Modesto (serving Community of Grayson), and the larger communities of Santa Nella, Crows Landing, and Westley. Changes to land use have the potential to change water demands or impact sustainable groundwater management in the Plan area.

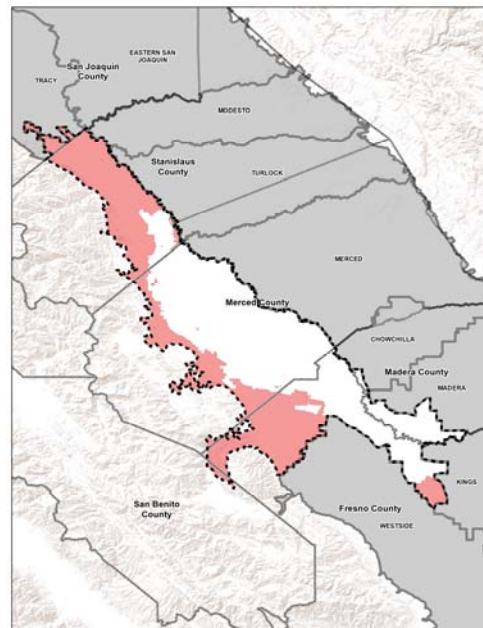
The Delta-Mendota Canal (DMC) and California Aqueduct extend nearly the entire length of the Plan area and provide water from the Central Valley Project and State Water Project, respectively, to water districts, irrigation districts, and private land owners south of the Sacramento-San Joaquin Delta and throughout the Delta-Mendota Subbasin. The San Joaquin River is the primary feature defining the eastern boundary of the Delta-Mendota Subbasin and serves as a water supply source for Patterson Irrigation District, West Stanislaus Irrigation District, and private landowners in the Northern and Central Delta-Mendota Regions. The Kings River, located south of the Subbasin, serves as a water supply for entities in the southern portion of the Subbasin. Groundwater is used as a supplemental water supply source by water purveyors throughout the Delta-Mendota Subbasin, with several entities reliant in whole or in part on groundwater as their primary water supply. Existing water resources monitoring and management plans are currently in place throughout the Delta-Mendota Subbasin and include the California Statewide Groundwater Elevation Monitoring (CASGEM) program and Irrigated Lands Regulatory Program (ILRP), in addition to county well standards and permitting. These existing programs can help inform SGMA activities by coordinating with monitoring and management entities on overlapping activities and goals.

## ES-3. Governance and Administration

As previously noted, the Northern & Central Delta-Mendota Region GSP was developed in a coordinated fashion by the eight GSAs comprising the Regions. All eight of these GSAs each have their own organization and management structure as well as legal authority under which they operate in order to enforce SGMA and the contents of this GSP. The Northern Delta-Mendota Region and Central Delta-Mendota Region coordinate with the San Luis & Delta-Mendota Water Authority (SLDMWA) as Plan Manager to prepare and implement a single GSP for their portion of the Delta-Mendota Subbasin.

The Northern Delta-Mendota Region is comprised of the following GSAs: DM-II, Patterson Irrigation District, West Stanislaus Irrigation District, City of Patterson, and Northwestern Delta-Mendota. The Central Delta-Mendota Region is comprised of the following GSAs: Central Delta-Mendota, San Benito County (under a Memorandum of Understanding with the Central Delta-Mendota GSA), Oro Loma Water District, and Widren Water District. The Northern Delta-Mendota Management Committee and Central Delta-Mendota Management Committee coordinate on

**Figure ES-2. Plan Area within the Delta-Mendota Subbasin**



all aspects of GSP development and implementation through joint management committee meetings. At the Subbasin-level, representatives from the Northern & Central Delta-Mendota Region GSP Group participate as members on the Delta-Mendota Subbasin Coordination Committee during regular meetings, where all SGMA-required coordination efforts regarding GSP development and implementation occurs.

#### ES-4. Outreach and Communication

A stakeholder engagement strategy was developed to solicit and discuss the interests of all beneficial users of groundwater in the Plan area and Subbasin. The strategy incorporated monthly meetings of the Northern and Central Delta-Mendota Management Committees and the Northern and Central Delta-Mendota Technical Advisory Committee; monthly meetings of the Delta-Mendota Subbasin Coordination Committee, Subbasin Technical Working Group, and Subbasin Communications Working Group; bi-annual public workshops (including outreach presentations on GSP development progress to solicit feedback); a monthly newsletter distributed to targeted stakeholders; a website where all meeting and public workshop materials, as well as supplemental resources, are posted; and information distributed to property owners and residents in the Subbasin. **Figure ES-3** shows attendees at one of the public workshop events conducted during development of the GSP.

**Figure ES 3. Public Workshop Events**



The Northern and Central Delta-Mendota Management Committees, as well as the Delta-Mendota Subbasin Coordination Committee, were established to encourage active involvement from diverse social, cultural, and economic elements of the population of the Plan area and Subbasin, in addition to meeting SGMA requirements for intrabasin coordination. Members of these committees include representatives from water and irrigation districts, representing large and small landowners and growers, and municipal water providers. Environmental interest groups, state agencies, and disadvantage community representatives were also consulted during regular meetings, special meetings, and workshops early on in the GSP development process to consider the interest of all users of groundwater in the Plan area and Subbasin as a whole. Participating stakeholders were invited to provide comments during these meetings (subject to the Brown Act) as well as provide comments and feedback during public workshops hosted throughout the Subbasin during GSP development. Spanish translation was provided at the public workshops and associated materials were provided in Spanish and English, along with other SGMA-related informational materials, at the meetings and on the Subbasin website (<http://deltamendota.org/>), creating an opportunity for local Spanish-speaking individuals to engage in the GSP development process.

#### ES-5. Basin Setting

The Northern & Central Delta-Mendota Region GSP contains the required sections for establishing the Basin Setting. These sections contain descriptions of the Regions' physical setting, characteristics, and current conditions, and include the Hydrogeologic Conceptual Model, Groundwater Conditions, Water Budgets, and Management Areas sections. Combined, these sections serve as a basis for defining and assessing reasonable sustainable management criteria and projects and management actions.

## Hydrogeologic Conceptual Model

The Delta-Mendota Subbasin is located in the northwestern portion of the San Joaquin Valley Groundwater Basin within the southern portion of the Central Valley. The Subbasin is bounded on the west by the Tertiary and older marine sediments of the Coast Range, on the north generally by the San Joaquin-Stanislaus County line, on the east generally by the San Joaquin River and Fresno Slough, and on the south by the Tranquillity Irrigation District boundary near the community of San Joaquin. Surface waters culminate from the Fresno, Merced, Tuolumne, and Stanislaus rivers into the San Joaquin River, which drains toward the Sacramento-San Joaquin Delta. The location of the Subbasin and Plan area are shown in Figure ES-4.

A two-aquifer system is created by the Corcoran Clay layer and is generally pervasive throughout the Subbasin, creating a semi-confined aquifer above the Corcoran Clay layer (Upper Aquifer) and confined aquifer below the Corcoran Clay (Lower Aquifer). The Corcoran Clay layer largely inhibits vertical flow between aquifers, except in areas where the Corcoran Clay layer is thin or wells perforated in both principal aquifers provides a conduit for vertical flow.

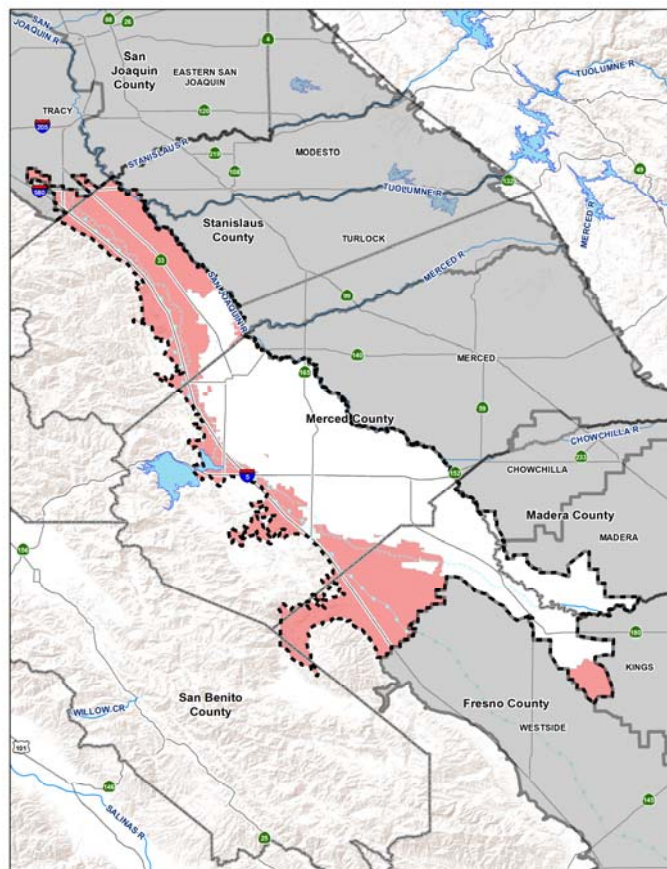
Prevailing horizontal groundwater flow within the Upper Aquifer and Lower Aquifer systems is predominantly in the general northeasterly direction from the Coast Range towards and parallel to the San Joaquin River. While local pumping depressions are present, the prevailing northeasterly flow direction for groundwater in the Subbasin has remained.

## Groundwater Conditions

Groundwater levels in some portions of the Northern and Central Delta-Mendota Regions have been declining for many years, while groundwater levels in other areas of the Subbasin have remained stable or increased in recent years. Groundwater levels have varied over time within the Delta-Mendota Subbasin where historically, groundwater levels decreased with increased groundwater pumping and the expansion of irrigated agriculture. As large-scale water projects, such as the Central Valley Project and State Water Project, began making imported surface water deliveries south of the Sacramento-San Joaquin Delta, groundwater levels increased as imported water was conjunctively used with groundwater and diverted San Joaquin River waters. During prolonged periods of drought, groundwater levels are observed to decline as groundwater extractions increase to offset loss of imported surface water, with groundwater levels rebounding following increased surface water deliveries during wet conditions.

While the total volume of groundwater in storage in the Subbasin has declined over time, groundwater storage reduction has not historically been an area of concern in the Plan area, particularly in the Lower Aquifer (below the Corcoran Clay layer) as there are large volumes of fresh water in storage. Despite periods of wet conditions, with recharge outpacing extractions, an overall declining trend in groundwater storage can be observed in both the Upper Aquifer and Lower Aquifer, with storage typically declining more rapidly in the Upper Aquifer than the Lower Aquifer.

Figure ES-4. Basin Setting



Groundwater quality in the Plan area varies by location. Concerns related to groundwater quality are largely related to non-point sources and/or naturally occurring constituents. Seawater intrusion is not applicable to the Delta-Mendota Subbasin as the Subbasin is located inland from the Pacific Ocean. Primary constituents of concern throughout the Plan area are total dissolved solids (TDS), nitrate as Nitrogen (nitrate as N), and boron, which all have anthropogenic as well as natural sources. In recent years, TDS concentrations in the Upper Aquifer are generally stable near or below the Secondary Maximum Contaminant Level (MCL) of 1,000 milligrams per liter (mg/L). In the Lower Aquifer, TDS concentrations are largely stable though have been found to exceed the Secondary MCL in some locations. Nitrate concentrations are largely below the Primary MCL of 10 mg/L, with elevated concentrations above the Primary MCL found south of Los Banos and northwest toward Patterson in the Upper Aquifer, and at elevated concentrations below the Primary MCL in the Lower Aquifer in locations where the Corcoran Clay is thin or non-existent. While boron does not have a drinking water standard, many crops are sensitive to high boron concentrations. Boron concentrations are greater than the agricultural goal within the Grassland Drainage Area (at about 2 mg/L), where near the City of Patterson, boron concentrations are generally stable and below agricultural objectives at 0.4 mg/L.

Inelastic land subsidence is a prevalent issue throughout the Delta-Mendota Subbasin as it has impacted prominent infrastructure of statewide importance as well as local canals, causing serious operational, maintenance, and construction design issues. Land subsidence monitoring in the Delta-Mendota Subbasin as a result of the most recent drought demonstrated significant inelastic land subsidence as a result of increased groundwater pumping, with effects continuing to the present time (as evidenced by recent surveys). While the impacts appear to have slowed, the temporal and spatial impacts of continued land subsidence have not yet been evaluated.

Interconnected surface waters are surface water features that are hydraulically connected by a saturated zone to the groundwater system. If the water table adjacent to a river or stream declines as a result of groundwater pumping, the river or stream may “lose” water to the underlying aquifer. Within the Northern & Central Delta-Mendota Region GSP Plan area, the portion of the San Joaquin River adjacent to the Northern Delta-Mendota Region is identified as a gaining stream and will be managed under the GSP to protect against significant and unreasonable stream depletion.

## **Water Budgets**

Groundwater evaluations conducted as part of GSP development have provided estimates of historic, current, and future groundwater budget conditions. Based on these analyses, at projected groundwater pumping levels, overall change in groundwater storage within the Upper Aquifer and Lower Aquifer is estimated to decline at a rate of 43,000 acre-feet per year (AFY) and 7,000 AFY, respectively, indicating long-term decline in groundwater storage. As such, it is anticipated that future groundwater conditions in the Plan area will continue to show decreased groundwater levels and/or storage as projected pumping and land use continue. Projects and management actions that offset projected groundwater pumping and/or increase recharge will help the Plan area reach sustainability.

The projected water budget was evaluated under climate change conditions (e.g., climate change factors were applied), as well as climate change conditions with the addition of future projects and management actions. Under the immediate climate scenario prescribed by DWR, the estimated change in groundwater storage would continue to decline by 42,000 AFY in the Upper Aquifer and 6,000 AFY in the Lower Aquifer. With the addition of projects and management actions, the negative trend in change in groundwater storage is reversed where it is estimated to decline by 4,000 AFY in the Upper Aquifer and increase by 3,000 AFY in the Lower Aquifer. These values are considered to be within a reasonable level of error given the quality of data available for the analyses.

Water Budget Scenario	Upper Aquifer Average Annual Change in Storage (AFY)	Lower Aquifer Average Annual Change in Storage (AFY)
Historic (2003-2012)	-42,000	-8,000
Current (2013)	-73,000	-15,000
Baseline Projected (2014-2070)	-43,000	-7,000
Projected with Climate Change (2014-2070)	-42,000	-6,000
Projected with Climate Change and Projects & Management Actions (2014-2070)	-4,000	+3,000

The water budget analyses were prepared using the best available information in the development of the Northern & Central Delta-Mendota Region GSP spreadsheet model. It is anticipated that, as additional information becomes available, the model can be updated and more refined estimates of the Regions' water budgets can be developed.

## Management Areas

Under SGMA, management areas (or MAs) can be identified within a basin or subbasin for which the GSP may identify different numeric sustainable management criteria, monitoring, or projects and management actions based on differences in water use sector, water source type, geology, aquifer characteristics, or other factors. MAs have been established in the Northern & Central Delta-Mendota Region GSP for the purposes of monitoring and managing for the land subsidence sustainability indicator.

Land subsidence within the Plan area has the potential to impact water conveyance infrastructure of state-wide and local importance, where such impacts have the potential to cause undesirable results within the Plan area, Subbasin, and outside the Subbasin. MAs have been delineated jointly for the West Stanislaus Irrigation District and Patterson Irrigation District (WSID-PID MA) and for the Tranquillity Irrigation District (TRID MA) service areas to account for their respective unique, localized circumstances and conditions and to help facilitate implementation of the GSP to aid in achieving the sustainability goal for the Subbasin by 2040.

## ES-6. Sustainable Management Criteria

SGMA introduces several terms to measure sustainability including:

**Sustainability Indicators** – Sustainability indicators refer to adverse effects caused by groundwater conditions occurring throughout the Subbasin that, when significant and unreasonable, cause undesirable results. The six sustainability indicators identified by DWR are the following:

- Chronic lowering of groundwater levels
- Reduction of groundwater storage
- Seawater intrusion
- Degraded water quality
- Land subsidence
- Depletions of interconnected surface water

**Sustainability Goal** – This goal is the culmination of conditions resulting in a sustainable condition (absence of undesirable results) within 20 years.

**Minimum Thresholds** – Minimum thresholds are a numeric value for each sustainability indicator and are used to define when undesirable results occur.

**Measurable Objectives** – Measurable objectives are a specific set of quantifiable goals for the maintenance or improvement of groundwater conditions.

The method prescribed by SGMA to measure undesirable results involves setting minimum thresholds and measurable objectives for a series of representative monitoring sites.

Representative monitoring sites were identified throughout the Northern and Central Delta-Mendota Regions to provide a basis for measuring groundwater conditions throughout the Plan area. Representative monitoring sites were selected based on their potential to effectively represent the groundwater conditions using criteria specific to each sustainability indicator at each location.

A total of 35 representative wells (17 in the Upper Aquifer and 18 in the Lower Aquifer) have been identified for measurement of groundwater levels, change in groundwater storage, and groundwater quality, with two (2) representative wells selected for measurement of depletions of interconnected surface water. A total of 31 representative sites were selected for the measurement of land subsidence. This GSP uses groundwater levels as a basis for evaluating change in groundwater storage as well as depletions of interconnected surface water.

Minimum thresholds and measurable objectives were developed for each of the representative monitoring sites for each sustainability indicator. **Figure ES-5** shows a typical relationship of the minimum thresholds, measurable objectives, and other data for a sample groundwater level well. Minimum thresholds for groundwater levels were developed with reference to the hydrologic low for the available hydrograph record, where a 95 percent of the hydrologic low was established for Lower Aquifer wells to avoid undesirable results related to the land subsidence sustainability indicator. Measurable objectives were established based on the historic seasonal high average over the available hydrograph, Spring 2012, or Spring 2017, whichever value is lowest.

Tables summarizing minimum thresholds and measurable objectives are included in the GSP. Hydrographs showing the minimum threshold and measurable objective for each of the representative wells are contained in an appendix to the GSP (**Appendix E**).

Minimum thresholds for groundwater quality are defined by the Secondary MCL for TDS, Primary MCL for nitrate as N, and the water quality objective (WQO) for irrigation for boron, or the current groundwater quality where it exceeds the MCL or WQO as of December 2018. Measurable objectives for groundwater quality are to maintain current ambient groundwater quality conditions in each identified GSP subregion.

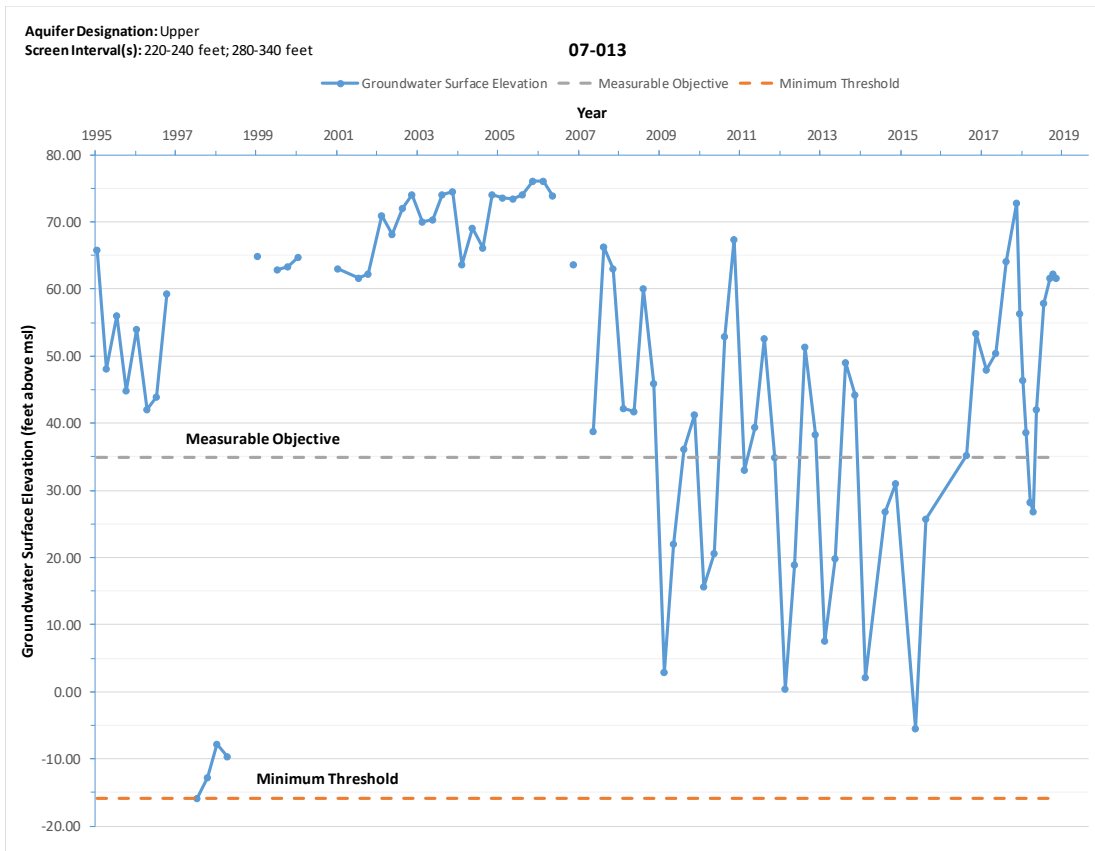
The minimum thresholds and measurable objectives for land subsidence vary by established MA and remaining Plan area. Within the WSID-PID MA, the minimum threshold is set as the acceptable loss of distribution capacity as a result of subsidence resulting from groundwater pumping as based on a future capacity study, where the measurable objective is no loss in distribution capacity as a result of subsidence related to groundwater pumping (numeric values to be established during the first GSP update). In the TRID MA, the minimum threshold is established as four (4) feet additional subsidence compared to 2019 benchmark elevation, where the measurable objective is set as two (2) feet additional subsidence compared to 2019 benchmark elevation. Within the remaining Plan area, the minimum threshold is set as the target rate/goal by monitoring subregion based on the average 2014-2016 elevation change from recent DMC surveys, where the measurable objective is the target rate/goal by monitoring subregion based on the average 2016-2018 elevation change from recent DMC surveys.

#### Categories of Undesirable Results

- Chronic lowering of groundwater levels indicating a significant and unreasonable depletion of supply if continued over the planning and implementation horizon
- Significant and unreasonable reduction of groundwater storage
- Significant and unreasonable seawater intrusion
- Significant and unreasonable degraded water quality, including the migration of contaminant plumes that impair water supplies
- Significant and unreasonable land subsidence that substantially interferes with surface land uses
- Depletions of interconnected surface water that have significant and unreasonable adverse impacts on beneficial uses of the surface water

Minimum thresholds for depletion of interconnection of surface water systems has been set as an X percent increase in surface water depletions along interconnected stretches of surface water as a result of groundwater pumping, where 'X' is the percent increase in depletions to be determined by monitoring data collected prior to the first GSP update and associated analyses of these data. The measurable objective for depletions of interconnected surface water is set as no increased depletions of surface water as a result of groundwater pumping. Numeric values will be included in the first update to this GSP following data collection and associated analysis.

Figure ES-5. Sample Relationship Between Minimum Threshold and Measurable Objective



## ES-7. Sustainability Implementation

The Northern & Central Delta-Mendota Region GSP contains the required sections for sustainability implementation, including Projects and Management Actions as well as Monitoring.

### Projects and Management Actions

The six Delta-Mendota Subbasin GSP Groups will work together in a coordinated fashion to implement projects and management actions within their respective GSP Plan areas in order to achieve sustainability Subbasin-wide. The Northern & Central Delta-Mendota Region GSP has identified projects that can either replace (offset) or supplement (recharge) groundwater to aid in reaching sustainability by 2040. Currently, no pumping restrictions have been proposed for the Northern and Central Delta-Mendota Regions; however, GSAs maintain the flexibility to implement such demand-side management actions in the future if needed. Management activities identified in the Northern & Central Delta-Mendota Region GSP include a variety of strategies, from implementing rules to limit pumping that may result in undesirable results to maximizing the use of other water supplies and incentivizing the use of those supplies over groundwater.

As previously noted, several projects to increase water supply availability in the Subbasin have been identified in the Northern & Central Delta-Mendota Region GSP. The initial set of projects was reviewed by the Northern and Central Delta-Mendota Technical Advisory Committee and recommended for approval by the Northern and Central Delta-Mendota Management Committees. A final list of 25 potential projects and management actions is included in this GSP, representing a variety of project types, including recharge and recovery, demand-side management, recycled water development and use, and reservoir expansion.

Projects and management actions are classified into three tiers, where Tier 1 indicates near-term projects and management actions to be completed and operational within the next five years; Tier 2 includes projects and management actions that currently require further development before implementation can occur and are anticipated to be developed over the next five years and implemented in 2026 or later; and Tier 3 includes long-term projects and management actions that may be implemented in the future as needed and/or are outside of the GSAs' control. The projects and management actions contained in this GSP, along with the projects and management actions implemented by the other five GSP Groups in the Subbasin, are anticipated to bring the Subbasin into sustainability by 2040. These projects and management actions require further analysis and permitting to determine feasibility and cost effectiveness and the project/management action list will be reviewed and revised, as appropriate, during GSP implementation. Projects and management actions are summarized in the table below.

Tier	Category	Project / Management Action	Project Type	Project Proponent
Tier 1	Projects	Los Banos Creek Recharge and Recovery Project	Recharge and Recovery	San Luis Water District
		Orestimba Creek Recharge and Recovery Project	Recharge and Recovery	Del Puerto Water District
		North Valley Regional Recycled Water Program (NVRWP) – Modesto and Early Turlock Years	Recycled Water	Del Puerto Water District
		City of Patterson Percolation Ponds for Stormwater Capture and Recharge	Recharge and Recovery	City of Patterson
		Kaljjan Drainwater Reuse Project	Recycled Water	San Luis Water District
		West Stanislaus Irrigation District Lateral 4-North Recapture and Recirculation Reservoir	Reservoir Creation/Expansion	West Stanislaus Irrigation District
		Revision to Tranquillity Irrigation District Lower Aquifer Pumping	Demand-side Management	Tranquillity Irrigation District
	Management Actions	Lower Aquifer Pumping Rules for Minimizing Subsidence	Demand-side Management	N/A
		Maximize Use of Other Water Supplies	Demand-side Management	N/A
		Increasing GSA Access to and Input on Well Permits	Demand-side Management	N/A
Drought Contingency Planning in Urban Areas		Demand-side Management	N/A	
Fill Data Gaps		Various	N/A	
Tier 2	Projects	Del Puerto Canyon Reservoir Project	Reservoir Creation/Expansion	Del Puerto Water District
		Little Salado Creek Groundwater Recharge and Flood Control Basin	Recharge and Recovery	Stanislaus County
		Patterson Irrigation District Groundwater Bank and/or Flood-Managed Aquifer Recharge (MAR)-type Project	Recharge and Recovery	Patterson Irrigation District
		West Stanislaus Irrigation District Lateral 4-South Recapture and Recirculation Reservoir	Reservoir Creation/Expansion	West Stanislaus Irrigation District
		Ortigalita Creek Groundwater Recharge and Recovery Project	Recharge and Recovery	San Luis Water District
	Management Action	Develop Program to Incentivize Use of Surface Water and Reduce Groundwater Demand	Demand-side Management	N/A
Tier 3	Projects	Pacheco Reservoir Expansion	Reservoir Creation/Expansion	Santa Clara Valley Water District
		Raising San Luis Reservoir	Reservoir Creation/Expansion	U.S. Bureau of Reclamation (Reclamation)
		Sites Reservoir	Reservoir Creation/Expansion	Sites Project Authority
		Los Vaqueros Expansion Phase 2	Reservoir Creation/Expansion	Contra Costa Water District
	Management Actions	Groundwater Extraction Fee with Land Use Modifications	Pumping Charges	N/A
		City of Patterson Reduced Groundwater Use Portfolio	Demand-side Management	City of Patterson
		Rotational Fallowing of Crop Lands	Demand-side Management	N/A

## Monitoring

The Northern & Central Delta-Mendota Region GSP includes monitoring networks for the five sustainability indicators applicable to the Delta-Mendota Subbasin, where seawater intrusion is not applicable to the Delta-Mendota Subbasin. The objective of these monitoring networks is to monitor conditions across the Plan area and to detect trends toward undesirable results. Specifically, the monitoring networks were developed to:

- Monitor impacts to the beneficial uses or users of groundwater resulting from groundwater use
- Monitor changes in groundwater conditions relative to measurable objectives and minimum thresholds
- Demonstrate progress toward achieving measurable objectives described in the GSP

### Five Sustainability Indicators Applicable to the Delta-Mendota Subbasin

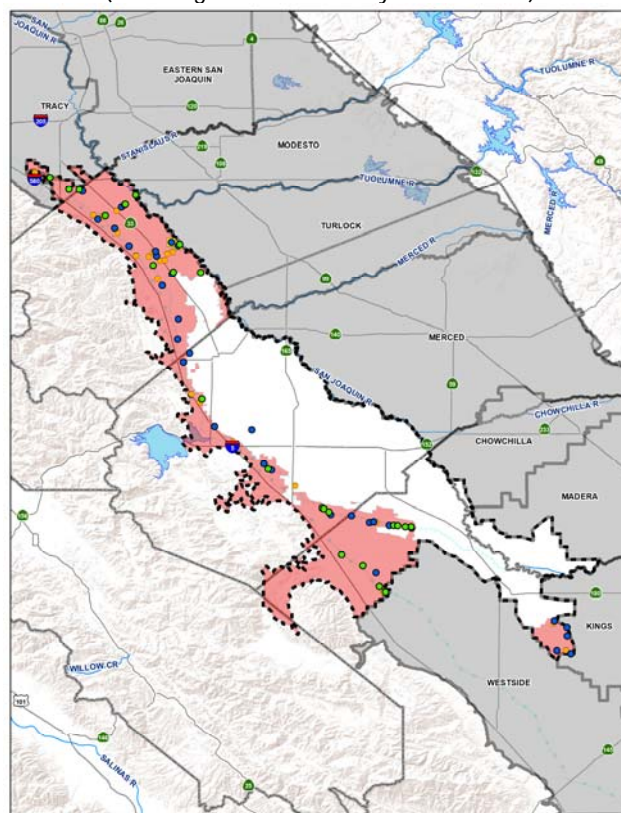
- Chronic lowering of groundwater levels
- Reduction of groundwater storage
- Degraded water quality
- Land subsidence
- Depletions of interconnected surface water

Five monitoring networks were developed for the Northern & Central Delta-Mendota Region GSP: groundwater levels (including both Upper Aquifer and Lower Aquifer wells), groundwater quality (including both Upper Aquifer and Lower Aquifer wells), land subsidence, and interconnected surface water. The same networks for the Upper and Lower Aquifers are used for assessing changes in groundwater elevations, groundwater storage, and groundwater quality. A subset of the monitoring wells is used along with stream gauge data for assessing changes to interconnected surface waters (using groundwater levels as a proxy for those changes). All monitoring networks described in this GSP are representative monitoring networks and are used to determine compliance with the measurable objectives and minimum thresholds established for the individual locations.

The monitoring networks were designed by evaluating existing monitoring programs within the Subbasin, such as CASGEM, the DMC Pump-in Program, ILRP Groundwater Quality Trend Monitoring Program, United States Bureau of Reclamation DMC subsidence monitoring program, and local agency monitoring programs, and supplementing those monitoring sites with other potential monitoring locations in the Plan area. The monitoring networks consist largely of monitoring sites that are already being used for monitoring in the Subbasin. Additional monitoring sites are being added as data gaps are filled through downhole video surveys to be conducted under DWR's Technical Support Services (TSS) program. The updated monitoring networks will be included in updates to this GSP. **Figure ES-6** shows the location of existing and planned monitoring sites (wells and survey benchmarks) for all sustainability indicators.

Monitoring frequencies vary by sustainability indicator and management area. For groundwater levels, measurements will be taken during seasonal high (February through April) and seasonal low (September through October) conditions. Groundwater quality for the identified constituents of concern (TDS, nitrate as N, and boron) will be analyzed annually between May and August, where wells will be

**Figure ES-6. Representative Monitoring Sites**  
(including wells and survey benchmarks)



tested for additional water quality constituents every five years. Measurements for interconnected surface waters will be collected concurrently with those for groundwater levels.

Land subsidence will be measured twice during the first five years of GSP implementation in the WSID-PID MA, following a baseline elevation survey to be conducted in 2019. Annual elevation surveys will take place in the TRID MA. Elevation surveys will take place every other year during even years in the remaining Plan area. Publicly-available land subsidence and stream gauge data will be downloaded periodically for GSP monitoring efforts and combined with data collected via the monitoring networks. Historical measurements have been entered into the Subbasin Data Management System (DMS) and future data will be added to the DMS. A summary of the monitoring sites established for this GSP is shown in the table above.

Summary of GSP Monitoring Networks	
<b>Representative Networks</b>	
Groundwater Level Wells	
Upper Aquifer	17
Lower Aquifer	18
Groundwater Quality Wells	
Upper Aquifer	17
Lower Aquifer	18
Land Subsidence Benchmarks and Continuous GPS Sites	31
Interconnected Surface Water Wells	2

### ES-8. Plan Implementation

Implementing the Northern & Central Delta-Mendota Region GSP will require numerous management activities that will be undertaken by the GSAs within the Region and throughout the Subbasin, including:

- Monitoring conditions relative to applicable sustainability indicators at specified frequency and timing
- Entering updated monitoring data into the Subbasin DMS
- Refining Subbasin model and water budget planning estimates
- Preparing annual reports summarizing the conditions of the Subbasin and progress towards sustainability and submitting them to DWR
- Updating the GSP once every five years

A preliminary schedule for GSP implementation and projects and management actions has been developed and agreed upon by the Northern and Central Delta-Mendota Management Committees for the first five years of GSP implementation (2020 through 2025). Implementation of projects and management actions is scheduled to begin in 2020, with full implementation achieved by 2040. The proposed schedule provides time to refine water budget estimates and re-evaluate projects and management actions in terms of benefits, technical feasibility, and cost effectiveness.

Implementation of the Northern & Central Delta-Mendota Region GSP will require both funding by GSAs and external sources. Outside grants will be sought to assist in reducing the cost of implementation to participating agencies, residents, and landowners of the Plan area. Ultimately, it is up to individual GSAs to determine the means by which they will achieve both the Delta-Mendota Subbasin sustainability goal and financial goals for GSP implementation. Costs associated with GSP implementation and Plan Administrator operations include the following:

- GSP-associated administration
- Stakeholder/Board engagement
- Project and management action implementation
- Monitoring
- Data management

GSA will individually fund implementation of projects and management actions within their boundaries. GSAs will evaluate options for securing the needed funding on an individual basis.

For budgetary purposes, the estimated cost of implementing this GSP is on the order of \$1.5 million to \$2.5 million per year over the first five years of implementation (2020 to 2025), with an additional \$6.6 million to \$40 million per year over the 20-year planning horizon for the implementation of projects and management actions. Annual reports and five-year assessment reports (or periodic evaluation assessment reports) will be developed in a manner consistent with the GSP Emergency Regulations and using DWR-provided formats and supplemental resources. Annual reports will be a coordinated effort among the six Delta-Mendota Subbasin GSP Groups with five-year or periodic evaluation assessment reports developed by the Northern and Central Delta-Mendota Regions in coordination with updates to the coordinated Common Chapter by all GSP Groups.

The Delta-Mendota Subbasin DMS, a subbasin-wide coordinated DMS, is a secured web-based application that is designed to support data visualization and aggregation as well as annual report generation. The web application functionality includes an embedded GIS viewer, screens to view tables of time series data, and charting capabilities for hydrographs as well as map layers. The DMS has been developed as part of a coordinated effort among the six Delta-Mendota GSP Groups with each GSP Group and their respective GSA member agencies responsible for conducting their own monitoring programs and associated data collection efforts (including quality control and quality assurance) and ensuring that these data are available at the Subbasin-level for analysis and annual reports. The DMS will be maintained by SLDMWA, while acting as the Plan Manager, with a contract with the software vendor as needed.

## **ES-9. Technical Studies**

Lists of references used to develop this GSP are included following each GSP chapter. Technical studies relied upon in developing the Northern & Central Delta-Mendota Region GSP are included as a chapter to this GSP.

Facility Name	2006 SURVEY	2019 SURVEY	2021 SURVEY	CHANGE FROM 2019 SURVEY
Well 2*	N/A	106.26	106.24	-0.02'
Well 4	102.77	102.7	102.7	no change
Well 5	89.39	89.3	89.3	no change
Well 6**	115.71	115.7	115.7	no change
Well 7	91.93	91.69	91.69	no change
Well 8	95.74	95.68	95.67	-0.01'
Well 9	No Data	94.52	94.5	-0.02'
Well 11	No Data	80.83	80.8	-0.03'
Keystone	No Data	141.25	141.21	-0.04'
Floragold	No Data	122.95	122.93	-0.02'

**City of Patterson  
Regional Subsidence Monitoring Program  
City Monitoring Network - 2021 Results**

NOTE \* The reference mark for well 2 was not found on the 2019 survey. This survey uses a comparison between the data from the 2019 survey and this 2021 survey. The auxiliary reference mark from the 2006 survey as 104.21, was found to be 104.18 on the 2019 survey. The same was also found to be 104.18 on this 2021 survey.

NOTE \*\* After reviewing the data from the 2019 survey, it was determined that there may have been a 0.5 foot error in the reading shown as 115.20. When applying a correction with relationship to nearby reference points from both 2006 and 2019, the well elevation is 115.70.

This survey was performed by a Licensed Land Surveyor. The 2021 survey control was adjusted to match the 2019 survey control to properly indicate the comparison between the two surveys. The 2006 survey is noted hereon for information purposes.



3/15/2021



San Luis & Delta-Mendota Water Authority

**2019**

# Westside-San Joaquin Integrated Regional Water Management Plan

January 2019



Prepared by:





The 2019 Westside-San Joaquin Integrated Regional Water Management Plan was funded in part under the Water Quality, Supply, and Infrastructure Improvement Act of 2014 (Proposition 1), administered by the State of California, Department of Water Resources.

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**Abbreviations**

AB	Assembly Bill
ACS	American Community Survey
AF	Acre-feet
ASCE	American Society of Civil Engineers
AWMP	Agricultural Water Management Plan
B:C	Benefit:cost ratio
BDCP	Bay-Delta Conservation Plan
BMPs	Best Management Practices
CalEPA	California Environmental Protection Agency
CALFED	CALFED Bay-Delta Program
CARB	California Air Resources Board
CASGEM	California Statewide Groundwater Elevation Monitoring Program
CDFW	California Department of Fish & Wildlife
CDP	Census-designated Place
CEQA	California Environmental Quality Act
cfs	Cubic Feet per Second
CNRA	California Natural Resources Agency
COA	Coordinated Operations Agreement
CREAT	Climate Resilience Evaluation and Awareness Tool
CVP	Central Valley Project
CVPIA	Central Valley Project Improvement Act
CVRWQCB	Central Valley Regional Water Quality Control Board
CV-SALTS	Central Valley Salinity Alternatives for Long-term Sustainability initiative
CWC	California Water Code
CWP	California Water Plan
DAC	Disadvantaged Community
DACI Program	Disadvantaged Community Involvement Program
Delta	Sacramento-San Joaquin Delta
Divisions	Discrete sub-areas within the Water Authority
DMC	Delta-Mendota Canal
DMS	Data Management System
DOI	Department of the Interior

CDPH	California Department of Public Health
DWR	California Department of Water Resources
EDA	Economically Distressed Area
EJ	Environmental Justice
ESA	Endangered Species Act
GCM	General Circulation Model
GHG	Greenhouse gas
GSA	Groundwater Sustainability Agency
GSP	Groundwater Sustainability Plan
ID	Irrigation District
ILRP	Irrigated Lands Regulatory Program
Intertie	Delta-Mendota Canal/California Aqueduct Intertie
IRWM	Integrated Regional Water Management
IRWMP	Integrated Regional Water Management Plan
LID	Low-Impact Development
MCL	Maximum Contaminant Level
MHI	Median Household Income
M&I	Municipal and Industrial
NEPA	National Environmental Policy Act
NOAA	National Oceanic and Atmospheric Administration
NOI	Notice of Intent
NRHP	National Register of Historic Places
NVRRWP	North Valley Regional Recycled Water Program
O&M	Operation and Maintenance
Prop	Proposition
PV	Present Value
QA/QC	quality assurance/quality control
RFMP	Regional Flood Management Plan
RMS	Resource Management Strategy
ROD	Record of Decision
RWMG	Regional Water Management Group
RWMP	Recycled Water Master Plan

SB	Senate Bill
SDAC	Severely disadvantaged community
SGMA	Sustainable Groundwater Management Act
SJRFA	San Joaquin River Funding Area
SJRIP	San Joaquin River Improvement Project
SLDMWA	San Luis & Delta-Mendota Water Authority
SNMP	Salt and Nutrient Management Plan
SWP	State Water Project
SWRCB	State Water Resources Control Board
SWRP	Stormwater Resources Plan
TAF	thousand acre-feet
TDS	Total Dissolved Solids
TMDL	Total Maximum Daily Load
TRD	Trinity River Division
UWMP	Urban Water Management Plan
USACE	United States Army Corps of Engineers
USBR	United States Bureau of Reclamation
USEPA	United States Environmental Protection Agency
USFWS	United States Fish & Wildlife Service
WD	Water District
WQCP	Water Quality Control Plan
WSA	Water Supply Assessments
WSJ IRWMP	Westside-San Joaquin Integrated Regional Water Management Plan
WSJ Region	Westside-San Joaquin Region

## Chapter 1 Governance

### 1.1 Regional Water Management Group

The Regional Water Management Group (RWMG) for the Westside-San Joaquin (WSJ) Integrated Regional Water Management (IRWM) Region is the San Luis & Delta-Mendota Water Authority (SLDMWA), which is governed by its Board of Directors. SLDMWA was established as a Joint Powers Authority in January 1992 and consists of 28 member agencies. Twenty-six of these agencies contract with the United States Bureau of Reclamation (USBR) for the delivery of water from the Central Valley Project (CVP). SLDMWA’s member agencies hold total contractual entitlements from the CVP for approximately 3.3 million acre-feet of water per year. Of this amount, approximately 2.8 million acre-feet (AF) per year are contracted for delivery to approximately 1.2 million acres of agricultural lands within areas of San Joaquin, Stanislaus, Merced, Fresno, Kings, San Benito, and Santa Clara counties. Approximately 150,000 to 200,000 AF per year are contracted for municipal and industrial (M&I) use by almost 2 million people within the service areas, including the City of Tracy and urban areas within Santa Clara County, such as Silicon Valley. The remaining amount, approximately 270,000 AF per year, is delivered to more than 90,000 acres of managed wetlands and wildlife refuges for habitat enhancement and restoration activities within the largest continuous wetland in the Western United States.

Table 1-1 lists SLDMWA’s member agencies, and Figure 1-1 shows those member agencies’ locations within the WSJ Region.

**Table 1-1: SLDMWA Member Agencies**

<b>Banta-Carbona Irrigation District</b>	<b>Henry Miller Reclamation District #2131</b>	Reclamation District 1606
<b>Broadview Water District</b>	<b>James Irrigation District</b>	<b>San Benito County Water District</b>
<b>Byron Bethany Irrigation District</b>	Laguna Water District	<b>San Luis Water District</b>
<b>Central California Irrigation District</b>	Mercy Springs Water District	<b>Santa Clara Valley Water District</b>
<b>City of Tracy</b>	Oro Loma Water District	<b>Tranquillity Irrigation District</b>
<b>Del Puerto Water District</b>	<b>Pacheco Water District</b>	Turner Island Water District
<b>Eagle Field Water District</b>	<b>Panoche Water District</b>	West Side Irrigation District
<b>Firebaugh Canal Water District</b>	<b>Patterson Irrigation District</b>	<b>West Stanislaus Irrigation District</b>
<b>Fresno Slough Water District</b>	Pleasant Valley Water District	<b>Westlands Water District</b>
<b>Grassland Water District</b>		

\*Bold text indicates a representative currently serves on the Board of Directors as a Director or Alternate.

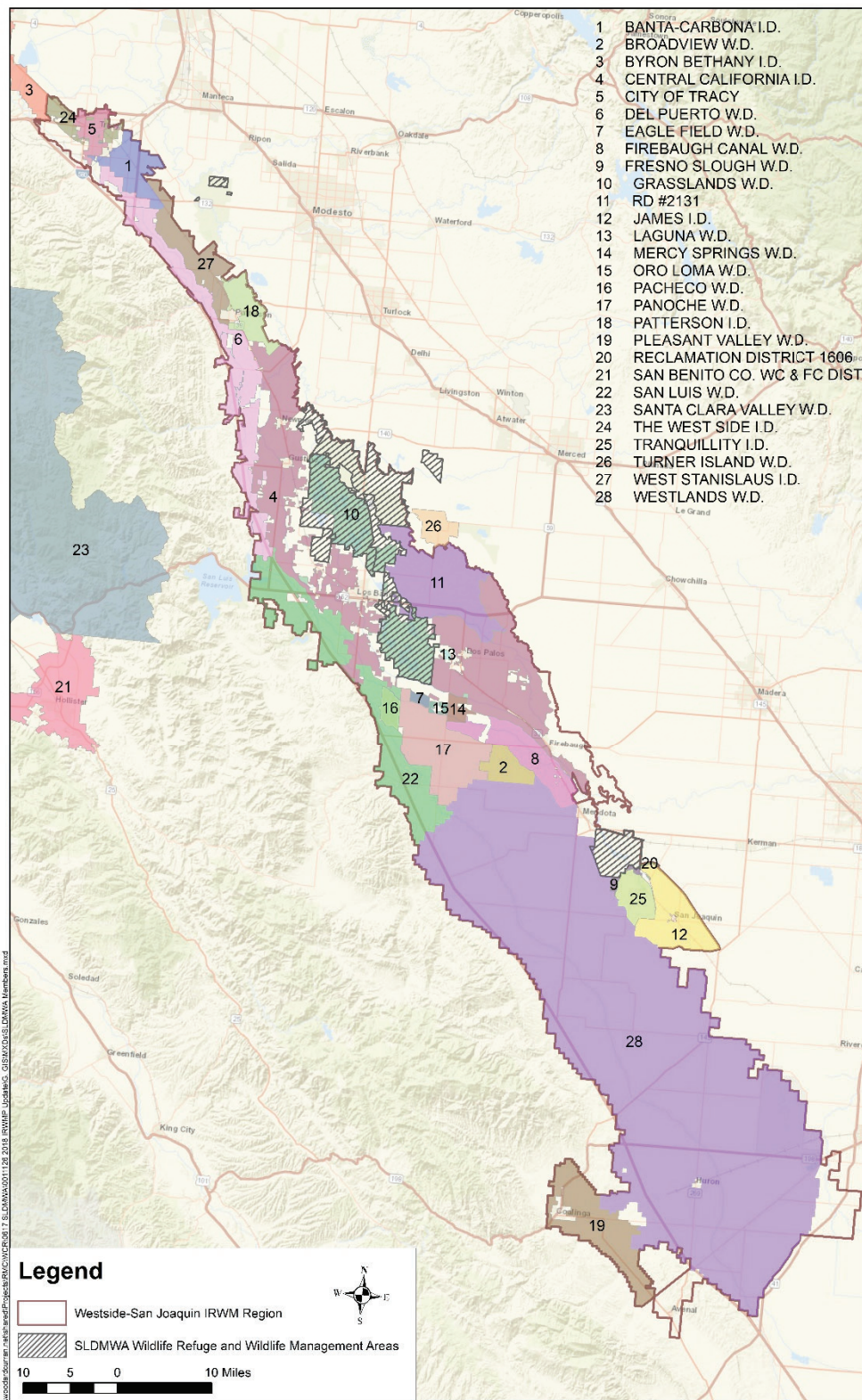


Figure 1-1: SLDMWA Member Agencies in the Westside-San Joaquin Region

As shown in Table 1-1, SLDMWA meets California Water Code (CWC) Section 10539 requirements for the RWMG, as it consists of more than three local agencies, all of which have statutory authority over water supply and management. While the RWMG includes only water districts (WDs) and irrigation districts (IDs), other land use and local planning entities have participated in the IRWM planning process.

One of the primary purposes of establishing SLDMWA was to assume the operation and maintenance (O&M) responsibilities of certain USBR CVP facilities, with the goal of increasing reliability of the facilities while containing costs. In addition, SLDMWA serves the information and representation needs of its members by developing information and protecting their common interests on a variety of issues such as: Sacramento-San Joaquin Delta (Delta) exports, water supply, water quality, water development, conservation, distribution, drainage, contractual rights, surface and groundwater management, and any other common interest of the member agencies. This information is made available to members, the general public, and legislative, regulatory and judicial bodies. The member agencies have legal authority to complete a range of tasks (which may vary by agency), including the following:

- Acquire works and to produce, store and distribute water for irrigation, domestic, M&I purposes, and provide drainage or reclamation works incidental thereto.
- Furnish water for any present or future beneficial use; acquire, appropriate, control, conserve, store and supply water, including drainage and flood waters; drain and reclaim lands, use water under district control for recreational purposes.
- Furnish sufficient water for, and put water to, any beneficial use and to control, distribute, store, spread, treat, recapture any water for beneficial use.
- Reclaim and protect land from overflow and to irrigate lands within or outside the Reclamation Districts.
- Acquire water and water rights; import water and conserve water; control flood and storm waters; protect watercourses and watersheds of streams; conserve flood and storm waters for beneficial uses; prevent waste or diminution of water supply; obtain, retain and reclaim storm, flood or other waters.
- Enter into contracts, undertake acts necessary to their purposes, and exercise a variety of related powers.

The governing body of SLDMWA consists of a 19-member Board of Directors, divided into five Divisions, with directors and alternates selected within each Division. The Board is listed on the SLDMWA website and updated as needed. Divisions were established by location and type of water contract. Each Director, and respective Alternate Director, is a member of the governing body or an appointed staff member of his or her agency. The Board is supported by standing committees that synthesize various technical and policy issues, such as financial and water related matters, and make recommendations for the full Board's consideration. Other standing committees direct the affairs of sub-groups of members, such as the Grassland Basin Drainage Steering Committee or Sustainable Groundwater Management Act (SGMA) Management Committee(s), subject to review and approval by the full Board. In addition, working groups and steering/technical committees are formed as necessary to focus on matters of particular expertise such as water quality and groundwater management.

SLDMWA assumed responsibility for the O&M of certain South-of-Delta federal facilities in phases. In October 1992, SLDMWA entered into the first of a multi-phased Cooperative Agreement with USBR, with the first phase for the O&M of the Delta-Mendota Canal (DMC). The purpose of this Agreement was to provide the personnel, materials, supplies and equipment necessary to properly operate, maintain and repair certain portions of the Delta Division, San Luis Unit, and West San Joaquin Divisions of the CVP.

In October 1993, the second phase was initiated. This included the addition of the Tracy Pumping Plant, O'Neill Pumping and Generating Plant, Tracy O&M Facilities, and the San Luis Drain to the list of facilities SLDMWA was to operate and maintain. The maintenance functions at the Tracy Fish Facility were included in this phase as well.

October 1994 saw the third phase begin. This included the added maintenance responsibilities for the Delta Cross Channel and the two fish release sites on the Delta. In October 1996 the O&M of the Mendota Pool and Kesterson Reservoir were also included.

In March 1998, SLDMWA entered into a Transfer Agreement with USBR wherein all O&M costs related to the above referenced facilities are funded directly by the water users themselves. SLDMWA continues to perform O&M of the Tracy Fish Facility, Delta Cross Channel and fish release sites under a separate Service Contract with funding provided by USBR.

The DMC/California Aqueduct Intertie (Intertie) was added to the system in 2012. The Intertie connects the CVP and State Water Project (SWP), providing operational flexibility for both systems. The Intertie restored DMC conveyance capacity back to 4,600 cubic feet per second (cfs) and improves CVP deliveries to south-of-Delta contractors (USBR, 2017).

The SLDMWA Board also directs the Grassland Basin Drainage Management Activity Agreement, Northern Delta-Mendota Region SGMA Activity Agreement, and Central Delta-Mendota Region SGMA Activity Agreement.

SLDMWA will continue to provide the leadership necessary to pursue additional reliable water supply for its member agencies and deliver the water with a reliable system in a cost-efficient manner. SLDMWA's role in IRWM planning for the WSJ Region is described in more detail in Section 1.3.

## 1.2 History of IRWM Planning

The initial Westside Integrated Water Resources Plan, the Region's first Integrated Regional Water Management Plan (IRWMP), was an effort undertaken by USBR, SLDMWA, and other local stakeholders beginning in 2001 to develop a plan to provide guidance for future water management and planning decisions. SLDMWA and its members were responding to diminishing supplies from the CVP due to implementation of the Endangered Species Act (ESA), Clean Water Act, and Central Valley Project Improvement Act (CVPIA). The original IRWMP served as the basis for subsequent versions, which has evolved through a series of stakeholder driven revisions. This update to the Plan is known as the 2019 Westside-San Joaquin Integrated Regional Water Management Plan (WSJ IRWMP).

The Region's past planning activities have included performing project solicitation, revising portions of the Plan, and applying for Proposition (Prop) 50 and Prop 84 IRWM grant funding. The Plan was updated in 2014 to meet the 2012 IRWM Planning Guidelines. This 2019 WSJ IRWMP Update has been prepared in order to bring the Plan into compliance with the 2016 IRWM Planning Guidelines (DWR, 2016) and address current conditions in the Region. Prior to updating the Plan, SLDMWA published a Notice of Intent (NOI) to update the Plan in accordance with Section 6066 of the Government Code. The NOI was published in the *Merced Sun-Star* on May 30, 2018 and June 6, 2018; a copy of this notice is included in Appendix A. SLDMWA will continue to work with its member agencies and project proponents to update and implement the Plan in the future. Strategies for Financing, Data Management, and Plan Performance and Monitoring, each described in their respective chapters, will enable the Region to implement the Plan in a sustainable, effective manner over the near- and long-term timeframe.

## 1.3 Governance

### Regional Water Management Group

The SLDMWA Board of Directors acts as the governing authority for the RWMG for the Region. The SLDMWA member agencies agreed that SLDMWA should perform administrative tasks such as submitting grant applications, completing and submitting progress reports and invoices, tracking funds, and facilitating the preparation and updates of the IRWMP. Memoranda of Agreement are also executed with non-member agencies for IRWM planning coordination. Working under the direction of the Board are various committees, including the Finance and Administration Committee, the Grassland Basin Drainage Steering Committee, the O&M Technical Committee, the Water Resources Committee, and the Westside Regional Drainage Steering Committee. These committees may play a role in IRWM planning as the RWMG calls on them to do so. For example, the Water Resources Committee reviewed and prioritized the Region's objectives. The Water Resources Committee made the recommendation on the prioritization of the objectives, but also considered comments provided by the Working Group. Final decision-making authority on IRWM matters lies with the RWMG. Current Board of Directors members, who make up the RWMG, are listed in Table 1-2.

**Table 1-2: SLDMWA Board of Directors/RWMG Members**

<b>Board of Directors Officers</b>	<b>Division 3 Representatives</b>
Cannon Michael, Chairman	Michael Stearns, Director, Firebaugh CWD Jeff Bryant, Alternate, Firebaugh CWD
Don Peracchi, Vice Chairman	James O’Banion, Director, Central California ID Chris White, Alternate, Central California ID
Joyce Machado, Treasurer/Auditor	Cannon Michael, Director, Henry Miller R.D. 2131 Randy Houk, Alternate, Columbia CC
Frances Mizuno, Secretary	Ric Ortega, Director, Grassland WD Ellen Wehr, Alternate, Grassland WD
<b>Division 1 Representatives</b>	<b>Division 4 Representatives</b>
James McLeod, Director, Banta-Carbona ID David Weisenberger, Alternate, Banta-Carbona ID	John Varela, Director, Santa Clara Valley WD Garth Hall, Alternate, Santa Clara Valley WD
Bobby Pierce, Director, West Stanislaus ID Vacant, Alternate, Westside ID	Gary Kremen, Director, Santa Clara Valley WD Richard Santos, Alternate, Santa Clara Valley WD
Anthea Hansen, Director, Del Puerto WD Earl Perez, Alternate, Del Puerto WD	John Tobias, Director, San Benito County WD Jeff Cattaneo, Alternate, San Benito County WD
Rick Gilmore, Director, Byron Bethany ID/CVPSA Vince Lucchesi, Alternate, Patterson ID	Joseph Tonascia, Director, San Benito County WD Sara Singleton, Alternate, San Benito County WD
<b>Division 2 Representatives</b>	<b>Division 5 Representatives</b>
Don Peracchi, Director, Westlands WD Dan Pope, Alternate, Westlands WD	Bill Pucheu, Director, Tranquillity ID Lance LeVake, Alternate, Pacheco WD
Vacant, Director, Westlands WD William Bourdeau, Alternate, Westlands WD	Tom Birmingham, Director, Broadview WD Jose Gutierrez, Alternate, Broadview WD
John Bennett, Director, Panoche WD Michael Linneman, Alternate, Panoche WD	Steve Stadler, Director, James ID Thomas W. Chaney, Alternate, James ID
William Diedrich, Director, San Luis WD Lon Martin, Alternate, San Luis WD	

**Working Group**

In addition to the committees mentioned above, ad-hoc working groups are formed as necessary to focus on matters of particular expertise or interest, including the update of the WSJ IRWMP. A Working Group was convened in order to facilitate the 2019 update of the WSJ IRWMP. All stakeholders identified during the previous Plan update were invited to participate in the Working Group. The Working Group is made up of all stakeholders that have expressed interest in participating. The Working Group provides feedback and direction on day-to-day aspects of the Plan update, such as chapter updates, project solicitation, and project prioritization. The Working Group provides recommendations to the RWMG as necessary. The Working Group also provides local knowledge for such tasks as updating stakeholder contact lists and identifying contacts to represent disadvantaged communities (DACs). Working Group members are listed in Table 1-3.

**Table 1-3: Working Group Members**

Name	Affiliation
Glen Allen	Fresno County
Ara Azhderian	Panoche Water District
Gabriel Delgado	Panoche Water District/Linneman Law
Maria Encinas	City of Patterson
Ben Fenters	San Luis Water District
Andrew Garcia	SLDMWA
Anthea Hansen	Del Puerto Water District
Maria Herrera, Sal Alhomedí	Self-Help Enterprises
Lacey Kiriakou	Merced County
Vince Lucchesi	Patterson Irrigation District
David Vang, Antonio Solorio	Westlands Water District
Steve Stadler	James Irrigation District

**Decision-making**

The various committees and working groups provide opportunities to foster integration across jurisdictional boundaries and include multiple agencies and stakeholders in the identification of regional needs, articulation of region-wide objectives, and the selection and prioritization of projects that are consistent with the objectives. Regional stakeholders interact on at least a monthly basis through the regular Board and committee meetings, as well as working group meetings, which occur more frequently during Plan updates or funding solicitation periods. The committees and working groups, with input from stakeholders, evaluate and synthesize information and develop recommendations to the RWMG which serves as the final decision-making body for the Region. This structure allows for effective decision making and communication by having the RWMG direct processes and approve final decisions, while creating the opportunity for a broad base of input, comments, and questions from all SLDMWA member agencies, as well as stakeholders and interested parties both within and outside the WSJ Region. SLDMWA has assisted in the effective management of water resources for its member agencies in the service area for over two decades and has done so through robust decision-making processes, coordination, and communication, both internally and externally. These practices are applied during all aspects of SLDMWA’s responsibilities, including preparation and implementation of the WSJ IRWMP.



**Figure 1-2: Governance Structure**

The WSJ Region’s governance process includes public outreach and involvement processes through the RWMG, SLDMWA Committees, and Working Group meetings. All of the meetings are open to the public, and notices for RWMG (SLDMWA Board) meetings are posted on the SLDMWA website. Additionally, the WSJ IRWMP project manager, Andrew Garcia, a senior civil engineer for SLDMWA, emails the stakeholder contact list to announce IRWM-specific information as needed. By providing community members the opportunity to attend meetings and participate as members of the working groups, balanced access and opportunity for participation in the WSJ IRWMP is ensured.

## 1.4 Coordination

### Water Management Project Coordination

The governance structure provides the basis for coordination of water management projects and activities of participating local agencies and stakeholders in the WSJ Region. The purpose of the Plan is to identify shared water management issues and develop solutions – typically, projects – that can be implemented to achieve the Region’s goals. Additionally, by coordinating on various water resources planning efforts, efficiencies can be taken advantage of and the IRWM planning processes and governance structure can be used to avoid and solve conflicts.

### Coordination with Neighboring IRWM Regions

The WSJ Region is bordered by four other IRWM regions (Figure 1-3). To the east of the WSJ IRWM Region are the East Stanislaus, Merced, Madera, and the Upper Kings IRWM Regions. There are no immediately adjacent regions to the north, south, or west of the WSJ Region.

Coordination among these neighboring regions is not formalized, but SLDMWA staff and member agency representatives effectively communicate with the bordering IRWM regions and representatives of those regions for IRWM planning and other local planning efforts, such as the IRWM DAC Involvement Program

currently underway. The WSJ Region has also been collaborating with other IRWM Regions in the San Joaquin River Funding Area and the Tulare-Kern Funding Area with respect to Prop 1 IRWM implementation grants. The WSJ and Madera IRWM Regions are considering a draft Memorandum of Understanding to formalize coordination and collaboration on shared IRWM planning issues.

The WSJ Region has coordinated with the Upper Kings Region in the past. The Kings Basin Water Authority included SLDMWA on the mailing list for its IRWMP update effort and SLDMWA kept Kings Basin Water Authority informed of WSJ IRWM planning progress. Four SLDMWA members – Tranquillity ID, James ID, Fresno Slough WD, and Reclamation District 1606 – were included in the Upper Kings IRWM Region which was agreed upon by both regions as these agencies overlie the Kings Subbasin of the San Joaquin Valley Groundwater Basin and therefore, their inclusion in the Upper Kings Region provides for a cohesive hydrologic region. The shared agencies and issues (such as groundwater overdraft) between the WSJ and Upper Kings Regions create the opportunity for ongoing interregional coordination among these two Regions. The WSJ Region has suggested to the Upper Kings Region that the two RWMG entities execute a Letter of Agreement on Communication similar to the Madera and Upper Kings Regions. This agreement is pending.

Additionally, the WSJ and East Stanislaus Regions have a well-established relationship and have been coordinating for years through ongoing communication. Members of the East Stanislaus RWMG have participated in meetings of the WSJ Region and vice versa. Representatives from the City of Patterson (Mike Willet, formerly Public Works Director of the City of Newman) and the City of Turlock (Garner Reynolds, formerly Public Works Director for the City of Patterson), participated in both the WSJ and East Stanislaus IRWM planning process during past plan updates. These representatives contributed to the development and implementation of the project solicitation and prioritization process for the Regions, among other tasks. Additionally, the two Regions coordinate regularly regarding an interregional project – the North Valley Regional Recycled Water Program (NVRWP), a recycled water project that delivers recycled water from the Cities of Modesto and Turlock in the East Stanislaus Region to Del Puerto WD in the WSJ Region and CVPIA-designated wildlife refuges. Recently, the two Regions have been coordinating via the Stanislaus County Multi-Agency Regional Stormwater Resources Plan (SWRP). Representatives from both the East Stanislaus and WSJ Regions participate on the SWRP Technical Advisory Committee. Further coordination also occurs as projects are submitted to the Stanislaus County Multi-Agency Regional SWRP.



Figure 1-3: Neighboring IRWM Regions

There are no water management conflicts with the adjacent IRWM Regions, but the Regions do have shared issues and conflicts as they both lie within the Central Valley and are seeing diminished surface water supplies due to State and federal regulatory restrictions, resultant declining groundwater levels, and water supply impacts as a result of climate change and drought. The regions also share groundwater management issues. These shared issues result in great opportunities to identify efficiencies, joint projects, and collaborative efforts in the future.

### **Coordination with Local, State and Federal Agencies**

SLDMWA has a long history of collaborative participation with local, State, and federal agencies in working through statewide and regional water resource management planning efforts. SLDMWA was a leader in the development of the Bay-Delta Accord, to which it was a signatory, as well as the Framework for Action, Record of Decision (ROD), and creation of the Bay-Delta Authority (which oversees the implementation of the CALFED Bay-Delta Program). Locally, SLDMWA has worked with San Joaquin Valley Drainage Authority and the Westside San Joaquin River Watershed Coalition on the Irrigated Lands Regulatory Program (ILRP) and on multiple water use efficiency and water quality improvement programs. The WSJ Region also participates in funding programs that require coordination with State agencies. For example, the Region is currently participating in the DAC Involvement program, which involves coordination with the California Department of Water Resources (DWR). SLDMWA is also involved with the preparation of the Northern & Central Delta Mendota Region Groundwater Sustainability Plan (GSP) and coordination of a basin-wide GSP under SGMA. This effort requires coordination with DWR in addition to a range of local entities, such as the City of Patterson, Department of Fish and Wildlife, Fresno County, Merced County, Stanislaus County, Oro Loma WD, and Widren WD.

Beyond being a participant in shaping the vision of resource management in the State, SLDMWA has worked cooperatively with federal and State regulatory agencies to develop policies, standards, and implementation guidelines on many legislated and regulated actions. These efforts have required collaboration with the Department of the Interior (DOI), USBR, U.S. Army Corps of Engineers (USACE), U.S. Fish and Wildlife Service (USFWS), National Oceanic and Atmospheric Administration (NOAA), DWR, the California Department of Fish and Wildlife (CDFW), the State Water Resources Control Board (SWRCB), the Central Valley Regional Water Quality Control Board (CVRWQCB), among others.

As projects in the WSJ IRWMP are implemented, many of the agencies previously mentioned, as well as others, will likely play some role through one or all of the stages of development including feasibility studies, design, environmental review, funding, permitting, construction, and operation. The level of participation will be project-specific; however, a high degree of cooperation is generally necessary in order to ensure the success of any given effort. As projects develop, project proponents and SLDMWA will seek input from and respond to the queries of governmental agencies relative to the effort as needed.

SLDMWA recognizes the importance of coordinating with State and federal agencies and plans to continue ongoing communication and coordination to successfully manage water resources and implement projects in the WSJ IRWM Region.

## **1.5 WSJ IRWMP Adoption, Interim Changes, and Future Updates**

The 2019 WSJ IRWMP was finalized in January 2019. Upon completion, SLDMWA adopted the IRWMP at a public Board meeting in accordance with Section 6066 of the Government Code. Additionally, the following project proponents and/or stakeholders are expected to adopt the Plan in early 2019 at public meetings of their respective governing boards: Del Puerto Water District, West Stanislaus Irrigation

District, Westlands Water District, and San Joaquin River Exchange Contractors Water Authority. Appendix B contains the notices of intent to adopt and the adopting resolutions.

SLDMWA has historically updated the WSJ IRWMP no less than every five years and plans to continue this pattern in the future in order to ensure that the Plan addresses current day conditions and issues. The WSJ IRWMP project list itself will be housed in an interactive online database referred to as Opti, further discussed in Chapter 6, which allows for continuous update of projects. Formal Calls for Projects will occur prior to new funding solicitations and during IRWMP updates. The project list housed in the online database is considered the official WSJ IRWMP project list and is meant to be a living list that can be continually updated. This will not require SLDMWA to adopt the project list or WSJ IRWMP again, so long as the projects are vetted by working group. As has repeatedly been the case, coordination with stakeholders will occur and, depending upon the complexity or duration of a particular issue, it is possible a steering/technical committee or Ad-hoc Working Group will be involved.

**Table 3-1: Alignment of Plan Objectives with Statewide Priorities**

Plan Objective	Related Statewide Priority									
	Make Conservation a California Way of Life	Increase Regional Self-Reliance and Integrated Water Management Across All Levels of Government	Achieve the Co-Equal Goals for the Delta	Protect and Restore Important Ecosystems	Manage and Prepare for Dry Periods	Expand Water Storage Capacity and Improve Groundwater Management	Provide Safe Water for All Communities	Increase Flood Protection	Increase Operational and Regulatory Efficiency (directed toward State & federal agencies)	Identify Sustainable and Integrated Financing Opportunities (directed toward State agencies & legislature)
Objective A: Provide for more reliable water supply south of the Delta	💧	💧	💧		💧	💧			💧	
Objective B: Improve regional self-reliance for water through investment in water use efficiency, water recycling, advanced water technologies, local and regional water supply projects, and improved regional coordination of local and regional water supply efforts		💧			💧	💧			💧	
Objective C: Provide reasonable opportunity to advance ecosystem restoration through balanced project implementation				💧						
Objective D: Provide potential for environmental and habitat improvement, including wetlands				💧				💧		
Objective E: Promote projects that meet the needs of disadvantaged communities							💧			
Objective F: Promote and enhance water conservation, water use efficiency, and sustainable water use	💧									
Objective G: Promote and enhance water recycling					💧					
Objective H: Maximize utility of Regional aquifers while improving sustainability		💧				💧				
Objective I: Minimize risk of loss of life, infrastructure, and resources caused by significant storm events by utilizing uncontrolled flow beneficially								💧		
Objective J: Capture stormwater for higher beneficial use whenever practicable					💧	💧		💧		
Objective K: Develop Regional solutions that protect and enhance the quality of water supply, particularly in disadvantaged communities that are unable to meet water quality standards		💧					💧			

Plan Objective	Related Statewide Priority									
	Make Conservation a California Way of Life	Increase Regional Self-Reliance and Integrated Water Management Across All Levels of Government	Achieve the Co-Equal Goals for the Delta	Protect and Restore Important Ecosystems	Manage and Prepare for Dry Periods	Expand Water Storage Capacity and Improve Groundwater Management	Provide Safe Water for All Communities	Increase Flood Protection	Increase Operational and Regulatory Efficiency (directed toward State & federal agencies)	Identify Sustainable and Integrated Financing Opportunities (directed toward State agencies & legislature)
Objective L: Consider recreational potential in project development	💧									
Objective M: Minimize energy consumption and associated GHG emissions, including use of renewable energy when appropriate	💧								💧	
Objective N: Promote projects that increase operational flexibilities and supply management tools					💧				💧	

**Table 3-2: Alignment of Plan Objectives with Required Climate Change Considerations**

Plan Objective	Related Climate Change Consideration				
	Address adapting to changes in the amount, intensity, timing, quality and variability of runoff and recharge	Consider the effects of sea level rise on water supply conditions (indirectly via the Delta)	Reduce energy consumption and associated greenhouse gas (GHG) emissions	Consider strategies from CARB and AB32 Scoping Plan <sup>1</sup>	Consider options for carbon sequestration and renewable energy
Objective A: Provide for more reliable water supply south of the Delta	💧	💧		💧	
Objective B: Improve regional self-reliance for water through investment in water use efficiency, water recycling, advanced water technologies, local and regional water supply projects, and improved regional coordination of local and regional water supply efforts			💧	💧	💧
Objective C: Provide reasonable opportunity to advance ecosystem restoration through balanced project implementation					💧
Objective D: Provide potential for environmental and habitat improvement, including wetlands					💧
Objective E: Promote projects that meet the needs of disadvantaged communities		💧			
Objective F: Promote and enhance water conservation, water use efficiency, and sustainable water use			💧	💧	💧
Objective G: Promote and enhance water recycling				💧	
Objective H: Maximize utility of Regional aquifers while improving sustainability	💧		💧	💧	💧
Objective I: Minimize risk of loss of life, infrastructure, and resources caused by significant storm events by utilizing uncontrolled flow beneficially	💧				
Objective J: Capture stormwater for higher beneficial use whenever practicable	💧			💧	
Objective K: Develop Regional solutions that protect and enhance the quality of water supply, particularly in disadvantaged communities that are unable to meet water quality standards				💧	

Plan Objective	Related Climate Change Consideration				
	Address adapting to changes in the amount, intensity, timing, quality and variability of runoff and recharge	Consider the effects of sea level rise on water supply conditions (indirectly via the Delta)	Reduce energy consumption and associated greenhouse gas (GHG) emissions	Consider strategies from CARB and AB32 Scoping Plan <sup>1</sup>	Consider options for carbon sequestration and renewable energy
Objective L: Consider recreational potential in project development					
Objective M: Minimize energy consumption and associated GHG emissions, including use of renewable energy when appropriate			💧	💧	💧
Objective N: Promote projects that increase operational flexibilities and supply management tools	💧		💧		

<sup>1</sup>The five water-related GHG emissions reduction strategies identified in the CARB AB 32 Climate Change Scoping Plan are: water use efficiency, water recycling, water system energy efficiency, reuse of urban runoff, and increasing renewable energy production.

**Table 3-3: Potential Metrics for Plan Objectives**

Plan Objective	Potential Metric(s)
Objective A: Provide for more reliable water supply south of the Delta	Size and frequency of shortages, long term average allocations
Objective B: Improve regional self-reliance for water through investment in water use efficiency, water recycling, advanced water technologies, local and regional water supply projects, and improved regional coordination of local and regional water supply efforts	Urban water use (gallons per capita per day); volume of recycled water produced or used; number of coordinated water supply efforts undertaken, or volume of water produced via such efforts
Objective C: Provide reasonable opportunity to advance ecosystem restoration through balanced project implementation	Acreage of restored habitat; number of species potentially benefited by restoration measures
Objective D: Provide potential for environmental and habitat improvement, including wetlands	Acreage of restored habitat; acreage of protected habitat; number of species potentially benefited by restoration and protection measures; acreage of wetlands beneficially impacted by projects
Objective E: Promote projects that meet the needs of disadvantaged communities	Benefit provided to disadvantaged community (e.g., number of flood events avoided, improvement in water quality, volume of water supplied)
Objective F: Promote and enhance water conservation, water use efficiency, and sustainable water use	Ag demand reduction; urban demand reduction
Objective G: Promote and enhance water recycling	Average daily (or annual) recycled water supply
Objective H: Maximize utility of Regional aquifers while improving sustainability	Groundwater levels; running average of annual groundwater use compared to use targets from basin management or GSP/GSA Sustainability Criteria
Objective I: Minimize risk of loss of life, infrastructure, and resources caused by significant storm events by utilizing uncontrolled flow beneficially	Number of flood events with impacts to infrastructure; number of flood events with economic disruption; Loss of life due to flood events
Objective J: Capture stormwater for higher beneficial use whenever practicable	Pollutant loading to receiving waters; annual volume of beneficially used stormwater
Objective K: Develop Regional solutions that protect and enhance the quality of water supply, particularly in disadvantaged communities that are unable to meet water quality standards	Pollutant loading to receiving waters; Number of regional projects with direct or indirect water quality objectives
Objective L: Consider recreational potential in project development	Number of sites with multi-purpose and recreational projects; total area with recreational space from project implementation
Objective M: Minimize energy consumption and associated GHG emissions, including use of renewable energy when appropriate	Energy savings in kWh per year; percentage of energy from renewable sources
Objective N: Promote projects that increase operational flexibilities and supply management tools	Number of projects implemented; volume of water supply provided by a flexible method

## **3.2 Regional Priorities**

The Region assigned their Objectives to letters A through N in order of priority, placing particular importance on water supply reliability. Prioritization of the objectives was also taken into account during project prioritization through the application of a weighting schema (Section 6.2). The Region also recognizes that projects that are effective in targeting any of the objectives established will be beneficial and therefore important to accomplishing the overall regional goal.

## Chapter 4 Resource Management Strategies

Resource Management Strategies (RMSs) is the term used in the 2013 California Water Plan (CWP) Updates to refer to a diverse set of strategies (projects, programs and policies) to meet the water-related resource management needs of local agencies and governments throughout California. The WSJ Region has considered all of these RMSs, many of which are already applied in the Region, as tools to meet the regional objectives described in Chapter 3. The RMSs that are relevant to the Region in terms of its hydrologic, geologic, topographic and climatic characteristics, as well as its economic activities and water uses, are more likely to help the Region meet its overarching goal and specific objectives. These RMSs have been included in this IRWMP and are listed in Table 4-1.

The following sections present a summary of the RMSs and their applicability to achieving the Region's objectives, along with specific references to projects, policies or programs that are already in place in the region or that are being considered as part of this Plan. The sections also include climate change considerations associated with each strategy. Many of the RMSs have the potential to help the Region implement climate change adaptation strategies and mitigate climate change impacts. The Regional Objectives' relation to the RMSs is shown in Table 4-2.

**Table 4-1: RMS Applicable to WSJ IRWMP**

RMS	Considered in the WSJ IRWMP	RMS	Considered in the WSJ IRWMP
Agricultural Water Use Efficiency	☑	Matching Quality to Use	☑
Urban Water Use Efficiency	☑	Pollution Prevention	☑
Conveyance – Delta	☑	Salt and Salinity Management	☑
Conveyance – Regional/Local	☑	Urban Stormwater Runoff Management	☑
System Reoperation	☑	Agricultural Land Stewardship	☑
Water Transfers	☑	Economic Incentives (Loans, Grants, and Water Pricing)	☑
Conjunctive Management and Groundwater	☑	Ecosystem Restoration	☑
Desalination – Brackish & Seawater	☑	Forest Management	☑
Precipitation Enhancement	☑	Land Use Planning and Management	☑
Recycled Municipal Water	☑	Recharge Area Protection	☑
Surface Storage – CALFED	☑	Water-Dependent Recreation	☑
Surface Storage – Regional/Local	☑	Watershed Management	☑
Drinking Water Treatment and Distribution	☑	Flood Management	☑
Groundwater/Aquifer Remediation	☑	Outreach and Engagement	☑
Sediment Management	☑	Water and Culture	☑
Other Strategies (crop idling, dew vaporization, irrigated land retirement, rainfed agriculture, waterbag transport)	☑		

Table 4-2: Alignment of Plan Objectives with Resource Management Strategies

Plan Objective	RMS																														
	Ag Water Use Efficiency	Urban Water Use Efficiency	Conveyance - Delta	Conveyance – Regional/Local	System Reoperation	Water Transfers	Conjunctive Management/	Desalination – Brackish and Seawater	Precipitation Enhancement	Recycled Water	Surface Storage - CALFED	Surface Storage – Regional/Local	Drinking Water Treat and Distribute	Groundwater Remediation	Sediment Management	Other Strategies (crop idling, etc.)	Matching Quality to Use	Pollution Prevention	Salinity Management	Urban Runoff Management	Ag Lands Stewardship	Economic Incentives	Ecosystem Restoration	Forest Management	Land Use Plan and Management	Recharge Area Protection	Water-Dependent Recreation	Watershed Management	Flood Management	Outreach	Water and Culture
Objective A: Provide for more reliable water supply south of the Delta	●	●	●	●	●	●	●			●	●	●					●					●									●
Objective B: Improve regional self-reliance for water through investment in water use efficiency, water recycling, advanced water technologies, local and regional water supply projects, and improved regional coordination of local and regional water supply efforts	●	●		●	●	●	●	●		●		●	●	●					●		●	●	●			●	●		●	●	●
Objective C: Provide reasonable opportunity to advance ecosystem restoration through balanced project implementation															●			●	●	●	●		●	●	●				●	●	●
Objective D: Provide potential for environmental and habitat improvement, including wetlands						●	●			●					●	●		●	●	●	●	●		●	●	●	●	●	●	●	●
Objective E: Promote projects that meet the needs of disadvantaged communities							●			●			●	●				●		●	●				●				●	●	●
Objective F: Promote and enhance water conservation, water use efficiency, and sustainable water use	●	●														●	●					●			●					●	●
Objective G: Promote and enhance water recycling							●			●				●		●	●		●				●							●	●
Objective H: Maximize utility of Regional aquifers while improving sustainability	●	●					●	●					●	●			●	●	●						●	●			●	●	●
Objective I: Minimize risk of loss of life, infrastructure, and resources caused by significant storm events by utilizing uncontrolled flow beneficially							●					●				●				●			●		●	●		●	●		
Objective J: Capture stormwater for higher beneficial use whenever practicable							●		●		●			●	●	●	●			●			●	●	●	●	●		●	●	

Plan Objective	RMS																															
	Ag Water Use Efficiency	Urban Water Use Efficiency	Conveyance - Delta	Conveyance – Regional/Local	System Reoperation	Water Transfers	Conjunctive Management/	Desalination – Brackish and Seawater	Precipitation Enhancement	Recycled Water	Surface Storage - CALFED	Surface Storage – Regional/Local	Drinking Water Treat and Distribute	Groundwater Remediation	Sediment Management	Other Strategies (crop idling, etc.)	Matching Quality to Use	Pollution Prevention	Salinity Management	Urban Runoff Management	Ag Lands Stewardship	Economic Incentives	Ecosystem Restoration	Forest Management	Land Use Plan and Management	Recharge Area Protection	Water-Dependent Recreation	Watershed Management	Flood Management	Outreach	Water and Culture	
<b>Objective K: Develop Regional solutions that protect and enhance the quality of water supply, particularly in disadvantaged communities that are unable to meet water quality standards</b>								●		●				●	●	●	●	●	●	●	●			●	●	●	●		●			
<b>Objective L: Consider recreational potential in project development</b>																												●			●	●
<b>Objective M: Minimize energy consumption and associated GHG emissions, including use of renewable energy when appropriate</b>																●								●								●
<b>Objective N: Promote projects that increase operational flexibilities and supply management tools</b>				●	●	●	●			●							●				●				●	●		●				



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# Water Conservation and Production Reports

## Current Monthly Reports

Below is the most recent dataset of monthly urban water supplier reports on potable water production and conservation activities. Note that factors unaccounted for in this dataset can affect per capita water use. The current monthly data supersede all previously released material and archived reports.

January 19, 2021

- [June 2014 - November 2020 Urban Water Supplier Monthly Reports \(Raw Dataset\)](#)
- [Definitions and Data Dictionary for the Urban Water Supplier Monthly Reports Dataset \(applies to June 2014-September 2020 dataset onwards\)](#)

For questions about data, or to report a problem, please [contact us](#).

- Archived Datasets: [Monthly Report](#) and [Small Supplier Annual Conservation Reports](#)

**Use the dashboard below to view and customize some of the key urban water use summaries.**

### Open Data

These data are also published on the [California Open Data Portal](#) in machine-readable form.

### Factors that affect Per Capita Water Use

It is not appropriate to use Residential Gallons Per Capita Day (R-GPCD) water use data for comparisons across water suppliers, unless all relevant factors are accounted for.

[Click here to learn more about the factors](#)





- November
- South Coast
- South Lahontan
- Tulare Lake

**Statewide R-GPCD**

2014	2015	2016	2017	2018	2019
66	59	59	68	68	71
169	138	148	161	156	159
55	53	51	52	62	69
68	56	54	56	55	56
88	80	76	86	101	110
59	54	54	60	65	67
90	77	76	86	95	100
88	78	79	87	86	82
107	91	94	96	101	95

Oct   Nov   Dec

## Water Supplier Tools

- [Guidance for Estimating Percentage Residential Use \(PRU\) and Residential Gallons Per Capita Daily \(R-GPCD\)](#)
- [Submit Monthly Conservation Reports - Use the Urban Water Supplier Reporting Tool](#) (registration required)
- [Updated: Guidance for Urban Water Supplier Monthly Reporting](#) (updated 10/1/2020)
- [Exempting Emergency Water Production from the Conservation Standard](#) (5/05/2015)
- [Guidance for Estimating Service Area Population](#)
- [Conservation Water Pricing](#) (5/19/2015)
- [Frequently Asked Questions](#) (updated 10/1/2020)

## Archived Guidance Documents

- [Guidance for Urban Water Supplier Monthly Reporting](#) (updated 8/30/2017)
- [Subtracting Commercial Agricultural Water from Total Potable Water Production](#) (5/21/2015)
- [List of received Agricultural Water Use Exclusion Certifications](#)
- [Data Dictionary for the Urban Water Supplier Monthly Reports Dataset](#) (applies to all datasets prior to June 2014-September 2020 report)



## Archived Monthly Reports

2020





2017



2016



2015



2014



## Small Supplier Annual Conservation Reports - Archive

- 2016 Small Supplier Annual Conservation Dataset, December 2015 - November 2016 ([Excel](#)) (Final data pull 7-2-2017)
- 2015 Small Supplier Annual Conservation Dataset, June - November 2013 and 2015 ([Excel](#)) (Final data pull 4-8-2016)

(Page last updated 01/20/2021)

### Conservation Portal Resources

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[Conservation Reporting](#)

[Enforcement](#)

[Fact Sheets](#)

[FAQ](#)

[Regulations](#)

[Resources](#)

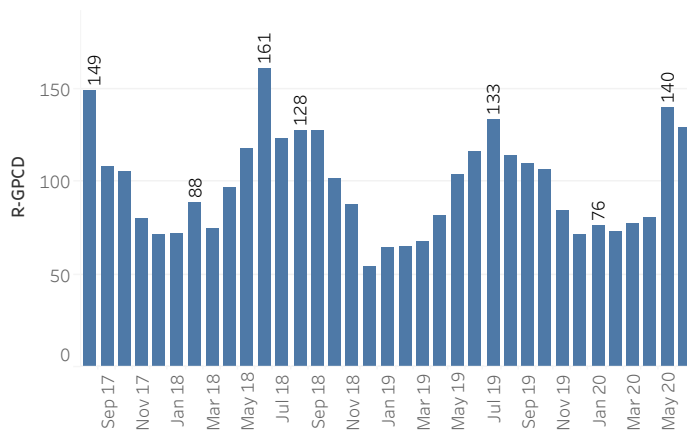
[Drought Home](#)



### Average Residential Gallons Per Capita Daily (R-GPCD)

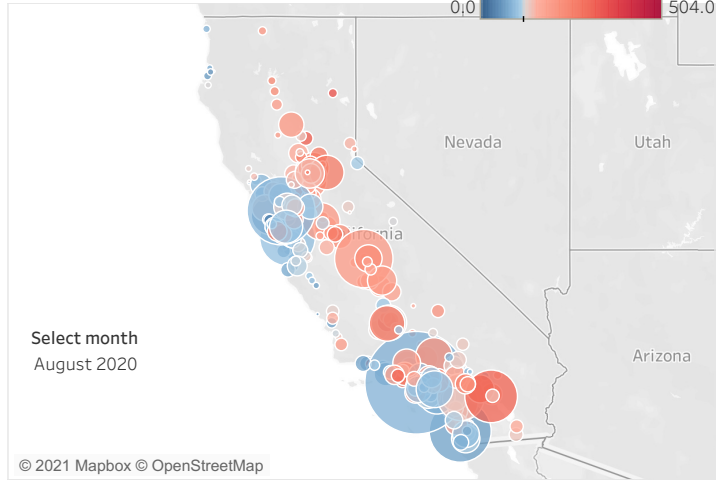
Select Supplier  
Patterson City of

Select Period  
August 2017 to August 20..  
and Null values



### Monthly Production

Monthly R-GPCD  
0.0 504.0



Relative bubble size reflects total monthly production.

## **APPENDIX E**

### **UWMP Tables and SBX7-7 Verification**

2020 UWMP DWR Data Tables

2020 UWMP DWR SBX7-7 Verification Tables

**SB X7-7 Table 0: Units of Measure Used in UWMP\***

*(select one from the drop down list)*

Acre Feet

*\*The unit of measure must be consistent with Table 2-3*

NOTES:

**SB X7-7 Table-1: Baseline Period Ranges**

Baseline	Parameter	Value	Units
10- to 15-year baseline period	2008 total water deliveries	4,398.00	Acre Feet
	2008 total volume of delivered recycled water	-	Acre Feet
	2008 recycled water as a percent of total deliveries	0.00%	Percent
	Number of years in baseline period <sup>1, 2</sup>	10	Years
	Year beginning baseline period range	2001	
	Year ending baseline period range <sup>3</sup>	2010	
5-year baseline period	Number of years in baseline period	5	Years
	Year beginning baseline period range	2006	
	Year ending baseline period range <sup>4</sup>	2010	

<sup>1</sup> If the 2008 recycled water percent is less than 10 percent, then the first baseline period is a continuous 10-year period. If the amount of recycled water delivered in 2008 is 10 percent or greater, the first baseline period is a continuous 10- to 15-year period. <sup>2</sup> The Water Code requires that the baseline period is between 10 and 15 years. However, DWR recognizes that some water suppliers may not have the minimum 10 years of baseline data.

<sup>3</sup> The ending year must be between December 31, 2004 and December 31, 2010.

<sup>4</sup> The ending year must be between December 31, 2007 and December 31, 2010.

NOTES: Similar methodology used in 2015 UWMP, and validated for use in 2020 UWMP.



**SB X7-7 Table 2: Method for Population Estimates****Method Used to Determine Population**  
(may check more than one) **1. Department of Finance (DOF)**  
DOF Table E-8 (1990 - 2000) and (2000-2010) and  
DOF Table E-5 (2010 - 2020) when available **2. Persons-per-Connection Method** **3. DWR Population Tool** **4. Other**  
DWR recommends pre-review

NOTES: 2020 population based on DOF 2020 population + 2020 growth.

**SB X7-7 Table 3: Service Area Population**

Year	Population	
<b>10 to 15 Year Baseline Population</b>		
Year 1	2001	13,759
Year 2	2002	14,092
Year 3	2003	14,568
Year 4	2004	16,307
Year 5	2005	19,843
Year 6	2006	21,474
Year 7	2007	21,609
Year 8	2008	21,130
Year 9	2009	20,662
Year 10	2010	20,260
Year 11		
Year 12		
Year 13		
Year 14		
Year 15		
<b>5 Year Baseline Population</b>		
Year 1	2006	21,474
Year 2	2007	21,609
Year 3	2008	21,130
Year 4	2009	20,662
Year 5	2010	20,260
<b>2020 Compliance Year Population</b>		
<b>2020</b>		23,764
NOTES: Baseline population from 2015 UWMP, 2020 population from DOF.		

**SB X7-7 Table 4: Annual Gross Water Use \***

Baseline Year <i>Fm SB X7-7 Table 3</i>	Volume Into Distribution System <i>This column will remain blank until SB X7-7 Table 4-A is completed.</i>	Deductions					Annual 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>	
<b>10 to 15 Year Baseline - Gross Water Use</b>							
Year 1	2001	2,380	-	-	-	-	2,380
Year 2	2002	3,001			-	-	3,001
Year 3	2003	2,837			-	-	2,837
Year 4	2004	2,840			-	-	2,840
Year 5	2005	3,356			-	-	3,356
Year 6	2006	4,083			-	-	4,083
Year 7	2007	4,165			-	-	4,165
Year 8	2008	4,398			-	-	4,398
Year 9	2009	3,836			-	-	3,836
Year 10	2010	3,869			-	-	3,869
Year 11	2011	-			-	-	-
Year 12	2012	-			-	-	-
Year 13	2013	-			-	-	-
Year 14	2014	-			-	-	-
Year 15	2015	-			-	-	-
<b>10 - 15 year baseline average gross water use</b>							<b>3,477</b>
<b>5 Year Baseline - Gross Water Use</b>							
Year 1	2006	4,083			-	-	4,083
Year 2	2007	4,165			-	-	4,165
Year 3	2008	4,398			-	-	4,398
Year 4	2009	3,836			-	-	3,836
Year 5	2010	3,869			-	-	3,869
<b>5 year baseline average gross water use</b>							<b>4,070</b>
<b>2020 Compliance Year - Gross Water Use</b>							
<b>2020</b>		3,894	-		-	-	<b>3,894</b>

\* NOTE that the units of measure must remain consistent throughout the UWMP, as reported in Table 2-3

NOTES: Annual Gross Potable Water Use in AF.

**SB X7-7 Table 4-A: Volume Entering the Distribution System(s)**

Complete one table for each source.

**Name of Source** Source 1 - Local Groundwater

**This water source is:**

- The supplier's own water source
- A purchased or imported source

<b>Baseline Year</b> <i>Fm SB X7-7 Table 3</i>	<b>Volume Entering Distribution System</b>	<b>Meter Error Adjustment*</b> <i>Optional (+/-)</i>	<b>Corrected Volume Entering Distribution System</b>
---	--	---	--

**10 to 15 Year Baseline - Water into Distribution System**

Year 1	2001	2,380.00		2,380.00
Year 2	2002	3,001.00		3,001.00
Year 3	2003	2,837.00		2,837.00
Year 4	2004	2,840.00		2,840.00
Year 5	2005	3,356.00		3,356.00
Year 6	2006	4,083.00		4,083.00
Year 7	2007	4,165.00		4,165.00
Year 8	2008	4,398.00		4,398.00
Year 9	2009	3,836.00		3,836.00
Year 10	2010	3,869.00		3,869.00
Year 11	2011	-		-
Year 12	2012	-		-
Year 13	2013	-		-
Year 14	2014	-		-
Year 15	2015	-		-

**5 Year Baseline - Water into Distribution System**

Year 1	2006	4,083.00		4,083.00
Year 2	2007	4,165.00		4,165.00
Year 3	2008	4,398.00		4,398.00
Year 4	2009	3,836.00		3,836.00
Year 5	2010	3,869.00		3,869.00

**2020 Compliance Year - Water into Distribution System**

<b>2020</b>	3,894.00		3,894.00
-------------	----------	--	----------

*\* Meter Error Adjustment - See guidance in Methodology 1, Step 3 of Methodologies Document*

NOTES: Source is City groundwater wells.

**SB X7-7 Table 5: Gallons Per Capita Per Day (GPCD)**

<b>Baseline Year</b> <i>Fm SB X7-7 Table 3</i>		<b>Service Area Population</b> <i>Fm SB X7-7 Table 3</i>	<b>Annual Gross Water Use</b> <i>Fm SB X7-7 Table 4</i>	<b>Daily Per Capita Water Use (GPCD)</b>
<b>10 to 15 Year Baseline GPCD</b>				
Year 1	2001	13,759.00	2,380.00	154.42
Year 2	2002	14,092.00	3,001.00	190.12
Year 3	2003	14,568.00	2,837.00	173.85
Year 4	2004	16,307.00	2,840.00	155.48
Year 5	2005	19,843.00	3,356.00	150.99
Year 6	2006	21,474.00	4,083.00	169.74
Year 7	2007	21,609.00	4,165.00	172.07
Year 8	2008	21,130.00	4,398.00	185.82
Year 9	2009	20,662.00	3,836.00	165.74
Year 10	2010	20,260.00	3,869.00	170.48
<i>Year 11</i>	0	-	-	
<i>Year 12</i>	0	-	-	
<i>Year 13</i>	0	-	-	
<i>Year 14</i>	0	-	-	
<i>Year 15</i>	0	-	-	
<b>10-15 Year Average Baseline GPCD</b>				<b>169</b>
<b>5 Year Baseline GPCD</b>				
<b>Baseline Year</b> <i>Fm SB X7-7 Table 3</i>		<b>Service Area Population</b> <i>Fm SB X7-7 Table 3</i>	<b>Gross Water Use</b> <i>Fm SB X7-7 Table 4</i>	<b>Daily Per Capita Water Use</b>
Year 1	2006	21,474.00	4,083.00	169.74
Year 2	2007	21,609.00	4,165.00	172.07
Year 3	2008	21,130.00	4,398.00	185.82
Year 4	2009	20,662.00	3,836.00	165.74
Year 5	2010	20,260.00	3,869.00	170.48
<b>5 Year Average Baseline GPCD</b>				<b>173</b>
<b>2020 Compliance Year GPCD</b>				
<b>2020</b>		23,764.00	3,894.00	<b>146.29</b>
NOTES: 2020 Population from DOF; 2020 Annual Gross Water Use from City in AF.				

**SB X7-7 Table 6: Gallons per Capita per Day**  
*Summary From Table SB X7-7 Table 5*

10-15 Year Baseline GPCD	169
5 Year Baseline GPCD	173
2020 Compliance Year GPCD	146

NOTES: Baseline data consistent with 2015 UWMP data; 2020 data based on actual City total potable water use.

**SB X7-7 Table 7: 2020 Target Method***Select Only One*

Target Method		Supporting Documentation
<input checked="" type="checkbox"/>	Method 1	SB X7-7 Table 7A
<input type="checkbox"/>	Method 2	SB X7-7 Tables 7B, 7C, and 7D <i>See UWMP DWR webpage or contact staff for these tables</i>
<input type="checkbox"/>	Method 3	SB X7-7 Table 7-E
<input type="checkbox"/>	Method 4	Method 4 Calculator

NOTES: 95% of 5-Year Baseline calculation for maximum target.

**SB X7-7 Table 7-A: Target Method 1**

20% Reduction

10-15 Year Baseline GPCD	2020 Target GPCD
169	135
NOTES: 80% of 10-15 Year Baseline GPCD.	

**SB X7-7 Table 7-E: Target Method 3**

Agency May Select More Than One as Applicable	Percentage of Service Area in This Hydrological Region	Hydrologic Region	"2020 Plan" Regional Targets	Method 3 Regional Targets (95%)
☐		North Coast	137	130
☐		North Lahontan	173	164
☐		Sacramento River	176	167
☐		San Francisco Bay	131	124
☑	100%	San Joaquin River	174	165
☐		Central Coast	123	117
☐		Tulare Lake	188	179
☐		South Lahontan	170	162
☐		South Coast	149	142
☐		Colorado River	211	200
<p align="center"><b>Target</b> <i>(If more than one region is selected, this value is calculated.)</i></p>				<p align="center"><b>165</b></p>

NOTES: Method 3 target exceeds maximum 5-year baseline target of 164 gpcd.

**SB X7-7 Table 7-F: Confirm Minimum Reduction for 2020 Target**

5 Year Baseline GPCD From SB X7-7 Table 5	Maximum 2020 Target <sup>1</sup>	Calculated 2020 Target <sup>2</sup>	<b>Confirmed 2020 Target</b>
173	164	165	<b>164</b>

<sup>1</sup> Maximum 2020 Target is 95% of the 5 Year Baseline GPCD except for suppliers at or below 100 GPCD.

<sup>2</sup> 2020 Target is calculated based on the selected Target Method, see SB X7-7 Table 7 and corresponding tables for agency's calculated target.

NOTES: Calculated = Method 3 with 95% of regional target calculation.

**SB X7-7 Table 8: 2015 Interim Target GPCD**

Confirmed 2020 Target <i>Fm SB X7-7 Table 7-F</i>	10-15 year Baseline GPCD <i>Fm SB X7-7 Table 5</i>	<b>2015 Interim Target GPCD</b>
164	169	<b>167</b>

NOTES: From 2015 UWMP.

**SB X7-7 Table 9: 2020 Compliance**

Actual 2020 GPCD	2020 Interim Target GPCD	Optional Adjustments <i>(in GPCD)</i>					2020 GPCD <i>(Adjusted if applicable)</i>	Did Supplier Achieve Targeted Reduction for 2020?
		Enter "0" if Adjustment Not Used			TOTAL Adjustments	Adjusted 2020 GPCD		
		Extraordinary Events	Weather Normalization	Economic Adjustment				
146	167	-	-	-	-	146.29	146.29	YES

NOTES: Based on City's total potable water use in 2020 which achieves 2020 water use target of 164 gpcd.

## **APPENDIX F**

### **2020 UWMP DWR Guidebook**

#### Checklist

## Appendix F. UWMP Checklist

This checklist is developed directly from the Urban Water Management Planning Act and SB X7-7. It is provided to support water suppliers (Suppliers) during preparation of their Urban Water Management Plans (UWMP). Two versions of the UWMP Checklist are provided below – the first one is organized according to the California Water Code and the second checklist according to subject matter. The two checklists contain duplicate information and the Supplier should use whichever checklist is more convenient. In the event that information or recommendations in these tables are inconsistent with, conflict with, or omit the requirements of the Act or applicable laws, the Act or other laws shall prevail.

Each water supplier submitting an UWMP can also provide DWR with the UWMP location of the required element by completing the last column of either checklist. This will support DWR in its review of these UWMPs. The completed form can be included with the UWMP.

If an item does not pertain to a Supplier, then state the UWMP requirement and note that it does not apply to the Supplier. For example, if a Supplier does not use groundwater as a water supply source, then there can be a statement in the UWMP that groundwater is not a water supply source.

**Checklist Arranged by Water Code Section**

<b>Water Code Section</b>	<b>Summary as Applies to UWMP</b>	<b>Subject</b>	<b>2020 Guidebook Location</b>	<b>2020 UWMP Location</b>
10608.20(e)	Retail suppliers shall provide baseline daily per capita water use, urban water use target, interim urban water use target, and compliance daily per capita water use, along with the bases for determining those estimates, including references to supporting data.	Baselines and Targets	Chapter 5	Chapter 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 5.7.2	Chapter 5
10608.24(a)	Retail suppliers shall meet their water use target by December 31, 2020.	Baselines and Targets	Section 5.7	Chapter 5
10608.24(d)(2)	If the retail supplier adjusts its compliance GPCD using weather normalization, economic adjustment, or extraordinary events, it shall provide the basis for, and data supporting the adjustment.	Baselines and Targets	Sections 5.2 and 5.5.7	Chapter 5

Water Code Section	Summary as Applies to UWMP	Subject	2020 Guidebook Location	2020 UWMP Location
10608.26(a)	Retail suppliers shall conduct a public hearing to discuss adoption, implementation, and economic impact of water use targets.	Plan Adoption, Submittal, and Implementation	Chapter 10	Chapter 10
10608.36	Wholesale suppliers shall include an assessment of present and proposed future measures, programs, and policies to help their retail water suppliers achieve targeted water use reductions.	Baselines and Targets	Section 5.1	Chapter 5
10608.4	Retail suppliers shall report on their progress in meeting their water use targets. The data shall be reported using a standardized form.	Baselines and Targets	Section 5.8 and App E	Chapter 5
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	Chapter 2

Water Code Section	Summary as Applies to UWMP	Subject	2020 Guidebook Location	2020 UWMP Location
10620(d)(2)	Coordinate the preparation of its plan with other appropriate agencies in the area, including other water suppliers that share a common source, water management agencies, and relevant public agencies, to the extent practicable.	Plan Preparation	Section 2.5.2	Chapter 2
10620(f)	Describe water management tools and options to maximize resources and minimize the need to import water from other regions.	Water Supply Reliability Assessment	Section 7.4	Chapter 7
10621(b)	Notify, at least 60 days prior to the public hearing, any city or county within which the supplier provides water that the urban water supplier will be reviewing the plan and considering amendments or changes to the plan.	Plan Adoption, Submittal, and Implementation	Section 10.2.1	Chapter 10
10621(f)	Each urban water supplier shall update and submit its 2020 plan to the department by July 1, 2021.	Plan Adoption, Submittal, and Implementation	Sections 10.3.1 and 10.4	Chapter 10

Water Code Section	Summary as Applies to UWMP	Subject	2020 Guidebook Location	2020 UWMP Location
10630.5	Each plan shall include a simple description of the supplier’s plan including water availability, future requirements, a strategy for meeting needs, and other pertinent information.	Summary	Chapter 1	Chapter 1
10631(a)	Describe the water supplier service area.	System Description	Section 3.1	Chapter 3
10631(a)	Describe the climate of the service area of the supplier.	System Description	Section 3.3	Chapter 3
10631(a)	Indicate the current population of the service area.	System Description and Baselines and Targets	Sections 3.4 and 5.4	Chapter 3,5
10631(a)	Provide population projections for 2025, 2030, 2035, 2040 and optionally 2045.	System Description	Section 3.4	Chapter 3
10631(a)	Describe other social, economic, and demographic factors affecting the supplier’s water management planning.	System Description	Section 3.4	Chapter 3

<b>Water Code Section</b>	<b>Summary as Applies to UWMP</b>	<b>Subject</b>	<b>2020 Guidebook Location</b>	<b>2020 UWMP Location</b>
10631(a)	Describe the land uses within the service area.	System Description	Section 3.5	Chapter 3
10631(b)	Identify and quantify the existing and planned sources of water available for 2020, 2025, 2030, 2035, 2040 and optionally 2045.	System Supplies	Section 6.2.8	Chapter 6
10631(b)	Indicate whether groundwater is an existing or planned source of water available to the supplier.	System Supplies	Section 6.2	Chapter 6
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	Chapter 6

Water Code Section	Summary as Applies to UWMP	Subject	2020 Guidebook Location	2020 UWMP Location
10631(b)(2)	When multiple sources of water supply are identified, describe the management of each supply in relationship to other identified supplies.	System Supplies	Section 6.1	Chapter 6
10631(b)(3)	Describe measures taken to acquire and develop planned sources of water.	System Supplies	Section 6.1	Chapter 6
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	Chapter 6
10631(b)(4)(B)	Describe the groundwater basin.	System Supplies	Section 6.2.2	Chapter 6

Water Code Section	Summary as Applies to UWMP	Subject	2020 Guidebook Location	2020 UWMP Location
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	Chapter 6
10631(b)(4)(B)	For unadjudicated basins, indicate whether or not the department has identified the basin as a high or medium priority. Describe efforts by the supplier to coordinate with sustainability or groundwater agencies to achieve sustainable groundwater conditions.	System Supplies	Section 6.2.3	Chapter 6
10631(b)(4)(C)	Provide a detailed description and analysis of the location, amount, and sufficiency of groundwater pumped by the urban water supplier for the past five years	System Supplies	Section 6.2.4	Chapter 6
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	Chapter 6

<b>Water Code Section</b>	<b>Summary as Applies to UWMP</b>	<b>Subject</b>	<b>2020 Guidebook Location</b>	<b>2020 UWMP Location</b>
10631(c)	Describe the opportunities for exchanges or transfers of water on a short-term or long-term basis.	System Supplies	Section 6.7	Chapter 6
10631(d)(1)	Quantify past, current, and projected water use, identifying the uses among water use sectors.	System Water Use	Section 4.2	Chapter 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 4.3	Chapter 4
10631(d)(3)(C)	Retail suppliers shall provide data to show the distribution loss standards were met.	System Water Use	Section 4.2	Chapter 4
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	Sections 9.2 and 9.3	Chapter 9
10631(e)(2)	Wholesale suppliers shall describe specific demand management measures listed in code, their distribution system asset management program, and supplier assistance program.	Demand Management Measures	Sections 9.1 and 9.3	Chapter 9

Water Code Section	Summary as Applies to UWMP	Subject	2020 Guidebook Location	2020 UWMP Location
10631(f)	Describe the expected future water supply projects and programs that may be undertaken by the water supplier to address water supply reliability in average, single-dry, and for a period of drought lasting 5 consecutive water years.	System Supplies	Section 6.8	Chapter 6
10631(g)	Describe desalinated water project opportunities for long-term supply.	System Supplies	Section 6.6	Chapter 6
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	Chapter 2
10631(h)	Wholesale suppliers will include documentation that they have provided their urban water suppliers with identification and quantification of the existing and planned sources of water available from the wholesale to the urban supplier during various water year types.	System Supplies	Section 2.5.1	Chapter 2
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	Chapter 4

Water Code Section	Summary as Applies to UWMP	Subject	2020 Guidebook Location	2020 UWMP Location
10631.2(a)	The UWMP must include energy intensity information as stated in the code.		Section 6.4 and Appendix O	Chapter 6
10632(a)	Provide a water shortage contingency plan (WSCP) with specified elements below.	Water Shortage Contingency Planning	Chapter 8	Chapter 8
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	Chapter 8
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	Chapter 8
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	Chapter 8

Water Code Section	Summary as Applies to UWMP	Subject	2020 Guidebook Location	2020 UWMP Location
10632(a)(3)(B)	Suppliers with an existing water shortage contingency plan that uses different water shortage levels must cross reference their categories with the six standard categories.	Water Shortage Contingency Planning	Section 8.3	Chapter 8
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	Chapter 8
10632(a)(4)(B)	Specify locally appropriate demand reduction actions to adequately respond to shortages.	Water Shortage Contingency Planning	Section 8.4	Chapter 8
10632(a)(4)(C)	Specify locally appropriate operational changes.	Water Shortage Contingency Planning	Section 8.4	Chapter 8

Water Code Section	Summary as Applies to UWMP	Subject	2020 Guidebook Location	2020 UWMP Location
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	Chapter 8
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	Chapter 8
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	Chapter 8
10632(a)(5)(B) 10632(a)(5)(C)	Suppliers must describe that they will inform customers, the public and others regarding any shortage response actions triggered or anticipated to be triggered and other relevant communications.	Water Shortage Contingency Planning	Section 8.5, 8.6	Chapter 8

Water Code Section	Summary as Applies to UWMP	Subject	2020 Guidebook Location	2020 UWMP Location
10632(a)(7)(A)	Describe the legal authority that empowers the supplier to enforce shortage response actions.	Water Shortage Contingency Planning	Section 8.7	Chapter 8
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	Chapter 8
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	Chapter 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	Chapter 8

Water Code Section	Summary as Applies to UWMP	Subject	2020 Guidebook Location	2020 UWMP Location
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	Chapter 8
10632(a)(8)(C)	Describe the cost of compliance with Water Code Chapter 3.3: Excessive Residential Water Use During Drought.	Water Shortage Contingency Planning	Section 8.8	Chapter 8
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	Chapter 8
10632(a)(10)	Describe reevaluation and improvement procedures for monitoring and evaluation the water shortage contingency plan to ensure risk tolerance is adequate and appropriate water shortage mitigation strategies are implemented.	Water Shortage Contingency Planning	Section 8.10	Chapter 8

Water Code Section	Summary as Applies to UWMP	Subject	2020 Guidebook Location	2020 UWMP Location
10632(b)	Analyze and define water features that are artificially supplied with water, including ponds, lakes, waterfalls, and fountains, separately from swimming pools and spas.	Water Shortage Contingency Planning	Section 8.11	Chapter 8
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	Chapter 6
10633(c)	Describe the recycled water currently being used in the supplier's service area.	System Supplies (Recycled Water)	Section 6.2	Chapter 6
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	Chapter 6

Water Code Section	Summary as Applies to UWMP	Subject	2020 Guidebook Location	2020 UWMP Location
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	Chapter 6
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	Chapter 6
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	Chapter 6
10634	Provide information on the quality of existing sources of water available to the supplier and the manner in which water quality affects water management strategies and supply reliability	Water Supply Reliability Assessment	Chapter 7	Chapter 7

Water Code Section	Summary as Applies to UWMP	Subject	2020 Guidebook Location	2020 UWMP Location
10635(a)	Assess the water supply reliability during normal, dry, and multiple dry water years by comparing the total water supply sources available to the water supplier with the total projected water use over the next 20 years.	Water Supply Reliability Assessment	Section 7.3	Chapter 7
10635(b)	Provide a drought risk assessment as part of information considered in developing the demand management measures and water supply projects.	Water Supply Reliability Assessment	Section 7.3	Chapter 7
10635(b)(1)	Include a description of the data, methodology, and basis for one or more supply shortage conditions that are necessary to conduct a drought risk assessment for a drought period that lasts 5 consecutive years.	Water Supply Reliability Assessment	Section 7.3	Chapter 7
10635(b)(2)	Include a determination of the reliability of each source of supply under a variety of water shortage conditions.	Water Supply Reliability Assessment	Section 7.3	Chapter 7

Water Code Section	Summary as Applies to UWMP	Subject	2020 Guidebook Location	2020 UWMP Location
10635(b)(3)	Include a comparison of the total water supply sources available to the water supplier with the total projected water use for the drought period.	Water Supply Reliability Assessment	Section 7.3	Chapter 7
10635(b)(4)	Include considerations of the historical drought hydrology, plausible changes on projected supplies and demands under climate change condition, anticipated regulatory changes, and other locally applicable criteria.	Water Supply Reliability Assessment	Section 7.3	Chapter 7
10635(c)	Provide supporting documentation that Water Shortage Contingency Plan has been, or will be, provided to any city or county within which it provides water, no later than 60 days after the submission of the plan to DWR.	Plan Adoption, Submittal, and Implementation	Sections 8.12, 10.4	Chapter 8
10642	Provide supporting documentation that the water supplier has encouraged active involvement of diverse social, cultural, and economic elements of the population within the service area prior to and during the preparation of the plan and contingency plan.	Plan Preparation	Section 2.6	Chapter 2

Water Code Section	Summary as Applies to UWMP	Subject	2020 Guidebook Location	2020 UWMP Location
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.	Plan Adoption, Submittal, and Implementation	Sections 10.2.2, 10.3, and 10.5	Chapter 10
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	Chapter 10
10642	Provide supporting documentation that the plan and contingency plan has been adopted as prepared or modified.	Plan Adoption, Submittal, and Implementation	Section 10.3.1	Chapter 10
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	Chapter 10
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 10.5	Chapter 10

Water Code Section	Summary as Applies to UWMP	Subject	2020 Guidebook Location	2020 UWMP Location
10644(a)(2)	The plan, or amendments to the plan, submitted to the department shall be submitted electronically.	Plan Adoption, Submittal, and Implementation	Sections 10.4.1 and 10.4.2	Chapter 10
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	Chapter 10
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	Chapter 10

**Checklist Arranged by Subject**

<b>Water Code Section</b>	<b>Summary as Applies to UWMP</b>	<b>Subject</b>	<b>2020 Guidebook Location</b>	<b>2020 UWMP Location (Optional Column for Agency Review Use)</b>
10608.20(e)	Retail suppliers shall provide baseline daily per capita water use, urban water use target, interim urban water use target, and compliance daily per capita water use, along with the bases for determining those estimates, including references to supporting data.	Baselines and Targets	Chapter 5	Chapter 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 5.7.2	Chapter 5
10608.24(a)	Retail suppliers shall meet their water use target by December 31, 2020.	Baselines and Targets	Section 5.7	Chapter 5

Water Code Section	Summary as Applies to UWMP	Subject	2020 Guidebook Location	2020 UWMP Location (Optional Column for Agency Review Use)
10608.24(d)(2)	If the retail supplier adjusts its compliance GPCD using weather normalization, economic adjustment, or extraordinary events, it shall provide the basis for, and data supporting the adjustment.	Baselines and Targets	Sections 5.2 and 5.5.7	Chapter 5
10608.36	Wholesale suppliers shall include an assessment of present and proposed future measures, programs, and policies to help their retail water suppliers achieve targeted water use reductions.	Baselines and Targets	Section 5.1	Chapter 5
10608.4	Retail suppliers shall report on their progress in meeting their water use targets. The data shall be reported using a standardized form.	Baselines and Targets	Section 5.8 and App E	Chapter 5

Water Code Section	Summary as Applies to UWMP	Subject	2020 Guidebook Location	2020 UWMP Location (Optional Column for Agency Review Use)
10631(e)(1)	Retail suppliers shall provide a description of the nature and extent of each demand management measure implemented over the past five years.	Demand Management Measures	Sections 9.2 and 9.3	Chapter 9
10631(e)(2)	Wholesale suppliers shall describe specific demand management measures listed in code, their distribution system asset management program, and supplier assistance program.	Demand Management Measures	Sections 9.1 and 9.3	Chapter 9
10608.26(a)	Retail suppliers shall conduct a public hearing to discuss adoption, implementation, and economic impact of water use targets.	Plan Adoption, Submittal, and Implementation	Chapter 10	Chapter 10

Water Code Section	Summary as Applies to UWMP	Subject	2020 Guidebook Location	2020 UWMP Location (Optional Column for Agency Review Use)
10621(b)	Notify, at least 60 days prior to the public hearing, any city or county within which the supplier provides water that the urban water supplier will be reviewing the plan and considering amendments or changes to the plan.	Plan Adoption, Submittal, and Implementation	Section 10.2.1	Chapter 10
10621(f)	Each urban water supplier shall update and submit its 2020 plan to the department by July 1, 2021.	Plan Adoption, Submittal, and Implementation	Sections 10.3.1 and 10.4	Chapter 10
10635(c)	Provide supporting documentation that Water Shortage Contingency Plan has been, or will be, provided to any city or county within which it provides water, no later than 60 days after the submission of the plan to DWR.	Plan Adoption, Submittal, and Implementation	Sections 8.12, 10.4	Chapter 8/10

Water Code Section	Summary as Applies to UWMP	Subject	2020 Guidebook Location	2020 UWMP Location (Optional Column for Agency Review Use)
10642	Provide supporting documentation that the urban water supplier made the plan and contingency plan available for public inspection, published notice of the public hearing, and held a public hearing about the plan and contingency plan.	Plan Adoption, Submittal, and Implementation	Sections 10.2.2, 10.3, and 10.5	Chapter 10
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	Chapter 10
10642	Provide supporting documentation that the plan and contingency plan has been adopted as prepared or modified.	Plan Adoption, Submittal, and Implementation	Section 10.3.1	Chapter 10
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	Chapter 10

Water Code Section	Summary as Applies to UWMP	Subject	2020 Guidebook Location	2020 UWMP Location (Optional Column for Agency Review Use)
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 10.5	Chapter 10
10644(a)(2)	The plan, or amendments to the plan, submitted to the department shall be submitted electronically.	Plan Adoption, Submittal, and Implementation	Sections 10.4.1 and 10.4.2	Chapter 10
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	Chapter 10

Water Code Section	Summary as Applies to UWMP	Subject	2020 Guidebook Location	2020 UWMP Location (Optional Column for Agency Review Use)
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	Chapter 10
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	Chapter 2
10620(d)(2)	Coordinate the preparation of its plan with other appropriate agencies in the area, including other water suppliers that share a common source, water management agencies, and relevant public agencies, to the extent practicable.	Plan Preparation	Section 2.5.2	Chapter 2

Water Code Section	Summary as Applies to UWMP	Subject	2020 Guidebook Location	2020 UWMP Location (Optional Column for Agency Review Use)
10642	Provide supporting documentation that the water supplier has encouraged active involvement of diverse social, cultural, and economic elements of the population within the service area prior to and during the preparation of the plan and contingency plan.	Plan Preparation	Section 2.6	Chapter 2
10630.5	Each plan shall include a simple description of the supplier’s plan including water availability, future requirements, a strategy for meeting needs, and other pertinent information.	Summary	Chapter 1	Chapter 1
10631(a)	Describe the water supplier service area.	System Description	Section 3.1	Chapter 3
10631(a)	Describe the climate of the service area of the supplier.	System Description	Section 3.3	Chapter 3
10631(a)	Provide population projections for 2025, 2030, 2035, 2040 and optionally 2045.	System Description	Section 3.4	Chapter 3

Water Code Section	Summary as Applies to UWMP	Subject	2020 Guidebook Location	2020 UWMP Location (Optional Column for Agency Review Use)
10631(a)	Describe other social, economic, and demographic factors affecting the supplier’s water management planning.	System Description	Section 3.4	Chapter 3
10631(a)	Describe the land uses within the service area.	System Description	Section 3.5	Chapter 3
10631(a)	Indicate the current population of the service area.	System Description and Baselines and Targets	Sections 3.4 and 5.4	Chapter 3
10631(b)	Identify and quantify the existing and planned sources of water available for 2020, 2025, 2030, 2035, 2040 and optionally 2045.	System Supplies	Section 6.2.8	Chapter 6
10631(b)	Indicate whether groundwater is an existing or planned source of water available to the supplier.	System Supplies	Section 6.2	Chapter 6
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	System Supplies	Section 6.2	Chapter 6

Water Code Section	Summary as Applies to UWMP	Subject	2020 Guidebook Location	2020 UWMP Location (Optional Column for Agency Review Use)
	severe periods of drought.			
10631(b)(2)	When multiple sources of water supply are identified, describe the management of each supply in relationship to other identified supplies.	System Supplies	Section 6.1	Chapter 6
10631(b)(3)	Describe measures taken to acquire and develop planned sources of water.	System Supplies	Section 6.1	Chapter 6
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	System Supplies	Section 6.2.2	Chapter 6

Water Code Section	Summary as Applies to UWMP	Subject	2020 Guidebook Location	2020 UWMP Location (Optional Column for Agency Review Use)
	the plan or authorization.			
10631(b)(4)(B)	Describe the groundwater basin.	System Supplies	Section 6.2.2	Chapter 6
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	Chapter 6

Water Code Section	Summary as Applies to UWMP	Subject	2020 Guidebook Location	2020 UWMP Location (Optional Column for Agency Review Use)
10631(b)(4)(B)	For unadjudicated basins, indicate whether or not the department has identified the basin as a high or medium priority. Describe efforts by the supplier to coordinate with sustainability or groundwater agencies to achieve sustainable groundwater conditions.	System Supplies	Section 6.2.3	Chapter 6
10631(b)(4)(C)	Provide a detailed description and analysis of the location, amount, and sufficiency of groundwater pumped by the urban water supplier for the past five years	System Supplies	Section 6.2.4	Chapter 6
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	Chapter 6

Water Code Section	Summary as Applies to UWMP	Subject	2020 Guidebook Location	2020 UWMP Location (Optional Column for Agency Review Use)
10631(c)	Describe the opportunities for exchanges or transfers of water on a short-term or long-term basis.	System Supplies	Section 6.7	Chapter 6
10631(f)	Describe the expected future water supply projects and programs that may be undertaken by the water supplier to address water supply reliability in average, single-dry, and for a period of drought lasting 5 consecutive water years.	System Supplies	Section 6.8	Chapter 6
10631(g)	Describe desalinated water project opportunities for long-term supply.	System Supplies	Section 6.6	Chapter 6
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	Chapter 2

Water Code Section	Summary as Applies to UWMP	Subject	2020 Guidebook Location	2020 UWMP Location (Optional Column for Agency Review Use)
10631(h)	Wholesale suppliers will include documentation that they have provided their urban water suppliers with identification and quantification of the existing and planned sources of water available from the wholesale to the urban supplier during various water year types.	System Supplies	Section 2.5.1	Chapter 2
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	Chapter 6
10633(c)	Describe the recycled water currently being used in the supplier's service area.	System Supplies (Recycled Water)	Section 6.2	Chapter 6

Water Code Section	Summary as Applies to UWMP	Subject	2020 Guidebook Location	2020 UWMP Location (Optional Column for Agency Review Use)
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	Chapter 6
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	Chapter 6
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	Chapter 6
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	Chapter 6

<b>Water Code Section</b>	<b>Summary as Applies to UWMP</b>	<b>Subject</b>	<b>2020 Guidebook Location</b>	<b>2020 UWMP Location (Optional Column for Agency Review Use)</b>
10631(d)(1)	Quantify past, current, and projected water use, identifying the uses among water use sectors.	System Water Use	Section 4.2	Chapter 4
10631(d)(3)(A)	Report the distribution system water loss for for each of the 5 years preceding the plan update.	System Water Use	Section 4.3	Chapter 4
10631(d)(3)(C)	Retail suppliers shall provide data to show the distribution loss standards were met.	System Water Use	Section 4.2	Chapter 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	Chapter 4
10632(a)	Provide a water shortage contingency plan (WSCP) with specified elements below.	Water Shortage Contingency Planning	Chapter 8	Chapter 8
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	Chapter 8

Water Code Section	Summary as Applies to UWMP	Subject	2020 Guidebook Location	2020 UWMP Location (Optional Column for Agency Review Use)
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	Chapter 8
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	Chapter 8

Water Code Section	Summary as Applies to UWMP	Subject	2020 Guidebook Location	2020 UWMP Location (Optional Column for Agency Review Use)
10632(a)(3)(B)	Suppliers with an existing water shortage contingency plan that uses different water shortage levels must cross reference their categories with the six standard categories.	Water Shortage Contingency Planning	Section 8.3	Chapter 8
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	Chapter 8
10632(a)(4)(B)	Specify locally appropriate demand reduction actions to adequately respond to shortages.	Water Shortage Contingency Planning	Section 8.4	Chapter 8
10632(a)(4)(C)	Specify locally appropriate operational changes.	Water Shortage Contingency Planning	Section 8.4	Chapter 8

Water Code Section	Summary as Applies to UWMP	Subject	2020 Guidebook Location	2020 UWMP Location (Optional Column for Agency Review Use)
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	Chapter 8
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	Chapter 8
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	Chapter 8
10632(a)(5)(B) 10632(a)(5)(C)	Suppliers must describe that they will inform customers, the public and others regarding any shortage response actions triggered or anticipated to be triggered and other relevant communications.	Water Shortage Contingency Planning	Section 8.5, 8.6	Chapter 8

Water Code Section	Summary as Applies to UWMP	Subject	2020 Guidebook Location	2020 UWMP Location (Optional Column for Agency Review Use)
10632(a)(7)(A)	Describe the legal authority that empowers the supplier to enforce shortage response actions.	Water Shortage Contingency Planning	Section 8.7	Chapter 8
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	Chapter 8
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	Chapter 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	Chapter 8
10632(a)(8)(B)	Provide a description of mitigation actions needed to address revenue reductions and expense increases associated with	Water Shortage Contingency Planning	Section 8.8	Chapter 8

Water Code Section	Summary as Applies to UWMP	Subject	2020 Guidebook Location	2020 UWMP Location (Optional Column for Agency Review Use)
	activated shortage response actions.			
10632(a)(8)(C)	Describe the cost of compliance with Water Code Chapter 3.3: Excessive Residential Water Use During Drought.	Water Shortage Contingency Planning	Section 8.8	Chapter 8
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	Chapter 8

Water Code Section	Summary as Applies to UWMP	Subject	2020 Guidebook Location	2020 UWMP Location (Optional Column for Agency Review Use)
10632(a)(10)	Describe reevaluation and improvement procedures for monitoring and evaluation the water shortage contingency plan to ensure risk tolerance is adequate and appropriate water shortage mitigation strategies are implemented.	Water Shortage Contingency Planning	Section 8.10	Chapter 8
10632(b)	Analyze and define water features that are artificially supplied with water, including ponds, lakes, waterfalls, and fountains, separately from swimming pools and spas.	Water Shortage Contingency Planning	Section 8.11	Chapter 8
10620(f)	Describe water management tools and options to maximize resources and minimize the need to import water from other regions.	Water Supply Reliability Assessment	Section 7.4	Chapter 7

Water Code Section	Summary as Applies to UWMP	Subject	2020 Guidebook Location	2020 UWMP Location (Optional Column for Agency Review Use)
10634	Provide information on the quality of existing sources of water available to the supplier and the manner in which water quality affects water management strategies and supply reliability	Water Supply Reliability Assessment	Chapter 7	Chapter 7
10635(a)	Assess the water supply reliability during normal, dry, and multiple dry water years by comparing the total water supply sources available to the water supplier with the total projected water use over the next 20 years.	Water Supply Reliability Assessment	Section 7.3	Chapter 7
10635(b)	Provide a drought risk assessment as part of information considered in developing the demand management measures and water supply projects.	Water Supply Reliability Assessment	Section 7.3	Chapter 7

Water Code Section	Summary as Applies to UWMP	Subject	2020 Guidebook Location	2020 UWMP Location (Optional Column for Agency Review Use)
10635(b)(1)	Include a description of the data, methodology, and basis for one or more supply shortage conditions that are necessary to conduct a drought risk assessment for a drought period that lasts 5 consecutive years.	Water Supply Reliability Assessment	Section 7.3	Chapter 7
10635(b)(2)	Include a determination of the reliability of each source of supply under a variety of water shortage conditions.	Water Supply Reliability Assessment	Section 7.3	Chapter 7
10635(b)(3)	Include a comparison of the total water supply sources available to the water supplier with the total projected water use for the drought period.	Water Supply Reliability Assessment	Section 7.3	Chapter 7

Water Code Section	Summary as Applies to UWMP	Subject	2020 Guidebook Location	2020 UWMP Location (Optional Column for Agency Review Use)
10635(b)(4)	Include considerations of the historical drought hydrology, plausible changes on projected supplies and demands under climate change condition, anticipated regulatory changes, and other locally applicable criteria.	Water Supply Reliability Assessment	Section 7.3	Chapter 7
10631.2(a)	The UWMP must include energy intensity information as stated in the code.	System Suppliers, Energy Intensity	Section 6.4 and Appendix O	Chapter 6

## **APPENDIX G**

### **2020 UWMP DWR Guidebook**

#### Glossary

## Appendix G.

# Glossary of Terms, Acronyms, and Abbreviations

**AB** – Assembly Bill

**Act** – Urban Water Management Planning Act, California Water Code Division 6, Part 2.6. Also found as Appendix A of the 2020 UWMP Guidebook.

**AF** – Acre-Foot

**Baseline** – The average per capita water use for the following baseline periods and calculated in accordance with *Methodologies for Calculating Baseline and Compliance Urban Per Capita Water Use*, DWR 2011 (report updated in 2016):

- A 10-15 year continuous period used to calculate baseline daily per capita water use per Water Code Section 10608.20.
- A continuous 5-year period used to determine whether the 2020 urban water use target meets the legislation’s minimum water use reduction requirement per Water Code Section 10608.22.

**BMP** – Best Management Practice. A set of practices used by the California Urban Water Conservation Council and its members. The BMPs were historically identical to the Demand Management Practices (DMMs) found in the Water Code, but revisions to both the BMPs and the DMMs have now made them different sets of practices.

**CASGEM** – California Statewide Groundwater Elevation Monitoring Program. A program of regular and systematic monitoring in all of California's alluvial groundwater basins that relies and builds on established, local, long-term groundwater monitoring and management programs. DWR maintains the collected groundwater elevation data in a public database.

**Census Designated Place (CDP)** – A settled concentration of population, designated by the US Census, that is identifiable by name but not legally incorporated under the laws of the state.

**CII** – The combination of commercial, institutional, and industrial water use sectors.

**CIMIS** – California Irrigation Management Information System. A network of automated weather stations that provide real time weather data to estimate reference evapotranspiration (ET<sub>o</sub>). The stations are owned and operated cooperatively between the California Department of Water Resources and local agencies.

**Compliance Daily per Capita Water Use/ Compliance GPCD** – The gross water use during the final year of the reporting period, reported in gallons per capita per day. 2020 is the compliance year due in this UWMP. This term is used in the context of SB X7-7, The Water Conservation Act of 2009.

**CWC** – California Water Code

**Disadvantaged Community** – A community with an annual median household income that is less than 80 percent of the statewide annual median household income.

**Distribution System** – Water distribution systems are generally large networks of pipes that deliver water for municipal purposes. Transmission canals and pipelines not used for delivering water directly to retail customers should not be included as part of the distribution system.

**DMMs** – Demand Management Measures. Measures listed in the California Water Code that are used by water suppliers for managing water demand. The DMMs were historically identical to the Best Management Practices (BMPs) found in the CUWCC MOU, but revisions to both the DMMs and the BMPs have now made them different sets of practices.

**DOF** – Department of Finance. DOF provides population estimates for cities and CDPs for inter- censal years (years between the census years).

**DWR** – Department of Water Resources

**eARDWP or eAR**– electronic Annual Reports to the Drinking Water Program. Every

public water system is required to submit these annual reports to the Division of Drinking Water specifying contact and operational information for the prior calendar year.

**ERP** – Emergency Response Plan

**Exchanges** – Water exchanges are typically water deliveries by one water user to another water user, with the receiving water user returning the water at a specified time, or when the conditions of the parties’ agreement are met. Water exchanges can be strictly a return of water on a basis agreed upon by the participants or can include payment and the return of water. For purposes of UWMP reporting, this is considered a “Wholesale Use,” even if the agency is not considered a wholesale water agency as per the definition in Water Code 10608.12 (p) and (r). Suppliers will make their own determination as to whether water sent to another agency is a sale, transfer, or exchange.

**GIS** – Geographic Information System. A system used for storing, manipulating, analyzing, and presenting geographical information electronically on a computer. A computer based mapping system.

**GPCD** – Gallons per Capita per Day. The unit of measure used for reporting baseline and target per capita water consumption. This term is used in the context of SB X7-7, The Water Conservation Act of 2009.

**Gross Water Use** – The volume of water entering a supplier’s distribution system over a 12 month period. This volume may be adjusted based on changes in system storage, sales to other agencies, recycled water use, agricultural water use, and industrial process water use. This term is used in the context of SB X7-7, The Water Conservation Act of 2009.

**GSP** - groundwater sustainability plan

**HOA** – Homeowners’ association

**Hydrologic Region** – A geographical division of the state based on the local hydrologic basins. The California Department of Water Resources divides California into 10 hydrologic regions that correspond to the state’s major water drainage basins: North Coast, North Lahontan, Sacramento River, San Francisco Bay, Central Coast, San Joaquin River, Tulare Lake, South Coast, South Lahontan, and Colorado River.

**Interim Urban Water Use Target** – The 2015 urban water use target that is the midpoint between the supplier's 10-15 year baseline GPCD and their 2020 target GPCD. 2015 UWMPs will compare the interim water use target to the actual water use of 2015. This term is used in the context of SB X7-7, The Water Conservation Act of 2009.

**IRWM** – Integrated Regional Water Management. A collaborative effort to manage all aspects of water resources in a region by the application of integrated water management (IWM) principals at a regional scale.

**LAFCO** – Local Agency Formation Commission

**Legislature** – State of California Legislature

**Lower Income** – Persons and families whose income does not exceed the qualifying limits for lower income families as established and amended from time to time pursuant to Section 8 of the United States Housing Act of 1937. In the event the federal standards are discontinued, the department shall, by regulation, establish income limits for lower income households for all geographic areas of the state at 80 percent of area median income, adjusted for family size and revised annually.

**Methodologies** – A shortened term for the publication *Methodologies for Calculating Baseline and Compliance Urban Per Capita Water Use (For the Consistent Implementation of the Water Conservation Act of 2009)*. DWR 2016. The Water Conservation Act of 2009 (also known as SB X7-7) directed DWR to develop these technical methodologies and criteria to ensure the consistent implementation of the Act and to provide guidance to urban retail water suppliers in calculating and reporting their baseline and compliance water use.

**MOU** – Memorandum of Understanding – In the context of Urban Water Management Plans, this term refers to the CUWCC MOU entitled “Memorandum of Understanding Regarding Urban Water Conservation in California”. CUWCC 2011.

**NAICS** – North America Industry Classification System

**NOAA** – National Oceanic and Atmospheric Administration. A federal agency focused on the condition of the oceans and atmosphere. NOAA provides weather data that may be useful to urban water suppliers when describing the climate of their service area.

**NPDES** – National Pollutant Discharge Elimination System. A permitting program to

control national water pollution. The program is administered by the United States Environmental Protection Agency at the federal level and by the State Water Resources Control Board at the California State level.

**P-NP** - Potable/Non-Potable

**Plan** – Urban Water Management Plan or UWMP.

**Potable Water** – Water intended for human consumption, delivered through a Public Water System, and regulated by a State or local health agency.

**Public Water Systems** – A system for the provision of water for human consumption through pipes or other constructed conveyances that has 15 or more service connections or regularly serves at least 25 individuals daily at least 60 days out of the year. Public water systems are regulated by the State Water Resources Control Board, Drinking Water Program.

**Raw Water** – Water that is untreated and used in its natural state. This may also be called “Source Water.” Some urban water agencies supply raw water to customers for non-potable uses.

**Recycled Water** – Municipal wastewater that has been treated to a specified quality, enabling it to be reused for a beneficial purpose.

**Regional Alliance** – A regional water management group that specifically addresses the requirements of the Water Conservation Act of 2009 (SB X7-7), that is, planning, reporting, and complying as an Alliance with 2015 and 2020 water use targets.

**Regional UWMP** – A UWMP that addresses all the requirements of the Water Code that pertain to urban water management, but not necessarily addressing the requirements of SB X7-7. Within the RUWMP agencies may elect to determine and report targets and baselines (SB X7-7 Water Conservation Act of 2009) on a regional basis through the formation of a Regional Alliance.

**Retail Water Use/Demand** – The sale of water directly to customers for end use. These include, single family, multi-family, landscape, or CII. The following sectors may be reported as either a

wholesale or retail demand, the determination is made by the supplier: Groundwater recharge, saline intrusion barrier, agricultural, wetlands or wildlife habitat.

**rGPCD** – Residential Gallons per Capita per Day. This is used in drought reporting to SWRCB for purposes of complying with the Governor’s drought declarations and executive orders in 2014 and 2015 (as of the publication of this Guidebook) and is solely the estimated residential water use in a service area divided by population. This differs from the GPCD used in UWMPs, which is the total water use within a service area divided by the population.

**SB** – Senate Bill

**SB X7-7** – The Water Conservation Act of 2009 that provides for a 20% statewide reduction of urban per capita water use by the year 2020. The Act includes requirements for determining baselines and targets, among other things. The complete text is found in Appendix A of the 2020 UWMP Guidebook.

**SB X7-7 Verification Form** – A set of tables that present the calculations used by a retail supplier or Regional Alliance for developing baselines and targets. These tables are required for retail suppliers and Regional Alliances. These tables are presented in Appendix E of the 2020 UWMP Guidebook.

**Sectors** – Classifications of water use that are clearly distinct from other water uses.

**SGMA** – Sustainable Groundwater Management Act of 2014. Three legislative bills that provide a framework for long-term sustainable groundwater management. Local and regional authorities will form Groundwater Sustainability Agencies (GSAs) that oversee the preparation and implementation of a local Groundwater Sustainability Plan. More information can be found at <http://water.ca.gov/groundwater/sgm/index.cfm>

**Standardized Tables** – DWR has specified the use of standardized tables for reporting UWMP data. Use of these tables is required in the 2020 UWMP, to the extent that the information is available. However, water agencies may include the standardized tables in an appendix and present adapted versions of the standardized tables in the body of the Plan, if that is better adapted to the agency’s records and/or better reflects the information available to the agency. The standardized tables are found in Appendix E of the UWMP Guidebook.

**State Water Board** – State Water Resources Control Board

**Supplier** – Term used to refer to urban water suppliers.

**Surface Water Augmentation** – The planned placement of recycled water into a surface water reservoir that is used as a source of domestic drinking water supply. (Used in Chapter 6).

**SWRCB** – State Water Resources Control Board. A state agency whose mission is to preserve, enhance, and restore the quality of California’s water resources and drinking water for the

protection of the environment, public health, and all beneficial uses, and to ensure proper water resource allocation and efficient use, for the benefit of present and future generations. Some key programs that are managed by SWRCB that pertain to UWMPs include: Emergency Drought Regulations, Drinking Water Program, Wastewater, and Water Recycling.

**Target** – The target per capita water use calculated for 2020 and 2015 as per *Methodologies for Calculating Baseline and Compliance Urban Per Capita Water Use*, DWR 2011. This term is used in the context of SB X7-7, The Water Conservation Act of 2009.

**Target Method** – The water supplier selects one of four different target methods when determining their 2020 Urban Water Use Target. See the *Methodologies* document (DWR 2016) and Appendix E, SB X7-7 Verification Form for details. This term is used in the context of SB X7-7, The Water Conservation Act of 2009.

**Transfers** – The Water Code defines a water transfer as a temporary or long-term change in the point of diversion, place of use, or purpose of use due to a transfer, sale, lease, or exchange of water or water rights. A water transfer can be a temporary or permanent sale of water or a water right by the water right holder, a lease of the right to use water from the water right holder, or a sale or lease of a contractual right to water supply. Water transfers can also take the form of long-term contracts for the purpose of improving long-term supply reliability. For purposes of UWMP reporting, this is considered a “Wholesale Use,” even if the agency is not considered a wholesale water supplier as per the definition in Water Code 10608.12 (p) and (r). Agencies will make their own determination as to whether water sent to another agency is a sale, transfer, or exchange.

**Urban Retail Water Supplier** – 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. The terms “Water Supplier” and “Water Agency” are used interchangeably in this guidebook.

**UWMP** – Urban Water Management Plan

**Urban Wholesale Water Supplier** – 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.

**Water Agency** – This term can refer to either an urban retail water supplier or an

urban wholesale water supplier. The guidebook will explicitly state whether retail or wholesale, unless it is clear by the context surrounding the term. The terms “water agency” and “water supplier” are used interchangeably in the Water Code.

**Water Code** – California Water Code

**Water demand/use** – Water conveyed through a distribution system that is used by a water agency and its customers for any purpose, including non-potable water uses, water losses, and other non-revenue water. For purposes of the Guidebook, the terms “Water Demand” and “Water

Use” will be used interchangeably and refer to all the demand sectors listed in Section 4.2.

**Water Supplier** – This term can refer to either an urban retail water supplier or an urban wholesale water supplier. The guidebook will either explicitly state whether retail or wholesale, unless it is clear by the context surrounding the term. The terms “Water Agency” and “Water Supplier” are used interchangeably in this guidebook.

**Water Use Sector** – Classifications of water use that are clearly distinct from other water uses.

**WDR** – Waste Discharge Requirement. A Program managed by SWRCB that regulates point discharges that are exempt pursuant to Subsection 20090 of Title 27 and not subject to the Federal Water Pollution Control Act, (e.g., sewage, wastewater) that meet and continue to meet, the preconditions listed for each specific exemption.

**Wholesale Water Use/Demand** – Generally large quantities of water not for municipal end uses. Wholesale uses include: Sales, transfers, or exchanges to other agencies. The following sectors may be reported as either a wholesale or retail demand, the determination is made by the supplier: Groundwater recharge, saline intrusion barrier, agricultural, wetlands or wildlife habitat.

**WRR** – Water Recycling (or Reuse) Requirement established by a Regional Water Quality Control Board.

**WSCP** – Water Shortage Contingency Plan. A strategic plan developed by and for a water supplier to prepare and respond to water shortages. The Water Code provides specific requirements for a WSCP and Chapter 8 of the 2020 UWMP Guidebook provides guidance and standardized tables for reporting a WSCP in a UWMP.

**WUEdata Portal** – Water Use Efficiency Data Portal, used for submitting electronic UWMPs and associated data to DWR.

**WWTP** – Waste Water Treatment Plant

## **APPENDIX H**

### **2020 UWMP DWR Guidebook**

#### References

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## **APPENDIX I**

### **2020 UWMP DWR Guidebook**

#### Considering Climate Change Impacts

City of Patterson 2020 UWMP – Section 4.5 Herein  
City of Patterson – General Plan Climate Change Report  
Westside-San Joaquin IRWMP – Climate Change Section

**APPENDIX 5.7B**  
**CLIMATE CHANGE SUMMARY REPORT**

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# CITY OF PATTERSON GENERAL PLAN UPDATE CLIMATE CHANGE SUMMARY REPORT



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**CITY OF PATTERSON  
GENERAL PLAN UPDATE  
CLIMATE CHANGE SUMMARY REPORT**

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<b>AB</b>	Assembly Bill
<b>BAU</b>	Business as Usual
<b>BPS</b>	Best Performance Standards
<b>CAP</b>	Climate Action Plan
<b>CARB</b>	California Air Resources Board
<b>CCAR</b>	California Climate Action Registry
<b>CEC</b>	California Energy Commission
<b>CO<sub>2e</sub></b>	Carbon Dioxide Equivalent
<b>COP</b>	Conference of Parties (Copenhagen 2009)
<b>EIR</b>	Environmental Impact Report
<b>EPA</b>	U.S. Environmental Protection Agency
<b>GHG</b>	Greenhouse Gas
<b>IPCC</b>	International Panel on Climate Change
<b>OPR</b>	California Governor's Office of Planning and Research
<b>SB</b>	Senate Bill



This technical report is a supplement to the City of Patterson's General Plan Environmental Impact Report (EIR) that analyzes the General Plan's impact on climate change. This report is intended to support the EIR and help the EIR sufficiently address climate change. By informing the EIR's analysis of climate change, the Climate Change Summary Report facilitates the EIR's use as a tiering document under the California Environmental Quality Act (CEQA) for purposes of climate change.

**Section II (Introduction)** explains that the purpose of this report is for inclusion in the EIR. More generally, this section also articulates the link between this report and the General Plan as a whole.

**Section III (Climate Change Overview)** synthesizes the general context of climate change. It provides an overview of the basic science of climate change and identifies anticipated statewide impacts that can affect the City of Patterson. The section also assesses the regulatory framework of climate change, including relevant legislation, CEQA guidance, litigation, and direction from the California Air Resources Board and the San Joaquin Valley Air Pollution Control District. These multiple factors necessitate that the EIR address climate change. Thus, this section explains the creation and purpose of this technical report.

**Section IV (Addressing Climate Change Through the General Plan and General Plan EIR)** explains in further detail the nexus to the EIR and how the technical report addresses climate change. Specifically, this section explains that the report identifies and quantifies the emissions for each of the three General Plan scenarios, establishes reduction targets, and quantifies the impact of General Plan policies on emissions projections. Through this approach, the report is able to demonstrate the City's efforts to mitigate its impact on climate change. This section further details how the EIR, through use of this report, will function as a CEQA tiering document for the purposes of climate change. Lastly, this section articulates the distinction between the EIR and the Climate Action Plan (CAP) called for by the General Plan. It explains the relationship between the two and clarifies how the CAP will serve as the implementation document for climate change mitigation.

**Section V (Emissions Inventory, Projections, and Reduction Measures)** provides the backbone of the report: the technical quantifications that demonstrate the City's impact on climate change and the General Plan's mitigation of those impacts. First, the section provides the community-wide greenhouse gas (GHG) emissions inventory for the baseline year of 2009. Emissions generated by each sector are provided, and technical explanations detail how each calculation was derived. Emissions by sector are provided below in **Table I-1**. Transportation caused the majority of all greenhouse gas (GHG) emissions, emitting over 60 percent of total emissions in 2009.

## I. EXECUTIVE SUMMARY

**TABLE I-1  
COMMUNITY-WIDE GHG EMISSIONS BY SECTOR, 2009**

2009 Baseline Greenhouse Gas Emissions	Metric Tons CO <sub>2</sub> e <sup>1</sup>	Percentage of Total
Residential	34,696	12.1%
Commercial/Industrial	69,616	24.3%
Transportation	179,885	62.7%
Waste	2,807	1.0%
<b>Total</b>	<b>287,003</b>	<b>100.0%</b>

Note: Due to rounding, totals and percentages may exceed amounts depicted here.

Second, emissions forecasts are created for each of the three planning scenarios for 2030 and 2050. These forecasts depict anticipated emissions that would occur as a result of buildout, operating under business-as-usual conditions. Business as usual assumes no behavior change or policies or programs to reduce greenhouse gas emissions are implemented. Detailed explanations specify the methodology by which these forecasts were developed. The same forecast methodology was used for each scenario. Variations in emissions projections are due to variations in projected residential and nonresidential uses for the target years. A summary of business-as-usual projections is provided below in **Table I-2**.

**TABLE I-2  
BUSINESS-AS-USUAL FORECASTS**

GHG Business-as- Usual Forecast	CD		JE		PC	
	2030 Forecast	2050 Forecast	2030 Forecast	2050 Forecast	2030 Forecast	2050 Forecast
Residential Electricity	49,818	62,439	51,652	72,825	71,299	84,128
Residential Natural Gas	37,704	47,256	39,092	55,116	53,962	63,671
Commercial/ Industrial Electricity	128,700	148,734	152,235	166,332	146,591	164,317
Commercial/ Industrial Natural Gas	79,407	91,768	93,928	102,625	90,445	101,382
Transportation	419,259	598,187	579,254	794,996	463,979	673,828
Waste	6,130	7,604	6,324	8,816	8,514	10,031
<b>Subtotal Energy Emissions</b>	<b>295,628</b>	<b>350,197</b>	<b>336,908</b>	<b>396,898</b>	<b>362,297</b>	<b>413,498</b>
<b>Total</b>	<b>721,017</b>	<b>955,988</b>	<b>922,486</b>	<b>1,200,710</b>	<b>834,790</b>	<b>1,097,357</b>

Note: CD = Compact Development, JE = Jobs Emphasis, PC = Planning Commission Environmental Review Plan

\*All data is in metric tons of CO<sub>2</sub>e

<sup>1</sup> Carbon dioxide equivalent (CO<sub>2</sub>e) is the common unit of measurement for greenhouse gases. This unit of measurement accounts for the varying global warming potentials of the greenhouse gases.

Upon creation of these forecasts, the report provides emissions reduction targets that comply with state direction. Lastly, this section quantifies anticipated reductions in emissions resulting from implementation of General Plan policies and state actions. These actions demonstrate the City’s progress in achieving reduction targets. The methodology and reductions achieved through each action are detailed. Total reductions are provided below in **Table I-3**. This section demonstrates that General Plan policies and state actions mitigate the City’s impact on climate change, but alone are insufficient to meet the City’s reduction targets. However, such early actions demonstrate the City’s commitment to climate change and provide a roadmap for future actions in a CAP.

Lastly, in **Section VI (Next Steps)**, the report summarizes next steps and the necessary links that will ensure the City is sufficiently utilizing this information to address climate change. Specifically, the Climate Change Summary Report concludes with **Table VI-9** (also shown below as **Table I-3**), which details the numeric gap between reductions achieved and reduction targets. The difference between the two represents the reductions that must be achieved through the CAP if the City is to meet its reduction targets.

**TABLE I-3  
COMPARISON OF FUTURE GHG SCENARIOS WITH REDUCTION TARGETS**

Scenario	Reductions*	2009	2030		2050	
		Baseline	Business as Usual	With CAP & State	Business as Usual	With CAP & State
<b>Reduction Targets (as a Percentage Reduction of Baseline Emissions)</b>				<b>-15%</b>		<b>-42%</b>
CD	Total Emissions	287,004	721,017	401,602	955,988	371,631
	Percentage Increase from Baseline Emissions	0.00%	151.22%	39.93%	233.09%	29.49%
	Actual Percentage Reduction from Business-as-Usual Forecast			<b>55%</b>		<b>44%</b>
JE	Total Emissions	287,004	922,486	511,397	1,200,710	410,791
	Percentage Increase from Baseline Emissions	0.00%	221.42%	78.18%	318.36%	43.13%
	Actual Percentage Reduction from Business-as-Usual Forecast			<b>93%</b>		<b>58%</b>
PC	Total Emissions	287,004	834,790	468,599	1,097,357	343,337
	Percentage Increase from Baseline Emissions	0.00%	190.86%	63.27%	282.35%	19.63%
	Actual Percentage Reduction from Business-as-Usual Forecast			<b>78%</b>		<b>35%</b>

Note: CD = Compact Development, JE = Jobs Emphasis, PC = Planning Commission Environmental Review Plan  
\*All data is in metric tons of CO<sub>2</sub>e



## II. INTRODUCTION

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This report is being prepared for the purpose of inclusion in the City's General Plan EIR. The report identifies significant issues related to climate change within the City of Patterson and mitigations to reduce the impacts of the City on climate change while also proposing mitigations that allow the City to adapt to the impacts of climate change.

This document will be used as a technical document to inform the completion of the climate change section of the EIR. It encompasses General Plan goals and policies and current and future efforts to reduce greenhouse gas (GHG) emissions and reduce the effects of global climate change. The report is intended to facilitate the EIR's examination of the potential impacts from GHG emissions associated with the three development scenarios under the City of Patterson General Plan Update. The California Environmental Quality Act (CEQA) requires that lead agencies consider the reasonably foreseeable adverse environmental effects of projects they are considering for approval. Emissions of greenhouse gases have the potential to adversely affect the environment because such emissions contribute, on a cumulative basis, to global climate change. In turn, global climate change has the potential to cause increased risk of wildfires; affect rain- and snowfall, leading to changes in water supply; affect habitat, leading to adverse effects on biological resources; and lead to other adverse environmental effects.

Cumulative impacts are the collective impacts of one or more past, present, and future projects, that, when combined, result in adverse changes to the environment. When the adverse change is substantial, the cumulative impact is considered significant. The cumulative project list for this issue (global climate changes) comprises anthropogenic (i.e., man-made) GHG emission sources across the entire globe. No project alone would cause noticeable incremental change to the global climate. However, legislation and executive orders on the subject of climate change in California have established a statewide context for and an enforceable statewide cap on GHG emissions. Given the nature of environmental consequences from GHGs and global climate change, CEQA requires the evaluation of the cumulative impacts of GHGs. Even relatively small (on a global basis) additions need to be considered, and small contributions to this cumulative impact (from which significant effects are occurring and are expected to worsen over time) may be potentially considerable (and therefore, significant). Thus, the City of Patterson is analyzing GHG emissions through the process established by CEQA.



#### A. CLIMATE CHANGE ESSENTIALS

Awareness of climate change and global warming has increased significantly in recent years. Although used interchangeably, there is a difference between the terms “climate change” and “global warming.” According to the National Academy of Sciences, climate change refers to any significant, measurable change of climate lasting for an extended period. It can be caused by natural factors and human activities alike. Global warming, on the other hand, is an average increase in the temperature of the atmosphere caused by increased greenhouse gas emissions from human activities. The use of the term *climate change* is becoming more prevalent because it encompasses all changes to the climate, not just temperature. The term *climate change* is used throughout this report.

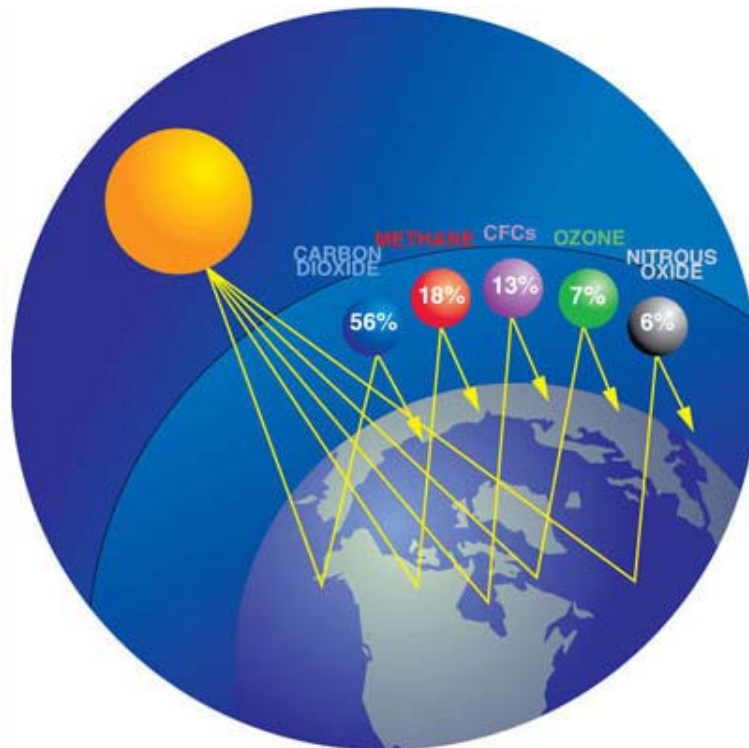
Climate change is now a widely accepted fact among scientists, with the only uncertainty remaining about how climate change will affect the earth’s systems over time. Although much of the attention to the topic is global in scale, it is important to realize that climate change affects every community at the local level.

To fully understand climate change, it is important to recognize the naturally occurring “greenhouse effect” and to define the greenhouse gases (GHG) that contribute to this phenomenon. Our planet relies on the natural greenhouse effect. This effect results when the atmosphere captures heat that radiates away from the earth toward space. By retaining heat and warming the planet’s surface, life on earth is possible. Several gases in the atmosphere function as barriers and trap heat within the planet’s atmosphere, including water vapor, carbon dioxide, methane, nitrous oxides, and chlorofluorocarbons. These gases function similar to glass on a greenhouse; the glass panes of a greenhouse allow sunlight to pass into the building but trap heat within it, preventing heat from escaping.<sup>2</sup> (Refer to **Figure III-1.**) GHGs are often referred to in metrics of “carbon dioxide equivalents” (CO<sub>2</sub>e) as a way to equalize the different potencies of the six internationally recognized greenhouse gases (carbon dioxide, methane, nitrous oxides, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride). For example, methane (CH<sub>4</sub>) has 21 times the potency of carbon dioxide (CO<sub>2</sub>); therefore, 1 metric ton of methane is equivalent to 21 metric tons of CO<sub>2</sub>.

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<sup>2</sup> NASA 2009.

**FIGURE III-1  
THE GREENHOUSE EFFECT**



Greenhouse gases are transparent to certain wavelengths of the sun's radiant energy, allowing them to penetrate deep into the atmosphere or all the way to the earth's surface. Clouds, ice caps, and particles in the air reflect about 30 percent of this radiation, but oceans and land masses absorb the rest (70 percent of the radiation received from the sun) before releasing it back toward space as infrared radiation. Greenhouse gases and clouds effectively prevent some of the infrared radiation from escaping; they trap the heat near the earth's surface where it warms the lower atmosphere. If this natural barrier of atmospheric gases were not present, the heat would escape into space and the earth's average global temperatures could be as much as 61 degrees Fahrenheit cooler.<sup>3</sup>

While the greenhouse effect is a natural process, humans have accelerated the generation of greenhouse gas emissions beyond natural levels. This overabundance of greenhouse gases has led to a dangerous acceleration of the warming of the earth. There is an international consensus that humans have caused the emission of dangerous levels of greenhouse gases. These greenhouse gases are impacting the planet's climate system and posing dangerous large-scale threats to the planet and humanity at large. Climate change will impact all facets of life. Many of its effects are irreversible and are already impacting communities around the world. The Intergovernmental Panel on Climate Change's (IPCC) Fourth Assessment Report's Working Group I Summary for Policymakers synthesizes current scientific understanding of global climate change and projects future climate change using the most comprehensive set of well-

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<sup>3</sup> NASA 2009.

established global climate models.<sup>4</sup> The report incorporates findings of the current effects of global climate change. These findings include:

- The intensity of tropical cyclones (hurricanes) in the North Atlantic has increased over the past 30 years, which correlates with increases in tropical sea surface temperatures.
- Droughts have become longer and more intense and have affected larger areas since the 1970s, especially in the tropics and subtropics.
- Since 1900 the Northern Hemisphere has lost 7 percent of the maximum area covered by seasonally frozen ground.
- Mountain glaciers and snow cover have declined worldwide.
- Satellite data since 1978 show that the extent of Arctic sea ice during the summer has shrunk by more than 20 percent.
- Since 1961, the world's oceans have been absorbing more than 80 percent of the heat added to the climate, causing ocean water to expand and contributing to rising sea levels. Between 1993 and 2003, ocean expansion was the largest contributor to sea level rise.
- Melting glaciers and losses from the Greenland and Antarctic ice sheets have also contributed to recent sea level rise.

As asserted in the IPCC Fourth Assessment Report, if trends remain unchanged, continued GHG emissions at or above current rates will induce further warming changes in the global climate system that will exceed trends observed to date and pose even greater risks than those currently witnessed.<sup>5</sup> Recent statements in 2010 by the IPCC reaffirm the scientific basis and certitude of the scientific foundation of anticipated climate change impacts and trends.<sup>6</sup> The IPCC itself does not generate new scientific research, but rather it serves as the final climate change checking point for all scientific work related to climate change. The role of the IPCC is to assess on a comprehensive, objective, open, and transparent basis the scientific, technical, and socioeconomic information relevant to understanding the scientific basis of risk of human-induced climate change, its potential impacts, and options for adaptation and mitigation. Essentially, the IPCC assesses and synthesizes scientific publications, the majority of which are peer-reviewed and edited publications that "provide an important foundational stage of quality control."<sup>7</sup> Work produced by the IPCC has become the "international gold standard in scientific assessments of climate change," which is constructed through the work of thousands of unpaid scientists that contribute to each report, the members of the IPCC (the world's national governments), and its elected leadership.<sup>8</sup> The work produced by the IPCC on climate change has "served the international community effectively for over 20 years. The conclusions of the IPCC assessment reports, and especially the Fourth Assessment Report, are as solid as careful

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<sup>4</sup> IPCC 2007.

<sup>5</sup> 2007.

<sup>6</sup> See IPCC 2010b and c.

<sup>7</sup> IPCC 2010c.

<sup>8</sup> Ibid.

### III. CLIMATE CHANGE OVERVIEW

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science can make them. They reflect the current state of knowledge about one of the most complex and important of all topics — climate change science. The scientific community still has much more to learn about climate change. But the scientific community and the world can count on the IPCC to provide an accurate picture of what is known and what is not known.”<sup>9</sup> On March 13, 2010, over 250 scientists signed an open letter that was sent to U.S. federal agencies reaffirming the consensus on climate change and veracity of IPCC findings. In this letter, scientists regret the sensationalist overexaggerations of minor IPCC errors and assert the ultimate legitimacy of climate change while providing procedures for refinement in an enhanced assessment approach. Primary signatories to this document include scientists from Yale, Stanford, the NASA Goddard Institute for Space Studies and Columbia University, and Pennsylvania State University.<sup>10</sup>

Given the scientific basis of basic climate change facts and expected trends, the challenge remains to prepare for and mitigate climate change through deliberate action. Efforts to address climate change are constantly unfolding, but existing commitments and programs have fallen short of climate change benchmarks. World leaders convened in December 2009 to participate in the intergovernmental United Nations Climate Change Conference in Copenhagen. This negotiating process on climate change consisted primarily of the Conference of Parties to the United Nations Framework Convention on Climate Change (COP); it was one instance of a yearly occurrence to review implementation of the COP. The COP adopts decisions and resolutions, and establishes rules for its practical and effective implementation — ultimately, the reduction of GHG emissions.<sup>11</sup> It provides the international framework for action to address climate change. At the 2009 conference in Copenhagen, 60 developed and developing economies pledged to reduce GHG emissions. However, according to a report released by the United Nations Environmental Programme (UNEP) in February 2010, these pledges are insufficient to restrict a rise in global temperatures to 2 degrees Celsius or less in 2050.<sup>12</sup> The 2-degree temperature cap by 2050 is acknowledged by UNEP to be the goal that will better ensure that the most catastrophic impacts of climate change are averted. UNEP estimates that to achieve this aim, between 2020 and 2050, global emissions will have to drop between 48 and 72 percent; this translates into a target of cutting GHG emissions by approximately 3 percent per year between 2020 and 2050.<sup>13</sup>

Adaptation or mitigation alone cannot avoid all of the anticipated impacts of climate change, but in coordination, these two strategies can complement each other and reduce climate change risks.<sup>14</sup> The burden to implement these strategies falls to governments. In receiving this burden, governments also are faced with tremendous opportunity: acting on these strategies yields both mitigation and economic benefits.

#### B. IMPACTS OF CLIMATE CHANGE

California is already experiencing the impacts of climate change. Climate change has exacerbated existing deficiencies in infrastructure and sensitivities of natural resources. Research suggests that the state will experience hotter and drier conditions, reductions in winter snow and

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<sup>9</sup> Ibid.

<sup>10</sup> Open Letter from U.S. Scientists on the IPCC, March 13, 2010.

<sup>11</sup> UNFCCC 2010.

<sup>12</sup> February 23, 2010.

<sup>13</sup> Ibid.

<sup>14</sup> Ibid.

increases in winter rains, sea level rise, and an increased occurrence of extreme weather events. Such compounded impacts will impact economic systems throughout the state; for instance, these changes are expected to affect the viability of agriculture in California. Reductions in crop production and water for irrigation could create food shortages and disrupt local and regional commodity systems.<sup>15</sup> To refrain from action is costly and risky; the 2009 California Climate Adaptation Strategy estimates that no action to address the impacts of climate change will lead to sector-wide losses of “ ‘tens of billions of dollars per year in direct costs’ and ‘expose trillions of dollars of assets to collateral risk.’ ” Further, \$2.5 trillion of the state’s \$4 trillion in real estate assets is at risk from “extreme weather events, sea level rise, and wildfires.”<sup>16</sup>

Risks from climate change are summarized in the following sections and linked to Patterson’s unique context. It is essential that such risks be understood and addressed as part of the local planning process. As asserted by the California Natural Resources Agency:

*The most effective adaptation strategies relate to short- and long-term decisions. Most of these decisions are the responsibility of local community planning entities. As a result, communities with General Plans and Local Coastal Plans should begin, when possible, to amend their plans to assess climate change impacts, identify areas most vulnerable to these impacts, and develop reasonable and rational risk reduction strategies using the CAS [Climate Adaptation Strategy] as guidance. Every effort will be made to provide tools, such as interactive climate impact maps, to assist in these efforts.*<sup>17</sup>

Consistent with this guidance, this Climate Change Summary Report draws on the Climate Adaptation Strategy and the most recently available tools and information, connecting them to locally relevant issues within the city. Utilizing the strategies provided by the California Climate Adaptation Strategy (2009), this section identifies anticipated statewide risks and local considerations for resiliency or adaptation.

In understanding local risks, the City is limited by the nature of the field of climate science: the anticipated impacts of climate change are based on scientific findings that are grounded in reality, but at best provide only ranges of quantitative estimates of impacts. Many impacts and risks can only be addressed in general and qualitative terms and are largely scenario-dependent.<sup>18</sup> Further, state and other entities are currently in the process of developing and refining tools that can help jurisdictions understand local risks and impacts with greater specificity. That these impacts can be expected is testified to by a strong scientific foundation; however, the scale and severity of these impacts is still uncertain and will be determined by unfolding trends, trends that are still only largely understood at larger, regional or statewide scales.

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<sup>15</sup> California Natural Resources Agency 2009.

<sup>16</sup> Ibid; citing a 2008 report by the University of California, Berkeley and the nonprofit organization Next 10, available at [www.next10.org/research/research\\_ccrr.html](http://www.next10.org/research/research_ccrr.html).

<sup>17</sup> California Natural Resources Agency 2009.

<sup>18</sup> Schaaf & Wheeler 2009.

### III. CLIMATE CHANGE OVERVIEW

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#### B.1 INCREASED RATE OF WILDFIRES

##### Risks

Wildfire risk is based on a combination of factors including precipitation, winds, temperature, and vegetation. These factors will be impacted by increased warming. Wildfires are likely to grow in number and size throughout the state as a result of increased temperatures induced by climate change. Even under the “medium” warming scenario predicted by the Intergovernmental Panel on Climate Change (IPCC), wildfire risk will likely increase by 55 percent in California.<sup>19</sup>

Further, as wildfires increase in frequency and size, they will also increase in intensity.<sup>20</sup> The factors which contribute to the risk of catastrophic fires (fuel loads, high temperatures, dry conditions, and wind) are typically present already in summer and fall seasons in California, but can exist at other times of the year, especially in drought conditions, and are likely to be exacerbated by climate change.

##### Considerations for Resiliency

According to the General Plan Background Report, the City of Patterson has an insufficient fire protection service to satisfy City-established thresholds of fire preparedness.<sup>21</sup> The added urgency of climate change and its augmentation of existing fire risks provide even further impetus for the City to address this deficiency.

Fire protection services to lands within city limits are provided by the Patterson Fire Department, while fire protection to lands in the larger General Plan planning area are provided by the Patterson Fire Department in conjunction with the West Stanislaus Fire District. These are volunteer fire departments that share a full-time fire chief and station in Patterson. According to the Insurance Services Office rating system, the Patterson Fire Department has a ranking of 6 within city limits and ~9 outside city limits. These ratings are based on fire department location, personnel, and equipment. The City-established ratio of desired firefighters per 1,000 population is 4.7, with 1 to 1.25 of the 4.7 firefighters serving as full-time fire protection personnel. As of 2006, to provide the protection required for buildout of the 1992 General Plan, approximately 40 additional firefighters would have been needed.<sup>22</sup> This buildout scenario is significantly smaller than the adopted buildout scenario under the 2010 General Plan.

#### B.2 NEGATIVE IMPACTS ON WILDLIFE

##### Risks

Increased global temperatures and resource depletion exacerbated by climate change are causing disruptions in animal migration and plant pollination. As temperatures rise, species are moving north in California or to higher elevations. This change in migration disrupts the food

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<sup>19</sup> California Climate Change Center, *Our Changing Climate: Assessing the Risks to California*, 2006. <http://www.energy.ca.gov/2006publications/CEC-500-2006-077/CEC-500-2006-077.PDF>. Accessed December 3, 2008.

<sup>20</sup> California Natural Resources Agency 2009.

<sup>21</sup> City of Patterson 2007.

<sup>22</sup> Ibid.

chain and prevents some plant species from being pollinated. Water and food supplies are expected to be more variable and to shift as the seasons change on different time frames. Further, those species that are unable to migrate face the danger of extinction: "The amount of future warming expected in California may likely exceed the tolerance of endemic species (i.e., those that are native to a specific location and that only occur there) given their limited distribution and microclimate."<sup>23</sup> The National Audubon Society estimates that future bird loss as a result of climate change will vary greatly; on average, it is anticipated that California will lose 6 percent of its bird species under a low emissions scenario, 14 percent under a moderate emissions scenario, and 19 percent under a high emissions scenario. Such losses will not be uniform across the state, but the Central Valley is anticipated to have "hotspots of loss."<sup>24</sup>

With vegetation, reduction in soil moisture will result in early dieback of many plants, potentially leading to conflicts with animal breeding seasons and other natural processes. Many of the potential effects on wildlife are still being studied, but due to inability to adapt to new climates, the potential for severe species loss is present.

Several potential hydrological changes associated with global climate change could also specifically influence the ecology of aquatic life in California and have several negative effects on cold-water fish. For example, if climate change raises air temperature by just a few degrees Celsius, this change could be enough to raise the water temperatures above the tolerance of salmon and trout in many streams, favoring instead non-native fishes such as sunfish and carp. Unsuitable summer temperatures would be particularly problematic for many of the threatened and endangered fish that spend summers in cold-water streams, either as adults or juveniles, or both. In short, climate change could significantly affect threatened and endangered fish in California. It could also cause non-threatened and non-endangered fish to reach the point where they become designated as such.<sup>25</sup>

#### **Considerations for Resiliency**

The City of Patterson is a Central Valley community, with a dry-summer subtropical climate, rainy winters, and relatively warm, dry summers. Waterways and canals run through the General Plan study area, including the San Joaquin River and Salado Creek.<sup>26</sup> With an anticipated raise in statewide temperatures, it is likely that Patterson will become increasingly dry, experiencing hotter and warmer summers. Both natural and altered habitat types exist within the city. Natural habitat types comprise a very small percentage of the General Plan study area and are primarily associated with water along the San Joaquin River, including riparian habitats, river channels, and valley grasslands.<sup>27</sup> Several protected plant and wildlife species are present, including species that are protected under state or federal endangered species law or designated as species of special concern.<sup>28</sup> Of these, many are native species to California.<sup>29</sup>

While there are numerous designated protected species in the General Plan study area, a small selection of these species includes:

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<sup>23</sup> California Natural Resources Agency 2009.

<sup>24</sup> Monahan and Langham February 2009.

<sup>25</sup> California Department of Water Resources 2006.

<sup>26</sup> City of Patterson 2007, Natural Resources chapter.

<sup>27</sup> Ibid.

<sup>28</sup> Ibid.

<sup>29</sup> Admin Draft Patterson GPEIR – Biology Report.

### III. CLIMATE CHANGE OVERVIEW

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- California tiger salamander (State List Threatened; State Fully Protected; California Species of Special Concern)
- California red legged-frog (Federally Threatened; State Fully Protected; California Species of Special Concern designation)
- Show madia (State Rare; California Native Plant Society: plants rare, threatened, or endangered in California and elsewhere)
- Foothill yellow-legged frog (California Species of Special Concern)
- Western pond turtle (California Species of Special Concern)
- Big tarplant (California Native Plant Society: plants rare, threatened, or endangered in California and elsewhere)
- Round-leaved filaree (California Native Plant Society: plants rare, threatened, or endangered in California and elsewhere)
- Lemmon's jewelflower (California Native Plant Society: plants rare, threatened, or endangered in California and elsewhere)
- Diamond-petaled California poppy (California Native Plant Society: plants rare, threatened, or endangered in California and elsewhere)<sup>30</sup>

Vulnerable species such as these are likely to be more susceptible to the impacts of climate change: increased temperatures, warmer waterways, more severe weather, and drier climate will alter the delicate ecosystems that support them and possibly force fragile species into altered migration patterns or facilitate their extinction. More specifically, Audubon California has estimated the ranges of bird loss that are expected to occur by the end of the 21<sup>st</sup> century as a result of a climate change in the Central Valley.<sup>31</sup> Of the estimated species that Audubon California has showcased as anticipated to decline in the Central Valley, four of them are identified by the General Plan Update EIR as existing within the City of Patterson General Plan study area: Swainson's hawk, tricolored blackbird, western meadowlark, and yellow-billed magpie. Notably, of these only Swainson's hawk and the tricolored blackbird are designated as protected species or species of special concern. This illustrates the fact that climate change will not only impact sensitive species, but also those that are currently in relative health. For instance, although the yellow-billed magpie is not currently endangered or threatened, its entire global population lives within California's Central Valley and Coastal ranges; climate change may reduce this bird's range by as much as 75 percent as depicted in **Figure III-3**. Note only four of the five birds shown in this graphic are locally present in Patterson.<sup>32</sup>

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<sup>30</sup> Ibid.

<sup>31</sup> Monahan and Langham February 2009.

<sup>32</sup> Ibid.

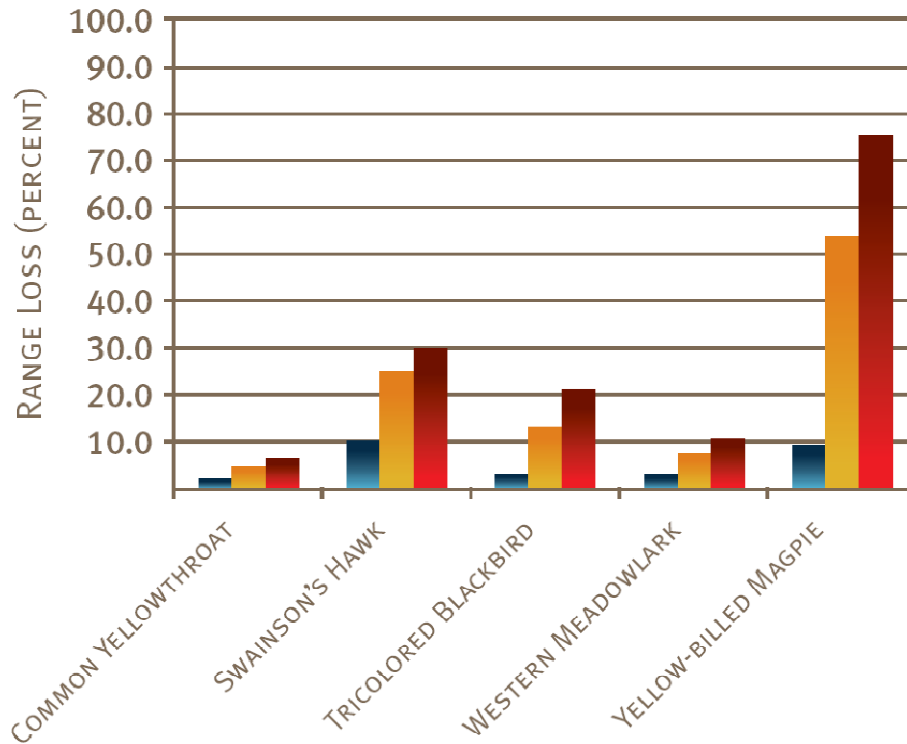
FIGURE III-2



YELLOW-BILLED MAGPIE BY GLEN TEPKE

### III. CLIMATE CHANGE OVERVIEW

FIGURE III-3  
BIRD LOSS RESULTING FROM CLIMATE CHANGE BY THE END OF THE 21<sup>ST</sup> CENTURY IN THE CENTRAL VALLEY<sup>33</sup>



Climate change will impact a range of species, both endangered and threatened species and those of relative health. Multi-pronged adaptation strategies have been proposed to prepare for this impact. Notably, the California Climate Adaptation Strategy has established several biology and habitat adaptation strategies, including:

- Manage for restoring and enhancing ecosystem function to conserve both species and habitats in a changing climate.
- Adjust management actions as appropriate for threatened and endangered species.
- Prioritize research needs and pursue collaborative partnerships to ensure that best available science is informing management actions.
- Re-evaluate existing frameworks to incorporate climate change and seek regulatory changes as appropriate.<sup>34</sup>

<sup>33</sup> Monahan and Langham February 2009.

<sup>34</sup> California Natural Resources Agency 2009.

#### B.3 DETERIORATING PUBLIC HEALTH

##### Risks

Heat waves are expected to have a major impact on public health, as well as decreasing air quality and increasing mosquito breeding and mosquito-borne diseases. Further, climate change is expected to alter the spread and prevalence of disease vectors, in addition to leading to a possible decrease in food quality and security.<sup>35</sup> Vector control districts throughout the state are already evaluating how they will address the expected changes to California's climate. The elderly, young, and vulnerable populations most likely to be impacted by climate change are also those that often lack sufficient resources to adapt. Such vulnerable demographics are likely to need assistance to respond to climate change. Social equity issues related to the unequal distribution of resources and increased costs to address community-wide health risks will need to be addressed proactively to reduce the potential for financial strain on the City.

##### Considerations for Resiliency

The California Department of Public Health (CDPH) has established a strategy for identifying and reducing health vulnerabilities by providing tools for local health departments and other agencies. For instance, CDPH suggests the establishment of community-wide assessments to identify homes occupied by disabled persons and seniors, and to assess housing stock deficiencies for these populations that will be especially vulnerable to increased temperatures and extreme weather. These assessments should then be complemented with retrofit programs and weatherproofing.<sup>36</sup> Additional strategies proposed by the CDPH include social engagement, outreach to vulnerable populations, and educational outreach.<sup>37</sup> The City stands to benefit from programs and strategies being developed at statewide or regional levels to deal with this issue.

#### B.4 A DECREASING SUPPLY OF FRESH WATER

##### Risks

The state's water supply is already under stress and is anticipated to shrink under even the most conservative climate change scenario. Warmer average global temperatures cause more rainfall than snowfall, making the winter snowfall season shorter and accelerating the rate at which the snowpacks melt in the spring. The Sierra snowpack is estimated to experience a 25 to 40 percent reduction from its average by 2050.<sup>38</sup> With rain and snow events becoming less predictable and more variable, the rate of flooding could increase and California's ability to store and transport fresh water for consumption could decrease. Warmer temperatures will lead to increased evapotranspiration rates from plants and lead to increased irrigation needs; further, warmer weather will lead to longer growing seasons and increased agricultural demand for water.<sup>39</sup>

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<sup>35</sup> Ibid.

<sup>36</sup> Ibid.

<sup>37</sup> Ibid.

<sup>38</sup> Department of Water Resources 2008.

<sup>39</sup> California Natural Resources Agency 2009.

### III. CLIMATE CHANGE OVERVIEW

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#### Considerations for Resiliency

The City of Patterson's water is supplied by groundwater sources. Overdraft is unlikely; as recently as February 2006, an aquifer test supplemented the 2000 Urban Water Management Plan, confirming that the City "has a reliable supply of water and is not vulnerable to reductions in deliveries in dry years."<sup>40</sup> While groundwater is assumed to be the main source of water supply for the City and is the only adopted water strategy, in 2005 the City initiated a Water Supply Planning Study to investigate programs that would use combinations of groundwater and surface water to supply future water demand.<sup>41</sup>

Under the current General Plan (1992), the City estimates that groundwater will adequately satisfy future demand until 2030; however, it is important to note that climate change is expected to accelerate and alter natural water cycles.<sup>42</sup> Meeting the water demand associated with any of the General Plan Update Equal-Weight Alternatives will require secondary water sources. As illustrated by the Department of Water Resources, climate change affects the hydrology of water systems and groundwater supplies through several means and is generally expected to reduce existing groundwater reserves.<sup>43</sup> Further, climate change will limit the availability of alternative surface water supply systems available to the City. Hence, climate change adds further impetus to protect and preserve existing water supplies and to determine how best to achieve appropriate water supply for future development.

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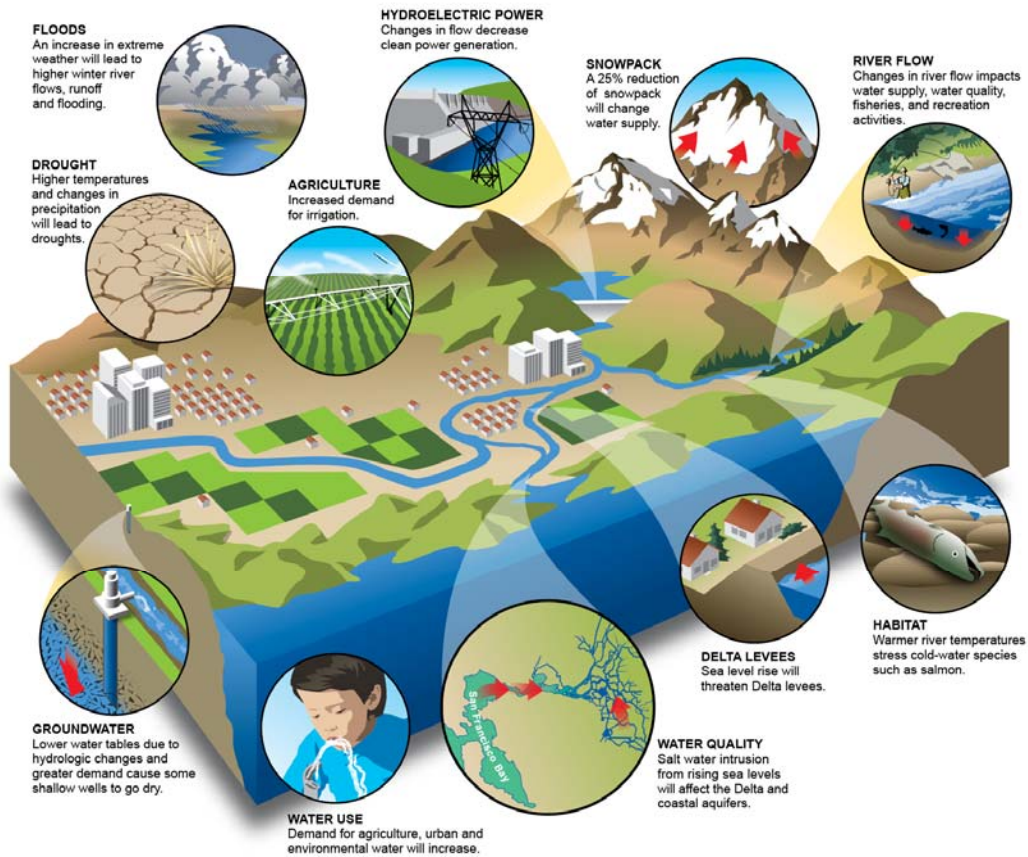
<sup>40</sup> City of Patterson 2007, VI. Public Services and Facilities.

<sup>41</sup> City of Patterson 2007, VI. Public Services and Facilities.

<sup>42</sup> Ibid.

<sup>43</sup> 2008.

FIGURE III-4  
HOW CLIMATE CHANGE IMPACTS A WATERSHED<sup>44</sup>



Many statewide efforts exist that are aimed at protecting water resources and supporting integrated, regional approaches that respond to climate change's impact on water. In its 2008 white paper *Managing an Uncertain Future: Climate Change Adaptation Strategies for California's Water*, the California Department of Water Resources establishes several strategies that the City of Patterson stands to benefit from. By positioning itself for such initiatives, the City can leverage resources and better facilitate its ability to benefit from statewide programs. Department of Water Resources strategies include:

- Utilize the Integrated Regional Water Management (IRWM) framework for coordinated and comprehensive approaches to determine appropriate water demand and supply options in response to climate change. By 2011, IRWM plans should include specific elements that adapt to climate change, including regional assessments to long-term water supply viability and integration with land use policies to promote water efficiency.

<sup>44</sup> California Department of Water Resources 2008.

### III. CLIMATE CHANGE OVERVIEW

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- Identification and funding of focused climate change impacts and adaptation research and analysis pilot projects.<sup>45</sup>

#### B.5 INCREASED SEVERITY AND FREQUENCY OF FLOOD EVENTS

##### **Risks**

Climate change is forecast to result in more intense rainfall events that will generate more frequent or more extensive runoff and flooding. Localized flood events may increase in periods of heavy rain. As explained by the Climate Adaptation Strategy, California's water system is structured and operated to balance between water storage for dry months and flood protection in rainy seasons.<sup>46</sup> Although climate change is likely to lead to a drier climate, risks from more intense and regular extreme rainfall events can generate more frequent and/or more severe flooding that upsets this managed balance between storage and protection. Additionally, erosion may increase and water quality may decrease as a result of increased rainfall amounts.

##### **Considerations for Resiliency**

Patterson is located in Stanislaus County, an area that is highly vulnerable to flooding. The Patterson and Newman area experienced flooding in 1954, 1955, 1957, 1958, 1959, 1968, 1969, 1978, 1980, 1983, and 1986. In the 1990s, flooding also occurred several times along Salado Creek in Patterson.<sup>47</sup> Infrastructure projects have been completed to reduce flooding risks in the area.

At the statewide level, the Department of Water Resources has established a target to develop a Central Valley Flood Protection Plan by January 1, 2012, that includes actions to improve integrated flood management and considers the expected impacts of climate change. This plan is intended to provide strategies for protection and environmental resilience.<sup>48</sup>

#### C. REGULATORY SETTING

The State of California's elected officials have taken an aggressive stance on combating climate change. The State has developed a framework of legislation that provides a method for local and state governments to address climate change. The framework is described below.

##### C.1 CALIFORNIA'S LEGISLATIVE DIRECTION

California has a long history of proven leadership in addressing climate change that spans the last 20 years. In 1988, before the world had even arrived at a consensus on the causes of climate change, Assembly Bill (AB) 4420 (Sher, Chapter 1506, Statutes of 1988) designated the California Energy Commission (CEC) as the lead agency for climate change issues in California.<sup>49</sup> Since that time, there has been a flurry of initiatives in California to address climate change. These initiatives have strengthened the ability of entities in California to engage in accurate data

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<sup>45</sup> 2008

<sup>46</sup> California Natural Resources Agency 2009.

<sup>47</sup> City of Patterson 2007, IX. Health and Safety.

<sup>48</sup> California Department of Water Resources 2008.

<sup>49</sup> California Energy Commission, 2009a.

collection and have created ambitious targets and regulations that will directly lead to reductions in greenhouse gas (GHG) emissions. Not only have California's efforts earned it a role as the leader in the United States for climate planning strategies, but the state has received world attention and accolades for its tireless efforts.

Currently, the State of California is the 15<sup>th</sup> largest emitter in the world of greenhouse gas emissions, ultimately accounting for 2 percent of global emissions.<sup>50</sup> In June of 2005, Governor Schwarzenegger issued a landmark Executive Order establishing progressive greenhouse gas emissions targets for the entire state. Executive Order (EO) S-3-05 outlines the following goals:

- By 2010, reduce greenhouse gas emissions to 2000 levels;
- By 2020 reduce greenhouse gas emissions to 1990 levels;
- By 2050, reduce greenhouse gas emissions to 80 percent below 1990 levels.

To support these reduction targets, the California legislature adopted the California Global Warming Solutions Act of 2006, also known as AB 32. The law requires the California Air Resources Board (CARB) to develop regulatory and market mechanisms that will reduce greenhouse gas emissions to 1990 levels by 2020. In December 2008, CARB approved the AB 32 Scoping Plan outlining regulatory and market mechanisms to achieve the goal of AB 32. The plan cites local government action as an integral partner to achieving the State's goals.

Numerous other actions have been taken in the state. The California Climate Action Registry (CCAR) was created by the State in 2000 through Senate Bill (SB) 1771 (Sher, Chapter 1018, Statutes of 2000). This organization is a nonprofit entity established to assist entities in California working to create GHG emissions baseline inventories.<sup>51</sup> It originally provided a means for entities to voluntarily record greenhouse gas emissions in expectation of a program that would allow these to be credited as early reductions.<sup>52</sup> In 2001, SB 527 directed the CEC to provide specific guidance to the CCAR on issues including the development of GHG emissions protocols and the qualifications of third parties providing technical assistance and certification of inventories.<sup>53</sup> Subsequently, in 2002, AB 1493 (Pavley, Chapter 200, Statutes of 2002) directed CARB to create regulations that would lead to reductions in greenhouse gas emissions from passenger vehicles, light-duty trucks, and noncommercial vehicles sold in California.<sup>54</sup> In 2006, SB 1368 (Perata, Chapter 598, Statutes of 2006) established greenhouse gas emission performance standards for longer-term financial investments in base-load electricity generation to catalyze the transition to cleaner energy use. This bill will also help utility companies transition to the cap-and-trade program that will be established by AB 32.<sup>55</sup> AB 32 has caused a ripple effect among cities, counties, and environment groups throughout the state. In *State of California Attorney General v. San Bernardino County* in 2007, the California Attorney General's Office argued that the Environmental Impact Report for San Bernardino's new General Plan did not conform to the overall goals of AB 32 because it did not adequately analyze or mitigate the effects of development on global warming. The County settled with the State by agreeing to produce a

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<sup>50</sup> California Air Resources Board 2008.

<sup>51</sup> California Energy Commission 2009a.

<sup>52</sup> California Air Resources Board, December 2008.

<sup>53</sup> California Energy Commission 2009a.

<sup>54</sup> California Air Resources Board, December 2008.

<sup>55</sup> California Air Resources Board, December 2008.

### III. CLIMATE CHANGE OVERVIEW

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greenhouse gas emissions reduction plan and, at the same time, furthering California's commitment to addressing climate change.

SB 97 was passed in August 2007 to clarify responsibilities for analyzing greenhouse gas emissions per the California Environmental Quality Act (CEQA). This law formally acknowledges that climate change is an important environmental issue that requires analysis under CEQA. The Governor's Office of Planning and Research (OPR) developed guidelines to address climate change in CEQA documents. These guidelines were adopted in January 2010 by the State Resources Agency.

In September 2008, the Attorney General reached another settlement agreement concerning climate change, this time with the City of Stockton. According to the Attorney General's Office and the Sierra Club, the City of Stockton did not adequately address climate change in its 2035 General Plan Update and corresponding Environmental Impact Report. The City of Stockton settled with the Attorney General by agreeing to adopt a climate action plan designed to reduce sprawl, increase infill development, promote public transit, and encourage more energy-efficient buildings.

EO S-3-05, AB 32, SB 97, and the Attorney General's actions have made California a global leader in climate change policy. Numerous bills concerning energy use, land use, transportation, and other climate change topics have been passed in Sacramento. Some of these bills, like SB 375 passed in September 2008, will result in regional approaches to reducing greenhouse gas emissions. SB 375 aims to reduce greenhouse gas emissions by linking transportation funding to land use planning. It requires Metropolitan Planning Organizations (MPOs) to create Sustainable Communities Strategies (SCSs) in their regional transportation plans (RTPs) for the purpose of reducing suburban sprawl. It also creates incentives for implementation of the SCS. Additional efforts are under way to affect the overall transportation sector by mandating fewer emissions from vehicles via AB 1493 (Pavley), signed into law in 2002 and approved by the U.S. Environmental Protection Agency (EPA) in 2009. The Pavley bill requires car manufacturers to reduce tailpipe emissions from new passenger cars and light trucks.

#### C.1 FEDERAL DIRECTION

The federal government has yet to enact legislation for greenhouse gas emissions reductions. However, the EPA releases endangerment findings for carbon dioxide, officially bringing the enforcement capabilities of the EPA to the issue of greenhouse gas emissions. Even without mandates, new activity has been ushered in with the approval of the American Reinvestment and Recovery Act (ARRA), also referred to as the federal stimulus package. Through the Energy Efficiency and Conservation Block Grant (EECBG) program, a division of ARRA, the U.S. Department of Energy (DOE) is providing a total of \$3.2 billion to cities and counties to reduce fossil fuel emissions; reduce total energy use; improve energy efficiency in the transportation, building, and other appropriate sectors; and create and retain jobs.<sup>56</sup> Using this money, jurisdictions across the United States are allocating funds to initiate climate change planning and achieve reductions in greenhouse gas emissions.

#### C.3 SAN JOAQUIN VALLEY AIR POLLUTION CONTROL DISTRICT DIRECTION

The City of Patterson is located in the San Joaquin Valley Unified Air Pollution Control District's jurisdiction. On December 17, 2009, the San Joaquin Valley Air Pollution Control District adopted

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<sup>56</sup> DOE, October 16, 2009.

*Guidance for Valley Land-use Agencies in Addressing GHG Emission Impacts for New Projects under CEQA and District Policy – Addressing GHG Emission Impacts for Stationary Source Projects Under CEQA When Serving as the Lead Agency.* Both documents utilize Best Performance Standards (BPS) to help lead agencies in assessing the significance of a project’s contribution of GHGs on global climate change. A Best Performance Standard utilizes established metrics or project design elements to reduce GHG emissions and provide a consistent approach to quantifying estimated emissions reductions. The intent of the BPS is to simplify and streamline the CEQA review process and establish clear criteria for lead agencies to apply in project assessment. These policies — when implemented — would result in a less than cumulatively significant impact on climate change.<sup>57</sup> These BPS scenarios and related guidance are available to valley land-use agencies for adoption to utilize in addressing GHG emissions when the agency serves as a lead agency for CEQA purposes. The December 17, 2009, Final Staff Report *Climate Change Action Plan: Addressing GHG Emissions Impacts under CEQA* further summarizes the BPS strategies to address GHGs through CEQA. Overall, these guiding policies are intended to supplement the lack of guidance for addressing climate change in the valley.

As of the writing of this report, the legitimacy of utilizing this approach to mitigate GHG emissions has been challenged by the State of California Attorney General’s Office. Although the Attorney General’s Office stated that they appreciate the District’s extensive efforts, it is “concerned that the approaches suggested in the Staff Report will not withstand legal scrutiny and may result in significant lost opportunities for the Air District and local governments to require mitigation of greenhouse gas (GHG) emissions.”<sup>58</sup> Therefore, while the District’s work creates a good interim framework to address GHG emissions in the absence of a programmatic approach for mitigating GHG emissions, the comments of the Attorney General’s Office create a situation where the decision to use the Air District’s guidelines should be weighed against the legal uncertainty of relying on such guidance. Due to the legal uncertainty of the Air District’s approach, the BPS was not used in this analysis.

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<sup>57</sup> San Joaquin Valley Air Pollution Control District, 2010.

<sup>58</sup> Attorney General’s Office, November 4, 2009.



## **IV. ADDRESSING CLIMATE CHANGE THROUGH THE GENERAL PLAN AND GENERAL PLAN EIR**

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### **A. PRIMARY PURPOSES**

As a component of the City of Patterson General Plan Update process, the climate change section of the Environmental Impact Report will be addressing climate change, consistent with the guidance included in the CEQA guidelines and from the California Air Resources Board, the California Resources Agency, and the California Attorney General's Office. By integrating the findings of this Climate Change Summary Report (CCSR) into the General Plan Update process, the City will be positioning itself for a legally defensible, long-term approach to addressing greenhouse gas emissions reductions and climate change. By integrating this process of policy development with preliminary impact analysis, this report ensures a holistic, coordinated approach that is conducive to the City's needs with the Final EIR. This approach to the CCSR will ultimately position the City for success in preparing an appropriate Mitigation Monitoring and Reporting Program and equip it for long-term viability that is facilitated by a streamlined and integrated planning process. Specifically, the EIR will utilize this report to accomplish the following:

- Identify and quantify major sources of GHG emissions from community-wide activities within the City of Patterson municipal boundary for each of the three planning scenarios;
- Establish GHG emission reduction targets consistent with AB 32;
- Provide feasible strategies to reduce emissions from energy use, transportation, land use, and solid waste to achieve targets utilizing General Plan policies;
- Mitigate the impacts of the City of Patterson on climate change (by reducing GHG emissions consistent with the direction of the State of California via AB 32 and Executive Order S-03-05);
- Establish a CEQA tiering document via the General Plan and General Plan EIR for the City for climate change that will apply to development projects;
- Outline the necessity of implementation as a programmatic CEQA tiering document and as the basis of the City's Climate Action Plan (CAP).

### **B. IMPLEMENTATION FUNCTIONS**

This report will facilitate the EIR's function as an ongoing implementation tool for the City and will accomplish this through two tasks: (1) laying the foundation for the Climate Action Plan called for in the Draft General Plan, and (2) functioning as a programmatic CEQA tiering document.

The Draft General Plan calls for adoption of a Climate Action Plan (CAP) within 24 months of adoption of the General Plan (see Policy AR 7.1, Implementation Measure AR 5, and Implementation Measure NR 8). The CAP will establish strategies for public input, a baseline inventory, goals for reducing emissions, resiliency and adaptation programs, reduction targets, strategies to achieve targets, a green building program, and a renewable energy portfolio standard. This report serves as an important foundation for the CAP; it provides direction for a more in-depth baseline GHG inventory, establishes reduction targets, and quantifies the reductions of relevant General Plan policies. As asserted by the Attorney General's Office, if the CAP will serve as the centerpiece of a CEQA climate change mitigation strategy, it should be

#### **IV. ADDRESSING CLIMATE CHANGE THROUGH THE GENERAL PLAN AND GENERAL PLAN EIR**

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prepared at the same time as the General Plan Update and EIR.<sup>59</sup> In the case of Patterson, climate change mitigation will primarily be achieved through policies and goals already provided in the General Plan, including the development of a climate action plan. Therefore, since the CAP will not serve as the centerpiece of the City's climate change mitigation strategy, it was not prepared concurrently with the General Plan Update and EIR. Rather, climate change mitigation is depicted through the quantified impact of General Plan goals and policies on GHG emission reductions.

The CAP will specifically accomplish the following elements, pursuant to the CEQA guidelines. Once the CAP is adopted following certification of an EIR, it may be used in the cumulative impacts analysis of later projects. Specific tasks for the CAP include:

- Quantify greenhouse gas emissions, both existing and projected over a specified time period, resulting from activities within a defined geographic area;
- Establish a level, based on substantial evidence, below which the contribution to greenhouse gas emissions from activities covered by the plan would not be cumulatively considerable;
- Identify and analyze the greenhouse gas emissions resulting from specific actions or categories of actions anticipated within the geographic area;
- Specify measures or a group of measures, including performance standards, that substantial evidence demonstrates, if implemented on a project-by-project basis, would collectively achieve the specified emissions level;
- Establish a mechanism to monitor the plan's progress toward achieving the level and to require amendment if the plan is not achieving specified levels;
- Be adopted in a public process following environmental review.<sup>60</sup>

In addition to serving as a foundation for the CAP, the climate change section of the EIR will serve as a programmatic tiering document for the purposes of impacts on climate change. It utilizes clear metrics to quantify the impact of General Plan policies and programs on GHG emissions. These policies and programs will be implemented on an ongoing basis.

The climate change section provides streamlined CEQA review that saves the City time, money, and liability. As applicable, the measures and standards assessed here will be used in project review. If a proposed development is consistent with the emissions reduction measures included in this Climate Change Summary Report, the project would be considered to have a less than significant impact on climate change and emissions consistent with the direction of the California Attorney General and Public Resources Code 21083.3.<sup>61</sup> Such projects will be utilizing standards that the City has already quantified and demonstrated as contributing to its GHG emissions reduction targets and assessed through CEQA. The measures that are discussed later in this report are presented in a transparent manner, clearly depicting the assumptions and standards that were calculated to determine GHG reductions.

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<sup>59</sup> September 1, 2009.

<sup>60</sup> California Natural Resources Agency, December 30, 2009.

<sup>61</sup> Ibid.

### C. OPPORTUNITIES AND CHALLENGES TO BE ADDRESSED THROUGH THE EIR

The climate change section of the EIR is premised on a unique approach to addressing climate change. It creates an initial and defensible framework as part of a longer-term implementation and policy program. The primary components of its role and limitations include the following points.

- **The EIR facilitates mitigation of climate change emissions.** The climate change section of the EIR creates a legally defensible framework for the General Plan Update by establishing a GHG emissions inventory baseline and projections and quantifying the self-mitigating policies and actions contained within the General Plan. The impact of these policies and actions are depicted with clearly articulated metrics that are conducive to direct implementation; this transparency supports and legitimates the City's assessment of the impact of General Plan implementation. Since existing General Plan goals and policies provide the centerpiece of its climate change mitigation strategy, quantification of these impacts provides a sufficient vehicle for climate change mitigation, apart from adoption of a full CAP. Further, this quantification represents a "good-faith effort, based on available information, to calculate, model, or estimate the amount of CO<sub>2</sub> and other GHG emissions from a project," as the Attorney General asserts is required for purposes of CEQA.<sup>62</sup> Given available data in the General Plan EIR, at this stage only community-wide emissions and reduction can be quantified. It is recognized that the CAP will surpass and build on this foundation with an updated inventory and additional reduction measures, but this foundation of a baseline community-wide emissions inventory and reductions from General Plan goals and policies is the City's primary vehicle to address climate change.
- **Link initial GHG inventory and reduction measures to long-term climate change implementation.** The General Plan calls for a comprehensive Climate Action Plan to be adopted within 24 months of General Plan adoption. The CAP will provide the robust policy framework and implementation guide for climate change with broader scope and efficacy by establishing a more comprehensive menu of reduction measures, detailed implementation items, and more detailed actions to deal with resiliency and adaptation. The CAP will function as more of a mitigation document and holistic plan, whereas the climate change section of the EIR serves as its foundation and quantifies the bulk of climate change mitigation strategies, those that will be directly captured within General Plan policies and programs themselves.

### D. REDUCTION TARGETS

#### D.1 GLOBAL, NATIONAL, AND STATE INVENTORIES

##### Global Inventory

According to the United Nations Framework Convention on Climate Change (UNFCCC), worldwide GHG emissions in 2004 were 30 billion metric tons of CO<sub>2</sub>e per year (including ongoing

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<sup>62</sup> Ibid.

## IV. ADDRESSING CLIMATE CHANGE THROUGH THE GENERAL PLAN AND GENERAL PLAN EIR

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emissions from both industrial and agricultural sources, but excluding emissions from land use changes).<sup>63</sup>

### National Inventory

As part of its commitments to the UNFCCC, the EPA has developed an inventory of anthropogenic emissions by sources and removals by sinks of all GHGs. This inventory is periodically updated, with the latest report published in 2009. In 2004, the United States emitted approximately 8 billion metric tons of CO<sub>2</sub>e, or approximately 25 metric tons per person per year.<sup>64</sup> It is estimated that the United States contributes up to 35 percent of the world's CO<sub>2</sub>e emissions.

The EPA reports that total U.S. emissions rose by 17 percent from 1990 to 2007.<sup>65</sup> A 1.1 percent decrease in emissions was noted from 2005 to 2006, which is reported as attributable to (1) climate conditions, (2) reduced use of petroleum products for transportation, and (3) increased use of natural gas over other fuel sources. The inventory noted that the transportation sector emits approximately 33 percent of CO<sub>2</sub> emissions, with 60 percent of those emissions coming from personal automobile use. Residential uses, primarily from energy use, accounted for 20 percent of CO<sub>2</sub> emissions. After the decrease from 2005 to 2006, emissions from fuel combustion grew from 2006 to 2007.<sup>66</sup>

As a part of the EPA's responsibility to develop and update an inventory of national GHG emissions and sinks, the EPA compared trends of other U.S. data. Over the period between 1990 and 2006, GHG emissions increased at a rate of approximately 0.9 percent per year. Population growth was slightly higher at 1.1 percent, while energy and fossil fuel consumption were more closely related at 1.0 percent. Gross Domestic Product (GDP) and energy generation grew at much higher rates.

### State of California Inventory

California GHG or CO<sub>2</sub>e emissions were estimated at 484 million metric tons of CO<sub>2</sub>e in 2006, which is approximately 6 percent of total emissions from the entire United States.<sup>67</sup> Transportation is the largest source of GHG emissions in California, contributing approximately 40 percent of the total emissions. Electricity generation is second, at over 20 percent, but California also imports electricity during the summer, which brings energy sources up to approximately 25 percent. Industrial activities account for approximately 20 percent of the state's emissions. On a per-person basis, GHG emissions are lower in California than in most other states; however, California is a populous state and the second largest emitter of GHGs in the United States and one of the largest emitters in the world.

Under a business-as-usual scenario, GHG emissions in California are estimated to increase to approximately 600 million metric tons of CO<sub>2</sub>e by 2020. CARB staff has estimated the 1990 statewide emissions level to be 427 million metric tons of CO<sub>2</sub>e, therefore requiring a reduction of almost 30 percent in emissions by 2020 to meet the AB 32 goal.

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<sup>63</sup> UNFCCC, 2008.

<sup>64</sup> US Environmental Protection Agency, 2008.

<sup>65</sup> US Environmental Protection Agency, 2009.

<sup>66</sup> Ibid.

<sup>67</sup> California Air Resources Board 2010. Greenhouse Gas Inventory Data 2000–2008.

## V. EMISSIONS INVENTORY, PROJECTIONS, AND REDUCTION MEASURES

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### A. BASELINE GHG INVENTORY

#### A.1 EMISSIONS SOURCES

The purpose of the inventory process is to create a baseline against which future changes in emissions can be compared. The baseline inventory includes major sources of greenhouse gas emissions, including the following:

- Vehicle trips with origins and destinations within the city, based on vehicle miles traveled (VMT) calculated by TJKM for the General Plan Update
- Residential natural gas and electricity consumption, based on average county consumption rates established in the Energy Consumption Data Management System (ECDMS)<sup>68</sup>
- Commercial natural gas and electricity consumption, based on average state- and nationwide consumption rates for nonresidential uses<sup>69</sup>
- Waste produced within the city and sent to landfill, based on disposal rates provided by CalRecycle and EPA's WARM model

While an official protocol for community-wide emissions is not yet available from the State, this inventory is consistent with current best practices for greenhouse gas inventories. Inventories are commonly restricted to energy, transportation, and waste analysis due to lack of methodology or lack of reliable data for a programmatic-level document to quantify other sources of emissions. This results in the exclusion of the following emission sources:

- Construction-related emissions
- Off-road vehicle emissions
- Propane emissions
- Refrigerant emissions
- Aircraft emissions
- Sewage treatment emissions

As inventory protocol and methodology advances, these sources can be incorporated into the baseline inventory. The current emissions sources are believed to comprise the vast majority of community-wide emissions.

For consistency with the California Environmental Quality Act and Attorney General guidance, the baseline year for the inventory is 2009. This data is most readily available and will be most integrated with General Plan forecasts.

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<sup>68</sup> California Energy Commission, 2008.

<sup>69</sup> US Energy Information Administration, 2005

## V. EMISSIONS INVENTORY, PROJECTIONS, AND REDUCTION MEASURES

### A.2 BASELINE GHG EMISSIONS BY SECTOR

In calendar year 2009, activities within the geopolitical boundary of Patterson emitted 287,003 metric tons of carbon dioxide equivalents (CO<sub>2</sub>e) into the atmosphere. "Carbon dioxide equivalent" is a way to equalize the different global warming potentials of the six internationally recognized greenhouse gases. For instance, methane (CH<sub>4</sub>) has 21 times the global warming potential (GWP) of carbon dioxide (CO<sub>2</sub>); therefore 1 metric ton of methane is equivalent to 21 metric tons of carbon dioxide.

**TABLE V-1**  
**COMMUNITY-WIDE GHG EMISSIONS BY SECTOR, 2009**

2009 Baseline Greenhouse Gas Emissions	Metric Tons CO <sub>2</sub> e	Percentage of Total
Residential	34,696	12.1%
Commercial/Industrial	69,616	24.3%
Transportation	179,885	62.7%
Waste	2,807	1.0%
<b>Total</b>	<b>287,003</b>	<b>100.0%</b>

Note: Due to rounding, percentages and totals may result in different sums than those depicted here.

As shown above in **Table V-1**, the transportation sector is responsible for the majority of emissions released within the Patterson community (62.7 percent). Electricity and natural gas consumption in the residential and commercial/industrial sectors constitute the second largest sector (36.4 percent), with waste comprising the smallest sector (1 percent).

### A.3 METHODOLOGY

For each sector accounted for in the baseline inventory, a description of the emissions sources, input data, and output data is provided below. Explanatory notes follow.

**TABLE V-2**  
**BASELINE INVENTORY GHG EMISSIONS**

Sector	Emission Source	Input Data	Output Data CO <sub>2</sub> e (metric tons/year)
<b>Residential</b>	Electricity consumption	63,421,471 kWh <sup>(1)</sup>	19,749
	Natural gas consumption	2,237,529 therms <sup>(1)</sup>	14,947
	<i>Subtotal</i>		34,696 <sup>(2)</sup>
<b>Commercial/ Industrial</b>	Electricity consumption	138,259,914 kWh <sup>(3)</sup>	43,053
	Natural gas consumption	3,976,557 therms <sup>(3)</sup>	26,563
	<i>Subtotal</i>		69,616 <sup>(2)</sup>
<b>Transportation</b>	Vehicle miles traveled (all vehicles and fuel types)	343,164,360 VMT <sup>(4)</sup>	179,885 <sup>(5)</sup>
<b>Waste</b>	Waste landfilled and alternative daily cover (ADC) <sup>(6)</sup>	7,920 tons <sup>(7)</sup>	2,807 <sup>(8)</sup>
<b>Total</b>			<b>287,003</b>

## V. EMISSIONS INVENTORY, PROJECTIONS, AND REDUCTION MEASURES

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- 1) Residential electricity and natural gas consumption (inputs):
  - a. Utilizes most current countywide Energy Consumption Data Management System (ECDMS) energy consumption totals for the year 2007 to determine a ratio of energy consumed per household.
  - b. Assumes uniform rate of consumption across the county for both electricity and natural gas. Determines average household energy consumption through the ratio of households in the county to total countywide energy consumption by type (natural gas or electricity). Ratio of average household energy consumption is applied to households in the city. Ratio of energy consumption is based on 2007 household and consumption figures (the most recent year for which ECDMS is available).
  - c. Assumes that energy consumption rates as calculated in 2007 remain constant until 2009.
- 2) Electricity and natural gas emissions (outputs) for residential and commercial uses:
  - a. CO<sub>2</sub> emission factor from Local Government Operations Protocol v. 1.0, Table G.5: CO<sub>2</sub> lbs/kWh for Turlock Irrigation District in 2006.<sup>70</sup>
  - b. Methane (CH<sub>4</sub>) and nitrous oxide (N<sub>2</sub>O) emission factors from California Climate Action Registry Reporting Protocol (January 2009), Table C.2: lbs/mwh for eGRID region CAMX WECC California.
  - c. Population and household figures from Department of Finance and Crawford Multari & Clarke (CMCA).
  - d. Electricity and natural gas use numbers are multiplied by emissions factors for carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>), and nitrous oxide (N<sub>2</sub>O) to determine GHG emissions.
  - e. Total metric tons CO<sub>2</sub>e determined by multiplying totals for CO<sub>2</sub>, CH<sub>4</sub>, and N<sub>2</sub>O by their respective Global Warming Potentials.
- 3) Commercial/industrial electricity and industrial natural gas consumption (inputs) consumption:
  - a. Applies Energy Information Administration (EIA) energy consumption averages for kWhs of electricity by square foot of land use from 2005 (the most recent year for which data is available). Average consists of the average of West (Table C15) and All US consumption rates (Table C15) when both available by land use, or All US consumption rates when West rates unavailable. Assumes higher accuracy results for electricity consumption from these census regions, based on a comparison of EIA residential consumption averages to ECDMS consumption averages for Stanislaus County.<sup>71</sup>

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<sup>70</sup> September 2008.

<sup>71</sup> U.S. Energy Information Administration 2005.

## V. EMISSIONS INVENTORY, PROJECTIONS, AND REDUCTION MEASURES

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- b. Applies EIA energy consumption averages for cubic feet of natural gas by square foot of land use from 2005 (the most recent year for which data is available). Utilizes consumption for West Pacific (C29) when available and All US consumption rates for all other scenarios (C24). Assumes higher accuracy results for natural gas consumption from these census regions, based on a comparison of EIA residential consumption averages to ECDMS consumption averages for Stanislaus County.<sup>72</sup>
  - c. Assumes that energy consumption rates remain constant.
  - d. For EIA averages, per EIA definitions, utilizes Retail (Other Than Mall) consumption averages for commercial floor area, Other consumption averages for industrial floor area, and Service consumption averages for services floor area.<sup>73</sup>
  - e. Square footages by land use from CMCA.
  - f. Conversion from cubic feet natural gas into BTUs from U.S. EIA based on U.S. consumption in 2008.<sup>74</sup>
- 4) Vehicle miles traveled (inputs):
- a. Daily vehicle miles traveled (VMT) provided by TJKM. Using the City of Patterson model (based on Stanislaus Council of Governments model), Select Zone assignment was performed for all zones in Patterson to ensure that the VMT was calculated by all trips generated by traffic analysis zones in Patterson. Once the trips were assigned to the overall network, VMT was calculated for each link by multiplying the link volume with the distance. Added VMT on a link-by-link basis to determine the overall VMT.
  - b. Daily VMT converted into annual VMT by multiplying by 330 days. Accounts for decreased traffic on weekends and holidays.
- 5) Vehicle miles traveled emissions (outputs):
- a. Emissions factors by vehicle class for CO<sub>2</sub> and CH<sub>4</sub> from countywide emissions provided by EMFAC 2007. Assumes emissions from average speed of 45 mph, since VMT is not differentiated by speed or type.
  - b. Emissions factors by vehicle class for N<sub>2</sub>O from the Local Government Operations Protocol (2008), average of all model years.
  - c. Assumes annual average temperature and humidity of Patterson: 63 degrees Fahrenheit and 60% humidity.
  - d. Vehicle classification and proportion of VMT per vehicle class from EMFAC 2007. Proportion of VMT per vehicles class as follows: light-duty autos: 40.8% of VMT;

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<sup>72</sup> U.S. Energy Information Association 2005.

<sup>73</sup> Ibid. Refer specifically to [http://www.eia.doe.gov/emeu/cbecs/building\\_types.html](http://www.eia.doe.gov/emeu/cbecs/building_types.html) for details.

<sup>74</sup> N.d.

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light-duty trucks: 32.0% of VMT; medium-duty trucks: 12.1% of VMT; heavy-duty trucks: 14.0% of VMT; urban buses: 0.1% of VMT; motorcycles: 1.0% of VMT.

- e. VMT for each vehicle class is multiplied by specific emissions factor for that vehicle class for CO<sub>2</sub>, CH<sub>4</sub>, and N<sub>2</sub>O.
  - f. Total metric tons CO<sub>2</sub>e determined by multiplying totals for CO<sub>2</sub>, CH<sub>4</sub>, and N<sub>2</sub>O by their respective Global Warming Potentials.
- 6) CalRecycle defines alternative daily cover as a mixture of approved materials other than soil used as temporary overlay on an exposed landfill face.
- 7) Tons of waste landfilled and ADC (inputs):
- a. Only calculates emissions from disposal tons and ADC. Excludes transformed and export tons. These items to be addressed as necessary in the CAP.
  - b. Utilizes waste totals from CalRecycle waste tonnage by origin.<sup>75</sup>
  - c. To determine 2009 countywide waste totals: calculates compound average growth rate (CAGR) from 2003–2008. Growth rate applied to amounts of waste disposed in 2008 to determine waste disposed in 2009.
  - d. Calculates waste for Patterson based on total waste originated in Stanislaus County Regional Solid Waste Planning Agency (SCRSWPA), which includes the population of the county and all jurisdictions except Modesto. Calculates a countywide per person rate of waste disposed in 2009 and applies rate to 2009 population of Patterson.
- 8) Waste emissions (outputs):
- a. Waste type data not collected by landfill. Assumes that waste breakdown is proportional to 2008 CalRecycle Waste Characterization Study, which captures the state average of waste characterization. From Composition of California's Overall Disposed Waste Stream by Material Type for landfill tonnage provided by CalRecycle 2008 Statewide Waste Characterization Study.<sup>76</sup>
  - b. Waste types are cross-referenced with input groups for EPA's WARM model and entered into WARM groups for yearly waste emissions outputs.<sup>77</sup>

### B. GENERAL PLAN EMISSIONS FORECASTS

#### B.1 TARGET YEARS AND REDUCTION GOALS

For legal defensibility, this document projects emissions consistent with General Plan buildout and phasing. Two target years are quantified: 2030 (buildout within 20 years) and 2050 (total at

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<sup>75</sup> CalRecycle 2010.

<sup>76</sup> 2008.

<sup>77</sup> U.S. EPA 2009.

## V. EMISSIONS INVENTORY, PROJECTIONS, AND REDUCTION MEASURES

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buildout in 40 years). Further, these target dates allow the City to demonstrate its trajectory to achieve state reduction targets, including:

- AB 32 calls for reducing greenhouse gas emissions to 1990 levels by 2020 (15 percent below 2005 levels has been interpreted to equate to 1990 levels).
- Executive Order S-3-05 outlines reducing greenhouse gas emissions to 80 percent below 1990 levels by 2050.

For purposes of this document, a reduction goal of 15 percent below 2009 levels is assumed to demonstrate efforts to comply with these state mandates. Since 2009 is the most current year for which data is available in the City of Patterson, 15 percent below 2009 emissions levels is consistent with AB 32.

While General Plan buildout will lead to higher emissions in target years, the General Plan itself will act as a self-mitigating program. Policies contained within the General Plan will alter current emissions trends and will lead to lower emissions scenarios than would result if existing trends were applied to projected buildout scenarios. Furthermore, by 2050 multiple state programs will affect emissions within the Patterson city limits and cause lower levels of emissions independent of City actions. These programs will lead to emissions reductions that the City is not responsible for directly implementing, such as tailpipe emissions of passenger cars and light-duty trucks. Based on this logic, anticipated reductions from statewide actions and General Plan policies are applied to forecast emissions scenarios to determine the City's progress in achieving reduction goals. Progress to achieve reduction goals is demonstrated as follows:

- 1) Emissions forecasts were developed for each of the three General Plan planning scenarios developed for 2030 and 2050. Forecasts are developed applying business-as-usual consumption and activity patterns to growth scenarios for each of the three planning scenarios.
- 2) General Plan policies that are expected to reduce GHG emissions were quantified. Statewide actions that will reduce emissions were also quantified. Collectively these are referred to as reduction measures.
- 3) The quantified reductions in GHG emissions are deducted from each business-as-usual planning scenario in 2030 and 2050 to determine the new anticipated emissions scenario.
- 4) The remaining emissions not reduced through General Plan policies or state actions are contrasted with the business-as-usual scenarios to determine a percentage reduction and progress to reduction targets.

### B.2 BUSINESS-AS-USUAL FORECASTS

Forecasts for each emissions sector were developed using General Plan buildout projections. A description of the methodology utilized for each sector is provided below. All reduction measures were developed by calculating anticipated reductions to these business-as-usual forecasts. Planning scenarios are referred to as follows: CD = Compact Development, JE = Jobs Emphasis, PC = Planning Commission Environmental Review Plan. See **Table V-3** for summary tables of emission outputs by scenario in CO<sub>2</sub>e.

## V. EMISSIONS INVENTORY, PROJECTIONS, AND REDUCTION MEASURES

**TABLE V-3  
EMISSIONS FORECASTS**

Sector	Scenario	Emission Source	2030 Input Data	2030 GHG Emissions (metric tons/year CO <sub>2</sub> e)	2050 Input Data	2050 GHG Emissions (metric tons/year CO <sub>2</sub> e)
Residential	CD	Electricity consumption	159,984,277 kWh <sup>(1)</sup>	<b>49,818</b> <sup>(2)</sup>	200,516,161 kWh <sup>(1)</sup>	<b>62,439</b> <sup>(2)</sup>
		Natural gas consumption	5,644,294 therms <sup>(1)</sup>	<b>37,704</b> <sup>(2)</sup>	7,074,272 therms <sup>(1)</sup>	<b>47,256</b> <sup>(2)</sup>
Residential	JE	Electricity consumption	165,875,600 kWh <sup>(1)</sup>	<b>51,652</b> <sup>(2)</sup>	233,868,654 kWh <sup>(1)</sup>	<b>72,825</b> <sup>(2)</sup>
		Natural gas consumption	5,852,142 therms <sup>(1)</sup>	<b>39,092</b> <sup>(2)</sup>	8,250,958 therms <sup>(1)</sup>	<b>55,116</b> <sup>(2)</sup>
Residential	PC	Electricity consumption	228,969,776 kWh <sup>(1)</sup>	<b>71,299</b> <sup>(2)</sup>	270,166,809 kWh <sup>(1)</sup>	<b>84,128</b> <sup>(2)</sup>
		Natural gas consumption	8,078,124 therms <sup>(1)</sup>	<b>53,962</b> <sup>(2)</sup>	9,531,568 therms <sup>(1)</sup>	<b>63,671</b> <sup>(2)</sup>
Commercial/ Industrial	CD	Electricity consumption	413,304,847 kWh <sup>(3)</sup>	<b>128,700</b> <sup>(2)</sup>	477,643,009 kWh <sup>(3)</sup>	<b>148,734</b> <sup>(2)</sup>
		Natural gas consumption	11,887,251 therms <sup>(3)</sup>	<b>79,407</b> <sup>(2)</sup>	13,737,710 therms <sup>(3)</sup>	<b>91,768</b> <sup>(2)</sup>
Commercial/ Industrial	JE	Electricity consumption	488,886,631 kWh <sup>(3)</sup>	<b>152,235</b> <sup>(2)</sup>	534,155,940 kWh <sup>(3)</sup>	<b>166,332</b> <sup>(2)</sup>
		Natural gas consumption	14,061,093 therms <sup>(3)</sup>	<b>93,928</b> <sup>(2)</sup>	15,363,105 therms <sup>(3)</sup>	<b>102,625</b> <sup>(2)</sup>
Commercial/ Industrial	PC	Electricity consumption	470,759,405 kWh <sup>(3)</sup>	<b>146,591</b> <sup>(2)</sup>	527,685,470 kWh <sup>(3)</sup>	<b>164,317</b> <sup>(2)</sup>
		Natural gas consumption	13,539,728 therms <sup>(3)</sup>	<b>90,445</b> <sup>(2)</sup>	15,177,005 therms <sup>(3)</sup>	<b>101,382</b> <sup>(2)</sup>
Transportation	CD	Annual vehicle miles traveled (all vehicles and fuel types)	817,488,870 VMT <sup>(4)</sup>	<b>419,259</b> <sup>(5)</sup>	1,188,774,510 VMT <sup>(4)</sup>	<b>598,187</b> <sup>(5)</sup>
Transportation	JE	Annual vehicle miles traveled (all vehicles and fuel types)	1,129,454,040 VMT <sup>(4)</sup>	<b>579,254</b> <sup>(5)</sup>	1,579,892,160 VMT <sup>(4)</sup>	<b>794,996</b> <sup>(5)</sup>
Transportation	PC	Annual vehicle miles traveled (all vehicles and fuel types)	904,684,770 VMT <sup>(4)</sup>	<b>463,979</b> <sup>(5)</sup>	1,339,095,780 VMT <sup>(4)</sup>	<b>673,828</b> <sup>(5)</sup>

## V. EMISSIONS INVENTORY, PROJECTIONS, AND REDUCTION MEASURES

Sector	Scenario	Emission Source	2030 Input Data	2030 GHG Emissions (metric tons/year CO <sub>2</sub> e)	2050 Input Data	2050 GHG Emissions (metric tons/year CO <sub>2</sub> e)
Waste	CD	Waste landfilled and alternative daily cover (ADC)	17,296 tons <sup>(6)</sup>	<b>6,130</b> <sup>(7)</sup>	21,456 tons <sup>(6)</sup>	<b>7,604</b> <sup>(7)</sup>
Waste	JE	Waste landfilled and alternative daily cover (ADC)	17,845 tons <sup>(6)</sup>	<b>6,324</b> <sup>(7)</sup>	24,874 tons <sup>(6)</sup>	<b>8,816</b> <sup>(7)</sup>
Waste	PC	Waste landfilled and alternative daily cover (ADC)	24,022 tons <sup>(6)</sup>	<b>8,514</b> <sup>(7)</sup>	28,303 tons <sup>(6)</sup>	<b>10,031</b> <sup>(7)</sup>
<b>Total by Scenario</b>	<b>CD</b>			<b>721,017</b>		<b>955,988</b>
	<b>JE</b>			<b>922,486</b>		<b>1,200,710</b>
	<b>PC</b>			<b>834,790</b>		<b>1,097,357</b>

- 1) Residential electricity and natural gas consumption (inputs):
  - a. Consumption data projected based on the compound average growth rate (CAGR) of households from baseline year to target year. Assumes household growth rates equate to energy consumption rates. CAGR of household growth of each planning scenario is applied to baseline consumption to determine target year consumption.
  - b. Assumes that growth rates remain constant.
  - c. Growth of households calculated from projected household figures for each scenario in the General Plan.
- 2) Electricity and natural gas emissions (outputs) for residential and commercial uses:
  - a. Assumes emissions of CO<sub>2</sub>e/kWh and therms in the baseline inventory remain constant throughout the target years.
  - b. Emission factor is deduced by dividing total emissions from each sector in the baseline inventory by input data from the baseline inventory (total metric tons of CO<sub>2</sub>e from electricity consumption/total kWhs; total metric tons of CO<sub>2</sub>e from natural gas consumption/total therms).

## V. EMISSIONS INVENTORY, PROJECTIONS, AND REDUCTION MEASURES

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- c. Emissions factors are applied to the projected consumption data for each target year to determine emissions.
- 3) Commercial/industrial electricity and natural gas consumption (inputs):
    - a. Consumption data projected based on the compound average growth rate (CAGR) of square footages of nonresidential land uses from baseline year to target year. Assumes square footage growth rates equate to energy consumption rates. CAGR of nonresidential square footage growth for each planning scenario is applied to baseline consumption to determine target year consumption.
    - b. Assumes that growth rates remain constant.
    - c. Growth of square footages calculated from projected square footages of commercial, industrial, and services floor area for each scenario in the General Plan.
  - 4) Transportation vehicle miles traveled (inputs):
    - a. Daily vehicle miles traveled (VMT) provided by TJKM for each planning scenario for the target years. Using the City of Patterson model (based on Stanislaus Council of Governments model), Select Zone assignment was performed for all zones in Patterson to ensure that the VMT was calculated by all trips generated by traffic analysis zones in Patterson. Once the trips were assigned to the overall network, VMT was calculated for each link by multiplying the link volume with the distance. Added VMT on a link-by-link basis to determine the overall VMT.
    - b. Daily VMT converted into annual VMT by multiplying by 330 days. Accounts for decreased traffic on weekends and holidays.
  - 5) Vehicle miles traveled emissions (outputs):
    - a. Emissions factors by vehicle class for CO<sub>2</sub> and CH<sub>4</sub> from countywide emissions provided by EMFAC 2007. Assumes emissions from average speed of 45 mph, since VMT is not differentiated by speed or type. 2050 emissions factor by vehicle class calculated using the CAGR of emissions trends for CH<sub>4</sub> and CO<sub>2</sub> between 2009 and 2030.
    - b. Emissions factors by vehicle class for N<sub>2</sub>O from the Local Government Operations Protocol (2008), average of all model years.
    - c. Assumes annual average temperature and humidity of Patterson: 63 degrees Fahrenheit and 60% humidity.
    - d. Vehicle classification and proportion of VMT per vehicle class from EMFAC 2007.
      - i. 2030 Proportion of VMT per vehicles class as follows: light-duty autos: 42.2% of VMT; light-duty trucks: 31.6% of VMT; medium-duty trucks: 11.3% of VMT; heavy-duty trucks: 13.7% of VMT; urban buses: 0.1% of VMT; motorcycles: 1.0% of VMT.

## V. EMISSIONS INVENTORY, PROJECTIONS, AND REDUCTION MEASURES

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- ii. 2050 Proportion of VMT per vehicle class:
    - 1. EMFAC 2007 used to determine VMT by vehicle class for 2009 and 2030. CAGR of the change of VMT by vehicle class was calculated for 2009–2030 and used to determine 2050 VMT by vehicle class.
    - 2. 2050 Proportion of VMT per vehicles class as follows: light-duty autos: 43.5% of VMT; light-duty trucks: 31.2% of VMT; medium-duty trucks: 10.6% of VMT; heavy-duty trucks: 13.4% of VMT; urban buses: 0.2% of VMT; motorcycles: 1.0% of VMT.
  - e. VMT for each vehicle class is multiplied by specific emissions factor for that vehicle class for CO<sub>2</sub>, CH<sub>4</sub>, and N<sub>2</sub>O.
  - f. Total metric tons CO<sub>2</sub>e determined by multiplying totals for CO<sub>2</sub>, CH<sub>4</sub>, and N<sub>2</sub>O by their respective Global Warming Potentials.
  - g. For reduction measures, assumes a static average emission factor of CO<sub>2</sub>e per vehicle mile reduced based on 2009 baseline data: 2009 total CO<sub>2</sub>e emissions from transportation/total VMT in 2009.
- 6) Waste tons landfilled (inputs):
- a. Waste data projected based on the compound average growth rate (CAGR) of population from baseline year to target year. Assumes population growth rates equate to energy consumption rates. CAGR of population growth of each planning scenario is applied to baseline waste generation and ADC to determine target year totals.
  - b. Assumes that growth rates remain constant.
  - c. Growth of populations calculated from projected household figures for each scenario in the General Plan.
- 7) Waste emissions (outputs):
- a. Waste type data not collected by landfill. Assumes that waste breakdown is proportional to 2008 CalRecycle Waste Characterization Study, which captures the state average of waste characterization. From Composition of California's Overall Disposed Waste Stream by Material Type for landfill tonnage provided by CalRecycle 2008 Statewide Waste Characterization Study.<sup>78</sup>
  - b. Waste types are cross-referenced with input groups for EPA's WARM model<sup>79</sup> and entered into WARM groups for yearly waste emissions outputs.
  - c. Assumes emissions of CO<sub>2</sub>e/ton of waste in the baseline inventory remains constant throughout the target years.

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<sup>78</sup> 2008.

<sup>79</sup> US Environmental Protection Agency, 2009

## V. EMISSIONS INVENTORY, PROJECTIONS, AND REDUCTION MEASURES

- d. Emissions factors are applied to the projected consumption data for each target year to determine emissions.

In summary, the total emissions outputs for all sectors of the three planning scenarios are provided in **Table V-4** below.

**TABLE V-4**  
**SCENARIO COMPARISON OF EMISSIONS BY SECTOR**

GHG Business-as- Usual Forecast	CD		JE		PC	
	2030 Forecast	2050 Forecast	2030 Forecast	2050 Forecast	2030 Forecast	2050 Forecast
Residential Electricity	49,818	62,439	51,652	72,825	71,299	84,128
Residential Natural Gas	37,704	47,256	39,092	55,116	53,962	63,671
Commercial/ Industrial Electricity	128,700	148,734	152,235	166,332	146,591	164,317
Commercial/ Industrial Natural Gas	79,407	91,768	93,928	102,625	90,445	101,382
Transportation	419,259	598,187	579,254	794,996	463,979	673,828
Waste	6,130	7,604	6,324	8,816	8,514	10,031
<b>Subtotal Energy Emissions</b>	<b>295,628</b>	<b>350,197</b>	<b>336,908</b>	<b>396,898</b>	<b>362,297</b>	<b>413,498</b>
<b>Total</b>	<b>721,017</b>	<b>955,988</b>	<b>922,486</b>	<b>1,200,710</b>	<b>834,790</b>	<b>1,097,357</b>

Comparing these business-as-usual emissions projections with state emissions reduction goals yields the targets for emissions reductions. The difference between the emissions target and the forecast business-as-usual emissions represents the emissions the City is trying to eliminate. Targets for each scenario are shown below.

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TABLE V-5  
 COMPACT DEVELOPMENT SCENARIO  
 BUSINESS-AS-USUAL EMISSIONS GROWTH AND STATE REDUCTION TARGETS

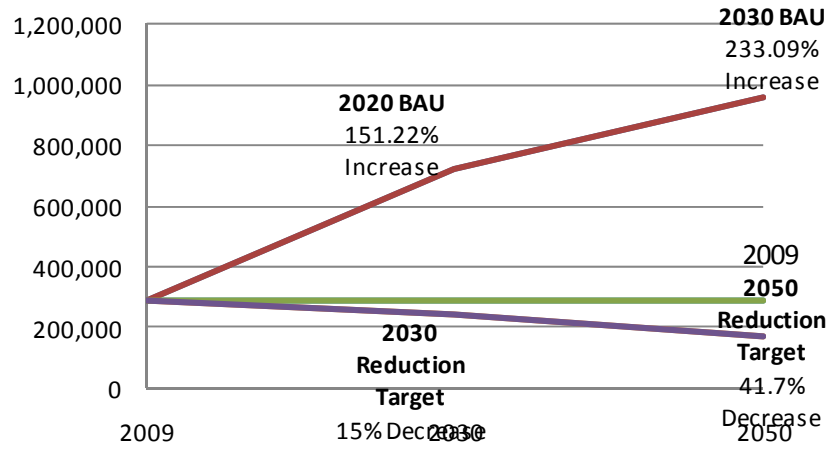
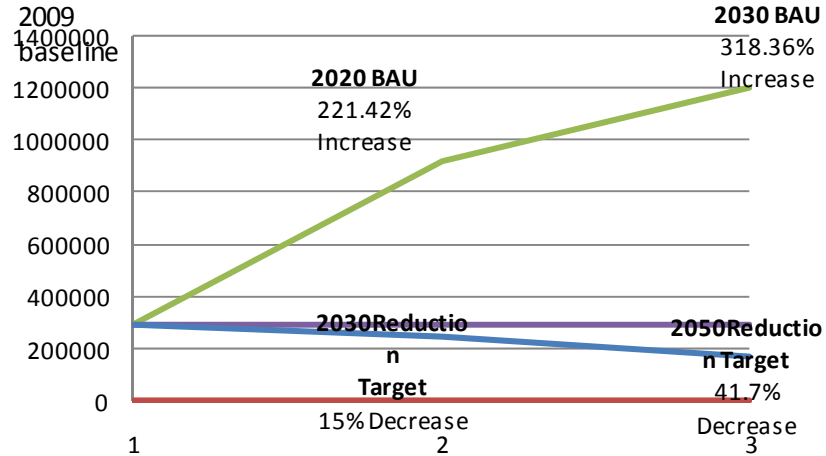
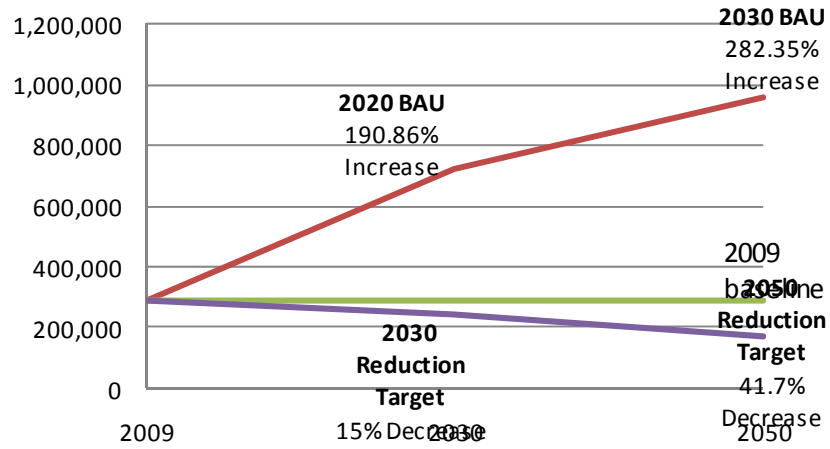


TABLE V-6  
 JOBS EMPHASIS SCENARIO  
 BUSINESS-AS-USUAL EMISSIONS GROWTH AND STATE REDUCTION TARGETS



V. EMISSIONS INVENTORY, PROJECTIONS, AND REDUCTION MEASURES

TABLE V-7  
 PLANNING COMMISSION ENVIRONMENTAL REVIEW SCENARIO  
 BUSINESS-AS-USUAL EMISSIONS GROWTH AND STATE REDUCTION TARGETS



## V. EMISSIONS INVENTORY, PROJECTIONS, AND REDUCTION MEASURES

### B.3 REDUCTION MEASURES

Reduction measures are categorized into five groups, as shown in **Table V-8** below: Energy Efficiency, Conservation, and Production; Land Use; Transportation; Waste; and State Reductions. The impact each reduction measure has on business-as-usual projections is depicted. When a reduction measure consists of a General Plan policy, the policy number is cited. A number of General Plan policies are expected to reduce emissions from the same source. In order to avoid double-counting and redundancy issues in this analysis, many similar policies were grouped and quantified as a single emissions reduction measure (e.g., policies related to mixed-use and higher-density developments were quantified as a single reduction measure). In these instances, footnotes identify which similar General Plan policies are included in the quantification.

**TABLE V-8**  
**SUMMARY OF EMISSIONS REDUCTION MEASURES**

		CD		JE		PC	
		2030	2050	2030	2050	2030	2050
<b>Draft General Plan Policies</b>							
<b>A</b>	<b>Energy Efficiency, Conservation, and Production <sup>(1)</sup></b>						
1	CD-1.8	-23,326	-57,361	-27,949	-73,492	-19,787	-65,456
2	AR-7.6	-88	-110	-91	-128	-71	-148
3	AR-7.8	-13,975	-50,259	-15,913	-56,776	-16,342	-59,340
4	NR-14	-1,928	-4,561	-2,202	-5,166	-2,353	-5,366
5	AR-7.5	-145	-194	-182	-222	-173	-219
6	NR-1.10	-1	-2	-1	-2	-2	-2
	<b>Total</b>	<b>-39,461</b>	<b>-112,487</b>	<b>-46,338</b>	<b>-135,785</b>	<b>-38,728</b>	<b>-130,530</b>
<b>B</b>	<b>Land Use <sup>(2)</sup></b>						
7	AQ-1.12	-2,984	-5,319	-4,946	-7,779	-3,532	-6,265
8	T-3.3	-23,470	-44,123	-24,334	-51,462	-33,590	-59,450
9	CD-1.1	-13,886	-22,417	-20,264	-31,554	-17,570	-27,506
10	ED-3.1	-37,127	-51,760	-48,987	-67,587	-36,053	-51,197
	<b>Total</b>	<b>-77,466</b>	<b>-123,620</b>	<b>-98,532</b>	<b>-158,383</b>	<b>-90,745</b>	<b>-144,417</b>
<b>C</b>	<b>Transportation</b>						
11	T-7.9	-2	-3	-2	-3	-3	-4
12	T-7.1	-11,950	-26,742	-17,575	-47,767	-25,511	-52,417
13	T-7.6	-909	-1,367	-1,310	-1,857	-1,043	-1,573
14	T-7.2	-8,702	-15,514	-14,426	-22,690	-10,302	-18,272
15	T-1.12	-6,428	-31,157	-8,881	-41,409	-7,113	-35,097
16	T-15	-5,142	-7,478	-7,105	-9,938	-5,691	-8,423
	<b>Total</b>	<b>-33,134</b>	<b>-82,261</b>	<b>-49,298</b>	<b>-123,664</b>	<b>-49,663</b>	<b>-115,787</b>

## V. EMISSIONS INVENTORY, PROJECTIONS, AND REDUCTION MEASURES

		CD		JE		PC	
		2030	2050	2030	2050	2030	2050
<b>4</b>	<b>Waste <sup>(3)</sup></b>						
17	PS-4.1	-3,183	-6,873	-3,284	-7,968	-4,421	-9,066
	<b>Total</b>	<b>-3,183</b>	<b>-6,873</b>	<b>-3,284</b>	<b>-7,968</b>	<b>-4,421</b>	<b>-9,066</b>
<b>Total Local Reductions</b>		<b>-153,244</b>	<b>-325,241</b>	<b>-197,452</b>	<b>-425,800</b>	<b>-183,557</b>	<b>-399,801</b>
<b>State Programs</b>							
	Renewable Portfolio Standard	<b>-33,920</b>	<b>-48,066</b>	<b>-36,452</b>	<b>-102,756</b>	<b>-44,193</b>	<b>-138,584</b>
	Pavley (AB 1493)	<b>-121,331</b>	<b>-175,876</b>	<b>-162,556</b>	<b>-228,853</b>	<b>-127,010</b>	<b>-190,233</b>
	Low Carbon Fuel Standard	<b>-10,920</b>	<b>-35,175</b>	<b>-14,630</b>	<b>-32,511</b>	<b>-11,431</b>	<b>-25,402</b>
<b>Total State Reductions</b>		<b>-166,171</b>	<b>-259,117</b>	<b>-213,638</b>	<b>-364,120</b>	<b>-182,634</b>	<b>-354,219</b>
<b>Total Reductions (Local + State)</b>		<b>-319,415</b>	<b>-584,358</b>	<b>-411,090</b>	<b>-789,920</b>	<b>-366,191</b>	<b>-754,020</b>
<b>Projected Business-As-Usual Emissions</b>		<b>721,017</b>	<b>955,988</b>	<b>922,486</b>	<b>1,200,710</b>	<b>834,790</b>	<b>1,097,357</b>
<b>Net Emissions (Projected - Reductions)</b>		<b>401,602</b>	<b>371,631</b>	<b>511,397</b>	<b>410,791</b>	<b>468,599</b>	<b>343,337</b>
<b>Percentage Change from General Plan Growth Projection</b>		<b>-44.30%</b>	<b>-61.13%</b>	<b>-44.56%</b>	<b>-65.79%</b>	<b>-43.87%</b>	<b>-68.71%</b>
<b>Percentage Change from 2009 Levels</b>		<b>39.93%</b>	<b>29.49%</b>	<b>78.18%</b>	<b>43.13%</b>	<b>63.27%</b>	<b>19.63%</b>

Notes:

1. Also refer to General Plan Policies NR-6.1, NR-8, NR-12, AQ-1.14, PS-1.6, PS-1.11, and PS-2.5
2. Also refer to General Plan Policies T-3.1, LU-1.1, LU-2.3, and NR-4.3
3. Also refer to General Plan Policy PS-4.9

As shown in **Table V-8**, these strategies will result in a significant reduction from business-as-usual emissions growth for each planning scenario. State reductions account for an almost equal portion of the reductions within Patterson and will be achieved through the Renewable Portfolio Standard, AB 1493 (Pavley), and the Low Carbon Fuel Standard.

The reduction of greenhouse gas emissions is a realistic estimate of Patterson's reduction potential given the significant amount of expected growth in the city. By 2030, reduction measures will have reversed General Plan business-as-usual forecasts by 44.3 percent for the Compact Development scenario, 44.56 percent for the Jobs Emphasis scenario, and 43.87 percent for the Planning Commission scenario. These are significant reductions, yet none of the scenarios is able to achieve reduction targets of 15 percent below 2009 levels by 2030 or 41.7 percent below 2009 levels by 2050. Nonetheless, the forecast emissions reduction measures demonstrate significant effort at attaining the reduction targets. Contextually, the level of anticipated growth in Patterson makes the reduction results appropriate and consistent with the direction of state climate change legislation.

Adoption of a Climate Action Plan, planned for within 24 months of General Plan adoption, will provide the City with the opportunity to pick up where reduction measures leave off and close the gap between emissions forecasts and reduction targets. Until that time, these reduction

## **V. EMISSIONS INVENTORY, PROJECTIONS, AND REDUCTION MEASURES**

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measures demonstrate that the City is working to achieve reduction targets and mitigate its impact on climate change.

Descriptions of each reduction measure follow.

### **A.1. Energy Efficiency, Conservation, and Production: CD-1.8**

#### General Plan Policy

CD-1.8 Green building practices. The City supports the use of green building practices in the planning, design, construction, management, renovation, operations, and demolition of all private buildings and projects, including:

- Land planning and design techniques that preserve the natural environment and minimize disturbance of the land.
- Site development to reduce erosion, minimize paved surfaces and runoff, and protect vegetation, especially trees.
- Water conservation indoors and outdoors.
- Energy efficiency in heating/cooling systems, appliances, lighting and the building envelope.
- Selection of materials based on recyclability, durability and the amount of energy used to create the material.
- Waste reduction, reuse and recycling during construction and throughout the life of the project.
- Other new aspects of green design and construction included in LEED or other certification programs.
- Control nighttime lighting to lower energy use, reduce glare, and prevent illumination of the night sky.

Also refer to General Plan Policies NR-6.1 and NR-8.

#### Methodology

- Assumes implementation of a green building ordinance that requires development to surpass California Title 24 energy standards by 15 percent, as amended, and quantifies reduced energy consumption that will result.
- Assumes that 50 percent of development between 2009 and 2030 will occur after adoption of this ordinance.
- Assumes percentage reductions in energy use from 2008 Title 24 Energy Efficiency Improvements in comparison to 2005 baseline efficiency.
- For 2030 reductions, assumes Tier 1 reductions for all new development.

## V. EMISSIONS INVENTORY, PROJECTIONS, AND REDUCTION MEASURES

- Residential electricity 36.80 percent reduction
- Residential natural gas 24.82 percent reduction
- Nonresidential electricity 19.90 percent reduction
- Nonresidential natural gas 24.40 percent reduction
- Assumes Tier 2 for commercial development 2030–2050.
  - Electricity 34.90 percent reduction
  - Natural gas 39.40 percent reduction
- Assumes Zero Net Energy for residential development 2030–2050.
- Assumes all growth in natural gas and electricity sectors is from new construction.

### Base Data

- Electricity and natural gas consumption for new commercial and residential development
  - For 2030, assume for each sector = 2030 consumption – 2009 consumption
  - For 2050, assume for each sector = 2050 consumption – 2009 consumption

**EMISSIONS REDUCTIONS (METRIC TONS CO<sub>2</sub>E)**

CD		JE		PC	
2030	2050	2030	2050	2030	2050
-23,325.58	-57,361.38	-27,948.82	-73,491.84	-19,787.29	-65,455.72

### **A.2. Energy Efficiency, Conservation, and Production: AR-7.6**

#### General Plan Policy

AQ-1.14 Public education. The City shall work to improve the public’s understanding of the land use, transportation, and air quality link.

Also refer to General Plan Policy AQ-1.14.

#### Methodology

- Assumes public education leads to lowered energy consumption rates.
- Based on empirical data from a public education campaign designed to reduce emissions of criteria air pollutants in the Sacramento region (the Spare the Air program). This is one of the few public outreach campaigns that conducted an analysis of the effectiveness of the program as it relates to emission reduction. Although this outreach campaign is transportation- and not energy-related, findings

## V. EMISSIONS INVENTORY, PROJECTIONS, AND REDUCTION MEASURES

are used for market penetration. The analysis confirmed that approximately 1 percent of people changed their behavior (i.e., took fewer vehicle trips on Spare the Air days) as a result of the Spare the Air campaign.<sup>80</sup>

- For the City's public education campaign, it was assumed that approximately 1 percent of people would reduce their emissions from electricity and natural gas by 10 percent.

### Base Data

- Electricity and natural gas consumption for all residential development (new and existing) in the target year

#### REDUCTIONS (METRIC TONS CO<sub>2</sub>E)

CD		JE		PC	
2030	2050	2030	2050	2030	2050
-87.52	-109.70	-90.74	-127.94	-71.30	-147.80

### A.3. Energy Efficiency, Conservation, and Production: AR-7.8

#### General Plan Policy

AR-7.8 Financing for energy-efficient improvements. The City shall investigate options for providing low-interest financing for energy efficient improvements and solar system installation for residents. Such financing could take the form of long-term assessments on individual property tax bills.

#### Methodology

- Assumes reduction in energy consumption that will result from creation of a finance mechanism such as a Property Assessed Clean Energy bond to finance energy efficiency improvements (e.g., AB 811 type program).
- Reductions in kWh from renewable energy facilities: Calculation takes 15 percent of kWh energy use for new and existing residential and commercial development, as depicted in the kWh used in 2030, phased in with only 8 percent applied in 2030. The estimate of photovoltaics installed is restricted to installations on existing homes by 2030 and all commercial properties, both those existing by 2030 and those that will be constructed after 2030. It excludes renewable installations to power new developments that come as a result of green building efforts and the State's Zero Net Energy Homes effort in the Green Building measure (represented by the difference of projected kWh between 2030 and 2050).
- Therms for residential uses: Reductions for greater efficiencies in water heaters are applied only to new residential development in 2030, including therms for water heating in existing development and excluding reductions resulting from the State's

<sup>80</sup> SMAQMD 2009.

## V. EMISSIONS INVENTORY, PROJECTIONS, AND REDUCTION MEASURES

Zero Net Energy Homes effort that will result by 2050 (accounted for in the Green Building measure). It accounts for all possible savings that would be generated by more efficient water heaters.

- Assumes a 15 percent market penetration of renewable energy facilities and water heaters in the target years phased in with only 8 percent penetration achieved by 2030 and that this penetration rate will apply to new and existing development in 2030 (excluding reductions that will be attributed to green building efforts and the State's Zero Net Energy Homes effort (represented by new kWhs in 2030)).
- Assumes that 44 percent of residential natural gas is used for water heating<sup>81</sup> and that this rate will remain constant.
- Assumes that there is 19.5 percent in natural gas savings for improved efficiency water heaters (the average of tankless and efficient gas storage models according to Energystar.gov savings and benefits Web pages) and that this will remain constant.
- Assumes that conversion to more efficient water heaters is merely an issue of turnover and easy for property owners to finance because of minimal price differences and existing subsidies. The reductions for more efficient water heaters are assumed to be achieved in all new development in 2030.<sup>82</sup> This measure excludes all therm use attributed to new residential development between 2030 and 2050, which is captured under Policy CD-1.8 and which takes credit for the State's Zero Net Energy Homes effort.

### Base Data

- Natural gas consumption for all new residential development in 2030
- Total electricity consumption for residential and nonresidential uses in 2030
- Electricity consumption for commercial uses in 2050

#### REDUCTIONS (METRIC TONS CO<sub>2</sub>E)

CD		JE		PC	
2030	2050	2030	2050	2030	2050
-13,974.60	-50,259.34	-15,913.09	-56,775.98	-16,341.76	-59,339.59

### A.4. Energy Efficiency, Conservation, and Production: NR-14

#### General Plan Policy

NR-14. The City will consider amendments to the Zoning Regulations and relevant building codes and providing training for City staff regarding the incorporation of features which will reduce heat gain in new construction. Such revisions may include:

<sup>81</sup> CPUC, 2008

<sup>82</sup> Fuller et al. 2009.

## V. EMISSIONS INVENTORY, PROJECTIONS, AND REDUCTION MEASURES

- Allowances for the construction of “green” roofs;
- Standards for surface shading of paved areas such as parking lots;
- Standards for the use of paving materials with an enhanced solar reflective index (SRI);
- Standards that provide for pervious pavement options.

### Methodology

- Quantifies reduced electricity consumption that results from combating the urban heat island effect.
- Assumes a combination of the following strategies will be utilized for 50 percent of the landscape (including roads, sidewalks, courtyards, and parking lots): Shade (within 5 years of occupancy); paving materials with a solar reflective index (SRI) of at least 29; open grid pavement system.
- The urban area is assumed to be approximately 40 percent pavement. Assumes total of 30 percent of all existing pavement will be replaced with high albedo content, as supported by the literature.<sup>83</sup>
- Pavement has a potential for a .15 increase in albedo.  $0.40 * 0.30 * 0.15 =$  net change of 0.018 by 2030. Assumes half will be achieved by 2020, or .009. Assumes a 10K<sup>84</sup> decrease in temperature for a 0.25 increase in albedo.<sup>85</sup>
- Electricity demand in cities increases by 2–4 percent for each 1 degree Celsius increase in temperature.<sup>86</sup> Assumes 3 percent increase for each 1 degree Celsius increase in temperature; conversely, this quantification assumes that for each degree change in temperature, there will be a 3 percent change in electricity use.

### Base Data

- Total electricity consumption for residential and commercial uses

#### REDUCTIONS (METRIC TONS CO<sub>2</sub>E)

CD		JE		PC	
2030	2050	2030	2050	2030	2050
-1,927.99	-4,561.35	-2,201.99	-5,165.79	-2,353.21	-5,366.41

<sup>83</sup> EPA n.d.; Rosenfield 2008.

<sup>84</sup> K is a unit of measurement to measure the total amount of incoming and reflecting solar radiation, otherwise known as insolation.

<sup>85</sup> Akbari 2001.

<sup>86</sup> Ibid.

**A.5. Energy Efficiency, Conservation, and Production: AR-7.5**

General Plan Policy

AR-7.5 Passive solar heating. To the extent feasible, the City shall require the orientation of buildings to maximize passive solar heating during cool seasons, avoid solar heat gain in warm seasons, enhance natural ventilation and effective use of daylight, and to maximize opportunities for the installation of solar panels.

Methodology

- Quantifies the impact of improved orientation and solar shading requirements on electricity consumption.
- Planting shade trees within 40 feet of the south side or within 60 feet of the west side of properties can reduce summertime energy consumption associated with air conditioning by approximately 30 percent.<sup>87</sup>
  - If trees are planted strategically to shade east and west walls of residential buildings, they would reduce air conditioning energy use by 6,408 GWh, equivalent to an average annual CO<sub>2</sub> equivalent emission reduction of 1.8 metric tons.
  - If 50,000,000 trees would reduce energy use by 6,408 GWh (6,408,000,000 kWh), then 1 tree reduces energy use by 128.16 kWh per year.
- Assumes that the following trees would reach maturity in 5 to 10 years: Approximately 3 percent of existing residential properties in Patterson would receive an additional tree by 2030 (assumed to equal the same percentage of existing dwelling units in 2009) and 10 percent of new residential properties by 2050, and that 1 new tree would be planted for every 5,000 square feet of nonresidential use for each target year.

Base Data

- Total electricity consumption for residential and commercial uses for each target year

**REDUCTIONS (METRIC TONS CO<sub>2</sub>E)**

CD		JE		PC	
2030	2050	2030	2050	2030	2050
-144.61	-193.54	-182.37	-221.77	-173.32	-218.54

<sup>87</sup> USDA 2009.

## V. EMISSIONS INVENTORY, PROJECTIONS, AND REDUCTION MEASURES

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### A.6. Energy Efficiency, Conservation, and Production: NR-1.10

#### General Plan Policy

NR-1.10 Water conservation. The City shall promote the efficient use of water.

Also refer to General Plan Policies PS-1.6, PS-1.11, and PS-2.5.

#### Methodology

- Calculates the energy savings that result from reduced indoor water use.
- Assumes implementation of actions such as the following related General Plan policies:
  - PS-1.6 Reclaimed water. The City shall require the use of reclaimed water by industrial, commercial, recreational, agricultural and roadway landscaping uses.
  - PS-1.11 New development conservation measures. The City shall require all new development to use best available technologies for water conservation including, but not limited to, water-conserving toilets, showerheads, faucets, and irrigation systems.
  - PS-2.5 Reuse of treated water. The City shall research viable options for the reuse of treated wastewater, in conjunction with industrial, commercial, agricultural, recreational, and public landscaping uses.
- Assumes a 20 percent reduction in indoor water use by 2030 and a 25 percent reduction by 2050. Conservative assumption, based on SBx7-7, signed into law in November 2009, which aims to reduce urban use 20 percent statewide by 2020.
- Assumes the Northern California average of energy used per gallon of indoor water consumed is .0054 kWh.<sup>88</sup> Consumption rate is assumed to remain constant.
- To determine the amount of water consumed in the city, assumes the indoor per capita water average of 69.3 gallons.<sup>89</sup> Assumed to remain constant in the business-as-usual projections.

#### Base Data

- Population projections

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<sup>88</sup> California Energy Commission 2006.

<sup>89</sup> American Water Works Association 2009.

## V. EMISSIONS INVENTORY, PROJECTIONS, AND REDUCTION MEASURES

### REDUCTIONS (METRIC TONS CO<sub>2</sub>E)

CD		JE		PC	
2030	2050	2030	2050	2030	2050
-1.08	-1.68	-1.11	-1.94	-1.50	-2.21

#### B.7. Land Use: AQ-1.12

##### General Plan Policy

AQ-1.12 Affordable housing access to alternate mode of travel. The City shall work with the Housing Authority, transit providers, and developers to encourage the construction of low income housing developments that use transit-oriented and pedestrian-oriented design principles.

##### Methodology

- URBEMIS provides a 4 percent reduction in vehicle trips for each deed-restricted below market rate (BMR) unit. Thus, the total reduction is as follows: Trip reduction = % units that are BMR \* 0.04.
- The Regional Housing Needs Allocation (RHNA) Plan determined that 23 percent of the construction need in the county is classified as very low-income households and an additional 16 percent shows a need for low income. Assumes conservatively that by 2030 the RHNA will be met and 30 percent of households in Patterson will be affordable to very low- and low-income households. Assumes this percentage remains constant until 2050.
- Assumes reductions observed for BMR units equal reductions that will be achieved through very low- and low-income units.
- Assumes that all new traffic is caused by new business growth and new housing growth equally.

##### Base Data

- All new VMT that exceeds baseline activity

### REDUCTIONS (METRIC TONS CO<sub>2</sub>E)

CD		JE		PC	
2030	2050	2030	2050	2030	2050
-2,983.66	-5,319.17	-4,946.03	-7,779.44	-3,532.15	-6,264.75

## V. EMISSIONS INVENTORY, PROJECTIONS, AND REDUCTION MEASURES

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### B.8. Land Use: T-3.3

#### General Plan Policy

T-3.3 Rideshare coordination. The City shall organize a voluntary ride-share coordination system for commuters.

Also refer to General Plan Policy T-3.1.

#### Methodology

- Quantifies reduced VMT that will result from a ride-share program.
- Estimated number of vehicles in Patterson calculated by assuming that the number of cars per household is constant with the countywide car per household figure. Car population derived from EMFAC 2007, which uses historical DMV registration data. 356,872 cars in 2009/177,545 households = 2.01 cars per household, which is in line with the national average. Rate assumed to remain constant.
- The San Luis Obispo City Trip Reduction Incentive Program (TRIP) is used as a case study for estimated emission reductions associated with similar programs. SLO City TRIP in cooperation with SLO County Rideshare: Case Study – In August 2009, there were 69 individuals enrolled in the City's incentive program (which includes rewards and guaranteed rides home for commuters). Cumulatively they eliminated 9,235.2 one-way trips and 122,675.3 VMT, or 133.84 trips and 1,777.903 VMT reduced annually per person. Total employment at the City of SLO was approximately 350 in 2008; therefore total participation was approximately 20 percent.<sup>90</sup>
- Assumes 30 percent participation rate achieved by 2050, with 20 percent participation rate phased in by 2030.
- According to General Plan background report (2007), in 2000 36 percent of persons employed outside the home traveled more than 45 minutes to their place of work. Assumes conservative daily one-way work commute on average of 15 miles for those who will participate in ride-share. Assumes 49 work weeks a year, accounting for holidays. Equals yearly commute of 14,700 miles per rideshare participant.

#### Base Data

- All new VMT that exceeds baseline activity

#### REDUCTIONS (METRIC TONS CO<sub>2</sub>E)

CD		JE		PC	
2030	2050	2030	2050	2030	2050
-23,469.55	-44,123.31	-24,333.80	-51,462.49	-33,589.66	-59,449.85

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<sup>90</sup> Rideshare Lucky Bucks statistical data provided by Cindy Blake, Rideshare Administrative Assistant, on November 3, 2009.

### B.9 Land Use: CD-1.1

#### General Plan Policy

CD-1.1 Smart Growth principles. The City will continue to require new development to incorporate the principles of 'Smart Growth,' including:

- A mix of housing products and densities serving the broadest range of households, incomes, and ages;
- A neighborhood center containing higher density residential development, retail, restaurants, entertainment, office, and public uses within a short walk or bicycle ride of surrounding residences;
- Parks, schools, and other public/quasi-public uses within a short walk or bicycle ride;
- A complete and interconnected system of mobility consisting of roadways, bicycle and pedestrian paths, and transit stops;
- Short blocks with a substantial tree canopy shading the street and sidewalk;
- Connectivity to surrounding neighborhoods, regional retail centers and employment;
- A sense of personal safety;
- Elements that foster the sustainable use of scarce or non-renewable resources

Also refer to General Plan Policies LU-1.1, LU-2.3, and NR-4.3.

#### Methodology

- Assumes reduced VMT triggered by the elasticity of travel associated with the increased mixture of uses. The literature supports a 5 percent reduction in vehicle miles traveled for every 100 percent increase in density and increase in convenience. To calculate the net increase in density in the city between 2005 and the target years, the following variables were needed.
  - Density calculated as population and jobs for each target year.
  - Assumes that a 5 percent reduction in VMT would result from each 100 percent increase in density.<sup>91</sup> Accordingly, 0.05 was taken of each target year's percentage increase in density. The resulting number was the percentage reduction in VMT for the target year.
  - Similarly, the literature supports a 5 percent reduction for increasing the density of jobs-housing balance and convenience of shopping and services. Relying upon the percentage of travel attributed to shopping and commuting from national averages (14 percent shopping and 18 percent commuting), it was assumed that shopping and commuting related trips would be reduced by 5 percent.

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<sup>91</sup> Ewing, Reid, et al. 2001.

## V. EMISSIONS INVENTORY, PROJECTIONS, AND REDUCTION MEASURES

### Base Data

- Annual VMT for each target year

#### REDUCTIONS (METRIC TONS CO<sub>2</sub>E)

CD		JE		PC	
2030	2050	2030	2050	2030	2050
-13,885.51	-22,417.24	-20,264.49	-31,553.63	-17,569.54	-27,505.99

### B.10 Land Use: ED-3.1

#### General Plan Policy

ED-3.1 Jobs-to-housing ratio. The City shall maintain an adequate retail, business, and industrial land supply to meet a jobs-to-housing ratio of 1.0.

#### Methodology

- Gives credit for reduced VMT that results from increased jobs-housing balance.
- Assumes VMT Reduction =  $(1 - (\text{ABS}(1.5 \cdot h - e) / (1.5 \cdot h + e)) - 0.25) / 0.25 \cdot 0.03$  where h = study area housing units, e = study area employment.<sup>92</sup> Also assumes an asymptote of 9 percent reduction and an ideal 1.5 jobs per household. Note: These point reductions were taken from URBEMIS 2007 9.2.458 data according to sample jobs-to-housing ratio.

### Base Data

- Total VMT for each target year

#### REDUCTIONS (METRIC TONS CO<sub>2</sub>E)

CD		JE		PC	
2030	2050	2030	2050	2030	2050
-37,126.90	-51,760.21	-48,987.45	-67,587.16	-36,053.47	-51,196.83

### C.11 Transportation: Safe Routes to School

#### General Plan Policy

T-7.9 Coordination with schools. The City will collaborate with the School District to promote bike use and will actively pursue Safe Route to School grants to fund programs that facilitate safe bike routes.

<sup>92</sup> SJVAPCD 2009; ONL 2004; California Air Pollution Control Officer's Association 2008.

Methodology

- Quantifies reduced VMT that will result from improved alternative transportation programs for school-age children.
- As of 2000 census, there were 3,164 school-age children in Patterson. Assumes number will remain constant until 2009. Assumes number of school-age children increases evenly with population growth. Number of school-age children includes children ages 5–17 in the city.
- According to the Victoria Town Planning Institute, there are currently few detailed studies of the effectiveness of School Transport Management programs, but anecdotal evidence indicates that total reductions in automobile trips of 10–20 percent or more are possible at a particular school under programs such as a walking school bus.<sup>93</sup> Assumes a 15 percent reduction in automobile trips
- Assumes average round-trip drop-off distance for parents is 5 miles and that 80 percent of trips are single-child drop-offs.

Base Data

- Total VMT for each target year

REDUCTIONS (METRIC TONS CO<sub>2</sub>E)

CD		JE		PC	
2030	2050	2030	2050	2030	2050
-2.17	-2.70	-2.24	-3.13	-3.02	-3.56

**C.12 Transportation: T-7.1**

General Plan Policy

T-7.1 Safe pedestrian and bike pathways. The City shall create and maintain a safe and convenient system of pedestrian and bicycle pathways that encourages walking and bicycling as an alternative to driving. New development shall be required to pay its share of the costs for development of this pathway system.

Methodology

- Quantifies reduced VMT that will result from provision of bike lanes.
- Each mile of bikeway per 100,000 residents increases bicycle commuting 0.075 percent, all else being equal.<sup>94</sup> Calculates the increase in bicycle commuting through the cumulative amount of bike lanes — both new lanes planned for construction and those already existing.

<sup>93</sup> Victoria Town Planning Institute 2008.

<sup>94</sup> Nelson and Allen 1997.

## V. EMISSIONS INVENTORY, PROJECTIONS, AND REDUCTION MEASURES

- Assumes that 1 percent of trips are performed by bikes per national average.
- Assumes constant level of service of bike lanes is provided, at a ratio of 1.73 miles bike lanes installed per 1,000 residents, and 21.12 miles of existing bike lanes in 2009.<sup>95</sup>

### Base Data

- Total VMT for each target year

#### REDUCTIONS (METRIC TONS CO<sub>2</sub>E)

CD		JE		PC	
2030	2050	2030	2050	2030	2050
-909.06	-1,366.98	-1,309.69	-1,856.99	-1,043.03	-1,573.46

### C.13 Transportation: T-7.6

#### General Plan Policy

T-7.6 Bike storage. The City shall require the inclusion of bicycle parking facilities at all new major public facilities and commercial and employment sites and will encourage large employers to provide showers for employees.

#### Methodology

- Calculates reduced VMT that will result from enhanced bicycle support facilities.
- Assumes bike facilities will be required at all new nonresidential uses.
- According to the CAPCOA/the SJVAPCD Plan, provision of short- and long-term bike parking at the rate of 1:20 vehicle spaces supports a 0.625 percent reduction in emissions.<sup>96</sup> Assumes implementation of this development standard as a result of General Plan adoption.
- According to the National Household Travel Survey, average annual VMT per household is 21,187 and the “to or from work” subcategory is 5,724 (27.0 percent). Shopping is 3,062 (14.5 percent), Other Family and Personal Business is 3,956 (18.7 percent), and Social and Recreational driving is 5,186 (24.5 percent).<sup>97</sup> Therefore, VMT attributed to commercial businesses is 27% + 14.5% = 41.5%.
- Assumes that percentage of VMT attributable to new commercial development equals the percentage of all jobs that are new applied to VMT of commercial development.

<sup>95</sup> Per CMCA guidance.

<sup>96</sup> CAPCOA 2009.

<sup>97</sup> 2001.

## V. EMISSIONS INVENTORY, PROJECTIONS, AND REDUCTION MEASURES

- Assumes that emissions reductions for commercial bicycle parking are attributed equally to short- and long-term bicycle parking spaces.

### Base Data

- Total VMT for each scenario

#### REDUCTIONS (METRIC TONS CO<sub>2</sub>E)

CD		JE		PC	
2030	2050	2030	2050	2030	2050
-909.06	-1,366.98	-1,309.69	-1,856.99	-1,043.03	-1,573.46

### **C.14 Transportation: T-7.2**

#### General Plan Policy

T-7.2 Pedestrian access. All new development will be reviewed to ensure safe pedestrian access is provided from the street, within parking areas and between development and surrounding neighborhoods.

#### Methodology

- Quantifies reductions in VMT that result from enhanced pedestrian facilities.
- Assumes a 3.5 percent reduction in VMT for connectivity to transit, measures which relegate parking to the rear of structures, providing shaded pedestrian pathways between transit facilities and building entrances, and minimizing barriers to pedestrian access of neighboring facilities and sites.<sup>98</sup>
- Assumes that all development will include the removal of physical barriers between residential and nonresidential uses that impede bicycle or pedestrian circulation.

### Base Data

- VMT from new development = VMT in the target year – VMT in 2009 baseline

#### REDUCTIONS (METRIC TONS CO<sub>2</sub>E)

CD		JE		PC	
2030	2050	2030	2050	2030	2050
-8,702.35	-15,514.26	-14,425.92	-22,690.02	-10,302.11	-18,272.18

<sup>98</sup> CAPCOA 2008.

## V. EMISSIONS INVENTORY, PROJECTIONS, AND REDUCTION MEASURES

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### C.15 Transportation: T-1.12

#### General Plan Policy

T-1.12 Traffic calming. Traffic calming techniques, including roundabouts, traffic circles, “chokers” and chicanes, shall be considered as an alternative to traditional intersection controls.

#### Methodology

- Quantifies reduction in VMT caused by traffic calming.
- Assumes that a comprehensive menu of traffic calming measures shall be installed to utilize the full elasticity of vehicle travel.
- The penetration of traffic calming measures is phased in, assuming that installation of such devices will impact 15 percent of VMT in 2030 and 25 percent of VMT in 2050.
- Assumes that total VMT reductions from this action will be 10 percent by 2030 and 20 percent by 2050, based on conservative reductions from other case studies.<sup>99</sup>

#### Base Data

- Total VMT for each target year

#### REDUCTIONS (METRIC TONS CO<sub>2</sub>E)

CD		JE		PC	
2030	2050	2030	2050	2030	2050
-6,427.85	-31,157.48	-8,880.81	-41,408.57	-7,113.47	-35,097.36

### C.16 Transportation: T-15

#### General Plan Policy

T-15. The City will conduct a study to determine the costs and benefits of metered parking in Downtown. More expensive parking will motivate people to take alternative transportation, or at the very least, motivate people to limit the number of trips that require paid parking.

#### Methodology

- Takes credit for reduced VMT that will result from paid parking measures.
- Cost-based parking pricing (i.e., prices set to recover the full cost of parking facilities) typically reduces parking demand 10–30 percent compared with unpriced

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<sup>99</sup> Victoria Town Planning Institute 2008.

## V. EMISSIONS INVENTORY, PROJECTIONS, AND REDUCTION MEASURES

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parking.<sup>100</sup> Reduction of 10 percent applied to local road trips to and from the downtown area, which were assumed to be a quarter of all local transportation.

- Assumes establishment of paid parking that penetrates local VMT.
- Assumes 48 percent of VMT takes place on local roads and is impacted.

### Base Data

- Total VMT for each target year

#### REDUCTIONS (METRIC TONS CO<sub>2</sub>E)

CD		JE		PC	
2030	2050	2030	2050	2030	2050
-5,142.28	-7,477.79	-7,104.65	-9,938.06	-5,690.77	-8,423.37

### **D.17 Waste: PS-4.1**

#### General Plan Policy

PS-4.1 Reduction goals. The City shall study and actively pursue methods of solid waste recycling and reuse, including source separation, with the goal of reducing its solid waste generation by 25 percent by the year 2015 and 50 percent by the year 2020.

Also refer to General Plan Policy PS-4.9.

#### Methodology

- Calculates reduced waste emissions that will result from a smaller waste stream.
- Stanislaus County Regional Solid Waste Planning Agency's diversion rate was 61 percent in 2006. Assumed to remain constant.<sup>101</sup> Assumes a 50 percent diversion rate by 2030 and a 70 percent rate by 2050.
- Current composting methods are understood to produce greenhouse gas emissions; however commercial composting methods are expected to improve to negate these emissions by 2030 and 2050.

### Base Data

- Total waste tons for each target year

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<sup>100</sup> Shoup 2005.

<sup>101</sup> CalRecycle 2010b.

## V. EMISSIONS INVENTORY, PROJECTIONS, AND REDUCTION MEASURES

### REDUCTIONS (METRIC TONS CO<sub>2</sub>E)

CD		JE		PC	
2030	2050	2030	2050	2030	2050
-3,182.85	-6,873.07	-3,283.85	-7,968.15	-4,420.64	-9,066.45

#### D.1 State Reductions: Pavley

##### Description

Assembly Bill 1493 (Pavley), signed into law in 2002, will require carmakers to reduce greenhouse gas emissions from new passenger cars and light trucks beginning in 2011. The California Air Resources Board adopted regulations in September 2004 that create two phases of increasingly stringent standards for car manufacturers between 2009 and 2020. It is expected that new vehicles sold in California will create an average of 16 percent less greenhouse gas emissions than current models.

##### Methodology

- Quantifies reductions in emissions from VMT that will result from Pavley.
- Pavley rules establish GHG emission standards for two different groups of passenger vehicles: (1) passenger cars (PC) and light-duty trucks with test weights under 3,751 pounds loaded vehicle weight (LDT1); and (2) light-duty trucks with test weights between 3,751 pounds loaded vehicle weight and 8,500 pounds gross vehicle weight (GVW) (LDT2). Medium-duty passenger vehicles (LDT3) between 8,500 and 10,000 pounds. GVW are included with manufacturers' LDT2 vehicles when determining compliance with California's GHG standards. For the purposes of this analysis, only vehicles up through 8,500 pounds were considered since the majority of LDT3 vehicles are commercial and therefore do not fall under the scope of the Pavley rules.
- The GHG emission standards established by the Pavley regulation reflect not only exhaust CO<sub>2</sub> emissions resulting directly from operation of the vehicle, but also (1) tailpipe emissions of CH<sub>4</sub> and N<sub>2</sub>O; (2) CO<sub>2</sub> emissions resulting from operating the air conditioning system (indirect AC emissions); and (3) hydrofluorocarbon refrigerant emissions released from the air conditioning system due to leakage, losses during recharging, sudden releases due to accidents, or release from scrappage of the vehicle at end of life (direct AC emissions). Analysis only accounts for CO<sub>2</sub> from tailpipe emissions. Air conditioning is not included in EMFAC estimates of CO<sub>2</sub>e and methane and therefore is not accounted for in the reductions.
- EMFAC used to determine percentage of VMT by model year and percentage of VMT attributed to Pavley-applicable cars. For 2050 figures, utilized the compound average growth rate (CAGR) of trends for each data set from 2009 to 2030.

##### Base Data

- Total emissions of CO<sub>2</sub>e from the transportation sector remaining after General Plan policy reductions

## V. EMISSIONS INVENTORY, PROJECTIONS, AND REDUCTION MEASURES

### REDUCTIONS (METRIC TONS CO<sub>2</sub>E)

Vehicle Model Year	CD		JE		PC	
	2030	2050	2030	2050	2030	2050
Pre-2010	28,734	0	39,867.66	-	31,176.48	0
2010	3,332	4,810	4,622.47	6,258.87	3,614.76	5,203
2011	3,601	5,195	4,996.09	6,759.24	3,906.94	5,619
2012	3,975	5,729	5,515.70	7,454.56	4,313.27	6,197
2013	4,775	6,881	6,625.73	8,953.34	5,181.31	7,442
2014	5,703	8,217	7,913.21	10,691.49	6,188.12	8,887
2015	6,581	9,478	9,130.95	12,333.25	7,140.40	10,252
2016	7,231	10,413	10,033.49	13,549.28	7,846.18	11,263
2017	7,812	11,250	10,839.04	14,638.31	8,476.12	12,168
2018	8,268	11,909	11,471.82	15,496.44	8,970.96	12,881
2019	8,824	12,712	12,242.55	16,541.24	9,573.66	13,750
2020–2030	175,958	253,458	244,140.94	329,803.42	190,918.04	274,147
<b>Total</b>	<b>264,794</b>	<b>340,050</b>	<b>367,399.64</b>	<b>442,479.44</b>	<b>287,306.25</b>	<b>367,809</b>

### D.2 State Reductions: Low Carbon Fuel Standard

#### Description

To reduce the carbon intensity of transportation fuels, CARB is developing a Low Carbon Fuel Standard (LCFS), which would reduce the carbon intensity of California's transportation fuels by at least 10 percent by 2020 as called for by Governor Schwarzenegger in Executive Order S-01-07. LCFS will incorporate compliance mechanisms that provide flexibility to fuel providers in how they meet the requirements to reduce greenhouse gas emissions. A 10 percent reduction in the intensity of transportation fuels is expected to equate to a reduction of 16.5 million metric tons CO<sub>2</sub>e in 2020. However, in order to account for possible overlap of benefits between LCFS and the Pavley greenhouse gas standards, CARB has discounted the contribution of LCFS to 15 million metric tons CO<sub>2</sub>e. Therefore, LCFS will be responsible for a 9 percent reduction in global warming intensity (GWI) by 2020.

#### Methodology

- Assumes a 9 percent reduction in global warming intensity (GWI) by 2020. Assumes a 20 percent reduction in GWI by 2030.

#### Base Data

- Total reductions calculated for Pavley

## V. EMISSIONS INVENTORY, PROJECTIONS, AND REDUCTION MEASURES

### REDUCTIONS (METRIC TONS CO<sub>2</sub>E)

	CD		JE		PC	
	2030	2050	2030	2050	2030	2050
<b>LCFS Reduction Target</b>	9.00%	20.00%	9.00%	20.00%	9.00%	20.00%
<b>GHG Reduction</b>	10,920	35,175	14,630	32,511	11,431	25,402

### D.3 State Reductions: Renewable Portfolio Standard

#### Description

Established in 2002 in Senate Bill 1078, the Renewable Portfolio Standard (RPS) program requires electricity providers to increase the portion of energy that comes from renewable sources to 20 percent by 2010 and to 33 percent by 2020. Per the trend of Executive Order S-14-08, this renewable energy goal is assumed to increase to 50 percent by 2030.

#### Methodology

- Takes credit for reduced electricity emissions that will result from energy production mandated under the RPS.
- Pacific Gas and Electric (PG&E) had 13.6 percent renewable mix in 2008.<sup>102</sup>
- Assumes that the state will reach 50 percent renewable by 2050 as identified in the State's Strategic Energy Plan, phased in with 30 percent achievement by 2030.<sup>103</sup>

#### Base Data

- Total energy consumption remaining after General Plan policy reductions

### REDUCTIONS (METRIC TONS CO<sub>2</sub>E)

	CD		JE		PC	
	2030	2050	2030	2050	2030	2050
<b>RPS Target</b>	30.00%	50.00%	30.00%	50.00%	30.00%	50.00%
<b>Reduction in Electricity Emissions</b>	33,920	48,066	36,452	102,756	44,193	138,584

<sup>102</sup> CPUC, 2009

<sup>103</sup> CPUC, 2009. Accessed from <http://www.californiaenergyefficiency.com/docs/EEStrategicPlan.pdf>

While the impact of General Plan policies and state actions are significant and reduce the City's impacts on climate change, under each of the three planning scenarios, these actions fail to achieve the City's ultimate reduction targets that would comply with state guidance. The City's reduction targets and actual reduction achievements are compared below for each scenario.

**TABLE VI-9  
COMPARISON OF FUTURE GHG SCENARIOS WITH REDUCTION TARGETS**

Scenario	Reductions*	2009	2030		2050	
		Baseline	Business as Usual	With CAP & State	Business as Usual	With CAP & State
<b>Reduction Targets (as a Percentage Reduction of Baseline Emissions)</b>				<b>-15%</b>		<b>-42%</b>
CD	Total Emissions	287,004	721,017	401,602	955,988	371,631
	Percentage Increase from Baseline Emissions	0.00%	151.22%	39.93%	233.09%	29.49%
	Actual Percentage Reduction from Business-as-Usual Forecast			<b>55%</b>		<b>44%</b>
JE	Total Emissions	287,004	922,486	511,397	1,200,710	410,791
	Percentage Increase from Baseline Emissions	0.00%	221.42%	78.18%	318.36%	43.13%
	Actual Percentage Reduction from Business-as-Usual Forecast			<b>93%</b>		<b>58%</b>
PC	Total Emissions	287,004	834,790	468,599	1,097,357	343,337
	Percentage Increase from Baseline Emissions	0.00%	190.86%	63.27%	282.35%	19.63%
	Actual Percentage Reduction from Business-as-Usual Forecast			<b>78%</b>		<b>35%</b>

Note: CD = Compact Development, JE = Jobs Emphasis, PC = Planning Commission Environmental Review Plan

\*All data is in metric tons of CO<sub>2</sub>e

These reductions are realistic estimates of Patterson's reduction potential through only General Plan policies and state actions. This report demonstrates the City's efforts to reduce emissions and comply with state direction to date. While targets are not ultimately realized through this document, they provide an important starting point to realize reduction targets and provide a road map for the Climate Action Plan.

The City will adopt a Climate Action Plan within two years. This Climate Action Plan provides the City with the opportunity to close the gap between reduction targets and actual reductions outlined here. The Climate Action Plan represents the single most important opportunity the City has to show compliance with state direction and to mitigate its impact on climate change. Specifically, the policy for development of a Climate Action Plan has to be specific and quantifiable. The policy for development of the Climate Action Plan also has to require solid target years and reduction targets. It will surpass the actions taken to date through the General Plan and provide concrete, enforceable actions. Through such an approach, the City can create an effective mechanism that facilitates achievement of reduction targets and demonstrates the methods by which they are to be achieved.

Thus, by taking a first step through this Climate Change Summary Report to demonstrate its efforts to achieve reduction targets, the City has displayed its commitment to mitigating impacts

## **VI. NEXT STEPS**

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on climate change. By emphasizing the importance of the Climate Action Plan to further address the complexities of achieving reduction targets, the City is placing itself on a trajectory for achieving long-term success and attainment of a successful, informed approach to land use planning.



San Luis & Delta-Mendota Water Authority

**2019**

# Westside-San Joaquin Integrated Regional Water Management Plan

January 2019



Prepared by:



## Chapter 13 Climate Change

The potential effects of climate change in California are well documented in multiple studies, reports and agency communications (DWR, 2009; CNRA, 2012; Null, et al, 2010; DWR, 2011) and generally point to increased temperatures, sea level rise, a reduced winter snowpack, altered precipitation patterns, and more frequent storm events. The purpose of this section is to identify the forecasted climate change impacts specific to the WSJ Region and interpret these changes in climatic and hydrologic variables in terms of the region’s vulnerability. This section also describes how the RMSs pursued in the region can be useful as adaptation responses for the areas of vulnerability and how the Region can monitor climate change information relevant to the region in the future. Climate change aspects are relevant for many of the components of this plan (Objectives, Coordination, RMSs, etc.); therefore, climate change is discussed, as applicable, in the respective chapters.

Climate change is a term with a very specific physical meaning – the long-term change in climatic conditions on the planet – but in the context of IRWM, the term has crossover implications in the physical and natural systems, social and economic activities, and the interaction between stakeholders to plan and implement projects and strategies to accomplish objectives. Several specific aspects of climate change are discussed in this section; some of the relevant terms are defined below:

- **Climate change mitigation** refers to reductions in GHG emissions that may result from the implementation of policies, projects, and programs, and are discussed in this chapter when presenting RMSs considered by the WSJ Region.
- **Climate change adaptation** refers to policies, projects and programs that can be used to reduce the vulnerability of the Region to climate change and are discussed in this chapter when presenting RMSs considered by the WSJ Region.
- **Climate change impacts** refers to changes in specific climatic variables and sea level, but also the resulting impacts in specific aspects of the water resources system such as streamflows, snowpack, water temperature, ecosystem stress, etc. Impacts are discussed in this section first as part of the assessment of vulnerability, but also in terms of how the performance of specific projects and RMSs may vary as a result of climate change.
- **Climate change data** refers to data, information, modeling results and forecasts related to specific climate, hydrology and ecology variables of interest to the Region. This is discussed in the vulnerability assessment at the end of the chapter when presenting a general plan for continued data gathering efforts.

### 13.1 Legislative and Policy Context

The climate change elements of this WSJ IRWMP need to consider the current legislative, regulatory, and policy context. In California, specifically, there are a number of policies and laws dealing with climate change (mitigation, adaptation, vulnerability assessment). Relevant legislation and executive orders in terms of California’s response to climate change have been considered in this plan and are summarized in the following sections.

### **Executive Order EO S-3-05 (2005)**

EO S-3-05 establishes GHG emission reduction targets for California:

- By 2010, reduce GHG emissions to 2000 California levels
- By 2020, reduce GHG emissions to 1990 California levels
- By 2050, reduce GHG emissions to 80 percent below 1990 California levels

The California Environmental Protection Agency (CalEPA) has established the Climate Action Team (CAT) to coordinate efforts to meet these targets. Specifically relevant to the water sector is the Water-Energy subgroup (also known as WET-CAT) which is tasked with exploring mitigation strategies for energy consumption related to water use. Currently, WET-CAT is tasked with implementation and analysis of five water-related measures (identified in the AB 32 Scoping Plan): water use efficiency, recycled water, water systems efficiency, stormwater reuse, and renewable development (CARB, 2017).

### **AB 32: The California Global Warming Solutions Act of 2006 (2006)**

AB 32, the California Global Warming Solutions Act of 2006, codifies the mid-term GHG reduction target established in EO S-3-05 and provides further details for those targets. AB 32 identifies CARB as the State agency responsible to develop regulations, emission limits and additional measures to meet the limits.

CARB has designed a California cap-and-trade program that is enforceable and meets the requirements of AB 32. The program started on January 1, 2012, with an enforceable compliance obligation beginning with the 2013 GHG emissions.

Under AB 32, CARB was required to prepare a Scoping Plan to identify and achieve reductions in GHG emissions in California. The first Scoping Plan was adopted by CARB in 2008, and recommended specific strategies for different business sectors, including water management, to achieve the 2020 GHG emissions limit. An updated Scoping Plan was released in 2014 which reviewed progress to date and identified next steps toward meeting the 2020 emissions goal. A second update was finalized in November 2017. In the water sector, the following high-level goals and objectives were identified to reduce GHG emissions (CARB, 2017):

- Develop and support more reliable water supplies for people, agriculture, and the environment, provided by a more resilient, diversified, sustainably managed water resources system with a focus on actions that provide direct GHG reductions.
- Make conservation a California way of life by using and reusing water more efficiently through greater water conservation, drought tolerant landscaping, stormwater capture, water recycling, and reuse to help meet future water demands and adapt to climate change.
- Develop and support programs and projects that increase water sector energy efficiency and reduce GHG emissions through reduced water and energy use.
- Increase the use of renewable energy to pump, convey, treat, and utilize water.
- Reduce the carbon footprint of water systems and water uses for both surface and groundwater supplies through integrated strategies that reduce GHG emissions while meeting the needs of a growing population, improving public safety, fostering environmental stewardship, aiding in adaptation to climate change, and supporting a stable economy.

The Scoping Plan's goals and objectives were considered during establishment of the WSJ Region's IRWMP goals and objectives.

### **SB 97 (2007)**

SB 97 (SB 97) directed the Governor's Office of Planning and Research to develop Guideline amendments for CEQA to include the analysis of climate change in the environmental permitting process. The CEQA Guidelines call for lead agencies to determine baseline conditions and levels of significance and to evaluate mitigation measures. The guidelines do not prescribe mitigation measures.

### **Executive Order S-13-08 (2008)**

EO S-13-08 is an executive order with the purpose of advancing California's ability to adapt to climate change and more specifically sea level rise. It directs a number of State agencies to engage in planning and research efforts to assess the vulnerability of California's transportation system and key coastal infrastructure to different sea level rise scenarios for the years 2050 and 2100. It also required the CAT (see EO S-3-05 above) to develop state strategies for adaptation in the water sector, ocean and coastal resources, infrastructure, biodiversity, and other areas. The CNRA, working through CAT, prepared the California Climate Adaptation Strategy in response to this EO (discussed below).

### **SB 375 (2008)**

The Sustainable Communities and Climate Protection Act of 2008 (Sustainable Communities Act, SB 375) aligns with the State's goals to reduce GHG emissions through coordinated transportation and land use planning. Under the Act, CARB sets regional targets for GHG emissions reductions from passenger vehicle use. In 2010, CARB established these targets for 2020 and 2035 for each region covered by one of the State's metropolitan planning organizations. For the WSJ Region, the corresponding Metropolitan Planning Organizations are the San Joaquin Council of Governments, Stanislaus Council of Governments, Merced County Association of Governments, Madera County Transportation Commission, and the Council of Fresno County Governments. CARB will periodically review and update the targets, as needed.

### **California Climate Adaptation Strategy (2009)**

The CNRA developed the California Climate Adaptation Strategy (2009) in response to EO S-13-08, outlining a set of guiding principles: "California must protect public health and safety and critical infrastructure; California must protect, restore, and enhance ocean and coastal ecosystems, on which our economy and wellbeing depend; California must ensure public access to coastal areas and protect beaches, natural shoreline, and park and recreational resources; new development and communities must be planned and designed for long-term sustainability in the face of climate change; California must look for ways to facilitate adaptation of existing development and communities to reduce their vulnerability to climate change impacts over time; and California must begin now to adapt to the impacts of climate change. We can no longer act as if nothing is changing."

Twelve key recommendations resulting from the strategy (CNRA, 2009) are:

1. Appoint a Climate Adaptation Advisory Panel to assess the greatest risks to California from climate change and to recommend strategies to reduce those risks, building on the Climate Change Adaptation Strategy.
2. Implement the 20x2020 water use reductions and expand surface and groundwater storage; implement efforts to fix Delta water supply, quality and ecosystems; support agricultural water use efficiency; improve statewide water quality; improve Delta ecosystem conditions; and stabilize water supplies as developed in the Bay Delta Conservation Plan.

3. Consider project alternatives that avoid significant new development in areas that cannot be adequately protected from flooding, wildfire, and erosion due to climate change.
4. Prepare, as appropriate, agency-specific adaptation plans, guidance or criteria.
5. For all significant state projects, including infrastructure projects, consider the potential impacts of locating such projects in areas susceptible to hazards resulting from climate change.
6. The Climate Adaptation Advisory Panel and other agencies will assess California's vulnerability to climate change, identify impacts to state assets, and promote climate adaptation/mitigation awareness through the Hazard Mitigation Web Portal and My Hazards Website, as well as other appropriate sites.
7. Identify key California land and aquatic habitats that could change significantly during this century due to climate change.
8. The California Department of Public Health will develop guidance for use by local health departments and other agencies to assess mitigation and adaptation strategies, which include impacts on vulnerable populations and communities, and assessment of cumulative health impacts.
9. Communities with General Plans and Local Coastal Plans should begin, when possible, to amend their plans to assess climate change impacts, identify areas most vulnerable to these impacts, and develop reasonable and rational risk reduction strategies using the CAS as guidance.
10. State firefighting agencies should begin immediately to include climate change impact information into fire program planning to inform future planning efforts.
11. State agencies should meet projected population growth and increased energy demand with greater energy conservation and an increased use of renewable energy.
12. New climate change impact research should be broadened and funded.

#### **GHG Reporting Rule (2009)**

Closely related to SB32 but at the federal level, in September 2009, USEPA released the Mandatory Reporting of Greenhouse Gases Rule (74FR56260, Reporting Rule) which requires reporting of GHG data and other relevant information from large sources and suppliers in the United States, such as Pacific Gas & Electric.

#### **California Ocean Protection Council Resolution (2011)**

Adopted in March 2011, this resolution directs entities implementing coastal projects to consider sea level rise vulnerabilities and establishes that state agencies should make decisions regarding coastal and ocean management based upon guiding principles presented in the 2009 California Climate Adaptation Strategy (see above).

#### **National Water Program 2012 Strategy: Response to Climate Change (2012)**

In 2012, the USEPA released a report entitled *National Water Program 2012 Strategy: Response to Climate Change*. The report assesses climate change impacts on water resources and identifies long- and short-term strategies to address the potential impacts of climate change. The report also outlines guiding principles for enacting its vision and recommendations for program support across agencies.

#### **California Water Plan (CWP) Update (2013)**

The CWP, updated every five years by DWR, is the State's strategic planning document for sustainable water management. The CWP discusses the status and trends of California's water supply and related

resources. The CWP also facilitates collaboration between various groups, including elected officials, agencies, tribes, water and resource managers, businesses, academics, stakeholders, and the public, as these groups work together to make informed decisions about the future of water in California. The CWP also includes RMSs which are aimed at reducing water demand, increasing water supply, reducing flood risk, improving water quality, and enhancing environmental and resource stewardship. In addition to the RMSs, the CWP Update 2013 lists the following 17 objectives to help achieve the goals of the CWP:

1. Strengthen integrated regional water management
2. Use and reuse water more efficiently
3. Expand conjunctive management of multiple supplies
4. Protect and restore surface water and groundwater quality
5. Practice environmental stewardship
6. Improve flood management using an integrated water management approach
7. Manage the Delta to achieve the coequal goals for California
8. Prepare Prevention, Response and Recovery Plans
9. Reduce the carbon footprint of water systems and water uses
10. Improve data, analysis, and decision-support tools
11. Invest in water technology and science
12. Strengthen Tribal/State relations and natural resources management
13. Ensure equitable distribution of benefits
14. Protect and enhance public access to the State's waterways, lakes, and beaches
15. Strengthen alignment of land use planning and integrated water management
16. Strengthen alignment of government processes and tools
17. Improve integrated regional water management finance strategy and investments

At a more local level, the CWP includes reports that summarize regional water conditions, including a water balance, water quality conditions, and flood management. The CWP identifies ten regions in the State; the WSJ Region is overlapped by the San Joaquin River and Tulare Lake Hydrologic Regions. These regional summaries also delineate the challenges facing each region and potential future scenarios for water management in the region and the WSJ IRWMP update draws on this information throughout. A 2018 CWP Update is underway as of spring 2018.

### **Safeguarding California: Reducing Climate Risk, an Update to the 2009 California Climate Adaptation Strategy (2014)**

As an update and supplement to the 2009 California Climate Adaptation Strategy, the CNRA prepared the *Safeguarding California Plan*. The intent of the Plan is to provide policy guidance for decision makers at the state level. The Plan details the climate risks to nine sectors, including water resources, and makes recommendations within each sector. The Plan provides the following guidance to address climate risks relative to water resources (CNRA, 2014):

1. Vigorously prepare California for flooding
2. Support regional groundwater management for drought resiliency
3. Diversify local supplies and increase water use efficiency

4. Reduce Sacramento-San Joaquin Delta climate change vulnerability
5. Prepare California for hotter and dryer conditions and improve water storage capacity
6. Address water-related impacts of climate change on vulnerable and disadvantaged populations and cultural resources
7. Continue to mainstream climate considerations into water management
8. Utilize LID and other methods in State and regional stormwater permits to restore the natural hydrograph
9. Require closer collaboration and coordination of land use and water planning activities to ensure that each reinforces sustainable development that is resilient to climate changes
10. Protect and restore water resources for important ecosystems
11. Better understand climate risks to California water and develop tools to support efforts to prepare for climate risks

### **Climate Ready Utilities (2015)**

In 2010, the USEPA released its Climate Ready Water Utilities Program, which provided tools to support water and wastewater utilities as they plan for the future. The tools and resources aimed to help utility owners and operators to understand climate risks, provide adaptation strategies, and support decision making. In 2015, the USEPA released an update to the 2010 report, entitled *Adaptation Strategies Guide for Water Utilities*. The guide focuses on adaptation strategies for drinking water, wastewater, and stormwater utilities. The guide is intended to help utilities identify climate-related threats and come up with an adaptation plan.

### **Statewide Climate Change Projections**

The statewide effects of climate change provide relevant background for discussing climate change within the WSJ Region. Below is a brief overview of climate change impacts on the State.

- **Temperature:** California's average temperature has increased by 1.7°F over roughly the past century (Moser et al., 2012). Higher elevations have seen the highest temperature increases. Summer temperatures in California are expected to increase by 0.9 to 3.6°F by 2030 (CAT, 2009). Temperature increases are expected to be more pronounced in the summer than in the winter (CAT, 2009). Higher temperatures also increase evapotranspiration, which raises crop water demands.
- **Precipitation:** With a warming climate, more precipitation is expected to fall as rain rather than snow (CNRA, 2012). This will likely cause more streamflow in the winter, and less in the spring and summer, when water demands are higher. Extreme precipitation events are also expected to become more frequent (CBO, 2009).
- **Snowpack:** The Sierra Nevada snowpack has been shrinking (CCSP, 2008). California's snowpack is also expected to melt earlier in the spring due to rising spring temperatures. Accelerated snowmelt reduces the snowpack's ability to act as a natural reservoir and puts additional pressure on the state's water storage infrastructure.
- **Streamflow:** With more frequent storm events and earlier spring snowmelt, as well as increase possibility of drought, streamflow in the State's surface water bodies is likely to become more variable (CNRA, 2012). This results in stress on water infrastructure and water suppliers, and also poses flood risks. Water quality can be impacted by reduction in streamflows because pollutants become more concentrated in lower volumes of water

- **Wildfire:** As drier and warmer weather becomes more common across the state, wildfire risk is expected to remain high or increase (CCSP, 2008). Sediment runoff into water bodies after wildfires can lower water quality.

## 13.2 Climate Change Projections for the Region

For the WSJ IRWMP, two main sources of information have been used to define potential climate change impacts for the Region. The first one is the Climate Resilience Evaluation and Awareness Tool (CREAT) tool developed by the USEPA, from which specific temperature and precipitation forecasts are available with geographic specificity. The second source of information is a study on hydrologic response and watershed sensitivity to climate change for the watersheds of the Sierra Nevada, published in 2010 (Null et. al., 2010). The importance of the hydrologic response study is that the climate variables of temperature and precipitation have been used as inputs to mechanistic hydrology models that forecast watershed impacts. The following sections describe the CREAT results and the analysis by Null *et al.*

### CREAT Results

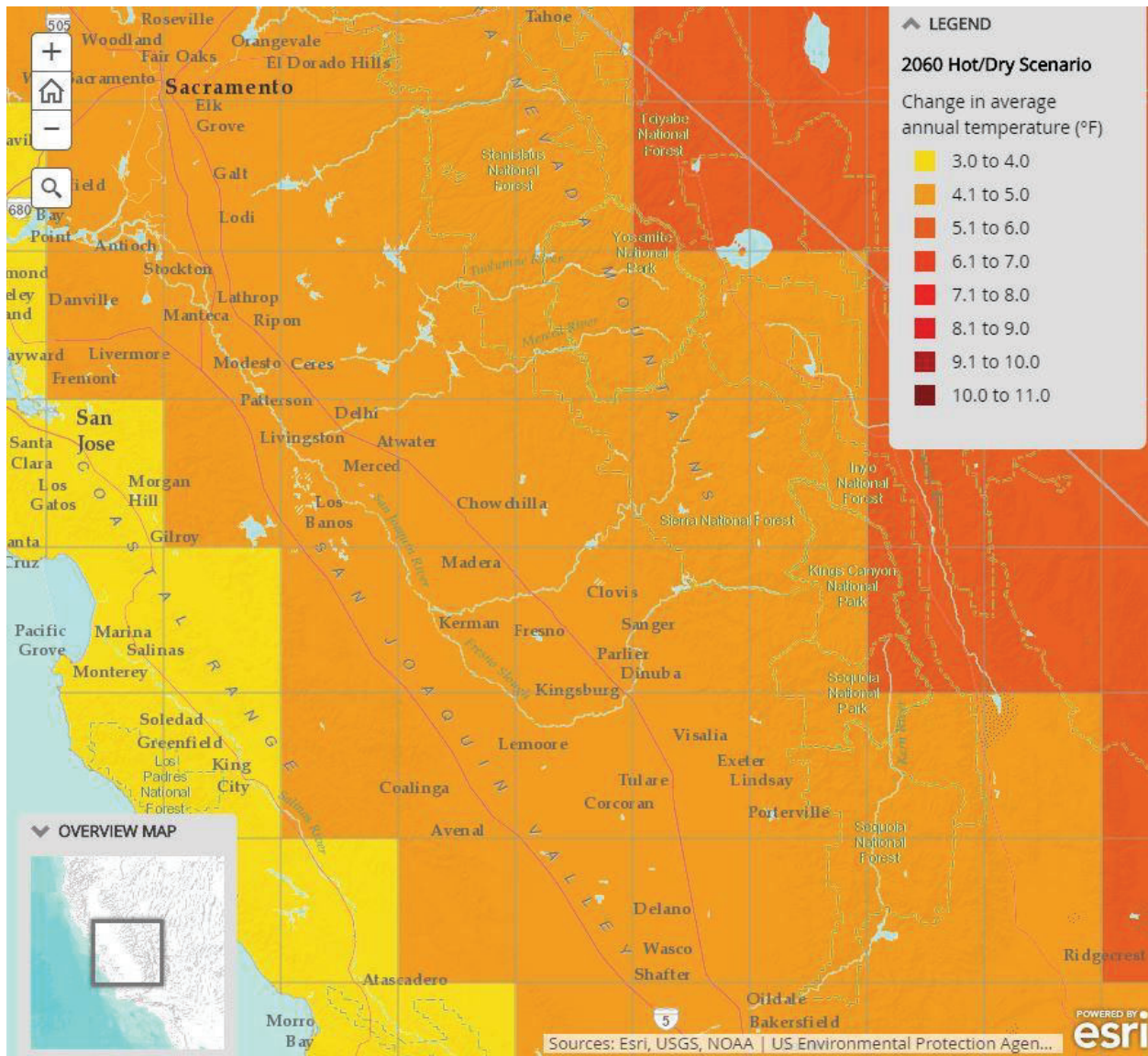
CREAT is a risk assessment- and scenario-based planning application for utilities in United States. Developed by the USEPA, it contains basic national and regional climate science information, and has the ability to access data for specific geographic locations with comparisons of temperature and precipitation under mid-term and long-term conditions using different sets of predictions.

The most significant watersheds for the WSJ Region are the western-slope Sierra Nevada watersheds of the Stanislaus, Tuolumne, Merced, San Joaquin, and Kings Rivers. CREAT results were obtained from the USEPA’s CREAT Climate Change Scenarios Projection Map for an area in the Kings River headwaters and in the Tuolumne River in order to show predicted changes for a geographic range across these watersheds (USEPA, 2016). Table 13-1 shows the predicted change in annual temperature and precipitation forecasted for the year 2060 for a general circulation model (GCM, also referred to as a global climate model) with a hot and dry tendency (worst-case projections). Table 13-1 also shows the predicted change in 100-year storm intensity. Figure 13-1 and Figure 13-2 display the CREAT Climate Change Scenarios Projections for much of central California, including both the WSJ Region and the sources of its rivers in the Sierra Nevada.

**Table 13-1: Changes in Temperature and Precipitation (CREAT Results, 2060 Prediction)**

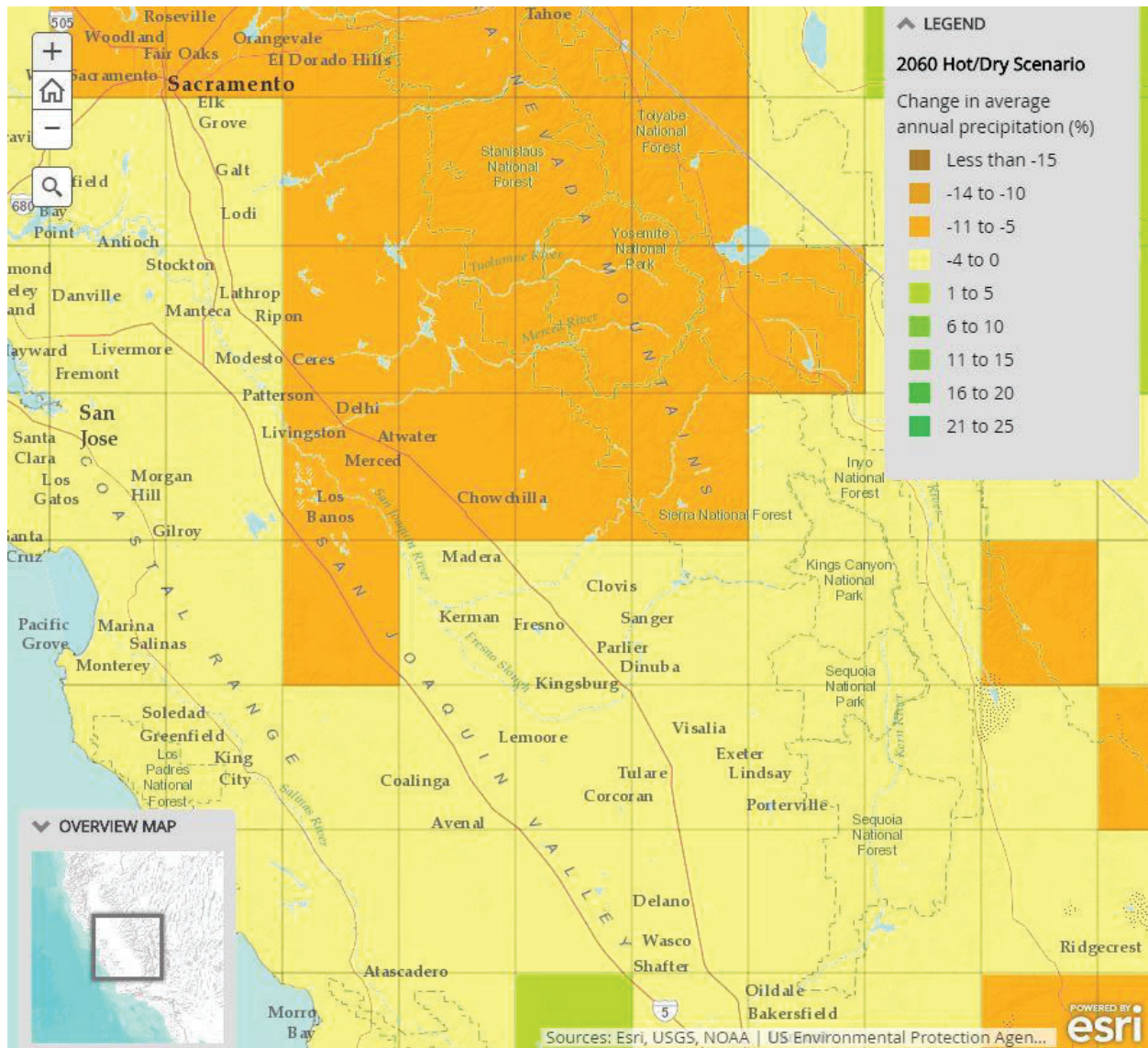
Watershed	Average Temperature Difference	Annual Precipitation Difference	Change in 100-Year Storm Intensity <sup>1</sup>
<b>Kings River</b>	+4.9 °F	-4.0%	+15 to 25%
<b>Tuolumne River</b>	+4.6 °F	-5.3%	+10 to 27%

<sup>1</sup>Range represents 2 GCM scenarios, one showing a stormier future than the other.



Source: USEPA, 2016

**Figure 13-1: CREAT Predictions of Change in Average Temperature by 2060, Using a Hot/Dry Model Scenario**

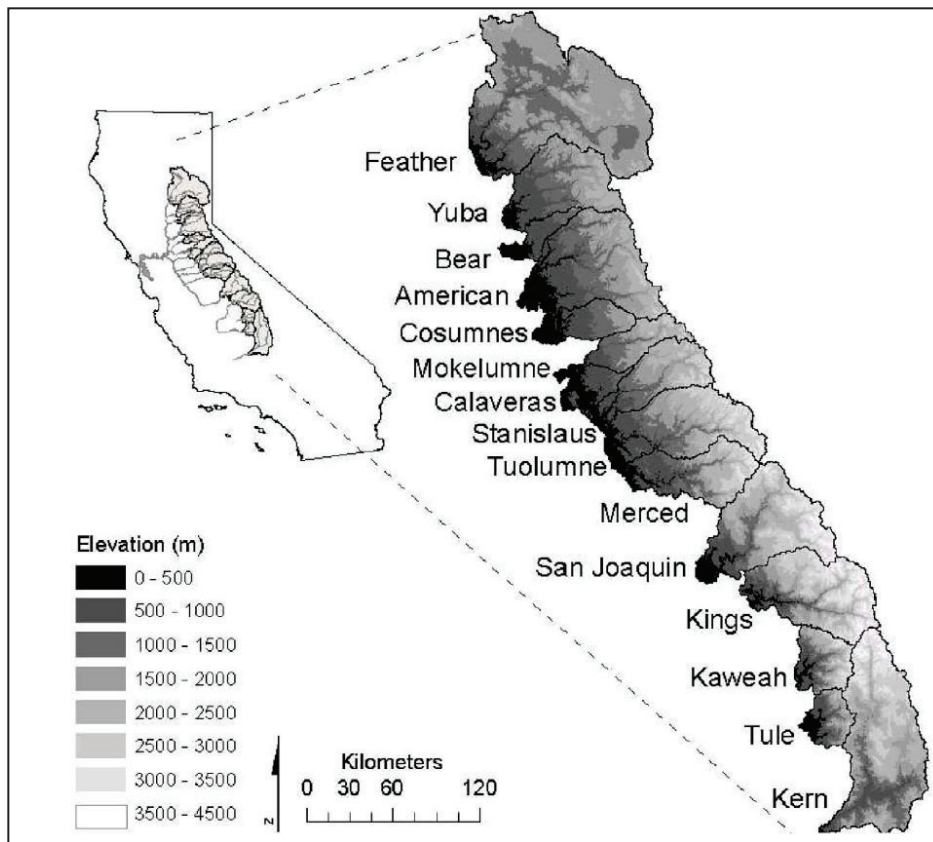


Source: USEPA, 2016

**Figure 13-2: CREAT Predictions of Change in Average Annual Precipitation by 2060, Using a Hot/Dry Model Scenario**

**Hydrology Impacts and Watershed Sensitivity**

While the forecasted results in temperature and precipitation give an idea of how the local weather is expected to change on average, it is necessary to translate those changes into impacts on water resources systems. The study *Hydrologic Response and Watershed Sensitivity to Climate Warming in California's Sierra Nevada* (Null, et. al., 2010) assessed the differential hydrologic responses to climate change of 15 west-slope Sierra Nevada watersheds. Figure 13-3 shows the watersheds evaluated in the 2010 study. The Stanislaus, Tuolumne, Merced, San Joaquin, and Kings Rivers, which correspond to the most significant watersheds for the WSJ Region, are all included in the analysis.



Source: Null et al, 2010.

**Figure 13-3: West-Slope Sierra Nevada Watersheds Studied**

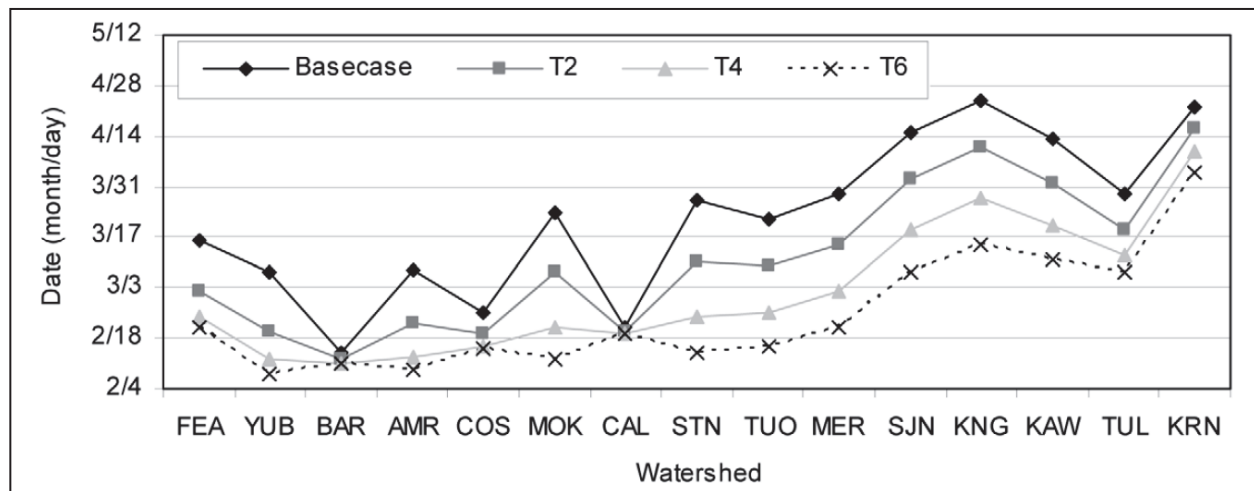
The study of hydrologic response and watershed sensitivity is based on a mechanistic hydrology model developed in WEAP21 (Water Evaluation and Planning model, developed by Stockholm Environmental Institute) to simulate intra-basin hydrologic dynamics given the climate variables. The model uses historical data from the period of 1981 to 2001, which includes a wide range of climatic variability including the wettest year on record (1983), the flood year of record (1997) and a prolonged drought (1988-1992). In terms of temperature, incremental climate warming alternatives were developed with uniform increases in air temperature of 2°C, 4°C, and 6°C (T2, T4 and T6, respectively) to evaluate impacts on regional water systems. (For reference, these increases equate to 3.6°F, 7.2°F, and 10.8°F, respectively.) For each scenario, the model produced simulated hydrology sequences and computed mean annual flow, centroid timing and low-flow duration for each of the watersheds in the study.

Results of modeling the 15 watersheds indicated that increases in temperature generally result in lower mean annual flow (the average yearly flow in the watershed). A summary of the reduction in average annual flow for the relevant watersheds contributing flows to the WSJ Region is presented in Table 13-2. Reductions in mean annual flow could have significant implication for the ability to meet demands for agricultural, urban and environmental water uses.

**Table 13-2: Modeled Mean Annual Flow for Watersheds and Temperature Scenarios**

Watershed	Annual Average Flow (mcm)				Change from Base Case (%)		
	Base Case	T2	T4	T6	T2	T4	T6
Stanislaus	1,561	1,523	1,482	1,435	-2.4	-5.1	-8.1
Tuolumne	2,445	2,401	2,354	2,304	-1.8	-3.7	-5.8
Merced	1,348	1,308	1,272	1,237	-3.0	-5.6	-8.2
San Joaquin	2,294	2,265	2,235	2,201	-1.3	-2.6	-4.1
Kings	2,117	2,094	2,070	2,041	-1.1	-2.2	-3.6

In California climate change predictions, the timing of stream flows is consistently shown to be an element with considerable impact, affecting the management of surface water reservoirs for both flood control and water supply. The study by Null *et al.* evaluated the runoff centroid timing, which is the date at which the total annual runoff at the outlet of each watershed has passed. Centroid timing is primarily driven by snowmelt, which is driven by temperature. Results of the study for all of the 15 watersheds modeled are presented in Figure 13-4.



Source: Null *et al.*, 2010 – Figure 6, page 8  
 Base case – baseline scenario  
 T2 – 2°C temperature increase  
 T4 – 4°C temperature increase  
 T6 – 6°C temperature increase

FEA – Feather  
 YUB – Yuba  
 BAR – Bear  
 AMR – American  
 COS – Cosumnes

MOK – Mokelumne  
 CAL – Calaveras  
 STN – Stanislaus  
 TUO – Tuolumne  
 MER – Merced

SJN – San Joaquin  
 KNG – Kings  
 KAW – Kaweah  
 TUL – Tule  
 KRN – Kern

**Figure 13-4: Average Centroid Timing by Watershed and Climate Scenario**

The results in Figure 13-4 are presented with the label for each watershed in the x-axis in the order of north to south. The y-axis presents the centroid timing (date). The relevant watersheds for the WSJ Region are labeled as follows:

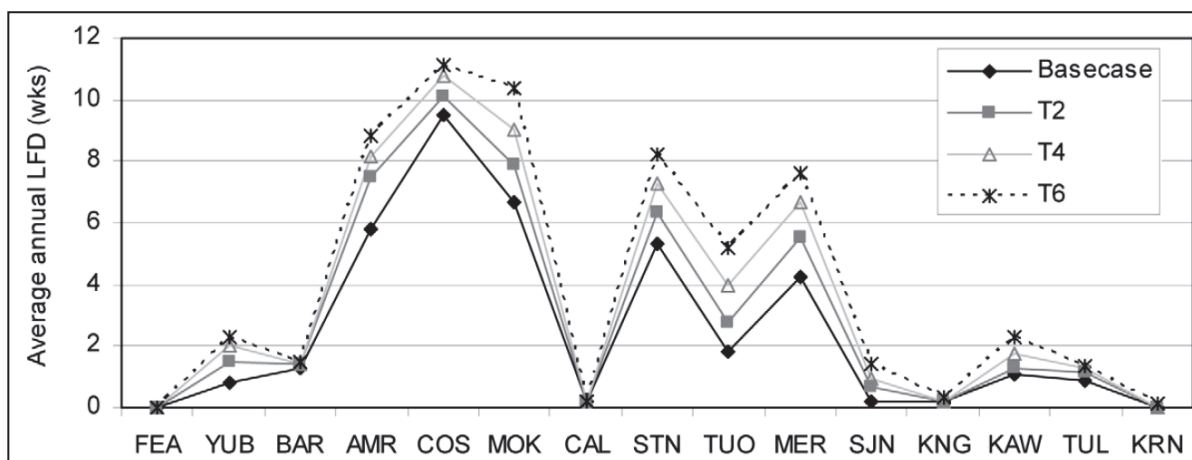
Stanislaus – STN  
 Tuolumne – TUO  
 Merced – MER

San Joaquin – SJN  
 Kings - KNG

The results show significant changes in centroid timing as indicated by the separation of the lines from base case to T2, T4, and T6. The minimum difference in centroid timing is for the scenario with a 2°C increase in temperature, which is about a 2-week change in centroid timing. The difference with T6 is over one month, indicating that the flows would arrive to the Region about a month earlier due to earlier snowmelt. This could have significant implications for water management in the Region. The watersheds of interest have very similar impacts in centroid timing mostly due to the fact that they have similar proportion of areas of high and lower elevations. Areas of high elevations are more susceptible to hydrology changes due to temperature increase given that these are snowpack-driven watersheds.

A third variable simulated by Null *et al.* is low flow duration. Low flow duration is the number of weeks with “low flow” conditions and, in this case, “low flow” has been defined as periods of at least three weeks where weekly discharge divided by total discharge for the water year is less than 1%. Although this definition of low flow is not based on a specific regulation, it does represent a flow condition that can stress a water supply system and aquatic habitat.

The results of modeling simulated changes in low flow duration are presented in Figure 13-5 with the label for each watershed along the x-axis (from north to south). The y-axis shows the number of weeks under low flow conditions (average over the years simulated).



Source: Null *et al.*, 2010 – Figure 8, page 9  
 Base case – baseline scenario  
 T2 – 2°C temperature increase  
 T4 – 4°C temperature increase  
 T6 – 6°C temperature increase

FEA – Feather	MOK – Mokelumne	SJN – San Joaquin
YUB – Yuba	CAL – Calaveras	KNG – Kings
BAR – Bear	STN – Stanislaus	KAW – Kaweah
AMR – American	TUO – Tuolumne	TUL – Tule
COS – Cosumnes	MER – Merced	KRN – Kern

**Figure 13-5: Average Number of Low Flow Weeks by Watershed and Climate Scenario**

For the relevant watersheds for the WSJ Region (Stanislaus, Tuolumne, Merced, San Joaquin and Kings), the results show changes in low flow duration for the Stanislaus, Tuolumne and Merced Rivers as indicated by the separation of the lines from base case to T2, T4, and T6. The minimum difference in low flow duration is for the scenario with a 2°C increase in temperature, which is about one more week of low flow duration. Changes are much less significant for the San Joaquin and Kings Rivers. It is also relevant to mention that the estimated low flow durations in this case are specifically for the rivers in a geographic location outside the WSJ Region. The low flows in these locations, however, will be likely correlated with lower flows downstream in areas within the WSJ Region.

Based on these predictions, it behooves the WSJ Region to consider the implications for water management. Earlier snowmelt and more intense storm events will result in increased runoff and potential flooding, which will likely occur earlier in the year, be more variable, and carry a greater sediment load. Resilient systems are needed to deal with the expected changes in the intensity of these events, including measures to capture runoff for beneficial use as groundwater recharge. Extended dry periods are also expected to occur with a changing climate; these would result in extremely low streamflow and low amounts of recharge. Low streamflow can exacerbate water quality issues as less dilution occurs. Poor recharge can also result in land subsidence during droughts. Therefore, hydrologic changes present a range of water supply, water quality, and flood management issues that the Region will consider. Adaptations to these issues are discussed in more detail in Section 13.3 under the respective vulnerability category.

**Sea Level Rise**

Although the WSJ Region is not a coastal region, it is dependent on the CVP for water supply to a large extent. As CVP supplies are conveyed via the Delta, sea level rise may impact the Region if Delta salinity increases and reservoir operations are impacted. Disruptions in the overall operation of the CVP can result in impacts to all CVP contractors. This makes sea level rise a relevant, climate change-driven factor to consider in terms of vulnerability. Section 13.3, where the vulnerability of the region is discussed, includes a description of the relevance of sea level rise to water supply for the WSJ Region. Table 13-3 presents assessments of potential sea level rise in the Delta region according to a variety of GCM model scenarios.

**Table 13-3: Sea Level Rise Projections for San Francisco and Delta Region (2050)**

Scenario	Projection
<b>“Business as usual” scenario (with a mix of fossil fuel and non-fossil fuel)</b>	11.0 ± 3.6 in
<b>Lower emission scenario</b>	4.8 in
<b>“Business as usual” scenario (fossil fuel intensive)</b>	23.9 in

Source: NRC, 2012. Projected sea levels are increases in mean sea level from the year 2000.

**13.3 WSJ Region Climate Change Vulnerability**

The climate change issues facing the Region were evaluated using the comprehensive Region Description (Chapter 2), California-wide predictions of climate change impacts, and regional/local climate change impacts. This information provided a basis for the WSJ IRWMP Region to assess its vulnerabilities to climate change. The Region used DWR’s *Climate Change Handbook for Regional Water Planning Vulnerability Assessment Checklist* to evaluate vulnerabilities (Appendix G). The Checklist is framed as a series of questions related to vulnerabilities in seven categories: Water Demand, Water Supply, Water Quality, Sea Level Rise, Flooding, Ecosystem and Habitat Vulnerability, and Hydropower. The following sections discuss the vulnerabilities of the region to climate change impacts within these categories as identified during completion of the checklist. The Region’s vulnerabilities, as well as the technical and financial feasibility of addressing the vulnerabilities are summarized in Table 13-4.

**Table 13-4: WSJ Region Vulnerabilities to Climate Change**

Area of Vulnerability	Summary	Technical Feasibility of Addressing Vulnerability	Financial Feasibility of Addressing Vulnerability
Water Demand	<p>A large percentage of the water demand in the WSJ Region is driven by agricultural irrigation. Higher temperatures will drive increased evapotranspiration rates and increase irrigation demand. This is applicable not only to agricultural demands (although that is the most significant impact), but also to outdoor demands in urban areas in the Region.</p>	<p>Feasible. Demands may be reduced through efficiency measures, but these do have a limit, beyond which more drastic changes would be necessary within the Region to reduce demand further.</p>	<p>Varies. Certain efficiency measures such as retrofits could be inexpensive, while solutions such as developing a new water supply would be costly.</p>
Water Supply	<p>The Region is highly dependent on surface flows that are vulnerable to decreased precipitation and snowpack in the Sierra Nevada. The water management system in the Region and State relies heavily on surface storage, including snowpack in the Sierras. The storage of water in snowpack is vulnerable, with earlier snowmelt and more intense short-duration storm events expected. More extended and potentially more frequent droughts will compound supply vulnerability and can also result in higher demands in agricultural and urban areas.</p>	<p>Feasible. Strategies like conjunctive management and recycled water expansion are technically feasible and some are already in use within the Region. More extreme solutions would include development of new surface storage.</p>	<p>Strategies for adapting to climate change impacts on water supply would generally be expensive. Development of new storage or supplies would be costly, as would treatment of low-quality supplies. The implementation of such projects can be cost prohibitive for agencies and communities, especially those in the WSJ Region that are DACs.</p>
Water Quality	<p>Surface water quality is vulnerable due to several factors, including increased low flow duration, an expected reduction in meadows, and a potential increase in storm intensity with short-term turbidity effects. Groundwater quality can also be vulnerable due to greater pressure on aquifers to offset surface supply shortages, thus creating overdraft conditions. Wildfires are expected to be more likely with post-event impacts to surface water quality.</p>	<p>Feasible. Technologies exist to treat water to a variety of standards and could be implemented within the Region if necessary. Solutions such as land use management could also be implemented (both to prevent wildfires and erosion in general), although some would need to occur outside the Region to have a downstream effect.</p>	<p>Varies. Strategies such as increased water treatment or aquifer remediation would be quite expensive. Land management changes or fire prevention efforts would be less costly.</p>
Flood Management	<p>The Region's flood management system is vulnerable to the changes in the balance of</p>	<p>Feasible. Strategies that could be implemented include riparian area</p>	<p>Varies. Including LID strategies in a new project would be relatively</p>

Area of Vulnerability	Summary	Technical Feasibility of Addressing Vulnerability	Financial Feasibility of Addressing Vulnerability
Ecosystem and Habitat	<p>storage to streamflow triggered by earlier snowmelt. More intense storms are also predicted while meadow area may be reduced, eliminating a natural peak flow reduction mechanism.</p> <p>Some terrestrial habitats will be vulnerable to increases in the frequency of wildfires, but the higher vulnerability may be in aquatic habitat due to changes in runoff timing and increased low flow periods and droughts. Higher water temperatures can also degrade water quality and stress aquatic species.</p>	<p>restoration, LID, stormwater runoff management, and levee improvements.</p> <p>Feasible. Ecosystem restoration, pollution prevention, land management are proven strategies to preserve ecosystem services and restore habitats. Some issues, such as effects of climate change, may be more difficult to address on a Regional level, although mitigation measures may be implemented to help reduce these effects.</p>	<p>inexpensive, while levee improvements could be very costly.</p> <p>Varies. Ecosystem and habitat restoration projects may range widely in cost but can be an effective alternative to more costly infrastructure projects.</p>
Hydropower	<p>The Region produces some hydropower, which could be vulnerable to reduced surface water flows and CVP water availability. Energy needs in general are also expected to rise in the future due to increasing temperatures and irrigation demands. The rising cost of hydropower generated outside the Region (and associated increased cost of water delivery) also represents a vulnerability for ratepayers within the Region.</p>	<p>Low feasibility. The Region may be able to address some impacts indirectly through water supply improvements, but the majority of impacts could not be addressed.</p>	<p>Low. Producing additional hydropower in the Region would require new projects and is unlikely to be financially viable.</p>
Sea Level Rise	<p>A large number of water purveyors in the WSJ Region rely heavily on the Delta, the Delta-Mendota Canal, and associated conveyance. Sea level rise will require more Delta outflow to maintain manageable levels of salinity near the export facilities. This may result in a less reliable water supply south of the Delta, and thus within the Region.</p>	<p>Low feasibility. The Region may be able to address some impacts indirectly (e.g., through water supply improvements to reduce reliance on the Delta), but occurrence of sea level rise could not be directly addressed by the Region except through efforts to reduce greenhouse gas emissions.</p>	<p>Low. This vulnerability would need to be addressed indirectly via improvements to water supply (discussed above).</p>

## **Vulnerability Assessment**

### ***Water Demand and Supply***

The correlation between temperature and water demand for irrigation is well documented and understood. In the WSJ Region, which encompasses approximately 2 million acres in total, about 800,000 acres are partially or solely irrigated with CVP water (depending on water availability conditions). Thus, the largest percentage of the water demand is driven by agricultural irrigation, and higher temperatures will drive great evapotranspiration rates and increase demands. This is applicable not only to agricultural demands (although that is the most significant impact), but also to outdoor demands in urban areas in the region.

In terms of environmental demands, Section 3406(d) of the CVP Improvement Act (CVPIA) requires firm water supplies to be delivered to federal, state and some private wildlife refuges. Historically, the wetlands throughout the region received water from the San Joaquin River. The CVPIA required firm water supplies of suitable quality to maintain and improve wetland habitat. This specific demand and other habitat-related demands may not increase but will continue to need limited water supplies under climate change conditions.

Compounding the impacts of increased water demands, water supply is also projected to be vulnerable to climate change impacts. Reduced annual precipitation and the timing of that precipitation combined with higher temperatures will result in new seasonality of flows due to earlier snowmelt in the Sierra Nevada, as discussed in Section 13.2.

Reduced surface water supplies could trigger a reduction in agricultural surface water use, resulting in a corresponding increase in groundwater use. This, in turn, may result in groundwater elevation declines such that infiltration from rivers to groundwater occurs, resulting in a groundwater-base flow disconnect. Many of the water users in the Region rely on groundwater on a permanent, seasonal or dry-year basis, and overall stresses in surface water make groundwater in the Tracy, Delta-Mendota and Westside subbasins susceptible to overdraft, which has further effects such as land subsidence.

### ***CVP Supply***

Disruptions in the overall operation of the CVP can result in impacts to all CVP contractors, and some critical elements of the CVP are vulnerable to sea level rise in terms of salinity impacts. A rising sea level will impact the Delta by increasing the risk of overtopping and other forms of levee failure, and by increased saline/brackish tidal pressure, which if not countered by increases in freshwater outflows, will lead to higher salinity intrusion and higher salinity levels in the Delta.

The CVP's Jones Pumping Plant is located in the southwestern edge of the Delta (just outside the WSJ Region) and lifts water into the Delta-Mendota Canal, which travels southward to the Mendota Pool, supplying water along the way to CVP contractors and San Luis Reservoir. Although irrigation canals are not subject to drinking water regulations, increased salinity levels at the plant due to a levee failure could require a temporary stop in diversions to the CVP because agricultural crops are sensitive to water quality and because the supply eventually mingles with that of the SWP in San Luis Reservoir, which serves water to both agricultural and municipal users. There are no set thresholds for salinity, bromide, or other constituents at which the Jones Pumping Plant would cease operations, but a significant increase in salinity in the vicinity of the pumping plants intakes could result in CVP disruption with impacts to the WSJ Region.

### ***Water Quality***

Surface water quality is vulnerable due to several factors, including longer periods of low flows, more frequent and intense droughts, and higher water temperature that can reduce dissolved oxygen concentrations. The vulnerability of meadows and other vegetated areas upstream can have consequences for water quality since natural vegetation removes pollutants and/or prevents them from entering streams. Wildfires are expected to be more likely and will bring with them post-event impacts to surface water quality. A potential increase in storm intensity could also trigger short-term turbidity increases. These negative surface water impacts also affect habitat vulnerability (described further below) by reducing or degrading suitable habitat.

Groundwater quality can also be vulnerable to climate change due to increased use of aquifers to offset surface supply shortages. This results in the use of deeper wells or shallower wells with lower water quality than currently produced. Overdraft conditions may persist for longer periods, preventing the basins from recovering even during wet periods, with associated water quality consequences. Increased pumping of deeper, higher quality groundwater can result in increased vertical gradients, with poorer quality shallow groundwater migrating to and impacting the deeper zones. As discussed in Chapter 2, groundwater levels in some areas of the Region have been declining due to the long-term overdraft conditions caused by continued pumping, and climate change may continue to exacerbate these effects.

### ***Flood Management***

A majority of the San Joaquin River's 100-year floodplain (in the stretch of the San Joaquin River at the geographic edge of the WSJ Region) is within the Region (Figure 2-4). The vulnerability of the region to floods is significant since there have been critical flooding events with great consequences for the economy, infrastructure, assets, and residents, even in the relatively recent past. These historical floods have been triggered by high peak flows due to high-intensity storms and/or rapid snowmelt at the Sierra Nevada foothills triggered by tropical storms. As described previously, it is expected that more intense storms could result from climate change. The WSJ Region is vulnerable to changes in the balance between storage and streamflow that can be triggered by earlier snowmelt under climate change conditions. More intense storms are predicted while natural recharge areas may be reduced, eliminating a natural peak flow attenuation mechanism.

### ***Ecosystem and Habitat***

There are a number of natural areas in the San Joaquin Valley that, while scattered throughout the region, provide concentrated areas of grasslands and habitats, such as freshwater marshes, valley sink scrub, and grassland vernal pool habitats. Some terrestrial habitats can be vulnerable to increased frequency of wildfires, but aquatic habitats are more vulnerable overall due to changes in runoff timing and increased low flow periods and droughts. Increases in water demands and reductions in overall water supplies will make it challenging for the Region to protect habitats under increased competition for limited supply, particularly in dry years. Higher water temperatures can also degrade water quality and stress aquatic species of interest.

### ***Hydropower***

Within the Region, some hydropower is generated at the O'Neill Pumping Plant when water is released from the O'Neill Forebay into the Delta-Mendota Canal. The electricity produced is sold and distributed to the larger power grid. The plant produces power intermittently, generally in the months of May through October, although this depends on the needs of the water users south of Los Banos. The plant may

generate more energy during droughts, as generally water users in this area rely on water delivered through the Jones Pumping Plant, receiving water from the O’Neill Forebay only when other allocations are reduced. The O’Neill Pumping Plant is not a major source of power in the Region, thus, any impacts of climate change on this source will likely have minor effects on the Region. Overall, the effects of climate change on the Region’s hydropower production are uncertain. Most of the hydropower for the CVP is generated outside the Region; this represents a significant vulnerability for the Region, as CVP water rates could be impacted by reduced hydropower generation capacity.

### ***Sea Level Rise***

Although the WSJ Region is not a coastal area and does not stand to be directly impacted by sea level rise (e.g., via flooding), it may be indirectly impacted via the Delta. As noted above, the Region depends heavily on the CVP for water supply. These supplies are conveyed via the Delta. With sea level rise, salinity in the Delta may increase, impacting reservoir operations and transfer of water through the Delta, and increasing the risk of levee failure. With higher sea levels, the Delta will become more saline/brackish unless sufficient freshwater outflows are present. This has implications for water supplies conveyed through the Delta (including CVP supply). Additional discussion of sea level rise impacts on water supply are discussed in the Water Demand and Supply subsection, above.

### **Vulnerability Prioritization**

These six areas of vulnerability were reviewed and prioritized by the Working Group. The vulnerabilities were ranked as either high or low priority. The Working Group designated high priority areas as ones that should be addressed first; lower priority areas were noted to require medium- to long-term solutions. The vulnerability areas were not further ranked within each category. The vulnerability areas were ranked as follows:

- High Priority (address first): water supply, water quality, and flood management vulnerabilities
- Lower Priority (medium- to long-term): water demand, ecosystem/habitat, and hydropower vulnerabilities

The ranking reflects the Region’s primary concerns and the urgency with which the vulnerabilities should be addressed. Due to the Region’s high level of dependence on water supply to support its agricultural industry, water supply was highly prioritized. A majority of the projects included in this WSJ IRWMP are related to, or have important components of, water supply, reflecting the Region’s views on the importance of addressing water supply needs today and into the future. Flood management is also of concern in the Region as its effects can be widespread and costly to life and property; the potential for damaging floods is expected to rise as climate changes. Therefore, flood management was identified as a high priority area. The final high-priority vulnerability is water quality. The Region has experienced water quality issues which affect both domestic and agricultural water use, and addressing these issues is central to climate change adaptation and continued water supply. This WSJ IRWMP has strong statements relating to flood management and environmental stewardship, reflecting the primary prioritization of those vulnerabilities.

Water demand, ecosystem/habitat, and hydropower vulnerabilities are expected to be less exacerbated by climate change than water supply, quality, and flood management; therefore, these vulnerabilities have been assigned a lower priority. The Region aims to implement adaptation measures to reduce these vulnerabilities but may do so over a long-term timeframe in order to address more pressing issues first.

### DAC Climate Vulnerabilities

Climate change impacts to DACs are similar to the vulnerabilities of the Region as a whole. However, DACs have fewer resources to adapt to climate change impacts. For example, prolonged droughts, which are expected to become more common due to climate change, disproportionately impact DACs that rely solely on groundwater or do not have diversified supplies. Future efforts, such as those conducted under SGMA, will help evaluate undesirable results that DACs may be experiencing related to their groundwater supply. Additionally, DACs may not have the financial or staff resources to implement new water supply projects to prepare for drought. Individual community members may also be impacted if water rates rise (due to supply shortages or increased delivery costs resulting from rising energy prices). DACs can also suffer from drought-related impacts on Region's agricultural economy, such as lost jobs due to lowered agricultural production. Although the WSJ Region has relatively little area within the 100-year floodplain, DACs in low-lying areas are particularly vulnerable to flooding resulting in damages or displacement.

### 13.4 RMSs Providing Climate Change Adaptation

The WSJ Region has been collaborating on planning and program and project implementation efforts for many years. Regional planning has been the primary forum to address regional issues and conflicts. This WSJ IRWMP distinguishes itself from previous regional planning efforts in the WSJ Region in that a formal assessment of climate change impacts and vulnerability has been performed, and RMSs are discussed in the context of climate change adaptation and mitigation. In many cases, an RMS applicable to the Region has the potential to mitigate climate change impacts by reducing GHG emissions, and in many cases, the RMSs can be used to adapt to climate change impacts, reducing the Region's vulnerability. The RMSs are presented in Table 13-5 with references to the vulnerability areas in which they can increase the regions resiliency.

**Table 13-5: Applicability of RMSs in Adapting to Climate Change Vulnerabilities**

Resource Management Strategies	Water Demand	Water Supply	Water Quality	Flood Management	Ecosystem and Habitat	Hydropower
<b>Reduce Water Demand</b>						
Agricultural Water Use Efficiency	●	●	●			
Urban Water Use Efficiency	●	●	●			
<b>Improve Operational Efficiency and Transfers</b>						
Conveyance-Delta		●	●	●	●	
Conveyance-Regional/Local		●	●	●	●	
System Reoperation		●		●		●
Water Transfers		●			●	
<b>Increase Water Supply</b>						
Conjunctive Management and Groundwater		●	●	●		

Resource Management Strategies	Water Demand	Water Supply	Water Quality	Flood Management	Ecosystem and Habitat	Hydropower
Desalination		💧				
Precipitation Enhancement		💧				💧
Recycled Municipal Water		💧			💧	
Surface Storage-CALFED		💧	💧	💧	💧	💧
Surface Storage-Regional/Local		💧	💧	💧	💧	💧
<b>Improve Water Quality</b>						
Drinking Water Treatment and Distribution		💧	💧			
Groundwater Remediation/Aquifer Remediation		💧	💧			
Matching Water Quality to Use	💧	💧	💧			
Pollution Prevention		💧	💧		💧	
Salt and Salinity Management		💧	💧		💧	
Urban Stormwater Runoff Management		💧	💧	💧	💧	
<b>Practice Resource Stewardship</b>						
Agricultural Land Stewardship	💧		💧	💧	💧	
Ecosystem Restoration	💧	💧	💧	💧	💧	
Forest Management*		💧	💧	💧	💧	
Land Use Planning and Management	💧		💧	💧	💧	
Recharge Areas Protection		💧	💧	💧		
Sediment Management		💧	💧	💧	💧	💧
Watershed Management	💧	💧	💧	💧	💧	💧
<b>People and Water</b>						
Economic Incentives	💧	💧	💧	💧	💧	💧
Outreach and Engagement	💧	💧	💧	💧	💧	💧
Water and Culture	💧		💧		💧	
Water-Dependent Recreation			💧	💧	💧	
<b>Improve Flood Management</b>						
Flood Management			💧	💧	💧	💧
<b>Other Strategies</b>						
Crop Idling for Water Transfers*	💧	💧			💧	
Dewvaporation or Atmospheric Pressure Desalination*		💧				

Resource Management Strategies	Water Demand	Water Supply	Water Quality	Flood Management	Ecosystem and Habitat	Hydropower
Fog Collection*		💧				
Irrigated Land Retirement*	💧	💧				
Rainfed Agriculture*	💧				💧	
Waterbag Transport/Storage Technology*		💧	💧		💧	

\*These strategies were not included when developing objectives or evaluating projects as they either do not apply to the WSJ IRWMP Region, or would not be considered in the Region unless all other RMSs had been exhausted, as discussed in Chapter 4.

### 13.5 Plans for Future Data Gathering

As climate change continues to impact the Region, it is vital that data be gathered to help the Region react appropriately to climate change impacts. Robust data collection practices will help the Region plan for future changes and will provide a basis for prioritizing and identifying high-priority projects that will provide adaptation or mitigation benefits. The general strategy for climate change data gathering is to align this specific data collection need with the overall data management process for the Region. As part of IRWM project implementation, different types of data will be collected to track project performance and meet monitoring program requirements. Table 13-6 provides detail on the types of data that may be collected during project implementation in order to support the Region’s efforts to adapt to and mitigate climate change.

**Table 13-6: Data Gathering Strategy to Assess Climate Change Impacts**

Climate Change Vulnerability Category	Potential Data to be Gathered
Water Demand	<ul style="list-style-type: none"> <li>• Water meter data (municipal, commercial, industrial)</li> <li>• Groundwater use (municipal and agricultural)</li> <li>• Demand projections</li> <li>• Population projections</li> </ul>
Water Supply	<ul style="list-style-type: none"> <li>• Groundwater elevation data</li> <li>• Streamflow (especially seasonal low flows)</li> <li>• Reservoir levels</li> </ul>
Water Quality	<ul style="list-style-type: none"> <li>• Groundwater quality (e.g., salinity, TDS, arsenic, nitrate)</li> <li>• Surface water quality (e.g., turbidity, temperature, dissolved oxygen)</li> <li>• Household water quality, particularly in DACs</li> </ul>
Flood Management	<ul style="list-style-type: none"> <li>• Streamflow measurements</li> <li>• Area flooded during storm events</li> <li>• Value of assets in floodplain</li> </ul>
Ecosystem and Habitat	<ul style="list-style-type: none"> <li>• Fish surveys</li> <li>• Animal and plant surveys</li> <li>• Habitat surveys (e.g., to assess streambed quality)</li> <li>• Volume of water provided for environmental uses</li> </ul>
Hydropower	<ul style="list-style-type: none"> <li>• Kilowatt hours produced</li> <li>• Frequency of power generation</li> </ul>

## **APPENDIX J**

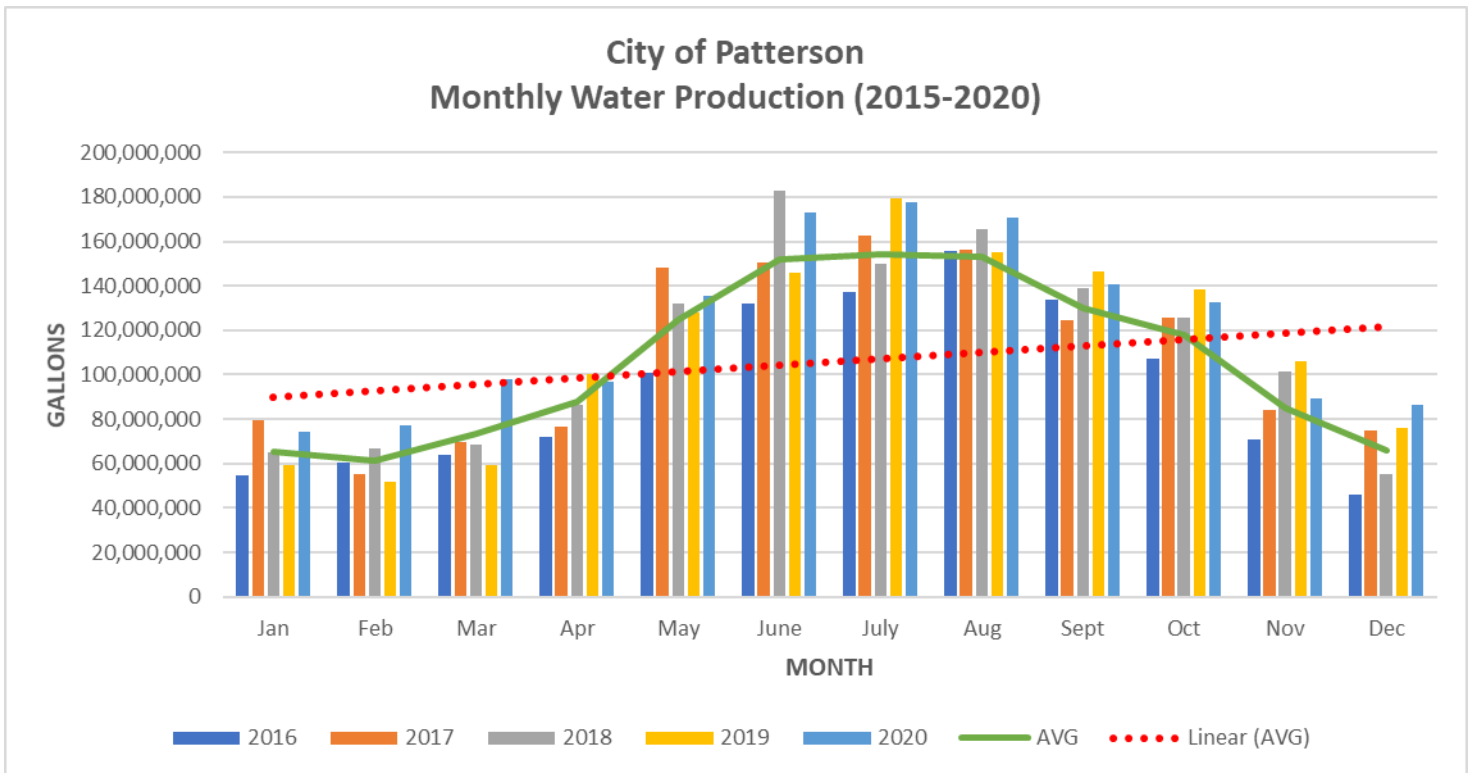
### **2020 UWMP DWR Guidebook**

#### Water Conservation Program Information

**City of Patterson  
Water Conservation Program  
Future Conservation Water Use Alternative**

**Monthly Water Production (2015-2020)**

City population grew about 10% since 2015 with only minor increases in total production.

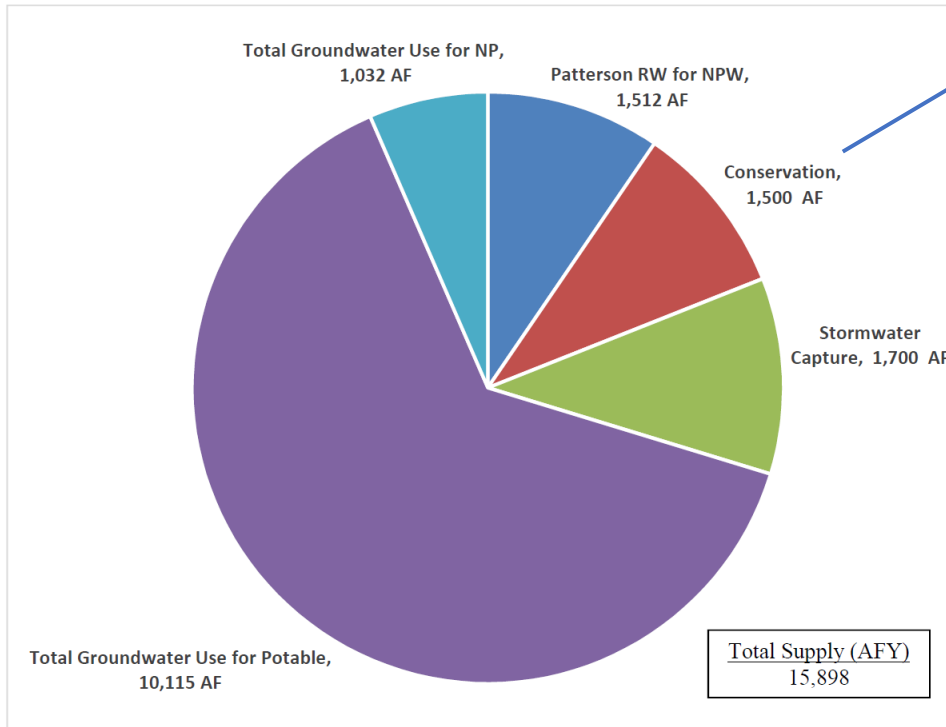


City water production figures impacted by 2012-2016 drought cycle with 2015 SWRCB water use cutback policy reducing per capita water use below 130 gpcd.

The City’s long term water portfolio considers Conservation to be of the water management strategies to be used strategically to help meet build-out water demands within the safe yield of the Delta-Mendota subbasin.

The City’s current Water Master Plan identifies Conservation to be in the City’s preferred water portfolio with maximum local control in meeting the future water needs of the community.

Figure 6-3: Supply Mix After Implementation of Preferred Portfolio (Portfolio 2 “Local Control”)



**City Future Water Supply Portfolio Conservation at Build-out**

Up to 1,500 AF per year possible.

Patterson routinely maintains its total potable water use below its 164 gpcd 2020 water use target. Additional savings are expected from old housing stock green code compliance, lower water losses, and more efficient irrigation practices.

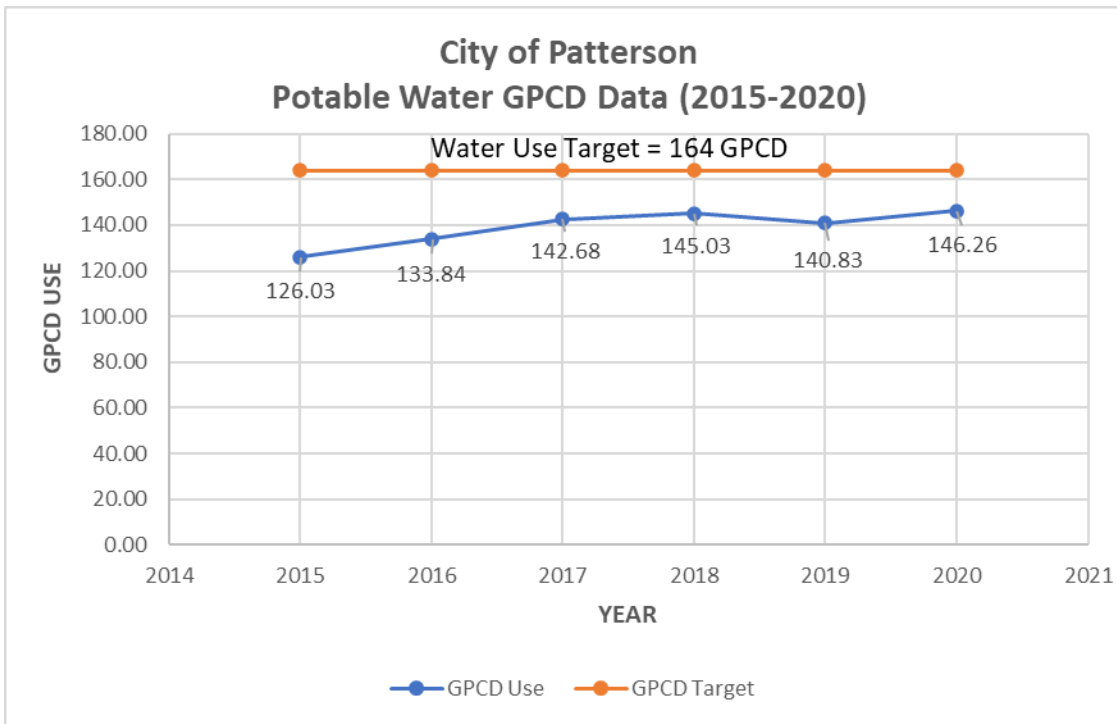
**Future Conservation Alternative Scenario – 2045**

Key Assumptions:

2045 Population Projection	= 41,812
2020 GPCD Water Use Target	= 164 gpcd
2045 Total Potable Water Use @ Target	= 7,681 AF
Build-out Total Potable Water Use @ Target	= 10,655 AF
Future Water Supply Portfolio Scenario	= 1,500 AF
Build-out Total Potable Water Use w/Conservation)	= 9,155 AF
Build-out w/Conservation – Equivalent GPCD Use	= 140 gpcd

*Assumes build-out population = 58,684 subject to updates in local and regional general plans.*

**Per Capita Water Use Data– 2015-2020**



**Future Conservation Savings – Water Portfolio Scenario**

**Key Assumptions:**

- Water Loss – reduce real system losses = 250-350 AFY (fix leaks)
- Water Loss – reduce real customer losses = 200-300 AFY (with AMI)
- Pre-1994 Housing Stock Green Code Conversion = 250-350 AFY (by 2035)
- Irrigation Efficiency = 300-400 AFY (by 2030)
- Conservation-Oriented Rate Structure = 150-250 AFY (by 2030)
- Total Potential Savings – Likely Range** = **1,150-1,600 AFY**

**Build-out Potential Savings – Additional Standards = TBD (Green Code Amendments)**

*(actual savings based on level of water conservation program investment, enacted conservation-oriented water rates in place during the planning period, and achieving a high level of market saturation for water efficient devices, appliances, water loss reductions, and improved irrigation efficiency.)*

# City of Patterson

## Water Conservation Program Information

### 2020 UWMP

## Rebate Programs

### Cash for Grass Pilot Rebate Program

The goal of this program is to permanently reduce the amount of water being used for landscape purposes. The City is offering \$1.00 for every square foot of turf removed and replaced with landscape that is drought resistant or uses less water. In addition to these terms and conditions, the following rules apply:



- 1) Rebates are available on a first-come, first-served basis. Only one rebate per household, per fiscal year.
- 2) A minimum of 200 square feet of turf must be removed. A maximum of 2,000 square feet is allowed.
- 3) Only City of Patterson utility customers are eligible and must currently be maintaining their lawn.
- 4) Dead lawns are not eligible.
- 5) For front yards only, the applicant must still maintain 50 percent landscape in front of their home.

For the application or to view the terms and conditions of the program, please click on the link below: [Cash for Grass Pilot Program Application](#)

*\*\*Note: Although we have exceeded our budget for this rebate program, we are still accepting applications for this program. In the case an applicant de-obligates their funds, those funds may be available for other pending projects. Please call Public Works for more information at (209) 895-8060.*

### High Efficiency Toilet (HET) Pilot Rebate Program

Efficiency measures such as replacing water guzzling toilets with the latest low-flush toilet technology helps ensure future water supply and helps maintain low water rates. Replacing a high water use toilet with a new HET of 1.28 gallons per flush (GPF) can save about 38 gallons of water each day. The rebate amount for a qualifying HET of 1.28 GPF or less is \$100. The following rules apply:

- 1) Rebates are based on a first-come, first-served basis and only City of Patterson utility customers are eligible.
- 2) Toilet being replaced must be MORE than 1.6 GPF. If your home was built before 1994 and the toilet have never been changed, you may qualify for the program.
- 3) Toilets must have been purchased after July 1, 2014.

4) If the toilet has already been changed out, you may still qualify for a rebate. Applicant must have original receipt and new toilet must be 1.28 GPF and be a Water Sense approved toilet. A post check is still required.

The goal for the HET Rebate Program is to encourage a permanent reduction in the amount of water used for indoor plumbing. Toilets must have been purchased after July 1, 2014.

For the application or to view the complete terms and conditions of the program, please click on the link below:

[High Efficiency Toilet \(HET\) Pilot Rebate Program \(PDF\)](#)

## **Free Water Conserving Fixtures**

In addition to these rebate programs, the City is offering free water-conserving fixtures. Replacing old plumbing fixtures can save hundreds of gallons a day and can save you money on your water bill. As part of the City's Water Conservation Program, the City offers free low-flow bathroom and kitchen aerators, free showerheads, and free toilet leak detection tablets. All you have to do is come in to City Hall, fill out an application and you're on your way to saving water! The following rules apply:

- 1) Supplies are limited and are available on a first-come, first-served basis.
- 2) A post verification visit may be required.
- 3) Only City of Patterson utility customers are eligible for this program.

For the application or to view the complete terms and conditions of the program, please click on the link below: [Free Water Conservation Fixtures Request Form \(PDF\)](#)

## **Other Rebates**

If you do not find the rebate program you are looking for, it is possible our local utility providers offer them. Please visit Turlock Irrigation District (TID) and Pacific Gas & Electric (PG&E) for water and energy efficiency rebate programs. They offer Clothes Washer, Refrigerator, and Water Heater Rebates, among many others.

[Turlock Irrigation District \(TID\)](#)

[Pacific Gas & Electric \(PG&E\)](#)



# City of Patterson

## Water Conservation Program Information

### 2020 UWMP

## Indoor Water Use Conservation

Water is essential to each of us every day. It is a limited resource, so we all need to rethink the way we use water on a daily basis. By following these water-saving tips inside your home, you can help save water every day.



### Laundry Room

- Use the washing machine for full loads only to save water and energy.
- Install a water-efficient clothes washer (save 16 gallons per load).
- Washing dark clothes in cold water saves water and energy, and helps your clothes retain their color.

### Kitchen

- Run the dishwasher only when full to save water and energy.
- Install a water- and energy-efficient dishwasher (save 3 to 8 gallons per load).
- Install aerators on the kitchen faucet to reduce flows to less than 1 gallon per minute. When washing dishes by hand, don't let the water run. Fill one basin with wash water and the other with rinse water.
- Dishwashers typically use less water than washing dishes by hand.
- If your dishwasher is new, cut back on rinsing. Newer models clean more thoroughly than older ones.
- Soak pots and pans instead of letting the water run while you scrape them clean.
- Use the garbage disposal sparingly. Instead, compost vegetable food waste and save gallons every time.
- Wash your fruits and vegetables in a pan of water instead of running water from the tap.
- Don't use running water to thaw food. Defrost food in the refrigerator.
- Keep a pitcher of drinking water in the refrigerator instead of running the tap.
- Cook food in as little water as possible. This also helps it retain more nutrients.
- Select the proper pan size for cooking. Large pans may require more cooking water than necessary.
- If you accidentally drop ice cubes, don't throw them in the sink. Drop them in a house plant instead.

## Bathroom

- Install low-flow shower heads (save 2.5 gallons).
- Take 5-minute showers instead of 10-minute showers. Save 12.5 gallons with a low flow showerhead, and 25 gallons with a standard 5-gallon-per-minute showerhead.
- Fill the bathtub halfway or less (save 12 gallons).
- When running a bath, plug the bathtub before turning on the water. Adjust the temperature as the tub fills.
- Install aerators on bathroom faucets (save 1.2 gallons per person, per day).
- Turn water off when brushing teeth or shaving (save approximately 10 gallons per day).
- Install a high-efficiency toilet (save 19 gallons per person, per day).
- Don't use the toilet as a wastebasket.
- Be sure to test your toilet for leaks at least once a year.
- Put food coloring in your toilet tank. If it seeps into the bowl without flushing, there's a leak. Fix it and start saving gallons.
- Consider buying a dual-flush toilet. It has 2 flush options: a half-flush for liquid waste, and a full-flush for solid waste.
- Plug the sink instead of running the water to rinse your razor and save up to 300 gallons a month.
- Turn off the water while washing your hair and save up to 150 gallons a month.
- When washing your hands, turn the water off while you lather.
- Take a (short) shower instead of a bath. A bathtub can use up to 70 gallons of water.

**City of Patterson**  
**Water Conservation Program Information**  
**2020 UWMP**

## **SB 407 Water Use Surveys**

With Senate Bill 407, California intends to increase water and energy conservation through measures triggered by many forms of construction or renovation. The law requires that all noncompliant plumbing fixtures in any single-family, multi-family and commercial real estate property shall be replaced with water-conserving plumbing fixtures. **SB 407 only applies to residential and commercial real property built before January 1, 1994.** These surveys will help us better understand where the retrofits still need to take place. Thank you for your time!

[SB 407 Residential Survey](#)

[SB 407 Self-Certification Form \(PDF\)](#)

# City of Patterson

## Water Conservation Program Information

### 2020 UWMP

## Outdoor Water Use Conservation

Most Californians think that they use more water indoors than outdoors. Typically, the opposite is true. In some areas, 50% or more of the water we use daily goes on lawns and outdoor landscaping. There are lots of ways to save water at home, but reducing the water you use outdoors can make the biggest difference of all. Listed below are a few easy ways to change the way you use water outside your home.

### Know the Basics

- Water early in the morning or later in the evening when temperatures are cooler (save 25 gallons each time you water).
- Check your sprinkler system frequently and adjust sprinklers so only your lawn is watered and not the house, sidewalk, or street (save 12 to 15 gallons each time you water).
- Choose a water-efficient irrigation system such as drip irrigation for your trees, shrubs, and flowers (save 15 gallons each time you water). [\*How to prevent runoff from outdoor irrigation \(PDF\)\*](#)
- Water deeply but less frequently to create healthier and stronger landscapes.
- Put a layer of mulch around trees and plants to reduce evaporation and keep the soil cool. Organic mulch also improves the soil and prevents weeds (save 20 to 30 gallons each time you water every 1,000 square foot).
- Plant drought-resistant trees and plants (save 30 to 60 gallons each time you water every 1,000 square foot).

### Don't Overwater

One easy way to cut down how much water you use outdoors is to learn how much water your landscaping actually needs in order to thrive. Overwatering is one of the most common mistakes people make.

### Get Smart

If you really want to be a sophisticated water user, invest in a weather-based irrigation controller, or a smart controller. These devices will automatically adjust the watering time and frequency based on soil moisture, rain, wind, and evaporation and transpiration rates. Check with your local water agency to see if there is a rebate available for the purchase of a smart controller.

### Know Your Climate

One way to save water outdoors is to plant the right plants for your climate. Explore the [Save Our Water Water-Wise Garden Tool \(PDF\)](#) to learn what plants and flowers will flourish in your neighborhood.

### Outdoor Cleanup

Water is often a go-to tool for outdoor clean-up jobs. Conserve water by following these simple steps:

- Use a broom to clean driveways, sidewalks, and patios (save 8 to 18 gallons per minute).
- Wash cars / boats with a bucket, sponge, and hose with self-closing nozzle (save 8 to 18 gallons per minute).
- Invest in a water broom. If you have to use water to clean up outside, a water broom will attach to your hose but uses a combination of air and water pressure to aid cleaning. Water brooms can use as little as 2.8 gallons per minute to remove dirt, food spills, leaves, and litter from concrete and asphalt while a standard hose typically uses 5 to 20 gallons per minute.



### **Additional Information**

For more information on water-wise sprinklers, visit the [Save Our Water: Sprinklers 101](#) website.

# City of Patterson

## Water Conservation Program Information

### 2020 UWMP

## Water Wise Gardening

Outdoor watering and toilets are the biggest users of water in and outside your home. In fact, during the summer half of all household water use is for the lawn and garden purposes. However, it is possible to dramatically reduce your water consumption, lower your water bill, and still have a beautiful, productive garden. The following steps can help you achieve these results:

- **Add organic matter to your soil** - All soil is not created equal. Soil is essentially a collection of mineral particles of different sizes. If most of the particles are large (sand), water drains through rapidly. If most of the particles are small (clay), water will penetrate the soil much more slowly. The solution for either problem is the same: add organic matter. Organic matter, in the form of compost, chopped up leaves or composted manure will improve the texture and water-holding capacity of your soil. Add at least an inch of compost each year.
- **Deliver water to the root-zone** - Drip irrigation and soaker hoses ensure that up to 90% of the water you apply to your garden is actually available to your plants. Sprinklers can claim only 40% to 50% efficiency. Drip irrigation minimizes evaporation loss and keeps the areas between plants dry, which also helps limit weed growth.
- **Use mulch to retain water** - A 6- to 8-inch layer of organic mulch can cut water needs in half by smothering thirsty weeds and reducing evaporation. Organic mulches retain some water themselves and increase the humidity level around plants.
- **Use free water** - Rainwater is the best choice for your plants. It's clear, unchlorinated, and free. Use rain barrels or a cistern to collect water from your downspouts. A 1,000-square-foot roof will yield 625 gallons of water from 1 inch of rain.
- **Reduce your lawn** - Turf grass is one of the most water and labor-intensive types of "gardens" you can have. Consider planting ground covers or low-maintenance perennials instead.
- **Plan before you plant** - By planning your garden before you plant, you can take advantage of the characteristics of your site, such as sun, shade, wind, and soil. Group plants with similar water needs. Also consider how your plants will get the water they need. Will you need to carry water to demanding plants in a remote corner of your yard? Planning will save you time and energy down the road.
- **Choose plant carefully** - A plant that's satisfied getting most of the water it needs from natural rainfall will require a lot less work from you. For drought-tolerant perennials, choose varieties that are native to your area (or a region with a similar climate). These plants will be naturally adapted for your local climate and soils.
- **Take good care of your plants** - Healthy plants need less water, fertilizer, and pest controls than stressed plants. By keeping on top of tasks, such as weeding, thinning, pruning, and monitoring pests, you'll be able to ease off on watering (2014. Gardeners Supply Company).

## Additional Information

For more information like this, please visit the [Gardener's Supply Company](#) website, or view the [Useful Links](#) page.



**City of Patterson**  
**Water Conservation Program Information**  
**2020 UWMP**

**Penalties for Water Waste**

Any violation of the provisions of this section shall constitute an infraction and shall be punished by a fine of \$25 for the 1st violation after a warning in writing, \$50 for a 2nd violation within 1 year, and a fine of \$100 for each additional violation within 1 year. The city, at its option, may discontinue the service after the 3rd violation after giving the customer written notice.



**City of Patterson**  
**Water Conservation Program Information**  
**2020 UWMP**

**Mandatory Outdoor Water Use Schedule**

**REVISED**

Day of the Week	If Address Ends in Even Number (0,2,4,6,8)	If Address Ends in Odd Number (1,3,5,7,9)
Monday	No Outdoor Water Use	No Outdoor Water Use
<i>Tuesday</i>	Only Use Water Outdoors Before 10AM and/or After 7PM	No Outdoor Water Use
<i>Wednesday</i>	No Outdoor Water Use	Only Use Water Outdoors Before 10AM and/or After 7PM
<i>Thursday</i>	Only Use Water Outdoors Before 10AM and/or After 7PM	No Outdoor Water Use
<i>Friday</i>	No Outdoor Water Use	Only Use Water Outdoors Before 10AM and/or After 7PM
<i>Saturday</i>	Only Use Water Outdoors Before 10AM and/or After 7PM	No Outdoor Water Use
<i>Sunday</i>	No Outdoor Water Use	Only Use Water Outdoors Before 10AM and/or After 7PM

Although these are the days you are allowed to water, we strongly encourage you to only water when your grass or plants need water. When the ground is moist from low temperatures or previous rain, it is not necessary to water as much as the schedule allows. The most common turf in Patterson only requires one to two inches of water a week. To measure how long you should set your timers, place a clear cup within your sprinkler's spray range, turn on the sprinklers, and record how long it takes to fill the cup to the desired height. This is how long you should set your sprinklers throughout the week. If you need assistance with the adjustment of your sprinklers, please call the Public Works Department at (209) 895-8060.

## **APPENDIX K**

### **2020 UWMP DWR Guidebook**

#### Estimating Future Water Savings

# Appendix K.

## Estimating Future Water Savings from Adopted Codes, Standards, Ordinances, or Transportation and Land-Use Plans

### **K.1. Introduction and Background**

Pursuant to California Water Code (Water Code) Section 10610 et seq., referred to as the Urban Water Management Planning Act (Act), an urban water supplier “*shall be required to develop water management plans to actively pursue the efficient use of available supplies*” (California Water Code 10610.4(c)). One challenge from this directive is reflecting how the pursuit of efficient use is best represented in the projected future water uses that are the cornerstone of good planning. As required by the Act, the water uses from both existing customers and those that may be added during each five-year increment for at least a 20-year planning horizon should be reflected in projections of future water demands.

This document provides urban water suppliers guidance for projecting future water uses for both existing customers and future, new customers based on recent trends, new codes and ordinances, land use changes and other water-use impacting factors and it allows Suppliers to calculate anticipated conservation savings for its existing customers, as well as predict the demands for new customers.

Further, this suggested methodology can be used to reflect the outcome of required coordination with local or regional land-use authorities by allowing unique land-use classifications to be separately considered, as appropriate, to reflect varied water-use factors (e.g., residential lot density, anticipated occupancy, etc.) and be consistent with potential varied designations used by land-use authorities.

### **K.2. Using a Land-use Basis for Unit Water Demand Estimates**

As noted earlier, Water Code Section 10631(d)(1) requires water suppliers to separate water use into several categories, ranging from “single-family residential” to “institutional and government.” Though this subdivision is helpful, it still limits a water supplier’s opportunity to reflect the impact of

conservation measures or land uses because the differences between the unit water demand of existing customers and future customers must be blended into one representative unit water demand factor. For example, if a water supplier currently serves 15,000 residential customers, but anticipates adding another 5,000 customers over the next 10 years — approximately a 3 percent growth rate — the unit water demand factors for existing housing versus that of future housing cannot be differentiated and is generally reflected as one blended value.

To improve on this, DWR recommends but does not require, at a minimum, a water supplier separate each of the six customer categories described in Water Code Section 10631(d)(1) into “existing” and “future” customers (see Figure K-1). This allows the water supplier to assign different unit demand factors to each customer category, allowing adjustments to reflect important water-using drivers — such as existing versus future housing density, and new building standards versus those in place 10 or 20 years ago. As shown in Figure K-1, through this simple separation, a supplier can readily recognize the potential decreasing unit water demand over each five-year planning increment for existing homes (as may result from natural replacements of appliances or from the water supplier’s conservation actions), but can also recognize the different starting point for a home built today that must meet new landscape and building standards, and be equipped with water-efficient appliances. (“Natural replacement” is the term for adopting water conservation ethics and replacing fixtures and appliances with more efficient models.)

### **K.2.1 Using Land-use instead of Population to Estimate Water Demand**

As part of the 2010 and 2015 UWMPs, all retail suppliers were required to determine baseline per-capita water use and set targets for reduced per-capita use by 2020, established as gallons per capita per day (GPCD). Many water suppliers used these 2020 GPCD targets to determine future demands in their 2010 and 2015 UWMPs. This is an easy calculation because it requires multiplying a future estimated population by the GPCD. While simple, this method did not provide a water supplier with the opportunity to assess the effect of codes, ordinances, and land-use plans on future water demand.

Consequently, it potentially misrepresents actual trends and reduces the opportunity for the supplier to assess success toward achieving its 2020 target. For example, a water supplier that forecasts future demands by simply applying GPCD targets to population projections

did not have the ability to differentiate the effect of new landscape ordinances on new construction from the effect of conservation mandates on existing customers.

For 2020 UWMPs, the supplier should consider a more robust approach than GPCD x population not only to better estimate its future water use needs, but also to compare its projections with pending urban water-use objective that will be established prior to the 2025 UWMP period, as described in California Water Code Section 10609.25.

DWR strongly encourages water suppliers to shift to land-use-based water demand factors to have a more thorough understanding of how demand may change over time, as influenced by the composition of its existing and future customers, and help position the supplier to address future water-use objective requirements.

### **K.2.2 Using Meter Data to Develop Unit Demand Factors**

The most accurate way to analyze existing demands for differing land use classifications is to review historic meter records obtained from the water system itself, especially for residential customers that often constitute the majority of an urban supplier's water use. The following steps outline a simple meter analysis for residential data, though each water supplier likely has unique circumstances that may require more specialized assessments to assure the data is usable for demand forecasting purposes. Non-residential meter data can also be analyzed using similar steps.

☐ Create land-use categories. In this step, the lot sizes, housing types, neighborhood types, and relative ages of structures are used to develop appropriate land-use categories in relation to expected differences in water use. Existing residential developments typically can be grouped by age and size into a manageable number of dwelling unit categories. Some typical characteristics that can be used for dwelling unit classification include lot size, housing square footage, and general development age. As outdoor demands are generally the largest component of residential water use, net landscape area provides a good basis for creating land-use categories. Generally, large developments are built grouping similar-sized homes into their own neighborhoods. One method for defining a lot type is to review satellite photos of a few houses in a neighborhood and

identify the general lot size, house size, and net landscape area. Geographic information system (GIS) tools, if available to water suppliers, can also offer methods to help establish categories. Indoor demands can vary significantly in older neighborhoods where there is a mixture of newer and older appliances and fixtures compared to newer homes that may have been built or remodeled subject to more recent plumbing code requirements. These differences can create another basis for category distinction. Note that typical neighborhoods built after the initial plumbing codes in the early 1990's (e.g., 1.6-gallon-per-flush toilets) will see normalized indoor demands. Homes built after the latest efficiency codes (e.g., 1.28-gallon-per-flush toilets) see even lower indoor demands.

**D**ownload meter data. For each land-use classification, obtain a few years (minimum) of monthly customer meter data from at least one representative neighborhood. (Note: This step requires staff or consultant access to query the billing database or other source of records). Typically, meter data will be available in database form where a spreadsheet can be generated through a query designed to reflect the categories developed in Step 1. This is the most primitive type of data pull and is easily achieved by locating a few streets in neighborhoods with identified housing types. At least 50 customer meter records in a given dwelling unit classification should be analyzed, but 150 records would allow for more confidence in the data. The more data used, the more errors or anomalies that can be normalized. Although it can be valuable to assess all residential customer data, often-representative samplings provide a solid basis for developing the unique unit water demand factors. If the meter data database is accessible through a GIS system, then data queries can be defined by geographical area and can encompass entire tracts easily. There are a number of GIS-based tools emerging that may be used to simplify the meter data analysis process.

**S**ort data. This step allows the data to be scrubbed so that it appears reflective of the general water demand characteristics of the selected land-use category. Assuming a typical inclined rate structure, the resulting total annual demands should graph into an offset bell curve when plotted as a histogram. This curve will smooth with more meters, but 150 is typically enough to define the shape. The more data available for a land-use class, the

more representative the average consumption data will be (see Figure K-3). As indicated by the data set used to create the figure, the rate structure results only in a minor offset in water use. This is more noticeable in the data set using 150 or more customer meters and is absent in the data set with only 50 customer meters. From this curve the erroneous or outlier meter sets can be eliminated. Meters with exceptionally high and exceptionally low use can be eliminated so as to not inappropriately skew the analysis of “typical” water-use characteristics for the specific land-use class. Specific thresholds are not defined in this guide, but typically eliminating the top and bottom 10 percent of records (in relation to annual quantity of use) will improve the relevance of the curve. Monthly data should be reviewed in chart format and errors removed. Some basic criteria for removal include months with zero use, incomplete meter records, months with default minimum use, lack of seasonality in meter use, and fixed annual use. The goal is to eliminate records from vacant homes, seasonally used homes, and the like. This step is subjective, requiring reasonable judgment.

7 Analyze data. Using the sorted data for each land-use category, monthly averages can be developed, indoor and outdoor use characteristics can be ascertained, and use between categories can be compared. This step may result in some consolidation of the original land-use categories (see step 1) or may verify that enough variance exists to maintain separate categories. Finally, an annual water demand per unit can be developed (e.g., acre feet per year or average gallons per day per house type A). This value represents the “current” demand of the “existing” customer categories. From this existing set of demand factors, the water supplier can begin applying reductions to account for the effects of codes and ordinances and other water conservation-related factors applicable to existing customer types.

These existing demand factors can also act as a baseline factors for future land-use categories. For instance, a medium density neighborhood built in the early 2000s has a determined set of demand factors that can indicate indoor use. New medium density homes should have an indoor factor that is less by some percentage to reflect plumbing code and building standard changes since the existing homes were constructed (e.g., CalGreen Building Standards or California Energy Commission Title 20 appliance standards for toilets, urinals, faucets, and showerheads).

Another example of the use of meter data may be found in how many water suppliers are assessing monthly water-use data to satisfy mandated State Water Resources Control Board (SWRCB) reporting. In the SWRCB monthly reporting, suppliers have the opportunity to separate residential from non-residential use on a monthly basis. Throughout the year, the

determination of percentage of residential versus non-residential should vary. For example, a hot inland area would see a residential use as a higher percentage of overall water demand. This results from more extensive outdoor residential water demand in the summer months because of landscaping needs. In winter months, the percentage of residential use compared to nonresidential would lower reflecting only minimal residential outdoor watering. The supplier that is already reporting this likely has the data readily available to also take the steps above to develop land-use based demand factors.

### **K.2.2.1 Commercial Water-Use Sector Considerations**

The commercial water sector is a very broad category that may include a wide range of non-residential water users, from large regional shopping centers, to neighborhood retail centers, to high-rise office buildings, hotels, and medical centers. If the commercial class is a significant portion of water demands or a number of unique water users exist, then suppliers are encouraged to create appropriate subcategories to enable appropriate analysis for future water needs.

Because of the wide variety of customer types in this class and the large variability of water use and lot size, suppliers are encouraged to use a demand per-acre value to account for varied businesses within one metered water service account. For example, a neighborhood retail center may have a mix of very low and very high water users, such as a laundromat or restaurant. Individually, the use varies significantly; but for the entire commercial parcel, including parking areas, ornamental landscaping and other features, the entire water use can be averaged per acre of the commercial space. However, a neighborhood retail center may vary from a high-rise office complex, which may cause the supplier to create a separate category under the "commercial" sector for each. The important consideration is to create unique categories as most appropriate to facilitate future water-use projections as those may vary by each subcategory.

### **K.2.2.2 Industrial Sector Considerations**

The industrial water-use sector is another category with a wide range of actual or potential water use and an even greater range of land development intensity, making forecasts challenging. For example, a new major industrial facility may be opening soon or may expect to significantly expand. Conversations with the local land-use authority are extremely important to understand likely new industrial water users otherwise unknown to the supplier.

For this classification, suppliers are encouraged to closely review the

water-use history of its industrial customers and potentially group into “high-water using” or other categories that can facilitate forecasts for future water needs. In some instances, conversations with the highwater users may be useful for projecting whether demands may change over the next five-year period. Overall, this category requires close analysis to assure future demands reflect anticipated conditions.

### **K.2.2.3 Institutional and Governmental Sector Considerations**

This water-use sector likely has obvious subclasses for water-use analysis, such as parks, schools, fire stations, or other explicit uses. Often these can be significant water users with only a limited number of water-service accounts, allowing easy separation into unique categories. The class may also capture some unique land-use classes, such as large airports, which should be separated from the general use in the class.

### **K.2.2.4 Representing Unique Water-Use Sectors and Land-Use Classification**

Several water suppliers in the state have unique land uses, or variation of uses, that fall outside of the six categories described in Water Code Section 10631(d)(1) (see page K-2). Some examples include vacation homes, dual-plumbed homes, and “rural residential” or “country estate” type larger (multi-acre) parcels with active agricultural demands. In each of these cases, the most appropriate method to develop unit demand factors is to obtain representative meter data either from existing similar projects already served by the supplier or through coordination with another supplier with similar circumstances.

For example, estimating the future demand from new vacation homes would require some analysis of similar vacation homes in the region (whether served by the supplier or not). It is important to remember that this is representative data to assist the supplier in performing demand forecasts, so absolute certainty is not required. If data is not available, subjective-based adjustments could be made to existing uses, such as multiplying outdoor use per square foot for a standard residential development, then applying the value to the larger lots.

Many factors can affect water use in unique land classifications. Generally, if existing data is not available for similar uses, the unique use is likely a small contributor to the overall demand of the supplier. For example, in a vacation community, the supplier should have ample access to data to establish usable demand factors. In a community with a new vacation development, the new demand likely represents a small portion of existing

demand, so it can be assessed using professional judgment extrapolating existing land-use factors.

Other unique water-use classes which are worth analyzing as their own subclass may include universities, resorts, large hospitals, large office and research parks, and large hotels. In addition to the unique examples in previous sections, each of these categories can represent a significant water use and impact the larger trends on the supplier as a whole.

#### **K.2.4 Converting Per-capita to Land-use Based Demand Factors**

Per-capita demand factors can easily be calculated from land-use based demand factors. Unfortunately, a simple method to convert per 2020 capita demand factors into land-use demand factors is not viable. Because the use characteristics between land-use classes can vary significantly, trying to convert a supplier's average of 120 GPCD (example only) is meaningless without looking at actual water-use characteristics for each land-use class. DWR encourages suppliers using a per-capita basis for forecasting demands switch to the more refined land-use-based approach, then convert back to GPCD to understand overall trending toward per-capita targets or other supplier-specific objectives.

Care should be taken when converting back to GPCD that the appropriate population estimate is used that best reflects the land-use forecasts. As an example, a water supplier's land-use-based forecast may assume that 1,000 medium-density, single-family and 500 multifamily homes are constructed over the next 10 years. Based on available census data, the water supplier may determine that the average single-family residence has 3.1 people and the multi-family housing averages 1.8 people. These numbers would generate a forecasted population (all other aspects remaining the same) of 4,000 people. In contrast, the California Department of Finance may project a 10-year population growth of 4,500 people, based upon birth, death and migration statistics. These two different methods will result in different projected GPCD values. DWR strongly recommends that the population basis used to convert back to GPCD values match that used to determine the baseline GPCD values, as first documented in a water supplier's 2010 and 2015 UWMPs.

### **K.4 – Additional Useful Information**

As discussed in previous sections, developing unit water demand factors for various land-use classifications is essential to understanding current customer use characteristics and to forecast future water demands. The Water Code requires that a supplier shall reflect codes, standards,

ordinances, or transportation and land-use plans in its forecasted water demands, where such information is available.

Incorporating these into future unit demand factors (to include in tables such as sampled in Figure K-2 and Figure K-5) requires a supplier to make adjustments to baseline demand factors determined through the assessment of meter data. There is no standard formula to accomplish this task. Rather, a supplier is encouraged to use professional judgment, a discretionary action that will be supported by DWR during review of UWMPs. This section provides guidance.

#### **K.4.1 Applicable State Codes and Ordinances**

At the State level, various codes and ordinances are adopted and put into law, which increases efficiency statewide. Overall, a water supplier retains discretion to reflect these conservation savings as deemed appropriate for its circumstances. If baseline unit demand factors for existing land uses are used as a basis, these State codes and ordinances will, at a minimum, cause a reduction from the baseline.

Experimenting with the sensitivity of overall forecast demands by modifying the effect of all these factors can help a supplier assess likely 2025 GPCD conditions, the value of existing conservation efforts, and the need to potentially make adjustments prior to the next UMWP update. A brief description follows of several statewide codes and ordinances that should affect future water needs.

##### **K.4.1.1 Model Water Efficient Landscaping Ordinance**

The Water Conservation in Landscaping Act was enacted in 2006 and has since been revised and expanded multiple times by DWR resulting in the current MWELo (Government Code sections 65591-65599). In response to Governor Brown's executive order dated April 1, 2015, (EO B-29-15), DWR updated MWELo and the California Water Commission approved the adoption and incorporation of the updated State standards for MWELo on July 15, 2015. MWELo requires a retail water supplier or a county to adopt MWELo provisions or to enact its own provisions equal to or more restrictive than the MWELo provisions. The changes included a reduction from 70 percent to 55 percent of the reference evapotranspiration (ET<sub>o</sub>) for the maximum amount of water that may be applied to a landscape for residential projects, and non-residential projects to 45 percent, which effectively reduces the landscape area that can be planted with high-water-use plants, such as turf. For residential projects, the allowable maximum coverage of high-water-use plants is reduced to 25 percent of the landscaped area (down from 33 percent). The updated MWELo also now

applies to new construction with a landscape area greater than 500 square feet (the prior MWELo only applied to landscapes greater than 2,500 square feet, per Cal. Code Reg. Tit. 23, Div. 2, Ch. 27, Sec. 490.1.).

#### **K.4.1.2 California Energy Commission Title 20**

First developed in 1977, the California Energy Commission (CEC) introduced appliance energy-efficiency standards. Since then, these standards have been expanded to include a number of household items related to water and energy use including dishwashers, clothes washers, sprinklers, showerheads, faucets, toilets, and urinals. These standards are applied in addition to national standards. In many cases, within a few years, national standards are modeled on and adopted from California's standards. Following approval of a new standard, the CEC ensures that only items that can pass new testing procedures are legally allowed to be sold in California.

#### **K.4.1.3 Cal-Green Building Code**

Beginning in January 2010, the California Building Standards Commission adopted the statewide mandatory Green Building Standards Code (CALGreen Code) requiring the installation of water efficient indoor and outdoor infrastructure for all new projects after January 1, 2011. The CALGreen Code was incorporated as Part 11 into Title 24 of the California Code of Regulations and was revised in 2016 to address changes to MWELo adopted during the 2012–2016 statewide drought. Revisions to CALGreen Code in 2019 modified sections to direct users to MWELo regulations.

The 2016 Triennial Code Adoption Cycle consisted primarily of the MWELo updates adopted in response to the drought. Indoor infrastructure changes were limited to some minor non-residential fixture changes and changes to the voluntary Tier 1 and Tier 2 requirements. Additionally, the Code was updated to match the new Title 20 Appliance Efficiency Regulations. The 2019 updated sections to direct CALGreen code users to Title 23 of the California Code of Regulations to allow Title 23 to be the sole location of MWELo requirements.

The CALGreen Code applies to the planning, design, operation, construction, use, and occupancy of every newly constructed or remodeled building or structure. All new residential and non-residential customers added to the District's demands must meet the CALGreen Code as well as the outdoor requirements described by MWELo. Generally, remodels and new construction will satisfy these indoor requirements through the use of appliances and fixtures such as high efficiency toilets,

faucet aerators, on-demand water heaters, or other fixtures, as well as Energy Star and California Energy Commission-approved appliances.

#### **K.4.1.4 Water Conservation Objectives and Legislative Actions**

In 2009, Governor Arnold Schwarzenegger signed Senate Bill No. 7 (SBX7-7), which established a statewide goal of achieving a 20 percent reduction in urban per capita water use by 2020 for urban retail water suppliers (Water Code Section 10608.20). The efforts undertaken by urban retail suppliers to comply with this statute affects existing customer purchases of replacement appliances and fixtures, has caused landscapes to alter, and has generally created a continuing water conservation ethic.

In response to multi-year drought conditions, Governor Brown issued Executive Order B-37-16, "Making Water Conservation a California Way of Life," in May 2016. In May 2018, Governor Brown signed into law SB 606 and AB 1668, both of which imposed additional statutory requirements above and beyond the 20 percent by 2020 target and resulted in continued efforts to increase water-use efficiency and ultimately to reduce water demands of existing customers.

In 1991, SB 229 passed which created Water Code Section 525 and required water suppliers to install meters on all new service connections after January 1, 1992. Water Code Section 527, modified in 2004 by AB 2572, required water suppliers to charge for water based upon the actual volume of water delivered if a meter has been installed, and more importantly, to install water meters on all customers by January 1, 2025. Customers that are metered and billed in part based upon volume have consistently shown a lower use when compared to flat rate non-metered customers.

#### **K.4.2 Examples of Applying Local Ordinances and Conservation Programs**

Standard rules do not exist for reflecting the benefits of local ordinances on future demand factors. However, through assessments of selected meter data, use of readily available studies and reports, sound professional judgments can be made. Overall, the anticipated reduction in unit water demand factors for specific land-use classes needs to consider the existing circumstances (e.g., age of home, cost of water to customer, and local demographics). Although recent extreme efforts to manage demand during the 2015 drought crisis indicate reductions in excess of 30 percent, the actual long-term savings for existing residential users may be much less. Without a more thorough assessment, a water supplier may conservatively

assume existing residential customers reduce unit demands by 5 to 10 percent over the forecast timeframe. More sophisticated analysis to support reductions can be undertaken using available guidance from existing reports. Consider these examples:

Turf replacement — With several water suppliers throughout the state implementing these programs over the past several years, data to guide anticipated savings is readily available. As noted in a 2015 study by the California Water Efficiency Partnership (California Water Efficiency Partnership/California Urban Water Conservation Council 2015), not all programs achieve success, with savings dependent on the design of the program. Before and after meter data can be helpful in providing guidance as to expected long-term benefits to unit demand factors.

Fixture and appliance rebates — To an even greater extent than turf replacement, fixture and appliance rebates have been ongoing for many years with varied success. The supplier will need to anticipate participation rates and ultimate reductions in the various unit water demand factors.

Natural Replacement — Even without targeted conservation programs, existing water users will generally experience a reduction in unit water demands over time as fixtures and appliances are replaced and water conservation ethics continue to be embodied. This is considered “natural replacement.” For instance, even without a rebate incentive, residential customers will purchase new washing machines over time, likely replacing an inefficient appliance with one meeting the current State appliance standards. Care must be taken to ensure the acceleration of replacement intended through rebate programs is not double counted with natural replacement.

In addition to specific conservation programs, the water supplier or land-use agency may have other specific ordinances that will affect unit demand factors. Most of the time, these factors will need to be reflected in unit demands for future land-uses (e.g., the anticipated homes and commercial establishments occurring in the next 5- or 10- year increment). Examples of local ordinances include expansions beyond the State’s MWEL0, adding turf percentage limits, turf square footage limits, native area landscaping or open space requirements, more strict irrigation limits, stricter water budgets, and native only or xeriscaping requirements.

The California Water Efficiency Partnership, the Alliance for Water Efficiency, and other conservation-oriented advocacy groups offer many tools to assist water suppliers. Examples of tools are available online at [California Water](#)

[Efficiency Partnership](#) and [Alliance for Water Efficiency](#) websites. Membership may be required to access some tools and references.)

#### **K.4.3 Using Standardized Values**

DWR prefers the use of actual supplier-specific meter data as the best source for baseline demand factors. However, some future land-uses, especially those predicted in the 20th year may not have detailed information beyond a general zoning designation of “residential” or “commercial.” These land-uses may include large tracts of land designated in an adopted zoning map or may be nearer-term projects not currently part of a supplier’s customer base (e.g., a hotel or particular industry). For these instances, water-use data from a recently completed specific plan or possible water supply assessment, may provide a standard value. Lacking any other data, a standard American Water Works Association-approved value or other common standard in the industry may be used as available.

Caution should be used when applying typical engineering standards to develop annual residential demands. These standards often represent a daily demand in gallons per unit for purpose of sizing infrastructure. Expanding to an annual value (multiplying by 365 days) could be misleading. But daily values can be useful for estimating commercial and industrial uses (e.g., office buildings, retail centers, shipping warehouses), as these uses tend to be stable throughout most of the year.

#### **K.4.4 Recognizing Trends in Land-Use Planning**

As noted earlier, when using land-use or transportation planning documents to help define future land-use classes, the time-relevance of those documents needs to be considered. For instance, a general plan completed prior to 2005 likely reflected the trend toward larger lots and rapid build-out, matching the conditions of the late 1990s. But today, land-use agencies are promoting trends to more dense residential developments, mixed uses, and slower growth, although they may not have updated their general plans or other relevant land use documents. Developers are responding with combinations of compressed densities but also with large homes on smaller lots. The effect of this latter trend is significant reductions in outdoor landscaped square footage, as the house and hardscapes cover most of the lot. This translates to lower unit demand factors when compared to what might have been otherwise reflected under existing land-use documents, even if the result is more dwelling units, as the indoor demands are typically less than the previously projected outdoor demands for the larger lots.

Ideally, incorporating land-use and transportation planning documents

provides an opportunity for the water supplier and local land-use agency(ies) to coordinate on trends, applications of ordinances (e.g., the State or local MWELo), and anticipated growth rates. Improved coordination also allows the 2020 UWMP to be a useful resource to land planning agencies that may be updating general plans or evaluating specific development proposals. Suppliers are encouraged to work with local land-use authorities to understand growth plans and incorporate these into more realistic and aligned water demand projections.

#### **K.4.5 Including Citations**

As required in the statute, a water supplier must “Provide citations of the various codes, standards, ordinances, or transportation and landuse plans utilized in making the projections” or otherwise note the absence of estimated savings from its water-use projections. Citations can easily be included by simple reference to an ordinance or basis of a calculation, or the source of land-use information (e.g., from 2005 General Plan for City A). Appropriately citing sources and methods will allow a water supplier to easily revisit approaches and assumptions made in the 2020 UWMP when it is undertaken the 2025 UWMP. Internal trends published in an annual report, such as submitted by suppliers to the State’s Division of Drinking Water also serve as a useful and reliable citation for preparing State document.

## City of Patterson

**Estimating Future Water Savings From Adopted Codes/Standards/Land Use Plans  
Considered in Future Savings Analysis and Demand Projections**

<b>Source</b>	<b>Future Savings Impact</b>	<b>Potential Savings</b>
Green Code Standards	New development - indoor water use efficiency	Reduce per capita indoor use to EPA Smart Home estimate of 107 gpcd
AB 1668/ SB 606	Standards For: Residential Indoor Use Residential Outdoor Use CII Landscape Irrigation Water Loss Per Capita Water Use Targets	Pending DWR and SWRCB approval, City will update demand projections accordingly
Plumbing Fixture and Appliance Efficiency Rebates and Time-of-Sale Req.	Pre-1994 Development Approx. 2,400 housing units Conversion by 2030	Reduce per capita indoor use for older housing stock to 107-114 gpcd
MWELO New Development Standard	New Development – outdoor water use efficiency	0.55 ETo new landscape water budget requirement target
City AMI Meter Project	Install hourly read water meters with real-time leak detection By 2025	City to reduce customer leak losses by 5-7%, some outdoor savings
2020 Water Use Target	Monitor monthly water production, consumption and population data for potable water system	Reliably below 164 gpcd water use target (accounting for non-potable water usage)
Water Loss Control	Reduce real losses in existing water system	Reduce real losses by 300-325 AFY
Potable and Non-Potable Irrigation	Water Budgets-Irrigation Rates	Reduce annual use by 10-15% with lower peak use
Future Demand Projections	Calibrate GPCD targets with land use validation Update Every 5 Years	Validate accuracy of demand projections and future savings realized
User Class Demand Analysis	Commercial/Industrial users Disaggregate end uses	Potential for 5-10% annual savings through program offerings based on data

**APPENDIX L****2020 UWMP DWR Guidebook**

## Water Loss Auditing (2016-2020)

<b>Calendar Year</b>	<b>Annual Water Audit Completed</b>	<b>Audit Validation Report to SWRCB</b>
2016	YES	YES
2017	YES	YES
2018	YES	YES
2019	YES	YES
2020	YES	

*Water audits conducted by City of Patterson Public Works Department.*



# 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 Patterson (5010017)  
**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.

Master Meter and Supply Error Adjustments

**WATER SUPPLIED**

		<----- Enter grading in column 'E' and 'J' ----->				Pcmt:	Value:		
Volume from own sources:	<input type="button" value="+"/> <input type="button" value="7"/>	<input type="text" value="1,030.450"/>	MG/Yr	<input type="button" value="+"/> <input type="button" value="2"/>	<input type="text" value="0.000"/>	<input type="text" value="0.000"/>	MG/Yr		
Water imported:	<input type="button" value="+"/> <input type="button" value="n/a"/>	<input type="text" value="0.000"/>	MG/Yr	<input type="button" value="+"/> <input type="button" value="n/a"/>	<input type="text" value="0.000"/>	<input type="text" value="0.000"/>	MG/Yr		
Water exported:	<input type="button" value="+"/> <input type="button" value="n/a"/>	<input type="text" value="0.000"/>	MG/Yr	<input type="button" value="+"/> <input type="button" value="n/a"/>	<input type="text" value="0.000"/>	<input type="text" value="0.000"/>	MG/Yr		

Enter negative % or value for under-registration  
Enter positive % or value for over-registration

**WATER SUPPLIED:** 1,030.450 MG/Yr

**AUTHORIZED CONSUMPTION**

Billed metered:	<input type="button" value="+"/> <input type="button" value="6"/>	<input type="text" value="884.378"/>	MG/Yr
Billed unmetered:	<input type="button" value="+"/> <input type="button" value="n/a"/>	<input type="text" value="0.000"/>	MG/Yr
Unbilled metered:	<input type="button" value="+"/> <input type="button" value="n/a"/>	<input type="text" value="0.000"/>	MG/Yr
Unbilled unmetered:	<input type="button" value="+"/> <input type="button" value="5"/>	<input type="text" value="2.576"/>	MG/Yr

Click here:  for help using option buttons below

Pcmt:  Value:  MG/Yr

Use buttons to select percentage of water supplied OR value

Pcmt:  Value:  MG/Yr

MG/Yr  
  MG/Yr

**AUTHORIZED CONSUMPTION:**  886.954 MG/Yr

**WATER LOSSES (Water Supplied - Authorized Consumption)** 143.496 MG/Yr

**Apparent Losses**

Unauthorized consumption:   2.576 MG/Yr

Default option selected for unauthorized consumption - a grading of 5 is applied but not displayed

Customer metering inaccuracies:   4.444 MG/Yr  
Systematic data handling errors:   2.211 MG/Yr

Default option selected for Systematic data handling errors - a grading of 5 is applied but not displayed

**Apparent Losses:**  9.231 MG/Yr

**Real Losses (Current Annual Real Losses or CARL)**

Real Losses = Water Losses - Apparent Losses:  134.265 MG/Yr

**WATER LOSSES:** 143.496 MG/Yr

**NON-REVENUE WATER**

**NON-REVENUE WATER:**  146.072 MG/Yr

= Water Losses + Unbilled Metered + Unbilled Unmetered

**SYSTEM DATA**

Length of mains:    miles  
Number of active AND inactive service connections:     
Service connection density:  130 conn./mile main

Are customer meters typically located at the curbside 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:    psi

**COST DATA**

Total annual cost of operating water system:    \$/Year  
Customer retail unit cost (applied to Apparent Losses):    \$/100 cubic feet (ccf)  
Variable production cost (applied to Real Losses):    \$/Million gallons  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: Volume from own sources
- 2: Customer metering inaccuracies
- 3: Customer retail unit cost (applied to Apparent Losses)



## CA-NV AWWA Water Loss Technical Assistance Program Wave 4 Water Audit Level 1 Validation Document

### Audit Information:

**Utility:** Patterson                      **PWS ID:** 5010017  
**System Type:** Potable                **Audit Period:** Calendar 2016  
**Utility Representation:** Maria Encinas (Management Analyst), Robert Andrade (Director of Public Works), Mike Heard (Water Department Supervisor)  
**Validation Date:** 8/22/2017            **Call Time:** 1:00pm                      **Sufficient Supporting Documents Provided:** Yes

### Validation Findings & Confirmation Statement:

#### Key Audit Metrics:

**Data Validity Score:** 61                **Data Validity Band (Level):** Band III (51-70)  
**ILI:** 5.01                      **Real Loss:** 57.58 (gal/conn/day)            **Apparent Loss:** 3.96 (gal/conn/day)  
**Non-revenue water as percent of cost of operating system:** 1.5%

#### Certification Statement by Validator:

This water loss audit report has been Level 1 validated per the requirements of California Code of Regulations Title 23, Division 2, Chapter 7 and the California Water Code Section 10608.34.

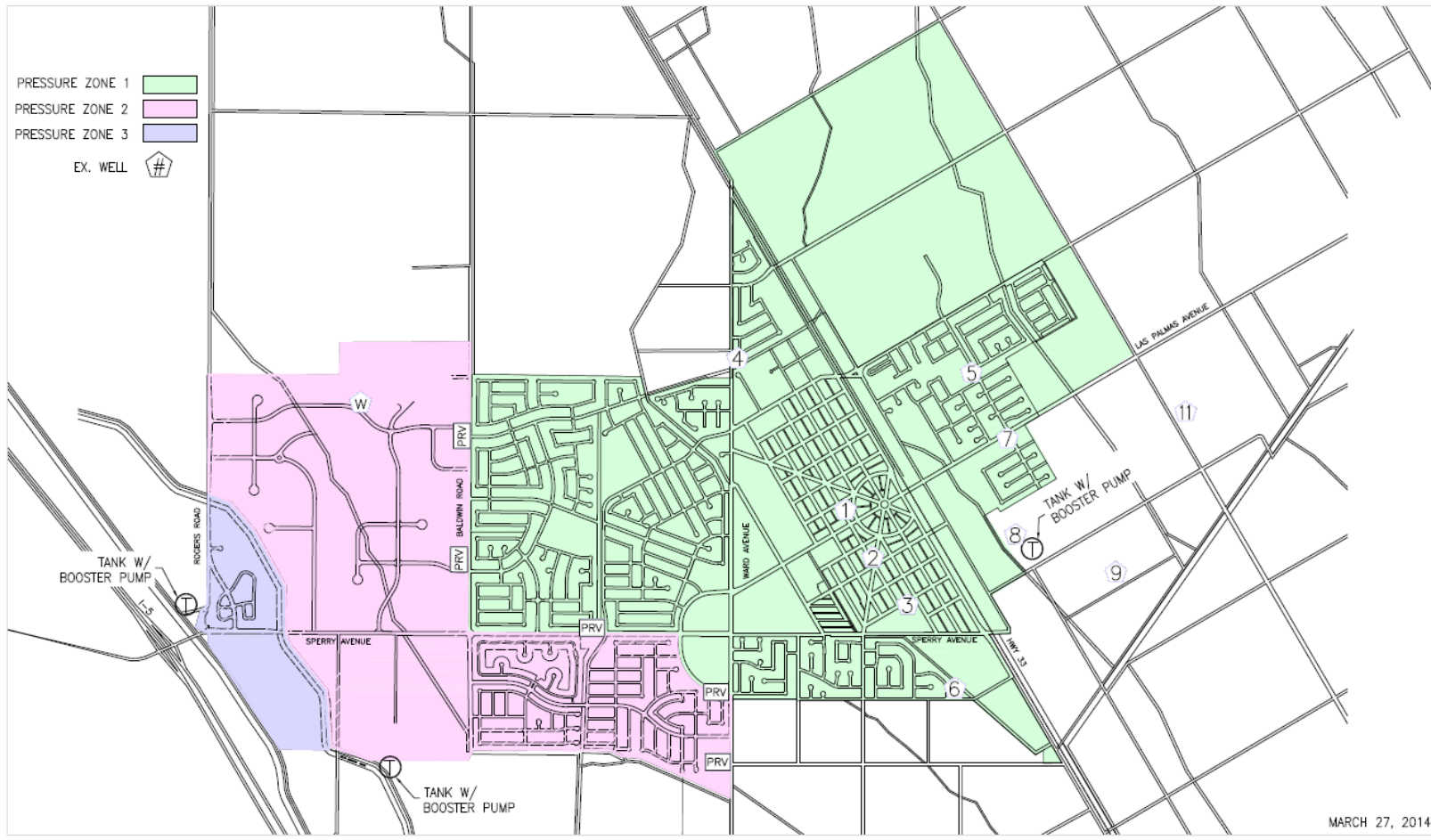
All recommendations on volume derivation and Data Validity Grades were incorporated into the water audit.

### Validator Information:

**Water Audit Validator:** Kate Gasner                      **Validator Qualifications:** Contractor for CA-NV AWWA Water Loss TAP

Validator Provided

**CITY OF PATTERSON  
 PRESSURE ZONES AND WATER FACILITIES**





#	AWWA Water Audit Input	Code	Final DVG	Basis on Input Derivation	Basis on Data Validity Grade
1	Volume from Own Sources	VOS	7	<p><b>Supply meter profile:</b> 7 active potable wells, all metered by McCrometer UMO6, ultrasonic meters. Patterson also operates 2 non-potable wells (not chlorinated, serving irrigation customers).</p> <p><b>VOS input derived from:</b> Manual reads from production meters as archived.</p> <p><b>Comments:</b> Input derivation from supporting documents confirmed. Exclusion of non-potable volumes (from 2 wells sites) confirmed.</p>	<p><b>Percent of own supply metered:</b> 100%</p> <p><b>Signal calibration frequency:</b> Annual.</p> <p><b>Volumetric testing frequency:</b> Annual.</p> <p><b>Volumetric testing method:</b> Comparative apparatus.</p> <p><b>Percent of own supply tested and/or calibrated:</b> 100%</p> <p><b>Comments:</b> All potable well meters were <i>either</i> electronically calibrated or volumetrically tested. Unclear why the different treatment for different meters. All tests conducted through third-party while Patterson acquires capacity and ability to test internally.</p>
2	VOS Master Meter & Supply Error Adjustment	VOS MMSEA	2	<p><b>Input derivation:</b> Left blank in absence of available test data.</p> <p><b>Net storage change included in MMSEA input:</b> No.</p> <p><b>Comments:</b> 3.2 MG in storage capacity; required to maintain a certain storage level based on fire requirements and attempt to keep full consistently.</p>	<p><b>Supply meter read frequency:</b> Daily.</p> <p><b>Supply meter read method:</b> Manual.</p> <p><b>Frequency of data review for trends &amp; anomalies:</b> Each business day.</p> <p><b>Storage levels monitored in real-time:</b> Yes.</p> <p><b>Comments:</b> In addition to the daily manual reads, a recent update to SCADA system allows for flow monitoring remotely.</p>
3	Water Imported	WI	n/a	n/a	n/a
4	WI Master Meter & Supply Error Adjustment	WI MMSEA	n/a	n/a	n/a
5	Water Exported	WE	n/a	n/a	n/a
6	WE Master Meter & Supply Error Adjustment	WE MMSEA	n/a	n/a	n/a



#	AWWA Water Audit Input	Code	Final DVG	Basis on Input Derivation	Basis on Data Validity Grade
7	Billed metered	BMAC	6	<p>Customer meter profile:                      Age profile: up to 15 or 16 years old                      Reading system: AMR                      Read frequency: Monthly.</p> <p>Comments: Lag-time correction is not employed in input derivation. This may introduce error because January 2016 bills actually represent the latter half of November 2015 and the first half of December 2015.</p> <p>Input derivation from supporting documents confirmed. Exclusion of non-potable volumes corrected for.</p> <p>For the 2016 billing data, non-potable customer accounts could not be isolated and removed from total consumption queries. The only customer class this affects is the Irrigation class, wherein 25-30 accounts (i.e city parks) receive non-potable water. As a stop-gap estimation, the total non-potable well production (from Well #4 and the Keystone Well, 73.968 MG) was subtracted from the total billed volume.</p> <p>Patterson billing staff about to finish process of identifying all non-potable accounts and flagging them for future exclusion.</p> <p>Estimate for construction meter use not available and excluded.</p> <p>It is notable that there are a handful of different ways to query consumption from Springbrook; those total billed metered volumes are not perfectly aligned but within a couple percentage points. This difference prompted a more thorough auditing of bill integrity (comparing billed volumes to raw AMR reads) which revealed no transfer error.</p>	<p>Percent of customers metered: 100%</p> <p>Small meter testing policy: Reactive - complaint based or flagged-consumption testing only. Meter conversion also serving as proxy for testing criteria.</p> <p>Number of small meters tested/year: Not quantified, but known to be small.</p> <p>Large meter testing policy: Reactive - complaint based or flagged-consumption testing only.</p> <p>Number of large meters tested/year: Not quantified, but known to be small.</p> <p>Meter replacement policy: Oldest meters are replaced at 15-20 year range. A big push of meter replacements were completed in 2016. Anticipating a significant phase of meters arriving at that age range within the next couple years.</p> <p>Number of replacements/year: between 2-3,000</p> <p>Billing data auditing: AMR reads transfer automatically to Springbrook billing system. Re-reads are triggered by flagged reads. 10-15 manual adjustments made per month based on re-reads.</p> <p>Comments: In the process of acquiring a bench test equipment of certification so that older meters can be tested.</p>
8	Billed unmetered	BUAC	n/a	n/a	n/a
9	Unbilled metered	UMAC	n/a	n/a	n/a



#	AWWA Water Audit Input	Code	Final DVG	Basis on Input Derivation	Basis on Data Validity Grade
10	Unbilled unmetered	UUAC	5	<b>Profile:</b> Operational flushing and fire department usage. <b>Comments:</b> Flushing activities greatly scaled back due to drought. Custom California default of 0.25%xWS utilized.	<b>Comments:</b> Default grade applied.
11	Unauthorized consumption	UC	5	<b>Comments:</b> Default input applied.	<b>Comments:</b> Default grade applied.
12	Customer metering inaccuracies	CMI	3	See BMAC comments regarding meter testing & replacement activities. <b>Input derivation:</b> Inferred from reference data (manufacturer, anecdotal test results) but not derived from test data analysis & calculation. <b>Comments:</b> Largely inferred from influx of new meters (over one third of population was replaced in 2016).	<b>Characterization of meter testing:</b> Limited (upon request AND consumption flag only). <b>Characterization of meter replacement:</b> Ongoing (proactive), annual. <b>Comments:</b> No additional comments.
13	Systematic data handling errors	SDHE	5	<b>Comments:</b> Default input applied.	<b>Comments:</b> Default grade applied.
14	Length of mains	Lm	8	<b>Input derivation:</b> Totaled from CAD based map. <b>Hydrant leads included:</b> Uncertain. <b>Comments:</b> Water Infrastructure Map stores infrastructure information (composed of CAD files). In parallel, staff uses a web based GIS service.	<b>Mapping format:</b> Digital. <b>Asset management database:</b> Size, material, age filed in CAD files. <b>Map updates &amp; field validation:</b> Accomplished through normal work order processes and upon receiving as-builts. <b>Comments:</b> No additional comments.
15	Number of service connections	Ns	8	<b>Input derivation:</b> Standard report run from billing system. <b>Basis for database query:</b> Account ID - non-premise based. <b>Comments:</b> Count of accounts in December 2016, including inactive accounts (~150). Different reports can be run in Springbrook, but staff reports +/- 2% potential error.	<b>CIS updates &amp; field validation:</b> Accomplished through normal meter reading processes. <b>Estimated error of total count within:</b> 2%. <b>Comments:</b> No additional comments.
16	Ave length of cust. service line	Lp	10	<b>Comments:</b> Default input and grade applied, as customer meters are typically located at the property boundary given California climate.	



#	AWWA Water Audit Input	Code	Final DVG	Basis on Input Derivation	Basis on Data Validity Grade
17	Average operating pressure	AOP	5	<p><b>Number of zones, general profile:</b> 3 pressure zones  <b>Typical pressure range:</b> 55 – 60 PSI  <b>Input derivation:</b> Pressure collected from automatically from well sites and pumping stations, PRVs have manual reads  <b>Comments:</b> Average city pressure calculated from SCADA data</p>	<p><b>Extent of static pressure data collection:</b> Have completed surveys in the past but only part of specific project work.  <b>Characterization of real-time pressure data collection:</b> Basic - telemetry or pressure logging at boundary points (supply locations, tanks, PRVs, boosters).  <b>Hydraulic model:</b> In place and calibrated within the last 5 years.  <b>Comments:</b> Typically update hydraulic every 5 years, just finished one update.</p>
18	Total annual operating cost	TAOC	10	<p><b>Input derivation:</b> From official financial reports.  <b>Comments:</b> Confirmed costs limited to water only, and water debt service included. Value submitted is a budgeted value. Use of actuals recommended if available.</p>	<p><b>Frequency of internal auditing:</b> Annually.  <b>Frequency of third-party CPA auditing:</b> Annually.  <b>Comments:</b> No additional comments.</p>
19	Customer retail unit cost	CRUC	4	<p><b>Input derivation:</b> Simple rate structure with only a single volumetric rate. Sewer charges were not confirmed.  <b>Comments:</b> Recommend for next audit to derive as total consumptive revenue for water (and sewer if applicable) divided by BMAC (cell G23), converted as needed.</p>	<p><b>Characterization of calculation:</b> Composite via simple rate structure with only a single rate. Input calculations have not been reviewed by an M36 water loss expert.  <b>Comments:</b> Same rates for the last five years. Starting in 2018 rate change will be adopted.</p>
20	Variable production cost	VPC	5	<p><b>Supply profile:</b> Own sources only.  <b>Primary costs included:</b> Treatment chemicals and supply &amp; distribution power.  <b>Secondary costs included:</b> None currently included.  <b>Comments:</b> No additional comments.</p>	<p><b>Characterization of calculation:</b> Primary costs only. Input calculations have not been reviewed by an M36 water loss expert.  <b>Comments:</b> No additional comments.</p>





# 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 Patterson (5010017)**  
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' ----->				Master Meter and Supply Error Adjustments	
Volume from own sources:	<a href="#">+</a> <a href="#">?</a>	6	1,176.487	MG/Yr	<a href="#">+</a> <a href="#">?</a>	2	MG/Yr
Water imported:	<a href="#">+</a> <a href="#">?</a>	n/a	0.000	MG/Yr	<a href="#">+</a> <a href="#">?</a>		MG/Yr
Water exported:	<a href="#">+</a> <a href="#">?</a>	n/a	0.000	MG/Yr	<a href="#">+</a> <a href="#">?</a>		MG/Yr

**WATER SUPPLIED:**    **1,176.487** MG/Yr

Enter negative % or value for under-registration  
Enter positive % or value for over-registration

### AUTHORIZED CONSUMPTION

Billed metered:	<a href="#">+</a> <a href="#">?</a>	4	954.137	MG/Yr
Billed unmetered:	<a href="#">+</a> <a href="#">?</a>	n/a	0.000	MG/Yr
Unbilled metered:	<a href="#">+</a> <a href="#">?</a>	n/a	0.000	MG/Yr
Unbilled unmetered:	<a href="#">+</a> <a href="#">?</a>	5	14.706	MG/Yr

Default option selected for Unbilled unmetered - a grading of 5 is applied but not displayed

**AUTHORIZED CONSUMPTION:**    **968.843** MG/Yr

Click here: [?](#)  
for help using option buttons below

Pcnt: 1.25%    Value:    MG/Yr

Use buttons to select percentage of water supplied  
**OR**  
value

### WATER LOSSES (Water Supplied - Authorized Consumption)

**207.644** MG/Yr

#### Apparent Losses

Unauthorized consumption: [+](#) [?](#)    **2.941** MG/Yr

Default option selected for unauthorized consumption - a grading of 5 is applied but not displayed

Customer metering inaccuracies:	<a href="#">+</a> <a href="#">?</a>	3	4.795	MG/Yr
Systematic data handling errors:	<a href="#">+</a> <a href="#">?</a>	5	2.385	MG/Yr

Default option selected for Systematic data handling errors - a grading of 5 is applied but not displayed

**Apparent Losses:**    **10.121** MG/Yr

Pcnt: 0.25%    Value:    MG/Yr

0.50%    MG/Yr  
0.25%    MG/Yr

### Real Losses (Current Annual Real Losses or CARL)

Real Losses = Water Losses - Apparent Losses:    **197.523** MG/Yr

**WATER LOSSES:**    **207.644** MG/Yr

### NON-REVENUE WATER

**NON-REVENUE WATER:**    **222.350** MG/Yr

= Water Losses + Unbilled Metered + Unbilled Unmetered

### SYSTEM DATA

Length of mains:	<a href="#">+</a> <a href="#">?</a>	8	49.0	miles
Number of <u>active</u> AND <u>inactive</u> service connections:	<a href="#">+</a> <a href="#">?</a>	8	6,543	
Service connection density:	<a href="#">?</a>		134	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 has been set to zero and a data grading score of 10 has been applied

Average operating pressure: [+](#) [?](#)    6    60.0    psi

### COST DATA

Total annual cost of operating water system:	<a href="#">+</a> <a href="#">?</a>	10	\$2,400,000	\$/Year
Customer retail unit cost (applied to Apparent Losses):	<a href="#">+</a> <a href="#">?</a>	10	\$2.54	\$/100 cubic feet (ccf)
Variable production cost (applied to Real Losses):	<a href="#">+</a> <a href="#">?</a>	5	\$304.00	\$/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: Volume from own sources

2: Billed metered

3: Customer metering inaccuracies

# City of Patterson – 10/30/2019 – Level 1 Water Audit Validation Notes for 2017 & 2018 Audits

## Level 1 Validation Notes:

Audit Input	Confirmation of Input Derivation	Confirmation of Data Validity Grade (DVG) Assignment
<p>Volume from Own Sources (VOS)</p>	<p>Supply meter profile:</p> <ul style="list-style-type: none"> <li>• 7 potable wells with disinfection (no WTP)</li> <li>• Each well has an electromagnetic (mag) meter</li> <li>• Reads are collected via SCADA (real time remote) but City does not have historian driver installed.</li> <li>• Staff visit well sites daily and manually record flow reads and other diagnostic information in an electronic spreadsheet.                             <ul style="list-style-type: none"> <li>○ Pre-2019 – used paper inspection forms and entered information into electronic spreadsheet.</li> <li>○ Now using Mobile MMS – asset management web-based program. All electronic with daily review.</li> </ul> </li> </ul> <p>VOS Input Data Source:</p> <ul style="list-style-type: none"> <li>• Electronic summary reports.</li> </ul> <p>Confirmed input value (2017): 1,176.487 MG                      Confirmed input value (2018): 1,203.000 MG</p>	<p>Percent of VOS metered: 100%</p> <p>Signal calibration frequency:</p> <ul style="list-style-type: none"> <li>• N/A – reads are recorded manually.</li> </ul> <p>Volumetric testing frequency:</p> <ul style="list-style-type: none"> <li>• Policy to calibrate once per year began in 2017. Documentation was provided for 2017, showing MAGLFO Verification Certificates.</li> <li>• Testing was not accomplished in 2018. The practice is resuming in 2019. The city has purchased flow testers to calibrate meters internally.</li> </ul> <p>Volumetric testing method:</p> <ul style="list-style-type: none"> <li>• Unsure.</li> </ul> <p>Percent of VOS tested and/or calibrated: 100%</p> <p>Comments:</p> <ul style="list-style-type: none"> <li>• Limiting criteria:                             <ul style="list-style-type: none"> <li>○ To reach a 6: <u>Annual</u> electronic calibration (if SCADA is used) OR volumetric accuracy testing (calibration was not conducted in 2018, so a 5 was selected).</li> <li>○ For 8 or higher: Requires both calibration of electronic signal (e.g. SCADA connectivity) AND volumetric meter testing, along with providing documentation of both annual practices.</li> </ul> </li> <li>• Recommendation: In future years, be prepared with writeup or explanation from metering team about steps taken to test accuracy of production meters (e.g. how will the flow testers that the city just purchased be used in conjunction with the mag meters?).</li> </ul> <p>Confirmed DVG: 6 (2017); 5 (2018)</p>

## City of Patterson – 10/30/2019 – Level 1 Water Audit Validation Notes for 2017 & 2018 Audits

Audit Input	Confirmation of Input Derivation	Confirmation of Data Validity Grade (DVG) Assignment
<p>VOS Master Meter Error Adjustment</p>	<p>Adjustment Basis: N/A Net Storage Change Included:</p> <ul style="list-style-type: none"> <li>• Not included.</li> <li>• Tanks are audited through Fire Department – data collected for each pressure zone.</li> <li>• Each tank is about 1-1.5 MG.</li> </ul> <p>Confirmed input value (2017): 0% Confirmed input value (2018): 0%</p>	<p>Supply meter read frequency: Daily Supply meter read method: Manual Frequency of data review: Daily Storage level monitoring frequency:</p> <ul style="list-style-type: none"> <li>• City previously had issues with automated recording of monitoring data.</li> <li>• Measured manually daily.</li> </ul> <p>Comments:</p> <ul style="list-style-type: none"> <li>• Limiting criterion: automatic production data logging (via SCADA) required for greater than a 2.</li> <li>• Required for 4 or higher: comparison of tank levels at the start and end of an audit period for volume adjustment (e.g. 1.5 MG at start of audit period and 0.5 MG at end of audit period means that 1 MG was delivered to customers that wasn't already captured through well flow meter)</li> <li>• Recommendation:                             <ul style="list-style-type: none"> <li>○ Target installation of the SCADA historian driver to automatically record production readings.</li> <li>○ In 2019 audit, obtain tank level readings for Jan. 1 (start of audit) and Dec. 31 (end of audit) for comparison of tank levels and calculation of net storage change.</li> </ul> </li> </ul> <p>Confirmed DVG: 2</p>
<p>Water Imported (WI)</p>	<p>N/A</p>	<p>N/A</p>
<p>WI Master Meter Error Adjustment</p>	<p>N/A</p>	<p>N/A</p>
<p>Water Exported (WE)</p>	<p>N/A</p>	<p>N/A</p>

**City of Patterson – 10/30/2019 – Level 1 Water Audit Validation Notes for 2017 & 2018 Audits**

Audit Input	Confirmation of Input Derivation	Confirmation of Data Validity Grade (DVG) Assignment
WE Master Meter Error Adjustment	N/A	N/A
Billed Metered Authorized Consumption (BMAC)	<p>Customer Meters &amp; Reads Profile:</p> <ul style="list-style-type: none"> <li>• Age profile:               <ul style="list-style-type: none"> <li>○ Mixed based on when meters were installed in various groups of development projects.</li> </ul> </li> <li>• Reading system:               <ul style="list-style-type: none"> <li>○ Automatic Meter Reading (AMR) system – working to move towards Advanced Metering Infrastructure (AMI).</li> <li>○ Transponders no longer serviced by Badger.</li> </ul> </li> <li>• Read frequency:               <ul style="list-style-type: none"> <li>○ Monthly reads and billing based on AMR system.</li> <li>○ All reads recorded roughly the same time of month (not spread out by cycle). Generally read in the middle of the month.</li> </ul> </li> </ul> <p>Billing data pro-rated?</p> <ul style="list-style-type: none"> <li>• No.</li> </ul> <p>Comments:</p> <ul style="list-style-type: none"> <li>• Added during validation session: fire hydrant use permits used by construction companies for construction – temporary meters capture the exact consumption volume and this is billed. This was only included for 2018; the value could not be furnished for inclusion in 2017.</li> </ul> <p>Confirmed input value (2017): 954.137 MG            Confirmed input value (2018): 1,014.300 MG</p>	<p>Percent of customers metered: 100%</p> <p>Small meter testing policy:</p> <ul style="list-style-type: none"> <li>• If there is a customer complaint, the City may visit and profile the meter. Typically, a flow test is conducted to test a meter for accuracy. It will be repaired or replaced, if needed.</li> <li>• A sampling plan is in place from the previous California Urban Water Conservation Council Best Management Practice for well meter sampling plan, but has not been executed.</li> </ul> <p>Number of small meters testing/year: 0 (proactive, small number of customer complaints)</p> <p>Large meter testing policy: Same as small meters.</p> <p>Number of large meter tested/year: 0</p> <p>Meter replacement policy:</p> <ul style="list-style-type: none"> <li>• Lifespan expected to be 10-15 years. Meters are separated/organized by age class according to geographic developments as they were built.</li> </ul> <p>Number of replacements/year:</p> <ul style="list-style-type: none"> <li>• Recently – 580 meters per year.</li> </ul> <p>Billing data auditing practice:</p> <ul style="list-style-type: none"> <li>• Generally expected to have standard billing auditing practices (thresholds for hi/lo flags). Door hangers provided as a follow-up for billing flags.</li> </ul> <p>Comments:</p> <ul style="list-style-type: none"> <li>• Limiting criterion:               <ul style="list-style-type: none"> <li>○ For a DVG of 6 – “limited meter accuracy testing” describes a proactive testing program wherein subsets of meters (i.e. old meters, large meters) are targeted but a representative sample of the full meter population is not involved.</li> </ul> </li> <li>• Recommendation: Conduct some level of proactive meter testing for a subset of the meter population (e.g. large meters) AND/OR conduct meter accuracy testing for meters as a result of billing system flags (e.g. zero usage for suspected stopped meters).</li> </ul> <p>Confirmed DVG: 4</p>

## City of Patterson – 10/30/2019 – Level 1 Water Audit Validation Notes for 2017 & 2018 Audits

Audit Input	Confirmation of Input Derivation	Confirmation of Data Validity Grade (DVG) Assignment
Billed Unmetered Authorized Consumption (BUAC)	N/A	N/A
Unbilled Metered Authorized Consumption (UMAC)	N/A	N/A
Unbilled Unmetered Authorized Consumption (UUAC)	<p>Unbilled Unmetered Profile:</p> <ul style="list-style-type: none"> <li>• Fire engine fill-ups using hydrants (firefighting)</li> <li>• Flushing</li> <li>• Street sweepers</li> </ul> <p>Input Derivation if Estimated: (default)</p> <p>Comments:</p> <ul style="list-style-type: none"> <li>• Note – in next year's 2019 audit, might have a metered consumption value for fire hydrant fill-ups.</li> <li>• Fire hydrant maintenance (flushing) – desire to quantify with a meter in future.</li> </ul> <p>Confirmed input value (2017): 14.706 MG Confirmed input value (2018): 15.038 MG</p>	<p>Default or Adjusted Default Applied: Default</p> <p>Completeness of Documentation: N/A</p> <p>Confirmed DVG: 5 (default)</p>

## City of Patterson – 10/30/2019 – Level 1 Water Audit Validation Notes for 2017 & 2018 Audits

Audit Input	Confirmation of Input Derivation	Confirmation of Data Validity Grade (DVG) Assignment
<p>Unauthorized Consumption (UC)</p>	<p>Default Applied? Yes                      Input Derivation if Customized: N/A                      Comments:</p> <ul style="list-style-type: none"> <li>• Known water theft occurs if a contractor accesses hydrant without temporary permitted meter.</li> <li>• City is surrounded by agricultural land. Some fire hydrants are located in more rural areas, so they can be used for authorized activities like flushing near well sites. However, they can also be used (unauthorized) by contractors doing work for nearby irrigation districts. City is working to get locks on them.</li> </ul> <p>Confirmed input value (2017): 2.941 MG                      Confirmed input value (2018): 3.008 MG</p>	<p>Confirmed DVG: 5 (default)</p>
<p>Customer Metering Inaccuracies (CMI)</p>	<p>Input Derivation:</p> <ul style="list-style-type: none"> <li>• Meter company states that meters are 99.8% accurate. The City has not performed any independent tests.</li> </ul> <p>Confirmed input value (2017): 0.5% --&gt; 4.768 MG                      Confirmed input value (2018): 0.5% --&gt; 5.097 MG</p>	<p>Characterization of meter testing: See BMAC section                      Characterization of meter replacement: See BMAC section                      Comments:</p> <ul style="list-style-type: none"> <li>• Limiting criteria:                             <ul style="list-style-type: none"> <li>○ A DVG of 4 requires that meter accuracy tests are triggered by customer requests <u>and</u> consumption flags. City only reports testing based on customer complaints.</li> <li>○ A DVG of 6 requires a “routine, but limited meter accuracy testing” program that is proactive for a targeted sub-group of the meter population.</li> </ul> </li> <li>• Recommendation: It is likely that meters are underperforming as time goes on and the 0.5% under-registration estimate is not capturing the full range of Apparent Losses from Customer Metering Inaccuracies (which subsequently makes the calculation of Real Losses appear higher). Consider testing of a random sample of meters in the field to verify field accuracy against meter manufacturer claims for new meters.</li> </ul> <p>Confirmed DVG: 3</p>
<p>Systematic Data Handling Errors (SDHE)</p>	<p>Input Derivation: (default)                      Comments:</p> <ul style="list-style-type: none"> <li>• See BMAC for description of billing validation practices.</li> </ul> <p>Confirmed input value (2017): 2.372 MG                      Confirmed input value (2018): 2.536 MG</p>	<p>Confirmed DVG: 5 (default)</p>

## City of Patterson – 10/30/2019 – Level 1 Water Audit Validation Notes for 2017 & 2018 Audits

Audit Input	Confirmation of Input Derivation	Confirmation of Data Validity Grade (DVG) Assignment
<p>Length of Mains</p>	<p>Input Derivation:</p> <ul style="list-style-type: none"> <li>Approximate number comes from the 2012 Water Utility Map.</li> </ul> <p>Hydrant lateral length included:</p> <ul style="list-style-type: none"> <li>No. Post-validation session – average hydrant lateral length of 30 feet was provided, but the total number of hydrants could not be furnished in time for audit submission. This won't impact DVG, but should be estimated in 2019 for greater data accuracy (e.g. 30 ft * count of hydrants = # ft which can be converted to miles and added on to 49.0 miles of mains).</li> </ul> <p>Confirmed input value (2017): 49.0 miles Confirmed input value (2018): 49.0 miles</p>	<p>Mapping format:</p> <ul style="list-style-type: none"> <li>CAD file – converted to shapefile and uploaded to GovClarity (GIS)</li> <li>Digital access to paper maps - last updated in 2012. Currently in the middle of the update for all utilities which involves collecting all as-builts since 2012 and adding them to the system.</li> </ul> <p>Asset management database:</p> <ul style="list-style-type: none"> <li>Aug. 2018 – rolled out Mobile MMS – asset management program. Every utility is visible in various layers using the mobile platform.</li> </ul> <p>Map updates &amp; field validation:</p> <ul style="list-style-type: none"> <li>Verification through Mobile MMS</li> </ul> <p>Comments:</p> <ul style="list-style-type: none"> <li>Limiting criterion for 9 or 10 would include random field validation for verification of database(s), with records of field validation available for review.</li> </ul> <p>Confirmed DVG: 8</p>
<p>Number of Active and Inactive Service Connections</p>	<p>Input Derivation:</p> <ul style="list-style-type: none"> <li>Total number of accounts at end of audit period for 4 billing classifications.</li> <li>This includes the nonpotable accounts, which are not easy to exclude. It is a minimal number compared to the total number of accounts (~45 out of 6,500).</li> <li>New policy – 2" or larger landscape meters typically required to connect to the nonpotable system.</li> </ul> <p>Basis for database query:</p> <ul style="list-style-type: none"> <li>Account – billing policy is one account per meter. <ul style="list-style-type: none"> <li>There are a few older regions of the City where there's one meter for the entire area.</li> </ul> </li> <li>Vacant properties with an inactive (but live – i.e. not shut off) connection would not be included in the query since they don't have an account.</li> </ul> <p>Confirmed input value (2017): 6,543 connections Confirmed input value (2018): 6,591 connections</p>	<p>CIS updates &amp; field validation:</p> <ul style="list-style-type: none"> <li>Well established procedures exist for tracking account opening and closing.</li> <li>Ongoing staff field visits stand in for field validation.</li> </ul> <p>Estimated error of total count within:</p> <ul style="list-style-type: none"> <li>Expected to be about 1%-2% error since the reported value is known to <u>include</u> nonpotable accounts and <u>exclude</u> vacant properties with inactive but live (i.e. not shut off) connections.</li> </ul> <p>Confirmed DVG: 8</p>
<p>Average Length of Customer Service Line</p>	<p>Are customer meters at the curbstop? Yes</p> <p>Confirmed input value (2017): 0 ft Confirmed input value (2018): 0 ft</p>	<p>Confirmed DVG: 10 (default)</p>

## City of Patterson – 10/30/2019 – Level 1 Water Audit Validation Notes for 2017 & 2018 Audits

Audit Input	Confirmation of Input Derivation	Confirmation of Data Validity Grade (DVG) Assignment
<p>Average Operating Pressure</p>	<p>Number of zones, general setup:</p> <ul style="list-style-type: none"> <li>• 3 zones</li> </ul> <p>Typical pressure range:</p> <ul style="list-style-type: none"> <li>• 55-60 psi</li> </ul> <p>Input derivation:</p> <ul style="list-style-type: none"> <li>• Average between data collected for all pressure zones</li> <li>• Daily pressure readings at well sites and through SCADA</li> </ul> <p>Confirmed input value (2017): 60.0 psi Confirmed input value (2018): 60.0 psi</p>	<p>Extent of static pressure data collection:</p> <ul style="list-style-type: none"> <li>• Daily measurements at boundary points</li> </ul> <p>Characterization of real-time pressure data collection:</p> <ul style="list-style-type: none"> <li>• Daily</li> </ul> <p>Hydraulic model in place? Calibrated?:</p> <ul style="list-style-type: none"> <li>• Yes. Last calibrated in 2017 as part of Water Master Plan.</li> </ul> <p>Comments:</p> <ul style="list-style-type: none"> <li>• Other measurements made at hydrants when there's been a customer complaint about low water pressure (treated the same as water quality concerns). This stands in for pressure logging beyond boundary points.</li> <li>• Limiting criterion:                             <ul style="list-style-type: none"> <li>○ DVG of 8: "Full scale" describes telemetry or pressure logging that captures data beyond the boundary points, collecting pressure information from throughout the distribution system, representing a full pressure profile. If pressure logging is used instead of using telemetry, seasonal variation must also be captured.</li> </ul> </li> </ul> <p>Confirmed DVG: 6</p>
<p>Total Operating Cost (TOC)</p>	<p>Input Derivation:</p> <ul style="list-style-type: none"> <li>• Includes costs associated with nonpotable system since this portion is difficult to remove.</li> <li>• Includes all operating costs, including smaller-scale capital and salaries for operators working on the system.</li> <li>• 4-5 large CIP projects planned and may not be included. This will be updated to be more comprehensive for 2019 and beyond.</li> </ul> <p>Confirmed input value (2017): \$2,400,000 Confirmed input value (2018): \$2,469,600</p>	<p>Frequency of internal auditing: Annual Frequency of third-party CPA auditing: Annually Confirmed DVG: 10 Recommendation: For 2019 and future audits, look at larger-scale utility finance annual reports for all annual short- and long-term costs associated with operating the water utility within the City (including production, salary, debt financing, etc.)</p>
<p>Customer Retail Unit Cost (CRUC)</p>	<p>Input Derivation:</p> <ul style="list-style-type: none"> <li>• Tier 2 cost (highest tier) of water usage.</li> </ul> <p>Sewer Charges Volumetric? No – flat fee. Sewer Charges Included? No. Confirmed input value (2017): \$2.54/CCF Confirmed input value (2018): \$2.82/CCF</p>	<p>Characterization of calculation:</p> <ul style="list-style-type: none"> <li>• Marginal rate that applies to all customer classes</li> </ul> <p>Comments:</p> <ul style="list-style-type: none"> <li>• All customer classes pay the same flat rate, so there is no need for a composite rate calculation.</li> <li>• The rate structure is tiered. Average consumption is above Tier 2 (the highest tier), so the Tier 2 rate was selected. This is the marginal cost that the City would expect to receive, for example, if meter accuracy was increased.</li> <li>• Water auditor stands in as third party knowledgeable in M36 water audit methodology for review purposes.</li> </ul> <p>Confirmed DVG: 10</p>

**City of Patterson – 10/30/2019 – Level 1 Water Audit Validation Notes for 2017 & 2018 Audits**

<b>Audit Input</b>	<b>Confirmation of Input Derivation</b>	<b>Confirmation of Data Validity Grade (DVG) Assignment</b>
<p>Variable Production Cost (VPC)</p>	<p>Supply profile:</p> <ul style="list-style-type: none"> <li>• All local well production.</li> </ul> <p>Direct variable costs included:</p> <ul style="list-style-type: none"> <li>• Electricity and chemical costs</li> </ul> <p>Secondary costs included: No</p> <p>Confirmed input value (2017): \$304.00/MG Confirmed input value (2018): \$293.15/MG</p>	<p>Characterization of calculation: Valid, includes known direct costs.</p> <p>Comments:</p> <ul style="list-style-type: none"> <li>• DVG is limited to a 5 due to no secondary costs (e.g. deferred cost of water supply expansion) being incorporated, which is typical of most, if not all, CA utilities.</li> </ul> <p>Confirmed DVG: 5</p>

# Certified Validation Report

## Part A: Provided by Validator

### Audit Information:

Water Supplier Name: City of Patterson PWS ID: CA5010017  
System Type: Potable Audit Period: CY 2017  
Utility Representation: Maria Encinas  
Validation Date: 10/30/2019 Call Time: 9AM Sufficient Supporting Documents Provided: Yes

### Validation Findings & Confirmation Statement:

#### Key Audit Metrics:

Data Validity Score: 61  
ILI: 7.24 Real Loss: 197.523 MG Apparent Loss: 10.121 MG  
Non-revenue water as percent of cost of operating system: 4.1%

### Certification Statement by Validator:

This water loss audit report has been Level 1 validated per the requirements of California Code of Regulations Title 23, Division 2, Chapter 7 and the California Water Code Section 10608.34.

All recommendations on volume derivation and Data Validity Grades were incorporated into the water audit.

*If not, rejected recommendations are included here.*

### Validator Information:

Water Audit Validator: Chris Hewes Qualifications: Water Audit Validator Certificate issued by the CA-NV Section of the AWWA

Validator Provided



# Certified Validation Report Template

## Part B: Provided by Utility

**Water Supplier Name:** City of Patterson

**Water Supplier ID Number:** CAS010017

**Water Audit Period:** CY 2017

### Water Audit & Water Loss Improvement Steps:

Utility to provide steps taken in preceding year to increase data validity, reduce real loss and apparent loss as informed by the annual validated

#### water audit:

- To help increase data validity, the city will continue to audit all city-maintained and large private accounts for metering inaccuracies.
- The city will improve on maintaining records of unbilled/unmetered consumption, such as hydrant flushing and fire protection water use.
- The city will implement a well production metering calibration test program to ensure metering accuracy.

### Certification Statement by Utility Executive:

This water loss audit report meets the requirements of California Code of Regulations Title 23, Division 2, Chapter 7 and the California Water Code Section 10608.34 and has been prepared in accordance with the method adopted by the American Water Works Association, as contained in their manual, *Water Audit and Loss Control Programs, Manual M36, Fourth Edition* and in the Free Water Audit Software version 5.

Executive Name (Print)

Executive Position

Signature

Date

Mike Willett

Public Works Director



4-13-20

Utility Provided



# 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 Patterson (5010017)**  
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:	<input type="button" value="+"/>	<input type="button" value="?"/>	<input type="text" value="5"/>	<input type="text" value="1,203.000"/>	MG/Yr
Water imported:	<input type="button" value="+"/>	<input type="button" value="?"/>	<input type="text" value="n/a"/>	<input type="text" value="0.000"/>	MG/Yr
Water exported:	<input type="button" value="+"/>	<input type="button" value="?"/>	<input type="text" value="n/a"/>	<input type="text" value="0.000"/>	MG/Yr

### Master Meter and Supply Error Adjustments

	<input type="button" value="+"/>	<input type="button" value="?"/>	<input type="text" value="2"/>	<input type="text" value=""/>	<input type="text" value=""/>	MG/Yr
	<input type="button" value="+"/>	<input type="button" value="?"/>	<input type="text" value=""/>	<input type="text" value=""/>	<input type="text" value=""/>	MG/Yr
	<input type="button" value="+"/>	<input type="button" value="?"/>	<input type="text" value=""/>	<input type="text" value=""/>	<input type="text" value=""/>	MG/Yr

Enter negative % or value for under-registration  
Enter positive % or value for over-registration

**WATER SUPPLIED:**    **1,203.000** MG/Yr

### AUTHORIZED CONSUMPTION

Billed metered:	<input type="button" value="+"/>	<input type="button" value="?"/>	<input type="text" value="4"/>	<input type="text" value="1,014.300"/>	MG/Yr
Billed unmetered:	<input type="button" value="+"/>	<input type="button" value="?"/>	<input type="text" value="n/a"/>	<input type="text" value="0.000"/>	MG/Yr
Unbilled metered:	<input type="button" value="+"/>	<input type="button" value="?"/>	<input type="text" value="n/a"/>	<input type="text" value="0.000"/>	MG/Yr
Unbilled unmetered:	<input type="button" value="+"/>	<input type="button" value="?"/>	<input type="text" value="5"/>	<input type="text" value="15.038"/>	MG/Yr

Default option selected for Unbilled unmetered - a grading of 5 is applied but not displayed

**AUTHORIZED CONSUMPTION:**    **1,029.338** MG/Yr

Click here:  for help using option buttons below

Pcnt:	<input type="text" value="1.25%"/>	<input type="text" value=""/>	MG/Yr
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Use buttons to select percentage of water supplied OR value

Pcnt:	<input type="text" value="0.25%"/>	<input type="text" value=""/>	MG/Yr
-------	------------------------------------	-------------------------------	-------

<input type="text" value="0.50%"/>	<input type="text" value=""/>	MG/Yr
<input type="text" value="0.25%"/>	<input type="text" value=""/>	MG/Yr

### WATER LOSSES (Water Supplied - Authorized Consumption)

**173.663** MG/Yr

### Apparent Losses

Unauthorized consumption:     MG/Yr

Default option selected for unauthorized consumption - a grading of 5 is applied but not displayed

Customer metering inaccuracies:	<input type="button" value="+"/>	<input type="button" value="?"/>	<input type="text" value="3"/>	<input type="text" value="5.097"/>	MG/Yr
Systematic data handling errors:	<input type="button" value="+"/>	<input type="button" value="?"/>	<input type="text" value="5"/>	<input type="text" value="2.536"/>	MG/Yr

Default option selected for Systematic data handling errors - a grading of 5 is applied but not displayed

**Apparent Losses:**    **10.640** MG/Yr

### Real Losses (Current Annual Real Losses or CARL)

Real Losses = Water Losses - Apparent Losses:   MG/Yr

**WATER LOSSES:**    **173.663** MG/Yr

### NON-REVENUE WATER

**NON-REVENUE WATER:**    **188.700** MG/Yr

= Water Losses + Unbilled Metered + Unbilled Unmetered

### SYSTEM DATA

Length of mains:	<input type="button" value="+"/>	<input type="button" value="?"/>	<input type="text" value="8"/>	<input type="text" value="49.0"/>	miles
Number of active AND inactive service connections:	<input type="button" value="+"/>	<input type="button" value="?"/>	<input type="text" value="8"/>	<input type="text" value="6,591"/>	
Service connection density:	<input type="button" value="?"/>	<input type="text" value=""/>	<input type="text" value="135"/>	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:     psi

### COST DATA

Total annual cost of operating water system:	<input type="button" value="+"/>	<input type="button" value="?"/>	<input type="text" value="10"/>	<input type="text" value="\$2,469,600"/>	\$/Year
Customer retail unit cost (applied to Apparent Losses):	<input type="button" value="+"/>	<input type="button" value="?"/>	<input type="text" value="10"/>	<input type="text" value="\$2.82"/>	\$/100 cubic feet (ccf)
Variable production cost (applied to Real Losses):	<input type="button" value="+"/>	<input type="button" value="?"/>	<input type="text" value="5"/>	<input type="text" value="\$293.15"/>	\$/Million gallons <input type="checkbox"/> Use Customer Retail Unit Cost to value real losses

### WATER AUDIT DATA VALIDITY SCORE:

**\*\*\* YOUR SCORE IS: 58 out of 100 \*\*\***

A weighted scale for the components of consumption and water loss is included in the calculation of the Water Audit Data Validity Score

### PRIORITY AREAS FOR ATTENTION:

Based on the information provided, audit accuracy can be improved by addressing the following components:

1: Volume from own sources

2: Billed metered

3: Customer metering inaccuracies

# City of Patterson – 10/30/2019 – Level 1 Water Audit Validation Notes for 2017 & 2018 Audits

## Level 1 Validation Notes:

Audit Input	Confirmation of Input Derivation	Confirmation of Data Validity Grade (DVG) Assignment
<p>Volume from Own Sources (VOS)</p>	<p>Supply meter profile:</p> <ul style="list-style-type: none"> <li>• 7 potable wells with disinfection (no WTP)</li> <li>• Each well has an electromagnetic (mag) meter</li> <li>• Reads are collected via SCADA (real time remote) but City does not have historian driver installed.</li> <li>• Staff visit well sites daily and manually record flow reads and other diagnostic information in an electronic spreadsheet.                             <ul style="list-style-type: none"> <li>○ Pre-2019 – used paper inspection forms and entered information into electronic spreadsheet.</li> <li>○ Now using Mobile MMS – asset management web-based program. All electronic with daily review.</li> </ul> </li> </ul> <p>VOS Input Data Source:</p> <ul style="list-style-type: none"> <li>• Electronic summary reports.</li> </ul> <p>Confirmed input value (2017): 1,176.487 MG                      Confirmed input value (2018): 1,203.000 MG</p>	<p>Percent of VOS metered: 100%</p> <p>Signal calibration frequency:</p> <ul style="list-style-type: none"> <li>• N/A – reads are recorded manually.</li> </ul> <p>Volumetric testing frequency:</p> <ul style="list-style-type: none"> <li>• Policy to calibrate once per year began in 2017. Documentation was provided for 2017, showing MAGLFO Verification Certificates.</li> <li>• Testing was not accomplished in 2018. The practice is resuming in 2019. The city has purchased flow testers to calibrate meters internally.</li> </ul> <p>Volumetric testing method:</p> <ul style="list-style-type: none"> <li>• Unsure.</li> </ul> <p>Percent of VOS tested and/or calibrated: 100%</p> <p>Comments:</p> <ul style="list-style-type: none"> <li>• Limiting criteria:                             <ul style="list-style-type: none"> <li>○ To reach a 6: <u>Annual</u> electronic calibration (if SCADA is used) OR volumetric accuracy testing (calibration was not conducted in 2018, so a 5 was selected).</li> <li>○ For 8 or higher: Requires both calibration of electronic signal (e.g. SCADA connectivity) AND volumetric meter testing, along with providing documentation of both annual practices.</li> </ul> </li> <li>• Recommendation: In future years, be prepared with writeup or explanation from metering team about steps taken to test accuracy of production meters (e.g. how will the flow testers that the city just purchased be used in conjunction with the mag meters?).</li> </ul> <p>Confirmed DVG: 6 (2017); 5 (2018)</p>

## City of Patterson – 10/30/2019 – Level 1 Water Audit Validation Notes for 2017 & 2018 Audits

Audit Input	Confirmation of Input Derivation	Confirmation of Data Validity Grade (DVG) Assignment
<p>VOS Master Meter Error Adjustment</p>	<p>Adjustment Basis: N/A Net Storage Change Included:</p> <ul style="list-style-type: none"> <li>• Not included.</li> <li>• Tanks are audited through Fire Department – data collected for each pressure zone.</li> <li>• Each tank is about 1-1.5 MG.</li> </ul> <p>Confirmed input value (2017): 0% Confirmed input value (2018): 0%</p>	<p>Supply meter read frequency: Daily Supply meter read method: Manual Frequency of data review: Daily Storage level monitoring frequency:</p> <ul style="list-style-type: none"> <li>• City previously had issues with automated recording of monitoring data.</li> <li>• Measured manually daily.</li> </ul> <p>Comments:</p> <ul style="list-style-type: none"> <li>• Limiting criterion: automatic production data logging (via SCADA) required for greater than a 2.</li> <li>• Required for 4 or higher: comparison of tank levels at the start and end of an audit period for volume adjustment (e.g. 1.5 MG at start of audit period and 0.5 MG at end of audit period means that 1 MG was delivered to customers that wasn't already captured through well flow meter)</li> <li>• Recommendation:                             <ul style="list-style-type: none"> <li>○ Target installation of the SCADA historian driver to automatically record production readings.</li> <li>○ In 2019 audit, obtain tank level readings for Jan. 1 (start of audit) and Dec. 31 (end of audit) for comparison of tank levels and calculation of net storage change.</li> </ul> </li> </ul> <p>Confirmed DVG: 2</p>
<p>Water Imported (WI)</p>	<p>N/A</p>	<p>N/A</p>
<p>WI Master Meter Error Adjustment</p>	<p>N/A</p>	<p>N/A</p>
<p>Water Exported (WE)</p>	<p>N/A</p>	<p>N/A</p>

**City of Patterson – 10/30/2019 – Level 1 Water Audit Validation Notes for 2017 & 2018 Audits**

Audit Input	Confirmation of Input Derivation	Confirmation of Data Validity Grade (DVG) Assignment
WE Master Meter Error Adjustment	N/A	N/A
Billed Metered Authorized Consumption (BMAC)	<p>Customer Meters &amp; Reads Profile:</p> <ul style="list-style-type: none"> <li>• Age profile:               <ul style="list-style-type: none"> <li>○ Mixed based on when meters were installed in various groups of development projects.</li> </ul> </li> <li>• Reading system:               <ul style="list-style-type: none"> <li>○ Automatic Meter Reading (AMR) system – working to move towards Advanced Metering Infrastructure (AMI).</li> <li>○ Transponders no longer serviced by Badger.</li> </ul> </li> <li>• Read frequency:               <ul style="list-style-type: none"> <li>○ Monthly reads and billing based on AMR system.</li> <li>○ All reads recorded roughly the same time of month (not spread out by cycle). Generally read in the middle of the month.</li> </ul> </li> </ul> <p>Billing data pro-rated?</p> <ul style="list-style-type: none"> <li>• No.</li> </ul> <p>Comments:</p> <ul style="list-style-type: none"> <li>• Added during validation session: fire hydrant use permits used by construction companies for construction – temporary meters capture the exact consumption volume and this is billed. This was only included for 2018; the value could not be furnished for inclusion in 2017.</li> </ul> <p>Confirmed input value (2017): 954.137 MG            Confirmed input value (2018): 1,014.300 MG</p>	<p>Percent of customers metered: 100%</p> <p>Small meter testing policy:</p> <ul style="list-style-type: none"> <li>• If there is a customer complaint, the City may visit and profile the meter. Typically, a flow test is conducted to test a meter for accuracy. It will be repaired or replaced, if needed.</li> <li>• A sampling plan is in place from the previous California Urban Water Conservation Council Best Management Practice for well meter sampling plan, but has not been executed.</li> </ul> <p>Number of small meters testing/year: 0 (proactive, small number of customer complaints)</p> <p>Large meter testing policy: Same as small meters.</p> <p>Number of large meter tested/year: 0</p> <p>Meter replacement policy:</p> <ul style="list-style-type: none"> <li>• Lifespan expected to be 10-15 years. Meters are separated/organized by age class according to geographic developments as they were built.</li> </ul> <p>Number of replacements/year:</p> <ul style="list-style-type: none"> <li>• Recently – 580 meters per year.</li> </ul> <p>Billing data auditing practice:</p> <ul style="list-style-type: none"> <li>• Generally expected to have standard billing auditing practices (thresholds for hi/lo flags). Door hangers provided as a follow-up for billing flags.</li> </ul> <p>Comments:</p> <ul style="list-style-type: none"> <li>• Limiting criterion:               <ul style="list-style-type: none"> <li>○ For a DVG of 6 – “limited meter accuracy testing” describes a proactive testing program wherein subsets of meters (i.e. old meters, large meters) are targeted but a representative sample of the full meter population is not involved.</li> </ul> </li> <li>• Recommendation: Conduct some level of proactive meter testing for a subset of the meter population (e.g. large meters) AND/OR conduct meter accuracy testing for meters as a result of billing system flags (e.g. zero usage for suspected stopped meters).</li> </ul> <p>Confirmed DVG: 4</p>

## City of Patterson – 10/30/2019 – Level 1 Water Audit Validation Notes for 2017 & 2018 Audits

Audit Input	Confirmation of Input Derivation	Confirmation of Data Validity Grade (DVG) Assignment
Billed Unmetered Authorized Consumption (BUAC)	N/A	N/A
Unbilled Metered Authorized Consumption (UMAC)	N/A	N/A
Unbilled Unmetered Authorized Consumption (UUAC)	<p>Unbilled Unmetered Profile:</p> <ul style="list-style-type: none"> <li>• Fire engine fill-ups using hydrants (firefighting)</li> <li>• Flushing</li> <li>• Street sweepers</li> </ul> <p>Input Derivation if Estimated: (default)</p> <p>Comments:</p> <ul style="list-style-type: none"> <li>• Note – in next year's 2019 audit, might have a metered consumption value for fire hydrant fill-ups.</li> <li>• Fire hydrant maintenance (flushing) – desire to quantify with a meter in future.</li> </ul> <p>Confirmed input value (2017): 14.706 MG Confirmed input value (2018): 15.038 MG</p>	<p>Default or Adjusted Default Applied: Default</p> <p>Completeness of Documentation: N/A</p> <p>Confirmed DVG: 5 (default)</p>

## City of Patterson – 10/30/2019 – Level 1 Water Audit Validation Notes for 2017 & 2018 Audits

Audit Input	Confirmation of Input Derivation	Confirmation of Data Validity Grade (DVG) Assignment
<p>Unauthorized Consumption (UC)</p>	<p>Default Applied? Yes                      Input Derivation if Customized: N/A                      Comments:</p> <ul style="list-style-type: none"> <li>• Known water theft occurs if a contractor accesses hydrant without temporary permitted meter.</li> <li>• City is surrounded by agricultural land. Some fire hydrants are located in more rural areas, so they can be used for authorized activities like flushing near well sites. However, they can also be used (unauthorized) by contractors doing work for nearby irrigation districts. City is working to get locks on them.</li> </ul> <p>Confirmed input value (2017): 2.941 MG                      Confirmed input value (2018): 3.008 MG</p>	<p>Confirmed DVG: 5 (default)</p>
<p>Customer Metering Inaccuracies (CMI)</p>	<p>Input Derivation:</p> <ul style="list-style-type: none"> <li>• Meter company states that meters are 99.8% accurate. The City has not performed any independent tests.</li> </ul> <p>Confirmed input value (2017): 0.5% --&gt; 4.768 MG                      Confirmed input value (2018): 0.5% --&gt; 5.097 MG</p>	<p>Characterization of meter testing: See BMAC section                      Characterization of meter replacement: See BMAC section                      Comments:</p> <ul style="list-style-type: none"> <li>• Limiting criteria:                             <ul style="list-style-type: none"> <li>○ A DVG of 4 requires that meter accuracy tests are triggered by customer requests <u>and</u> consumption flags. City only reports testing based on customer complaints.</li> <li>○ A DVG of 6 requires a “routine, but limited meter accuracy testing” program that is proactive for a targeted sub-group of the meter population.</li> </ul> </li> <li>• Recommendation: It is likely that meters are underperforming as time goes on and the 0.5% under-registration estimate is not capturing the full range of Apparent Losses from Customer Metering Inaccuracies (which subsequently makes the calculation of Real Losses appear higher). Consider testing of a random sample of meters in the field to verify field accuracy against meter manufacturer claims for new meters.</li> </ul> <p>Confirmed DVG: 3</p>
<p>Systematic Data Handling Errors (SDHE)</p>	<p>Input Derivation: (default)                      Comments:</p> <ul style="list-style-type: none"> <li>• See BMAC for description of billing validation practices.</li> </ul> <p>Confirmed input value (2017): 2.372 MG                      Confirmed input value (2018): 2.536 MG</p>	<p>Confirmed DVG: 5 (default)</p>

## City of Patterson – 10/30/2019 – Level 1 Water Audit Validation Notes for 2017 & 2018 Audits

Audit Input	Confirmation of Input Derivation	Confirmation of Data Validity Grade (DVG) Assignment
Length of Mains	<p>Input Derivation:</p> <ul style="list-style-type: none"> <li>Approximate number comes from the 2012 Water Utility Map.</li> </ul> <p>Hydrant lateral length included:</p> <ul style="list-style-type: none"> <li>No. Post-validation session – average hydrant lateral length of 30 feet was provided, but the total number of hydrants could not be furnished in time for audit submission. This won't impact DVG, but should be estimated in 2019 for greater data accuracy (e.g. 30 ft * count of hydrants = # ft which can be converted to miles and added on to 49.0 miles of mains).</li> </ul> <p>Confirmed input value (2017): 49.0 miles Confirmed input value (2018): 49.0 miles</p>	<p>Mapping format:</p> <ul style="list-style-type: none"> <li>CAD file – converted to shapefile and uploaded to GovClarity (GIS)</li> <li>Digital access to paper maps - last updated in 2012. Currently in the middle of the update for all utilities which involves collecting all as-builts since 2012 and adding them to the system.</li> </ul> <p>Asset management database:</p> <ul style="list-style-type: none"> <li>Aug. 2018 – rolled out Mobile MMS – asset management program. Every utility is visible in various layers using the mobile platform.</li> </ul> <p>Map updates &amp; field validation:</p> <ul style="list-style-type: none"> <li>Verification through Mobile MMS</li> </ul> <p>Comments:</p> <ul style="list-style-type: none"> <li>Limiting criterion for 9 or 10 would include random field validation for verification of database(s), with records of field validation available for review.</li> </ul> <p>Confirmed DVG: 8</p>
Number of Active and Inactive Service Connections	<p>Input Derivation:</p> <ul style="list-style-type: none"> <li>Total number of accounts at end of audit period for 4 billing classifications.</li> <li>This includes the nonpotable accounts, which are not easy to exclude. It is a minimal number compared to the total number of accounts (~45 out of 6,500).</li> <li>New policy – 2" or larger landscape meters typically required to connect to the nonpotable system.</li> </ul> <p>Basis for database query:</p> <ul style="list-style-type: none"> <li>Account – billing policy is one account per meter. <ul style="list-style-type: none"> <li>There are a few older regions of the City where there's one meter for the entire area.</li> </ul> </li> <li>Vacant properties with an inactive (but live – i.e. not shut off) connection would not be included in the query since they don't have an account.</li> </ul> <p>Confirmed input value (2017): 6,543 connections Confirmed input value (2018): 6,591 connections</p>	<p>CIS updates &amp; field validation:</p> <ul style="list-style-type: none"> <li>Well established procedures exist for tracking account opening and closing.</li> <li>Ongoing staff field visits stand in for field validation.</li> </ul> <p>Estimated error of total count within:</p> <ul style="list-style-type: none"> <li>Expected to be about 1%-2% error since the reported value is known to <u>include</u> nonpotable accounts and <u>exclude</u> vacant properties with inactive but live (i.e. not shut off) connections.</li> </ul> <p>Confirmed DVG: 8</p>
Average Length of Customer Service Line	<p>Are customer meters at the curbstop? Yes</p> <p>Confirmed input value (2017): 0 ft Confirmed input value (2018): 0 ft</p>	<p>Confirmed DVG: 10 (default)</p>

## City of Patterson – 10/30/2019 – Level 1 Water Audit Validation Notes for 2017 & 2018 Audits

Audit Input	Confirmation of Input Derivation	Confirmation of Data Validity Grade (DVG) Assignment
<p>Average Operating Pressure</p>	<p>Number of zones, general setup:</p> <ul style="list-style-type: none"> <li>• 3 zones</li> </ul> <p>Typical pressure range:</p> <ul style="list-style-type: none"> <li>• 55-60 psi</li> </ul> <p>Input derivation:</p> <ul style="list-style-type: none"> <li>• Average between data collected for all pressure zones</li> <li>• Daily pressure readings at well sites and through SCADA</li> </ul> <p>Confirmed input value (2017): 60.0 psi Confirmed input value (2018): 60.0 psi</p>	<p>Extent of static pressure data collection:</p> <ul style="list-style-type: none"> <li>• Daily measurements at boundary points</li> </ul> <p>Characterization of real-time pressure data collection:</p> <ul style="list-style-type: none"> <li>• Daily</li> </ul> <p>Hydraulic model in place? Calibrated?:</p> <ul style="list-style-type: none"> <li>• Yes. Last calibrated in 2017 as part of Water Master Plan.</li> </ul> <p>Comments:</p> <ul style="list-style-type: none"> <li>• Other measurements made at hydrants when there's been a customer complaint about low water pressure (treated the same as water quality concerns). This stands in for pressure logging beyond boundary points.</li> <li>• Limiting criterion: <ul style="list-style-type: none"> <li>○ DVG of 8: "Full scale" describes telemetry or pressure logging that captures data beyond the boundary points, collecting pressure information from throughout the distribution system, representing a full pressure profile. If pressure logging is used instead of using telemetry, seasonal variation must also be captured.</li> </ul> </li> </ul> <p>Confirmed DVG: 6</p>
<p>Total Operating Cost (TOC)</p>	<p>Input Derivation:</p> <ul style="list-style-type: none"> <li>• Includes costs associated with nonpotable system since this portion is difficult to remove.</li> <li>• Includes all operating costs, including smaller-scale capital and salaries for operators working on the system.</li> <li>• 4-5 large CIP projects planned and may not be included. This will be updated to be more comprehensive for 2019 and beyond.</li> </ul> <p>Confirmed input value (2017): \$2,400,000 Confirmed input value (2018): \$2,469,600</p>	<p>Frequency of internal auditing: Annual Frequency of third-party CPA auditing: Annually Confirmed DVG: 10 Recommendation: For 2019 and future audits, look at larger-scale utility finance annual reports for all annual short- and long-term costs associated with operating the water utility within the City (including production, salary, debt financing, etc.)</p>
<p>Customer Retail Unit Cost (CRUC)</p>	<p>Input Derivation:</p> <ul style="list-style-type: none"> <li>• Tier 2 cost (highest tier) of water usage.</li> </ul> <p>Sewer Charges Volumetric? No – flat fee. Sewer Charges Included? No. Confirmed input value (2017): \$2.54/CCF Confirmed input value (2018): \$2.82/CCF</p>	<p>Characterization of calculation:</p> <ul style="list-style-type: none"> <li>• Marginal rate that applies to all customer classes</li> </ul> <p>Comments:</p> <ul style="list-style-type: none"> <li>• All customer classes pay the same flat rate, so there is no need for a composite rate calculation.</li> <li>• The rate structure is tiered. Average consumption is above Tier 2 (the highest tier), so the Tier 2 rate was selected. This is the marginal cost that the City would expect to receive, for example, if meter accuracy was increased.</li> <li>• Water auditor stands in as third party knowledgeable in M36 water audit methodology for review purposes.</li> </ul> <p>Confirmed DVG: 10</p>

**City of Patterson – 10/30/2019 – Level 1 Water Audit Validation Notes for 2017 & 2018 Audits**

<b>Audit Input</b>	<b>Confirmation of Input Derivation</b>	<b>Confirmation of Data Validity Grade (DVG) Assignment</b>
<p>Variable Production Cost (VPC)</p>	<p>Supply profile:</p> <ul style="list-style-type: none"> <li>• All local well production.</li> </ul> <p>Direct variable costs included:</p> <ul style="list-style-type: none"> <li>• Electricity and chemical costs</li> </ul> <p>Secondary costs included: No</p> <p>Confirmed input value (2017): \$304.00/MG Confirmed input value (2018): \$293.15/MG</p>	<p>Characterization of calculation: Valid, includes known direct costs.</p> <p>Comments:</p> <ul style="list-style-type: none"> <li>• DVG is limited to a 5 due to no secondary costs (e.g. deferred cost of water supply expansion) being incorporated, which is typical of most, if not all, CA utilities.</li> </ul> <p>Confirmed DVG: 5</p>

# Certified Validation Report

## Part A: Provided by Validator

### Audit Information:

Water Supplier Name: City of Patterson PWS ID: CA5010017  
System Type: Potable Audit Period: CY 2018  
Utility Representation: Maria Encinas  
Validation Date: 10/30/2019 Call Time: 9AM Sufficient Supporting Documents Provided: Yes

### Validation Findings & Confirmation Statement:

#### Key Audit Metrics:

Data Validity Score: 58  
ILI: 5.94 Real Loss: 163.022 MG Apparent Loss: 10.640 MG  
Non-revenue water as percent of cost of operating system: 3.7%

### Certification Statement by Validator:

This water loss audit report has been Level 1 validated per the requirements of California Code of Regulations Title 23, Division 2, Chapter 7 and the California Water Code Section 10608.34.

All recommendations on volume derivation and Data Validity Grades were incorporated into the water audit.

*If not, rejected recommendations are included here.*

### Validator Information:

Water Audit Validator: Chris Hewes Qualifications: Water Audit Validator Certificate issued by the CA-NV Section of the AWWA

Validator Provided



# Certified Validation Report Template

## Part B: Provided by Utility

**Water Supplier Name:** City of Patterson

**Water Supplier ID Number:** CA5010017

**Water Audit Period:** CY 2018

### Water Audit & Water Loss Improvement Steps:

Utility to provide steps taken in preceding year to increase data validity, reduce real loss and apparent loss as informed by the annual validated water audit:

- To help increase data validity, the city will continue to audit all city-maintained and large private accounts for metering inaccuracies.
- The city will improve on maintaining records of unbilled/unmetered consumption, such as hydrant flushing and fire protection water use.
- The city will continue to implement its well production metering calibration test program to ensure metering accuracy.

### Certification Statement by Utility Executive:

This water loss audit report meets the requirements of California Code of Regulations Title 23, Division 2, Chapter 7 and the California Water Code Section 10608.34 and has been prepared in accordance with the method adopted by the American Water Works Association, as contained in their manual, *Water Audit and Loss Control Programs, Manual M36, Fourth Edition* and in the Free Water Audit Software version 5.

Executive Name (Print)

Executive Position

Signature

Date

Mike Willett

Public Works Director



4-13-20

Utility Provided



# 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 Patterson (5010017)**  
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

<----- Enter grading in column 'E' and 'J' ----->

Volume from own sources:	<input type="button" value="+"/>	<input type="button" value="?"/>	<input type="text" value="5"/>	<input type="text" value="1,180.967"/>	MG/Yr
Water imported:	<input type="button" value="+"/>	<input type="button" value="?"/>	<input type="text" value="n/a"/>	<input type="text" value="0.000"/>	MG/Yr
Water exported:	<input type="button" value="+"/>	<input type="button" value="?"/>	<input type="text" value="n/a"/>	<input type="text" value="0.000"/>	MG/Yr

### Master Meter and Supply Error Adjustments

	<input type="button" value="+"/>	<input type="button" value="?"/>	<input type="text" value="2"/>	<input type="text" value=""/>	<input type="text" value=""/>	MG/Yr
	<input type="button" value="+"/>	<input type="button" value="?"/>	<input type="text" value=""/>	<input type="text" value=""/>	<input type="text" value=""/>	MG/Yr
	<input type="button" value="+"/>	<input type="button" value="?"/>	<input type="text" value=""/>	<input type="text" value=""/>	<input type="text" value=""/>	MG/Yr

Enter negative % or value for under-registration  
Enter positive % or value for over-registration

**WATER SUPPLIED:**    **1,180.967** MG/Yr

### AUTHORIZED CONSUMPTION

Billed metered:	<input type="button" value="+"/>	<input type="button" value="?"/>	<input type="text" value="4"/>	<input type="text" value="963.000"/>	MG/Yr
Billed unmetered:	<input type="button" value="+"/>	<input type="button" value="?"/>	<input type="text" value="n/a"/>	<input type="text" value=""/>	MG/Yr
Unbilled metered:	<input type="button" value="+"/>	<input type="button" value="?"/>	<input type="text" value="n/a"/>	<input type="text" value=""/>	MG/Yr
Unbilled unmetered:	<input type="button" value="+"/>	<input type="button" value="?"/>	<input type="text" value="5"/>	<input type="text" value="14.762"/>	MG/Yr

Default option selected for Unbilled unmetered - a grading of 5 is applied but not displayed

**AUTHORIZED CONSUMPTION:**    **977.762** MG/Yr

Click here:   
for help using option buttons below

Pcnt:	<input type="text" value="1.25%"/>	<input type="text" value=""/>	MG/Yr
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Use buttons to select percentage of water supplied OR value

Pcnt:	<input type="text" value="0.25%"/>	<input type="text" value=""/>	MG/Yr
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<input type="text" value="0.50%"/>	<input type="text" value=""/>	MG/Yr
<input type="text" value="0.25%"/>	<input type="text" value=""/>	MG/Yr

### WATER LOSSES (Water Supplied - Authorized Consumption)

**203.204** MG/Yr

### Apparent Losses

Unauthorized consumption:	<input type="button" value="+"/>	<input type="button" value="?"/>	<input type="text" value=""/>	<input type="text" value="2.952"/>	MG/Yr
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Default option selected for unauthorized consumption - a grading of 5 is applied but not displayed

Customer metering inaccuracies:	<input type="button" value="+"/>	<input type="button" value="?"/>	<input type="text" value="3"/>	<input type="text" value="4.839"/>	MG/Yr
Systematic data handling errors:	<input type="button" value="+"/>	<input type="button" value="?"/>	<input type="text" value="5"/>	<input type="text" value="2.408"/>	MG/Yr

Default option selected for Systematic data handling errors - a grading of 5 is applied but not displayed

**Apparent Losses:**    **10.199** MG/Yr

### Real Losses (Current Annual Real Losses or CARL)

Real Losses = Water Losses - Apparent Losses:    **193.005** MG/Yr

**WATER LOSSES:**    **203.204** MG/Yr

### NON-REVENUE WATER

**NON-REVENUE WATER:**    **217.967** MG/Yr

= Water Losses + Unbilled Metered + Unbilled Unmetered

### SYSTEM DATA

Length of mains:	<input type="button" value="+"/>	<input type="button" value="?"/>	<input type="text" value="8"/>	<input type="text" value="53.9"/>	miles
Number of active AND inactive service connections:	<input type="button" value="+"/>	<input type="button" value="?"/>	<input type="text" value="8"/>	<input type="text" value="6,588"/>	
Service connection density:	<input type="button" value="?"/>	<input type="text" value=""/>	<input type="text" value="122"/>	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:     psi

### COST DATA

Total annual cost of operating water system:	<input type="button" value="+"/>	<input type="button" value="?"/>	<input type="text" value="10"/>	<input type="text" value="\$2,469,600"/>	\$/Year
Customer retail unit cost (applied to Apparent Losses):	<input type="button" value="+"/>	<input type="button" value="?"/>	<input type="text" value="10"/>	<input type="text" value="\$2.82"/>	\$/100 cubic feet (ccf)
Variable production cost (applied to Real Losses):	<input type="button" value="+"/>	<input type="button" value="?"/>	<input type="text" value="5"/>	<input type="text" value="\$293.15"/>	\$/Million gallons <input type="checkbox"/> Use Customer Retail Unit Cost to value real losses

### WATER AUDIT DATA VALIDITY SCORE:

**\*\*\* YOUR SCORE IS: 58 out of 100 \*\*\***

A weighted scale for the components of consumption and water loss is included in the calculation of the Water Audit Data Validity Score

### PRIORITY AREAS FOR ATTENTION:

Based on the information provided, audit accuracy can be improved by addressing the following components:

**1: Volume from own sources**

**2: Billed metered**

**3: Customer metering inaccuracies**

# City of Patterson – 1/27/2021 – Level 1 Water Audit Validation Notes for 2019 Audit

## Level 1 Validation Notes:

Audit Input	Confirmation of Input Derivation	Confirmation of Data Validity Grade (DVG) Assignment
<p>Volume from Own Sources (VOS)</p>	<p>Supply meter profile:</p> <ul style="list-style-type: none"> <li>• 7 potable wells with disinfection (no water treatment plant)</li> <li>• Each well has an electromagnetic (mag) meter</li> <li>• Reads are collected via SCADA (real time, remote) but City does not have historian driver installed to save and review historical records.</li> <li>• Staff visit well sites daily and manually record flow reads and other diagnostic information in an electronic spreadsheet.                             <ul style="list-style-type: none"> <li>○ Now all reads recorded via Mobile MMS – asset management web-based program. All electronic with daily review.</li> </ul> </li> </ul> <p>VOS Input Data Source:</p> <ul style="list-style-type: none"> <li>• Electronic summary reports.</li> </ul> <p>Confirmed input value: 1,180.967 million gallons (MG)</p>	<p>Percent of VOS metered: 100%</p> <p>Signal calibration frequency:</p> <ul style="list-style-type: none"> <li>• N/A – reads are recorded manually.</li> </ul> <p>Volumetric testing frequency:</p> <ul style="list-style-type: none"> <li>• Policy to calibrate once per year began in 2017. Documentation was provided for 2017, showing MAGLFO Verification Certificates.</li> <li>• Testing was not performed in 2018 and 2019. Last testing happened in late 2020 and will apply to next year's audit.</li> </ul> <p>Volumetric testing method:</p> <ul style="list-style-type: none"> <li>• Unsure – more info to be provided in 2020.</li> </ul> <p>Percent of VOS tested and/or calibrated: 100%</p> <p>Comments:</p> <ul style="list-style-type: none"> <li>• Limiting criteria:                             <ul style="list-style-type: none"> <li>○ To reach a 6: <u>Annual</u> electronic calibration (if SCADA is used) OR volumetric accuracy testing (calibration was not conducted in 2019, so a 5 was selected).</li> <li>○ For 8 or higher: Requires both calibration of electronic signal (e.g. SCADA connectivity) AND volumetric meter testing, along with providing documentation of both annual practices.</li> </ul> </li> <li>• Recommendation: In future years, be prepared with writeup or explanation from metering team about steps taken to test accuracy of production meters (e.g. how will the flow testers that the city just purchased be used in conjunction with the mag meters?).</li> </ul> <p>Confirmed DVG: 5</p>

## City of Patterson – 1/27/2021 – Level 1 Water Audit Validation Notes for 2019 Audit

Audit Input	Confirmation of Input Derivation	Confirmation of Data Validity Grade (DVG) Assignment
<p>VOS Master Meter Error Adjustment</p>	<p>Adjustment Basis: N/A Net Storage Change Included:</p> <ul style="list-style-type: none"> <li>• Not included.</li> <li>• Tanks kept at approximately 20 feet level year round. Major fluctuations are not expected.</li> <li>• Tank levels are audited through Fire Department – data collected for each pressure zone.</li> <li>• Each tank is about 1-1.5 MG.</li> </ul> <p>Confirmed input value: (no input – value expected in 2020)</p>	<p>Supply meter read frequency: Daily Supply meter read method: Manual Frequency of data review: Daily Storage level monitoring frequency:</p> <ul style="list-style-type: none"> <li>• City previously had issues with automated recording of monitoring data.</li> <li>• Measured manually daily.</li> <li>• Compare against SCADA live values daily.</li> </ul> <p>Comments:</p> <ul style="list-style-type: none"> <li>• Limiting criterion: automatic production data logging (via SCADA) required for greater than a 2.</li> <li>• Recommendation:                             <ul style="list-style-type: none"> <li>○ Target installation of the SCADA historian driver to automatically record production readings.</li> </ul> </li> </ul> <p>Confirmed DVG: 2</p>
<p>Water Imported (WI)</p>	<p>N/A</p>	<p>N/A</p>
<p>WI Master Meter Error Adjustment</p>	<p>N/A</p>	<p>N/A</p>
<p>Water Exported (WE)</p>	<p>N/A</p>	<p>N/A</p>

## City of Patterson – 1/27/2021 – Level 1 Water Audit Validation Notes for 2019 Audit

Audit Input	Confirmation of Input Derivation	Confirmation of Data Validity Grade (DVG) Assignment
WE Master Meter Error Adjustment	N/A	N/A
Billed Metered Authorized Consumption (BMAC)	<p>Customer Meters &amp; Reads Profile:</p> <ul style="list-style-type: none"> <li>• Age profile: <ul style="list-style-type: none"> <li>○ Mixed based on when meters were installed in various groups of development projects.</li> </ul> </li> <li>• Reading system: <ul style="list-style-type: none"> <li>○ Automatic Meter Reading (AMR) system in use currently.</li> <li>○ Recently submitted application through State Revolving Fund (SRF) for funding for AMI implementation. Working on towards project bid in early summer 2021.</li> </ul> </li> <li>• Read frequency: <ul style="list-style-type: none"> <li>○ Monthly reads and billing based on AMR system.</li> <li>○ All reads recorded roughly the same time of month (not spread out by cycle). Generally read in the middle of the month.</li> </ul> </li> </ul> <p>Billing data pro-rated?</p> <ul style="list-style-type: none"> <li>• No.</li> </ul> <p>Comments:</p> <ul style="list-style-type: none"> <li>• Fire hydrant use permits used by construction companies for construction – temporary meters capture the exact consumption volume and this is billed. <ul style="list-style-type: none"> <li>○ However, all contractors directed to use non-potable as of 2018-2019, they wouldn't be using potable hydrants and thus this can be ignored for the potable water loss audit.</li> </ul> </li> <li>• Recommendation for 2020 audit: pro-rate the billing data to re-assign half to the prior month and half to the current month to align more closely with physical usage patterns.</li> </ul> <p>Confirmed input value: 963.000 MG</p>	<p>Percent of customers metered: 100%</p> <p>Small meter testing policy:</p> <ul style="list-style-type: none"> <li>• If there is a customer complaint, the City may visit and profile the meter. Typically, a flow test is conducted to test a meter for accuracy. It will be repaired or replaced, if needed.</li> <li>• A sampling plan was created from the previous California Urban Water Conservation Council Best Management Practice for well meter sampling plan, but has not been executed.</li> </ul> <p>Number of small meters testing/year: 0 (proactive, small number of customer complaints)</p> <p>Large meter testing policy: Same as small meters.</p> <p>Number of large meter tested/year: 0</p> <p>Meter replacement policy:</p> <ul style="list-style-type: none"> <li>• Lifespan expected to be 10-15 years. Meters are separated/organized by age class according to geographic developments as they were built.</li> </ul> <p>Number of replacements/year:</p> <ul style="list-style-type: none"> <li>• Fewer meters being replaced now because an expected total system replacement with AMI is expected in 2021. Currently replacing a small number of meters as-needed with new AMI technology.</li> </ul> <p>Billing data auditing practice:</p> <ul style="list-style-type: none"> <li>• Generally expected to have standard billing auditing practices (thresholds for hi/lo flags). Door hangers provided as a follow-up for billing flags.</li> </ul> <p>Comments:</p> <ul style="list-style-type: none"> <li>• Limiting criterion: <ul style="list-style-type: none"> <li>○ For a DVG of 6 – “limited meter accuracy testing” describes a proactive testing program wherein subsets of meters (i.e. old meters, large meters) are targeted but a representative sample of the full meter population is not involved.</li> </ul> </li> <li>• Recommendation: Conduct some level of proactive meter testing for a subset of the meter population (e.g. large meters) AND/OR conduct meter accuracy testing for meters as a result of billing system flags (e.g. zero usage for suspected stopped meters).</li> </ul> <p>Confirmed DVG: 4</p>

## City of Patterson – 1/27/2021 – Level 1 Water Audit Validation Notes for 2019 Audit

Audit Input	Confirmation of Input Derivation	Confirmation of Data Validity Grade (DVG) Assignment
Billed Unmetered Authorized Consumption (BUAC)	N/A	N/A
Unbilled Metered Authorized Consumption (UMAC)	N/A	N/A
Unbilled Unmetered Authorized Consumption (UUAC)	Unbilled Unmetered Profile: <ul style="list-style-type: none"> <li>• Fire engine fill-ups using hydrants (firefighting)</li> <li>• Flushing</li> <li>• Street sweepers</li> </ul> Input Derivation if Estimated: (default) Comments: <ul style="list-style-type: none"> <li>• In future, might have a metered consumption value for fire hydrant truck fill-ups – don't currently think it's being measured.</li> <li>• Fire hydrant maintenance (flushing) – desire to quantify with a meter in future.</li> </ul> Confirmed input value: 14.762 MG	Default or Adjusted Default Applied: Default Completeness of Documentation: N/A Confirmed DVG: 5 (default)

## City of Patterson – 1/27/2021 – Level 1 Water Audit Validation Notes for 2019 Audit

Audit Input	Confirmation of Input Derivation	Confirmation of Data Validity Grade (DVG) Assignment
<p>Unauthorized Consumption (UC)</p>	<p>Default Applied? Yes                      Input Derivation if Customized: N/A                      Comments:</p> <ul style="list-style-type: none"> <li>• While most permitted contractors are using nonpotable hydrants with meters, the City still catches occasional water theft occurring if a contractor accesses potable hydrant without temporary permitted meter.</li> <li>• City is surrounded by agricultural land. Some fire hydrants are located in more rural areas, so they can be used for authorized activities like flushing near well sites. However, they can also be used (unauthorized) by contractors doing work for nearby irrigation districts. City is working to get locks on them.</li> </ul> <p>Confirmed input value: 2.952 MG</p>	<p>Confirmed DVG: 5 (default)</p>
<p>Customer Metering Inaccuracies (CMI)</p>	<p>Input Derivation:</p> <ul style="list-style-type: none"> <li>• Meter company states that meters are 99.8% accurate. The City has not performed any independent tests.</li> <li>• During validation call, selected 0.5% as a point estimate to account for some level of apparent losses while the actual value is unknown.</li> </ul> <p>Confirmed input value: 0.5% --&gt; 4.839 MG</p>	<p>Characterization of meter testing: See BMAC section                      Characterization of meter replacement: See BMAC section                      Comments:</p> <ul style="list-style-type: none"> <li>• Limiting criteria:                             <ul style="list-style-type: none"> <li>○ A DVG of 4 requires that meter accuracy tests are triggered by customer requests <u>and</u> consumption flags. City only reports testing based on customer complaints.</li> <li>○ A DVG of 6 requires a “routine, but limited meter accuracy testing” program that is proactive for a targeted sub-group of the meter population.</li> </ul> </li> <li>• Recommendation: It is likely that meters are underperforming as time goes on and the 0.5% under-registration estimate is not capturing the full range of Apparent Losses from Customer Metering Inaccuracies (which subsequently makes the calculation of Real Losses appear higher). Consider testing of a random sample of meters in the field to verify field accuracy against meter manufacturer claims for new meters.</li> <li>• Recommendation: test a subset of the new meters installed as part of the AMI project implementation to document the accuracy of the population at start of service.</li> </ul> <p>Confirmed DVG: 3</p>
<p>Systematic Data Handling Errors (SDHE)</p>	<p>Input Derivation: (default)                      Comments:</p> <ul style="list-style-type: none"> <li>• See BMAC for description of billing validation practices.</li> </ul> <p>Confirmed input value: 2.408 MG</p>	<p>Confirmed DVG: 5 (default)</p>

## City of Patterson – 1/27/2021 – Level 1 Water Audit Validation Notes for 2019 Audit

Audit Input	Confirmation of Input Derivation	Confirmation of Data Validity Grade (DVG) Assignment
Length of Mains	<p>Input Derivation:</p> <ul style="list-style-type: none"> <li>Approximate number comes from the 2012 Water Utility Map.</li> <li>Water utility map was updated for 2020 and will be updated in 2020 audit.</li> </ul> <p>Hydrant lateral length included:</p> <ul style="list-style-type: none"> <li>Yes. Estimated at 859 hydrants with average hydrant lateral length of 30 feet.</li> </ul> <p>Confirmed input value: 53.9 miles</p>	<p>Mapping format:</p> <ul style="list-style-type: none"> <li>CAD file – converted to shapefile and uploaded to GovClarity (GIS)</li> <li>Digital access to paper maps - last updated in 2012. Completed update for all utilities as of 2020 which involved collecting all as-builts since 2012 and adding them to the system.</li> </ul> <p>Asset management database:</p> <ul style="list-style-type: none"> <li>Aug. 2018 – rolled out Mobile MMS – asset management program. Every utility is visible in various layers using the mobile platform.</li> </ul> <p>Map updates &amp; field validation:</p> <ul style="list-style-type: none"> <li>Verification through Mobile MMS</li> </ul> <p>Comments:</p> <ul style="list-style-type: none"> <li>Limiting criterion for 9 or 10 would include random field validation for verification of database(s), with records of field validation available for review.</li> </ul> <p>Confirmed DVG: 8</p>
Number of Active and Inactive Service Connections	<p>Input Derivation:</p> <ul style="list-style-type: none"> <li>Total number of accounts at end of audit period for 4 billing classifications.</li> <li>This includes the nonpotable accounts, which are not easy to exclude. It is a minimal number compared to the total number of accounts (~45 out of 6,500).</li> <li>New policy – 2" or larger landscape meters typically required to connect to the nonpotable system.</li> </ul> <p>Basis for database query:</p> <ul style="list-style-type: none"> <li>Account – billing policy is one account per meter. <ul style="list-style-type: none"> <li>There are a few older regions of the City where there's one meter for the entire area.</li> </ul> </li> <li>Vacant properties with an inactive (but live – i.e. not shut off) connection would not be included in the query since they don't have an account.</li> </ul> <p>Confirmed input value: 6,588 connections</p>	<p>CIS updates &amp; field validation:</p> <ul style="list-style-type: none"> <li>Well-established procedures exist for tracking account opening and closing.</li> <li>Ongoing staff field visits stand in for field validation.</li> </ul> <p>Estimated error of total count within:</p> <ul style="list-style-type: none"> <li>Expected to be about 1%-2% error since the reported value is known to <u>include</u> nonpotable accounts and <u>exclude</u> vacant properties with inactive but live (i.e. not shut off) connections.</li> </ul> <p>Confirmed DVG: 8</p>
Average Length of Customer Service Line	<p>Are customer meters at the curbstop? Yes</p> <p>Confirmed input value: 0 ft</p>	<p>Confirmed DVG: 10 (default)</p>

## City of Patterson – 1/27/2021 – Level 1 Water Audit Validation Notes for 2019 Audit

Audit Input	Confirmation of Input Derivation	Confirmation of Data Validity Grade (DVG) Assignment
<p>Average Operating Pressure</p>	<p>Number of zones, general setup:</p> <ul style="list-style-type: none"> <li>• 3 zones</li> </ul> <p>Typical pressure range:</p> <ul style="list-style-type: none"> <li>• 61 psi winter to 65 psi summer</li> </ul> <p>Input derivation:</p> <ul style="list-style-type: none"> <li>• Average between values above which are based on data collected for all pressure zones</li> <li>• Daily pressure readings at well sites and through SCADA</li> </ul> <p>Confirmed input value: 63.0 psi</p>	<p>Extent of static pressure data collection:</p> <ul style="list-style-type: none"> <li>• Daily measurements at boundary points</li> </ul> <p>Characterization of real-time pressure data collection:</p> <ul style="list-style-type: none"> <li>• Daily</li> </ul> <p>Hydraulic model in place? Calibrated?:</p> <ul style="list-style-type: none"> <li>• Yes. Last calibrated in 2017 as part of Water Master Plan.</li> </ul> <p>Comments:</p> <ul style="list-style-type: none"> <li>• Other measurements made at hydrants when there's been a customer complaint about low water pressure (treated the same as water quality concerns). This stands in for pressure logging beyond boundary points.</li> <li>• Limiting criterion:                             <ul style="list-style-type: none"> <li>○ DVG of 8: "Full scale" describes telemetry or pressure logging that captures data beyond the boundary points, collecting pressure information from throughout the distribution system, representing a full pressure profile. If pressure logging is used instead of using telemetry, seasonal variation must also be captured.</li> </ul> </li> </ul> <p>Confirmed DVG: 6</p>
<p>Total Operating Cost (TOC)</p>	<p>Input Derivation:</p> <ul style="list-style-type: none"> <li>• Includes costs associated with nonpotable system since this portion is difficult to remove.</li> <li>• Includes all operating costs, including smaller-scale capital and salaries for operators working on the system.</li> <li>• Includes some financing for larger CIP projects within audit year.</li> <li>• Pulled from various sources:                             <ul style="list-style-type: none"> <li>○ Expenses – water rates study from 2017 and projected 5 years out</li> <li>○ Other inputs from bills</li> </ul> </li> </ul> <p>Confirmed input value: \$2,469,600</p>	<p>Frequency of internal auditing: Annual</p> <p>Frequency of third-party CPA auditing: Annually</p> <p>Confirmed DVG: 10</p> <p>Recommendation: For 2020 and future audits, consider looking at larger-scale utility finance annual reports for all annual short- and long-term costs associated with operating the water utility within the City (including production, salary, debt financing, etc.). This should contain financing costs related to large capital projects spread out over a longer period of time without causing a huge spike in single-year operating costs.</p>

## City of Patterson – 1/27/2021 – Level 1 Water Audit Validation Notes for 2019 Audit

Audit Input	Confirmation of Input Derivation	Confirmation of Data Validity Grade (DVG) Assignment
<p>Customer Retail Unit Cost (CRUC)</p>	<p>Input Derivation:</p> <ul style="list-style-type: none"> <li>• Tier 2 cost (highest tier) of water usage.</li> </ul> <p>Sewer Charges Volumetric? No – flat fee.                      Sewer Charges Included? No.                      Confirmed input value: \$2.82/CCF</p>	<p>Characterization of calculation:</p> <ul style="list-style-type: none"> <li>• Marginal rate that applies to all customer classes</li> </ul> <p>Comments:</p> <ul style="list-style-type: none"> <li>• All customer classes pay the same variable rate, so there is no need for a composite rate calculation.</li> <li>• The rate structure is tiered. Average consumption is above Tier 2 (the highest tier), so the Tier 2 rate was selected. This is the marginal cost that the City would expect to receive, for example, if meter accuracy was increased.</li> <li>• Water auditor stands in as third party knowledgeable in M36 water audit methodology for review purposes.</li> </ul> <p>Confirmed DVG: 10</p>
<p>Variable Production Cost (VPC)</p>	<p>Supply profile:</p> <ul style="list-style-type: none"> <li>• All local well production.</li> </ul> <p>Direct variable costs included:</p> <ul style="list-style-type: none"> <li>• Electricity and chemical costs</li> </ul> <p>Secondary costs included: No</p> <p>Confirmed input value: \$293.15/MG</p>	<p>Characterization of calculation: Valid, includes known direct costs.</p> <p>Comments:</p> <ul style="list-style-type: none"> <li>• DVG is limited to a 5 due to no secondary costs (e.g. deferred cost of water supply expansion) being incorporated, which is typical of most, if not all, CA utilities.</li> </ul> <p>Confirmed DVG: 5</p>

# Certified Validation Report

## Part A: Provided by Validator

### Audit Information:

Water Supplier Name: City of Patterson

PWS ID: CA5010017

System Type: Potable

Audit Period: CY 2019

Utility Representation: Maria Encinas & Mike Heard

Validation Date: 1/27/2021

Call Time: 10:30AM

Sufficient Supporting Documents Provided: Yes

### Validation Findings & Confirmation Statement:

#### Key Audit Metrics:

Data Validity Score: 58

ILI: 6.56

Real Loss: 193.005 MG

Apparent Loss: 10.199 MG

Non-revenue water as percent of cost of operating system: 4.0%

#### Certification Statement by Validator:

This water loss audit report has been Level 1 validated per the requirements of California Code of Regulations Title 23, Division 2, Chapter 7 and the California Water Code Section 10608.34.

All recommendations on volume derivation and Data Validity Grades were incorporated into the water audit.

*If not, rejected recommendations are included here.*

#### Validator Information:

Water Audit Validator: Chris Hewes

Qualifications: Water Audit Validator Certificate issued by the CA-NV Section of the AWWA

Validator Provided

# Certified Validation Report Template

## Part B: Provided by Utility

**Water Supplier Name:** City of Patterson

**Water Supplier ID Number:** CA5010017

**Water Audit Period:** CY 2019

### Water Audit & Water Loss Improvement Steps:

Utility to provide steps taken in preceding year to increase data validity, reduce real loss and apparent loss as informed by the annual validated water audit:

- The city will provide well meter calibration reports for each well site on a yearly basis. This will confirm the accuracy of our well production meters.
- Conduct some level of proactive meter testing for a subset of the meter population.
- Finish installation of the SCADA historian driver to automatically record production readings.
- For 2020 and future audits, the city will look at larger-scale utility finance annual reports for all annual short- and long-term costs associated with operating the water utility within the City (including production, salary, debt financing, etc.). This will contain financing costs related to large capital projects spread out over a longer period of time without causing a huge spike in single-year operating costs.

### Certification Statement by Utility Executive:

This water loss audit report meets the requirements of California Code of Regulations Title 23, Division 2, Chapter 7 and the California Water Code Section 10608.34 and has been prepared in accordance with the method adopted by the American Water Works Association, as contained in their manual, *Water Audit and Loss Control Programs, Manual M36, Fourth Edition* and in the Free Water Audit Software version 5.

Executive Name (Print)

Executive Position

Signature

Date

Mike Willett

Public Works Director



2-16-2021



# 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 Patterson (5010017)  
**Reporting Year:** 2020    1/2020 - 12/2020

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:	+ ?	5	1,269.000	MG/Yr
Water imported:	+ ?	n/a	0.000	MG/Yr
Water exported:	+ ?	n/a	0.000	MG/Yr

**Master Meter and Supply Error Adjustments**

	Pcnt:	Value:	
+ ?	2	● ○	MG/Yr
+ ?		● ○	MG/Yr
+ ?		● ○	MG/Yr

Enter negative % or value for under-registration  
Enter positive % or value for over-registration

**WATER SUPPLIED:** **1,269.000** MG/Yr

**AUTHORIZED CONSUMPTION**

Billed metered:	+ ?	4	1,122.000	MG/Yr
Billed unmetered:	+ ?	n/a		MG/Yr
Unbilled metered:	+ ?	n/a		MG/Yr
Unbilled unmetered:	+ ?	5	15.863	MG/Yr

Default option selected for Unbilled unmetered - a grading of 5 is applied but not displayed

**AUTHORIZED CONSUMPTION:** **1,137.863** MG/Yr

Click here: ?  
for help using option buttons below

Pcnt:	Value:	
1.25%	● ○	MG/Yr

Use buttons to select percentage of water supplied OR value

**WATER LOSSES (Water Supplied - Authorized Consumption)**

**131.138** MG/Yr

**Apparent Losses**

Unauthorized consumption: + ? **3.173** MG/Yr

Default option selected for unauthorized consumption - a grading of 5 is applied but not displayed

Customer metering inaccuracies:	+ ?	3	5.638	MG/Yr
Systematic data handling errors:	+ ?	5	2.805	MG/Yr

Default option selected for Systematic data handling errors - a grading of 5 is applied but not displayed

**Apparent Losses:** **11.616** MG/Yr

Pcnt:	Value:	
0.25%	● ○	MG/Yr

0.50%	● ○	MG/Yr
0.25%	● ○	MG/Yr

**Real Losses (Current Annual Real Losses or CARL)**

Real Losses = Water Losses - Apparent Losses: ? **119.522** MG/Yr

**WATER LOSSES:** **131.138** MG/Yr

**NON-REVENUE WATER**

**NON-REVENUE WATER:** **147.000** MG/Yr

= Water Losses + Unbilled Metered + Unbilled Unmetered

**SYSTEM DATA**

Length of mains:	+ ?	8	53.9	miles
Number of active AND inactive service connections:	+ ?	8	6,588	
Service connection density:	?		122	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 has been set to zero and a data grading score of 10 has been applied

Average operating pressure: + ? 6 63.0 psi

**COST DATA**

Total annual cost of operating water system:	+ ?	10	\$2,469,600	\$/Year
Customer retail unit cost (applied to Apparent Losses):	+ ?	10	\$2.82	\$/100 cubic feet (ccf)
Variable production cost (applied to Real Losses):	+ ?	5	\$293.15	\$/Million gallons <input type="checkbox"/> Use Customer Retail Unit Cost to value real losses

**WATER AUDIT DATA VALIDITY SCORE:**

**\*\*\* YOUR SCORE IS: 58 out of 100 \*\*\***

A weighted scale for the components of consumption and water loss is included in the calculation of the Water Audit Data Validity Score

**PRIORITY AREAS FOR ATTENTION:**

Based on the information provided, audit accuracy can be improved by addressing the following components:

- 1: Volume from own sources
- 2: Billed metered
- 3: Customer metering inaccuracies

SWRCB Water Loss Control - Proposed Performance Standard (City of Patterson highlighted)

December 1, 2020

Urban water supplier (naming per water loss audit)	Baseline water loss (Averaged over 2017-2019) Gallons per connection per day	Baseline water loss (Averaged over 2017-2019) Gallons per mile per day	Water loss performance standards Gallons per connection per day	Water loss performance standards Gallons per mile per day
Olivenhain Municipal Water District	36.2	N/A	36.2	N/A
Ontario City Of	23.0	N/A	23.0	N/A
Orange City Of	31.1	N/A	21.6	N/A
Orangevale Water Company	29.6	N/A	16.4	N/A
Orchard Dale Water District	32.3	N/A	13.7	N/A
Otay Water District	15.9	N/A	15.9	N/A
Oxnard City Of	31.3	N/A	17.0	N/A
Padre Dam Municipal Water District	6.6	N/A	6.6	N/A
Palmdale Water District	44.7	N/A	19.8	N/A
Palo Alto City Of	13.4	N/A	13.4	N/A
Paradise Irrigation District	20.9	N/A	20.9	N/A
Paramount City Of	68.5	N/A	18.9	N/A
Pasadena City Of	31.8	N/A	19.0	N/A
Paso Robles City Of	11.0	N/A	11.0	N/A
Patterson City Of	69.4	N/A	12.6	N/A
Petaluma City Of	23.7	N/A	13.4	N/A
Phelan Pinon Hills Community Services District	N/A	819.7	N/A	819.7
Pico Rivera City Of	10.0	N/A	10.0	N/A
Pico Water District	10.3	N/A	10.3	N/A
Pismo Beach City Of	11.8	N/A	11.8	N/A
Pittsburg City Of	24.9	N/A	15.4	N/A
Placer County Water Agency-Auburn Bowman	56.9	N/A	19.9	N/A
Placer County Water Agency-Foothill	47.0	N/A	20.2	N/A
Placer County Water Agency	49.5	N/A	20.1	N/A
Pleasanton City Of	49.2	N/A	18.9	N/A

**APPENDIX M**

**2020 UWMP DWR Guidebook**

Recycled Water

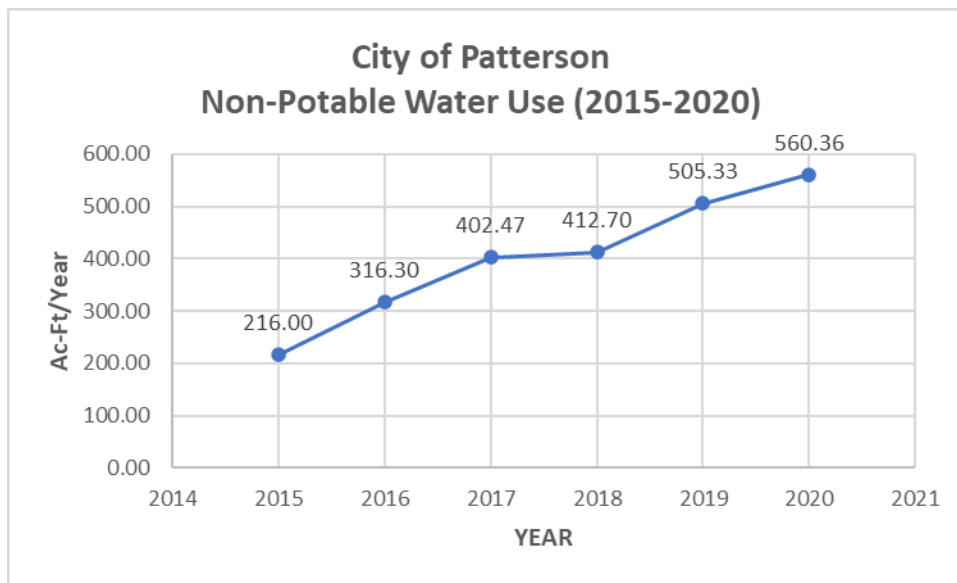


## Future Recycled Water Use Availability – 2045

### Key Assumptions:

2045 Population Projection	= 41,812
Avg. Per Capita Wastewater Flows	= 65 gpcd
Max. % Wastewater Flows For Re-use	= 60%
2045 Available Wastewater For Re-use	= 1,827 AF
Future Water Supply Portfolio Scenario	= 1,512 AF
Planned Start-up (if feasible)	= 2030

## Future Recycled Water Use – Serving Existing Non-Potable Irrigation Uses



## Future Recycled Water Use – Project Phasing Scenario

### Key Assumptions:

Phase 1 – Tertiary Treatment Upgrade	= 2030 (if feasible)
Phase 1 – Wastewater Distribution Facilities	= 2030
Phase 2 – Wastewater Distribution Facilities	= 2030-2035
Phase 3 – Wastewater Distribution Facilities	= 2040-2045
Phase 4 - Wastewater Distribution Facilities	= Build-out (TBD)

*(actual phasing would be based on development, cost, regulatory and affordability issues)*

# Appendix M.

## Recycled Water

This appendix describes the various aspects of municipal recycled water to support completion of the urban water management plan (UWMP) recycled water section and tables discussed in Chapter 5. The appendix provides clarification on how to define and document recycled water in the 2020 UWMPs, as well as additional background information that may be helpful for understanding recycled water and, in turn, completing the wastewater and recycled water requirements in the 2020 UWMPs.

The topics covered in Appendix M are as follows:

- Status of Recycled Water in California
- Recycled Water Definition
- Title 22
- Levels of Treatment
- Disposal vs Recycling
- Direct vs Indirect Use
- Planned vs Unplanned Beneficial Uses
- Potable vs Non-potable Reuse
- Direct Potable and Indirect Potable Reuse
- Supplemental Water
- Quantifying Recycled Water Production and Use within the Area Considered by the UWMP
- Estimating vs Metering
- Involved Agencies
- Wholesaler vs Retailer
- Internal Reuse
- Coordination of UWMP and the 2015 Recycled Water Survey Data
- Beneficial Uses

- Recycled Water Use and Urban Per Capita Water Use Targets
- Fit for Purpose
- Tables
- Figures

## **M.1 Status of Recycled Water in California**

Recycled water as a water supply potentially can provide additional locally available and locally controlled water resources. It has been safely reused in California for more than 100 years and the state, as of 2015, is annually reusing over 714,000 acre-feet (AF) to meet water supply needs (Municipal Wastewater Recycling Survey 2015). Although this is a significant amount of water, there is potential to increase this amount and provide greater local water supply reliability.

## **M.2 Recycled Water Definition**

Municipal recycled water is wastewater that has been treated to a specified quality to enable it to be used again. As defined in Water Code Section 13050(n), recycled water means “water which, as a result of treatment of waste, is suitable for a direct beneficial use or a controlled use that would not otherwise occur and is therefore considered a valuable resource.” Although the legal definition does not specify the source of water, in common use, “recycled water” refers to water originating as municipal wastewater, and it is the reuse of that wastewater that is tracked in UWMPs.

There are two requirements that treated municipal water must meet to be classified as recycled water in UWMPs. It must be reused:

- Beneficially, in a manner consistent with recycled water criteria in Title 22 of the California Code of Regulations.
- In accordance with a Regional Water Quality Control Board (RWQCB) permit, such as National Pollutant Discharge Elimination System, waste discharge requirements, or water recycling requirements.

The terms “recycled water” and “reclaimed water” have the same meaning and can be used interchangeably. But, recycled water is used more commonly and implies a municipal wastewater source. The process by which a facility (industrial or otherwise) uses process water multiple times is usually referred to as internal reuse to distinguish it from municipal recycled

water.

The quality of most water discharged from a wastewater facility in California is suitable to be recycled for some beneficial use. Recycled water encompasses a range of water qualities, depending on the level of treatment provided at the wastewater facility. The distinction between discharged or disposed wastewater effluent and recycled water is the act of the planned beneficial reuse that makes the treated effluent “recycled water”. The term “recycled water” indicates a beneficial use after wastewater treatment. It does not mean or imply a certain level of treatment, such as “tertiary-treatment.”

Municipal wastewater originates primarily from domestic (household) sources, but it can include commercial, industrial, and institutional wastewater discharged to a sanitary sewer. Industrial water is considered municipal recycled water when it is comingled with other municipal wastewater or treated by a municipal wastewater treatment facility. Industrial wastewater that is separately treated and reused is not categorized as municipal recycled water.

### **M.3 Title 22**

Title 22 (California Code of Regulations, Division 4, Chapter 3, Section 60301 et seq.) is the regulation overseeing reuse or “recycling” of municipal wastewater to protect public health. Level of treatment and bacteriological water quality standards are used in Title 22 to define what uses are legally allowed, based on the probability of public contact to protect public health. Title 22 identifies uses for a range of wastewater treatment levels, from undisinfected secondary treatment through water that has undergone advanced treatment. Title 22 regulations also specify monitoring and reporting requirements and onsite use area requirements.

The State Water Resource Control Board’s (SWRCB’s) Division of Drinking Water administers the adoption of Title 22 regulations and oversees their application. The applicable provisions of Title 22 are incorporated into permits issued by RWQCB or statewide general permits issued by SWRCB. These permits are the mechanism for enforcement of Title 22 regulations.

## M.4 Levels of Treatment

Municipal wastewater that can be beneficially reused is classified by its level of treatment in accordance with Title 22. Primary-treated water, that which has removed 70 to 85 percent of the organic and inorganic solids through either settling or floating, is not able to be recycled in California. When reporting level of treatment in Tables 6-3 and 6-4, one of the five treatment categories specified in Title 22 must be used. The specific requirements for each level of treatment are included in Title 22, but are briefly summarized, as follows:

- Secondary, Undisinfected (California Code of Regulations [CCR] Section 60301.900) — Oxidized wastewater.
- Secondary, Disinfected-23 (CCR Section 60301.225) — Oxidized and disinfected wastewater.
- Secondary, Disinfected-2.2 (CCR Section 60301.220) — Oxidized and disinfected to a higher level than Secondary, Disinfected-23.
- Tertiary (CCR Section 60301.230) — Oxidized, filtered, and disinfected wastewater to achieve both bacterial and virus removal.
- Advanced (CCR Section 60320.201) — Treatment technologies beyond conventional coagulation, filtration and disinfection, including reverse osmosis, micro- or nanofiltration, ozonation, or advanced oxidation. Refer to the CCR for specific requirements.

Tables at the end of this appendix summarize uses allowed for levels of municipal recycled water treatment specified in Title 22. Although Title 22 lists specific allowed uses, other uses are permitted and approved on a case-by-case evaluation by the SWRCB's Division of Drinking Water (DDW). Examples of other specific allowed non-potable recycled water applications are geothermal power production and carpet dyeing. In general, the linkage between level of recycled water treatment and potential uses specified in Title 22 is strongly influenced by the potential for direct human contact and ingestion, with higher levels of treatment (tertiary or advanced) required for open public access and worker contact conditions.

A key component of incorporating municipal recycled water into water supply is aligning potential uses to the availability of various levels of treated municipal recycled water. Determining municipal recycled water availability requires coordination with both the local water and wastewater agencies,

because each jurisdiction has its own roles, authorities, and service areas with respect to municipal recycled water generation and distribution.

### **M.5 Disposal vs Recycling**

There are three situations where misconceptions may occur about the distinction between wastewater disposal and recycled water:

- Release of treated municipal wastewater into a receiving water body.
- Land application of treated municipal wastewater onto a field for the primary purpose of disposal.
- Treated wastewater percolation ponds.

Once the treatment process is complete and the effluent is released into a receiving water body, the effluent becomes part of the receiving water body and is considered disposal unless there is a contractual arrangement to use the river to convey the treated water from the discharger to a downstream user. If a downstream user extracts water from the water body without a contractual relationship with the upstream discharger, the reuse of the treated effluent would be considered an incidental use (see below for further discussion of incidental use).

If a wastewater treatment plant uses land application to dispose of its treated effluent, how the irrigated field is subsequently used distinguishes whether the disposal can also be considered as water recycling. If the field has a planned use for pastureland or crop cultivation, then the effluent would be classified as recycling for agricultural irrigation. If there is no use of the field, then the effluent discharge is considered disposal without recycling.

Percolation disposal ponds may be adding water to a usable aquifer, but that incidental recharge is not a planned purpose of such ponds and these ponds are not regulated as a water supply source. Thus, percolation from disposal ponds is not counted as groundwater recharge or recycled water use.

### **M.6 Direct vs Indirect Use**

Direct beneficial use is defined in the CCR Section 60301.200 as the use of recycled water that has been transported from the point of treatment or production to the point of use without an intervening discharge to waters of

the State. Direct reuse involves a conveyance structure, such as a pipe or canal, to take treated wastewater from the point of treatment to the point of use. Typically, treated wastewater is discharged into rivers and streams as part of permitted disposal practices. Discharged water then commingles with the stream or river that may be a water source for downstream communities or agricultural users. These downstream uses are considered indirect reuse. Groundwater recharge and surface water augmentation with recycled water are two forms of planned indirect reuse for potable use; these are discussed below.

### **M.7 Planned vs Unplanned Beneficial Uses**

Treated municipal wastewater is integrated into California’s water supply through both planned and unplanned applications. A planned reuse is an intentional use of recycled water without relinquishing control. Planned reuses are generally identified in planning studies and permit applications. They also generally involve agreement between the recycled water supplier and the recycled water user.

An unplanned reuse occurs when water is discharged and subsequently reused by an entity that is not the discharger without a continuity of custody of the water. Indirect reuse is often also unplanned reuse, with the major exception of indirect potable reuse, which is discussed below. Non-potable indirect reuse may also be planned if treated wastewater is discharged — usually into a surface water body — and there is prearranged agreement or intention between the producer and user that treated wastewater discharge will be maintained in specified quantities and times for use by downstream diverters. Discharged treated wastewater supplements river flow and can be a downstream benefit for wetland or aquatic habitat, or withdrawn by a downstream river water user. In the case of the latter, the wastewater discharge is regulated to protect the all beneficial uses of the receiving water (Recycled Water Task Force 2003). The instream benefits of treated wastewater discharge and indirect reuse by downstream diversions are both important components of managing California’s water resources, but they are distinguished from planned reuse.

### **M.8 Potable vs Non-potable Reuse**

Non-potable recycling includes any application not involving drinking water for human consumption, such as landscape or agricultural irrigation,

commercial applications such as car washes or dual-plumbed office buildings, or industrial process such as oil refineries or cooling towers. Examples of non-potable uses are given in the Beneficial Uses section below. Potable reuse results in augmentation to drinking water supplies. Potable reuse can be either direct reuse or indirect reuse.

### **M.9 Direct Potable and Indirect Potable Reuse**

Direct potable reuse is the planned introduction of recycled water either directly into a public water system, as defined in Section 116275 of the California Health and Safety Code, or into a raw water supply immediately upstream of a water treatment plant. Direct potable reuse is a practice which is not currently occurring in California.

Indirect potable reuse occurs when tertiary or advanced treated wastewater augments drinking water resources. The two types of indirect potable reuse are as follows:

- Indirect potable reuse for groundwater recharge, where recycled water recharges a groundwater basin and groundwater is later extracted from the basin.
- Surface water augmentation, where recycled water is added into a surface water reservoir used as a source of domestic drinking water supply.

Potable use does not actually occur until the water is subsequently pumped from the ground or withdrawn from the reservoir, treated, and added to the drinking water distribution system.

Because seawater intrusion barriers typically result in groundwater recharge, they may be considered a form of indirect potable reuse.

Indirect potable reuse through groundwater recharge has occurred in California since 1962. Title 22, Division 4, Chapter 3, Article 5.1 (CCR Section 60320 et seq.) describes the permitting and monitoring process required to obtain a RWQCB permit for groundwater recharge.

Water Code Section 13558 requires SWRCB to adopt regulations for onsite treatment and reuse of non-potable water in multifamily residential, commercial, and mixed-use buildings on or before December 1, 2022.

## **M.10 Supplemental Water**

Supplemental water is water added to a recycled water system to meet peak demands when the supply of recycled water cannot meet demands.

Supplemental water may also be added to recycled water systems during interruptions in the recycled water supply or to a groundwater recharge project as a required blend with tertiary-treated water.

Supplemental water can be potable or non-potable. If a supplier adds supplemental water to its recycled water system, the volume of supplemental water is not to be included in the volumes of recycled water provided by UWMP preparers in Tables 6-4 and 6-5 but is to be included as a separate line in Table 6-4.

## **M. 11 Quantifying Recycled Water Production and Use within the Area Considered by the UWMP**

The focus of the discussion of recycled water in an UWMP is to be the volume of wastewater generated and treated and the amount of recycled water beneficially reused within the service area. This can be a straightforward assessment when there is one utility that provides both water and wastewater services within a service area. It can get very complicated in larger urban areas where cities are adjacent to each other and independent water suppliers (suppliers) provide regional services. For example, wastewater generated within a service area is not always treated within the service area or recycled water used in a service area may have been generated in another service area.

Guidance on collection and treatment scenarios and how an UWMP preparer should approach completing Tables 6-2 and 6-3 is provided at the end of this section.

## **M.12 Estimating vs Metering**

Table 6-2 summarizes wastewater volumes collected within the service area. Because wastewater volumes frequently are not metered, it may be necessary to estimate values. For this table, indicate in the appropriate column whether the values provided are from estimated or metered data. It is assumed that the volumes in the remaining tables summarizing wastewater and recycling will be metered data with the exception of Table 6-6 (methods to increase recycled water use).

### **M.13 Involved Suppliers**

The guidebook requests a summary list of suppliers or organizations involved in the collection, treatment, or discharge of wastewater. This list should also include recycled water agencies and may consider organizations involved but not directly participating in the treatment process, such as groups operating a wetland or participants in memoranda of understanding. It could also include contracted operations as well as joint-venture participants. It is likely that many of these organizations would be part of the overall UWMP outreach effort.

### **M.14 Wholesaler vs Retailer**

A recycled water wholesaler is an organization that distributes recycled water to another organization that is not an end user. A wholesaler obtains the recycled water fully treated from another agency, may provide additional treatment to partially treated wastewater, or may provide all treatment of wastewater. A recycled water retailer distributes recycled water to end users. An agency may also be both a wholesaler and a retailer if it has direct customers that use recycled water and it provides recycled water to another organization that distributes it to end users in that service area.

### **M.15 Internal Reuse**

Wastewater facilities frequently internally reuse partially or fully treated, non-potable water within their facilities for equipment cleaning or minor landscaping. This is a similar practice to industrial internal reuse. Although this internal reuse is a beneficial use, internal industrial or wastewater treatment reuse should not be included with other recycled uses in Tables 6-3, 6-4, or 6-5.

If a wastewater plant uses treated effluent for on-site landscape irrigation at a treatment plant where public access is not restricted, that volume should be entered in Table 6-4 as landscape irrigation. The table should also include treated wastewater used offsite for sewer system maintenance, such as sewer line flushing (included in the “Other” category).

### **M.16 Beneficial Uses**

The term “beneficial uses” applies to almost every aspect of water use in California. Water Code section 13050(f) specifies: “Beneficial uses” of the

waters of the state that may be protected against quality degradation include, but are not limited to, domestic, municipal, agricultural and industrial supply; power generation; recreation; aesthetic enjoyment; navigation; and preservation and enhancement of fish, wildlife, and other aquatic resources or preserves.

For the purposes of recycled water, Water Code 10633(d) specifies that a UWMP must contain a description and quantification of the potential uses of recycled water, including, 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. UWMP preparers are requested to review the descriptions, provided below, of the recycled water beneficial uses to be quantified and apply them to completing the tables summarizing recycled water use for their service area. Recycled water does not have to offset potable demand to be considered beneficially reused.

The quantified data provided for the beneficial uses by the recycled water provider must be for uses authorized by a permit issued by a RWQCB or SWRCB for waste discharge or water recycling. Volumes indicated in Tables 6-4 and 6-5 should be consistent with that permit.

An “Other” category is included in Tables 6-4 and 6-5. But, it is intended that the category be used only if there is no other appropriate category. A category of water use, institutional water use, is used in water use accounting but is not used in recycled water use accounting. An institutional water user is a water user dedicated to public service, such as higher education institutions, schools, courts, churches, prisons, hospitals, government facilities, and non-profit institutions. Recycled water used by institutional water users is to be included with the type of use and will generally be landscape irrigation, golf course irrigation, agricultural irrigation, or “Other” categories.

The following provides specific definitions of each beneficial use classification.

**Agricultural Irrigation**

Irrigation of food, fiber, and fodder crops, and pastureland. This also includes Christmas tree production, pasture for farm animals, and wholesale plant nurseries.

**Landscape Irrigation (excluding Golf Courses)**

Irrigation of parks, schools, cemeteries, churches, residential, streetscapes, slope protection, or public facilities. Golf course irrigation is not included. Water to maintain aesthetic impoundments within landscaped areas is included with landscape irrigation. Fill stations primarily used for public use should be classified as landscape irrigation.

**Golf Course Irrigation**

Irrigation of golf courses, whether publicly or privately held. Water used to maintain aesthetic impoundments within golf courses is also included with golf course irrigation.

**Commercial Use**

Uses by commercial water users, except landscape irrigation. A commercial water user is a water user that provides or distributes a product or service. Examples of commercial water use are: commercial building use (toilets, HVAC, etc.), car washes, laundries, and retail nurseries.

Landscape irrigation of commercial building areas is to be classified as landscape irrigation if it is separately metered or if landscape is the dominant use of mixed uses served by a single meter. Fill stations, if they are primarily used for commercial use, should be classified as commercial use. Landscape irrigation on golf courses should be reported as golf course irrigation. Fill stations primarily used for public use should be classified as landscape irrigation.

**Industrial Use**

Uses by industrial water users, except landscape irrigation and geothermal energy production. An industrial user is a water user that is primarily a manufacturer or processor of materials.

Examples of industrial water uses are cooling towers, oil refining, process water, and mining. Landscape irrigation of industrial building areas is to be classified as landscape irrigation if it is separately metered or if landscape is the dominant use of mixed uses served by a single meter.

### **Geothermal and Other Energy Production**

Water used to augment geothermal zones or used in the energy industry, excluding refineries. Refinery use is classified as industrial.

### **Seawater Intrusion Barrier**

Injected water in coastline setting designed to reduce seawater intrusion into a coastal aquifer with a seawater interface.

### **Recreational Impoundment**

Addition of water to maintain water levels in a lake for recreation or other non-potable uses. Lakes for wildlife habitat are included in the natural systems/restoration category. Small impoundments that are features in parks or golf courses are included as part of landscape irrigation or golf course irrigation.

### **Natural Systems/Restoration**

Any water provided to a designated wildlife area, whether included as part of a wastewater facilities treatment process or an independent area. The area must be designated as a wetland or wildlife area and so does NOT include water that a wastewater facility must discharge to maintain habitat in the creek to which it is discharging. This category also includes recycled water used at wetlands, wildlife habitats and refuges, and duck clubs.

### **Groundwater Recharge (IPR)**

Addition of water to augment groundwater aquifers for future use. Only groundwater recharge projects that are permitted by the state or regional water boards for the purpose of groundwater recharge is accounted for in this category. A water agency cannot claim as planned groundwater recharge treated wastewater incidentally recharging groundwater as a result of leakage from evaporation/percolation ponds.

When recycled water is blended with other water sources within the recharge system, only the amount of recycled water is to be reported in Tables 6-4 and 6-5.

**Surface Water Augmentation (IPR)**

Surface water augmentation is defined in the Water Code as “the planned placement of recycled water into a surface water reservoir used as a source of domestic drinking water supply” (Water Code Section 13561). Surface water augmentation is not allowed in California at this time; so, 2015 recycled water use cannot be classified as surface water augmentation. But, regulations for its implementation are being prepared by the SWRCB’s DDW, so projects may be permitted and implemented by 2020. In Table 6-4, surface water augmentation may be considered a future beneficial use in 2020 and thereafter.

**Direct Potable Reuse**

Direct potable reuse is defined in the CWC as “the planned introduction of recycled water either directly into a public water system or into a raw water supply immediately upstream of a water treatment plant” (Water Code Section 13561). This use is currently not permitted in the State of California, but its feasibility is being assessed by an expert panel supported by the SWRCB’s DDW. A time frame for permitting and implementing direct potable reuse projects is uncertain at this time, but a supplier may be considering and planning for its enactment. In Table 6-4, direct potable reuse may be considered a future beneficial use in 2020 or thereafter, but it is not certain that regulations allowing implementation will be in place.

**Other**

If a recycled water use cannot be classified into one of the categories identified above, a supplier may use this category. Sewer system flushing and firefighting are two possible uses that could be classified as “Other.” Fill stations should not be classified as “Other.” If the fill station was primarily used by commercial users for dust control or other purposes, fill station use should be classified as “Commercial use.” If the majority was used by landscapers or residential customers, then the use should be classified as “Landscape irrigation.”

## **M.17 Recycled Water Use and Urban Per Capita Water Use Targets**

Urban water suppliers may exclude recycled water use for the purpose of setting and meeting per capita water use targets. The amounts of recycled water excluded must be calculated in accordance with the methodologies in Chapter 5, and these amounts may not coincide with the amounts of recycled water reported in Tables 6-4 and 6-5.

## **M.18 Fit for Purpose**

A concept that organizations may find useful for increasing recycled water use within the UWMP area is a concept referred to as “fit for purpose” (U.S. Environmental Protection Agency 2012).

The basis of this concept is that the level of wastewater treatment should be commensurate with the uses of recycled water to ensure adequate treatment to meet the needs of users or protect public health while avoiding excessive treatment and associated costs. More rigorous treatment (and more energy-intensive processes) is reserved for uses with higher human or food production contact to minimize pathogen or harmful chemical contact. Conversely, less-treated wastewater has been safely used for decades in many agricultural reuse applications, which is the largest category of recycled water use in California. Greater reuse of secondary-treated wastewater in agriculture and environmental settings, where additional “natural treatment” through exposure to sunlight and soil contact can augment wastewater plant treatment, may provide additional opportunities for expanding recycled water use. Finally, suppliers may determine that having available multiple levels of treated wastewater may support increased integration of recycled water use into their water supply portfolio. For example, West Basin Municipal Water District is successfully providing multiple water quality levels of recycled water to its customers to meet specific needs of its diverse customer base.

## **M.19 Tables**

Each UWMP will have three to five tables addressing wastewater and recycled: Tables 6-2, 6-3, and 6-6. Tables 6-4 and 6-5 are included in the UWMP if recycled water is being used in an UWMP area or is planned to be during the planning horizon of the UWMP (required to be 20 years, but may be 25 years at the discretion of the supplier). suppliers complete Table 6-6

to show actions they have considered to begin or increase use of recycled water. Additional guidance for completing each table is included below.

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

Submittal Table 6-2 Retail: Wastewater Collected Within Service Area in 2020						
<input type="checkbox"/>						
There is no wastewater collection system. The supplier will not complete the table below.						
Percentage of 2020 service area covered by wastewater collection system <i>(optional)</i>						
Percentage of 2020 service area population covered by wastewater collection system <i>(optional)</i>						
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) Drop Down List</i>
<i>Add additional rows as needed</i>						
<b>Total Wastewater Collected from Service Area in 2020:</b>		0				
NOTES:						

Each retail supplier completes this table for all wastewater **collected** within the UWMP service area. Instructions for completing the table are as follows:

- If there is not a centralized wastewater collection system (the UWMP area is 100 percent septic), then check this box and do not complete the remainder of the table. Continue completing the table if there is a wastewater collection system.
- Percentage of 2020 service area covered by wastewater collection system (optional): Using the 2020 size of the UWMP area, identify what percentage (to the nearest whole number) of the service area is covered by sewer service.
- Percentage of 2020 service area covered by wastewater collection system (optional): Using the 2020 population determined for the gallons per capita per day calculations (Section 5), identify what percentage (to the nearest whole number) of the population is covered by sewer service.
- Enter wastewater collection agency information and the wastewater treatment plants within the service area. Enter the requested

information for each column.

Starting in Row 8, enter the name of the wastewater collection agency. In the next column of the same row, enter the volume of wastewater **collected** within the UWMP area and treated at the wastewater facility identified in the row. In the next column, enter the names (one per row) of each agency receiving collected wastewater and then treating it. In the next column, enter the names of the wastewater facility (one per row) treating the wastewater produced within the UWMP area. In the next column, select whether or not the wastewater treatment plant (WWTP) is located within the service area of the UWMP (or service areas of the suppliers covered under the UWMP). And then in the final column, enter the names of the wastewater facility (one per row) treating the wastewater produced within the UWMP area.

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

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.											
Wastewater Treatment Plant Name	Discharge Location Name or Identifier	Discharge Location Description	Wastewater Discharge ID Number (optional)	Method of Disposal <i>Drop down list</i>	Does This Plant Treat Wastewater Generated Outside the Service Area?	Treatment Level <i>Drop down list</i>	2020 volumes					Instream Flow Permit Requirement
							Wastewater Treated	Discharged Treated Wastewater	Recycled Within Service Area	Recycled Outside of Service Area		
<i>Add additional rows as needed</i>												
<b>Total</b>							0	0	0	0	0	
NOTES:												

This table is to be completed for all wastewater TREATED OR DISPOSED within the UWMP area. If neither occur, the table does not have to be completed. Instructions for completing the table are as follows:

- If wastewater is neither treated nor disposed, then check the box and do not complete the rest of the table. If wastewater is treated or disposed within the service area, including use of recycled water, then the supplier continues to fill out the table.
- Enter the WWTP name, as indicated. Use as many rows as needed. Multiple rows can be used for one treatment plant, if different quality waters are produced, or if there are multiple discharge locations or

wastewater discharge IDs. For each WWTP and non-recycled wastewater discharged within the UWMP service area, provide the requested information.

- For the columns marked “2020 volumes,” enter the total amount of wastewater generated in 2020 within the UWMP service area. The value in the outlined cells are what should be reported in Tables 6-4 and 6-5.

In the columns to the right of the WWTP Name, enter the following information (listed by column):

- Discharge Location Name or Identifier
- Discharge Location Description
- Wastewater Discharge ID Number (optional)
- Method of Disposal
- Does This Plant Treat Wastewater Generated Outside the Service Area?
- Treatment Level
- Then enter volumes from 2020 for each of the following:
  - Wastewater Treated: Enter the total volume of water treated at the wastewater facility associated with the discharge location. If more than one row is used to fully account for different levels of wastewater treatment and/or discharge.
  - Discharged treated wastewater in 2020: Enter the volume to treated wastewater that was not recycled and was discharged to the environment at the discharge location.
  - Recycled within Service Area: Enter the volume of recycled water used within the service area. If more than one treatment level of recycled water is used, use more than one row. If recycled water is provided outside the service area directly to customers that are not included in another UWMP, this recycled water is to be included in this column. In the notes (Row 4), indicate the amount of recycled water directly supplied outside the service area. This directly supplied recycled water is to be included in subsequent tables with the outlined cell (Tables 6-4, 6-5, and 6-6).

- Recycled Outside of Service Area: Enter the volume of recycled water produced within the service area but transported for use to another area that is included in the UWMP of a different supplier.
- Instream Flow Permit Requirement: Enter the volume of instream flow required by permit.

**Submittal Table 6-3 Wholesale: Wastewater Treatment and Discharge within Service Area in 2020**

Submittal Table 6-3 Wholesale: Wastewater Treatment and Discharge Within Service Area in 2020										
<input type="checkbox"/> Wholesale Supplier neither distributes nor provides supplemental treatment to recycled water. The Supplier will not complete the table below.										
Wastewater Treatment Plant Name	Discharge Location Name or Identifier	Discharge Location Description	Wastewater Discharge ID Number (optional)	Method of Disposal <i>Drop down list</i>	Does This Plant Treat Wastewater Generated Outside the Service Area?	Treatment Level <i>Drop down list</i>	2020 volumes			
							Wastewater Treated	Discharged Treated Wastewater	Recycled Within Service Area	Recycled Outside of Service Area
<i>Add additional rows as needed</i>										
<b>Total</b>							0	0	0	0
NOTES:										

This table is to be completed by a wholesale supplier it provides supplemental treatment to recycled water it distributes. Instructions for completing the table are as follows:

If the wholesale supplier does not distribute nor provide supplemental treatment to recycled water, please select the checkbox and go on to the next applicable table of the UWMP. If the supplier provides supplemental treatment to recycled water it distributes, the following further describes the information to enter for each column for each WWTP and non-recycled wastewater discharged within the UWMP service area (list each WWTP separately as its own row):

- Discharge Location Name or Identifier
- Discharge Location Description
- Wastewater Discharge ID Number (optional)
- Method of Disposal

- Does This Plant Treat Wastewater Generated Outside the Service Area?
- Treatment Level
- Then enter volumes from 2020 for each of the following:
  - Wastewater Treated: Enter the total volume of water treated at the wastewater facility associated with the discharge location. If more than one row is used to fully account for different levels of wastewater treatment and/or discharge.
  - Discharged treated wastewater in 2020: Enter the volume to treated wastewater that was not recycled and was discharged to the environment at the discharge location.
  - Recycled within Service Area: Enter the volume of recycled water used within the service area. If more than one treatment level of recycled water is used, use more than one row. If recycled water is provided outside the service area directly to customers that are not included in another UWMP, this recycled water is to be included in this column. In the notes (Row 4) indicate the amount of recycled water directly supplied outside the service area. This directly supplied recycled water is to be included in subsequent tables with the outlined cell (Tables 6-4, 6-5, and 6-6).
  - Recycled Outside of Service Area: Enter the volume of recycled water produced within the service area but transported for use to another area that is included in the UWMP of a different supplier.

### Submittal Table 6-4 Retail: Current and Projected Recycled Water Direct Beneficial Uses within Service Area

Submittal Table 6-4 Retail: Current and Projected Recycled Water Direct Beneficial Uses Within Service Area											
<input type="checkbox"/> 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:											
Name of Supplier Operating the Recycled Water Distribution System:											
Supplemental Water Added in 2020 (volume) <i>Include units</i>											
Source of 2020 Supplemental Water											
Beneficial Use Type	Projected: Potential Beneficial Uses of Recycled Water (Describe)	Projected: Amount of Potential Uses of Recycled Water (Quantity) <i>Include volume units</i>	General Description of 2020 Uses	Level of Treatment <i>Drop down list</i>	2020	2025	2030	2035	2040	2045 (opt)	
Agricultural irrigation											
Landscape irrigation (excludes golf courses)											
Golf course irrigation											
Commercial use											
Industrial use											
Geothermal and other energy production											
Seawater intrusion barrier											
Recreational impoundment											
Wetlands or wildlife habitat											
Groundwater recharge (IPR)*											
Surface water augmentation (IPR)*											
Direct potable reuse											
Other (Provide General Description)											
					<b>Total:</b>	0	0	0	0	0	0
Internal Reuse (not counted towards Statewide Recycled Water volume).											
<i>*IPR - Indirect Potable Reuse</i>											
NOTES:											

The purpose of Table 6-4 is to record the current and projected recycled water for current and projected beneficial uses. A supplier completes Table 6-4 Retail if there is any recycled water used or projected in its service area. If recycled water is not currently nor planned to be used, the table does not have to be completed (check the box at the top and do not complete the table).

For those completing this table, please note that if recycled water within the supplier’s service area is supplied by more than one entity operating separate systems, the supplier creates multiple versions of this table so that each system is reported in its own table. If recycled water is obtained from multiple suppliers but operated within a single system, please provide the total amount of recycled water obtained in 2020 from each provider in Row 1, but report the use numbers in a single table.

The top portion of the table includes space for the supplier to enter the name of the supplier treating the recycled water, and the name of the organization that operates the recycled water distribution system. If more than one entity supplies recycled water into a single distribution system, indicate each supplier’s 2020 total. For example, Supplier A (250 AF) and Supplier B (125 AF). If any supplemental water was added in 2020, list the addition volume, and the name or description of the source of the

supplemental water. Record the volume of water added to the recycled water system in 2020 that was **not** municipal recycled water.

The remainder of the table is structured for the supplier to enter information about potential or actual beneficial uses of recycled water and to document the volumes used in 2020 and projected into 20–25 years by five-year increments.

The supplier will enter either a potential beneficial use **or** an existing beneficial use from 2020 in each row. List as many as are relevant, one per row. List all the potential uses under the appropriate header, followed by its expected volume (with units). List all existing beneficial uses from 2020 in new rows under the appropriate header, followed by its actual volume use in 2020 and then projected for every five years up to 2040 or 2045.

Each row should have either a projected use listed or a 2020 use (recorded in different columns), but not both. Suppliers can add as many extra rows as are needed. For each use recorded, provide the actual and projected uses for the identified uses of recycled water. For “surface water augmentation” and “direct potable reuse,” entry of 2020 use is not allowed because these uses are currently not permitted.

The “other” category is to be used for uses not classified by any of the provided use types. “Other” use types may include firefighting, fill stations, and dust control. If a supplier has multiple “other” uses, additional lines can be inserted.

### **Submittal Table 6-4 Wholesale: Current and Projected Retailers**

**Provided Recycled Water Within Service Area**

Submittal Table 6-4 Wholesale: Current and Projected Retailers Provided Recycled Water Within Service Area							
<input type="checkbox"/>	Recycled water is not directly treated or distributed by the Supplier. The Supplier will not complete the table below.						
Name of Receiving Supplier or Direct Use by Wholesaler	Level of Treatment <i>Drop down list</i>	2020	2025	2030	2035	2040	2045 <i>(opt)</i>
<i>Add additional rows as needed</i>							
<b>Total</b>		0	0	0	0	0	0
NOTES:							

Submittal Table 6-4 Wholesale is to be completed by a wholesale supplier for any recycled water it directly treats or distributes to retail suppliers. Enter the name of each supplier to which recycled water was provided and used in the service area.

For each supplier entered, the supplier enters the total amount of recycled water used or planned for use for each of the corresponding years within the service area. The total for the Year 2020 should equal the value of the sum of the corresponding totals in Tables 6-3 and 6-5.

**Submittal Table 6-5 Retail: 2015 UWMP Use Projection Compared to**

**2020 Actual**

Submittal Table 6-5 Retail: 2015 UWMP Recycled Water Use Projection Compared to 2020 Actual		
<input type="checkbox"/>	Recycled water was not used in 2015 nor projected for use in 2020. The Supplier will not complete the table below.	
Use Type	2015 Projection for 2020	2020 Actual Use
Agricultural irrigation		
Landscape irrigation (excludes golf courses)		
Golf course irrigation		
Commercial use		
Industrial use		
Geothermal and other energy production		
Seawater intrusion barrier		
Recreational impoundment		
Wetlands or wildlife habitat		
Groundwater recharge (IPR)		
Surface water augmentation (IPR)		
Direct potable reuse		
Other	<i>Type of Use</i>	
<b>Total</b>	<b>0</b>	<b>0</b>
NOTES:		

If recycled water was not used in 2015 or 2020 (and the supplier did not project for recycled water to be used in 2020), the table does not have to be completed. A supplier completes Submittal Table 6-5 Retail if recycled water was used in 2015 or 2020, or if it was projected to be used for 2020.

For each use type listed, enter the 2015 UWMP’s projected 2020 volume of recycled water used. In the next column, enter the volume of recycled water actually used in 2020.

**Submittal Table 6-5 Wholesale: 2015 UWMP Use Projection Compared to 2020 Actual**

Submittal Table 6-5 Wholesale: 2015 UWMP Recycled Water Use Projection Compared to 2020 Actual		
<input type="checkbox"/>	Recycled water was not used or distributed by the supplier in 2015, nor projected for use or distribution in 2020. The wholesale supplier will not complete the table below.	
Name of Receiving Supplier or Direct Use by Wholesaler	2015 Projection for 2020	2020 Actual Use
<i>Add additional rows as needed</i>		
<b>Total</b>	0	0
NOTES:		

If recycled water was not used in 2015 or 2020, the table does not have to be completed. Wholesale suppliers complete this table if they distributed recycled water in 2015 or 2020.

For those suppliers that complete the table, enter the actual and projected volumes of recycled water provided to retail or wholesale customers in 2020. The sum of the 2020 Actual Use should equal the sum of the corresponding cells in Table 6-3 and 6-4. If they are not equal, please explain in the UWMP text and the Notes section at the bottom of this table.

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

Submittal Table 6-6 Retail: Methods to Expand Future Recycled Water Use			
<input type="checkbox"/>	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
<i>Add additional rows as needed</i>			
<b>Total</b>			0
NOTES:			

If the supplier does not plan to expand recycled water use in the future, the supplier selects the relevant box, describe the limitations for implementing or expanding recycled water use in the narrative of its UWMP with page number and not complete the rest of the table.

For those suppliers with plans to expand recycled water use in the future, enter the name of the action, meaning specific actions planned to be taken to increase the use of recycled water within the UWMP area. These may include specific programs such as onsite retrofit support, price reduction per unit volume of recycled water, increased discussion with potential users of recycled water, changes in the permitting to expand user or use area, or development of joint projects with regional partners.

Following listing the approximate year for the listed action (Planned Implementation Year), suppliers enter the volume of expected increase in recycled water use for that action.

### Summary of Most Recycled Water Uses Approved Under Title 22

Uses for recycled water are becoming increasingly common among urban water suppliers in California. The more advanced the treatment typically requires more energy demand and increased capital, operational and maintenance costs. The following tables offer examples of beneficial uses by water use type for five levels of water treatment.

#### Undisinfected Secondary Treatment Beneficial Use Examples

Water Use Type	Beneficial Uses
Agricultural Irrigation	Fodder and fiber crops.
Agricultural Irrigation	Seed crops not eaten by humans.
Agricultural Irrigation	Non-food-bearing trees.
Agricultural Irrigation	Nurseries and sod farms, with limitations.
Agricultural Irrigation	Food crops processed before human consumption.
Agricultural Irrigation	Orchards or vineyards with no contact between edible portion and recycled water.
Other Urban Uses	Sanitary sewer flushing.

#### Disinfected Tertiary Treatment Beneficial Use Examples

Water Use Type	Beneficial Uses
Urban Irrigation	Residential landscaping.
Urban Irrigation	Golf courses.
Urban Irrigation	Parks and playgrounds.
Urban Irrigation	School yards.
Urban Irrigation	Any other irrigation not specific in Title 22 and not prohibited by other California laws and regulations.
Other Urban Uses	Decorative fountains.
Other Urban Uses	Toilet/Urinal flushing.
Other Urban Uses	Structural firefighting.
Commercial and Industrial	Laundries.
Commercial and Industrial	Cooling or air conditioning.

<b>Water Use Type</b>	<b>Beneficial Uses</b>
Commercial and Industrial	Artificial snowmaking.
Commercial and Industrial	Process water that may contact workers.
Commercial and Industrial	Car washes.
Impoundments	Recreational impoundments.
Indirect Potable Reuse	Groundwater recharge or salinity barrier injection allowed with permits by RWQCBs.

### **Disinfected Secondary 23 Treatment Beneficial Use Examples**

<b>Water Use Type</b>	<b>Beneficial Uses</b>
Agricultural Irrigation	Pastures for dairy animals with human consumption.
Agricultural Irrigation	Non-edible vegetation with access control.
Agricultural Irrigation	Nurseries and sod farms with unrestricted access.
Urban Irrigation	Cemeteries.
Urban Irrigation	Freeway landscaping.
Urban Irrigation	Golf courses with restricted access.
Other Urban Uses	Dust control.
Other Urban Uses	Road cleaning.
Other Urban Uses	Non-structural firefighting.
Commercial and Industrial	Boiler feedwater.
Commercial and Industrial	Mixing concrete.
Commercial and Industrial	Some types of cooling or air conditioning.
Commercial and Industrial	Soil compaction.
Commercial and Industrial	Process water not in contact with workers.
Impoundments	Landscape impoundments.

### Disinfected Secondary 2.2 Treatment Beneficial Use Examples

Water Use Type	Beneficial Uses
Agricultural Irrigation	Food crops with surface irrigation with food portion above-ground and not in contact with recycled water.
Impoundments	Restricted recreational impoundment.
Impoundments	Publicly accessible fish hatcheries.

### Advanced Treatment Beneficial Use Examples

Water Use Type	Beneficial Uses
Indirect Potable Reuse	Advanced treated recycled water is now defined in the June 18, 2014, revision of Title 22 and is used for groundwater recharge, including groundwater injection for salinity barriers. Advanced treatment also will be considered as part of the surface reservoir augmentation and direct potable reuse efforts to be completed as part of Senate Bill 918 and Senate Bill 322.

## M.21 Collection and Treatment Scenarios for Completing Table 6-2

The following offers six plausible scenarios of wastewater treatment responsibility in the service area of the UWMP's supplier. Each scenario offers steps to follow for how to complete Submittal Table 6-2.

**Scenario 1:** The supplier is responsible for collecting, treating, and disposing of the wastewater generated within its service area.

Steps to follow:

- Complete Tables 6-3.

**Scenario 2:** The supplier does not treat or dispose of the wastewater generated within its service area. Wastewater is treated and disposed by an organization that does not prepare an UWMP.

Steps to follow:

- Provide narrative description on wastewater disposal (treatment level and location).

**Scenario 3:** The supplier does not treat or dispose of the wastewater generated within its service area. Wastewater is conveyed for treatment to another entity that also prepares an UWMP.

Steps to follow:

- Provide narrative description on wastewater disposal and the name of the UWMP that applies to the plant receiving the effluent.

**Scenario 4:** A portion of the wastewater collected in supplier's area is conveyed for treatment to another entity which also prepares an UWMP.

Steps to follow:

- Complete Table 6-3 for the wastewater treated within the service area.
- Provide narrative description on wastewater disposal and the name of the UWMP that applies to the plant receiving the effluent.

**Scenario 5:** Multiple wastewater facilities may occur within the supplier's area. Untreated wastewater may be received from another agency.

Steps to follow:

- Complete Table 6-3 for the wastewater treated within the service area.
- Summarize volumes reported in Table 6-3 by each separate facility.

## M.22 References

DWR and SWRCB. 2015 Municipal Wastewater Recycling Survey 2015.

Available online at:

[https://www.waterboards.ca.gov/water\\_issues/programs/grants\\_loans/water\\_recycling/munirec.shtml](https://www.waterboards.ca.gov/water_issues/programs/grants_loans/water_recycling/munirec.shtml) (Accessed August 25, 2020).

**APPENDIX N**

**2020 UWMP DWR Guidebook**

City Water Rate Study



# Water Rate Study 2017

November 14, 2017



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**APPENDIX A - 7% INCREASE SCENARIO, LESS CAPITAL  
EARLY YEARS**

# 1. INTRODUCTION

---

## 1.1 Background

The City of Patterson (the City) is a general law City located in western Stanislaus County with a population of approximately 22,730. The City owns and operates its own water system. The water utility is accounted for as self-supporting enterprise fund; revenues are derived primarily from utility service charges and must be adequate to fund operating and capital needs.

The City retained Bartle Wells Associates to develop a long-term financial plan and 5-year rate recommendations for the water enterprise. The last water rate study was completed in 2010 and the City last increased the water rates in January 2015. The major objectives of this study include:

- Ensuring the continued financial health and stability of the City's water enterprise;
- Developing a projection of operating and capital revenue requirements for the water utility;
- Recommending rates which meet these revenue requirements;
- Phase in rate adjustments over time, to the extent possible, to minimize the annual impact on ratepayers.
- Calculate impacts on the City's customers.
- Maintaining equity among all users of the system and ensure compliance with all legal requirements such as Proposition 218.

## 1.2 Summary of Findings

**Financial Overview** - Overall, the City's water enterprise is in good financial condition. Water rates have increased 4% annually from 2010/11 to 2014/15. The combination of small, incremental rate increases and prudent fiscal management has allowed the City to cover expenditures and build fund reserves, which as of July 1, 2017, totaled approximately \$4.9 million. However, the water enterprise faces extensive capital needs.

**Capital Needs** - The 10-year water capital improvement program from 2017/18 through 2026/27 includes over \$92 million in potential improvements. Major projects include extensive pipeline replacements and a new storage tank. Projects may be funded through various sources, including rates, bonds, developer contributions, grants, and water impact fees.

**Debt** - The water enterprise has one outstanding bond issue from October 2010. The 2010 Water Revenue Bonds had an original par amount of \$10.2 million and were used to fund a number of water system capital improvements including new wells and piping. Annual debt service is approximately \$635,000 and the final maturity is June 1, 2040.

The financial plan contained in this report assumes that the City will issue new debt to fund future planned capital improvements. New obligations will likely require the City to maintain a debt service coverage ratio of 125% of annual debt service.

**Rate Structure Change** - BWA recommends reducing the number of tiers from four to two. This change will simplify the rate structure and is designed to recover costs associated with peak use. Currently there is little use falling in the highest two tiers.

**Rate Adjustments** - Rate increases are needed to keep rates in line with cost inflation and to provide sufficient revenues for the City's operating and capital programs while promoting overall conservation. Rate adjustments will take effect on February 1st of 2018 and January 1st of each following year.

**Alternate Scenario** - Appendix A includes an alternate scenario based on less capital projects in the early years.

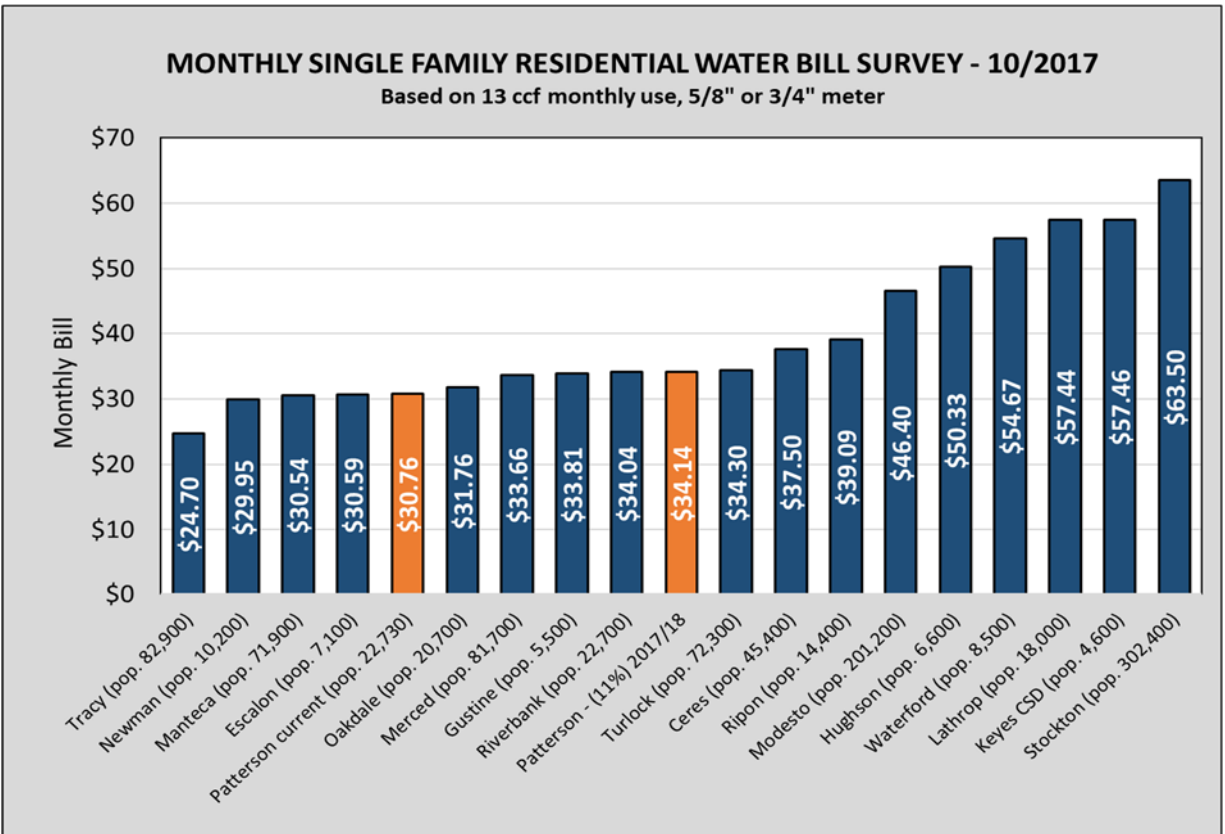
### 1.3 Proposed Rates

Table 1 provides the proposed rate schedule for the next five years. The 2018/19 through 2021/22 rates are increased by 11% annually from the 2017/18 rates.

The typical single family residential customer in the City of Patterson uses 13 hundred cubic feet (ccf, 1 ccf is 748 gallons) monthly and pays a water bill of \$30.76. Following the proposed February 1, 2018 rate increase, the typical residential bill will increase to \$34.14. For this rate study, a survey was conducted comparing the typical water bills of regional agencies. The City of Patterson's bill is currently in the low range and will fall in the mid range following the rate increase.

Table 1: Executive Summary - 5 Year Proposed Rate Schedule & Survey

		Proposed Rates				
		2017/18	2018/19	2019/20	2020/21	2021/22
<b>Monthly Tiers</b>		<i>(Recommended increases)</i>				
		11.0%	11.0%	11.0%	11.0%	11.0%
<b>Quantity Rates</b>	Use (\$/ccf)					
	Tier 1 (0 to 13)	\$1.78	\$1.97	\$2.19	\$2.43	\$2.70
	Tier 2 (>13)	\$2.54	\$2.82	\$3.14	\$3.48	\$3.86
<b>Service Charges</b>						
<b>Meter Size</b>		<b>Monthly Rate</b>				
5/8"		\$11.06	\$12.27	\$13.62	\$15.12	\$16.79
3/4"		\$11.06	\$12.27	\$13.62	\$15.12	\$16.79
1"		\$14.37	\$15.96	\$17.71	\$19.66	\$21.82
1 1/2"		\$17.69	\$19.64	\$21.80	\$24.19	\$26.86
2"		\$28.75	\$31.91	\$35.42	\$39.32	\$43.64
3"		\$110.57	\$122.73	\$136.23	\$151.22	\$167.85
4"		\$140.42	\$155.87	\$173.02	\$192.05	\$213.17
6"		\$211.19	\$234.42	\$260.20	\$288.83	\$320.60
8"		\$291.90	\$324.01	\$359.65	\$399.22	\$443.13



## 2. RATE SETTING LEGISLATION & PRINCIPLES

---

### 2.1 Constitutional Rate Requirements

The water rates developed in this Water Rate Study are designed to comply with Article 13D of the California Constitution. In accordance with the constitutional provisions, the proposed rates are designed to a) recover the City's cost of providing water service, and b) allocate costs in proportion to the cost for serving each customer class.

### 2.2 Article 13D, Section 6 (Proposition 218)

Proposition 218 was adopted by California voters in 1996 and added Articles 13C and 13D to the California Constitution. Article 13D, Section 6 governs property-related charges, which the California Supreme Court subsequently ruled includes ongoing utility service charges such as water, sewer, and garbage rates. Article 13D, Section 6 establishes a) procedural requirements for imposing or increasing property-related charges, and b) substantive requirements for those charges. Article 13D also requires voter approval for new or increased property-related charges but exempts from this voting requirement rates for water, sewer, and garbage service.

The City must follow the procedural requirements of Proposition 218 for all water rate increases. These requirements include:

1. *Noticing Requirement* - The City must mail a notice of the proposed rate increases to all affected property owners. The notice must specify the amount of the fee, the basis upon which it was calculated, the reason for the fee, and the date/time/location of a public rate hearing at which the proposed rates will be considered/adopted.
2. *Public Hearing* - The City must hold a public hearing prior to adopting the proposed rate increases. The public hearing must be held not less than 45 days after the required notices are mailed.
3. *Rate Increases Subject to Majority Protest* - At the public hearing, the proposed rate increases are subject to majority protest. If more than 50% of affected property owners submit written protests against the proposed rate increases, the increases cannot be adopted.

Proposition 218 also established a number of substantive requirements that apply to water rates and charges, including:

1. *Cost of Service* - Revenues derived from the fee or charge cannot exceed the funds required to provide the service. In essence, fees cannot exceed the "cost of service".
2. *Intended Purpose* - Revenues derived from the fee or charge can only be used for the purpose for which the fee was imposed.

3. *Proportional Cost Recovery* - The amount of a fee or charge imposed upon any parcel or person as an incident of property ownership shall not exceed the proportional cost of the service attributable to the parcel.
4. *Availability of Service* - No fee or charge may be imposed for a service unless that service is used by, or immediately available to, the owner of the property.
5. *General Government Services* - No fee or charge may be imposed for general governmental services, such as police or fire services, where the service is available to the public at large in substantially the same manner as it is to property owners.

A subsequent appellate court decision in 2011 further clarified that agencies must demonstrate, satisfactory to a court's independent judgment, that property-related fees and charges meet the substantive requirements of Section 6 (3b). This rate study provides that justification. The water rates derived in this report are based on a cost-of-service methodology that fairly apportions costs to all customers.

### **2.3 Use of Industry Standard Rate-Making Principles**

The rates developed in this Water Rate Study use a straightforward methodology to establish an equitable system charges that recover the cost of providing service and fairly apportion costs to each rate component. In reviewing the City's water rates and finances, BWA used the following criteria in developing our recommendations:

1. *Revenue Sufficiency*: Rates should recover the annual cost of service and provide revenue stability.
2. *Rate Impact*: While rates are calculated to generate sufficient revenue to cover operating and capital costs, they should be designed to minimize, as much as possible, the impacts on ratepayers.
3. *Equitable*: Rates should be fairly allocated among all customer classes based on their estimated demand characteristics. Each user class only pays its proportionate share.
4. *Practical*: Rates should be simple in form and, therefore, adaptable to changing conditions, easy to administer and easy to understand.
5. *Provide Incentive*: Rates provide price signals which serve as indicators to use water efficiently.

## **3. WATER UTILITY OVERVIEW**

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### **3.1 Overview of Water System**

Groundwater wells are the City's sole source of water supply. The City operates nine wells with pumps ranging in horsepower (HP) from 60 to 150 HP. Water is treated via chlorine injection at the wellhead. Water storage facilities include one tank in each of the City's three pressure zones. The total storage capacity is 3.2 million gallons. Water system assets also include transmission and distribution pipelines, meters, hydrants, and vehicles. The City invested in expanding its water infrastructure in the 2000s to meet the demands of rapid population growth.

The City is in the process of constructing recycled water pipelines to convey non-potable treated wastewater to customers. The City hopes to expand recycled water service in the future and requires dual plumbing for all new development areas.

### **3.2 Current Water Rates**

Table 2 shows a schedule of historical and current monthly water service charges. Customers pay a fixed meter service charge based on the size of the water meter and volume rates billed to each hundred cubic feet of water use. One hundred cubic feet (ccf) is equal to 748 gallons. The City of Patterson utilizes an inclining tiered rate structure in which higher levels of use are billed at a higher rate. The benefit of this rate structure is that it provides a strong conservation price signal.

Table 2: Historical and Current Water Rates

Rate Category	4/1/06 -						Current					
	2005	6/30/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	
<b>Service Charge</b>												
<u>Meter Size</u>												
5/8-inch	\$4.90	\$7.02	\$8.07	\$8.39	\$8.73	\$9.08	\$9.44	\$9.82	\$10.21	\$10.62	\$11.04	
3/4-inch	5.40	7.02	8.07	8.39	8.73	9.08	9.44	9.82	10.21	10.62	11.04	
1-inch	7.26	9.44	10.85	11.28	11.73	12.20	12.69	13.20	13.73	14.28	14.85	
1 1/2-inch	9.48	12.32	14.17	14.74	15.33	15.94	15.10	15.70	16.33	16.98	17.66	
2-inch	13.03	16.94	19.48	20.26	21.07	21.91	23.16	24.48	25.86	27.33	28.70	
3-inch	23.46	30.50	35.07	36.47	37.93	39.45	51.78	65.05	79.28	94.57	110.40	
4-inch	31.72	41.24	47.42	49.32	51.29	53.34	68.29	84.40	101.63	120.16	140.21	
6-inch	53.93	70.11	80.63	83.86	87.21	90.70	111.48	133.84	157.73	183.40	210.86	
8-inch	78.19	101.65	116.89	121.57	126.43	131.49	159.17	188.95	220.75	254.89	291.46	
<b>Quantity Charge</b>							<b>Quantity Charge</b>					
<u>Monthly Use</u>							<u>Monthly Use</u>					
0 to 3 ccf	\$0.72	\$0.78	\$0.90	\$0.94	\$0.98	\$1.02	0 to 3 ccf	\$1.06	\$1.10	\$1.14	\$1.19	\$1.24
3.1 to 70 ccf	0.88	1.02	1.17	1.22	1.27	1.32	3.1 to 20 ccf	1.37	1.42	1.48	1.54	1.60
Over 70 ccf	0.88	1.90	2.19	2.28	2.37	2.46	20.1 to 50 ccf	1.67	1.74	1.81	1.88	1.96
NA							Over 50 ccf	2.36	2.45	2.55	2.65	2.76

### 3.3 Water Customers

The City currently provides water service to approximately 6,500 customers<sup>1</sup> as detailed on Table 3. The majority of customers are single family residential, accounting for over 89% of all customers.

Table 3: Water Customers

Meter Size	Residential	Multi Family (1)	Commercial	Irrigation	Total
5/8"	784	7	63	4	858
3/4"	4,781	238	25	3	5,047
1"	233	21	62	22	338
1 1/2"	0	2	14	6	22
2"	1	3	80	103	187
3"	0	1	24	14	39
4"	0	2	7	3	12
6"	0	0	2	1	3
8"	0	0	0	0	0
Total	5,799	274	277	156	6,506
% of Total	89.1%	4.2%	4.3%	2.4%	100.0%

Source: data from 2015/16

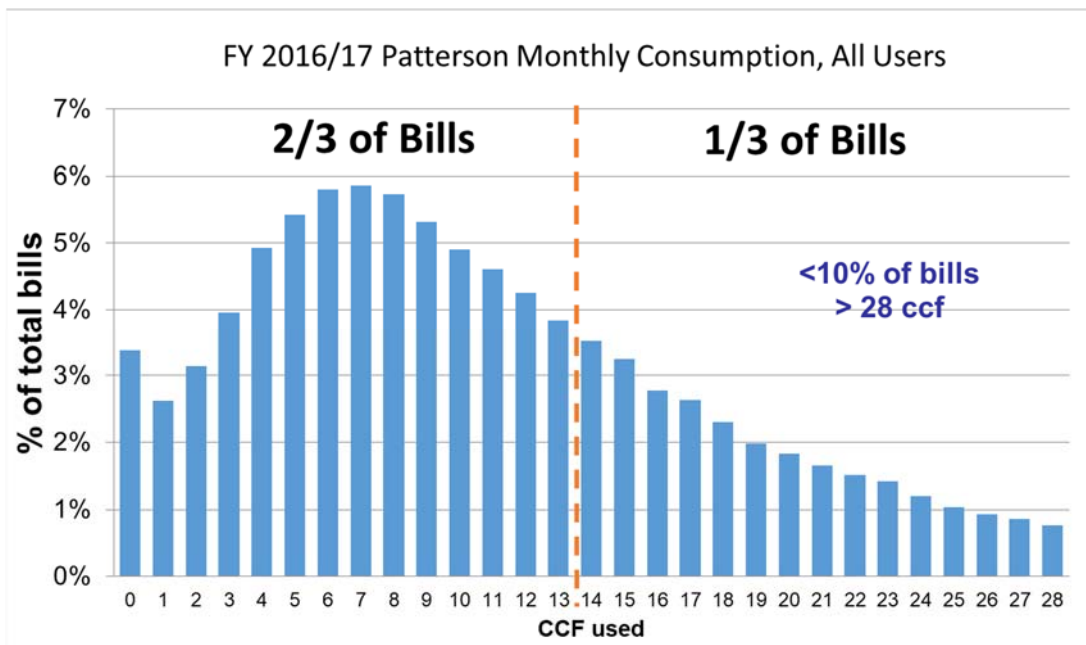
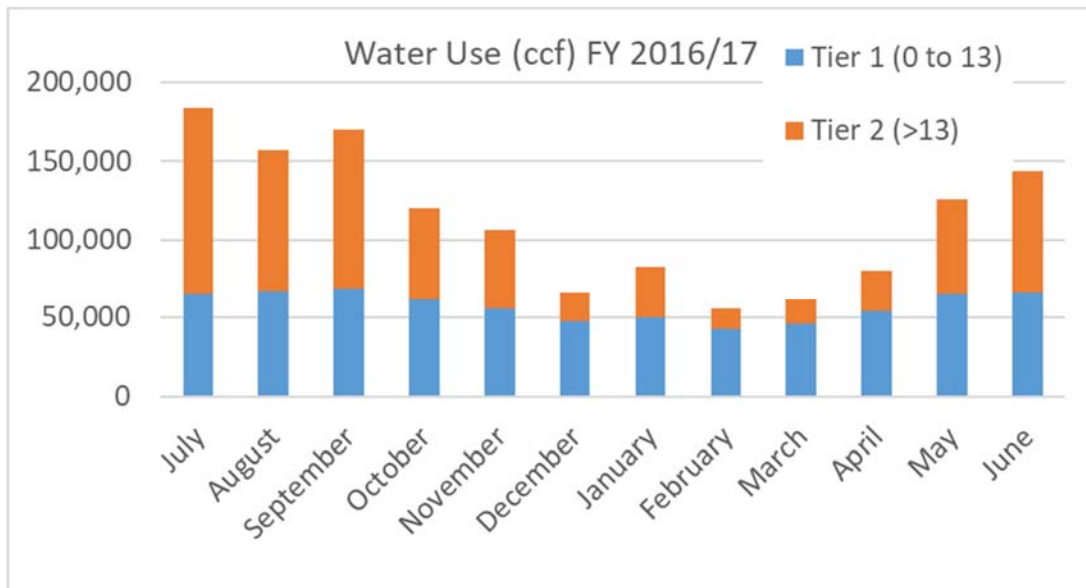
1 - A small number of multi family accounts are billed based on number of dwelling units. Each dwelling unit is represented as one 3/4" meter.

1 In any given billing period, a number of customers will initiate or discontinue service. The estimated customer count provided in this report is an average of all customers that were billed for each month in 2015/16.

### 3.4 Water Use and Proposed New Tier Structure

Table 4 provides water usage statistics for the most recent fiscal year (FY 2016/17). Based on an analysis of the City’s water use data, BWA recommends adjusting the four tier rate structure to a two tier structure. The first tier breakpoint is recommended to be set at 13 ccf per month. Under the recommended structure, 1/3<sup>rd</sup> of the City’s annual bills are estimated to reach tier 2.

Table 4: Water Use



## 4. REVENUE REQUIREMENTS

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### 4.1 Cash Flow Assumptions

BWA developed cash flow projections to determine annual revenue requirements and required rate adjustments. The first five years considered in this rate study are shown in Tables 5. Rate adjustments are designed to 1) ensure a balanced budget in which revenues cover expenses; 2) meet debt service coverage requirements; and 3) meet water fund targets in all years.

Future projections incorporate the latest information available as well as a number of reasonable and slightly conservative assumptions. The cash flows only include ratepayers' share of capital improvement projects. The City anticipates that growth will fully fund the expansion portion of capital needs. Key assumptions include:

- Rate increases are effective based on calendar year.
- The projections include growth of 0.5%
- Other revenues are projected to be approximately \$200,000 annually.
- The financial projections include roughly \$13.4 million of debt financing through 2021/22. Debt financing is needed to enable the City to fund existing ratepayers' share of capital projects on schedule as water rate increases are gradually being phased in. Debt proceeds shown in the cash flow projections are aligned with external capital funding needs. The City's actual debt issuances from year to year may vary based on actual financing needs and analysis at the time debt is issued. For example, the City may opt to pursue a single debt adequate to fund two to three years of capital financing needs, if appropriate.
- Debt service is funded out of the water capital fund.
- The financial projections assume a minimum water operating fund reserve target equal to 30% of annual operating and maintenance costs, not including transfers or ongoing capital plus \$500,000 for emergency capital reserves. Maintaining a prudent minimal level of fund reserves provides a financial cushion for dealing with unanticipated expenses, revenue shortfalls, and non-catastrophic emergency capital repairs. The fund reserve target will escalate over time as the City's expenses gradually increase. It is acceptable if reserves fall below the target on a temporary basis, provided action is taken to achieve the target over the longer run. The targets are met in all projected years.

---

Table 5: Cash Flow

Patterson - Cash Flow (11% max Annual Increase Scenario)	Projected				
	2017/18 Budget	2018/19	2019/20	2020/21	2021/22
<b>Beginning Fund Balance</b>					
Operating Fund 610	\$2,904,062	\$2,544,575	\$2,147,954	\$1,964,109	\$1,289,564
Capital Fund 611	2,033,179	602,662	1,388,054	1,415,626	1,443,198
Total Fund Balance	4,937,241	3,147,237	3,536,008	3,379,735	2,732,762
<b>% Rate Adjustment</b>	<b>11.0%</b>	<b>11.0%</b>	<b>11.0%</b>	<b>11.0%</b>	<b>11.0%</b>
Growth - %	0.5%	0.5%	0.5%	0.5%	0.5%
<b>REVENUES</b>					
<b>Operating Revenue</b>					
Water Service	3,706,297	4,097,268	4,568,454	5,093,826	5,679,616
Interest	5,000	5,000	5,000	5,000	5,000
<u>Other Revenues</u>	<u>192,000</u>	<u>197,760</u>	<u>203,693</u>	<u>209,804</u>	<u>216,098</u>
Total Operating Revenues	3,903,297	4,300,028	4,777,146	5,308,629	5,900,713
<b>Capital Revenues</b>					
Water Impact Fee Revenues	757,820	757,820	757,820	757,820	757,820
Water Acquisition Funds	25,072	25,072	25,072	25,072	25,072
Grant	0				
Bond Proceeds	0	2,949,000	6,554,000	2,850,000	1,068,000
Developer Constructed Facilities	0	0	7,725,180	7,743,180	9,673,180
Transfer from CFD/LMD	0	0	0	0	0
Rental Income	0	0	0	0	0
Interest Income	<u>2,500</u>	<u>2,500</u>	<u>2,500</u>	<u>2,500</u>	<u>2,500</u>
Total Water Capital Fund Revenue	785,392	3,734,392	15,064,572	11,378,572	11,526,572
<b>TOTAL REVENUES</b>	<b>4,688,689</b>	<b>8,034,420</b>	<b>19,841,718</b>	<b>16,687,201</b>	<b>17,427,285</b>
<b>EXPENSES</b>					
<b>Operating Expenses</b>					
Salary & Benefits	1,873,360	1,929,560	1,987,450	2,047,070	2,108,480
New Staff		26,986	27,796	59,226	124,031
New Utility Vehicles			47,741	49,173	50,648
Meter Replacements	50,000	51,500	53,045	54,636	56,275
Security Upgrades		77,250	0	0	0
Operations & Maintenance	688,067	708,710	729,970	751,870	774,430
Utilities - Wells	350,000	360,500	371,320	382,450	393,930
Transfer to General Fund	524,057	539,780	555,970	572,650	589,830
Capital (Equip, Wells & Vehicles R & R)	146,667	373,000	337,200	730,000	90,000
Debt Service 2010 Bonds	630,633	629,363	632,500	633,100	633,300
New Debt Service		0	218,000	703,000	914,000
Total Operating Expenses	4,262,784	4,696,649	4,960,991	5,983,175	5,734,924
<b>Capital Expenses</b>					
Capital for Existing Users	2,215,909	2,949,000	6,554,000	2,850,000	1,068,000
Capital for Future Growth		0	8,483,000	8,501,000	10,431,000
Total Capital Expenses	2,215,909	2,949,000	15,037,000	11,351,000	11,499,000
<b>TOTAL EXPENSES</b>	<b>6,478,693</b>	<b>7,645,649</b>	<b>19,997,991</b>	<b>17,334,175</b>	<b>17,233,924</b>
Net Revenues - Operating Fund	(359,487)	(396,621)	(183,845)	(674,546)	165,789
<u>Net Revenues - Capital Fund</u>	<u>(1,430,517)</u>	<u>785,392</u>	<u>27,572</u>	<u>27,572</u>	<u>27,572</u>
NET REVENUES	(1,790,004)	388,771	(156,273)	(646,974)	193,361
Debt Service Coverage (NIC Cap fees)	1.57	2.02	1.95	1.55	1.62

## 5. COST ALLOCATION

Table 6 shows an allocation of water enterprise costs to the water rate components including fixed meter charges, base usage, and peak usage. BWA recommends recovering 25% of system costs from fixed meter charges and 75% from volumetric charges. Collecting greater than 70% of costs from volumetric charges is generally recommended to encourage conservation. BWA estimates the current structure collects slightly more than 25% of revenue from meter charges

BWA further recommends recovering 25% of system costs from peak usage, as peak use requires the water enterprise to incur significant capital costs to oversize facilities as well as additional operations and maintenance expenses.

Table 6: Cost Allocation

Expenses	2017/18	% Attributed	\$ Attributed		
<b>Expenses Recovered by Service Charges</b>	<b>Total Expenses</b>	<b>% Fixed</b>	<b>\$ Fixed</b>		
Salary & Benefits	\$1,873,360	60%	\$1,121,650		
Operations & Maintenance	738,067	0%	\$0		
Utilities - Wells	350,000	0%	\$0		
Transfer to General Fund	524,057	100%	\$524,057		
Capital (Equip, Wells & Vehicles R & R)	146,667	0%	\$0		
Debt Service	630,633	0%	\$0		
Capital Projects	<u>2,215,909</u>	0%	<u>\$0</u>		
<b>Total</b>	<b>\$6,478,693</b>		<b>\$1,645,707</b>		
				<b>Variable Cost Allocation</b>	
<b>Expenses Recovered by Quantity Rates</b>	<b>Total Expenses</b>	<b>% Variable</b>	<b>\$ Variable</b>	<b>% Peaking</b>	<b>\$ Peaking</b>
Salary & Benefits	\$1,873,360	40%	\$751,710	0%	\$0
Operations & Maintenance	738,067	100%	\$738,067	25%	\$184,517
Utilities - Wells	350,000	100%	\$350,000	39%	\$137,070
Transfer to General Fund	524,057	0%	\$0	0%	\$0
Capital (Equip, Wells & Vehicles R & R)	146,667	100%	\$146,667	25%	\$36,667
Debt Service	630,633	100%	\$630,633	25%	\$157,658
Capital Projects	<u>2,215,909</u>	100%	<u>\$2,215,909</u>	50%	<u>\$1,118,488</u>
<b>Total</b>	<b>\$6,478,693</b>		<b>\$4,832,986</b>		<b>\$1,634,400</b>
				<b>% Peaking of</b>	<b>% Peaking of</b>
		<b>% Fixed</b>	<b>% Variable</b>	<b>Variable Costs</b>	<b>Total Costs</b>
<b>Total Costs</b>		<b>25%</b>	<b>75%</b>	<b>34%</b>	<b>25%</b>
	<b>\$ Rate Requirement</b>	<b>\$ for Meters</b>	<b>\$ for Use</b>	<b>\$ for Peak Use</b>	<b>\$ for Base Use</b>
<b>Rate Revenue Requirement</b>	<b>\$3,899,517</b>	<b>\$990,549</b>	<b>\$2,908,968</b>	<b>\$983,743</b>	<b>\$1,925,225</b>

## 6. PROPOSED WATER SERVICE CHARGES

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### 6.1 Fixed Meter Charges

Table 7 shows the derivation of the fixed meter charge. The meter revenue requirement from Table 6 of \$990,549 is divided by the water enterprise 7,466 equivalent ¾” meters to arrive at a charge of \$11.06 per month per ¾” and 5/8” meter. Larger meters are recommended to be charged more in proportion to each meters size based on American Water Works Association (AWWA) standard ratios.

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Table 7: Meter Charges

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<b>Water Service Charge Calculation (25% revenue recovery)</b>	<b>2017/18</b>
<b>Fixed Rate Revenue Requirement</b>	<b>\$990,549</b>
Meter Equivalent Units (¾ inch)	7,466
\$/Meter Equivalent (Annual)	\$133
Projected Monthly Service Charges	
5/8 inch	\$11.06
¾ inch	\$11.06
1 inch	\$14.37
1-1/2 inch	\$17.69
2 inch	\$28.75
3 inch	\$110.57
4 inch	\$140.42
6 inch	\$211.19
8 inch	\$291.90
<b>Projected Service Charge Revenue</b>	<b>\$990,549</b>

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## 6.2 Quantity Rates

Table 8 shows an analysis of the City of Patterson’s use data to determine how many units of water can be considered peak usage in each tier. Average winter use (defined as February and March) in Tier 1 and Tier 2 was annualized to determine base use to be 532,062 ccf in Tier 1 and 173,076 in Tier 2. Subtracting the base use from total use in each tier yields total peak units of 160,111 in Tier 1 and 486,446 Tier 2. Based on this analysis, 25% of peak system costs are recommended to be recovered from Tier 1 use and 75% from Tier 2 use.

Table 8: Peak Units Calculation

<b>FY 2016/17</b>	<b>Tier 1 (0 to 13)</b>	<b>Tier 2 (&gt;13)</b>	<b>Total</b>
July	65,663	118,300	<b>183,963</b>
August	67,469	89,248	<b>156,717</b>
September	68,827	100,589	<b>169,416</b>
October	61,801	57,892	<b>119,693</b>
November	55,870	50,646	<b>106,516</b>
December	47,926	18,084	<b>66,010</b>
January	50,452	32,163	<b>82,615</b>
February	42,903	13,240	<b>56,143</b>
March	45,774	15,711	<b>61,485</b>
April	54,095	26,251	<b>80,346</b>
May	65,209	60,754	<b>125,963</b>
June	<u>66,184</u>	<u>77,274</u>	<u><b>143,458</b></u>
	692,173	660,152	<b>1,352,325</b>
	<b>Tier 1 (0 to 13)</b>	<b>Tier 2 (&gt;13)</b>	<b>Total</b>
Avg winter use (Feb/ March)	44,339	14,476	58,814
Annualized (Base use)	532,062	173,706	705,768
Peak Units	160,111	486,446	646,557
	<b>25%</b>	<b>75%</b>	<b>100%</b>

Table 9 shows the derivation of the quantity rates. Each unit of use pays for base costs totaling \$1,925,225 from Table 6, resulting in a charge of \$1.42 per unit. Peak costs of \$983,743 from Table 6 are divided by total peak units of 646,557 from Table 8, resulting in an additional charge of \$1.52 per peak unit.

The unit costs are multiplied by their respective units in each tier to determine a revenue requirement of \$1.23 million in Tier 1 and \$1.68 million in Tier 2. The revenue requirements are divided by projected use in each tier to determine a cost of \$1.78 per ccf in Tier 1 and \$2.54 per ccf in Tier 2

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Table 9: Quantity Rate Calculation

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<b>Water Quantity Rate Calculation (75% revenue recovery) 2017/18</b>	
<b>Quantity Rates</b>	
<b>Total Base Costs</b>	\$1,925,225
<b>Projected Use (ccf)</b>	1,352,325
<b>Quantity Rate, All Use</b>	\$1.42
<b>Total Peak Costs</b>	\$983,743
<b>Projected Peak Use (ccf)</b>	646,557
<b>Quantity Rate, Peak Units</b>	\$1.52
<hr/>	
<b>Tier 1 Cost</b>	\$1,229,016
<b>Tier 2 Cost</b>	<u>\$1,679,952</u>
	\$2,908,968
<hr/>	
<b>Tier 1 Rate</b>	\$1.78
<b>Tier 2 Rate</b>	\$2.54

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### 6.3 Proposed Rate Schedule

Table 10 provides the five-year schedule of proposed rates. The 2017/18 rates are based on the cost allocations provided in Section 5. The rates for 2018/19 through 2021/22 are increased by the rate adjustment percentage developed in Tables 5.

Table 10: Proposed Rate Schedule

		<b>Proposed Rates</b>				
		<b>2017/18</b>	<b>2018/19</b>	<b>2019/20</b>	<b>2020/21</b>	<b>2021/22</b>
<b>Monthly Tiers</b>		<i>(Recommended increases)</i>				
		11.0%	11.0%	11.0%	11.0%	11.0%
<b>Quantity Rates</b>	Use (\$/ccf)					
	Tier 1 (0 to 13)	\$1.78	\$1.97	\$2.19	\$2.43	\$2.70
	Tier 2 (>13)	\$2.54	\$2.82	\$3.14	\$3.48	\$3.86
<b>Service Charges</b>						
<b>Meter Size</b>				<b>Monthly Rate</b>		
5/8"		\$11.06	\$12.27	\$13.62	\$15.12	\$16.79
3/4"		\$11.06	\$12.27	\$13.62	\$15.12	\$16.79
1"		\$14.37	\$15.96	\$17.71	\$19.66	\$21.82
1 1/2"		\$17.69	\$19.64	\$21.80	\$24.19	\$26.86
2"		\$28.75	\$31.91	\$35.42	\$39.32	\$43.64
3"		\$110.57	\$122.73	\$136.23	\$151.22	\$167.85
4"		\$140.42	\$155.87	\$173.02	\$192.05	\$213.17
6"		\$211.19	\$234.42	\$260.20	\$288.83	\$320.60
8"		\$291.90	\$324.01	\$359.65	\$399.22	\$443.13

## 6.4 Bill Impacts

Figure 1 provides a bill survey comparing the City of Patterson's typical bill with the typical water bills of other local agencies. Under current rates, the City's bill is in the low range of surveyed agencies. Under the proposed rates, the City's bill would fall in the mid range.

Table 11 provides water bills for typical single family residential customers under the current and proposed rates. The rate impacts show a \$1.62 per month for a low user and a \$3.38 per month increase for an average user.

**Figure 1**

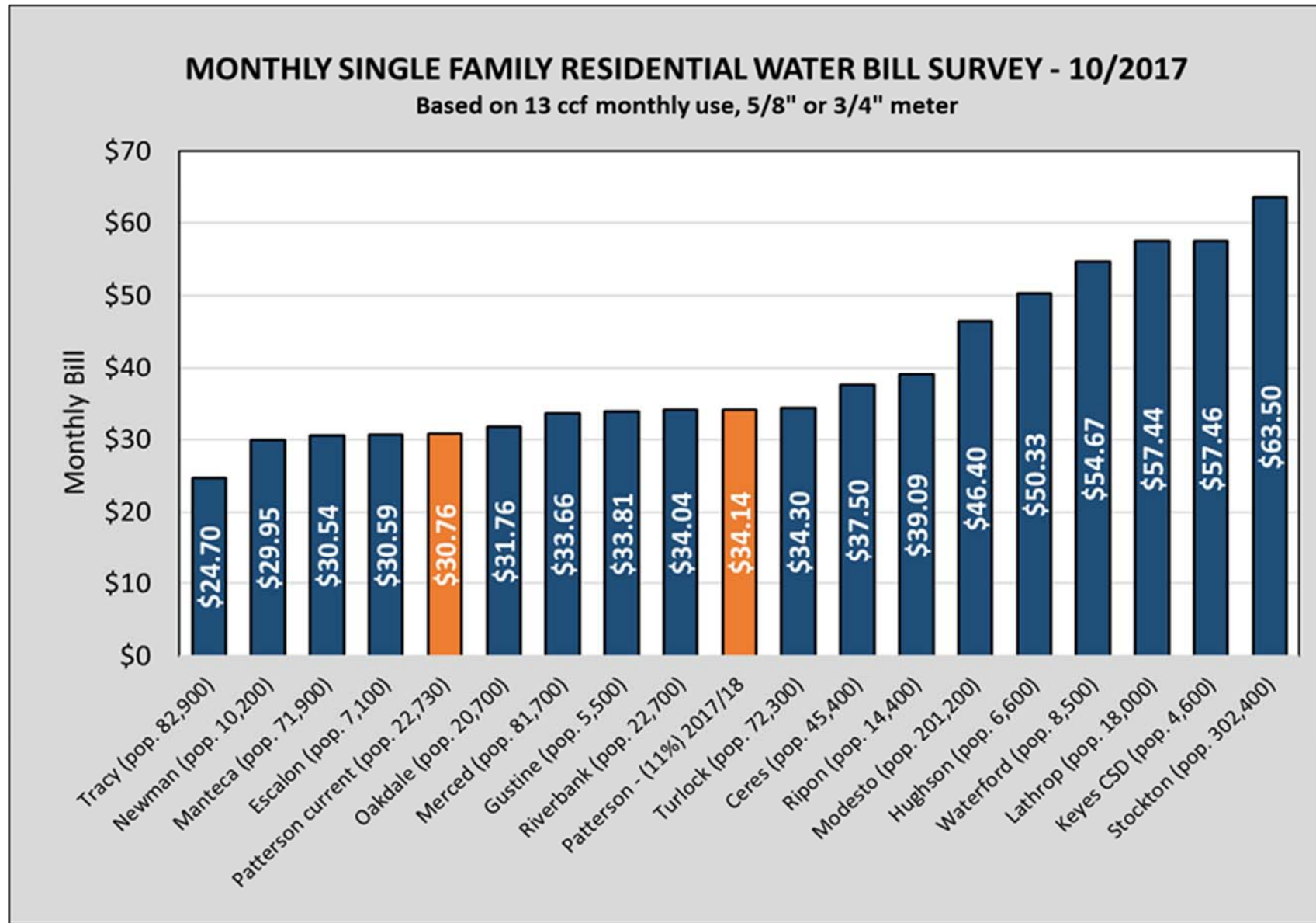


Table 11: Residential Bill Impacts

<b>IMPACTS FOR SINGLE FAMILY RESIDENTIAL CUSTOMERS</b>			
<b>Customer</b>	<b>Monthly Use (ccf)</b>	<b>Current</b>	<b>Proposed (11% Scenario)</b>
<b>Single Family Residential - 5/8" or 3/4" meter</b>			
<b><u>Low Use</u></b>			
<b>Service Charge</b>		<b>\$11.04</b>	<b>\$11.06</b>
<i>Increase \$</i>			\$0.02
<i>Increase %</i>			0.2%
<b>Quantity Charge</b>	3	<b>\$3.72</b>	<b>\$5.33</b>
<i>Increase \$</i>			\$1.61
<i>Increase %</i>			43.2%
<b>Total Water Service Charge</b>		<b>\$14.76</b>	<b>\$16.38</b>
<i>Increase \$</i>			\$1.62
<i>Increase %</i>			11.0%
<b><u>Average Use</u></b>			
<b>Service Charge</b>		<b>\$11.04</b>	<b>\$11.06</b>
<i>Increase \$</i>			\$0.02
<i>Increase %</i>			0.2%
<b>Quantity Charge</b>	13	<b>\$19.72</b>	<b>\$23.08</b>
<i>Increase \$</i>			\$3.36
<i>Increase %</i>			17.1%
<b>Total Water Service Charge</b>		<b>\$30.76</b>	<b>\$34.14</b>
<i>Increase \$</i>			\$3.38
<i>Increase %</i>			11.0%
<b><u>High Use</u></b>			
<b>Service Charge</b>		<b>\$11.04</b>	<b>\$11.06</b>
<i>Increase \$</i>			\$0.02
<i>Increase %</i>			0.2%
<b>Quantity Charge</b>	28	<b>\$46.60</b>	<b>\$61.25</b>
<i>Increase \$</i>			\$14.65
<i>Increase %</i>			31.4%
<b>Total Water Service Charge</b>		<b>\$57.64</b>	<b>\$72.31</b>
<i>Increase \$</i>			\$14.67
<i>Increase %</i>			25.5%
<b><u>Higher Use</u></b>			
<b>Service Charge</b>		<b>\$11.04</b>	<b>\$11.06</b>
<i>Increase \$</i>			\$0.02
<i>Increase %</i>			0.2%
<b>Quantity Charge</b>	69	<b>\$142.16</b>	<b>\$165.59</b>
<i>Increase \$</i>			\$23.43
<i>Increase %</i>			16.5%
<b>Total Water Service Charge</b>		<b>\$153.20</b>	<b>\$176.65</b>
<i>Increase \$</i>			\$23.45
<i>Increase %</i>			15.3%

## Appendix A - 7% Increase Scenario, Less Capital Early Years

Patterson - Water Cash Flow (7% max Annual Increase Scenario)	Projected				
	2017/18	2018/19	2019/20	2020/21	2021/22
<b>Budget</b>					
<b>Beginning Fund Balance</b>					
Operating Fund 610	\$2,904,062	\$2,474,314	\$1,870,280	\$1,299,577	\$183,420
Capital Fund 611	2,033,179	602,662	1,388,054	1,415,626	1,443,198
Total Fund Balance	4,937,241	3,076,976	3,258,334	2,715,203	1,626,618
<b>% Rate Adjustment</b>	<b>7.0%</b>	<b>7.0%</b>	<b>7.0%</b>	<b>7.0%</b>	<b>7.0%</b>
Growth - %	0.5%	0.5%	0.5%	0.5%	0.5%
<b>REVENUES</b>					
<b>Operating Revenue</b>					
Water Service	3,636,036	3,889,856	4,181,595	4,495,214	4,832,355
Interest	5,000	5,000	5,000	5,000	5,000
<u>Other Revenues</u>	<u>192,000</u>	<u>197,760</u>	<u>203,693</u>	<u>209,804</u>	<u>216,098</u>
Total Operating Revenues	3,833,036	4,092,616	4,390,288	4,710,018	5,053,453
<b>Capital Revenues</b>					
Water Impact Fee Revenues	757,820	757,820	757,820	757,820	757,820
Water Acquisition Funds	25,072	25,072	25,072	25,072	25,072
Grant	0				
Bond Proceeds	0	2,949,000	4,431,000	0	1,068,000
Developer Constructed Facilities	0	0	7,725,180	7,743,180	9,673,180
Transfer from CFD/LMD	0	0	0	0	0
Rental Income	0	0	0	0	0
Interest Income	<u>2,500</u>	<u>2,500</u>	<u>2,500</u>	<u>2,500</u>	<u>2,500</u>
Total Water Capital Fund Revenue	785,392	3,734,392	12,941,572	8,528,572	11,526,572
<b>TOTAL REVENUES</b>	<b>4,618,428</b>	<b>7,827,008</b>	<b>17,331,860</b>	<b>13,238,590</b>	<b>16,580,025</b>
<b>EXPENSES</b>					
<b>Operating Expenses</b>					
Salary & Benefits	1,873,360	1,929,560	1,987,450	2,047,070	2,108,480
New Staff		26,986	27,796	59,226	124,031
New Utility Vehicles			47,741	49,173	50,648
Meter Replacements	50,000	51,500	53,045	54,636	56,275
Security Upgrades		77,250	0	0	0
Operations & Maintenance	688,067	708,710	729,970	751,870	774,430
Utilities - Wells	350,000	360,500	371,320	382,450	393,930
Transfer to General Fund	524,057	539,780	555,970	572,650	589,830
Capital (Equip, Wells & Vehicles R & R)	146,667	373,000	337,200	730,000	90,000
Debt Service 2010 Bonds	630,633	629,363	632,500	633,100	633,300
New Debt Service		0	218,000	546,000	546,000
Total Operating Expenses	4,262,784	4,696,649	4,960,991	5,826,175	5,366,924
<b>Capital Expenses</b>					
Capital for Existing Users	2,215,909	2,949,000	4,431,000	0	1,068,000
Capital for Future Growth		0	8,483,000	8,501,000	10,431,000
Total Capital Expenses	2,215,909	2,949,000	12,914,000	8,501,000	11,499,000
<b>TOTAL EXPENSES</b>	<b>6,478,693</b>	<b>7,645,649</b>	<b>17,874,991</b>	<b>14,327,175</b>	<b>16,865,924</b>
Net Revenues - Operating Fund	(429,748)	(604,033)	(570,703)	(1,116,157)	(313,471)
<u>Net Revenues - Capital Fund</u>	<u>(1,430,517)</u>	<u>785,392</u>	<u>27,572</u>	<u>27,572</u>	<u>27,572</u>
<b>NET REVENUES</b>	<b>(1,860,265)</b>	<b>181,359</b>	<b>(543,131)</b>	<b>(1,088,585)</b>	<b>(285,899)</b>
Debt Service Coverage (NIC Cap fees)	1.46	1.70	1.50	1.25	1.40

## Appendix A - 7% Increase Scenario, Less Capital Early Years

<b>Proposed Rates - 7% Scenario</b>						
	<b>2017/18</b>	<b>2018/19</b>	<b>2019/20</b>	<b>2020/21</b>	<b>2021/22</b>	
<b>Monthly Tiers</b>		<i>(Recommended increases)</i>				
	7.0%	7.0%	7.0%	7.0%	7.0%	
<b>Quantity Rates</b>	Use (\$/ccf)					
	Tier 1 (0 to 13)	\$1.71	\$1.83	\$1.96	\$2.10	\$2.24
	Tier 2 (>13)	\$2.45	\$2.62	\$2.81	\$3.01	\$3.22
<b>Service Charges</b>						
<b>Meter Size</b>		<b>Monthly Rate</b>				
5/8"	\$10.66	\$11.40	\$12.20	\$13.06	\$13.97	
3/4"	\$10.66	\$11.40	\$12.20	\$13.06	\$13.97	
1"	\$13.86	\$14.83	\$15.86	\$16.97	\$18.16	
1 1/2"	\$17.05	\$18.25	\$19.52	\$20.89	\$22.35	
2"	\$27.71	\$29.65	\$31.73	\$33.95	\$36.32	
3"	\$106.59	\$114.05	\$122.03	\$130.57	\$139.71	
4"	\$135.36	\$144.84	\$154.98	\$165.83	\$177.43	
6"	\$203.58	\$217.83	\$233.08	\$249.39	\$266.85	
8"	\$281.38	\$301.08	\$322.16	\$344.71	\$368.84	

## Scenario Comparison

### 11% Increases:

2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26	2026/27
11.0%	11.0%	11.0%	11.0%	11.0%	4.0%	4.0%	4.0%	4.0%	4.0%

### 7% Increases:

2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26	2026/27
7.0%	7.0%	7.0%	7.0%	7.0%	7.0%	10.0%	10.0%	10.0%	10.0%

## Appendix A - 7% Increase Scenario, Less Capital Early Years

IMPACTS FOR SINGLE FAMILY RESIDENTIAL CUSTOMERS			
Customer	Monthly Use (ccf)	Current	Proposed (7% Scenario)
<b>Single Family Residential - 5/8" or 3/4" meter</b>			
<b><u>Low Use</u></b>			
<b>Service Charge</b>		<b>\$11.04</b>	<b>\$10.66</b>
Increase \$			(\$0.38)
Increase %			-3.5%
<b>Quantity Charge</b>	3	<b>\$3.72</b>	<b>\$5.13</b>
Increase \$			\$1.41
Increase %			38.0%
<b>Total Water Service Charge</b>		<b>\$14.76</b>	<b>\$15.79</b>
Increase \$			\$1.03
Increase %			7.0%
<b><u>Average Use</u></b>			
<b>Service Charge</b>		<b>\$11.04</b>	<b>\$10.66</b>
Increase \$			(\$0.38)
Increase %			-3.5%
<b>Quantity Charge</b>	13	<b>\$19.72</b>	<b>\$22.25</b>
Increase \$			\$2.53
Increase %			12.8%
<b>Total Water Service Charge</b>		<b>\$30.76</b>	<b>\$32.91</b>
Increase \$			\$2.15
Increase %			7.0%
<b><u>High Use</u></b>			
<b>Service Charge</b>		<b>\$11.04</b>	<b>\$10.66</b>
Increase \$			(\$0.38)
Increase %			-3.5%
<b>Quantity Charge</b>	28	<b>\$46.60</b>	<b>\$59.05</b>
Increase \$			\$12.45
Increase %			26.7%
<b>Total Water Service Charge</b>		<b>\$57.64</b>	<b>\$69.71</b>
Increase \$			\$12.07
Increase %			20.9%
<b><u>Higher Use</u></b>			
<b>Service Charge</b>		<b>\$11.04</b>	<b>\$10.66</b>
Increase \$			(\$0.38)
Increase %			-3.5%
<b>Quantity Charge</b>	69	<b>\$142.16</b>	<b>\$159.62</b>
Increase \$			\$17.46
Increase %			12.3%
<b>Total Water Service Charge</b>		<b>\$153.20</b>	<b>\$170.28</b>
Increase \$			\$17.08
Increase %			11.2%

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**RESOLUTION NO. 2018-09**

**A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF PATTERSON,  
CALIFORNIA, DECLARING THE RESULTS OF A NOTICED PROTEST  
PROCEEDINGS AND ADOPTING A FIVE-YEAR SCHEDULE  
OF WATER RATE ADJUSTMENTS**

The City Council of the City of Patterson (hereafter referred to as the "City Council") does resolve as follows:

**WHEREAS**, the City of Patterson ("City") owns and operates the City's water utility system, which provides water service(s) to the community; and

**WHEREAS**, the City Council has by previous Resolution set rates, fees and charges for water and service(s); and

**WHEREAS**, the City Council has retained Bartle Wells Associates for the purpose of assisting with the Water Rate Analysis and Prop 218 mailing of Notices to property owners and rate payers pursuant to Article XIII D of the California Constitution; and

**WHEREAS**, a mailed Prop 218 notice was distributed to the property owners and rate payers of record with in the City as the County's last equalized roll and the City's latest rate payer database. The property owners and rate payers as of the close of the Public Hearing held on February 6, 2018 consented to the increase of rates, fees and charges for water service; and

**NOW, THEREFORE BE IT RESOLVED, DETERMINED, AND ORDERED BY THE CITY COUNCIL OF THE CITY OF PATTERSON, AS FOLLOWS:**

**Section 1** The above recitals are true and correct.

**Section 2** The canvass of the written protests cast at the noticed protest proceeding held on February 6, 2018, is hereby approved and confirmed.

**Section 3** The proposition, presented to qualified property owners and rate payers for receipt by the City Clerk on February 6, 2018 each has received a notice. Of the qualified property owners and rate payers filing written protests at said noticed protest proceeding, the proposition has carried. The City Council is hereby authorized to take the necessary steps to adopt the following five-year schedule of increased rates, fees and charges for water services(s) as authorized by the proposition.

	Current Rates		Date		Proposed			
	Jan-1, 2015		Effective	Mar-1, 2018	Jan-1, 2019	Jan-1, 2020	Jan-1, 2021	Jan-1, 2022
<b>SERVICE CHARGE</b>								
<b>Meter Size</b>	<b>Rate</b>							
5/8 x 3/4 inch meter	\$11.04		\$11.06	\$12.27	\$13.62	\$15.12	\$16.79	
3/4 inch meter	\$11.04		\$11.06	\$12.27	\$13.62	\$15.12	\$16.79	
1 inch meter	\$14.85		\$14.37	\$15.96	\$17.71	\$19.66	\$21.82	
1-1/2 inch meter	\$17.66		\$17.69	\$19.64	\$21.80	\$24.19	\$26.86	
2 inch meter	\$28.70		\$28.75	\$31.91	\$35.42	\$39.32	\$43.64	
3 inch meter	\$110.40		\$110.57	\$122.73	\$136.23	\$151.22	\$167.85	
4 inch meter	\$140.21		\$140.42	\$155.87	\$173.02	\$192.05	\$213.17	
6 inch meter	\$210.86		\$211.19	\$234.42	\$260.20	\$288.83	\$320.60	
8 inch meter	\$291.46		\$291.90	\$324.01	\$359.65	\$399.22	\$443.13	
<b>QUANTITY RATE PER CCF*</b>								
<b>Tier</b>	<b>Breakpoints</b>	<b>Rate</b>	<b>Breakpoints</b>					
Tier 1	0 - 3 ccf	\$1.24	0 - 13 ccf	\$1.76	\$1.97	\$2.19	\$2.43	\$2.70
Tier 2	3.1 - 20 ccf	\$1.60	Over 13.1 ccf	\$2.54	\$2.82	\$3.14	\$3.48	\$3.86
Tier 3	20.1 - 50 ccf	\$1.96	N/A					
Tier 4	Over 50.1 ccf	\$2.76	N/A					
* 1 ccf = one hundred cubic feet = 748 gallons of water								

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3 **Section 4** The City Clerk is hereby directed to enter this Resolution on the minutes of the  
4 City Council which shall constitute the official declaration of the result of such noticed protest  
5 proceeding.

6  
7 **Section 5** This Resolution shall become effective immediately upon its adoption.

8  
9 **Section 6** The City Clerk shall certify the adoption of this Resolution.

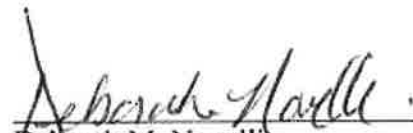
10  
11 The foregoing resolution was passed by the City Council at a regular meeting held on the 6<sup>th</sup> day  
12 of February 2018, and the resolution adopted by the following roll call vote:

13  
14 **AYES:** Councilmembers McCord, Naranjo, Farinha, Parham and Mayor Novelli

15  
16 **NOES:** None

17  
18 **EXCUSED:** None

19  
20  
21 APPROVED:

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23  
24  
25  
26   
27 Deborah M. Novelli  
28 Mayor of the City of Patterson  
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31

1 ATTEST:  
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7 **Maricela L. Vela**  
8 **City Clerk of the City of Patterson**  
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31 I hereby certify that the forgoing is a full, correct and true copy of the resolution passed  
32 by the City Council of said City of Patterson, a Municipal Corporation of the County of  
33 Stanislaus, State of California, at a regular meeting held on the 6<sup>th</sup> day of February 2018, and I  
34 further certify that said resolution is in full force and effect and has never been rescinded or  
35 modified.  
36

37 DATED: November 27, 2019  
38  
39

40  
41  
42   
43

44 **City Clerk of the City of Patterson**  
45 **Maricela L. Vela**

## **APPENDIX O**

### **2020 UWMP DWR Guidebook**

#### Reporting of Energy Intensity

## Appendix O.

# Reporting of Energy Intensity

This appendix provides guidance for required reporting of the energy intensity associated with sources of water used by the urban water supplier as required by Water Code Section 10631.2(a). This section of the urban water management plan (UWMP) is now required, whereas in the 2015 UWMP it was voluntary. If complete data are not available, estimates, informed judgements, and assumptions can be used to fill in missing information.

### Water Code Section 10631.2(a)

In addition to the requirements of Section 10631, an urban water management plan shall include any of the following information:

- (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.

### Water Code Section 10631.2 (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. Energy intensity reporting has many benefits for water suppliers and their customers including:

- ☐ Identifying energy saving opportunities as energy consumption is often a large portion of the cost of delivering water.
- ☐ Calculating energy savings and greenhouse gas (GHGs) emissions reductions associated with water conservation programs.

- Potential opportunities for receiving energy efficiency funding for water conservation programs.
- Informing climate change mitigation strategies.
- Benchmarking of energy use at each water acquisition and delivery step and the ability to compare energy use among similar agencies.

### **O.1 Water Energy Intensity Defined**

Water energy intensity is the total amount of energy, calculated on a whole system basis, required for the use of a given amount of water in a specific location (Wilkinson 2000). This guidance provides a methodology and tools for calculating the operational energy intensity, which is defined as the total amount of energy expended by the urban water supplier on a per acre-foot (AF) basis to take water from the location where the urban water supplier acquires the water to its point of delivery.

For the purposes of the required water energy reporting for urban water management plans, urban water suppliers are only expected to report the *energy intensity* associated with *water management processes* occurring within their *operational control*. Any energy embedded in water supplies by an upstream water supplier (such as a water wholesaler) is not intended to be included in the energy intensity reported in Table O-1. Urban water suppliers that wish to report the embedded energy of their water supplies are encouraged to do so by adding additional text and tables in the Water Energy section of their respective UWMP.

### **O.3 Reporting Methods**

The availability of water-related energy-consumption data varies greatly across urban water management wholesalers and suppliers. This guidance is intended to accommodate a range of energy consumption detail. Three reporting options are provided; urban water suppliers should decide which level of reporting to provide based on the resolution of available energy consumption data. Using the more detailed reporting approach (A) will provide water managers with the best understanding of the energy intensity of their systems and how energy consumption of water management operations compares throughout the state.

- **Water Supply Process Approach (A):** Report energy intensity by water management operation (aggregated across all supply sources). Enter amount of energy consumed for extraction, conveyance, placement into storage, treatment, and distribution (See Table O-1A).
- **Total Utility Approach (B):** Report a single energy intensity for all water management operations. Enter total energy consumed by agency's water operations. The agency's energy intensity is

automatically calculated as the ratio of energy consumption over volume of water entering the distribution system (See Table O-1B).

Multiple Water Delivery Products (C): Water Supply Process Approach (A) methodology with additional functionality for reporting energy intensity by water delivery product (retail potable, retail non-potable, wholesale potable, wholesale non-potable, agricultural, environmental, and other deliveries.). See Table O-1C for an example.

The City of Patterson will be completing two tables, one for total water production associated energy use, and one for total wastewater treatment and disposal associated energy use including net energy calculations as appropriate.

## O.5 Water Delivery Product

The type of water delivered by supplier can significantly impact the reported energy intensity. For the purposes of this guidance, water delivery products include retail potable, retail non-potable, wholesale potable, wholesale nonpotable, agricultural, environmental, and other deliveries. Tables O-1A and O-1B request that suppliers report a single type of water delivered. Suppliers delivering more than one type of water should use Table O-1C.

## O.11 Wastewater Energy Intensity

For suppliers that do not provide wastewater treatment services, the reporting guidelines for wastewater will not apply. But, for suppliers that do provide wastewater collection, treatment, or discharge services within their operational control a separate reporting table (Table O-2) is provided to report energy intensity for these processes. The energy intensity of wastewater operations is the amount of energy consumed within an urban water supplier's *operational control* to collect, treat, and dispose of wastewater from domestic and industrial sources less any consequential energy production, divided by the amount of water entering the wastewater treatment plant(s).

The City will calculate its energy intensity associated with its utility resource operations per the following DWR definitions.

**Energy Intensity (kWh/AF):** Quantity of energy consumed divided by volume of water entering the water management process. A measure of the required amount of energy needed to take a unit volume of water from its starting location through all necessary steps to its point of use.

**Net Utility Energy Intensity (kWh/AF):** Net utility energy consumed divided by volume of water entering distribution system. [Net Utility Energy Intensity = Net Utility Energy Consumed / Total Utility Volume of Water

Entering Process]

**Production Volume (AF):** Volume of water entering distribution system. If delivery occurs prior to distribution system use volume of water delivered.

**Reporting Period:** One year period for reporting volume of water delivered and quantity of energy consumed. When possible, use time period used to report 2020 data in other sections of UWMP.

**Self-Generated Renewable Energy (kWh):** Amount of renewable energy generated by facilities under urban water supplier's operational control not included in consequential or non-consequential hydropower generation items (examples include solar, wind, geothermal, and tidal).

#### **Wastewater Total**

Energy Consumed (kWh): Total energy consumed within an urban water supplier's operational control to collect, treat and discharge wastewater.

[sum (Energy Consumed for all Wastewater Management Processes)]

Volume (AF): Volume of wastewater entering wastewater treatment plant.

#### **Water Energy Tables**

On the following pages are screenshots of tables offered for completing the water and wastewater energy analysis. Excel versions of these tables are available online from the [DWR website](#).

The City has completed the appropriate DWR provided water and wastewater energy intensity tables which are included in Chapter 6 of this document.

**Urban Water Supplier:**

City of Patterson

**Water Delivery Product** (If delivering more than one type of product use Table O-1C)

Retail Potable Deliveries

Table O-1B: Recommended Energy Intensity - Total Utility Approach			
Enter Start Date for Reporting Period 1/1/2019 End Date 12/31/2019	Urban Water Supplier Operational Control		
	Sum of All Water Management Processes	Non-Consequential Hydropower	
	Total Utility	Hydropower	Net Utility
Volume of Water Entering Process (AF)	4,130	0	4129.578967
Energy Consumed (kWh)	2,660,206	0	2660206
Energy Intensity (kWh/AF)	644.2	0.0	644.2

**Quantity of Self-Generated Renewable Energy**

0 kWh

**Data Quality** (Estimate, Metered Data, Combination of Estimates and Metered Data)

Metered Data

**Data Quality Narrative:**

Data from monthly PG&E utility bills with monthly meter reading cycle.

**Narrative:**

Includes water well and storage facilities related to water volumes entering the water system in 2019.

**Urban Water Supplier:**

City of Patterson

Table O-2: Recommended Energy Intensity - Wastewater & Recycled Water				
Enter Start Date for Reporting Period 1/1/2019 End Date 12/31/2019	Urban Water Supplier Operational Control			
	Water Management Process			
	Collection / Conveyance	Treatment	Discharge / Distribution	Total
Volume of Wastewater Entering Process (AF)	1,745	0	0	0
Wastewater Energy Consumed (kWh)	221289	0	0	221289
Wastewater Energy Intensity (kWh/AF)	126.8	0.0	0.0	0.0
Volume of Recycled Water Entering Process (AF)	0	0	0	0
Recycled Water Energy Consumed (kWh)	0	0	0	0
Recycled Water Energy Intensity (kWh/AF)	0.0	0.0	0.0	0.0

**Quantity of Self-Generated Renewable Energy related to recycled water and wastewater operations**

1446686 kWh

**Data Quality** (Estimate, Metered Data, Combination of Estimates and Metered Data)

Metered Data

**Data Quality Narrative:**

Wastewater flows and associated energy use are metered and calculated on a monthly basis in accordance with monthly meter reading cycle.

**Narrative:**

Wastewater energy consumed (kWh) = Total metered wastewater energy use - Total solar array production = Net metered energy use

**City of Patterson**  
**Water Quality Control Facility**  
**Energy Intensity Calculations**

**Solar Array Location Map**



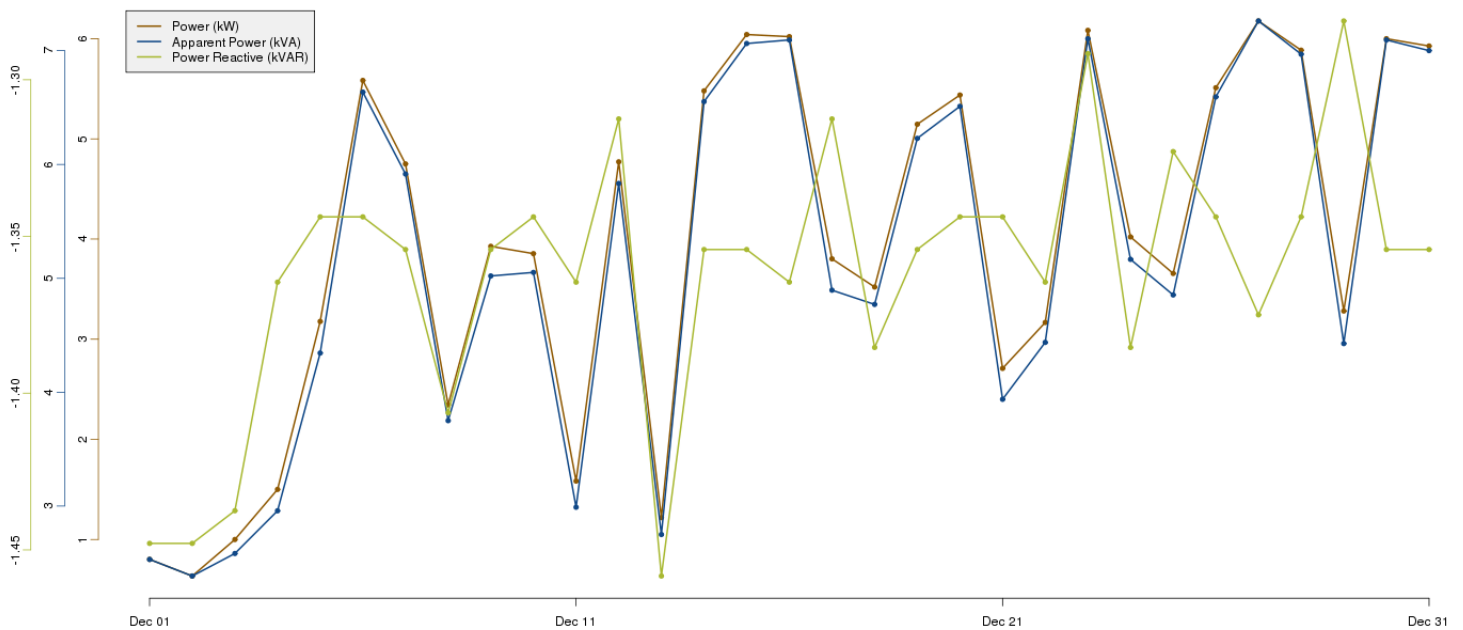
## City of Patterson - Aquatic Center: Generation/Power

[Click here to view this data live in your admin panel.](#)



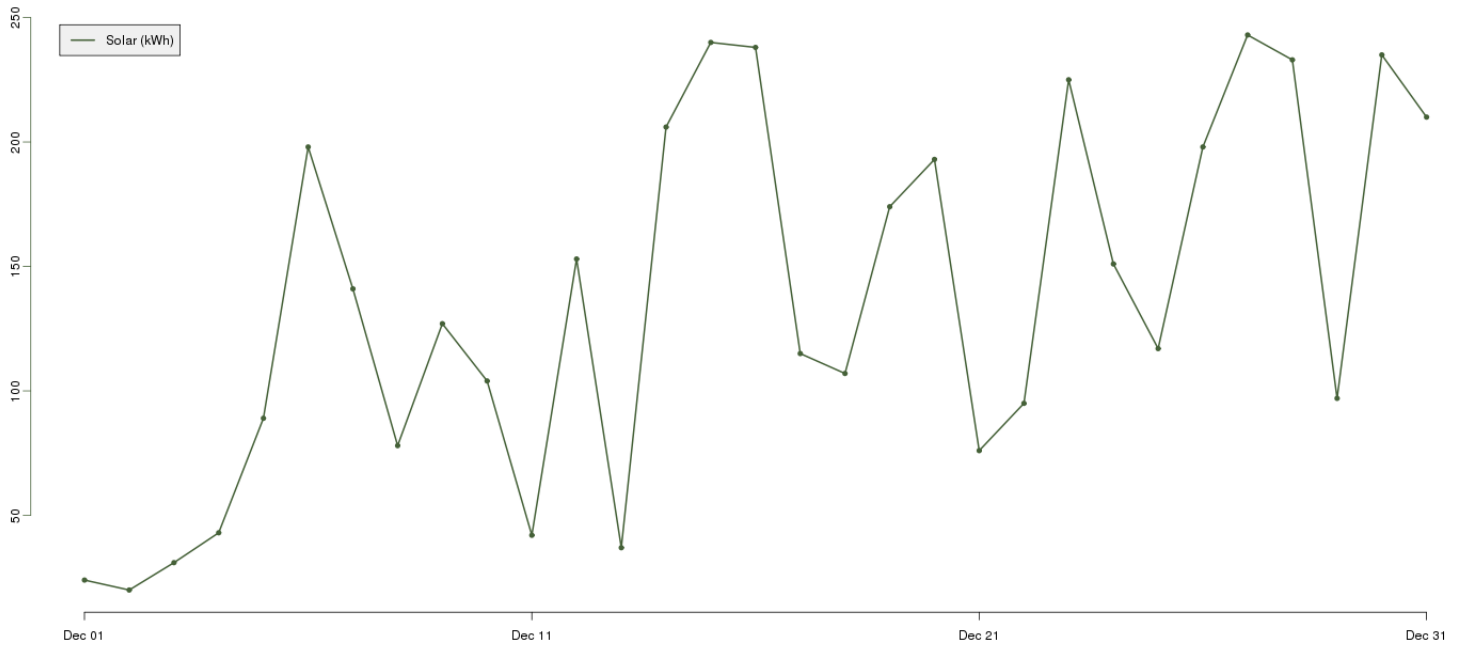
## City of Patterson - Aquatic Center: Power Information

[Click here to view this data live in your admin panel.](#)



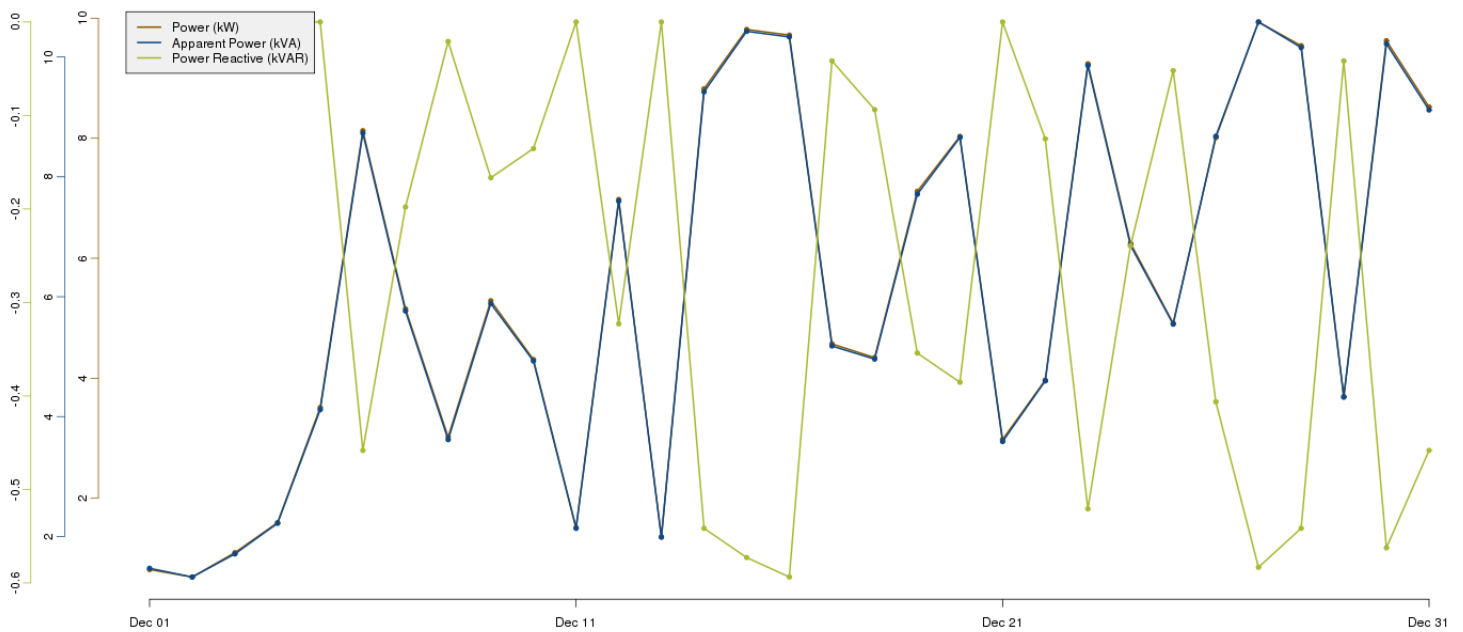
## City of Patterson - Corporate Yard: Generation/Power

[Click here to view this data live in your admin panel.](#)



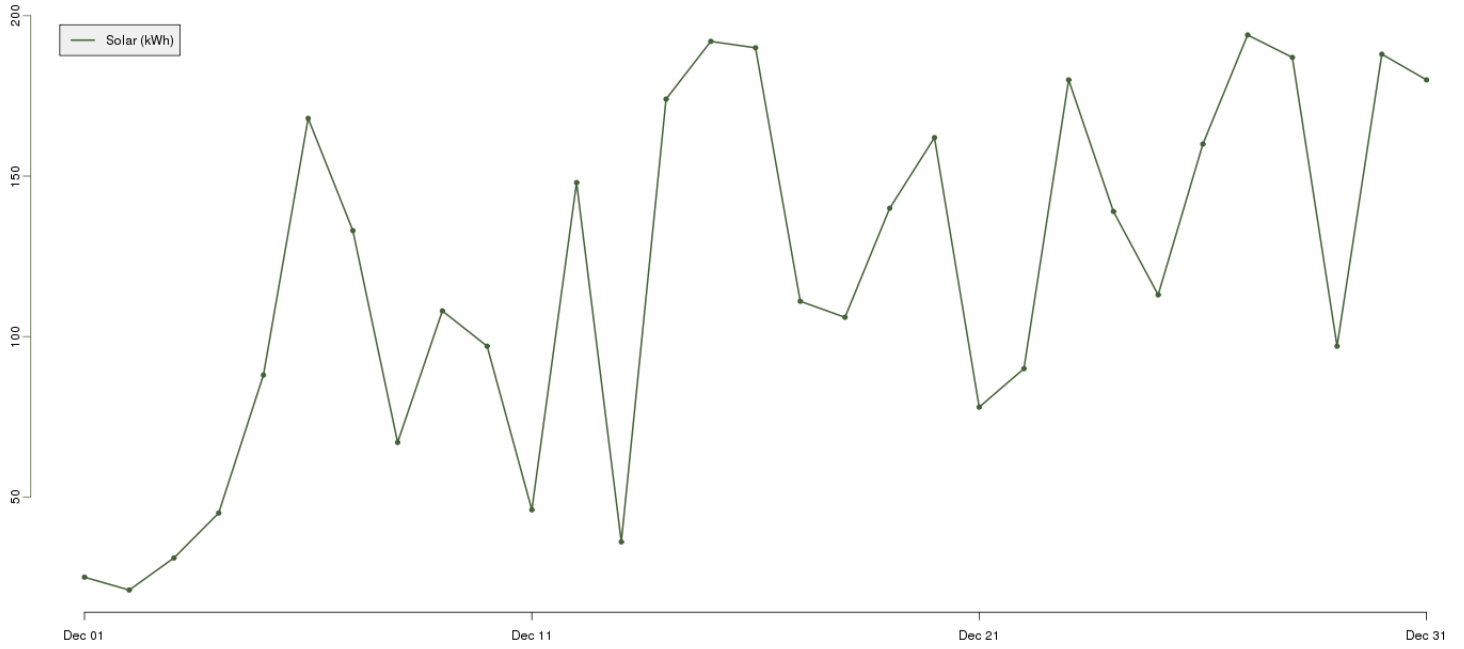
## City of Patterson - Corporate Yard: Power Information

[Click here to view this data live in your admin panel.](#)



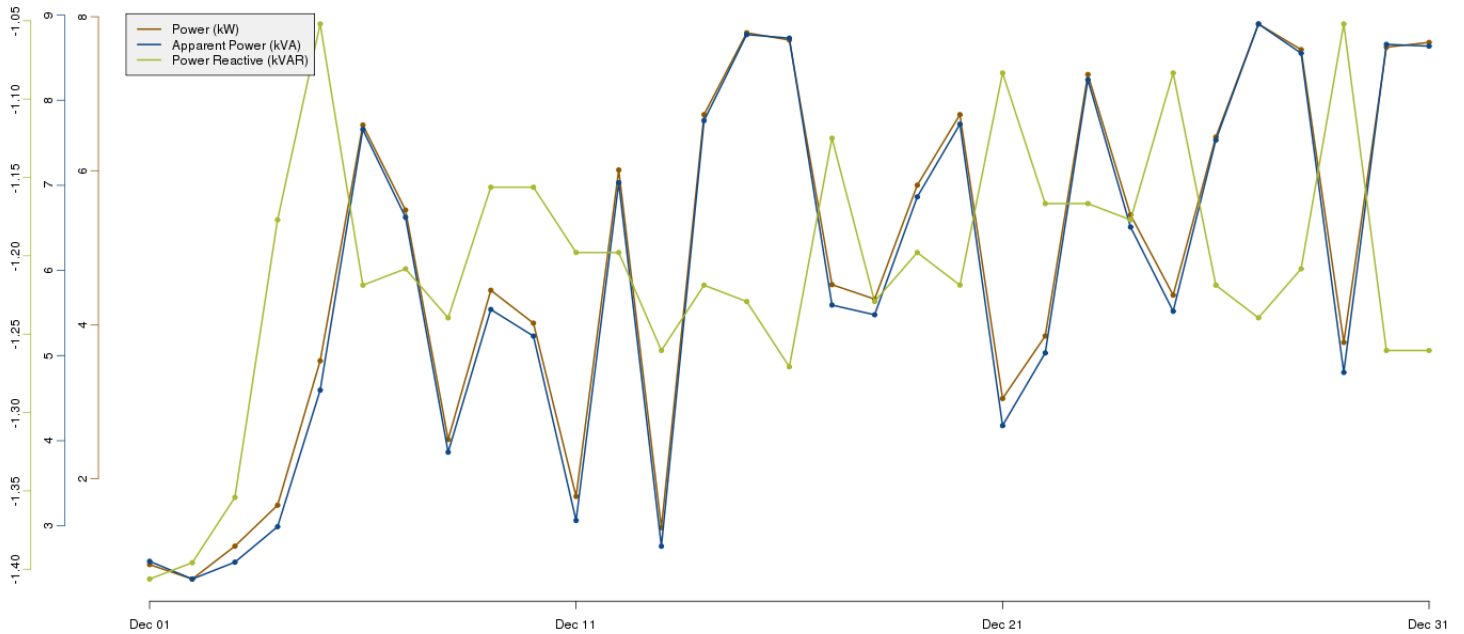
## City of Patterson - Senior Center: Generation/Power

[Click here to view this data live in your admin panel.](#)



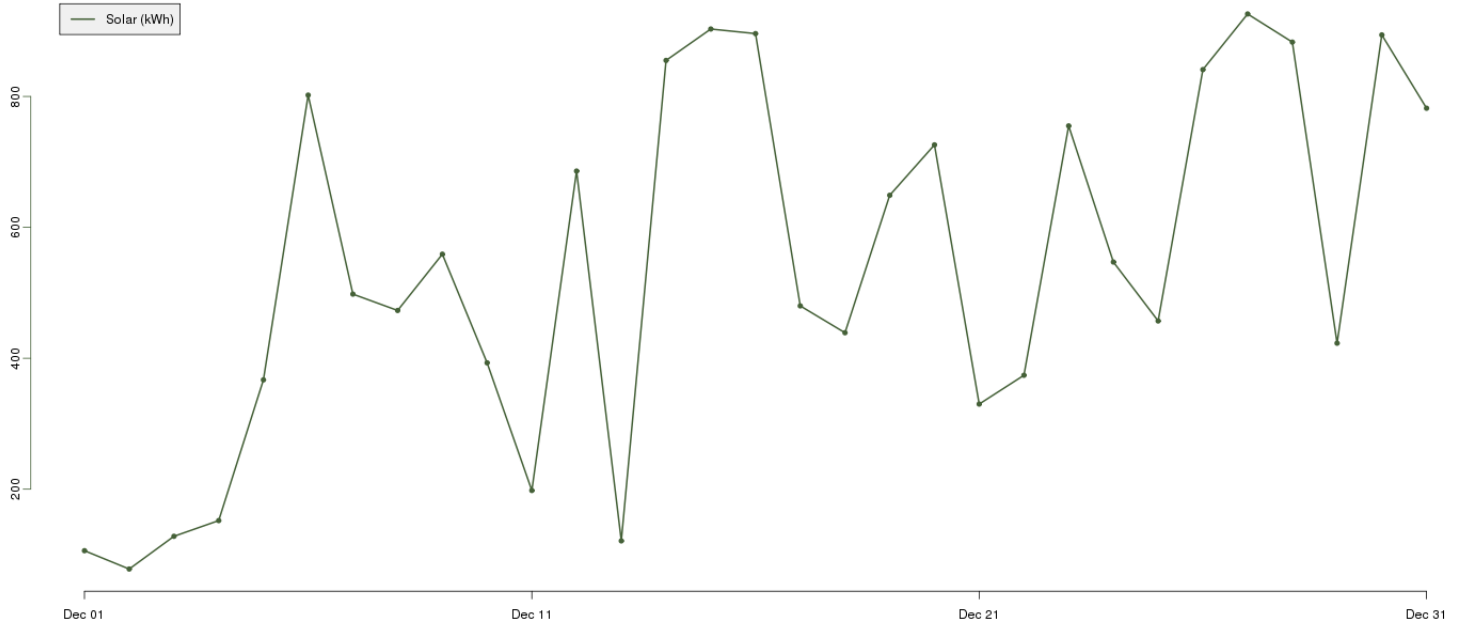
## City of Patterson - Senior Center: Power Information

[Click here to view this data live in your admin panel.](#)



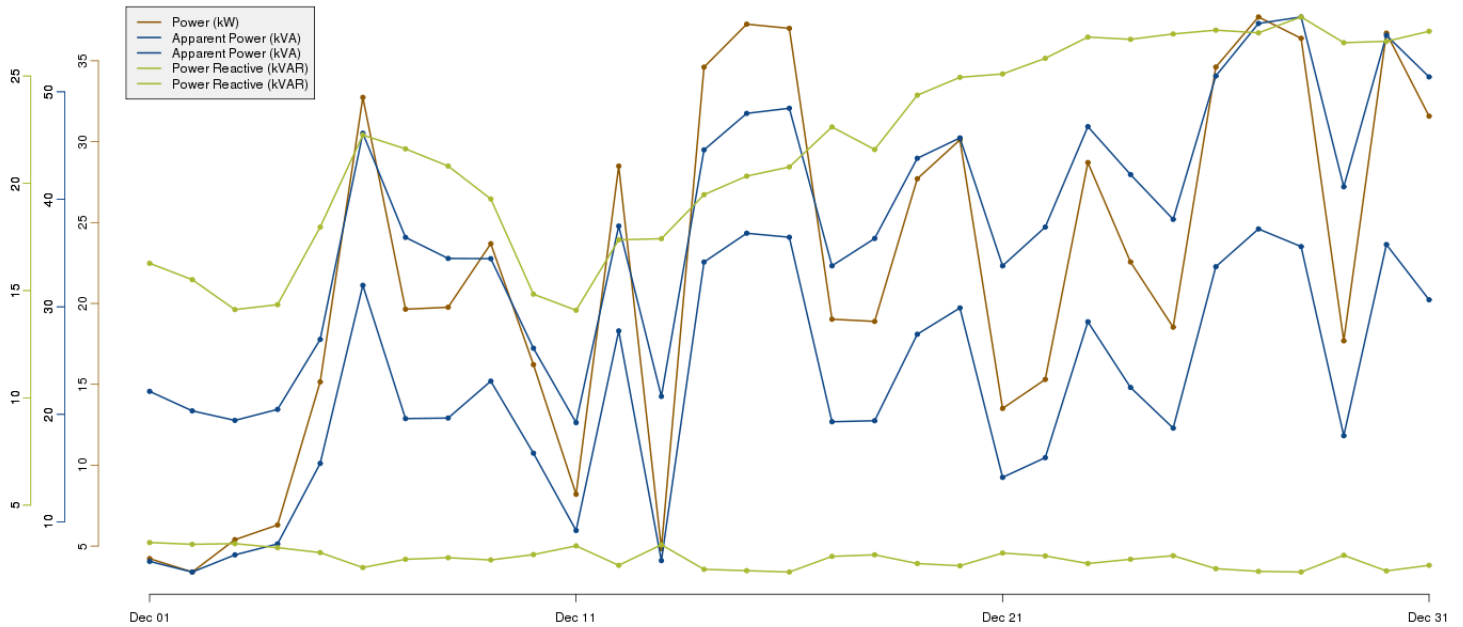
## City of Patterson - Waste Water North: Generation/Power

[Click here to view this data live in your admin panel.](#)



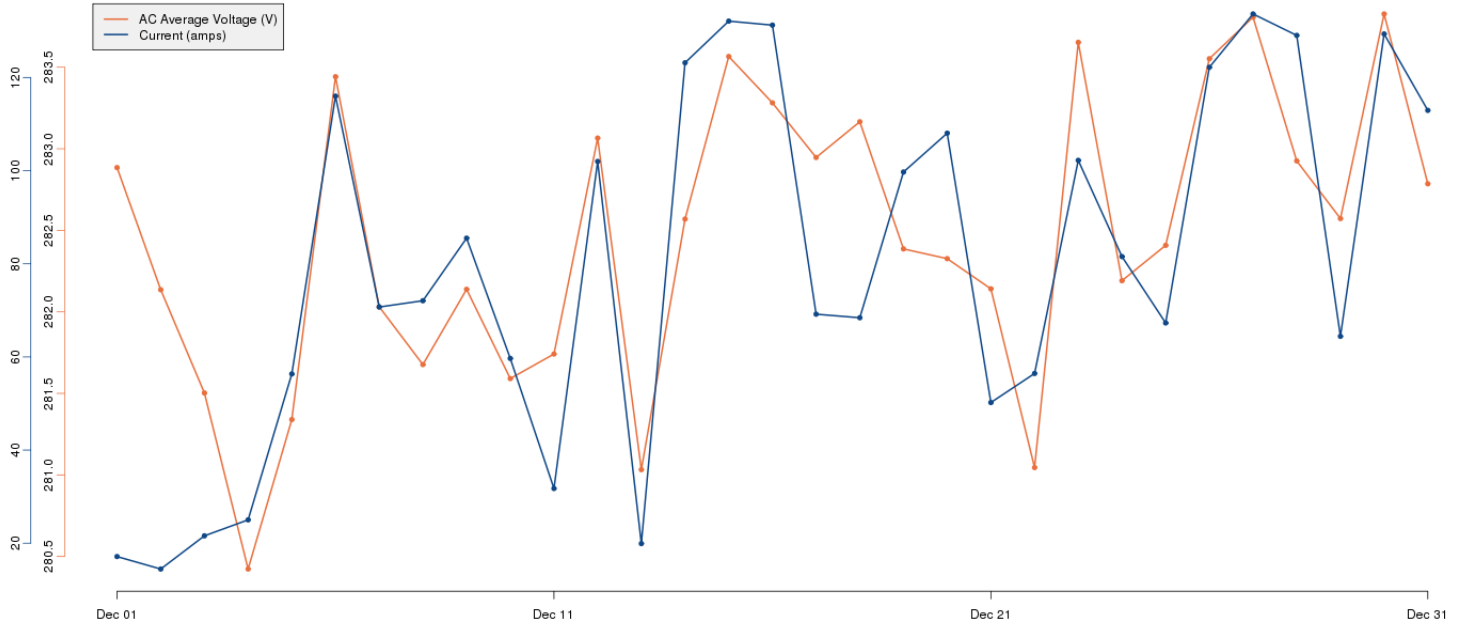
## City of Patterson - Waste Water North: Power Information

[Click here to view this data live in your admin panel.](#)



## City of Patterson - Waste Water North: Volts & Amps

[Click here to view this data live in your admin panel.](#)



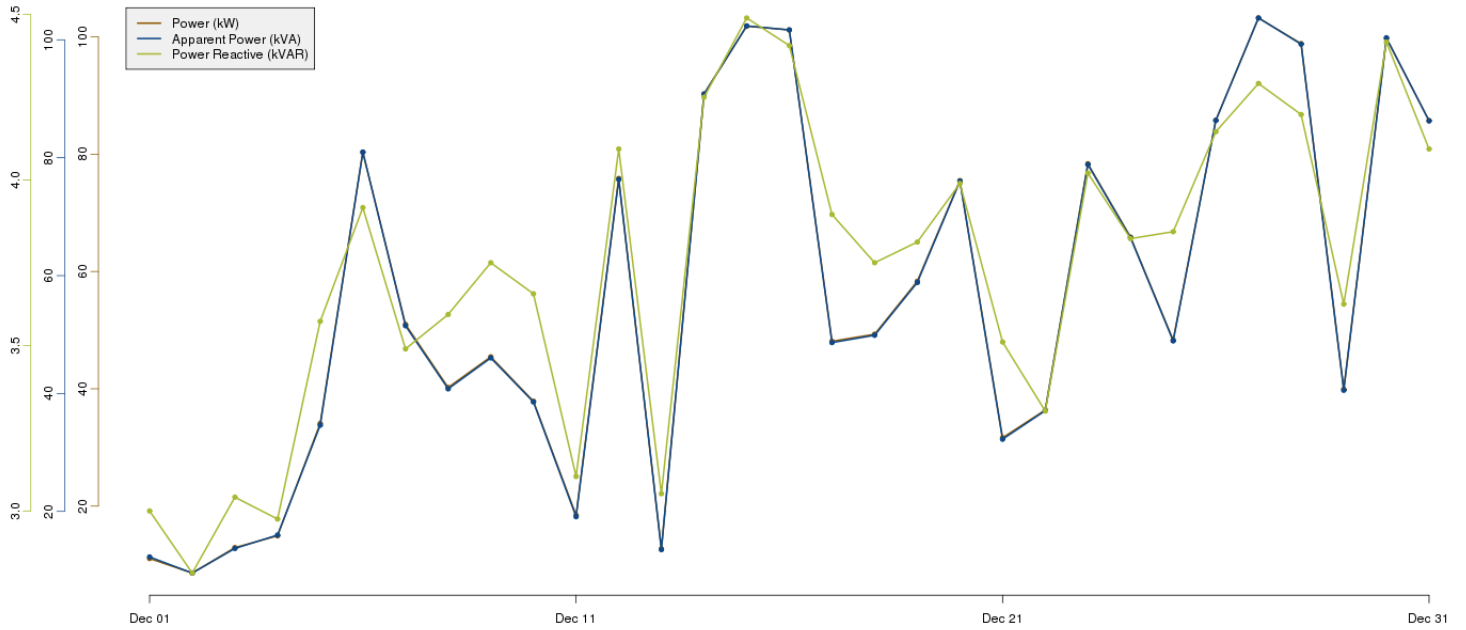
## City of Patterson - Waste Water South: Generation/Power

[Click here to view this data live in your admin panel.](#)



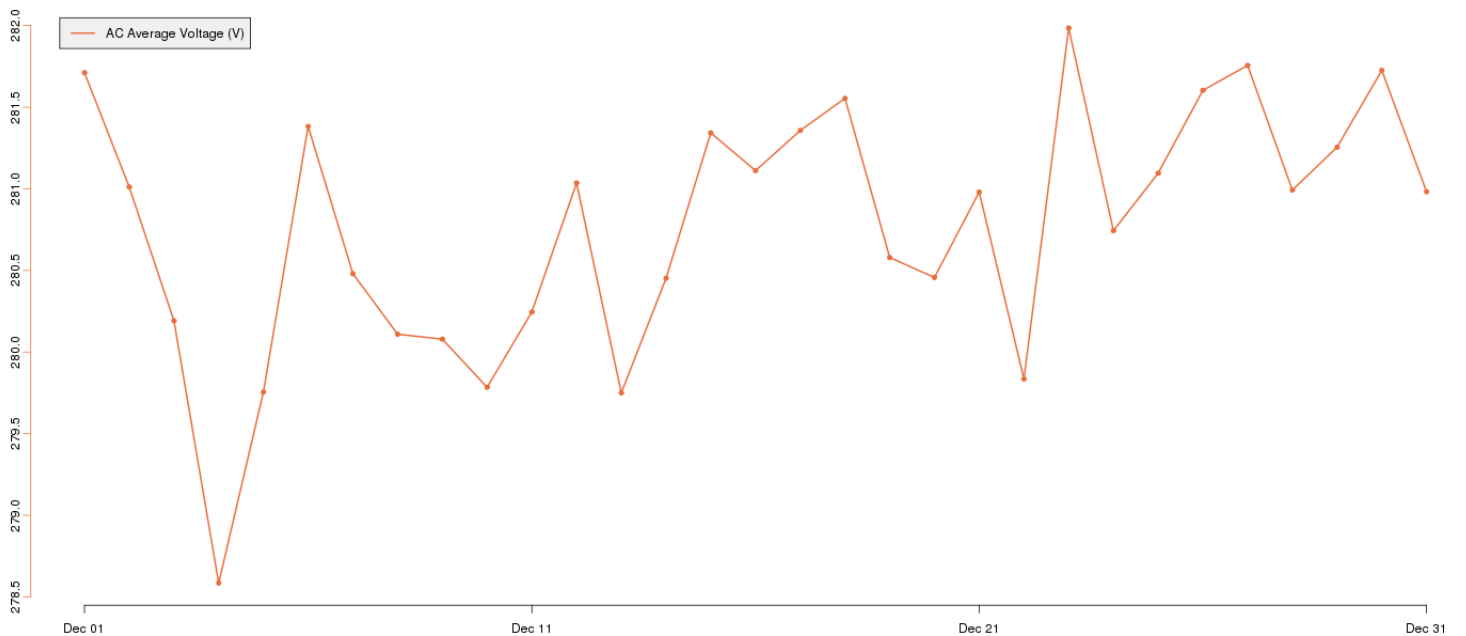
## City of Patterson - Waste Water South: Power Information

[Click here to view this data live in your admin panel.](#)



## City of Patterson - Waste Water South: Volts & Amps

[Click here to view this data live in your admin panel.](#)



## Baseline/Performance Summary Table

System	YTD Baseline	YTD Actual	YTD Delta	MTD Baseline	MTD Actual	MTD Delta	Dec Baseline	Dec Actual	Dec Delta
City of Patterson - Aquatic Center	0	95,289	--	0	3,079	--	0	3,079	--
City of Patterson - Corporate Yard	0	106,380	--	0	4,240	--	0	4,240	--
City of Patterson - Senior Center	0	102,042	--	0	3,694	--	0	3,694	--
City of Patterson - Waste Water North	0	453,897	--	0	16,721	--	0	16,721	--
City of Patterson - Waste Water South	0	992,789	--	0	42,035	--	0	42,035	--
TOTAL	0	1,750,397	--	0	69,769	--	0	69,769	--

**APPENDIX P**

**2020 UWMP DWR Guidebook**

Annual Water Supply and Demand Assessments

## 8.2 Annual Water Supply and Demand Assessment Procedures

### Water Code Section 10632(a)(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.*

### Water Code Section 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 July 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 July 1 of each year, whichever is later.*

Beginning by July 1, 2022, each Supplier shall prepare and submit their annual water supply and demand assessment (referred to in this Guidebook as an Annual Assessment). The Annual Assessment will be due by July 1 of every year, as required by Water Code Section 10632.1. The Annual

Assessment and associated reporting are to be conducted based on the Supplier's procedures detailed in the WSCP.

DWR is developing a stand-alone guidance document that will recommend practical procedures and analytical methods that may be used, at the Supplier's discretion, to effectively and efficiently comply with the Annual Assessment requirement. The Annual Assessment guidance will discuss varying water supply sources and water use conditions to help Suppliers develop their own procedures. Ultimately, the Annual Assessment guidance will be included as Appendix P to this Guidebook.

This section of the Guidebook offers general guidance for Suppliers regarding the Annual Assessment information that must be included in the WSCP, but it does not provide guidance on the Supplier-specific procedures themselves. Further, this section of the Guidebook does not provide guidance on the form or substance of Annual Assessment reports to be submitted to DWR by July 1, 2022.

As required by Water Code Section 10623(a), the Supplier's WSCP shall include its specific procedures—akin to its *instruction manual*—that describe annual steps and timing to complete the Annual Assessment, such that it can be consistently followed year-after-year, regardless of changing Supplier staff undertaking the steps. Water Code requires that the following shall be described by the Supplier in its WSCP for this element.

### **Decision-Making Process**

The written decision-making process would describe the functional steps to formally *approve* the Annual Assessment determination of water supply reliability each year. For example, a Supplier's process may include a formal presentation to its elected body (e.g., at a Board or Council meeting) and request that the body vote on the findings of the Annual Assessment and appropriately trigger any recommendations for specific shortage response actions resulting from the assessment.

### **Data and Methodologies**

A description of key data inputs and Annual Assessment methodologies used to evaluate the water system reliability for the coming year, while considering that the year to follow would be considered *dry*. The characteristics of a *dry* year is at the discretion of the Supplier, but it should be adequately defined and ideally align with one of the WSCP water shortage levels.

This description must include key data inputs and methodologies for determining:

1. **Evaluation Criteria.** The locally applicable evaluation criteria that will be consistently relied on for each Annual Assessment.
2. **Water Supply.** Quantification of each source of water supply along with descriptive text.
3. **Unconstrained Customer Demand.** How will the Supplier determine anticipated customer water needs for the year *prior to* any special shortage response actions that may be necessary (i.e., the Supplier's expected customer water needs for the coming year or "unconstrained demand" as used in Water Code Section 10632(a)(2)(B)(i)). Customer water use ideally reflects the same methodology presented in Chapter 4 for projecting demand, while allowing for real-time adjustments to account for factors such as weather, prior-year conditions, anticipated new demands for the year, and other factors pertinent to the land use and customer use patterns known to the Supplier.
4. **Planned Water Use for Current Year Considering Dry Subsequent Year.** Evaluation of how anticipated supplies for the particular coming year will be used, while anticipating that the following year will be dry. Each year's assessment is informed by the characterizations in Chapter 6 and other current pertinent factors and considerations.
5. **Infrastructure Considerations.** Evaluation of how infrastructure capabilities and constraints may affect the Supplier's ability to deliver supplies to meet expected customer water use needs in the coming year. This would also include anticipated capital projects that may influence capabilities, such as repairs that may constrain capabilities (e.g., planned treatment plant upgrades) or new projects that may add capacity (e.g., a new groundwater well or system intertie).
6. **Other Factors.** Suppliers are encouraged to describe any specific locally applicable factors that can influence or disrupt supplies, along with other unique local considerations that are considered as part of the Annual Assessment.

Since an Annual Assessment reflects the Supplier's specific circumstances, the procedures developed and consistently applied will likely vary among Suppliers—there is no formulaic requirement mandated by the state, only that specific elements are included. The focus of the Supplier's Annual

Assessment is best based on actual forecasted near-term water supply conditions (for the next 12 months) to ensure appropriate shortage response actions are triggered in a timely manner with expected outcomes. This analysis contrasts with the Drought Risk Assessment (see Chapter 7), which has a longer term, multiyear water supply reliability focus.

While the first Annual Assessment is not required to be submitted to DWR until July 1, 2022, Suppliers are encouraged to use the procedures documented in its WSCP to prepare and include the outcome of an Annual Assessment for 2021, and to present the results in their UWMP as an example.

Further, although the Annual Assessment must be submitted to DWR on or before July 1 of every year, an early Annual Assessment allows Suppliers and customers to identify uncertainties and prepare financially and logistically for any anticipated water supply constraints in the coming months. Therefore, Suppliers are encouraged to develop procedures, including decision-making processes, that facilitate early analysis and adoption.

The City of Patterson will be prepared to submit its first Annual Water Supply and Demand Assessment report to DWR by July 2022. The City will use the following tools to prepare its Annual Assessments.

#### Water System Capacity Calculation – Firm Water Supply Capacity

The City's total groundwater pumping in 2020 was 4,454 AF, well within the City's water system capacity with conservative assumptions. The Water System Capacity calculations will be reviewed and updated annually as appropriate as an element for the City's Annual Assessment preparation process.

Source	Water System Capacity Largest Well Offline	Water System Capacity Largest Well Online
Water System Capacity	4,776 AFY	5,986 AFY
	6 Potable Wells 3 Non-Potable Wells Water Storage Tanks	7 Potable Wells 3 Non-Potable Wells Water Storage Tanks
Water Quality	Title 22 Requirements Special testing as needed	City data ties into regional water quality monitoring

### Groundwater Subbasin – Safe Yield Capacity

The City’s total groundwater pumping in 2020 was 4,454 AF, well within both the Operational and Safe Yield of the Delta-Mendota Subbasin upon which the city relies for its water supplies. The Safe Yield Capacity calculations will be reviewed and updated annually as appropriate as an element for the Annual Assessment preparation process.

<b>Source</b>	<b>Operational Safe Yield (OSY)</b>	<b>Subbasin Safe Yield</b>
City Operational Safe Yield Study	10,000 AFY	12,000 AFY
	Operational safe yield established to assess potential groundwater impacts before subbasin safe yield is reached as proactive City OSY target	Average annual recharge calculated at 12,500 AFY, 12,000 AFY identified as conservative safe yield target
City Groundwater Use Projections (2020-2045 period)	3,600-8,300 AFY (assumes 164 gpcd use target and 2.26% growth rate)	70% of subbasin safe yield target
City Subsidence Monitoring Network	Bi-annual observations to track subsidence trends	City data ties in with larger regional subsidence monitoring program
City Average Static Water Level Monitoring	Monitor monthly average static water levels to identify declining water level trends	City data ties in with larger regional groundwater modeling calibrations
Water Quality	Title 22 Requirements Special testing as needed	City data ties into regional water quality monitoring