Appendix A

Completed UWMP Checklist

Retail	Wholesale	2020 Guidebook Location	Water Code Section	Summary as Applies to UWMP	Subject	2020 UWMP Location
x	x	Chapter 1	10615	A plan shall describe and evaluate sources of supply, reasonable and practical efficient uses, reclamation and demand management activities.	Introduction and Overview	Chapter 1
x	x	Chapter 1	10630.5	Each plan shall include a simple description of the supplier's plan including water availability, future requirements, a strategy for meeting needs, and other pertinent information. Additionally, a supplier may also choose to include a simple description at the beginning of each chapter.	Summary	Section 1.6
x	x	Section 2.2	10620(b)	Every person that becomes an urban water supplier shall adopt an urban water management plan within one year after it has become an urban water supplier.	Plan Preparation	Section 2.1
x	x	Section 2.6	10620(d)(2)	Coordinate the preparation of its plan with other appropriate agencies in the area, including other water suppliers that share a common source, water management agencies, and relevant public agencies, to the extent practicable.	Plan Preparation	Section 2.2.3
x	x	Section 2.6.2	10642	Provide supporting documentation that the water supplier has encouraged active involvement of diverse social, cultural, and economic elements of the population within the service area prior to and during the preparation of the plan and contingency plan.	Plan Preparation	Section 2.2.4

Retail	Wholesale	2020 Guidebook Location	Water Code Section	Summary as Applies to UWMP	Subject	2020 UWMP Location
x		Section 2.6, Section 6.1	10631(h)	Retail suppliers will include documentation that they have provided their wholesale supplier(s) - if any - with water use projections from that source.	System Supplies	Section 2.2.2
	x	Section 2.6	10631(h)	Wholesale suppliers will include documentation that they have provided their urban water suppliers with identification and quantification of the existing and planned sources of water available from the wholesale to the urban supplier during various water year types.	System Supplies	N/A
x	x	Section 3.1	10631(a)	Describe the water supplier service area.	System Description	Chapter 3
x	x	Section 3.3	10631(a)	Describe the climate of the service area of the supplier.	System Description	Section 3.3
x	x	Section 3.4	10631(a)	Provide population projections for 2025, 2030, 2035, 2040 and optionally 2045.	System Description	Section 3.2.1 and Table 3-1
x	x	Section 3.4.2	10631(a)	Describe other social, economic, and demographic factors affecting the supplier's water management planning.	System Description	Section 3.2.3 and Table 3-3
x	x	Sections 3.4 and 5.4	10631(a)	Indicate the current population of the service area.	System Description and Baselines and Targets	Section 3.2, Section 5.1 and Table 3-1
x	x	Section 3.5	10631(a)	Describe the land uses within the service area.	System Description	Section 3.1

Retail	Wholesale	2020 Guidebook Location	Water Code Section	Summary as Applies to UWMP	Subject	2020 UWMP Location
x	x	Section 4.2	10631(d)(1)	Quantify past, current, and projected water use, identifying the uses among water use sectors.	System Water Use	Chapter 4
x	x	Section 4.2.4	10631(d)(3)(C)	Retail suppliers shall provide data to show the distribution loss standards were met.	System Water Use	Section 4.1.3 and Table 4-3
x	x	Section 4.2.6	10631(d)(4)(A)	In projected water use, include estimates of water savings from adopted codes, plans, and other policies or laws.	System Water Use	Section 4.2.3
x	x	Section 4.2.6	10631(d)(4)(B)	Provide citations of codes, standards, ordinances, or plans used to make water use projections.	System Water Use	Section 4.2.3
x	optional	Section 4.3.2.4	10631(d)(3)(A)	Report the distribution system water loss for each of the 5 years preceding the plan update.	System Water Use	Section 4.1.3 and Table 4-3
x	optional	Section 4.4	10631.1(a)	Include projected water use needed for lower income housing projected in the service area of the supplier.	System Water Use	Section 4.2.5
x	x	Section 4.5	10635(b)	Demands under climate change considerations must be included as part of the drought risk assessment.	System Water Use	Section 4.4
x		Chapter 5	10608.20(e)	Retail suppliers shall provide baseline daily per capita water use, urban water use target, interim urban water use target, and compliance daily per capita water use, along with the bases for determining those estimates, including references to supporting data.	Baselines and Targets	Chapter 5

Retail	Wholesale	2020 Guidebook Location	Water Code Section	Summary as Applies to UWMP	Subject	2020 UWMP Location
x		Chapter 5	10608.24(a)	Retail suppliers shall meet their water use target by December 31, 2020.	Baselines and Targets	Section 5.4 and Table 5-2
	x	Section 5.1	10608.36	Wholesale suppliers shall include an assessment of present and proposed future measures, programs, and policies to help their retail water suppliers achieve targeted water use reductions.	Baselines and Targets	N/A
x		Section 5.2	10608.24(d)(2)	If the retail supplier adjusts its compliance GPCD using weather normalization, economic adjustment, or extraordinary events, it shall provide the basis for, and data supporting the adjustment.	Baselines and Targets	Section 5.4 and Table 5-2
x		Section 5.5	10608.22	Retail suppliers' per capita daily water use reduction shall be no less than 5 percent of base daily per capita water use of the 5-year baseline. This does not apply if the suppliers base GPCD is at or below 100.	Baselines and Targets	Section 5.3
x		Section 5.5 and Appendix E	10608.4	Retail suppliers shall report on their compliance in meeting their water use targets. The data shall be reported using a standardized form in the SBX7-7 2020 Compliance Form.	Baselines and Targets	Section 5.4 and Appendix E
x	x	Sections 6.1 and 6.2	10631(b)(1)	Provide a discussion of anticipated supply availability under a normal, single dry year, and a drought lasting five years, as well as more frequent and severe periods of drought.	System Supplies	Chapter 6

Retail	Wholesale	2020 Guidebook Location	Water Code Section	Summary as Applies to UWMP	Subject	2020 UWMP Location
x	x	Sections 6.1	10631(b)(1)	Provide a discussion of anticipated supply availability under a normal, single dry year, and a drought lasting five years, as well as more frequent and severe periods of drought, *including changes in supply due to climate change.*	System Supplies	Chapter 6
x	x	Section 6.1	10631(b)(2)	When multiple sources of water supply are identified, describe the management of each supply in relationship to other identified supplies.	System Supplies	Sections 6.1 and 6.2.2
x	x	Section 6.1.1	10631(b)(3)	Describe measures taken to acquire and develop planned sources of water.	System Supplies	Section 6.8
x	x	Section 6.2.8	10631(b)	Identify and quantify the existing and planned sources of water available for 2020, 2025, 2030, 2035, 2040 and optionally 2045.	System Supplies	Section 6.9 and Table 6-10
x	x	Section 6.2	10631(b)	Indicate whether groundwater is an existing or planned source of water available to the supplier.	System Supplies	Section 6.2.4
x	x	Section 6.2.2	10631(b)(4)(A)	Indicate whether a groundwater sustainability plan or groundwater management plan has been adopted by the water supplier or if there is any other specific authorization for groundwater management. Include a copy of the plan or authorization.	System Supplies	Section 6.2.1
x	x	Section 6.2.2	10631(b)(4)(B)	Describe the groundwater basin.	System Supplies	Section 6.2.1

Retail	Wholesale	2020 Guidebook Location	Water Code Section	Summary as Applies to UWMP	Subject	2020 UWMP Location
x	x	Section 6.2.2	10631(b)(4)(B)	Indicate if the basin has been adjudicated and include a copy of the court order or decree and a description of the amount of water the supplier has the legal right to pump.	System Supplies	Section 6.2.1
x	x	Section 6.2.2.1	10631(b)(4)(B)	For unadjudicated basins, indicate whether or not the department has identified the basin as a high or medium priority. Describe efforts by the supplier to coordinate with sustainability or groundwater agencies to achieve sustainable groundwater conditions.	System Supplies	Section 6.2.1
x	x	Section 6.2.2.4	10631(b)(4)(C)	Provide a detailed description and analysis of the location, amount, and sufficiency of groundwater pumped by the urban water supplier for the past five years	System Supplies	Section 6.2.3
x	x	Section 6.2.2	10631(b)(4)(D)	Provide a detailed description and analysis of the amount and location of groundwater that is projected to be pumped.	System Supplies	Section 6.2.4
x	x	Section 6.2.7	10631(c)	Describe the opportunities for exchanges or transfers of water on a short-term or long-term basis.	System Supplies	Section 6.7
x	x	Section 6.2.5	10633(b)	Describe the quantity of treated wastewater that meets recycled water standards, is being discharged, and is otherwise available for use in a recycled water project.	System Supplies (Recycled Water)	Section 6.5

Retail	Wholesale	2020 Guidebook Location	Water Code Section	Summary as Applies to UWMP	Subject	2020 UWMP Location
x	x	Section 6.2.5	10633(c)	Describe the recycled water currently being used in the supplier's service area.	System Supplies (Recycled Water)	Section 6.5.4
x	x	Section 6.2.5	10633(d)	Describe and quantify the potential uses of recycled water and provide a determination of the technical and economic feasibility of those uses.	System Supplies (Recycled Water)	Section 6.5.4
x	x	Section 6.2.5	10633(e)	Describe the projected use of recycled water within the supplier's service area at the end of 5, 10, 15, and 20 years, and a description of the actual use of recycled water in comparison to uses previously projected.	System Supplies (Recycled Water)	Section 6.5.4 and Table 6-5
x	x	Section 6.2.5	10633(f)	Describe the actions which may be taken to encourage the use of recycled water and the projected results of these actions in terms of acre-feet of recycled water used per year.	System Supplies (Recycled Water)	Section 6.5.6
x	x	Section 6.2.5	10633(g)	Provide a plan for optimizing the use of recycled water in the supplier's service area.	System Supplies (Recycled Water)	Section 6.5.6
x	x	Section 6.2.6	10631(g)	Describe desalinated water project opportunities for long-term supply.	System Supplies	Section 6.6
x	x	Section 6.2.5	10633(a)	Describe the wastewater collection and treatment systems in the supplier’s service area with quantified amount of collection and treatment and the disposal methods.	System Supplies (Recycled Water)	Section 6.5.2

Retail	Wholesale	2020 Guidebook Location	Water Code Section	Summary as Applies to UWMP	Subject	2020 UWMP Location
x	x	Section 6.2.8, Section 6.3.7	10631(f)	Describe the expected future water supply projects and programs that may be undertaken by the water supplier to address water supply reliability in average, single-dry, and for a period of drought lasting 5 consecutive water years.	System Supplies	Section 6.8
x	x	Section 6.4 and Appendix O	10631.2(a)	The UWMP must include energy information, as stated in the code, that a supplier can readily obtain.	System Suppliers, Energy Intensity	Section 6.11
x	x	Section 7.2	10634	Provide information on the quality of existing sources of water available to the supplier and the manner in which water quality affects water management strategies and supply reliability	Water Supply Reliability Assessment	Chapter 7
x	x	Section 7.2.4	10620(f)	Describe water management tools and options to maximize resources and minimize the need to import water from other regions.	Water Supply Reliability Assessment	Section 7.1.4
x	x	Section 7.3	10635(a)	Service Reliability Assessment: Assess the water supply reliability during normal, dry, and a drought lasting five consecutive water years by comparing the total water supply sources available to the water supplier with the total projected water use over the next 20 years.	Water Supply Reliability Assessment	Section 7.1.3

Retail	Wholesale	2020 Guidebook Location	Water Code Section	Summary as Applies to UWMP	Subject	2020 UWMP Location
x	x	Section 7.3	10635(b)	Provide a drought risk assessment as part of information considered in developing the demand management measures and water supply projects.	Water Supply Reliability Assessment	Section 7.2
x	x	Section 7.3	10635(b)(1)	Include a description of the data, methodology, and basis for one or more supply shortage conditions that are necessary to conduct a drought risk assessment for a drought period that lasts 5 consecutive years.	Water Supply Reliability Assessment	Section 7.2
x	x	Section 7.3	10635(b)(2)	Include a determination of the reliability of each source of supply under a variety of water shortage conditions.	Water Supply Reliability Assessment	Section 7.1
x	x	Section 7.3	10635(b)(3)	Include a comparison of the total water supply sources available to the water supplier with the total projected water use for the drought period.	Water Supply Reliability Assessment	Section 7.1.3
x	x	Section 7.3	10635(b)(4)	Include considerations of the historical drought hydrology, plausible changes on projected supplies and demands under climate change conditions, anticipated regulatory changes, and other locally applicable criteria.	Water Supply Reliability Assessment	Section 7.1.3
x	x	Chapter 8	10632(a)	Provide a water shortage contingency plan (WSCP) with specified elements below.	Water Shortage Contingency Planning	Chapter 8 and Appendix K
x	x	Chapter 8	10632(a)(1)	Provide the analysis of water supply reliability (from Chapter 7 of Guidebook) in the WSCP	Water Shortage Contingency Planning	Appendix K, Chapter 2

Retail	Wholesale	2020 Guidebook Location	Water Code Section	Summary as Applies to UWMP	Subject	2020 UWMP Location
x	x	Section 8.10	10632(a)(10)	Describe reevaluation and improvement procedures for monitoring and evaluation the water shortage contingency plan to ensure risk tolerance is adequate and appropriate water shortage mitigation strategies are implemented.	Water Shortage Contingency Planning	Appendix K, Chapter 13
x	x	Section 8.2	10632(a)(2)(A)	Provide the written decision- making process and other methods that the supplier will use each year to determine its water reliability.	Water Shortage Contingency Planning	Appendix K, Chapters 4 and 5
x	x	Section 8.2	10632(a)(2)(B)	Provide data and methodology to evaluate the supplier's water reliability for the current year and one dry year pursuant to factors in the code.	Water Shortage Contingency Planning	Appendix K, Chapter 4
x	x	Section 8.3	10632(a)(3)(A)	Define six standard water shortage levels of 10, 20, 30, 40, 50 percent shortage and greater than 50 percent shortage. These levels shall be based on supply conditions, including percent reductions in supply, changes in groundwater levels, changes in surface elevation, or other conditions. The shortage levels shall also apply to a catastrophic interruption of supply.	Water Shortage Contingency Planning	Appendix K, Chapter 5
x	x	Section 8.3	10632(a)(3)(B)	Suppliers with an existing water shortage contingency plan that uses different water shortage levels must cross reference their categories with the six standard categories.	Water Shortage Contingency Planning	Appendix K, Chapter 5

Retail	Wholesale	2020 Guidebook Location	Water Code Section	Summary as Applies to UWMP	Subject	2020 UWMP Location
x	x	Section 8.4	10632(a)(4)(A)	Suppliers with water shortage contingency plans that align with the defined shortage levels must specify locally appropriate supply augmentation actions.	Water Shortage Contingency Planning	Appendix K, Chapter 6
x	x	Section 8.4	10632(a)(4)(B)	Specify locally appropriate demand reduction actions to adequately respond to shortages.	Water Shortage Contingency Planning	Appendix K, Section 6.2 and Table 6-1
x	x	Section 8.4	10632(a)(4)(C)	Specify locally appropriate operational changes.	Water Shortage Contingency Planning	Appendix K, Section 6.3
x	x	Section 8.4	10632(a)(4)(D)	Specify additional mandatory prohibitions against specific water use practices that are in addition to state-mandated prohibitions are appropriate to local conditions.	Water Shortage Contingency Planning	Appendix K, Section 6.5
x	x	Section 8.4	10632(a)(4)(E)	Estimate the extent to which the gap between supplies and demand will be reduced by implementation of the action.	Water Shortage Contingency Planning	Appendix K, Section 6.2 and Table 6-1
x	x	Section 8.4.6	10632.5	The plan shall include a seismic risk assessment and mitigation plan.	Water Shortage Contingency Plan	Appendix K, Chapter 7
x	x	Section 8.5	10632(a)(5)(A)	Suppliers must describe that they will inform customers, the public and others regarding any current or predicted water shortages.	Water Shortage Contingency Planning	Appendix K, Chapter 8

Retail	Wholesale	2020 Guidebook Location	Water Code Section	Summary as Applies to UWMP	Subject	2020 UWMP Location
x	x	Section 8.5 and 8.6	10632(a)(5)(B) 10632(a)(5)(C)	Suppliers must describe that they will inform customers, the public and others regarding any shortage response actions triggered or anticipated to be triggered and other relevant communications.	Water Shortage Contingency Planning	Appendix K, Chapter 8
x		Section 8.6	10632(a)(6)	Retail supplier must describe how it will ensure compliance with and enforce provisions of the WSCP.	Water Shortage Contingency Planning	Appendix K, Chapter 9
x	x	Section 8.7	10632(a)(7)(A)	Describe the legal authority that empowers the supplier to enforce shortage response actions.	Water Shortage Contingency Planning	Appendix K, Chapter 10
x	x	Section 8.7	10632(a)(7)(B)	Provide a statement that the supplier will declare a water shortage emergency Water Code Chapter 3.	Water Shortage Contingency Planning	Appendix K, Chapter 10
x	x	Section 8.7	10632(a)(7)(C)	Provide a statement that the supplier will coordinate with any city or county within which it provides water for the possible proclamation of a local emergency.	Water Shortage Contingency Planning	Appendix K, Chapter 10
x	x	Section 8.8	10632(a)(8)(A)	Describe the potential revenue reductions and expense increases associated with activated shortage response actions.	Water Shortage Contingency Planning	Appendix K, Chapter 11
x	x	Section 8.8	10632(a)(8)(B)	Provide a description of mitigation actions needed to address revenue reductions and expense increases associated with activated shortage response actions.	Water Shortage Contingency Planning	Appendix K, Chapter 11

Retail	Wholesale	2020 Guidebook Location	Water Code Section	Summary as Applies to UWMP	Subject	2020 UWMP Location
x		Section 8.8	10632(a)(8)(C)	Retail suppliers must describe the cost of compliance with Water Code Chapter 3.3: Excessive Residential Water Use During Drought	Water Shortage Contingency Planning	Appendix K, Chapter 11
x		Section 8.9	10632(a)(9)	Retail suppliers must describe the monitoring and reporting requirements and procedures that ensure appropriate data is collected, tracked, and analyzed for purposes of monitoring customer compliance.	Water Shortage Contingency Planning	Appendix K, Chapter 12
x		Section 8.11	10632(b)	Analyze and define water features that are artificially supplied with water, including ponds, lakes, waterfalls, and fountains, separately from swimming pools and spas.	Water Shortage Contingency Planning	Appendix K, Section 6.4
x	x	Sections 8.12 and 10.4	10635(c)	Provide supporting documentation that Water Shortage Contingency Plan has been, or will be, provided to any city or county within which it provides water, no later than 30 days after the submission of the plan to DWR.	Plan Adoption, Submittal, and Implementation	Appendix K, Chapter 14
x	x	Section 8.14	10632(c)	Make available the Water Shortage Contingency Plan to customers and any city or county where it provides water within 30 after adopted the plan.	Water Shortage Contingency Planning	Appendix K, Chapter 14

Retail	Wholesale	2020 Guidebook Location	Water Code Section	Summary as Applies to UWMP	Subject	2020 UWMP Location
	x	Sections 9.1 and 9.3	10631(e)(2)	Wholesale suppliers shall describe specific demand management measures listed in code, their distribution system asset management program, and supplier assistance program.	Demand Management Measures	N/A
x		Sections 9.2 and 9.3	10631(e)(1)	Retail suppliers shall provide a description of the nature and extent of each demand management measure implemented over the past five years. The description will address specific measures listed in code.	Demand Management Measures	Chapter 9
x		Chapter 10	10608.26(a)	Retail suppliers shall conduct a public hearing to discuss adoption, implementation, and economic impact of water use targets (recommended to discuss compliance).	Plan Adoption, Submittal, and Implementation	Chapter 10
x	x	Section 10.2.1	10621(b)	Notify, at least 60 days prior to the public hearing, any city or county within which the supplier provides water that the urban water supplier will be reviewing the plan and considering amendments or changes to the plan. Reported in Table 10-1.	Plan Adoption, Submittal, and Implementation	Section 10.1
x	x	Section 10.4	10621(f)	Each urban water supplier shall update and submit its 2020 plan to the department by July 1, 2021.	Plan Adoption, Submittal, and Implementation	Section 10.3

Retail	Wholesale	2020 Guidebook Location	Water Code Section	Summary as Applies to UWMP	Subject	2020 UWMP Location
x	x	Sections 10.2.2, 10.3, and 10.5	10642	Provide supporting documentation that the urban water supplier made the plan and contingency plan available for public inspection, published notice of the public inspection, published notice of the public hearing, and held a public hearing about the plan and contingency plan.	Plan Adoption, Submittal, and Implementation	Section 10.5
x	x	Section 10.2.2	10642	The water supplier is to provide the time and place of the hearing to any city or county within which the supplier provides water.	Plan Adoption, Submittal, and Implementation	Section 10.2.2
x	x	Section 10.3.2	10642	Provide supporting documentation that the plan and contingency plan has been adopted as prepared or modified.	Plan Adoption, Submittal, and Implementation	Section 10.4
x	x	Section 10.4	10644(a)	Provide supporting documentation that the urban water supplier has submitted this UWMP to the California State Library.	Plan Adoption, Submittal, and Implementation	Section 10.4
x	x	Section 10.4	10644(a)(1)	Provide supporting documentation that the urban water supplier has submitted this UWMP to any city or county within which the supplier provides water no later than 30 days after adoption.	Plan Adoption, Submittal, and Implementation	Section 10.4
x	x	Sections 10.4.1 and 10.4.2	10644(a)(2)	The plan, or amendments to the plan, submitted to the department shall be submitted electronically.	Plan Adoption, Submittal, and Implementation	Sections 10.4 and 10.6

Retail	Wholesale	2020 Guidebook Location	Water Code Section	Summary as Applies to UWMP	Subject	2020 UWMP Location
x	x	Section 10.5	10645(a)	Provide supporting documentation that, not later than 30 days after filing a copy of its plan with the department, the supplier has or will make the plan available for public review during normal business hours.	Plan Adoption, Submittal, and Implementation	Section 10.5
x	x	Section 10.5	10645(b)	Provide supporting documentation that, not later than 30 days after filing a copy of its water shortage contingency plan with the department, the supplier has or will make the plan available for public review during normal business hours.	Plan Adoption, Submittal, and Implementation	Section 10.5
x	x	Section 10.6	10621(c)	If supplier is regulated by the Public Utilities Commission, include its plan and contingency plan as part of its general rate case filings.	Plan Adoption, Submittal, and Implementation	N/A
x	x	Section 10.7.2	10644(b)	If revised, submit a copy of the water shortage contingency plan to DWR within 30 days of adoption.	Plan Adoption, Submittal, and Implementation	Section 10.6

Appendix B

UWMP Agency Notification Letters

Public Works Services

1400 Broadway Street
Redwood City, CA 94063
(650) 780-7464
Fax (650) 780-7445

February 2, 2021

City of Redwood City
Justin Chapel, Public Works Superintendent
1400 Broadway Street
Redwood City, CA 94063

Re: Notice of Preparation of Urban Water Management Plan and Water Shortage Contingency Plan - 2020 Update

The Urban Water Management Planning Act (California Water Code §10608–10656) requires the City of Redwood City ("RWC") to update its Urban Water Management Plan (UWMP) and associated Water Shortage Contingency Plan (WSCP) every five years. RWC is currently reviewing its existing UWMP and associated WSCP, which were updated in 2016, and considering revisions to the documents. The updated UWMP and WSCP are due by July 1, 2021. We invite your municipality/agency's participation in this revision process.

A draft of the 2020 UWMP and WSCP will be made available for public review and a public hearing will be scheduled in 2021. In the meantime, if you would like more information regarding the City's 2015 UWMP and WSCP and the schedule for updating these documents, or if you would like to participate in the preparation of the 2020 UWMP and WSCP, please contact Justin Chapel or Sindy Mulyono-Danre at:

Justin Chapel, Water Superintendent
City of Redwood City
1400 Broadway Street
Redwood City, CA 94063
Phone: (650) 780-7124
jchapel@redwoodcity.org

Sindy Mulyono-Danre, Recycled Water Superintendent
City of Redwood City
1400 Broadway Street
Redwood City, CA 94063
Phone: (650) 780-7470
smdanre@redwoodcity.org

Sincerely,

Justin Chapel
Public Works Superintendent

PUBLIC WORKS SERVICES
WATER UTILITES SERVICES DIVISION

1017 Middlefield Road
Redwood City, CA 94063
(650) 780-7301
Fax (650) 780-7225

May 18, 2021

Agency
ATTN: Contact
Address
City, State Zip

Re: **Notice of Public Hearing for Urban Water Management Plan and Water Shortage Contingency Plan - 2020 Update**

The Urban Water Management Planning Act (California Water Code §10608–10656) requires the City of Redwood City (City) to update its Urban Water Management Plan (UWMP) and associated Water Shortage Contingency Plan (WSCP) every 5 years. The City must also make the draft documents available for public review and hold a public hearing before adopting its UWMP and associated WSCP.

This is to notify you that the City will hold a public hearing on June 14, 2021 at 6:00 p.m. by virtual meeting to consider proposed revisions and updates to the 2020 UWMP and associated WSCP. We invite your agency's participation in the process. In conjunction with the update to the UWMP, the public may also provide input on the urban water use target included in the UWMP, any impacts to the local economy, and the City's method of determining its urban water use target.

The UWMP and associated WSCP will be made available for public review by May 24, 2021 at https://www.redwoodcity.org/water. Visit https://www.redwoodcity.org/city-hall/city-council/city-council-meetings-agendas-and-minutes for the City Council meeting agenda and for links to the virtual public hearing.

If you have any questions about the 2020 UWMP or WSCP or the process for updating these documents, please contact Justin Chapel or Sindy Mulyono-Danre at:

Justin Chapel, Water Superintendent
City of Redwood City
1400 Broadway Street
Redwood City, CA 94063
Phone: (650) 780-7469
jchapel@redwoodcity.org

Sindy Mulyono-Danre, Recycled Water Superintendent
City of Redwood City
1400 Broadway Street
Redwood City, CA 94063
Phone: (650) 780-7470
smdanre@redwoodcity.org

Sincerely,

Justin Chapel
Public Works Superintendent

Notification Distribution List

Alameda County Water District

California Water Service Co.

City of Brisbane

City of Burlingame

City of Daly City

City of East Palo Alto

City of Hayward

City of Menlo Park

City of Millbrae

City of Milpitas

City of Mountain View

City of Palo Alto

City of San Bruno

City of San Carlos

City of Santa Clara

City of Sunnyvale

Coastside County Water District

County of San Mateo

Estero Mun. Improvement Dist.

Mid-Peninsula Water District

North Coast County Water Dist.

Purissima Hills Water District

San Jose Municipal Water System

Silicon Valley Clean Water

Stanford University

Town of Hillsborough

Town of Woodside

Westborough Water District

Appendix C

UWMP Public Notification Notices

NOTICE OF PUBLIC HEARING
COUNCIL OF THE CITY OF REDWOOD CITY

URBAN WATER MANAGEMENT PLAN &
WATER SHORTAGE CONTINGENCY PLAN UPDATE

City Council Meeting
Date: Monday, June 14, 2021 at 6:00 p.m.
Location: Zoom Teleconference
https://redwoodcity.zoom.us/j/99481825639
Zoom Meeting ID: 994 8182 5639
Dial-in audio: (669) 900-6833

NOTICE IS HEREBY GIVEN that the Council of Redwood City via an electronic meeting platform, will conduct a public hearing to receive comments on the 2020 Urban Water Management Plan (UWMP) and Water Shortage Contingency Plan (WSCP), which are adopted every five years. The purpose of the UWMP and WSCP is to consolidate information regarding water supply and demand, provide public information, and improve state-wide water planning. In conjunction with the updates to the UWMP and WSCP, the community is given the opportunity to give input on the City's method of determining its urban water use target, the City's implementation plan for meeting said target and any impacts to the local economy resulting from this implementation plan. The UWMP and WSCP are available for inspection online at www.redwoodcity.org/water.

Due to COVID-19, all participants will join the meeting via teleconference pursuant to Governor Newsom's Executive Order N-29-20. To view or participate in the meeting, see the instructions posted on the agenda 72 hours in advance at www.redwoodcity.org/councilmeetings.

The public hearing will be held on Monday, June 14, 2021, at 6:00 p.m., or soon thereafter as the matter may be heard, via Zoom teleconference at https://redwoodcity.zoom.us/j/99481825639 , at which time and place all interested persons shall have the opportunity to present their concerns to the City Council. Those wishing to comment may either join via Zoom or call (669) 900-6833 at the time of the public hearing, or prior to the hearing by submitting written comments to the City Clerk's office at 1017 Middlefield Road, Redwood City, California 94063 or council@redwoodcity.org.

By: Pamela Aguilar, City Clerk

Publication Dates: May 28, 2021
June 4, 2021
June 11, 2021

Appendix D

Supplemental Population and Employment Estimate Information

Business Summary

Redwood City, CA
Redwood City, CA (0660102)
Geography: Place

Prepared by Esri

Data for all businesses in area	**Redwood City,...**			
Total Businesses:	4,022			
Total Employees:	60,280			
Total Residential Population:	82,887			
Employee/Residential Population Ratio (per 100 Residents)	73			
	Businesses		**Employees**	
by SIC Codes	**Number**	**Percent**	**Number**	**Percent**
Agriculture & Mining	52	1.3%	312	0.5%
Construction	230	5.7%	1,350	2.2%
Manufacturing	89	2.2%	4,649	7.7%
Transportation	63	1.6%	469	0.8%
Communication	31	0.8%	333	0.6%
Utility	6	0.1%	86	0.1%
Wholesale Trade	111	2.8%	1,122	1.9%
Retail Trade Summary	635	15.8%	7,652	12.7%
Home Improvement	38	0.9%	273	0.5%
General Merchandise Stores	19	0.5%	924	1.5%
Food Stores	74	1.8%	1,395	2.3%
Auto Dealers, Gas Stations, Auto Aftermarket	66	1.6%	1,126	1.9%
Apparel & Accessory Stores	28	0.7%	149	0.2%
Furniture & Home Furnishings	51	1.3%	338	0.6%
Eating & Drinking Places	228	5.7%	2,566	4.3%
Miscellaneous Retail	131	3.3%	881	1.5%
Finance, Insurance, Real Estate Summary	386	9.6%	2,495	4.1%
Banks, Savings & Lending Institutions	65	1.6%	730	1.2%
Securities Brokers	68	1.7%	489	0.8%
Insurance Carriers & Agents	63	1.6%	263	0.4%
Real Estate, Holding, Other Investment Offices	190	4.7%	1,013	1.7%
Services Summary	1,622	40.3%	36,623	60.8%
Hotels & Lodging	22	0.5%	445	0.7%
Automotive Services	108	2.7%	565	0.9%
Motion Pictures & Amusements	91	2.3%	815	1.4%
Health Services	241	6.0%	4,656	7.7%
Legal Services	101	2.5%	1,198	2.0%
Education Institutions & Libraries	75	1.9%	1,660	2.8%
Other Services	984	24.5%	27,284	45.3%
Government	98	2.4%	4,904	8.1%
Unclassified Establishments	699	17.4%	285	0.5%
Totals	4,022	100.0%	60,280	100.0%

Source: Copyright 2020 Infogroup, Inc. All rights reserved. Esri Total Residential Population forecasts for 2020.
Date Note: Data on the Business Summary report is calculated using **Esri's Data allocation method** which uses census block groups to allocate business summary data to custom areas.

November 18, 2020

Business Summary

Redwood City, CA
Redwood City, CA (0660102)
Geography: Place

Prepared by Esri

	Businesses		Employees	
by NAICS Codes	**Number**	**Percent**	**Number**	**Percent**
Agriculture, Forestry, Fishing & Hunting	5	0.1%	17	0.0%
Mining	0	0.0%	0	0.0%
Utilities	4	0.1%	33	0.1%
Construction	247	6.1%	1,466	2.4%
Manufacturing	91	2.3%	4,120	6.8%
Wholesale Trade	107	2.7%	1,069	1.8%
Retail Trade	390	9.7%	4,998	8.3%
Motor Vehicle & Parts Dealers	52	1.3%	1,056	1.8%
Furniture & Home Furnishings Stores	22	0.5%	125	0.2%
Electronics & Appliance Stores	28	0.7%	202	0.3%
Bldg Material & Garden Equipment & Supplies Dealers	38	0.9%	315	0.5%
Food & Beverage Stores	63	1.6%	1,295	2.1%
Health & Personal Care Stores	31	0.8%	266	0.4%
Gasoline Stations	14	0.3%	70	0.1%
Clothing & Clothing Accessories Stores	37	0.9%	196	0.3%
Sport Goods, Hobby, Book, & Music Stores	25	0.6%	159	0.3%
General Merchandise Stores	19	0.5%	924	1.5%
Miscellaneous Store Retailers	41	1.0%	309	0.5%
Nonstore Retailers	20	0.5%	81	0.1%
Transportation & Warehousing	42	1.0%	438	0.7%
Information	177	4.4%	17,537	29.1%
Finance & Insurance	208	5.2%	1,650	2.7%
Central Bank/Credit Intermediation & Related Activities	68	1.7%	738	1.2%
Securities, Commodity Contracts & Other Financial	77	1.9%	649	1.1%
Insurance Carriers & Related Activities; Funds, Trusts &	63	1.6%	263	0.4%
Real Estate, Rental & Leasing	200	5.0%	899	1.5%
Professional, Scientific & Tech Services	456	11.3%	7,096	11.8%
Legal Services	107	2.7%	1,219	2.0%
Management of Companies & Enterprises	15	0.4%	60	0.1%
Administrative & Support & Waste Management & Remediation	158	3.9%	2,261	3.8%
Educational Services	91	2.3%	1,720	2.9%
Health Care & Social Assistance	314	7.8%	5,498	9.1%
Arts, Entertainment & Recreation	63	1.6%	697	1.2%
Accommodation & Food Services	255	6.3%	3,034	5.0%
Accommodation	22	0.5%	445	0.7%
Food Services & Drinking Places	233	5.8%	2,589	4.3%
Other Services (except Public Administration)	401	10.0%	2,494	4.1%
Automotive Repair & Maintenance	89	2.2%	471	0.8%
Public Administration	99	2.5%	4,908	8.1%
Unclassified Establishments	699	17.4%	285	0.5%
Total	4,022	100.0%	60,280	100.0%

Date Note: Data on the Business Summary report is calculated using **Esri's Data allocation method** which uses census block groups to allocate business summary data to custom areas.

November 18, 2020

Appendix E

SB X7-7 Compliance Tables

SB X7-7 2020 Compliance Form

The SB X7-7 2020 Compliance Form **is for the calculation of 2020 compliance only. All retail suppliers must complete the SB X7-7 Compliance Form.** Baseline and target calculations are done in the SB X 7-7 Verification Form.

The SB X7-7 Verification Form is for the calculation of baselines and targets and is a separate workbook from the SB X7-7 2020 Compliance Form. Most Suppliers will have completed the SB X7-7 Verification Form with their 2015 UWMP and do not need to complete this form again in 2020. See Chapter 5 Section 5.3 of the UWMP Guidebook for more information regarding which Suppliers must, or may, complete the SB X7-7 Verification Form for their 2020 UWMP. 2020 compliance calculations are done in the SB X7-7 2020 Compliance Form.

Process Water Deduction tables will not be entered into WUE Data Portal tables.
SB X7-7 tables 4-C, 4-C.1, 4-C.2, 4-C.3, 4-C.4 and 4-D
A supplier that will use the process water deduction will complete the appropriate tables in Excel, submit them as a separate upload to the WUE Data Portal, and include them in its UWMP.

Where to submit? Suppliers submit the completed table data and UWMPs (including the Water Shortage Contingency Plan) electronically through the WUE Data Portal (https://wuedata.water.ca.gov/). The portal will be updated in Spring 2021 and will be announced to the urban listserv, DWR webpage and WUE Data Portal opening page when it is available for plan and table submittals.

Unlocking templates (use with caution): The templates provided in this workbook are formated to mirror the structure of information that is submitted through the WUE Data Portal for the electronic submission of Submittal Tables in the UWMP. The tables are offered in a protected (locked) version to maintain the structure of the templates. However, for those needing to adjust the tables for their own planning needs beyond the Submittal Tables, the password to 'unprotect' each worksheet is 'dwr' (no quotes). To unprotect the worksheet, go to the Review tab, select Unprotect Sheet, and enter the password 'dwr' in the pop-up (no quotes). Preparers will still need to submit the information using the original template structure provided. To redownload the templates in their original format, visit https://wuedata.water.ca.gov in the Resources button of the Urban Water Management Plan section (no login necessary).

SB X7-7 Table 0: Units of Measure Used in 2020 UWMP* *(select one from the drop down list)*
Acre Feet
**The unit of measure must be consistent throughout the UWMP, as reported in Submittal Table 2-3.*
NOTES:

SB X7-7 Table 2: Method for 2020 Population Estimate	
Method Used to Determine 2020 Population (may check more than one)	
☐	**1. Department of Finance** (DOF) or **American Community Survey** (ACS)
☐	**2. Persons-per-Connection Method**
☑	**3. DWR Population Tool**
☐	**4. Other** DWR recommends pre-review
NOTES:	

SB X7-7 Table 3: 2020 Service Area Population	
2020 Compliance Year Population	
2020	89,037
NOTES:	

SB X7-7 Table 4: 2020 Gross Water Use							
Compliance Year 2020	2020 Volume Into Distribution System *This column will remain blank until SB X7-7 Table 4-A is completed.*	2020 Deductions					2020 Gross Water Use
		Exported Water *	Change in Dist. System Storage* (+/-)	Indirect Recycled Water *This column will remain blank until SB X7-7 Table 4-B is completed.*	Water Delivered for Agricultural Use*	Process Water *This column will remain blank until SB X7-7 Table 4-D is completed.*	
	9,852			-		-	**9,852**

* **Units of measure (AF, MG , or CCF)** must remain consistent throughout the UWMP, as reported in SB X7-7 Table 0 and Submittal Table 2-3.

NOTES:

SB X7-7 Table 4-A: 2020 Volume Entering the Distribution System(s), Meter Error Adjustment

Complete one table for each source.

Name of Source	SFPUC
This water source is *(check one)* **:**	
☐	The supplier's own water source
☑	A purchased or imported source

Compliance Year 2020	Volume Entering Distribution System [1]	Meter Error Adjustment [2] *Optional* *(+/-)*	Corrected Volume Entering Distribution System
	9,852	-	9,852

[1] ***Units of measure (AF, MG , or CCF)*** *must remain consistent throughout the UWMP, as reported in SB X7-7 Table 0 and Submittal Table 2-3.*

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

NOTES

SB X7-7 Table 5: 2020 Gallons Per Capita Per Day (GPCD)		
2020 Gross Water ***Fm SB X7-7 Table 4***	**2020 Population** ***Fm SB X7-7 Table 3***	**2020 GPCD**
9,852	89,037	**99**
NOTES:		

SB X7-7 Table 9: 2020 Compliance							
Actual 2020 GPCD[1]	Optional Adjustments to 2020 GPCD					2020 Confirmed Target GPCD [1, 2]	Did Supplier Achieve Targeted Reduction for 2020?
	Enter "0" if Adjustment Not Used			TOTAL Adjustments[1]	Adjusted 2020 GPCD [1] *(Adjusted if applicable)*		
	Extraordinary Events[1]	Weather Normalization[1]	Economic Adjustment[1]				
99	-	-	-	-	99	124	**YES**

[1] *All values are reported in GPCD*

[2] ***2020 Confirmed Target GPCD*** *is taken from the Supplier's SB X7-7 Verification Form Table SB X7-7, 7-F.*

NOTES:

SB X7-7 Table 7: 2020 Target Method *Select Only One*		
Target Method		Supporting Documentation
☐	Method 1	SB X7-7 Table 7A
☐	Method 2	SB X7-7 Tables 7B, 7C, and 7D *Contact DWR for these tables*
☑	Method 3	SB X7-7 Table 7-E
☐	Method 4	Method 4 Calculator

NOTES:

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
☑	100%	San Francisco Bay	131	124
☐		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
Target *(If more than one region is selected, this value is calculated.)*				**124**

NOTES:

SB X7-7 Table 7-F: Confirm Minimum Reduction for 2020 Target			
5 Year Baseline GPCD *From SB X7-7 Table 5*	Maximum 2020 Target[1]	Calculated 2020 Target[2]	**Confirmed 2020 Target**
133	126	124	**124**

[1] Maximum 2020 Target is 95% of the 5 Year Baseline GPCD [2] 2020 Target is calculated based on the selected Target Method, see SB X7-7 Table 7 and corresponding tables for agency's calculated target.

NOTES:

Appendix F

DWR Population Tool Outputs

Sign Out

Please print this page to a PDF and include as part of your UWMP submittal.

Confirmation Information

Generated By	Water Supplier Name	Confirmation #	Generated On
Sydney Cunniff	Redwood City	5480976700	12/18/2020 6:57:20 AM

Boundary Information

Census Year	Boundary Filename	Internal Boundary ID
1990	No Boundary Selected	N/A
2000	Water Service Area.kml	599
2010	Water Service Area.kml	599
1990	No Boundary Selected	N/A
2000	Water Service Area.kml	599
2010	Water Service Area.kml	599

Baseline Period Ranges

10 to 15-year baseline period

Number of years in baseline period:	10
Year beginning baseline period range:	2000
Year ending baseline period range[1]:	2009

5-year baseline period

Year beginning baseline period range:	2005
Year ending baseline period range[2]:	2009

[1] The ending year must be between December 31, 2004 and December 31, 2010.

[2] The ending year must be between December 31, 2007 and December 31, 2010.

Persons-Per-SF Connection and Persons-Per-MF/GQ Connection

	Census Block Group Level	Census Block Level						
Year	% Population in SF Housing	Service Area Population	Population in SF Housing (calculated)	Population in MF/GQ Housing (calculated)	# SF Connections	# MF/GQ Connections	Persons per SF Connection	Persons per MF/GQ Connection
1990	N/A	0	N/A	N/A			2.57	17.70
1991	-	-	-	-	-	-	2.59	17.65
1992	-	-	-	-	-	-	2.61	17.61
1993	-	-	-	-	-	-	2.63	17.56
1994	-	-	-	-	-	-	2.66	17.51
1995	-	-	-	-	-	-	2.68	17.46
1996	-	-	-	-	-	-	2.70	17.41
1997	-	-	-	-	-	-	2.72	17.36
1998	-	-	-	-	-	-	2.74	17.31
1999	-	-	-	-	-	-	2.76	17.27
2000	64.92%	82,023	53,253	28,770	19122	1671	2.78	17.22
2001	-	-	-	-	-	-	2.80	17.17
2002	-	-	-	-	-	-	2.82	17.12
2003	-	-	-	-	-	-	2.85	17.07
2004	-	-	-	-	-	-	2.87	17.02
2005	-	-	-	-	-	-	2.89	16.98
2006	-	-	-	-	-	-	2.91	16.93
2007	-	-	-	-	-	-	2.93	16.88
2008	-	-	-	-	-	-	2.96	16.83
2009	-	-	-	-	-	-	2.98	16.78
2010	66.53%	84,082	55,939	28,143	18650	1682	3.00	16.73
2011	-	-	-	-	-	-	2.78	17.22
2012	-	-	-	-	-	-	2.78	17.22
2013	-	-	-	-	-	-	2.78	17.22
2014	-	-	-	-	-	-	2.78	17.22
2015	-	-	-	-	-	-	2.78	17.22
2020	-	-	-	-	-	-	3.22 *	16.25 *

Population Using Persons-Per-SF Connection and Persons-Per-MF/GQ Connection

Year		# SF Connections	# MF/GQ Connections	Persons per SF Connection	Persons per MF/GQ Connection	SF Population	MF/GQ Population	Total Population
10 to 15 Year Baseline Population Calculations								
Year 1	2000	19122	1671	2.78	17.22	53,253	28,770	82,023
Year 2	2001	18433	1678	2.80	17.17	51,649	28,813	80,462
Year 3	2002	18440	1682	2.82	17.12	52,075	28,799	80,874
Year 4	2003	18481	1688	2.85	17.07	52,597	28,819	81,416
Year 5	2004	18414	1682	2.87	17.02	52,811	28,634	81,446
Year 6	2005	18392	1681	2.89	16.98	53,153	28,535	81,688
Year 7	2006	18541	1703	2.91	16.93	53,991	28,825	82,816
Year 8	2007	18608	1697	2.93	16.88	54,596	28,640	83,236
Year 9	2008	18593	1694	2.96	16.83	54,961	28,507	83,468
Year 10	2009	18611	1690	2.98	16.78	55,424	28,357	83,780
5 Year Baseline Population Calculations								
Year 1	2005	18392	1681	2.89	16.98	53,153	28,535	81,688
Year 2	2006	18541	1703	2.91	16.93	53,991	28,825	82,816
Year 3	2007	18608	1697	2.93	16.88	54,596	28,640	83,236
Year 4	2008	18593	1694	2.96	16.83	54,961	28,507	83,468
Year 5	2009	18611	1690	2.98	16.78	55,424	28,357	83,780
2020 Compliance Year Population Calculations								
2020		19201	1677	3.22 *	16.25 *	61,793	27,244	89,037

Hide Print Confirmation

Appendix G

Preliminary Assessment of Groundwater Production Potential

17 December 2020

TECHNICAL MEMORANDUM

To: Justin Chapel, City of Redwood City (City)

From: Anona Dutton, PG, CHg, EKI Environment & Water, Inc. (EKI)
Christina Lucero, PG, EKI
Nelson Schlater, PE, EKI

Subject: Preliminary Assessment of Groundwater Production Potential
(EKI C00110.00)

The City of Redwood City (City) has requested that EKI Environment & Water, Inc. (EKI) conduct an assessment of the groundwater (GW) production potential within the City (i.e. a "GW Study"). This technical memorandum (TM) describes the work performed to date as part of the GW Study, the results of which will be incorporated, as applicable, into the 2020 Urban Water Management Plan (UWMP).

1. INTRODUCTION

The City purchases all of its potable water from the San Francisco Public Utilities Commission (SFPUC) Regional Water System (RWS). The City's supply is limited to its contractual allocation, or Individual Supply Guarantee (ISG), and can be reduced during drought conditions, an issue which may be exacerbated by the Bay-Delta Plan[1]. In 2002, the City began investigating options to reduce reliance on the RWS, which included water tranfers, new sources of water supply, water conservation, and recycled water use (Todd, 2003a). The City has also been supplying recycled water to selected customers since 2000, with the most recent service area expansion (Phase II) occurring in 2016. In 2006, the City conducted a geophysical study for a potential water supply well at Red Morton Park to explore the option of new sources of water supply (Geoconsultants, 2006). However, based on recent disucssions with the City, no water supply well was ever drilled and the City remains reliant on the RWS and recycled water to meet their customers' water demands.

2. GROUNDWATER STUDY OBJECTIVES

The City requested this GW Study to support consideration of potential future groundwater development and to assess whether groundwater should be included in the City's planned supply portfolio in the 2020 UWMP. This GW Study is intended to provide a foundation to assess the potential for groundwater production within the City and the associated permitting pathways and potential costs. Specifically, the objectives of the GW Study are as follows:

- Compile publicly available information on groundwater production and quality information, water level data, aquifer testing results, and estimates of aquifer recharge and discharge;

[1] Water Quality Control Plan for the San Francisco Bay/Sacramento–San Joaquin Delta Estuary. Relevant information can be found at https://www.waterboards.ca.gov/waterrights/water_issues/programs/bay_delta/.

- Perform an assessment of the local aquifer characteristics and conduct a high-level evaluation of groundwater supply opportunities and constraints to identify areas of potential groundwater production opportunity;
- Identify regulatory constraints for permitting and construction of a new groundwater well; and
- Develop conceptual costs for permitting and construction of a new groundwater well.

Information developed as part of the GW Study will be used by the City to inform whether they pursue additional investigations in support of groundwater well construction, either for emergency backup supply or as part of their water supply portfolio.

3. SUMMARY OF FINDINGS

The City overlies the southern portion of the San Mateo Plain Subbasin (Basin) of the Santa Clara Valley Groundwater Basin (groundwater basin number 2-009.03; California Department of Water Resources [DWR], 2019) (**Figure 1**). The Basin has not been adjudicated, nor is the Basin actively managed in its entirety by any of the overlying entities or local agencies (Metzger & Fio, 1997; RWQCB, 2003; EKI et al., 2018).

The Basin is filled with alluvial fan deposits formed by tributaries to San Francisco Bay that drained across the Basin and toward the center of the Bay (RWQCB, 2003; EKI et al., 2018). These alluvial fan deposits are interbedded with thick clay aquitards or confining layers and comprise the main water bearing formations within the Basin (**Figures 2 and 3**). Generally, groundwater flow in the Basin is from the western uplands area to the northeast toward the San Francisco Bay (Todd, 2003a; RWQCB, 2003; Metzger and Fio, 1997; Metzger, 2002; EKI et al., 2018), although faulting and groundwater extraction can locally alter the groundwater flow direction.

An estimate of the annual groundwater recharge and discharge in the City's service area was developed based on application of the San Mateo Plain Groundwater Model (SMPGWM; **Table 1**), Within the City's service area, annual aquifer recharge and discharge are each estimated to be approximately 3,000 acre-feet per year (AFY) which suggests that the portion of the Basin underlying the City is currently in a state of approximate equilibrium. It is estimated that some portion of the annual recharge could be captured without creating significant detrimental effects to the aquifer system (e.g., a reversal of groundwater sub-flow out of the Basin, which could induce saltwater intrusion).

Publicly available well construction, water level, water quality and water use information for other entities that overlie the Basin in the vicinity of Redwood City was compiled. The majority of the productive groundwater wells are screened deeper than 200 feet below ground surface (ft bgs) and the estimated yield averages 200 gallons per minute (GPM) (**Table 2**). The water quality in the Basin is such that it would be expected to be of sufficient quality for municipal and irrigation supply, although some level of treatment may potentially be required depending on well location, depth, and intended use (EKI et al., 2018).

A constraints analysis was conducted to identify potential areas where the City may want to conduct further investigations to assess groundwater yield and quality (**Figures 4, 5 and 6**). Based on available information, it is recommended that the City consider developing one or more wells as back-up supply wells (i.e., standby wells) in the event of an emergency condition; the requisite permitting pathway and estimated costs for such a well are provided herein. It is anticipated that primary drinking water standards (i.e., primary Maximum Contaminant Levels, or MCLs) will likely be met without treatment and treatment for certain constituents with secondary drinking water standards[2] would not be required for a standby well. However, if the City did elect to incorporate the wells as part of their normal year supply portfolio, additional analysis would be required. Costs and permitting complexity, specifically environment permitting, would also be expected to increase and treatment for secondary drinking water standards would most likely be required.

4. SAN MATEO PLAIN SUBBASIN OVERVIEW

The City is located within the 38,000-acre Basin. The Basin is not adjudicated, nor has it been found by DWR to be in a condition of overdraft. As part of the implementation of the Sustainable Groundwater Management Act (SGMA), the Basin was ranked as a “very low priority” basin (DWR, 2019); the Basin is therefore not subject to the requirements of SGMA.

Figure 1 shows the Basin boundary, surrounding features, and the location of the City. The Basin boundaries are the foothills of the Santa Cruz Mountains near Alameda de las Pulgas on the west, San Francisco Bay on the east, the Westside Basin on the north near Burlingame Avenue and Coyote Point, and the Santa Clara Subbasin on the south at the San Mateo - Santa Clara County line (DWR, 2004). The northern Basin boundary corresponds to an area near Coyote Point where unconsolidated sediments are thin and bedrock crops out at the surface (RWQCB, 2003; Hensolt and Brabb, 1990).

Both the southern and eastern edges of the Basin are not physical hydrogeologic barriers to groundwater flow (RWQCB, 2003; Fio and Leighton, 1995; EKI et al., 2018). Depending upon streamflow, recharge, and pumping conditions, groundwater could flow either north or south across the southern boundary. The southern boundary coincides with San Francisquito Creek, which is a source of recharge to the Basin (Metzger, 2002; EKI et al., 2018). The eastern boundary is operationally defined as the edge of San Francisco Bay (the Bay); however, there is evidence that the Basin is hydraulically connected to aquifers in the East Bay (Fio and Leighton, 1995; RWQCB, 2003; EKI et al., 2018).

The Basin is bounded at the base by bedrock, consisting of marine sedimentary and low-grade metamorphic rocks of Mesozoic to Tertiary age. These older rocks are former seafloor sediments that were buried, then deformed, chemically altered, and emplaced by faulting and other tectonic movements along lithospheric plate boundaries. The sedimentary rocks range from well-consolidated shales, sandstones, and cherts of the Franciscan Complex, to very weakly-consolidated alluvial sediments of the Santa Clara Formation (Ferriz, 2001; Wentworth, 1997).

The San Francisco Bay and the Santa Clara Valley are part of a structural trough, bounded by major faults, that was created by movement along these faults (Ferriz, 2001). The San Andreas Fault and the Hayward Fault are the primary structural features controlling the shape of the structural trough. Numerous smaller faults exist in the area and control more local landscape features, both above and below the current land surface (Oliver, 1990; Hensolt and Brabb, 1990).

---

[2] Constituents may include iron, manganese, total dissolved solids (TDS), and chloride.

4.1. San Mateo Plain Subbasin Geology

The Basin filled with Plio-Pleistocene and Holocene alluvial fan deposits formed by tributaries to San Francisco Bay that drained across the Basin and toward the center of the Bay (RWQCB, 2003). Holocene refers to sediments laid down less than about 10,000 years ago; Pleistocene deposits are between 10,000 and 2 million years old; and Pliocene sediments were deposited between 2 million and 5 million years ago. The Holocene and Pleistocene epochs together make up the Quaternary period, during which most of the important local aquifer sediments were deposited (DWR, 2004).

Figure 2 shows a generalized surficial geologic map of the Basin. The alluvial deposits range from sands and gravels deposited in the uplands along the foothills and along existing stream channels, to silts and clays deposited far out on the flatlands marginal to the present-day Bay. The alluvial deposits are thinner near the bedrock foothills along the western and northern edges of the Basin, and increase in thickness toward the Bay (Metzger, 2002; RWQCB, 2003). A general description of the primary geologic units that comprise the two main Basin aquifer systems is provided below.

4.1.1. Quaternary Alluvium

The Quaternary alluvium includes Holocene and Pleistocene deposits of gravel, sand, silt, and clay that were deposited by streams as they converged and flowed eastward from the Santa Cruz Mountains toward the Bay. At the Bay margins, stream channels are typically confined within natural levees (Helley & Lajoie, 1979). The coarse-grained channel sediments vary laterally to silty and clay-rich material, reflecting the stream courses shifting over time and depositing interfingered and laterally-discontinuous gravel, sand, and clay layers (Ferriz, 2001; RWQCB, 2003). The coarse-grained units are not always discontinuous, with some older deposits laid down in fairly-continuous layers.

Within the Quaternary alluvium, the shallowest sand and gravel unit is a water-table aquifer which occurs in upland areas away from the Bay margin and is underlain by clays and silts. Below this unconfined aquifer, but still within the Quaternary alluvium, are several fairly-distinct subunits of coarser-grained materials, which make up a sequence of semiconfined and confined aquifers in the Basin (DWR, 2004; Poland & Garrett, 1943). Drilling in the Basin and locally beneath the Bay has revealed confining layers of clay and silt up to 200 feet thick (Fio & Leighton, 1995; Newhouse, 2004).

4.1.2. Santa Clara Formation

The Santa Clara Formation is of Plio-Pleistocene age and is probably present beneath the Quaternary alluvium throughout much of the Basin (DWR, 2004). Composed of interbedded and laterally-discontinuous gravel, sand, silt and clay, beds of the Santa Clara Formation tend to dip gently east (DWR, 2004), but outcrops of the Santa Clara Formation mapped in the hills to the west exhibit variable orientation (Brabb, Graymer, & Jones, 2000). Aquifer permeability in the Santa Clara Formation tends to increase from west to east and decrease with depth (DWR, 2004), following trends in grain-size distribution. The Santa Clara Formation can be quite similar geologically to the overlying younger alluvial deposits; thus, some wells drilled into deeper alluvium may in fact technically be completed in poorly-consolidated Santa Clara Formation (Poland & Garrett, 1943; Maggiora, 2000).

4.1.3. Franciscan Complex and Other Basement Rocks

Underlying the deep aquifer materials of the Santa Clara Formation and other Tertiary geologic units are complexes of altered, faulted, sheared, and folded Mesozoic rocks. The Franciscan Complex, in the vicinity of the City, is made up of weakly to completely metamorphosed sedimentary and igneous rocks that were originally seafloor sediments and oceanic crust (Brabb, Graymer, & Jones, 2000).

These bedrock units outcrop along the western margins of the Basin and are not generally considered to be water-bearing units. Local zones of fracturing or less-consolidated bedding within the Franciscan Complex may be conduits for very limited quantities of groundwater beneath the overlying alluvium.

4.1.4. Faults

Numerous faults exist in the Basin, some of which (e.g., the San Andreas, Hayward, Pilarcitos, and San Gregorio Faults) have displaced massive slabs of the earth's crust more than 90 miles (Brabb, Graymer, & Jones, 2000). Bedrock contours beneath the alluvium are influenced by buried faults which are not visible at the surface but can be inferred from local variations in the Earth's geomagnetic and gravity fields (Oliver, 1990). The San Francisquito Fault runs northeast from the top of the San Francisquito Creek alluvial fan out under the Bay, whereas the Atherton Fault, the Belmont Hill Fault, and the Pulgas Fault each run northwest, roughly parallel to the San Andreas Fault.

The Pulgas Fault dips southwest and is classified as a reverse fault, responding to compressional forces pushing inward toward the Bay. It forms a sharp boundary between water-bearing unconsolidated alluvium to the northeast, and very low permeability bedrock to the southwest, and as such, it may act as a barrier to subsurface groundwater flow from the foothills to the Basin (Metzger, 2002). The Pulgas Fault is mapped along the base of the hills west of the City (Brabb, Graymer, & Jones, 2000; Oliver, 1990). Oliver (1990) also mapped a hidden "Redwood City Fault Zone" directly beneath the City, based upon interpretation of geophysical measurements. Sleeter et al. (2004) also mapped a splay of the Pulgas Fault through Redwood Point. The effect of these buried faults on groundwater flow in deeper alluvium below the City is unknown but may be significant.

4.2. San Mateo Plain Subbasin Hydrogeology

Broadly speaking, the Basin can be divided into two aquifer systems, one shallow (approximately shallower than 120 ft bgs) and one deep (generally occur at depths ranging from 200 ft bgs to 400 ft bgs; Metzger, 2002). Where borelhole data exist in the Basin, a clay aquitard containing thin, minor intervals of coarser sand extends vertically from about 100 ft bgs to about 200 ft bgs, separating the shallow aquifer from the deeper aquifer system (Metzger, 2002).

Figure 3 shows variably oriented cross-sections, depicting general subsurface relationships in the portions of the Basin that underlie the City. These cross-sections were constructed using publicly-available stratigraphic data from a limited number of deep wells and boreholes in the area of interest (EKI et al., 2018). Additionally, as part of this GW Study, well logs for irrigation wells mapped near cross-sections D-D' and E-E' were compiled (see Attachment A). These well logs confirm interbedded intervals of gravel and clay units. Well logs that fall along cross-section E-E' were added to **Figure 3** and confirm the presence of gravel units beneath the main portion of the City.

Cross-section A-A' extends north to south along the western edge of the Basin boundary. Beneath the City, alluvial sediment thickness ranges from approximately 25 feet to 250 feet. Aquifer material is primarily fine-grained based on the very limited available borehole data.

Cross-section B-B' extends north to south along the eastern edge of the City. The total thickness of the alluvial sediments ranges up to approximately 700 feet. Very limited borehole data shows thick fine-gained clay units with discontinuous lenses of coarse-grained materials.

Cross-section D-D' extends west to east through the northern, Redwood Shores portion of the City. At depth, aquifer units in the western area are undifferentiated units of coarse-grained sands and gravel units which were most likely deposited as part of the alluvial fan associated with Belmont Creek. Moving eastward towards the Bay, interbedded clay units become more prevalent.

Cross-section E-E' extends southwest to northeast through the main portion of the City. As depicted near the southwestern (landward) end of cross-section E-E', the clay aquitard is not as well-developed on the western side of the Basin as it is closer to the Bay. Aquifer units in the western region are relatively undifferentiated, with discontinuous lenses of unconsolidated coarse- and fine-grained Pleistocene and Holocene sediments predominant (Fio and Leighton, 1995; Metzger, 2002). Areas near the foothills where a clay aquitard is not present are most likely recharge zones for the deeper alluvial aquifers in the Basin (Metzger, 2002). Recharge to the shallow aquifer, and potentially the deep aquifer, occurs along the gravel channel deposits of San Francisquito Creek and other drainage channels, such as Atherton Channel (Metzger & Fio, 1997). Other drainages, such as Redwood Creek, Ojo de Agua, and Cordilleras Creek also probably contribute recharge to the shallow and deeper aquifers, although a lack of wells and hydrogeologic data in the vicinity of the City makes estimation inexact (RWQCB, 2003; Fio & Leighton, 1995).

Cross-section F-F' extends west to east along the southern edge of the City. Similar to cross-section E-E', the aquifer units are composed of discontinuous lenses of coarse-grained sands and gravel units. Moving towards the Bay to the east, fine-grained materials become more prevalent.

Closer to the Bay margins, the Basin is more clearly divided into the upper and lower aquifer systems discussed above; the shallow aquifer corresponding to the Holocene and late Pleistocene alluvium, and a deeper aquifer corresponding to the Plio-Pleistocene age alluvium (possibly the Santa Clara Formation) (Metzger, 2002). The shallow aquifer is generally encountered at depths of less than 120 ft bgs and may correspond laterally under the Bay to the Newark shallow aquifer in the Niles Cone groundwater basin in the East Bay area (Fio and Leighton, 1995; RWQCB, 2003; Todd, 2003a). The Niles Cone Subbasin is managed by the Alameda County Water District (ACWD). Todd (2003a) and EKI (2018) describe hydraulic tests conducted by DWR in the 1960s that recorded drawdown in wells on the eastern side of the Bay due to pumping in a well located on the western side.

4.3. Review of Local Climate and Water-Balance Information

The climate on the Bay side of San Mateo County is Mediterranean, with wet winters and dry summers. Average annual precipitation increases from about 14 inches per year (in/yr) at the Bay shoreline to about 42 in/yr along the crest of the main Coast Range ridge (EKI et al., 2018). The main sources of natural recharge to the local groundwater aquifers include infiltration of water along the streambeds that enter the Basin valley from the upland areas (e.g., San Francisquito Creek, Belmont Creek, Cordilleras Creek, Redwood Creek, and Arroyo Ojo de Agua) and, to a lesser extent, percolation of precipitation that falls directly on the land surface. Additional recharge occurs as a result of infiltration of applied irrigation water. Basin outflows include groundwater seepage to creeks and tidal wetlands, limited municipal and private well pumping, groundwater infiltration into sewers, and dewatering pumping. Based on the water budget resulting from the SMPGWM, average recharge to the portion of the City's service area that falls within the Basin is approximately 1,100 AFY.

Total inflows and outflows to the City's service area within the Basin average about 3,200 AFY under historical land and water use conditions and average about 2,700 AFY under projected land and water use conditions with climate change (**Table 1**). The approximate balance between total inflows and total outflows reflects an assumption that there is no long-term change in storage. The groundwater seepage and outflow is estimated to be 3,000 AFY, whereas current groundwater pumping is estimated to be approximately 200 AFY, which indicates that there is available yield to support increased pumping. However, it is likely not possible to capture all current subsurface outflow without incurring undesirable results such as land subsidence, seawater intrusion, or reduction in aquatic or riparian habitat. Avoiding those negative impacts will require maintaining water levels above subsidence thresholds, subsurface outflow at rates sufficient to minimize inflows of salt water from the Bay or salt ponds, and groundwater-supported base flow in creeks sufficient to support sensitive aquatic or riparian habitat.

4.4. Groundwater Levels and Flow Direction

Generally, groundwater flow in the Basin is from the western uplands area to the northeast toward the Bay (Todd, 2003a; RWQCB, 2003; Metzger and Fio, 1997; Metzger, 2002; EKI et al., 2018). However, because of the discontinuous nature of the water-bearing units within the Basin, groundwater levels vary from well to well and groundwater may be confined, semi-confined, or unconfined depending on the location of the well and depth of the screened interval (Todd, 2003a). A review of limited available water level data indicates that groundwater levels within the Basin reached historical lows in the 1960s and have increased since then when most users switched to the newly available imported water supplies (EKI et al., 2018). Currently the groundwater levels are in a relatively stable condition.

Four groundwater level snapshots for deep wells are presented from Fall 1994, Fall 2010, Fall 2016, and Spring/Summer 2017 (see Attachment B). The maps show that groundwater elevations within the Basin range from less than 5 feet above mean sea level (ft msl) to approximately 50 ft msl. The gradient is generally steeper in the inland areas than in the areas closer to the Bay, a similar pattern to the topography.

5. ESTIMATE OF HISTORICAL AND POTENTIAL FUTURE GROUNDWATER DEMANDS

Groundwater use in the Basin has been relatively limited for the last several decades, as the primary water supply source for the overlying population has been imported water from the SFPUC RWS. The only municipal water suppliers within the Basin that utilize groundwater as a potable supply source are Palo Alto Park Mutual Water Company, O'Connor Tract Co-operative Water Company, and the City of East Palo Alto. Groundwater is also used by public and provate entities for landscape or domestic irrigation purposes. Total groundwater production for water supply within the Basin is approximately 2,300 AFY (EKI et al., 2018)[3]. It should also be noted that additional groundwater pumping occurs in the Basin for the purposes of contaminated site remediation and dewatering.

5.1. City of Redwood City Groundwater Use

There are a limited number of private well owners within the City that use local groundwater for domestic water uses and irrigation (**Figure 4**). Intermittent groundwater extraction of up to 27 AFY is reported by Sequoia High School for landscape irrigation (RWC UWMP, 2005). The Pacific Shores Development, which is located in the eastern portion of the City along Seaport Boulevard, reportedly has at least three wells that are used for landscape irrigation; the total water use from these wells is estimated to be 39 AFY (EKI et al., 2018). RMC Lonestar Cement Company (RMC), which is also located along Seaport Boulevard, reportedly historically operated multiple groundwater wells. The total groundwater extraction from the other private domestic and irrigation wells are not available; however the SMPGWM estimates water use from these wells total approximately 100 AFY.

As part of a study conducted on behalf of the City, Todd (2003a) estimated that between 500 AFY and 1,000 AFY could be extracted from the aquifer beneath the City without exceeding the safe yield of the local aquifer. The City did not identify groundwater as a current or potential future source of supply in its 2015 UWMP, and although the City did initiate a pilot groundwater exploration study at Red Morton Park in 2006 (Geoconsultants, 2006), City staff are not aware of any active City groundwater wells.

5.2. Groundwater Use by Nearby Entities

The following summarizes publicly-available data regarding current and projected future uses of groundwater by neighboring entities that overlie the Basin.

5.2.1. Mid-Peninsula Water District

No current use of groundwater has been reported by the Mid-Peninsula Water District (MPWD; BAWSCA, 2020), which serves the cities of Belmont and San Carlos, located immediately north of the City. Although MPWD has started exploring groundwater as a potential supplemental supply, no groundwater use is expected in the near future.

5.2.2. Town of Atherton

Metzger and Fio (1997) estimated that over 500 irrigation wells exist within the Town of Atherton, and that at least 100 of these wells were constructed during drought conditions that persisted from 1987 to 1992. The combined annual groundwater use in Atherton between 1993 and 1995 was estimated to be as much as 710 AFY, or 20% of the total water demand in Atherton (Metzger and Fio, 1997). Another study (Metzger, 2002) estimated that groundwater use from all wells in the Atherton and Menlo Park area could be as high as 2,500 AFY. In the mid-1990s, local recharge to the aquifer near Atherton due to percolation along stream channels, infiltration from rainfall, and excess irrigation (i.e. “return flows”) appeared sufficient to sustain groundwater extraction at then-current rates. Water levels were stable, and the

---

[3] The groundwater production value stated above excludes City of East Palo Alto which did not start pumping from its re-activated Gloria Way Well in 2018.

groundwater gradient was towards the San Francisco Bay indicating that the risk from saltwater intrusion was minimal (Metzger and Fio, 1997). Under 2016 land use conditions, domestic, irrigation, and institutional groundwater use in and near Atherton was estimated at approximately 730 AFY (EKI et al., 2018), indicating that groundwater extraction from the private wells within Atherton has not changed significantly since the 1990s.

5.2.3. City of Menlo Park

The total groundwater extraction from private wells located within the City of Menlo Park is estimated to be approximately 1,000 AFY (Todd, 2003b). Menlo Park is actively pursuing groundwater as an emergency/backup water supply source. Its first groundwater well reached completion in 2020 with an estimated capacity of 1,500 GPM. Menlo Park also plans to construct an additional one or two wells in order to achieve another 1,500 GPM of emergency/backup supply. As these wells are only expected to be operated in the event of a water supply emergency, they are not likely to represent an on-going demand on the Basin.

5.2.4. City of East Palo Alto

As many as 200 private groundwater wells are located in East Palo Alto (EPA UWMP, 2005). In addition, the Palo Alto Park Mutual Water Company supplies groundwater as the drinking water supply to the western portion of East Palo Alto, where annual production volume is estimated to be approximately 523 AFY (EKI et al., 2018).

East Palo Alto owns one groundwater well (Gloria Way) which could provide up to 450 AFY of supply (EPA UWMP, 2015). However, the well has only been minimally operational since its construction in 1981, due to poor water quality. The Gloria Way well has recently been retrofitted with a treatment system and is expected to be back on-line soon. East Palo Alto is also progressing with a second groundwater well at the Pad D site. The Pad D well will serve as a standby well with limited groundwater use.

5.2.5. O'Connor Water Company (serving Cities of Menlo Park and East Palo Alto)

O'Connor Tract Co-operative Water Company is a non-profit organization supplying water to certain areas of East Palo Alto and Menlo Park. The Company currently operates two wells in Menlo Park. The total annual production volume is estimated to be approximately 325 AFY (EKI et al., 2018).

6. AVAILABLE WELL PRODUCTION, CONSTRUCTION AND WATER QUALITY INFORMATION IN THE VICINITY OF REDWOOD CITY

6.1. Available Well Construction and Production Information

Limited deep wells or boreholes exist within the City; thus, the local aquifers have not been thoroughly characterized at the site level. Limited seismic refraction profiling was performed in the 1970s as part of a regional effort by the U.S. Geological Survey to determine depths to bedrock; the depth to bedrock in the central area of the City is estimated to be about 400 ft bgs (Hazlewood, 1976). These data have been incorporated into the cross-sections shown on **Figure 3**.

Additional local information was obtained from DWR Well Completion Reports, well-drilling and hydraulic-testing reports concerning wells on properties within the City (e.g., wells Pacific Shores 1, 2, and 3 and PPC-1 through PPC-8 as discussed in Poland & Garrett, 1943; Bohley/Maley, 1993; Maggiora, 2000; Maggiora, 2001) and is provided in **Table 2** (see also Attachment A). These data show that the majority of the local production wells are screened in the deeper aquifer system (i.e., generally greater than 200 ft bgs).

Boreholes on the Pacific Shores and RMC properties encountered the top of the shallow alluvial aquifer at depths of 40 to 50 ft bgs, and the bottom of the shallow aquifer between 60 and 90 ft bgs. Deeper drilling has revealed a clay and silt aquitard extending some 70 to 150 feet vertically below the shallow aquifer. The deeper alluvial aquifer may be encountered beneath the aquitard at depths as shallow as 130 ft bgs or as deep as 230 ft bgs. The deeper aquifer varies from approximately 100 to 200 feet in thickness and probably lies directly upon "bedrock", i.e., the much older alluvial sediments of the Santa Clara Formation or the older metasediments of the Franciscan Complex. Wells in the City are screened broadly from about 40 ft bgs to about 390 ft bgs (**Table 2**). Based on these limited corollaries, it is anticipated that production wells drilled within the City would be screened below about 200 ft bgs, down to as much as 350 ft bgs, depending upon encountered stratigraphy and water quality.

Potential well yields within the City may be estimated from pumping rate data from wells on the adjacent Pacific Shores and RMC sites, where groundwater extraction has varied since the 1920s between 25 GPM and 550 GPM (Poland & Garrett, 1943; Bohley/Maley, 1993; Maggiora, 2001) (**Table 2**). Sustained pumping rates appear to range from 100 to 180 GPM per well (Poland & Garrett, 1943; Bohley/Maley, 1993). Furthermore, additional well logs (see also Attachment A) show that pumping tests completed after well installation estimate well yields of 30 GPM to 160 GPM. As such, typical groundwater production rates for individual wells appear to be approximately 200 GPM[4].

6.2. Available Groundwater Quality Data

6.2.1. Potential Consituents of Concern

The San Mateo Plain Groundwater Basin Assessment (EKI et al., 2018) includes a comprehensive evaluation of the Basin groundwater quality based on available data. The evaluation indicates that local groundwater is generally hard. In some cases, the measured concentrations of total dissolved solids (TDS), chloride, iron, manganese, and nitrate have been detected above their applicable primary or secondary MCLs. Maps showing available water quality data for the Basin are compiled in Attachment C.

---

[4] Webster (1972) published a summary of well yield data then available for the San Francisco Bay Area, proposing a four-category classification scheme for zones of estimated well-yields, based upon the assumption that well yields are normally-distributed. The City area was mostly classed as either "B" or "C" category. Under the "B" category, which is "adequate for stock or single family domestic use, but inadequate to marginal for light industrial use", Webster indicated a 95% probability of maximum well yields falling between 1 GPM and 100 GPM, and a 68% probability of maximum well yields in the range of 5 GPM to 50 GPM. C-category areas, which are "adequate for light industry, but inadequate to marginal for irrigation, heavy industry, and municipal uses", were estimated to have a 95% probability of maximum well yields between of 10 GPM to 1,000 GPM, and a 68% probability of maximum well yields achieving 50 GPM to 500 GPM.

TDS provides a general representation of inorganic water quality in the Basin. According to prior investigations (EKI et al., 2018), shallow wells tend to have higher TDS concentrations than deep wells. Many of the shallow wells show maximum TDS concentrations exceeding the secondary MCL of 500 milligrams per liter (mg/L), while only a few deep wells exceed the secondary MCL. Chloride shows similar distribution to TDS as it typically constitutes a significant portion of TDS. Chloride concentrations in many of the shallow wells exceed the secondary MCL of 250 mg/L.

Based on available data (EKI et al., 2018), elevated iron and manganese concentrations may be ubiquitous in the Basin. Most wells show concentrations exceeding the secondary MCLs of iron and manganese, which is 0.3 mg/L and 0.05 mg/L, respectively. Elevated concentrations of iron and manganese can cause aesthetic and taste issues for drinking water.

Nitrate is another potential constituent of concern in the Basin. Elevated nitrate in groundwater typically derives from surface or near-surface sources, including fertilizers and wastewater sources such as historical septic tanks and leaking sewers. Available data show elevated concentrations of nitrate in the Atherton area.

Arsenic warrants sampling and analysis if groundwater is developed for drinking water purposes. Review of data from drinking water wells in the Basin indicated that arsenic concentrations were typically below the primary MCL of 0.01 mg/L (EKI et al., 2018).

Overall, groundwater in the Basin appears to be marginal for potable supply and would likely require treatment and/or blending with the RWS water to reduce the concentrations of the potential constituents of concern if intended for use as a regular potable water supply source.

6.2.2. Saltwater Intrusion

Generally, if the groundwater gradient is towards the Bay, and the water levels are maintained above mean sea level, then the seaward movement of the groundwater prevents saltwater from encroaching into coastal aquifers. However, groundwater extraction can drop water levels and locally reduce or reverse the bayward groundwater gradient, causing saltwater to flow into the freshwater zones of the aquifer. Saltwater intrusion can also occur as a result of vertical “upconing” or drawdown near groundwater extraction wells, where saline groundwater is pulled either upward or downward towards the screened interval of the pumped well.

Under historical pumping conditions, saltwater intrusion has occurred in locations in the Basin. For example, in 1950 the California Water Service Company (Cal-Water) was reportedly forced to discontinue pumping and shortly thereafter to abandon its two wells in Menlo Park because of a deterioration in water quality (Metzger and Fio, 1997). The chloride levels in groundwater extracted from these wells were reportedly measured in excess of 500 mg/L. Water hardness was measured as high as 850 mg/L in the Cal-Water wells (Metzger and Fio, 1997).

During the 1900s through the mid 1960s, groundwater levels in parts of the City, Palo Alto, Menlo Park, and Atherton declined below sea level due to groundwater pumping in the Basin. Hydraulic heads dropped low enough to reverse bayward hydraulic gradients, inducing movement of saline water, over several decades, to locations two to three miles inland from San Francisco Bay (Metzger, 2002; Poland and Garrett, 1943).

Along the City and Menlo Park shores, the threat of seawater intrusion is compounded by the existing salt ponds. Measured chloride values in shallow monitoring wells at the salt ponds can be as high as 100,000 mg/L. Maintenaning a positive bayward gradient in this region is essential.

6.2.3. Chemical Use and Release Sites

Approximately 45 open point source contamination sites are located in the City, as identified by the State Water Resources Control Board's (SWRCB's) Geotracker system. Most of these sites are clustered in the area between Highway 101 and El Camino Real, coincident with current and historical commercial and industrial land uses. Many of these locations have identified releases of hydrocarbons or other hazardous materials, but local hydrogeologic conditions have apparently limited chemical migration in shallow groundwater to localized areas around the release points.

As described above, the confining layers in the aquifer may retard the flow of impacted shallow groundwater into the deeper aquifer. However, if the integrity of the confining layers has been compromised, and preferential vertical flow paths have been created, then the deeper aquifer may be at a risk for cross-contamination. Further, if any of the identified chemical use or release sites are located in an area which contributes recharge to the deeper aquifer, there is additional potential for water quality within the deep aquifer to be adversely affected.

7. IDENTIFICATION OF AREAS OF GROUNDWATER PRODUCTION POTENTIAL

On the basis of constraints of hydrogeologic conditions, potential for shallow or deep groundwater impacts, and potential for well yield, EKI has identified several potential areas, at various locations within the City, where a well could be installed. Each of these potential areas may have additional constraints regarding access, local contamination, site use, or hydrogeology that are not fully explored in this report.

7.1. Sources of Data

Potential groundwater production target areas were identified within the City using a combination of suitability criteria and exclusion criteria. Areas considered most suitable for production wells were identified using the SMPGWM and related sources. The SMPGWM grid represents the alluvial aquifer system of the area adjacent to and beneath San Francisco Bay, with the smallest grid cell dimentions (and therefore most detailed resolution) occurring in San Mateo County. Within the City's Service Area, the SMPGWM grid cells are 660 ft x 660 ft horizontally and in the vertical direction the SMPGWM grid consists of five layers:

- **Layer 1** represents the shallow water-bearing zone (the shallow aquifer) and is 88 feet thick, on average.
- **Layer 2** is about 38 feet thick, on average, and represents primarily the regional confining bed beneath the Bay Plain and interior valley areas of the Santa Clara Plain, where it exists delineated by the presence of fine grained sediments in borehole data. The confining bed restricts the vertical movement of water between the shallow and deeper water-bearing zones. Where the regional confining bed is absent (for example, where streams have eroded previously deposited sediments and their incised sand channels remain), Layer 2 represents an intermediate zone aquifer between shallow and deeper water-bearing zones.

- **Layers 3-5** represent multiple water-bearing zones within the upper part of the deep aquifer. This primary or "main" water-supply production zone is approximately 215 feet thick, on average. Within the Basin, the thickness of Layers 3, 4, and 5 were specified to be 21%, 31%, and 48% of the total thickness of the main water-supply zone. In the City's Service Area, the bottom of Layer 5 represents the top of bedrock.

The SMPGWM uses sediment texture (e.g., fraction of coarse-grained sand and gravel) to determine a distribution for hydraulic conductivity (Kh). Texture maps representing the fraction of coarse-grained sediment (FC) were constructed for each model layer using the lithologic descriptions provided by almost 700 boreholes (311 of the boreholes are located in the Basin) (EKI et al., 2018). The FC values range from a value of 0, which represents completely fine-grained sediment, to a value of 1, which represents completely coarse-grained sediment. The modeled Kh is then calculated as the product of the FC and specified Kh for coarse-grained sediment.

Data sources to inform exclusion criteria include the location of other existing production wells, as shown in **Figure 4**, from EKI (2018) and the location of GeoTracker cleanup sites and underground storage tanks[5], queried to omit any site classified as 'Completed – Case Closed'.

7.2. Constraints Analysis

Using the SMPGWM grid, suitability criteria were calculated and used to create two separate shapefiles: (1) average aquifer transmissivity, and (2) weighted average FC. The transmissivity of each layer was calculated using the following equation, and the average transmissivity was calculated using the average transmissivity for Layers 1 through 5.

$$T_{Layer\ n} = Kh_{Layer\ n} \times Thickness_{Layer\ n}$$

Where:
T is transmissivity (ft^2/d),
Kh is modeled hydraulic conductivity (ft/d),
Thickness (ft), and
Layer n is SMPGWM layer 1 through 5.

The weighted average FC was calculated using the following equation:

$$Weighted\ average\ FC = \sum_{n=1}^{5} \left(\frac{Thickness_{Layer\ n}}{Total\ Thickness} \times FC_{Layer\ n} \right)$$

Where:
FC is the fraction of coarse grained sediment (unitless),
Thickness (ft), and
Layer n is SMPGWM layer 1 through 5.

[5] Retrieved from https://geotracker.waterboards.ca.gov/datadownload on 10 November 2020.

The average aquifer transmissivity in the vicinity of the City ranges from 0 to over 18,000 feet squared per day (ft^2/d). The weighted average FC values range from 0.00 to 0.86. For both resultant datasets, the highest values were shaded darker (most suitable) and lower values were shaded lighter (less suitable). The two shapefiles were then overlain to identify the areas, that when both criteria were combined, indicated the most "suitable" areas for the purposes of understanding where there might be a higher groundwater production potential (e.g., most suitable cells/areas would appear darkest; see **Figure 5**).

After the suitability shapefiles were finalized, the "exclusion areas" were identified. The following areas were excluded from further consideration, meaning that if a cell met the following criteria it was eliminated as being a potential groundwater production area:

- Within 1,000 feet of an existing production well to maximize the distance from existing public supply or large irrigation wells and to minimize well interference;
- Within 500 feet of an active GeoTracker cleanup site to maximize the distance from open and active shallow soil and groundwater contamination sites;
- Depth to bedrock (or total thickness of an SMPGWM grid cell) less than 300 ft to maximize the thickness of underlying, unconsolidated water-bearing sediments; and
- Within one (1) mile of the Bay shoreline to maximize the distance from the Bay and mitigate the risk of seawater intrusion.

After removing the exclusion areas, the remaining darkest areas show the general areas that are potentially suitable for groundwater production (see **Figure 5**).

7.3. General Areas of Potential Groundwater Production

Following the geo-spatial anlysis described above, the cross-section locations were then plotted on **Figure 5** to narrow down the recommended target areas for further exploration. **Figure 6** shows the location of the two target areas deemed potentially most suitable for a production well. Site 1 is located in the middle of the City's service area southwest of the Woodside Road and Highway 101 interchange (near the City's Pubic Works building), and Site 2 is located near the Redwood Shores Library. Based on conversations with City personnel, both of these locations would potentially be suitable for integration into the City's existing distribution system and could provide important redundancy in the event of an emergency.

7.4. Potential Groundwater Yield

Todd (2003a) estimated that the potential groundwater yiled within the City was between 500 and 1,000 AFY. Based on the information developed as part of this GW Study, it appears likely that the lower end range of that estimate is more probable, especially given that local conditions and permitting will further dictate the ultimate groundwater production potential.

A more refined estimate of sustainable yield would be possible once a well site has been selected, a test hole and aquifer pumping test completed, and more detailed modeling is conducted to understand local and regional impacts of a proposed pumping schedule. It is important to note that the potential for long-term groundwater extraction within the City could be limited by several issues of concern, including the potential for: (1) saltwater intrusion from the San Francisco Bay, (2) plume migration from nearby chemical use and release sites, (3) adverse effects to other nearby groundwater users within the Basin, and (4) subsidence due to drawdown from pumping. In addition, groundwater extraction by another adjacent party could impact the groundwater yield and quality at a City well. These issues will have to be addressed during detailed permitting-related analysis, design review, and through implementation of a comprehensive monitoring program if one or more wells are installed. No significant environmental impacts are anticipated if the well(s) is used as a standby well.

8. WELL PERMITTING

Based on feedback received from the City to date, it appears that the City is primarily interested in the permitting process for an emergency, or standby well. Both the SWRCB Division of Drinking Water and San Mateo County Department of Environmental Health are the permitting authorities. In addition, new water systems must undergo an environmental review that complies with the California Environmental Quality Act (CEQA).

Per Section 64556, Title 22, California Code of Regulations (22 CCR § 64556), an amendment of the City's domestic water supply permit is required in order to add a new groundwater well to the system. If the City decides to change the well status from standby to active in the future, another permit amendment would be required. The permit application usually entails significant work efforts apart from submission of an application form and a fee. The City initially needs to provide the following information to the SWRCB to determine if the location of the proposed well is acceptable (22 CCR § 64560):

- A source water assessment;
- Documentation demonstrating a well site control zone with a 50-foot radius;
- Design plans and specifications for the well; and
- Documentation required for compliance with CEQA.

After the SWRCB has provided written or oral approval of the initial permit amendment application and the water system has constructed the well, the following additional materials need to be submitted:

- A copy of the well construction permit;
- DWR well completion report;
- A copy of any pump tests required by the State Board;
- Results of all required water quality analyses; and
- As-built plans.

Other key components of the permitting application package include the technical report and operations plans[6]. The technical report should provide, among other things, source water quantity and water quality information, and design and treatment information on the well construction, treatment chemicals,

[6]Domestic Water Supply Permit Applicant Instructions, https://cchealth.org/eh/small-water/pdf/instructions_dws.pdf

disinfection facilities, etc. The operational plans consist of water quality monitoring plan, water system operations plan, and disaster/emergency response plan.

It is anticipated that primary drinking water standards (i.e., primary MCLs) will likely be met without treatment. Based on previous correspondence with the SWRCB[7] and the fact that standby wells will not be serving water to customers on a regularly basis (22 CCR § 64414 and 64449), it is assumed that treatment for certain constituents with secondary drinking water standards will not be required for a standby well. However, the City will need to confirm these assumptions after well-specifc water quality sampling is conducted and with the SWRCB when applying for the permit.

The City is also required to complete a Technical, Managerial, and Financial (TMF) Assessment form. The purpose of the TMF requirements is to assure that systems have adequate technical, managerial, and financial capability to be reliably operated in compliance with all drinking water requirements in the future.

In addition to the SWRCB permitting, San Mateo County also has permit requirements for wells. The City would need to first apply for a permit for the construction of the well (Ordinance 4.68.080), which mainly involves submission of an application form and relevant drilling and testing documents. For domestic water wells, a permit to operate the well is also required (Ordinance 4.68.210). Overall the permitting process is expected to be much more straightforward than the State-level permitting.

As every system is unique, it is highly recommended that the City work closely with the SWRCB and San Mateo County throughout the permitting process for system-specific requirements and guidance. It should be noted that if the project were to move forward, City staff would also work with the design engineer for ancillary permits like building permits that should be relatively straightforward, given that the City is the permitting entity.

9. COST ESTIMATE

A preliminary cost estimate for a standby well was prepared as part of this GW Study. At this early stage where no detailed plans or specifications have been developed, these costs are necessarily conceptual in nature. The assumed scope of work reflects an initial evaluation of available information in the vicinity of the City as discussed in previous sections. **Table 3** shows a list of key assumptions that the cost estimate is based on.

The conceptual cost estimate for one standby well is presented in **Table 4**. As can be seen therein, the first project component is the development of a test well[8], which is included as a prudent first step given the limited available data. Work associated with the test well typically includes well design, construction, testing, report development, etc. The estimated costs are approximately $430,000 in total. Based on the results of the test well, the standby well can be designed and constructed. As minimal treatment facilities are assumed to be required for a standy well, the below-grade well construction is expected to constitute a major portion of the construction costs. The total construction costs for the standby well system are

[7] Correspondence with SWRCB dated 15 April 2020.
[8] It is assumed that the well will be located on City-owned land, and thus no land purchasing or leasing are needed.

estimated to be approximately $2,670,000. Additional costs for well design, construction management, permitting and startup, and CEQA compliance are estimated as percentages of the construction costs based on EKI's project experience. The total capital costs are approximately $4,400,000. Future operations and maintenance (O&M) of the system are estimated to cost approximately $17,000 per year.

10. CONCLUSIONS AND LIMITATIONS

There is very little available well data located within the City's Service Area. Most available estimates of current groundwater production are limited to a few production wells located near the Bay. Well logs located near the target areas show variable thicknesses of gravel units and well yield estimates are typically less than 200 GPM. It is therefore unknown what the potential well yield could be at either of the target areas without further subsurface investigation.

Prior to further consideration of groundwater development, we recommend that the City conduct a well siting and test hole investigation program. This program should include more refined parcel-specific well siting, test hole drilling, water quality testing, and a pump test to assess potential well yield.

Although additional groundwater production appears feasible, active modeling and monitoring would be required to ensure avoidance of undesirable results.

11. REFERENCES

BAWSCA, 2020, *Annual Survey, Fiscal Year 2018-2019*, March 2020.

Bohley/Maley, 1993, *Irrigation Well Report for Pacific Shores Center*, 16 December 1993.

Brabb, E.E, R.W. Graymer, and D.L. Jones, 2000, *Geologic Map and Map Database of the Palo Alto 30' x 60' Quadrangle*, California. U.S. Geological Survey. Miscellaneous Field Studies Map MF-2332, v.1.0.

EPA, 2006, *2005 Urban Water Management Plan*, January 2006.

EPA, 2016, *2015 Urban Water Management Plan*, June 2016.

DWR, 2004, *California's Groundwater: Bulletin 118*.

DWR, 2019, *Sustainable Groundwater Management Act 2019 Basin Prioritization Process and Results*.

EKI/Todd/HydroFocus, 2018, *San Mateo Plain Groundwater Basin Assessment*, July 2018.

Ferriz, H. 2001, *Groundwater Resources of Northern California: An Overview.* California Division of Mines and Geology, Bulletin 210.

Fio, J.L., and D.A. Leighton, 1995, *Geohydrologic Framework, Historical Development Of The Ground-Water System, And General Hydrologic And Water-Quality Conditions In 1990, South San Francisco Bay And Peninsula Area, California.* U.S. Geological Survey Water-Resources Investigations Report 94-357.

Geoconsultants, 2006, *Geological and Geophysical Survey for Water Well Location, Red Morton Community Park, Redwood City, California*, 18 May 2006.

Hazlewood, R.M., 1976, *Contour Map and Interpretive Cross Sections Showing Depth and Configuration of Bedrock Surface, South San Francisco Bay Region, California*. U.S. Geological Survey Miscellaneous Field Studies Map MF-796, scale 1:62,500.

Helley, E.J., K.R. Lajoie, W.E. Spangle, and M.L. Blair, 1979, *Flatland Deposits of the San Francisco Bay Region, California - Their Geology and Engineering Properties, and Their Importance to Comprehensive Planning*. U.S. Geological Survey Professional Paper 943.

Hensolt, W.H. and E.E. Brabb. 1990. *Maps Showing Elevation of Bedrock and Implications for Design of Engineered Structures to Withstand Earthquake Shaking in San Mateo County, California*. U.S. Geological Survey Open-File Report 90-496.

Maggiora, 2000, *Driller's Reports for Water Wells 1 & 2*. Prepared by Maggiora Brothers Drilling, Inc., for Rudolph & Sletten, Inc., Foster City, CA.

Maggiora, 2001, *Redwood Shores - Turf Irrigation Water Wells 1, 2 & 3*. Prepared by Maggiora Brothers Drilling, Inc., for Rudolph & Sletten, Inc., Foster City, CA, 16 Oct 2001.

Metzger, L.F. and J.L. Fio, 1997, *Ground-Water Development and the Effects on Ground-Water Levels and Water Quality in the Town of Atherton, San Mateo County, California*. U.S. Geological Survey Water Resources Investigations Report 97-4033.

Metzger, L.F., 2002, *Streamflow Gains and Losses along San Francisquito Creek and Characterization of Surface-Water and Ground-Water Quality, Southern San Mateo and Northern Santa Clara Counties, California*, 1996–97. U.S. Geological Survey Water-Resources Investigations Report 02-4078.

Newhouse, M.W., Hanson, R.T., Wentworth, C.M., Rhett, Everett, Williams, C.F., Tinsley, J.C., Noce, T.E., and Carkin, B.A., 2004, *Geologic, Water-Chemistry, and Hydrologic Data from Multiple-Well Monitoring Sites and Selected Water-Supply Wells in the Santa Clara Valley, Ca, 199-2003.* U.S. Geological Survey Scientific Investigations Report 2004-5250, 2004.

Oliver, H.W., 1990*, Preliminary Ground-Water-Quality Data And The Extent Of The Ground-Water Basin From Drill-Hole, Seismic, And Gravity Data In The Palo Alto 7.5' Quadrangle, California*. U.S. Geological Survey Open-File Report 90-74.

Poland, J.F., and A.A. Garrett, 1943, *Ground-Water Conditions in the Redwood City Area, California, With Particular Reference to Water Supply for The Pacific Portland Cement Company*. U.S. Geological Survey Open File Report OFR 70-264 (republished 1970).

RWC, 2005. *Urban Water Management Plan 2005*, December 2005.

RWQCB, 2003, *A Comprehensive Groundwater Protection Evaluation for the South San Francisco Bay Basins*.

Sleeter, B.M., J.P. Calzia, S.R. Walter, F.L. Wong, and G.J. Saucedo, 2004, *Earthquakes and Faults in the San Francisco Bay Area (1970-2003).* U.S. Geological Survey Scientific Investigations Map 2848, scale 1:300,000.

Todd, 2003a, *Feasibility of Supplemental Groundwater Resources Development Redwood City, California*, March 2003.

Todd, 2003b, *Feasibility of Supplemental Groundwater Resources Development: Menlo Park and East Palo Alto, California*, 2003.

Webster, D.A., 1972, *Map Showing Ranges in Probable Maximum Well Yield from Water-Bearing Rocks in the San Francisco Bay Region, California*. U.S. Geological Survey Miscellaneous Field Studies Map MF-431.

Wentworth, C.M., 1997, *General Distribution Of Geologic Materials In The San Francisco Bay Region, California; A Digital Database*. U.S. Geological Survey Open-File Report 97-744.

TABLES

FIGURES

ATTACHMENTS

Table 1
SMPGWM Water Budget for the Redwood City Service Area
Preliminary Assessment of Groundwater Production Potential
City of Redwood City

SMPGWM Water Budget Component	SMPGWM-Calculated Water Budgets for the Redwood City Service Area	
	Historical WY 1992-2015 Average (AFY)	Projected WY 2016-2040 Baseline + Climate Change Average (AFY)
INFLOWS (AFY)[a]		
Recharge	1,130	1,120
Subsurface Inflow	2,030	1,530
Total Inflows	*3,160*	*2,650*
OUTFLOWS (AFY)[a]		
Wells	150	160
Groundwater seepage (marsh, sewer, dewatering)	1,500	1,200
San Francisco Bay	0	150
Subsurface Outflow	1,550	1,160
Total Outflows	*3,200*	*2,670*
CHANGE IN STORAGE (AFY)[a]		
Storage Change[b]	-40	-20
Interbed Storage Change	NA[c]	0

Abbreviations:
AFY = acre-feet per year
NA = not applicable
SMPGWM = San Mateo Plain Groundwater Model
WY = Water Year

Notes:
(a) All values shown are rounded to the nearest 10 AFY.
(b) Storage change determined by balance of total inflows and outflows.
(c) Interbed storage change as a result of subsidence is not modeled in the historical SMPGWM.

References:
(1) Historical and Scenario 2 SMPGWM files, available online at:
https://www.smcsustainability.org/wp-content/uploads/SMPGWM-archive.zip

Table 2
Selected Well Information
Preliminary Assessment of Groundwater Production Potential
City of Redwood City

Well ID	TOC Elevation (ft msl)	Depth of Borehole (ft bgs)	Depth to Bottom of Well (ft bgs)	Screened Interval (ft bgs)	Estimated Yield (GPM)	Transmissivity (ft^2/d)	References
Pacific Shores #1	12	-- (a)	250	190-250	35	787	1
Pacific Shores #2	7	--	250	120-250	100	418	1
Pacific Shores #3	8	--	330	120-330	300	115	1
PPC1 (b)	4	--	270	--	25	--	2
PPC2 (b)	4	--	396	--	190	--	2
PPC3 (b)	4	--	434	--	--	--	2
PPC4 (b)	--	--	--	--	450	--	2
PPC5 (b)	9	--	375	--	550	--	2
PPC6 (b)	--	--	--	--	230	--	2
PPC7 (b)	6	--	330	--	90	--	2
PPC8 (b)	--	--	330	--	98	--	3
005S003W17Q001	--	--	200	152-159 167-172 184-186	--	--	4
005S003W18H001	--	--	183	--	--	--	4
005S003W19F002	--	280	278	38-278	37	--	4
005S003W20F001	--	--	193	143-147 168-174 180-183	--	--	4
005S003W20P001	--	--	383	80-92 104-122 134-146 152-164 170-176 182-188 194-206 218-284	160	--	4
005S004W01C001	--	395	390	150-390	50	--	4
50670-1	--	200	195	105-185	30	--	4

Abbreviations:

ft	Foot
ft bgs	Feet below ground surface
ft msl	Feet above mean sea level
ft^2/day	Square feet per day
GPM	Gallons per minute
PPC	Portland Pacific Cement Company (currently RMC Lonestar Cement Company)
TOC	Top of casing

Notes:
(a) The symbol "--" denotes that data are not available.
(b) These wells have been abandoned (Poland and Garrett, 1943; EKI et al. 2018).

References:

(1) Bohley/Maley Associates, 1993, *Irrigation Well Report for Pacific Shores Center* , December 1993.
(2) Poland, J.F. and Garrett, A.A., 1943, *Groundwater Conditions in the Redwood City Area, California with Particular Reference to Water Supply for the Pacific Portland Cement Company* , U.S. Geological Survey Open File Report 70-264, 1943.
(3) Todd Engineers, 2003, *Feasibility of Supplemental Groundwater Resources Development, Redwood City, California,* March 2003.
(4) EKI/Todd/HydroFocus, 2018, San Mateo Plain Groundwater Basin Assessment, July 2018.

Table 3
List of Assumptions for Cost Estimate
Preliminary Assessment of Groundwater Production Potential
City of Redwood City

No.	Item	Assumptions
1	Land Acquisition	Assumed well to be located on City-owned land, and thus no land purchasing or leasing costs are included.
2	Test Well	Costs include all work relevant to the test well, such as well design, construction, testing, data analysis, report preparation, construction management, and etc.
3	Well Depth	Assumed 400 ft based on evaluation of aquifer characteristics and available information on existing wells in the vicinity of the City.
4	Flow Rate	Assumed 200 gpm based on analysis of typical groundwater production rates in the vicinity of the City.
5	Water Quality and Treatment	Assumed that source groundwater does not require removal of constituents with primary MCLs (e.g., arsenic) and that no treatment of constituents with secondary MCLs (e.g., iron and manganese) will be required for a standby well.
6	Major Equipment	Included a well pump, two chemical systems, and a hydropneumatic tank; Assumed no onsite storage tank.
7	Sitework, Concrete, and Special Construction	Assumed that the well head will not be in a building and that chemical systems will be under canopy and not in a building.
8	Electrical	Included a standby generator; Assumed that three-phase power is nearby and that the City will take the lead on PG&E coordination with the support of design consultant.
9	O&M	Assumed operation of a maximum of fifteen days a year per Section 64414, Title 22, CCR.

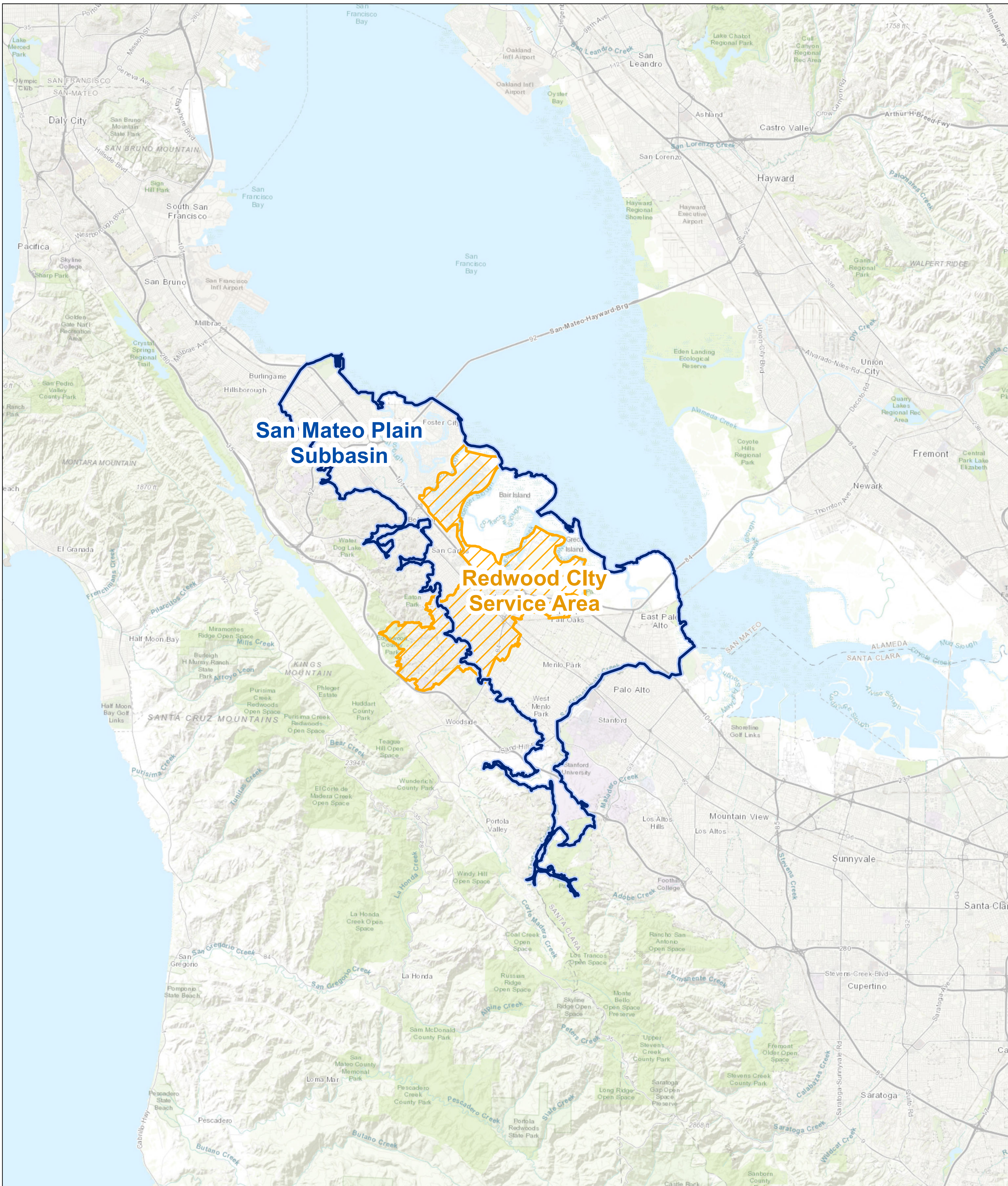
Abbreviations:
CCR = California Code of Regulations
ft = feet
gpm = gallons per minute
MCL = Maximum Contaminant Level
O&M = Operations and Maintenance

Table 4
Conceptual Cost Estimate of Standby Well
Preliminary Assessment of Groundwater Production Potential
City of Redwood City

Description	Quantity	Units	Unit Cost	Total
Capital Costs				
Test Well				
Test Well (Design, Construction, Analysis, etc.)	1	LS	$ 355,000	$ 355,000
Contingency on Materials and Labor	20	%	$ 355,000	$ 75,000
			Total Costs of Test Well	$ 430,000
Standy Well				
Standby Well Construction	1	LS	$ 525,000	$ 525,000
Sitework, Concrete, and Special Construction	1	LS	$ 325,000	$ 325,000
Equipment	1	LS	$ 245,000	$ 245,000
Mechanical	1	LS	$ 60,000	$ 60,000
Electrical	1	LS	$ 350,000	$ 350,000
Contingency on Materials and Labor	30	%	$ 1,505,000	$ 455,000
			Total Direct Costs of Standby Well	$ 1,960,000
Mobilization and Demobilization	5	%	$ 1,960,000	$ 100,000
General Conditions, Bonding, etc.	8	%	$ 2,060,000	$ 165,000
Contractor Markup (Overhead & Profit, Contract Administration)	20	%	$ 2,225,000	$ 445,000
			Total Construction Costs of Standby Well	*$ 2,670,000*
Standby Well Design	15	%	$ 2,670,000	$ 405,000
Standby Well Construction Management	10	%	$ 2,670,000	$ 270,000
Permitting & Startup	12	%	$ 2,670,000	$ 325,000
CEQA	10	%	$ 2,670,000	$ 270,000
			Total Costs of Standby Well	*$ 3,940,000*
			Total Capital Costs (rounded up to nearest $100,000)	**$ 4,400,000**
O&M Costs				
Annual O&M Costs	1	LS	$ 17,000	$ 17,000
			Annual O&M Costs	**$ 17,000**

Abbreviations:
CEQA = California Environmental Quality Act
LS = Lump Sum
O&M = Operations and Maintenance

Notes:
(a) The conceptual cost estimates are based on similar projects and EKI's experience.



Legend

San Mateo Plain Subbasin

Redwood City Service Area

Notes

1. All locations are approximate.

Sources

1. Basemap courtesy of Esri.
2. Base layers provided by The City of Redwood City through their Redwood City Community GIS interactive map, obtained 21 June 2016.
3. Groundwater subbasin boundary defined by California Department of Water Resources Bulletin 118 final Basin Prioritization - February 2019.

N

0 3 6

Miles

DRAFT

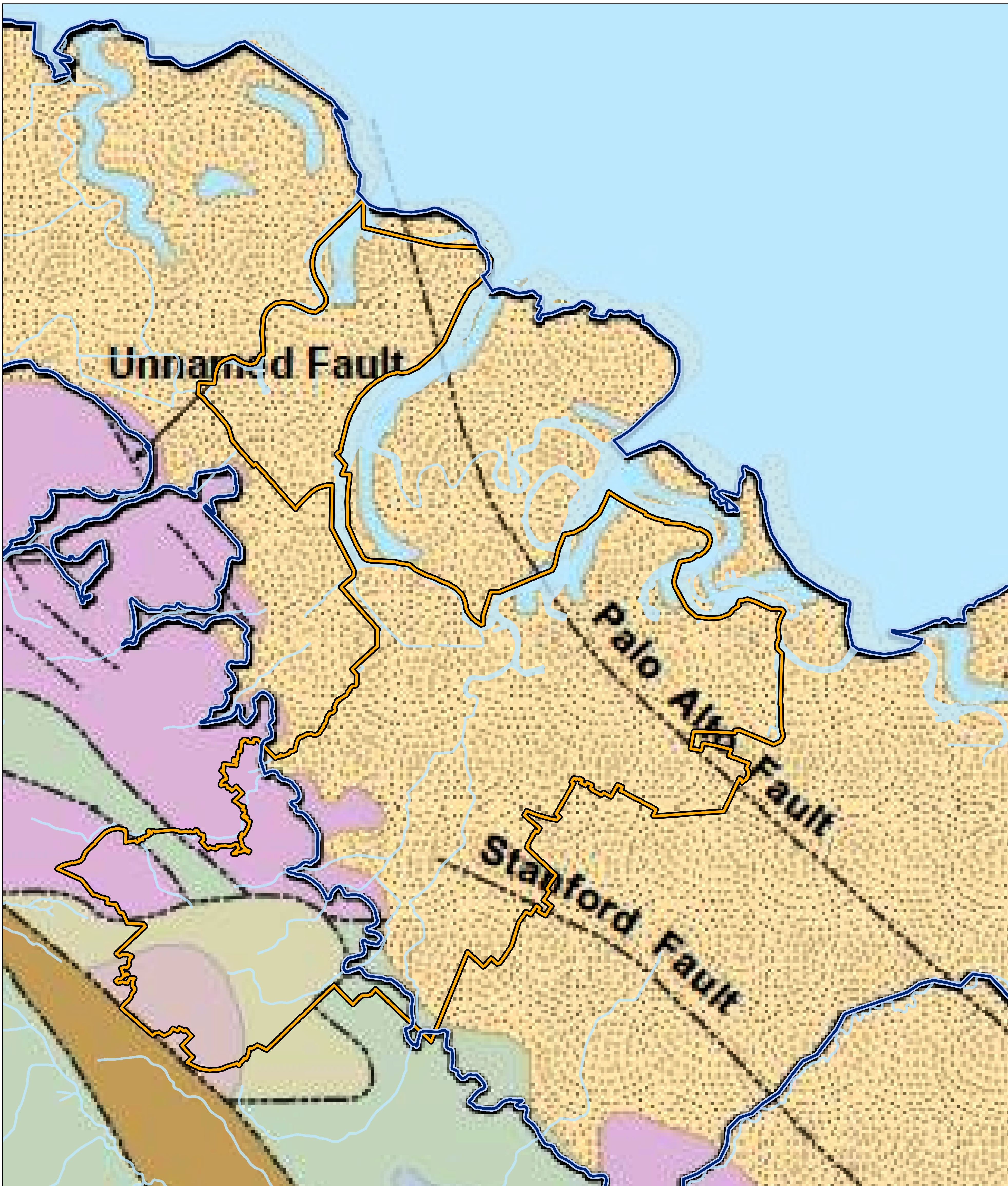
Redwood City and San Mateo Plain Subbasin

Redwood CIty Urban Water Management Plan
Redwood City, CA
December 2020
EKI C00110.00

Figure 01

eki environment & water

Path: \\Ekifileserver\gis\C00110\Maps_002020\12\Fig01_SiteLocation.mxd



Legend

- San Mateo Plain Subbasin
- Redwood City Service Area
- Stream
- Quaternary Alluvium
- Pliocene continental sedimentary rocks
- Pliocene marine sedimentary rocks
- Miocene marine sedimentary rocks
- Oligocene marine sedimentary rocks
- Eocene marine sedimentary rocks
- Cretaceous Marine sedimentary and metasedimentary rocks
- Mesozoic granite and quartz monzonite
- Mesozoic metavolcanic rocks
- Mesozoic plutonic rocks
- Tertiary Volcanic Rocks
- Water

Notes
1. All locations are approximate.

Sources
1. Basemap courtesy of Esri.
2. Based on the California Department of Conservation Geologic Map of California (2010)

N

0 4,500 9,000
Feet

DRAFT

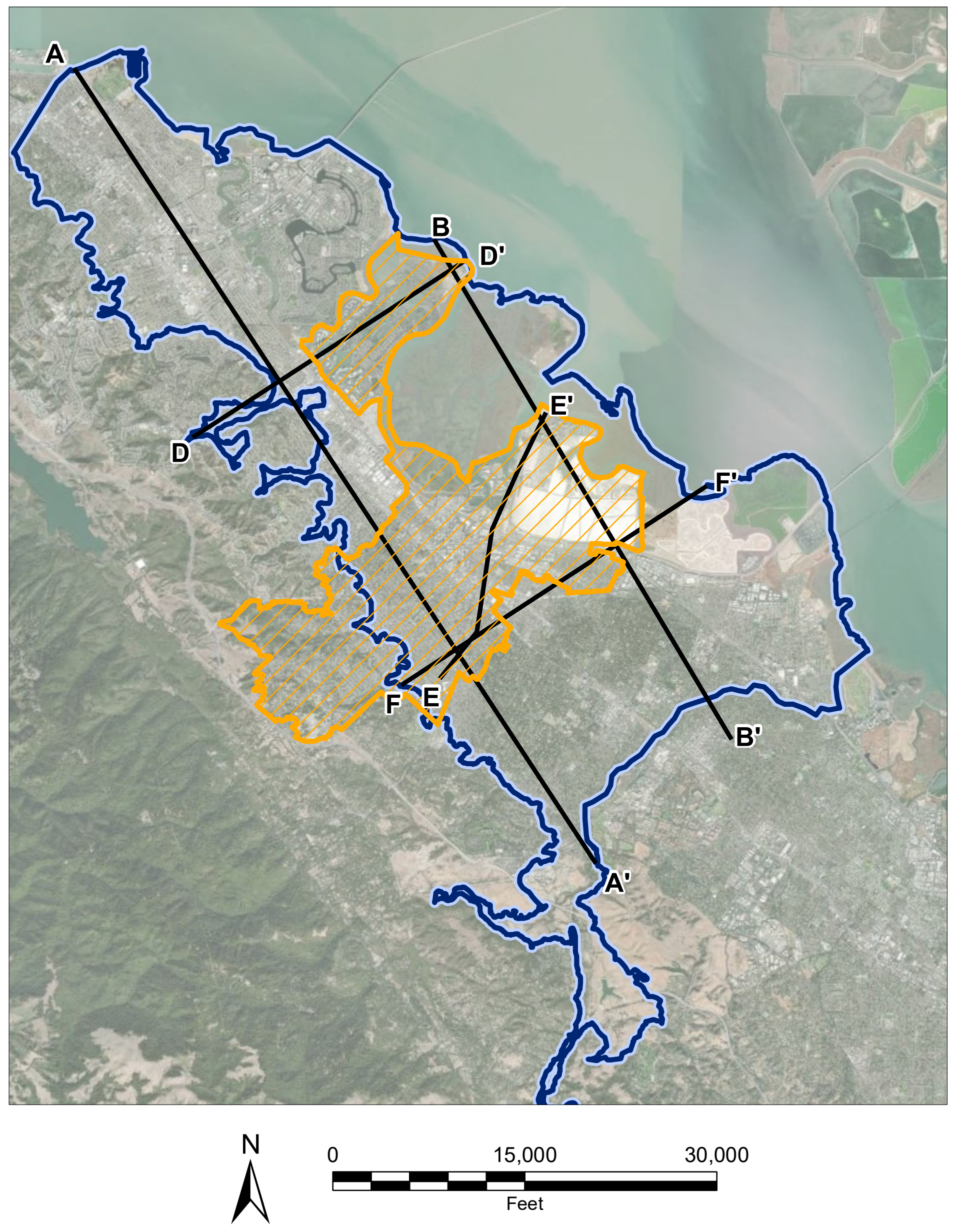
Geologic Map

Redwood CIty Urban Water Management Plan
Redwood City, CA
December 2020
EKI C00110.00

environment & water

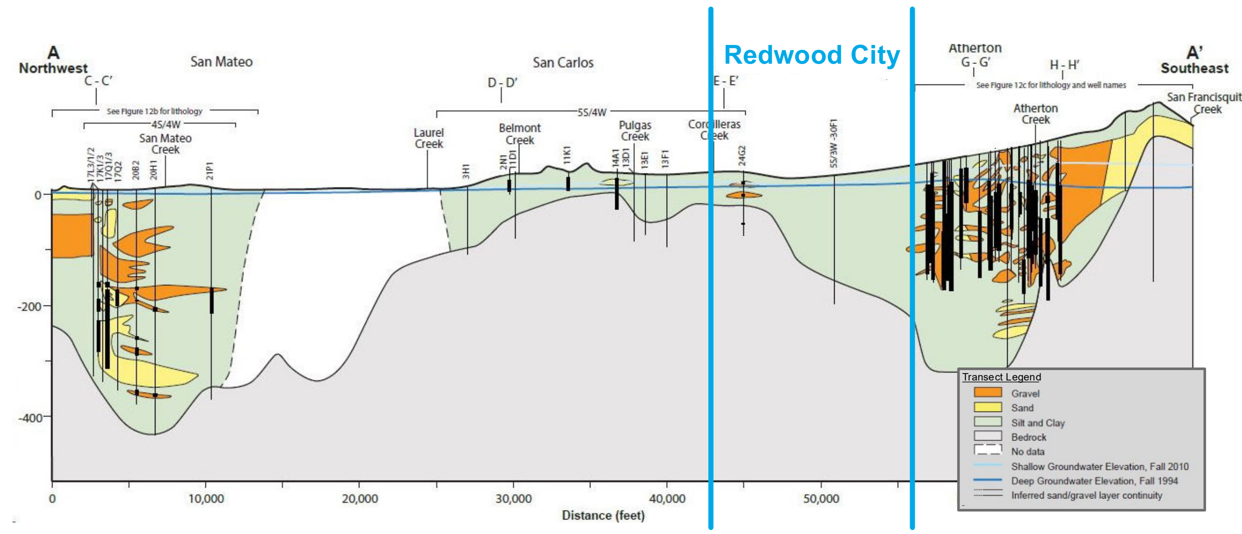
Figure 2

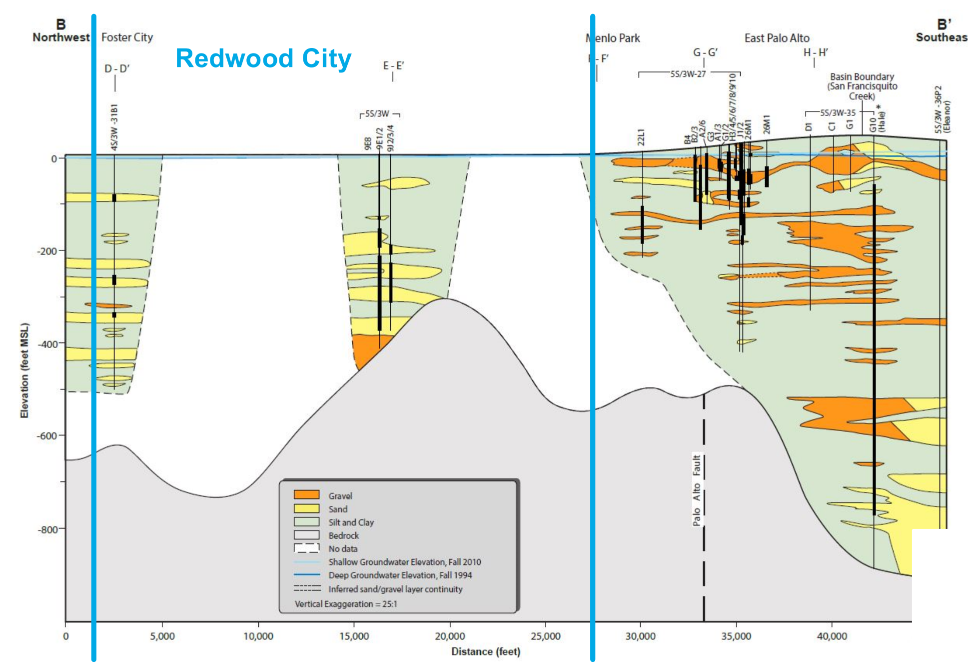
Path: \\Ekifileserver\gis\C00110\Maps_002020\12\Fig02_GeolMap.mxd

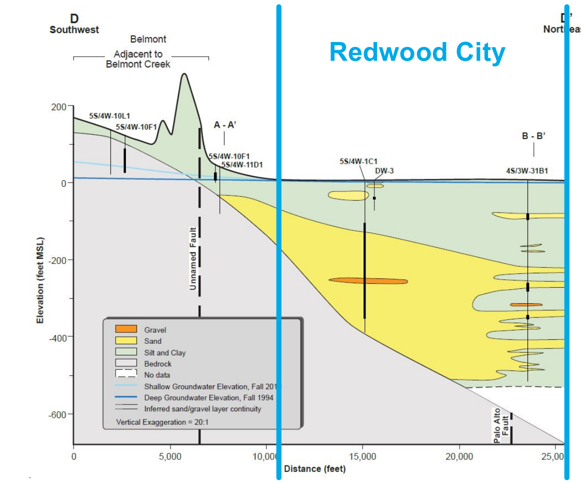


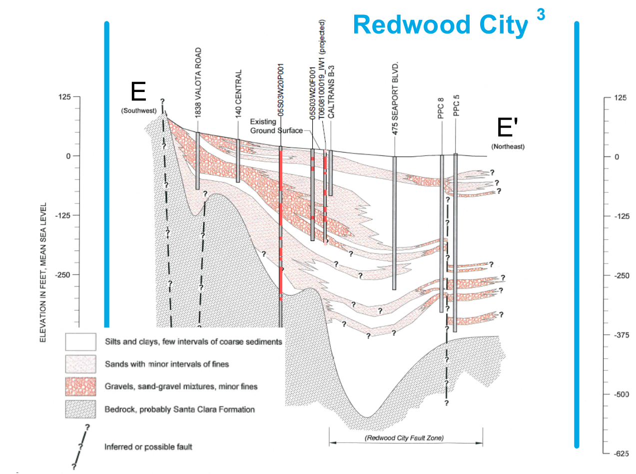
Legend

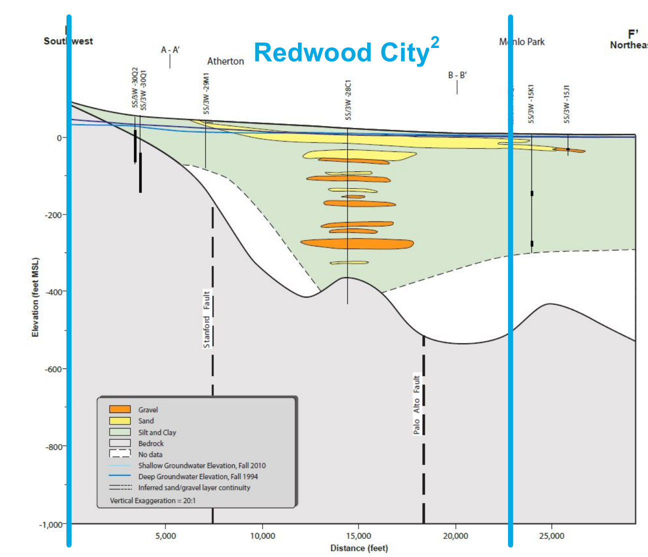
- Redwood City Boundary
- San Mateo Plain Subbasin
- Cross-section line











Notes

1. All locations approximate.
2. Redwood City boundary is discontiguous through cross section. The maximum and minimum extents are represented.
3. Well logs 05S03W20P001, 05S03W20F001, and T0608100019_IW1 were added after cross section development. Red shading inside well indicates gravels or gravel and clay mixtures.

Sources

1. Cross sections and transects adapted from San Mateo Plain Groundwater Assessment, July 2018.
2. Basemap courtesy of Esri.

DRAFT

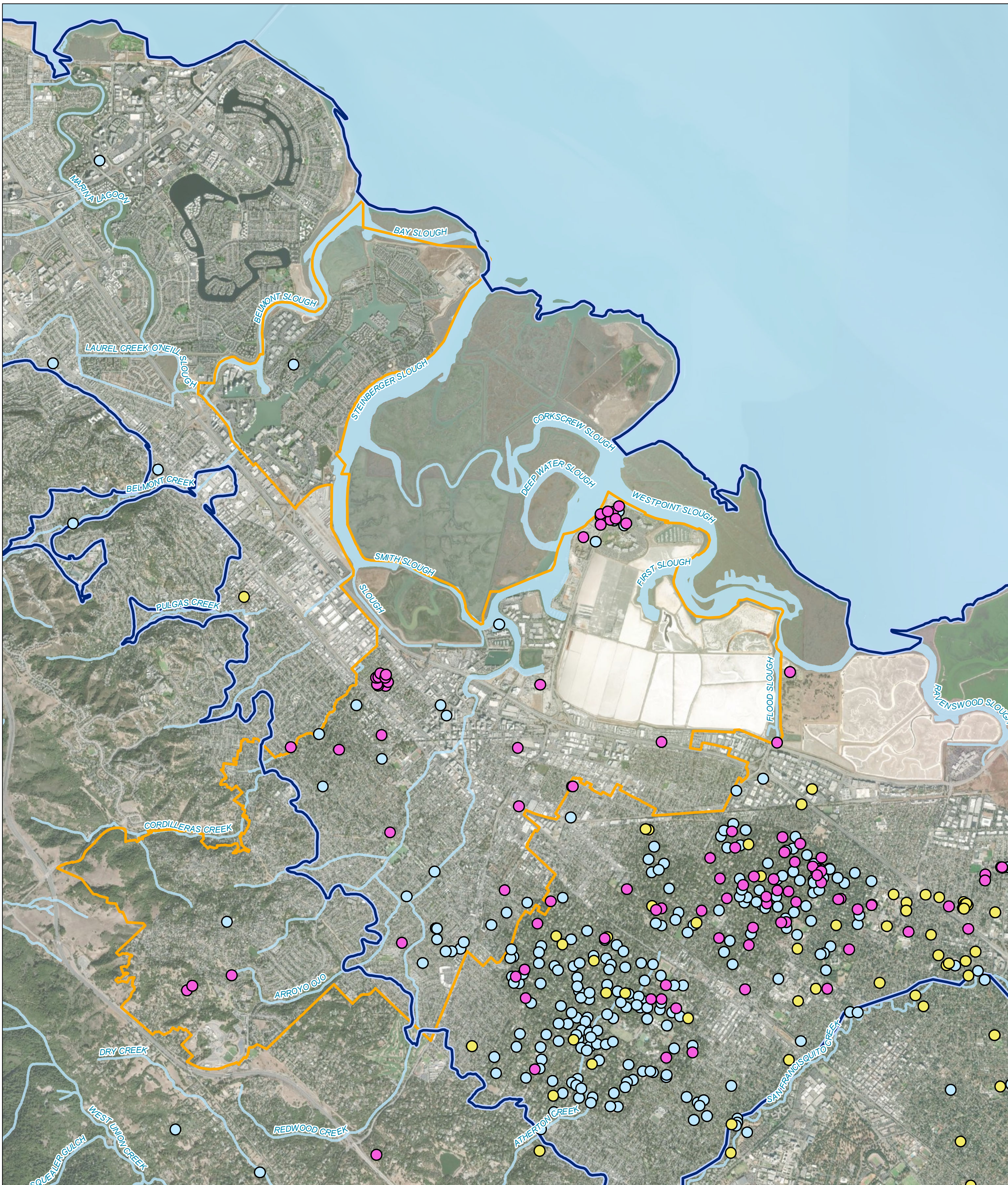
Cross Sections and Transects in San Mateo Plain Subbasin

Redwood City Urban Water Management Plan
Redwood City, CA
December 2020
EKI C00110.00

eki environment & water

Figure 3

Path: \\Ekifileserver\gis\C00110\Maps_00\2020\12\Fig03_CrossSectionOverview.mxd



Legend
- Irrigation Well
- Private Water Supply Well
- Public Water Supply Well
- Stream
- Redwood City Service Area
- San Mateo Plain Subbasin

Notes
1. All locations are approximate.

Sources
1. Basemap courtesy of Esri.
2. Base layers provided by The City of Redwood City through their Redwood City Community GIS interactive map, obtained 21 June 2016.
3. Production well locations from EKI/Todd/HydroFocus, 2018, San Mateo Plain Groundwater Basin Assessment, July 2018.

N

0 4,500 9,000
Feet

DRAFT

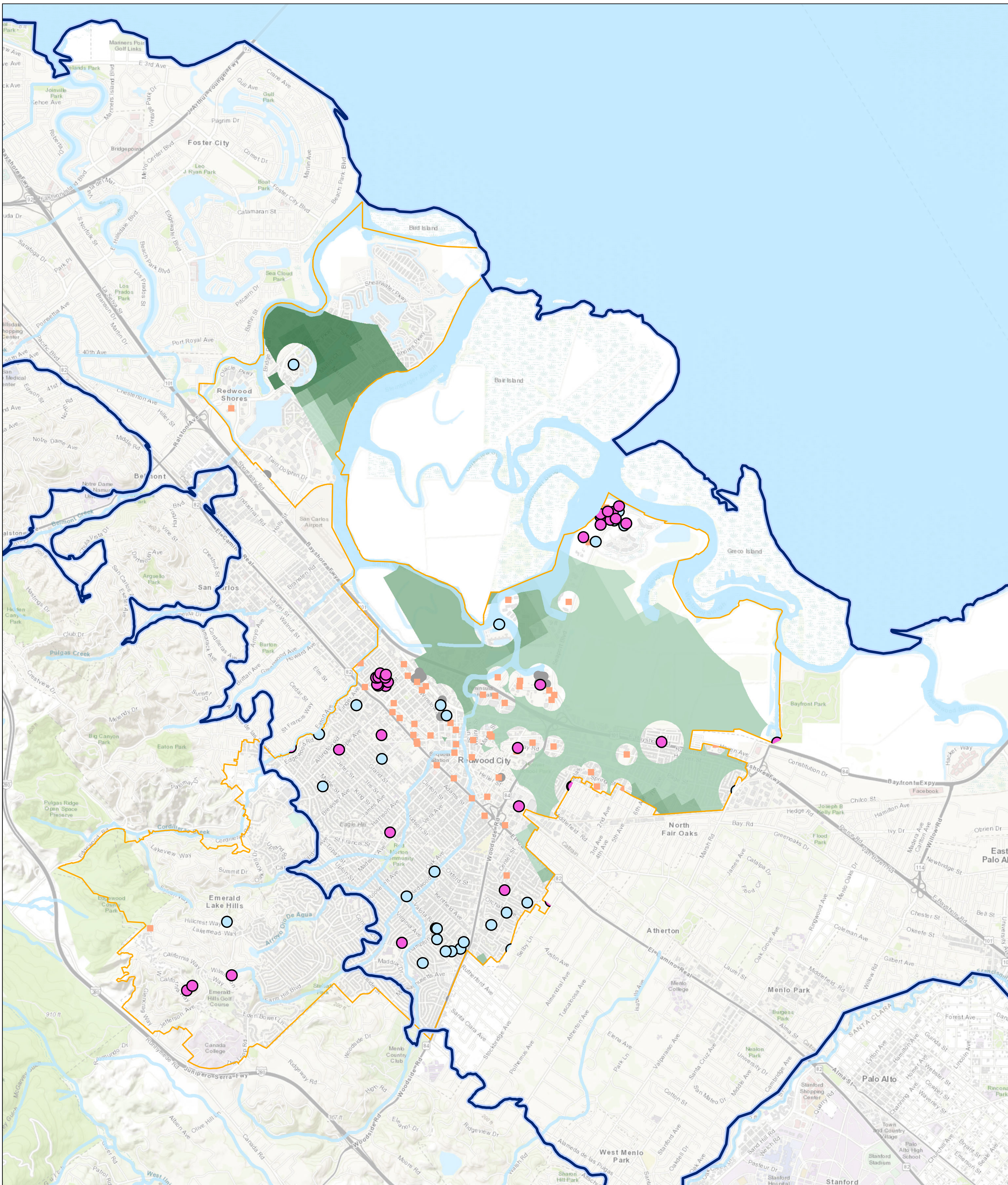
Production Wells in Redwood City

Redwood CIty Urban Water Management Plan
Redwood City, CA
December 2020
EKI C00110.00

eki environment & water

Figure 4

Path: \\Ekifileserver\gis\C00110\Maps_0020201 2\Fig04_RWC_WellLocs.mxd



Legend

- Irrigation Well
- Private Water Supply Well
- Public Water Supply Well
- Geotracker Cleanup Site
- TDS Detection of >1,000 mg/L
- San Mateo Plain Subbasin
- Redwood City Service Area
- Stream

Suitability

- Qualified
- Most Qualified

Abbreviations

mg/L = milligrams per liter
SMPGWM = San Mateo Plain Groundwater Model
TDS = total dissolved solids

Notes

1. All locations are approximate.
2. Suitability criteria are based on average transmissivity and weighted average fraction coarse grained material, as represented in the SMPGWM.
3. Area is excluded from well siting based on proximity to environmental cleanup sites (500 feet), irrigation or water supply wells (1,000 feet), bay shoreline (1 mile) and aquifer thickness (less than 300 feet).

Sources

1. Basemap courtesy of Esri.
2. SMPGWM grid from EKI/Todd/HydroFocus, 2018, San Mateo Plain Groundwater Basin Assessment, July 2018.
3. GeoTracker cleanup sites from https://geotracker.waterboards.ca.gov/data download on 10 November 2020.
4. Production well locations and TDS Detections from EKI/Todd/HydroFocus, 2018, San Mateo Plain Groundwater Basin Assessment, July 2018.

N

0 4,500 9,000
Feet

DRAFT

Well Siting Analysis of Redwood City Service Area

Redwood CIty Urban Water Management Plan
Redwood City, CA
December 2020
EKI C00110.00

eki environment & water

Figure 5

Path: \\Ekifileserver\gis\C00110\Maps_00202012\Fig05_WellSitingAnalysis.mxd

Legend

San Mateo Plain Subbasin

Redwood City Service Area

Suitability

Qualified

Most Qualified

Potential Target Area

Abbreviations

SMPGWM = San Mateo Plain Groundwater Model

Notes

1. All locations are approximate.
2. Suitability criteria are based on average transmissivity and weighted average fraction coarse grained material, as represented in the SMPGWM.
3. Area is excluded from well siting based on proximity to environmental cleanup sites (500 feet), irrigation or water supply wells (1,000 feet), bay shoreline (1 mile) and aquifer thickness (less than 300 feet).
4. Potential target areas require further detailed well siting and test hole investigation program prior to consideration of groundwater development.

Sources

1. Basemap courtesy of Esri.
2. SMPGWM grid from EKI/Todd/HydroFocus, 2018, San Mateo Plain Groundwater Basin Assessment, July 2018.
3. GeoTracker cleanup sites from https://geotracker.waterboards.ca.gov/data download on 10 November 2020.
4. Production well locations and TDS Detections from EKI/Todd/HydroFocus, 2018, San Mateo Plain Groundwater Basin Assessment, July 2018.

N

0 4,500 9,000

Feet

DRAFT

Most Suitable Well Locations

Redwood CIty Urban Water Management Plan
Redwood City, CA
December 2020
EKI C00110.00

Figure 6

eki environment & water

Path: X:\C00110\Maps_00\2020\12\Fig06_RecommendedAreas.mxd

Attachment A

Key Well Logs

ORIGINAL
File Original, Duplicate and Triplicate with the
DIVISION OF WATER RESOURCES
P. O. BOX 1079
SACRAMENTO 5, CALIFORNIA

RECEIVED REGIONAL WATER POLLUTION CONTROL BOARD #2 FEB 10 1958

WATER WELL DRILLERS REPORT

(Sections 7076, 7077, 7078, Water Code)

STATE OF CALIFORNIA—DEPARTMENT OF PUBLIC WORKS

DIVISION OF WATER RESOURCES

Do Not Fill In

State Well No.

Other Well No. 5S/3W 17 R1

Region

(1) DRILLER: (person, firm, or corporation)

Name Robert Garcia Well Drilling & Pump Co.

Address 1870 Bayshore

Palo Alto, California

OWNER:

Name Blomquist Oil Service

Address Harbor Rd. & Bayshore Highway

Redwood City, California

(2) Proposed Use (Check)

Domestic ☐ Industrial ☒

Irrigation ☐ Test Well ☐

Municipal ☐ Other ☐

Equipment

Rotary ☐

Cable ☒

Dug Well ☐

Other ☐

(3) CASING:

ft. of	in	lb./ga. casing	left in well
60	14	#12	
140	10	#12	

Type and size of shoe or well ring

(4) PERFORATIONS:

Type of perforator used Mills

Perforated ft.	to ft.	holes per	
152	159	4	ft.
167	172	4	ft.
184	186	4	ft.

Diameter of perforations ¼ in., length 3 in.

(5) WATER LEVELS:

Was electric log made of well? ☐ Yes ☒ No If yes, attach copy.

Depth at which water was first found 9 ft.

Standing level before perforating ft.

Standing level after perforating 18 ft.

Note your observation of any change in water level while drilling

Was a surface sanitary seal provided? cement seal

(6) WELL PUMPING TEST:

Capacity gal./min. ft. draw down

Was well gravel packed?

Were any strata sealed against pollution? no

Temperature unknown Was a chemical analysis made? no Attach copy

If abandoned was well capped?

(7) TYPE OF WORK (check):

New well ☒ Reconditioning of well ☐

Deepening existing well ☐

(8) LOCATION OF WELL:

County San Mateo

R. F. D. or Street No. Harbor Rd. & Bayshore

Redwood City, California

(9) WELL LOG:

Total depth of well 200 ft.

Formation: Mention size of water gravel—

ft. to	ft.	Formation
0	5	rock fill
5	9	yellow clay
9	17	blue clay
17	22	yellow clay
22	43	sand & yellow clay
43	46	sand & gravel
46	49	sandy yellow clay
49	54	sandy blue clay
54	59	tough blue clay
53	72	blue clay
72	114	sandy blue clay
114	123	yellow clay
123	137	blue clay
137	146	sticky blue clay
146	151	yellow clay
151	160	cement gravle
160	166	hard sand w/rock
166	172	cement gravel
172	180	yellwo clay
180	186	cement gravel
186	200	tough blue clay

FOR OFFICIAL USE ONLY

Work started April 2 1957 Completed April 15 1957

Date of Report January 28, 1958

WELL DRILLER'S STATEMENT:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

[SIGNED] Robert Garcia Well Drilling & Pump Co.

Well Driller

By Robert E. Garcia

License No. 29694 Classification C57

Dated January 28, 1958

46370 7-51 30M QUIN SPO

Bratt 6 20 828 33A RF

18N
19D

STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES
WATER WELL DRILLERS REPORT

Do not fill in

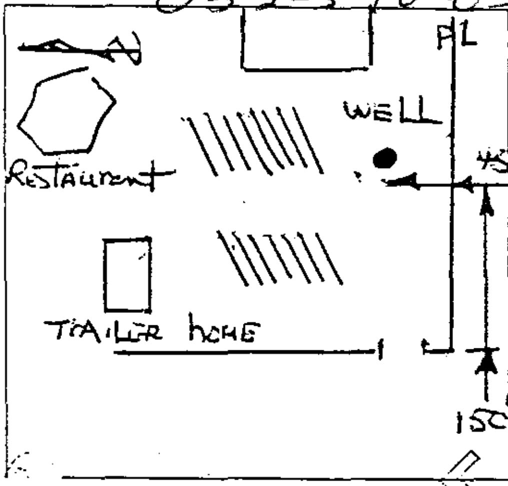
No. 18524

State Well No. 15F1
Other Well No. 5S/3W-19D

Local Permit No. or Date

(1) OWNER: Name Petes Harbor Pete Uccelli
Address #1 ~~Whipple~~ Uccelli Blvd
City Redwood City Zip

(2) LOCATION OF WELL (See instructions):
County San Mateo Owner's Well Number
Well address if different from above
Township — Range — Section
Distance from cities, roads, railroads, fences, etc. 45' N of So PL and 150' E of West PL located in parking lot
052-540-05 ✓



WELL LOCATION SKETCH

(3) TYPE OF WORK:
New Well ☒ Deepening ☐
Reconstruction ☐
Reconditioning ☐
Horizontal Well ☐
Destruction ☐ (Describe destruction materials and procedures in Item 12)

(4) PROPOSED USE:
Domestic ☐
Irrigation ☒
Industrial ☐
Test Well ☐
Stock ☐
Municipal ☐
Other Boat Washing ☐

(5) EQUIPMENT:
Rotary ☒ Reverse ☐
Cable ☐ Air ☐
Other ☐ Bucket ☐

(6) GRAVEL PACK:
Yes ☒ No ☐ Size 1/8
Diameter of bore
Packed from to ft.

(7) CASING INSTALLED:
Steel ☐ Plastic ☒ Concrete ☐

From ft.	To ft.	Dia. in.	Gage or Wall
0	183	5"	160

(8) PERFORATIONS:
Type of perforation or size of screen

From ft.	To ft.	Slot size
		1/4x6

(9) WELL SEAL:
Was surface sanitary seal provided? Yes ☒ No ☐ If yes, to depth 50' ft.
Were strata sealed against pollution? Yes ☐ No ☒ Interval ft.
Method of sealing Concrete

(10) WATER LEVELS:
Depth of first water, if known ft.
Standing level after well completion ft.

(11) WELL TESTS:
Was well test made? Yes ☐ No ☐ If yes, by whom?
Type of test Pump ☐ Bailer ☐ Air lift ☐
Depth to water at start of test ft. At end of test ft.
Discharge gal/min after hours Water temperature
Chemical analysis made? Yes ☐ No ☐ If yes, by whom?
Was electric log made? Yes ☐ No ☐ If yes, attach copy to this report

(12) WELL LOG: Total depth 183' ft. Depth of completed well ft.

from ft.	to ft.	Formation (Describe by color, character, size or material)
0	12'	fill
12	20	Black Bay Mud
20	28	Blue Clay
28	33	yellow clay little sand
33	-	sand
33	37	yellow clay
37	42	Blue clay MIXED Rock
42	47	Blue clay
47	60	Blue clay
60	62	yellow clay little sand
62	72	72 Blue clay Cemented gravel
72	86	" "
86	94	Con Blue Clay gravel
94	100	Blue Clay
100	114	Blue Clay Cemented gravel
114	126	yellow Clay
126	130	Blue clay Cemented gravel
130	135	yellow & Blue
135	158	Con Blue Clay gravel
158	168	Rock & gravel sand
168	178	gravel & sand
178	180	gravel Stratified Clay Blue
180	183	Cemented gravel Clay

Work started 10-26 1977 Completed 11-1 1977

WELL DRILLER'S STATEMENT:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

SIGNED [signature] (Well Driller)
NAME Green Bear Corp (Person, firm, or corporation) (Typed or printed)
Address #2 Palo Alto St
City Palo Alto Zip 94304
License No. 340507 Date of this report 11-1-77

188 (REV. 7-76) IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

alt 1 ft

RWQCB - 410414
San Mateo Co - 330046

Swl w'9.. 55/3w 19F2

ORIGINAL
File with DWR

STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES

WATER WELL DRILLERS REPORT

Do not fill in

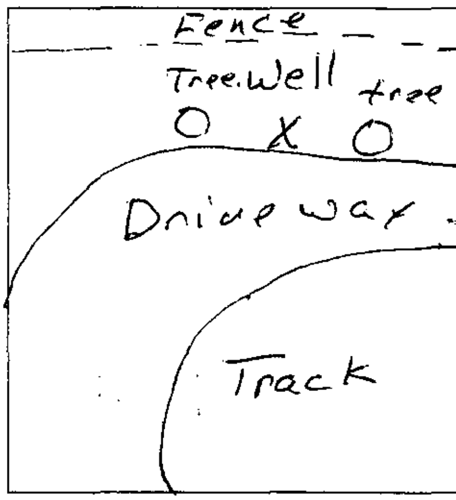
No. 346276

Notice of Intent No. 255837.
Local Permit No. or Date W-292-91

State Well No. ~~55/4W/24~~ 5S/3W/19
Other Well No.

(1) OWNER: Name Sequoia Union High School
Address 480 James Ave
City Redwood City Ca. ZIP 94062

(2) LOCATION OF WELL (See instructions):
County San Mateo Owner's Well Number
Well address if different from above
Township Range Section
Distance from cities, roads, railroads, fences, etc.
APN 052-201-010-7 ✓



WELL LOCATION SKETCH

(3) TYPE OF WORK:
New Well ☒ Deepening ☐
Reconstruction ☐
Reconditioning ☐
Horizontal Well ☐
Destruction ☐ (Describe destruction materials and procedures in Item 12)

(4) PROPOSED USE:
Domestic ☐
Irrigation ☒
Industrial ☐
Test Well ☐
Municipal ☐
Other ☐
(Describe)

(5) EQUIPMENT:
Rotary ☒ Reverse ☐
Cable ☐ Air ☐
Other ☐ Bucket ☐

(6) GRAVEL PACK:
Yes ☒ No ☐ Size 2/12
Diameter of bore 9 7/8
Packed from 280 to 38 ft.

(7) CASING INSTALLED:
Steel ☐ Plastic ☒ Concrete ☐

(8) PERFORATIONS:
Type of perforation or size of screen

From ft.	To ft.	Dia. in.	Gage or Wall	From ft.	To ft.	Slot size
0	38	6"	F480	38	278	0.20

(9) WELL SEAL:
Was surface sanitary seal provided? Yes ☒ No ☐ If yes, to depth 38 ft.
Were strata sealed against pollution? Yes ☐ No ☒ Interval ft.
Method of sealing Cement

(10) WATER LEVELS:
Depth of first water, if known ft.
Standing level after well completion ft.

(11) WELL TESTS:
Was well test made? Yes ☒ No ☐ If yes, by whom? WILKINSON
Type of test Pump ☒ Bailer ☐ Air lift ☐
Depth to water at start of test 3 ft. At end of test 260 2' ft.
Discharge 37 gal/min after 5 1/2 hours Water temperature
Chemical analysis made? Yes ☒ No ☐ If yes, by whom? Soil & Plant Lab
Was electric log made Yes ☐ No ☒ If yes, attach copy to this report

(12) WELL LOG: Total depth 280 ft. Completed depth 278 ft.

from ft.	to ft.	Formation (Describe by color, character, size or material)
0	5	Brown topsoil
5	15	100% Brown sand & small gravel
15	20	55% Brown sand & small gravel Soft Brn clay.
20	35	100% Brn sand & small gravel
35	40	100% medium gravel Brn sand
40	55	100% grey soft clay with hard stringers
55	85	100% grey clay with hard stringers
85	100	40% grey clay 60% hard shale.
100	260	100% Very hard Black shale
260	280	95% Very hard Black shale 5% white chips.

Work started 12/26 1991 Completed 1/3 1992

WELL DRILLER'S STATEMENT:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.
Signed James McClelk (Well Driller)
NAME Wilkinson Enterprises Inc. (Person, firm, or corporation) (Typed or printed)
Address 890 Sonora Ave.
City Half Moon Bay Ca ZIP 94019
License No. 511063 Date of this report 1/27/92

IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

DWR 188 (REV. 12-86) 86 96355

ID1 5s/3w-19F2

ID2 ______ T5sR3w>W19F02

DATE (YMD) ______

BHDTP (FT) 230

SWL (FT) ______

PT ______

CA ______ ~~3~~ 2

LG ______

PTOP (FT) ______

PBOT (FT) ______

GTOP (FT) ______

GBOT (FT) ______

SSL ______

USE ______

DIAM (IN) ______

DZ (FT)	DEP	FC	DESCR
0 - 5			+ 4
5 - 15			+ 7
15 - 20			+ 6
20 - 35			+ 7
35 - 40			8
40 - 55			- 3
55 - 85			- 3
85 - 100			- 3
100 - 260			- 1

DG (FT)	DEP	FC	DESCR
260-280			— /

Form DWR 429

Brett #4

State No. 5S/3W-20P1

STATE OF CALIFORNIA
DEPARTMENT OF WATER RESOURCES

WELL DATA

Owner: S & W Fine Foods Inc.
Address: Heller St., Redwood City
Tenant: Same
Address: Same

State No. 5S/3W-20P1
Other No.

Type of Well: Hydrograph ☐ Key ☐ Index ☐ Semiannual ☐

Location: County San Mateo Basin SANTA CLARA VALLEY No. 2-9.02

U.S.G.S. Quad. Palo Alto Quad. No. 312a

SE ¼ SW ¼ Section 20, Twp. 5S, Rge. 3W MD Base & Meridian

Description: 40' NE/o Heller St., 50' SE/o Willow

Reference Point description: Air line available

which is 0 ft. ~~above~~ below land surface. Ground Elevation 16 ft.

Reference Point Elev. 16 ft. Determined from U.S.G.S. ~~Contour~~ (1961) QUAD.

Well: Use Industrial Condition Depth 383 ft.

Casing, size in., perforations

Measurements By: DWR ☐ USGS ☐ USBR ☐ County ☐ Irr. Dist. ☐ Water Dist. ☐ Cons. Dist. ☐

Chief Aquifer: Name Depth to Top Aq. Depth to Bot. Aq.

Type of Material Perm. Rating Thickness

Gravel Packed? Yes ☐ No ☐ Depth to Top Gr. Depth to Bot. Gr.

Supp. Aquifer Depth to Top Aq. Depth to Bot. Aq.

Driller: Western

Date drilled Jan. 3, 1951 Log, filed DWR open (1) confidential (2)

Equipment: Pump, type Deep well turbine make Western

Serial No. 4592 Size of discharge pipe in.

Power, Kind elec Make U.S.

H. P. 20 Motor Serial No. 869685

Elec. Meter No. Transformer No.

Yield G.P.M. Pumping level ft.

Water Analysis: Min. (1) San. (2) H.M. (3)

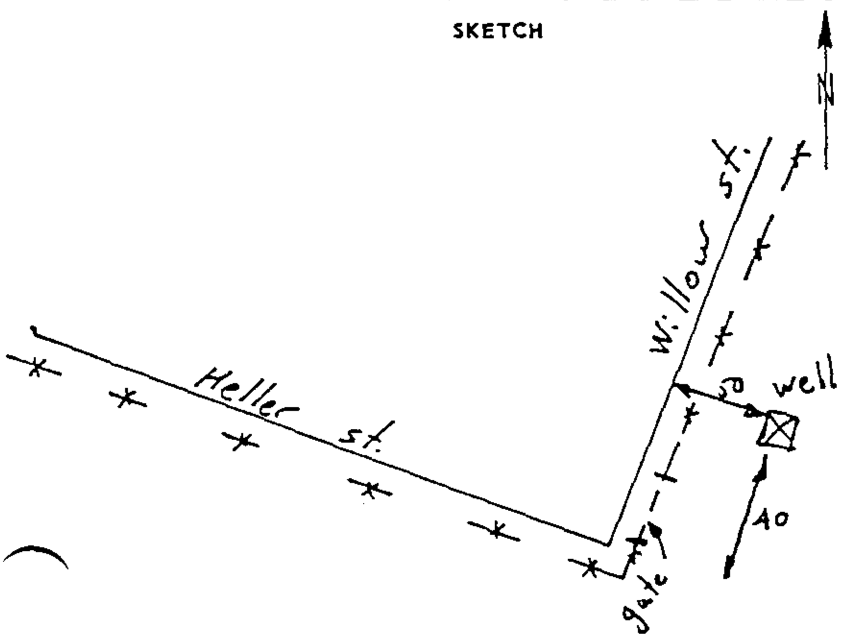
Water Levels available: Yes (1) X No

Period of Record: Begin 10-64 End

Collecting Agency:

Prod. Rec. (1) Pump Test (2) Yield (3)

SKETCH



REMARKS

Recorded by: Harry Sperber
Date: August 1962

37 28 42
122 13 02

Bratb 4

37.4783 // 122.2172

20P01

U.S.G.S. NO.: 4

OWNER NO.:

STATE WELL NUMBER: 5S/3W-~~21~~21

TOWNSHIP/RANGE: 5S/3W sec 21
N W
(Calif. grid coordinates)

WELL LOCATION:
Distance to section lines from well:
N - 1320 ft
E - 2000 ft

OWNER, ADDRESS, and TELEPHONE NO.:
S & W Fine Foods, Inc.
Laurel & Heller
Redwood City, Calif.

WELL USE: Industrial

DATE OF CONSTRUCTION: 2-5-51

DRILLING METHOD: Rotary

CASING DIAMETER AND MATERIAL: 12", single casing.

DEPTH OF WELL: 383 ft.

PERFORATED INTERVAL: 30'-90', 104'-122', 134-146, 152-164, 170-176, 182-188, 194-206, 218-284

ELEVATION (to top of casing/cristy box):

DEPTH TO WATER: ____________ DATE MEASURED: ____________

DEPTH TO BEDROCK: ~290'

EL. TOP OF BEDROCK:

KIND OF BEDROCK:

WELL LOGS FOUND (geophysic=G, lithologic=C, water chemistry=C): L

DISCHARGE:

SPECIFIC CAPACITY:

NOTES:

Batch 4

20P01M

U.S.G.S. NO.:

OWNER NO.:

STATE WELL NUMBER: 5S/3W 21L1

TOWNSHIP/RANGE: T5S/R3W 21 L 1
N W
(Calif. grid coordinates)

WELL LOCATION: —

OWNER, ADDRESS, and TELEPHONE NO.:
S & W Fine Foods, Inc
Laurel & Heller
Redwood City

WELL USE: Industrial

DATE OF CONSTRUCTION: March 1951

DRILLING METHOD: rotary

CASING DIAMETER AND MATERIAL: 70' - 30" diam 296' - 12" dia (single)

DEPTH OF WELL: 383'

PERFORATED INTERVAL: —

ELEVATION (to top of casing/cristy box):

DEPTH TO WATER: ________ DATE MEASURED: ________

DEPTH TO BEDROCK: 325?

EL. TOP OF BEDROCK:

KIND OF BEDROCK: —

WELL LOGS FOUND (geophysic=G, lithologic=L, water chemistry=C): L, V)

DISCHARGE: 160 gpm drawdown = 200' in 48 hr

SPECIFIC CAPACITY:

NOTES:
6 ft unaccounted for in [illegible] section at bedrock

Palo Alto Quad
Bull 4

DWR 5S/3W-20P1

DWR #4 5S/3W-21L

DUPLICATE
File Original, Duplicate and Triplicate with the
[illegible] OF WATER RESOURCES
[illegible]X 1079
[illegible]MENTO 5, CALIFORNIA

STATE OF CALIFORNIA
DEPARTMENT OF PUBLIC WORKS

DIVISION OF WATER RESOURCES

6083

WATER WELL DRILLERS REPORT

(Sections 7076, 7077, 7078, Water Code)

SHEET 1 19

San Mateo

Do Not Fill In
State Well No. 5S/3W-21L1
Other Well No. /
Region 2

(1) Driller:
Name Western Well Drilling Co., Ltd.
Address 522 W. Santa Clara Street
San Jose, Calif.
License No. R-50683 Classification C-57

(2) Proposed use or uses (check): Domestic ☐ Irrigation ☐ Domestic and Irrigation ☐ Municipal ☐ Industrial ☒ Test well ☐ Other

(3) Equipment used (check): Rotary ☒ Cable ☐ Dug well ☐ Other

Owner:
Name S. & N. Fine Foods, Inc.
Address Laurel & Heller
Redwood City, Calif.

(4) Type of work (check): New well ☒ Reconditioning of well ☐ Deepening existing well ☐

(5) Well log:
Total depth of well 383 ft.

Give details of formations penetrated, such as silt, peat, muck, sand, gravel, clay, shale, sandstone, hardpan, rock. Include size of gravel (diameter) and sand (fine, medium, coarse), color of material, structure (loose, packed, cemented, soft, hard, brittle).

	Depth From Ground Surface		
12	0 ft. to 12 ft.	Blue Clay	
28	12 " " 40 "	Boulders & Coarse Sand	
43	40 " " 83 "	Cemented Gravel & Clay	
11	83 " " 94 "	Gravel	
8	94 " " 102 "	Blue Clay	
20	102 " " 122 "	Clay & Streaks Cemented Gravel	
8	122 " " 130 "	Gravel	
37	130 " " 167 "	Cemented Gravel & Clay	
25	167 " " 192 "	Hard Clay	
5	192 " " 197 "	Gravel	
11	197 " " 208 "	Clay	
8	208 " " 216 "	Hard Rock ←	
15	216 " " 231 "	Cemented Gravel & Streaks Rock (Hard)	
5	231 " " 236 "	Rock ←	
5	236 " " 241 "	Gravel	
15	241 " " 256 "	Clay & Streaks Cemented Gravel	
34	256 " " 290 "	Cemented Gravel & Streaks Clay	
21	290 " " 311 "	Cemented Gravel & Clay	
9	311 " " 320 "	Shale (Hard)	Kjf ?
5	320 " " 325 "	Cemented Gravel	Kjfcg ?
12	331 " " 343 "	Rock (Hard)	Kjf
7	343 " " 350 "	Rock	
11	350 " " 361 "	Rock (Hard)	
5	361 " " 366 "	Rock	
4	366 " " 370 "	Rock (Hard)	
13	370 " " 383 "	Rock	

-331 ?

G	100
S	0
F	28
Cg	190
C	65
	383

If additional space is required, continue on DWR Form No. 246—Supplement, and attach to respective report copies.

(6) Casing left in well:

LENGTH FT.	DIAMETER INCHES	SINGLE, DOUBLE, WELDED, OTHER	LBS. PER FOOT OR GAGE OF CASING	SEATING BELOW GROUND SURFACE, FT.
70	30"	Single 1-X	1/4"	70
290	12"	" 1-X	1/4" .250	290

Type and size of shoe or well ring none Welded joints—☒ Yes ☐ No

D.W.R. FORM NO. 246

elev. from topo +20' | hard rock @ -365 ?

CONFIDENTIAL

Brett 4

TE
uplicate and Triplicate with the
WATER RESOURCES
O. BOX 1079
SACRAMENTO 5, CALIFORNIA

SHEET 2 19
Ben Miles

WATER WELL DRILLERS REPORT

(Sections 7076, 7077, 7078, Water Code)

Do Not Fill In
State Well No. 5S/3W-21L1
Other Well No.
Region 2

(7) Perforations:

Type of perforator used Factory 8

Perforated	80 ft. to	92 ft.	Hole size 1/4 x 1 3½" centers	No. of holes	
"	104	122			
"	134	146			
"	152	164			
"	170	176	25-10-50		
"	182	188			
"	194	206			
"	218	284			
"					
"					

200/160 = 8
160

(8) Water levels:

Depth at which water first encountered ......ft.
Depth to water before perforating ......ft.
Depth to water after perforating ......ft.
Not Available on Rotary Wells
Note any change in water level while drilling

(9) Well pumping test:

Date of test 1/30/51 By whom Western Well Drilling Co.
Depth to water when test started ......ft.
G.P.M. at beginning of test
Drawdown from standing level ......ft.
G.P.M. at completion of test 160
Drawdown at completion of test 200 ft.
Length of time tested 48 Hrs.
Temperature of water
Was gas present in water? ☐ Yes ☒ No

0.8 gpm/ftdd

(10) General: 1

Was well gravel packed? Yes 4 Size of rock 1/4 x 3/4 Thickness of pack 7"
Was a surface sanitary seal provided? Yes 1-4-070-30-.25-X
Were any strata sealed against pollution? ☐ Yes ☒ No If yes, attach detailed description.
Strata sealed 1-4
Was analysis made of water? ☒ Yes ☐ No If yes, attach copy.
Was electric log made of well? ☒ Yes ☐ No If yes, attach copy.
If well abandoned, was it plugged and sealed?
Method of plugging and sealing

(11) Location:

North

	X		

1 MILE

Section No. 21
Township 5S
Range ~~E~~ 3W
Base & Meridian M D
Show location of well in Section, thus (X)
Distances to section lines from well, N ~~or S~~ 1320 ft. S
and E ~~or W~~ 2000 ft. W
Show location of nearest known well, thus (O)
Distance to nearest known well ......ft.

(12) Time of work:

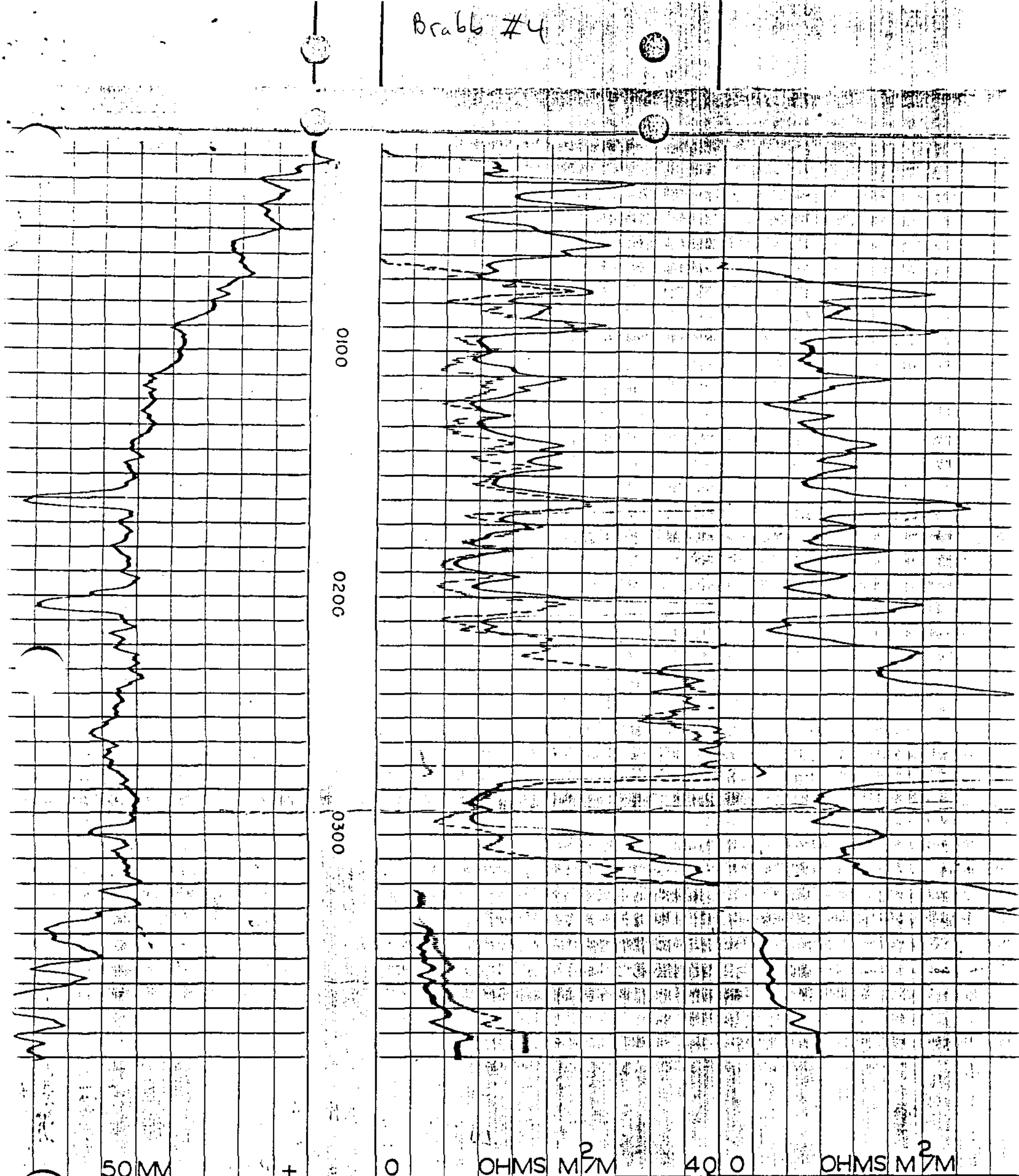
Work started date 12/26/50 Completed date 2/5/51
Date of this report March 2, 1951

WELL DRILLER'S STATEMENT:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

[SIGNED] WESTERN WELL DRILLING CO., LTD.
Well Driller
By [signature]
License No. R-50683 Classification C 57
Dated March 2, 1951

D.W.R. FORM NO. 246



S&W FINE FRUIT CANNING CO.

REDWOOD CITY

W.W. No

ORIGINAL
File Original, Duplicate and Triplicate with the
DIVISION OF WATER RESOURCES
P. O. BOX 1079
SACRAMENTO 5, CALIFORNIA

STATE OF CALIFORNIA
DEPARTMENT OF PUBLIC WORKS

DIVISION OF WATER RESOURCES

[redacted]

SHEET 1

Do Not Fill In
State Well No. 5S/3W-21-
Other Well No. 05503W20P01M
Region

WATER WELL DRILLERS REPORT

19
37

(Sections 7076, 7077, 7078, Water Code)

(1) Driller:
Name Western Well Drilling Co., Ltd.
Address 522 W. Santa Clara Street
San Jose, Calif.
License No. R-50683 Classification C 57

(2) Proposed use or uses *(check)*:
Domestic ☐ Municipal ☐
Irrigation ☐ Industrial ☒
Domestic and Irrigation ☐ Test well ☐
Other

(3) Equipment used *(check)*:
Rotary ☒
Cable ☐
Dug well ☐
Other

Owner:
Name S. & W. Fine Foods, Inc.
Address Laurel & Heller
Redwood City, Calif.

(4) Type of work *(check)*:
New well ☒ Reconditioning of well ☐
Deepening existing well ☐

(5) Well log:
Total depth of well 383 ft.

Give details of formations penetrated, such as silt, peat, muck, sand, gravel, clay, shale, sandstone, hardpan, rock. Include size of gravel (diameter) and sand (fine, medium, coarse), color of material, structure (loose, packed, cemented, soft, hard, brittle).

Depth From Ground Surface		
0 ft.	to 12 ft.	Blue Clay
12 "	" 40 "	Boulders & Coarse Sand
40 "	" 83 "	Cemented Gravel & Clay
83 "	" 94 "	Gravel
94 "	" 102 "	Blue Clay
102 "	" 122 "	Clay & Streaks Cemented Gravel
122 "	" 130 "	Gravel
130 "	" 167 "	Cemented Gravel & Clay
167 "	" 192 "	Hard Clay
192 "	" 197 "	Gravel
197 "	" 208 "	Clay
208 "	" 216 "	Hard Rock
216 "	" 231 "	Cemented Gravel & Streaks Rock (Hard)
231 "	" 236 "	Rock
236 "	" 241 "	Gravel
241 "	" 256 "	Clay & Streaks Cemented Gravel
256 "	" 290 "	Cemented Gravel & Streaks Clay
290 "	" 311 "	Cemented Gravel & Clay
311 "	" 320 "	Shale (Hard)
320 "	" 325 "	Cemented Gravel
331 "	" 343 "	Rock (Hard)
343 "	" 350 "	Rock
350 "	" 361 "	Rock (Hard)
361 "	" 366 "	Rock
366 "	" 370 "	Rock (Hard)
370	383	Rock

If additional space is required, continue on DWR Form No. 246—Supplement, and attach to respective report copies.

(6) Casing left in well:

LENGTH FT.	DIAMETER INCHES	SINGLE, DOUBLE, WELDED, OTHER	LBS. PER FOOT OR GAGE OF CASING	SEATING BELOW GROUND SURFACE, FT.
70	30"	Single	1/4"	70
290	12"	"	1/4"	290

Type and size of shoe or well ring none Welded joints—☒ Yes ☐ No

D.W.R. FORM NO. 246

REGIONAL WATER POLLUTION CONTROL BOARD COPY

23971 3-50 40M QUIN SPO

ORIGINAL
File Original, Duplicate and Triplicate with the
DIVISION OF WATER RESOURCES
P. O. BOX 1079
SACRAMENTO 5, CALIFORNIA

SHEET 2

WATER WELL DRILLERS REPORT

(Sections 7076, 7077, 7078, Water Code)

19

Do Not Fill In
State Well No. 5S/3W-21L1
Other Well No. 05S03W20P01M
Region 2

(7) Perforations:

Type of perforator used Factory

Perforated	ft. to	ft.	Hole size	No. of holes
80	92		1/4 x 1 3½" centers	
104	122			
134	146			
152	164			
170	176			
182	188			
194	206			
218	284			

(8) Water levels:

Depth at which water first encountered .... ft.
Depth to water before perforating .... ft.
Depth to water after perforating .... ft.
Note any change in water level while drilling

Not Available on Rotary Wells

(9) Well pumping test:

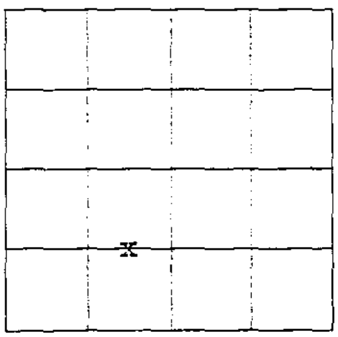
Date of test 1/30/51 By whom Western Well Drilling Co.
Depth to water when test started .... ft.
G.P.M. at beginning of test
Drawdown from standing level .... ft.
G.P.M. at completion of test 160
Drawdown at completion of test 200 ft.
Length of time tested 43 Hrs.
Temperature of water
Was gas present in water? ☐ Yes ☒ No

(10) General:

Was well gravel packed? Yes Size of rock 1/4 x 3/4 Thickness of pack 7"
Was a surface sanitary seal provided? Yes
Were any strata sealed against pollution? ☐ Yes ☒ No If yes, attach detailed description.
Strata sealed
Was analysis made of water? ☒ Yes ☐ No If yes, attach copy.
Was electric log made of well? ☒ Yes ☐ No If yes, attach copy.
If well abandoned, was it plugged and sealed?
Method of plugging and sealing

(11) Location:

North



1 MILE

Section No. 21
Township 5S
Range 3W
Base & Meridian MD
Show location of well in Section, thus (X)
Distances to section lines from well, N ~~or S~~ 1320 ft.
and E ~~or W~~ 2000 ft.
Show location of nearest known well, thus (O)
Distance to nearest known well .... ft.

(12) Time of work:

Work started date 12/26/50 Completed date 2/5/51
Date of this report March 2, 1951

WELL DRILLER'S STATEMENT:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

[SIGNED] WESTERN WELL DRILLING CO., LTD.
Well Driller
By J. J. Guardino
License No. R-50683 Classification C-57
Dated March 2, 1951

D.W.R. FORM NO. 246 REGIONAL WATER POLLUTION CONTROL BOARD COPY 23972 3-50 40M QUIN SPO

C O P Y

COOK RESEARCH LABORATORIES
950 Crane Street
Menlo Park, California

05S 03W 20P01m

: Davenport 3-5447

Mailing Address
P. O. Box 696

February 23, 1951

Western Well Drilling Co., Ltd.
522 West Santa Clara Street
San Jose, Calif.

Your Order No. 5877
Anal. No. 6777
Date Col. 2-14-51
Date Rec'd. 2-15-51
Date Reported 2-21/51
Sorce of Sample, S.&W. FINE FOODS INC. -WELL Redwood City

REPORT OF MINERAL ANALYSIS OF WATER

ANIONS	PARTS per MILLION	EQUIV. per MILLION
Nitrate (NO_3)	6.0	0.10
Chloride (Cl)	184.	5.19
Sulphate (SO_4)	49	1.02
Bicarbonate (HCO_3)	264	4.32
Carbonate (CO_3)	0.0	0.00
TOTAL Equiv. per Million		10.63

CATIONS	PARTS per MILLION	EQUIV. per MILLION
Sodium & Potassium	106	4.62
Magnesium (Mg)	38	3.12
Calcium (Ca)	58	2.89
TOTAL Equiv. per Million		10.63

DETERMINATION	PARTS per MILLION
Phenol. Alkalinity ($CaCO_3$)	0
M. O. Alkalinity($CaCO_3$)	216
Free Carbon Dioxide (CO_2)	4
Calcium Hardness($CaCO_3$)	139
Magnesium Hardness ($CaCO_3$)	161
Total Hardness ($CaCO_3$)	300
Total Solid-Evaporation-	662
Total Solids-Calculated	594
Sp. Cond.-Micromhos 25° C — SC	1,040
Silica (SiO_2)	23
Iron (Fe)	1.10
Manganese (Mn)	0.26
Hyd. Ion Conc. (pH) — ph	8.0

5-4

COOK RESEARCH LABORATORIES

BY /s/
Lawrence H. Cook

ORIGINAL
File with DWR

STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES

WATER WELL DRILLERS REPORT

Do not fill in

No. 346235

Notice of Intent No. 255874
Local Permit No. or Date W-227-91

State Well No. ______
Other Well No. 05504W01 (C)

(1) OWNER: Name SHOREBIRD HOMEOWNERS ASS
Address 560 SHOREBIRD CIRCLE
City REDWOOD CITY CA ZIP 94065

(2) LOCATION OF WELL (See instructions):
County SAN MATEO Owner's Well Number ______
Well address if different from above ______
Township ______ Range ______ Section ______
Distance from cities, roads, railroads, fences, etc. ______
APN 112-370-010 thru 220

WELL LOCATION SKETCH

(3) TYPE OF WORK:
New Well ☒ Deepening ☐
Reconstruction ☐
Reconditioning ☐
Horizontal Well ☐
Destruction ☐ (Describe destruction materials and procedures in Item 12)

(4) PROPOSED USE:
Domestic ☐
Irrigation ☒
Industrial ☐
Test Well ☐
Municipal ☐
Other ☐ (Describe)

(5) EQUIPMENT:
Rotary ☒ Reverse ☐
Cable ☐ Air ☐
Other ☐ Bucket ☐

(6) GRAVEL PACK:
Yes ☒ No ☐ Size 3/8 x 1/2
Diameter of bore 12 1/4 - 9 7/8
Packed from 98 to 390 ft.

(7) CASING INSTALLED:
Steel ☐ Plastic ☒ Concrete ☐

(8) PERFORATIONS:
Type of perforation or size of screen

From ft.	To ft.	Dia. in.	Gage or Wall	From ft.	To ft.	Slot size
0	150	5	F480	150	390	0.20

(9) WELL SEAL:
Was surface sanitary seal provided? Yes ☒ No ☐ If yes, to depth 98 ft.
Were strata sealed against pollution? Yes ☐ No ☐ Interval ______ ft.
Method of sealing CEMENT

(10) WATER LEVELS:
Depth of first water, if known ______ ft.
Standing level after well completion ______ ft.

(11) WELL TESTS:
Was well test made? Yes ☒ No ☐ If yes, by whom? W/E
Type of test Pump ☒ Bailer ☐ Air lift ☐
Depth to water at start of test 20 ft. At end of test 93 ft.
Discharge 50 gal/min after 7 1/2 hours Water temperature ______
Chemical analysis made? Yes ☒ No ☐ If yes, by whom? SOIL & PLANT
Was electric log made Yes ☒ No ☐ If yes, attach copy to this report

(12) WELL LOG: Total depth 395 ft. Completed depth 390 ft.

	from ft.	to ft.	Formation (Describe by color, character, size or material)
4	0	5	BROWN TOPSOIL
-3	5	30	GREYISH BLACK BAY MUD
6	30	35	BROWN SAND & GREY CLAY
7	35	50	BROWN SAND & SMALL GRAVEL
-3	50	105	BLACK BAY MUD
4	105	115	BROWN CLAY & BROWN SAND
-3	115	125	GREY CLAY
-4	125	135	GREY CLAY & SMALL GRAVEL
7	135	210	FINE BROWN SAND & GRAVEL
7	210	220	BROWN SAND & MED GRAVEL
6	220	235	BROWN SAND, SMALL GRAVEL & BROWN CLAY
8	235	265	LARGE GRAVEL & BROWN SAND
6	265	295	BROWN SAND, MED. GRAVEL & BROWN CLAY
6	295	355	MED. GRAVEL, BROWN SAND & BROWN CLAY
7	355	395	SMALL GRAVEL SAND

Work started 9/4 1991 Completed 9/8 1991

WELL DRILLER'S STATEMENT:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

Signed [signature] (Well Driller)
NAME WILKINSON ENTERPRISES INC
(Person, firm, or corporation) (Typed or printed)
Address 890 SONORA AVE
City HALF MOON BAY CA ZIP 94019
License No. 511063 Date of this report 10-7-91

CONFIDENTIAL
NOT FOR PUBLIC
WATER CODE SEC. 13752

DWR 188 (REV. 12-86) IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM 86 96355

Form DWR 429 Brett 272 5S/3W-20F01 B0

State No. ______

current owner

STATE OF CALIFORNIA
DEPARTMENT OF WATER RESOURCES

WELL DATA

ROHM & HAAS

Owner: ~~Diamond Alkali Co.~~
Address: 1901 Spring Rd., Redwood City
Tenant:
Address:

State No. 5S/3W-20F1
Other No.

Type of Well: Hydrograph ☐ Key ☐ Index ☐ Semiannual ☐

Location: County San Mateo Basin BAY PLAIN AREA No. 2-9.01

U.S.G.S. Quad. Palo Alto Quad. No. 312a

SE ¼ NW ¼ Section 20, Twp. 5S, Rge. 3W MD Base & Meridian

Description
300' W/o Spring Rd.
100' S/o North end of office building
0.1 Mile N/o Chestnut Ave.

Reference Point description none

which is ______ ft. above/below land surface. Ground Elevation 10 ft.

Reference Point Elev. ______ ft. Determined from USGS Contour

Well: Use Industrial Condition ______ Depth ~~151~~ 193 ft.

Casing, size 12 in., perforations ______

Measurements By: DWR ☐ USGS ☐ USBR ☐ County ☐ Irr. Dist. ☐ Water Dist. ☐ Cons. Dist. ☐

Chief Aquifer: Name ______ Depth to Top Aq. ______ Depth to Bot. Aq. ______

Type of Material ______ Perm. Rating ______ Thickness ______

Gravel Packed? Yes ☐ No ☐ Depth to Top Gr. ______ Depth to Bot. Gr. ______

Supp. Aquifer ______ Depth to Top Aq. ______ Depth to Bot. Aq. ______

Driller Garcia

Date drilled June 1957 Log, filed X DWR open (1) ______ confidential (2) X

Equipment: Pump, type D.W.T. make Johnston

Serial No. JM 3838 Size of discharge pipe 2 in.

Power, Kind Elec. Make U.S.

H. P. 7 ½ Motor Serial No. 1108970

Elec. Meter No. ______ Transformer No. ______

Yield ______ G.P.M. Pumping level ______ ft.

Water Analysis: Min. (1) ______ San. (2) ______ H.M. (3) ______

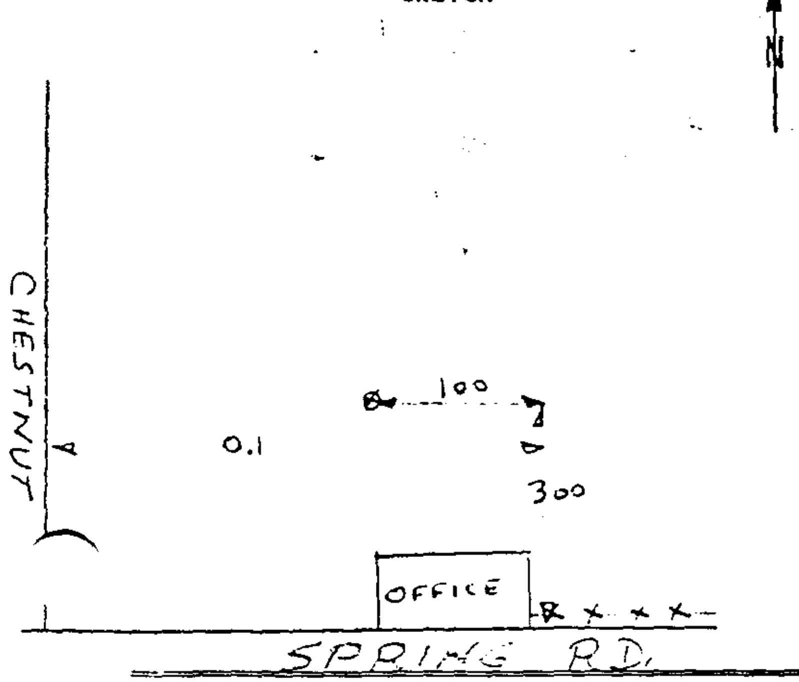
Water Levels available: Yes (1) ______ No ______

Period of Record: Begin ______ End ______

Collecting Agency:

Prod. Rec. (1) ______ Pump Test (2) ______ Yield (3) ______

SKETCH



REMARKS

Well is not used because water is too hard

Recorded by: H. Sperber

Date Aug. 1962

37 29 08/122 13 09 Brett 272 # Delete

ORIGINAL
File Original, Duplicate and Triplicate with the
DIVISION OF WATER RESOURCES
P. O. BOX 1079
SACRAMENTO 5, CALIFORNIA

RECEIVED REGIONAL WATER POLLUTION CONTROL BOARD FEB 10 1958

WATER WELL DRILLERS REPORT

(Sections 7076, 7077, 7078, Water Code)

STATE OF CALIFORNIA—DEPARTMENT OF PUBLIC WORKS

DIVISION OF WATER RESOURCES

Do Not Fill In 18
05S03W20F01
State Well No. 5/4-
Other Well No.
Region 20 F1

ROHM & HAAS 1986 37.4850 // 122.2175

DRILLER: (person, firm, or corporation)
Name Robert Garcia Well Drilling & Pump Co.
Address 1870 Bayshore
Palo Alto, California

OWNER:
Name Chemical Process Co.
Address 1901 Spring St.
Redwood City, California

(2) Proposed Use (*Check*)
Domestic ☐ Industrial ☒
Irrigation ☐ Test Well ☐
Municipal ☐ Other ☐

Equipment
Rotary ☐
Cable ☒
Dug Well ☐
Other ☐

(3) **CASING:**
193 ft. of 12 in #12 lb./ga. casing left in well

Type and size of shoe or well ring

PERFORATIONS:
Type of perforator used Mills

Perforated	ft. to	ft.	holes per	in.
143	147	5	ft.	
168	174	4	ft.	
180	183	4	ft.	

Diameter of perforations 1/4 in., length 3 in.

(5) **WATER LEVELS:**
Was electric log made of well? ☐ Yes ☒ No If yes, attach copy.
Depth at which water was first found 14 ft.
Standing level before perforating ft.
Standing level after perforating 12 ft.
Note your observation of any change in water level while drilling
Was a surface sanitary seal provided? no

(6) **WELL PUMPING TEST:**
Capacity gal./min. ft. draw down
Was well gravel packed?
Were strata sealed against pollution? no
Temperature unknown Was a chemical analysis made? no Attach copy
If abandoned was well capped?

(7) **TYPE OF WORK** (*check*):
New well ☒ Reconditioning of well ☐
Deepening existing well ☐

(8) **LOCATION OF WELL:** elev = 10'
County San Mateo
R. F. D. or Street No. 1901 Spring St.
Redwood City, California

el. 9 FT

(9) **WELL LOG:**
Total depth of well 193 ft.

Formation: Mention size of water gravel—

ft. to	ft.	
0	1	fill
1	5	tough blue clay
5	9	brown clay w/rock
9	12	yellow clay
12	19	sandy yellow clay
19	23	gravel
23	34	sandy y. cl.
34	39	sandy bl. cl.
39	41	gravel
41	43	tough bl. cl.
43	46	sandy bl. cl. w/gravel
46	49	tough bl. cl.
49	58	bl. cl.
58	66	tough bl. cl.
66	70	sandy bl. cl.
70	76	sandy y. cl.
76	79	bl. cl.
79	81	sandy bl. cl.
81	87	tough bl. cl.
87	119	sandy bl. cl.
119	128	sticky bl. cl.
128	134	y. cl.
134	142	sandy bl. cl.
142	143	y. cl.
143	147	cement gravel
147	151	sticky y. cl.
151	154	sandy y. cl.
154	158	hard sandy y. cl.
158	164	sandy y. cl. w/grit
164	169	hard rock in hard bl.cl.
169	170	" " " sandy " "
170	179	" " " hard " "
179	180	shale in sandy bl.cl.
180	182	" " tough " "
182	193	hard shale

Work started May 23, 1957 Completed June 6, 1957
Date of Report January 28, 1958

WELL DRILLER'S STATEMENT: FOR OFFICIAL USE ONLY
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

[SIGNED] Robert Garcia Well Drilling & Pump Co.
(Well Driller)
By Robert E. Garcia
License No. 23694 Classification C57
Dated January 28, 1958

46370 7-51 30M SUIN SPO

05503W20F01M

ORIGINAL
File with DWR

STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES
WATER WELL DRILLERS REPORT

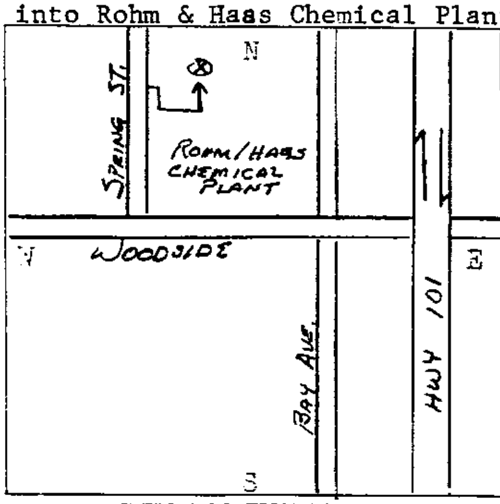
Do not fill in
No. 198212

State Well No.
Other Well No. 8614-2069

Notice of Intent No.
Local Permit No. or Date 11808

(1) OWNER: Name Rohm & Haas California, Inc.
Address 1901 Spring Street
City Redwood City, CA. Zip 94063

(2) LOCATION OF WELL (See instructions):
County San Mateo Owner's Well Number
Well address if different from above Same
Township Range Section
Distance from cities, roads, railroads, fences, etc. Parcel No. 054-062-080 West bound off HWY 1 on Woodside for 2 Blks. Then right on Spring St.; 1/2 Blk, turn right into Rohm & Haas Chemical Plant



WELL LOCATION SKETCH

(3) TYPE OF WORK:
New Well ☐ Deepening ☐
Reconstruction ☐
Reconditioning ☐
Horizontal Well ☐
Destruction ☒ (Describe destruction materials and procedures in Item 12)

(4) PROPOSED USE:
Domestic ☐
Irrigation ☐
Industrial ☐
Test Well ☐
Stock ☐
Municipal ☐
Other ☒

(5) EQUIPMENT:
Rotary ☐ Reverse ☐
Cable ☐ Air ☐
Other ☒ Bucket ☐

(6) GRAVEL PACK:
Yes ☐ No ☐ Size
Diameter of bore
Packed from to ft.

(7) CASING INSTALLED:
Steel ☐ Plastic ☐ Concrete ☐

(8) PERFORATIONS:
Type of perforation or size of screen

From ft.	To ft.	Dia. in.	Gage or Wall	From ft.	To ft.	Slot size

(9) WELL SEAL:
Was surface sanitary seal provided? Yes ☒ No ☐ If yes, to depth 194 ft.
Were strata sealed against pollution? Yes ☒ No ☐ Interval ft.
Method of sealing Pressure Grout & Tremmie (2")

(10) WATER LEVELS:
Depth of first water, if known Artesian +5' ft.
Standing level after well completion ft.

(11) WELL TESTS:
Was well test made? Yes ☐ No ☐ If yes, by whom?
Type of test Pump ☐ Bailer ☐ Air lift ☐
Depth to water at start of test ft. At end of test ft
Discharge gal/min after hours Water temperature
Chemical analysis made? Yes ☐ No ☐ If yes, by whom?
Was electric log made? Yes ☐ No ☐ If yes, attach copy to this report

(12) WELL LOG: Total depth ft. Depth of completed well ft.
from ft. to ft. Formation (Describe by color, character, size or material)

This well was reported by the State drillers log 05503w20 FOIM, to be installed with a cable tool to a depth of 193 ft. The well was sounded to a depth of 195 ft. The well was flowing when opened, so a new top was welded in place. This included a gate valve to control direction and flow. Then a tremmie pipe was installed to194'. Bentonite and Neat Cement was pumped into the well until it was visible from the top. A packer was installed and grout was again pumped into the hole. The flow of water ceased. After the cement had cured, the well head was cut and the surrounding area was excavated and cement was used to replace the void.

Work started 19 June 1986 Completed 27 June 1986

WELL DRILLER'S STATEMENT:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.
SIGNED Martin J. Maggiora
(Well Driller)
NAME Maggiora Bros. Drilling, Inc.
(Person, firm, or corporation) (Typed or printed)
Address 595 Airport Blvd
City Watsonville, CA Zip 95076
License No. 249957 Date of this report 21 July 1986

DWR 188 (REV. 7-76) IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

ORIGINAL
File Original, Duplicate and Triplicate with ...
DIVISION OF WATER RESOURCES
P. O. BOX 1079
SACRAMENTO 5, CALIFORNIA

RECEIVED REGIONAL WATER POLLUTION CONTROL BOARD FEB 10 1958

WATER WELL DRILLERS REPORT

(Sections 7076, 7077, 7078, Water Code)

STATE OF CALIFORNIA—DEPARTMENT OF PUBLIC WORKS

DIVISION OF WATER RESOURCES

ROHM & HAAS 1986

Do Not Fill In
05503W20F01M
State Well No.
Other Well No.
Region 20 F

(1) DRILLER: (person, firm, or corporation)
Name Robert Garcia Well Drilling & Pump Co.
Address 1870 Bayshore
Palo Alto, California

OWNER:
Name Chemical Process Co.
Address 1901 Spring St.
Redwood City, California

(2) Proposed Use (Check)
Domestic ☐ Industrial ☒
Irrigation ☐ Test Well ☐
Municipal ☐ Other ☐

Equipment
Rotary ☐
Cable ☒
Dug Well ☐
Other ☐

(3) CASING:
193 ft. of 12 in #12 lb./ga. casing left in well

Type and size of shoe or well ring

(4) PERFORATIONS:
Type of perforator used Mills

Perforated	ft. to	ft.	holes per
143	147	5	ft.
168	174	4	ft.
180	183	4	ft.

Diameter of perforations 1/4 in., length 3 in.

(5) WATER LEVELS:
Was electric log made of well? ☐ Yes ☒ No If yes, attach copy.
Depth at which water was first found 14 ft.
Standing level before perforating ft.
Standing level after perforating 12 ft.
Note your observation of any change in water level while drilling
Was a surface sanitary seal provided? no

(6) WELL PUMPING TEST:
Capacity gal./min. ft. draw down
Was well gravel packed?
Were any strata sealed against pollution? no
Temperature unknown Was a chemical analysis made? no Attach copy
If abandoned was well capped?

(7) TYPE OF WORK (check):
New well ☒ Reconditioning of well ☐
Deepening existing well ☐

(8) LOCATION OF WELL: elev = 10'
County San Mateo
R. F. D. or Street No. 1901 Spring St.
Redwood City, California

(9) WELL LOG:
Total depth of well 193 ft.
Formation: Mention size of water gravel—

From (ft.)	To (ft.)	Formation
0	1	fill
1	5	tough blue clay
5	9	brown clay w/rock
9	12	yellow clay
12	19	sandy yellow clay
19	23	gravel
23	34	sandy y. cl.
34	39	sandy bl. cl.
39	41	gravel
41	43	tough bl. cl.
43	46	sandy bl. cl. w/gravel
46	49	tough bl. cl.
49	58	bl. cl.
58	66	tough bl. cl.
66	70	sandy bl. cl.
70	76	sandy y. cl.
76	79	bl. cl.
79	81	sandy bl. cl.
81	87	tough bl. cl.
87	119	sandy bl. cl.
119	128	sticky bl. cl.
128	134	y. cl.
134	142	sandy bl. cl.
142	143	y. cl.
143	147	cement gravel
147	151	sticky y. cl.
151	154	sandy y. cl.
154	158	hard sandy y. cl.
158	164	sandy y. cl. w/grit
164	169	hard rock in hard cl.cl.
169	170	" " " sandy " "
170	179	" " " hard " "
179	180	shale in sandy bl.cl.
180	182	" " tough " "
182	193	hard shale

Work started May 23, 1957, Completed June 6, 1957
Date of Report January 28, 1958

WELL DRILLER'S STATEMENT:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

[SIGNED] Robert Garcia Well Drilling & Pump Co.
(Well Driller)
By Robert R. Garcia
License No. 29694 Classification C57
Dated January 28, 1958

46370 7-51 30M QUIN SPO

ORIGINAL
File with DWR

Page 1 of 1

Owner's Well No. RW-9X

Date Work Began Aug 27, 1993 Ended Aug 31, 1993

Local Permit Agency San Mateo County Dept. Health Services

Permit No. MW-134-93 Permit Date 8-6-93

STATE OF CALIFORNIA

WELL COMPLETION REPORT

Refer to Instruction Pamphlet

No. 422278

DWR USE ONLY — DO NOT FILL IN 5/3-20F

STATE WELL NO./STATION NO.

LATITUDE LONGITUDE

APN/TRS/OTHER

GEOLOGIC LOG

ORIENTATION (✓) ___ VERTICAL ___ HORIZONTAL ___ ANGLE ___ (SPECIFY)

DEPTH TO FIRST WATER ___ (Ft.) BELOW SURFACE

DEPTH FROM SURFACE Ft. to Ft.	DESCRIPTION (Describe material, grain size, color, etc.)
	Well destruction accomplished by cutting the screen interval with a perforation tool, tremie grouting from total depth with neat cement, and pressure izing well to 15 psi for approximately one hour. Surface structures removed and grouted to ground surface.

TOTAL DEPTH OF BORING ___ (Feet)

TOTAL DEPTH OF COMPLETED WELL ___ (Feet)

WELL OWNER

Name Rohm and Haas Company

Mailing Address Independence Mall West

CITY Philadelphia STATE PA ZIP 19105

WELL LOCATION

Address 800 Chestnut Street

City Redwood City

County San Mateo

APN Book 054 Page 006 Parcel 001 and 008

or Township ___ Range ___ Section ___

or Latitude ___ NORTH Longitude ___ WEST (DEG. MIN. SEC.)

LOCATION SKETCH

NORTH

WEST EAST

See Attached Map

SOUTH

Illustrate or Describe Distance of Well from Landmarks such as Roads, Buildings, Fences, Rivers, etc.
PLEASE BE ACCURATE & COMPLETE.

ACTIVITY (✓)

___ NEW WELL

MODIFICATION/REPAIR

___ Deepen

___ Other (Specify)

✓ DESTROY (*Describe Procedures and Materials Under "GEOLOGIC LOG"*)

PLANNED USE(S) (✓)

___ MONITORING

WATER SUPPLY

___ Domestic

___ Public

___ Irrigation

___ Industrial

___ "TEST WELL"

___ CATHODIC PROTECTION

___ OTHER (Specify)

DRILLING METHOD ___ FLUID ___

WATER LEVEL & YIELD OF COMPLETED WELL

DEPTH OF STATIC WATER LEVEL N/A (Ft.) & DATE MEASURED ___

ESTIMATED YIELD* ___ (GPM) & TEST TYPE ___

TEST LENGTH ___ (Hrs.) TOTAL DRAWDOWN ___ (Ft.)

* *May not be representative of a well's long-term yield.*

CASING(S)

DEPTH FROM SURFACE Ft. to Ft.	BORE-HOLE DIA. (Inches)	TYPE (✓) BLANK	SCREEN	CON-DUCTOR	FILL PIPE	MATERIAL/GRADE	INTERNAL DIAMETER (Inches)	GAUGE OR WALL THICKNESS	SLOT SIZE IF ANY (Inches)

ANNULAR MATERIAL

DEPTH FROM SURFACE Ft. to Ft.	CE-MENT (✓)	BEN-TONITE (✓)	FILL (✓)	FILTER PACK (TYPE/SIZE)

ATTACHMENTS (✓)

___ Geologic Log

___ Well Construction Diagram

___ Geophysical Log(s)

___ Soil/Water Chemical Analyses

X Other Location Map

ATTACH ADDITIONAL INFORMATION, IF IT EXISTS.

CERTIFICATION STATEMENT

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief.

NAME KVILHAUG WELL DRILLING (PERSON, FIRM, OR CORPORATION) (TYPED OR PRINTED)

ADDRESS 1109 LANDINI LN CITY CONCORD STATE CA ZIP 94520

Signed [signature] WELL DRILLER/AUTHORIZED REPRESENTATIVE DATE SIGNED 4 Jan 94 C-57 LICENSE NUMBER 482390

DWR 188 REV. 7-90 IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

Drill Code 1545

ORIGINAL
File with DWR

Page 1 of 1

Owner's Well No. RW-4D

Date Work Began Aug. 27, 1993 Ended Aug. 31, 1993

Local Permit Agency San Mateo County Dept. Health Services

Permit No. MW-134-93 Permit Date 8-6-93

STATE OF CALIFORNIA

WELL COMPLETION REPORT

Refer to Instruction Pamphlet

No. 422277

DWR USE ONLY — DO NOT FILL IN

STATE WELL NO./STATION NO.

LATITUDE LONGITUDE

APN/TRS/OTHER

GEOLOGIC LOG

ORIENTATION (✓) ___ VERTICAL ___ HORIZONTAL ___ ANGLE ___ (SPECIFY)

DEPTH TO FIRST WATER ___ (Ft.) BELOW SURFACE

DEPTH FROM SURFACE Ft. to Ft.	DESCRIPTION *Describe material, grain size, color, etc.*
	Well destruction accomplished by tremie grouting the well from total depth with neat cement; pressurized to 5 psi for 15 minutes, and pvc casing cut 2.5 feet below ground surface and hole cemented.

TOTAL DEPTH OF BORING ___ (Feet)

TOTAL DEPTH OF COMPLETED WELL ___ (Feet)

WELL OWNER

Name Rohm and Haas Company

Mailing Address Independence Mall West

Philadelphia PA 19105

CITY STATE ZIP

WELL LOCATION

Address 800 Chestnut Street

City Redwood City

County San Mateo

APN Book 054 Page 006 Parcel 001 and 008

or Township ___ Range ___ Section ___

or Latitude ___ NORTH Longitude ___ WEST

DEG. MIN. SEC. DEG. MIN. SEC.

LOCATION SKETCH

NORTH

See Attached Map

WEST EAST

SOUTH

Illustrate or Describe Distance of Well from Landmarks such as Roads, Buildings, Fences, Rivers, etc.
PLEASE BE ACCURATE & COMPLETE.

ACTIVITY (✓)

___ NEW WELL

MODIFICATION/REPAIR

___ Deepen

___ Other (Specify)

✓ DESTROY (*Describe Procedures and Materials Under "GEOLOGIC LOG"*)

PLANNED USE(S) (✓)

___ MONITORING

WATER SUPPLY

___ Domestic

___ Public

___ Irrigation

___ Industrial

___ "TEST WELL"

___ CATHODIC PROTECTION

___ OTHER (Specify)

DRILLING METHOD ___ FLUID ___

WATER LEVEL & YIELD OF COMPLETED WELL

DEPTH OF STATIC WATER LEVEL NA (Ft.) & DATE MEASURED ___

ESTIMATED YIELD* ___ (GPM) & TEST TYPE ___

TEST LENGTH ___ (Hrs.) TOTAL DRAWDOWN ___ (Ft.)

* *May not be representative of a well's long-term yield.*

CASING(S)

DEPTH FROM SURFACE Ft. to Ft.	BORE-HOLE DIA. (Inches)	TYPE (✓) BLANK	SCREEN	CON-DUCTOR	FILL PIPE	MATERIAL / GRADE	INTERNAL DIAMETER (Inches)	GAUGE OR WALL THICKNESS	SLOT SIZE IF ANY (Inches)

ANNULAR MATERIAL

DEPTH FROM SURFACE Ft. to Ft.	CE-MENT (✓)	BEN-TONITE (✓)	FILL (✓)	FILTER PACK (TYPE/SIZE)

ATTACHMENTS (✓)

___ Geologic Log

___ Well Construction Diagram

___ Geophysical Log(s)

___ Soil/Water Chemical Analyses

X Other Location Map

ATTACH ADDITIONAL INFORMATION, IF IT EXISTS.

CERTIFICATION STATEMENT

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief.

NAME KVILHAUG WELL DRILLING
(PERSON, FIRM, OR CORPORATION) (TYPED OR PRINTED)

1109 LANDINI LN CONCORD CA 94520
ADDRESS CITY STATE ZIP

Signed [signature] 4 Jan 94 492390
WELL DRILLER/AUTHORIZED REPRESENTATIVE DATE SIGNED C-57 LICENSE NUMBER

DWR 188 REV. 7-90

IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

DWR Code 1545

ORIGINAL
File with DWR

Page 1 of 1

Owner's Well No. [redacted] RW-4X [redacted]

Date Work Began Aug-27-1993, Ended Aug-31-1993

Local Permit Agency San Mateo County Dept. Health Services

Permit No. MW-[redacted]-93 134 Permit Date 8-6-93

STATE OF CALIFORNIA

WELL COMPLETION REPORT

Refer to Instruction Pamphlet

No. 422276

DWR USE ONLY — DO NOT FILL IN

STATE WELL NO./STATION NO.

LATITUDE LONGITUDE

APN/TRS/OTHER

GEOLOGIC LOG

ORIENTATION (✓) ___ VERTICAL ___ HORIZONTAL ___ ANGLE ___ (SPECIFY)

DEPTH TO FIRST WATER ______ (Ft.) BELOW SURFACE

DEPTH FROM SURFACE Ft. to Ft.	DESCRIPTION *Describe material, grain size, color, etc.*
	Well destruction accomplished by cutting/knifing screen intervals, tremie grouting with neat cement and pressurizing the well casings. Surface structures were removed, grouted to ground surface, and the area leveled. Well pressurized to 5 psi for approximately one hour during grout curing.

TOTAL DEPTH OF BORING ______ (Feet)

TOTAL DEPTH OF COMPLETED WELL ______ (Feet)

WELL OWNER

Name Rohm and Haas Company

Mailing Address Independence Mall West

Philadelphia PA 19105

CITY STATE ZIP

WELL LOCATION

Address 800 Chestnut Street

City Redwood City

County San Mateo

APN Book 054 Page 006 Parcel 001 and 008

or Township ______ Range ______ Section ______

or Latitude ___ NORTH Longitude ___ WEST (DEG. MIN. SEC.)

LOCATION SKETCH

NORTH

See Attached Map

WEST EAST

SOUTH

Illustrate or Describe Distance of Well from Landmarks such as Roads, Buildings, Fences, Rivers, etc.
PLEASE BE ACCURATE & COMPLETE.

ACTIVITY (✓)

___ NEW WELL

MODIFICATION/REPAIR

___ Deepen

___ Other (Specify)

✓ DESTROY (*Describe Procedures and Materials Under "GEOLOGIC LOG"*)

PLANNED USE(S) (✓)

___ MONITORING

WATER SUPPLY

___ Domestic

___ Public

___ Irrigation

___ Industrial

___ "TEST WELL"

___ CATHODIC PROTECTION

___ OTHER (Specify)

DRILLING METHOD ______ FLUID ______

WATER LEVEL & YIELD OF COMPLETED WELL

DEPTH OF STATIC WATER LEVEL N/A (Ft.) & DATE MEASURED ______

ESTIMATED YIELD* ______ (GPM) & TEST TYPE ______

TEST LENGTH ______ (Hrs.) TOTAL DRAWDOWN ______ (Ft.)

** May not be representative of a well's long-term yield.*

CASING(S)

DEPTH FROM SURFACE Ft. to Ft.	BORE-HOLE DIA. (Inches)	TYPE (✓) BLANK	SCREEN	CON-DUCTOR	FILL PIPE	MATERIAL/GRADE	INTERNAL DIAMETER (Inches)	GAUGE OR WALL THICKNESS	SLOT SIZE IF ANY (Inches)

ANNULAR MATERIAL

DEPTH FROM SURFACE Ft. to Ft.	CE-MENT (✓)	BEN-TONITE (✓)	FILL (✓)	FILTER PACK (TYPE/SIZE)

ATTACHMENTS (✓)

___ Geologic Log

___ Well Construction Diagram

___ Geophysical Log(s)

___ Soil/Water Chemical Analyses

X Other Location Map

ATTACH ADDITIONAL INFORMATION, IF IT EXISTS.

CERTIFICATION STATEMENT

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief.

NAME KVILHAUG WELL DRILLING
(PERSON, FIRM, OR CORPORATION) (TYPED OR PRINTED)

1109 LANGIN. LN CONCORD CA 94520
ADDRESS CITY STATE ZIP

Signed [signature] 4 Jan 94 482390
WELL DRILLER/AUTHORIZED REPRESENTATIVE DATE SIGNED C-57 LICENSE NUMBER

DWR 188 REV. 7-90 IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

Work code 1545

ORIGINAL
File with DWR

Page 1 of 1

Owner's Well No. 56670-1

Date Work Began 8/16/95, Ended 8/22/95

Local Permit Agency SAN MATEO COUNTY DEPT.OF HEALTH SERVICE

Permit No. W 153-95 Permit Date 8/11/95

STATE OF CALIFORNIA
WELL COMPLETION REPORT
Refer to Instruction Pamphlet

No. 419354

DWR USE ONLY — DO NOT FILL IN

05S03W19

STATE WELL NO./STATION NO.

LATITUDE LONGITUDE

APN/TRS/OTHER

GEOLOGIC LOG

ORIENTATION (✓) X VERTICAL ___ HORIZONTAL ___ ANGLE ___ (SPECIFY)

DEPTH TO FIRST WATER 15 (Ft.) BELOW SURFACE

DEPTH FROM SURFACE Ft.	to Ft.	DESCRIPTION *Describe material, grain size, color, etc.*
0	2	TOP SOIL
2	5	SAND
5	14	BROWN CLAY
14	17	GRAVEL & CLAY
17	40	GRAVEL
40	48	GRAY CLAY
48	50	SAND & GRAVEL
50	65	BLUE & GREEN CLAY
65	85	SANDY CLAY
85	95	GRAVEL & CLAY
95	120	BLUE CLAY & GRAVEL
120	130	SANDY CLAY & GRAVEL
130	140	BROWN CLAY
140	150	GRAVEL
150	190	BROWN CLAY
190	200	HARD BROWN SANDSTONE

TOTAL DEPTH OF BORING 200 (Feet)

TOTAL DEPTH OF COMPLETED WELL 195 (Feet)

WELL OWNER

Name

Mailing Address

CITY STATE ZIP

WELL LOCATION

Address 590 HAMILTON STREET

City REDWOOD CITY

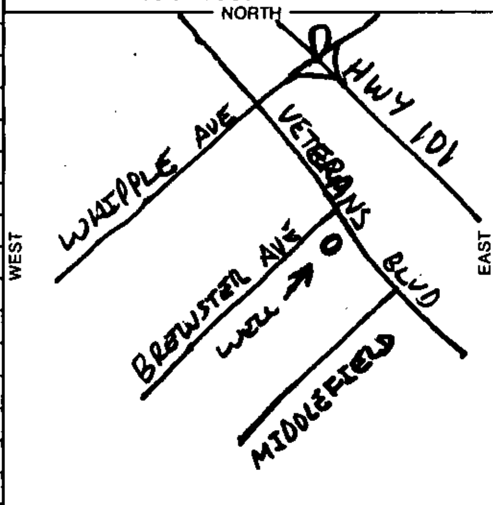
County SAN MATEO

APN Book 052 Page 341 Parcel 240

or Township ___ Range ___ Section ___

or Latitude ___ NORTH Longitude ___ WEST
DEG. MIN. SEC. DEG. MIN. SEC.

LOCATION SKETCH



Illustrate or Describe Distance of Well from Landmarks such as Roads, Buildings, Fences, Rivers, etc.
PLEASE BE ACCURATE & COMPLETE.

ACTIVITY (✓)

X NEW WELL

MODIFICATION/REPAIR
___ Deepen
___ Other (Specify)

___ DESTROY (*Describe Procedures and Materials Under "GEOLOGIC LOG"*)

PLANNED USE(S) (✓)

___ MONITORING

WATER SUPPLY
___ Domestic
___ Public
X Irrigation
___ Industrial
___ "TEST WELL"
___ CATHODIC PROTECTION
___ OTHER (Specify)

DRILLING METHOD MUD ROTARY FLUID WATER/BEN

WATER LEVEL & YIELD OF COMPLETED WELL

DEPTH OF STATIC WATER LEVEL 0 (Ft.) & DATE MEASURED 8/21/95

ESTIMATED YIELD * 30+ (GPM) & TEST TYPE BLOW

TEST LENGTH ___ (Hrs.) TOTAL DRAWDOWN ___ (Ft.)

* *May not be representative of a well's long-term yield.*

CASING(S)

DEPTH FROM SURFACE Ft.	to Ft.	BORE-HOLE DIA. (Inches)	TYPE: BLANK	SCREEN	CON-DUCTOR	FILL PIPE	MATERIAL / GRADE	INTERNAL DIAMETER (Inches)	GAUGE OR WALL THICKNESS	SLOT SIZE IF ANY (Inches)
0	105	12	X				PVC	6	SDR-21	
105	185	12		X			PVC	6	SDR-21	.032

ANNULAR MATERIAL

DEPTH FROM SURFACE Ft.	to Ft.	CE-MENT (✓)	BEN-TONITE (✓)	FILL (✓)	FILTER PACK (TYPE/SIZE)
0	85	XXX			
85	200			XX	8X16

ATTACHMENTS (✓)

___ Geologic Log
___ Well Construction Diagram
X Geophysical Log(s)
X Soil/Water Chemical Analyses
___ Other ___

ATTACH ADDITIONAL INFORMATION, IF IT EXISTS.

CERTIFICATION STATEMENT

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief.

NAME MAGGIORA BROS. DRILLING, INC. 153
(PERSON, FIRM, OR CORPORATION) (TYPED OR PRINTED)

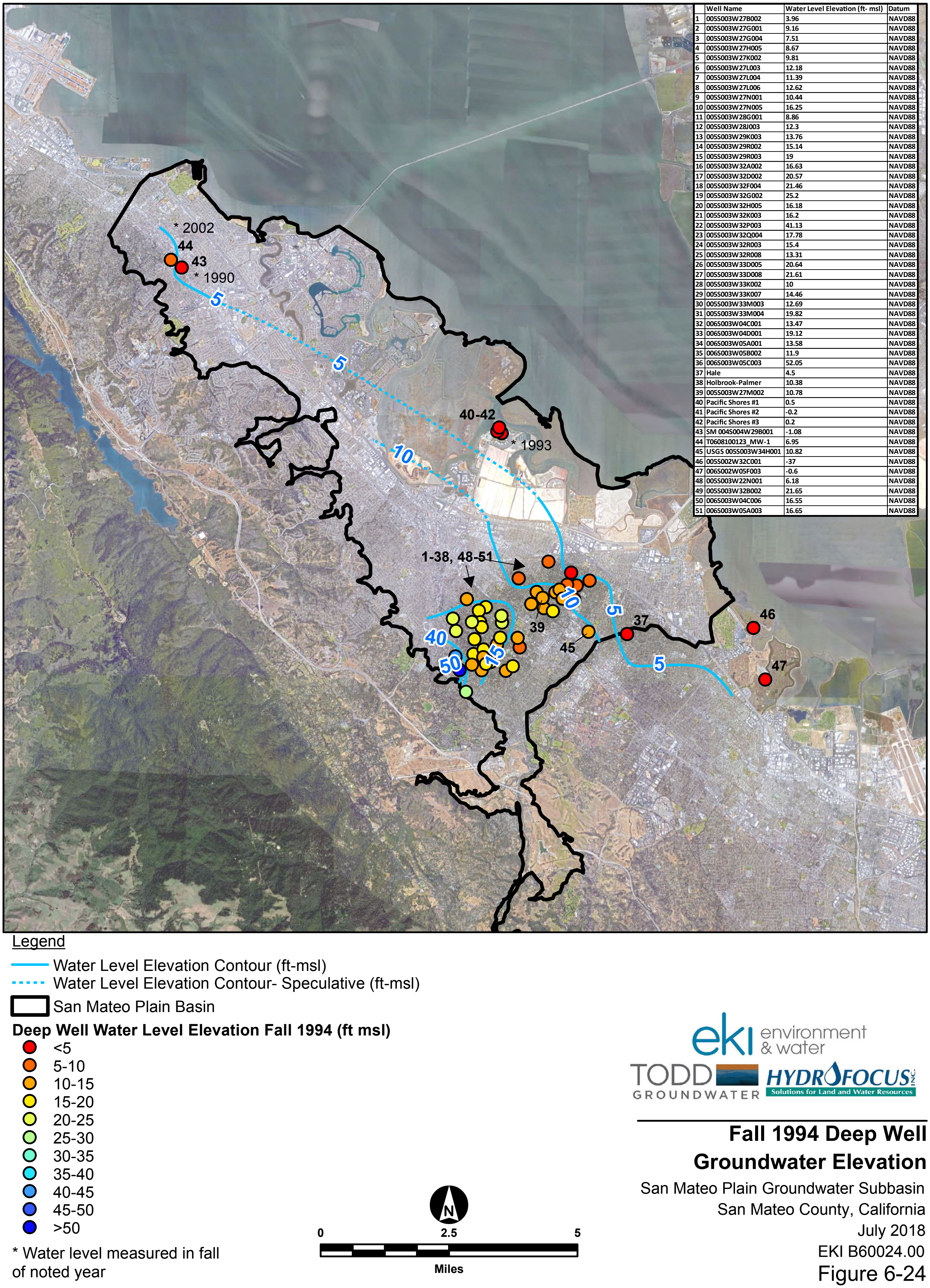
595 AIRPORT BLVD. WATSONVILLE, CA 95076
ADDRESS CITY STATE ZIP

Signed ___ 10/20/95 249957
WELL DRILLER/AUTHORIZED REPRESENTATIVE DATE SIGNED C-57 LICENSE NUMBER

DWR 188 REV. 7-90 IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

Attachment B

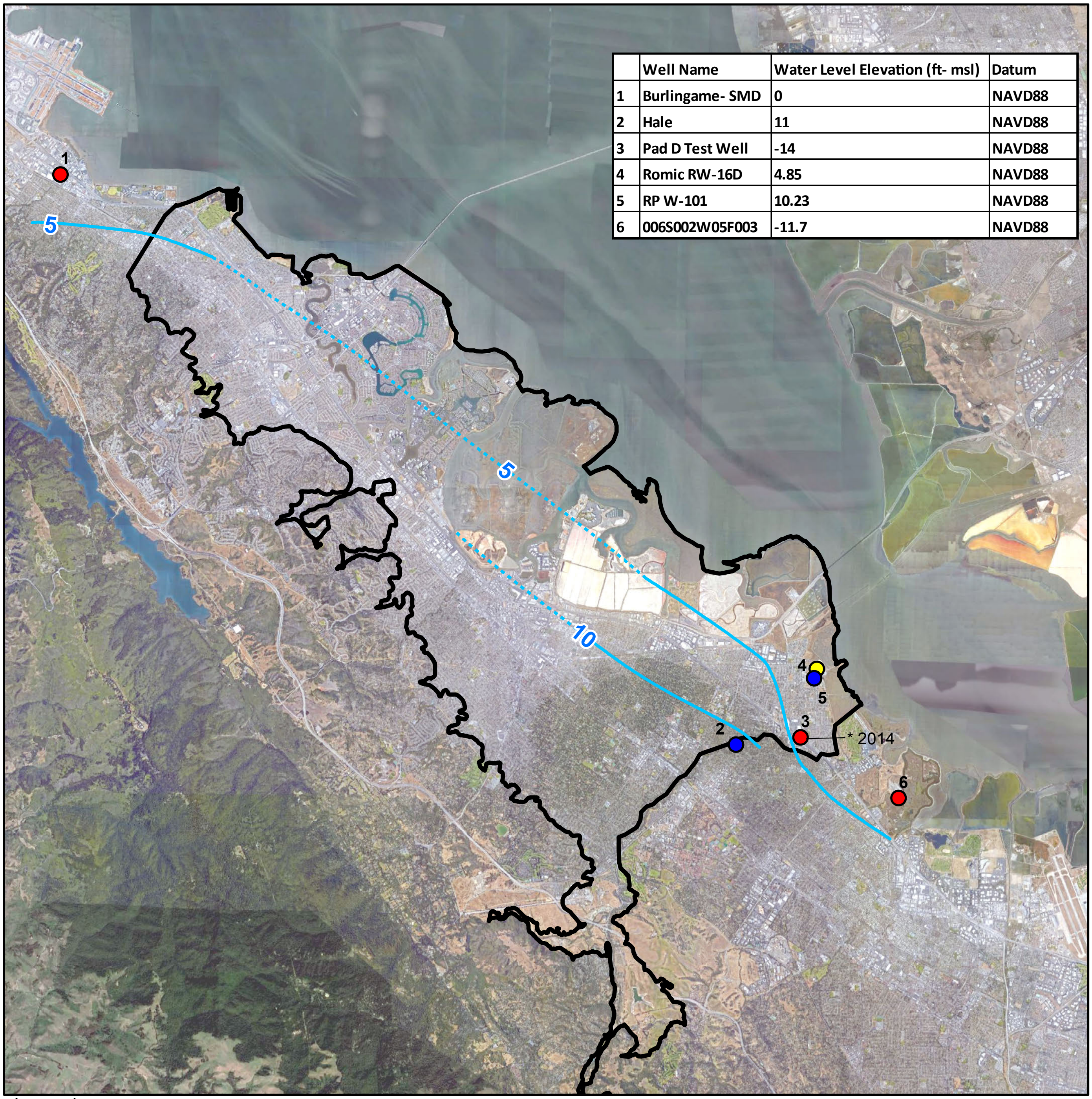
Groundwater Elevation Maps



	Well Name	Water Level Elevation (ft- msl)	Datum
1	005S003W27B002	3.96	NAVD88
2	005S003W27G001	9.16	NAVD88
3	005S003W27G004	7.51	NAVD88
4	005S003W27H005	8.67	NAVD88
5	005S003W27K002	9.81	NAVD88
6	005S003W27L003	12.18	NAVD88
7	005S003W27L004	11.39	NAVD88
8	005S003W27L006	12.62	NAVD88
9	005S003W27N001	10.44	NAVD88
10	005S003W27N005	16.25	NAVD88
11	005S003W28G001	8.86	NAVD88
12	005S003W28J003	12.3	NAVD88
13	005S003W29K003	13.76	NAVD88
14	005S003W29R002	15.14	NAVD88
15	005S003W29R003	19	NAVD88
16	005S003W32A002	16.63	NAVD88
17	005S003W32D002	20.57	NAVD88
18	005S003W32F004	21.46	NAVD88
19	005S003W32G002	25.2	NAVD88
20	005S003W32H005	16.18	NAVD88
21	005S003W32K003	16.2	NAVD88
22	005S003W32P003	41.13	NAVD88
23	005S003W32Q004	17.78	NAVD88
24	005S003W32R003	15.4	NAVD88
25	005S003W32R008	13.31	NAVD88
26	005S003W33D005	20.64	NAVD88
27	005S003W33D008	21.61	NAVD88
28	005S003W33K002	10	NAVD88
29	005S003W33K007	14.46	NAVD88
30	005S003W33M003	12.69	NAVD88
31	005S003W33M004	19.82	NAVD88
32	006S003W04C001	13.47	NAVD88
33	006S003W04D001	19.12	NAVD88
34	006S003W05A001	13.58	NAVD88
35	006S003W05B002	11.9	NAVD88
36	006S003W05C003	52.05	NAVD88
37	Hale	4.5	NAVD88
38	Holbrook-Palmer	10.38	NAVD88
39	005S003W27M002	10.78	NAVD88
40	Pacific Shores #1	0.5	NAVD88
41	Pacific Shores #2	-0.2	NAVD88
42	Pacific Shores #3	0.2	NAVD88
43	SM 004S004W29B001	-1.08	NAVD88
44	T0608100123_MW-1	6.95	NAVD88
45	USGS 005S003W34H001	10.82	NAVD88
46	005S002W32C001	-37	NAVD88
47	006S002W05F003	-0.6	NAVD88
48	005S003W22N001	6.18	NAVD88
49	005S003W32B002	21.65	NAVD88
50	006S003W04C006	16.55	NAVD88
51	006S003W05A003	16.65	NAVD88

Fall 1994 Deep Well Groundwater Elevation

San Mateo Plain Groundwater Subbasin
San Mateo County, California
July 2018
EKI B60024.00
Figure 6-24



	Well Name	Water Level Elevation (ft- msl)	Datum
1	Burlingame- SMD	0	NAVD88
2	Hale	11	NAVD88
3	Pad D Test Well	-14	NAVD88
4	Romic RW-16D	4.85	NAVD88
5	RP W-101	10.23	NAVD88
6	006S002W05F003	-11.7	NAVD88

Legend

Water Level Elevation Contour (ft-msl)

Water Level Elevation Contour- Speculative (ft-msl)

San Mateo Plain Basin

Deep Well Water Level Elevation Fall 2010 (ft msl)

- <0
- 0-5
- 5-10
- 10-15

* Water level measured in noted year

N

0 2.5 5

Miles

eki environment & water

TODD GROUNDWATER

HYDROFOCUS INC. Solutions for Land and Water Resources

Fall 2010 Deep Well Groundwater Elevation

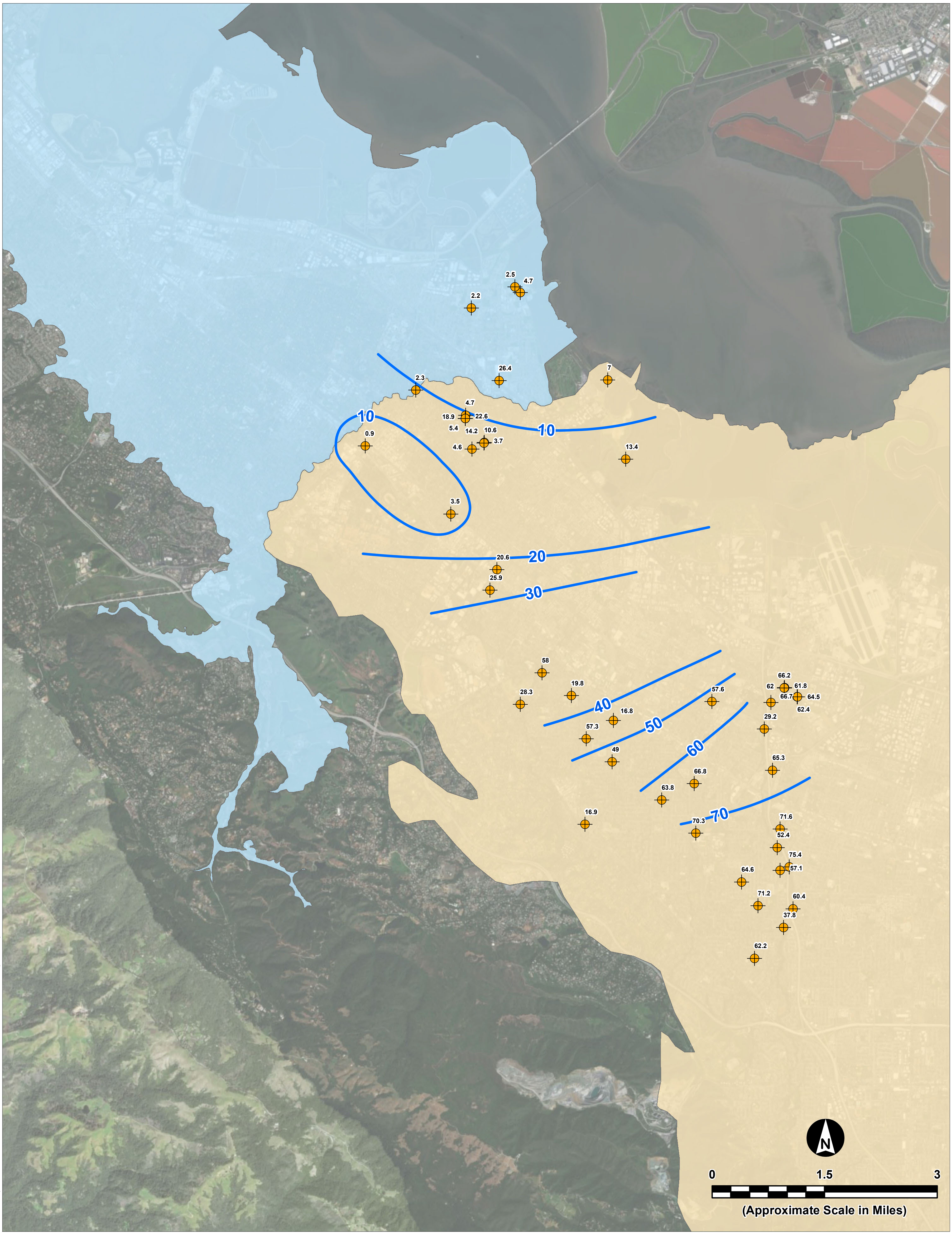
San Mateo Plain Groundwater Subbasin

San Mateo County, California

July 2018

EKI B60024.00

Figure 6-26



Legend

Water Level Elevation (ft-msl)

Groundwater Contour

Groundwater Basin

Santa Clara Valley

San Mateo Plain

eki environment & water

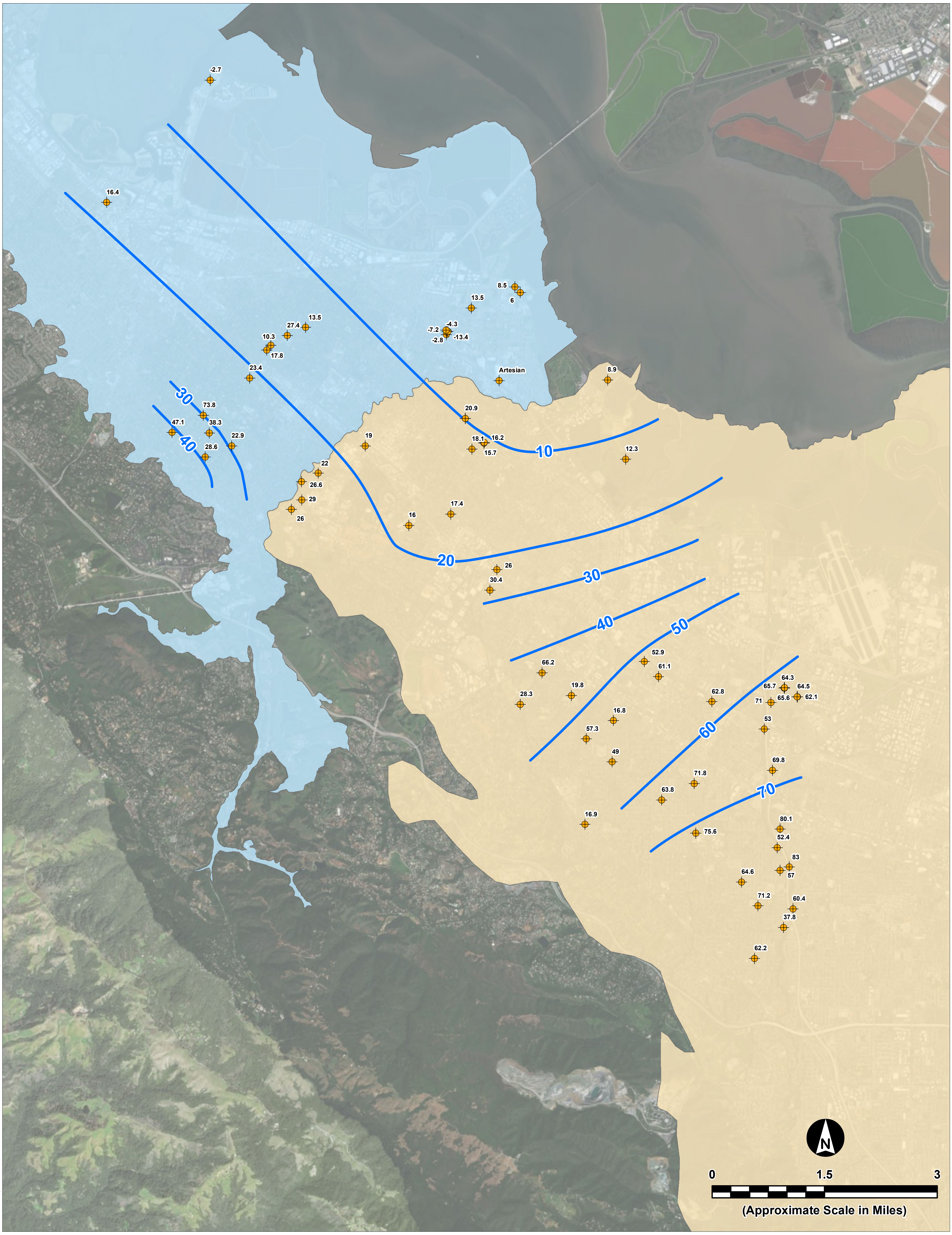
TODD GROUNDWATER

HYDROFOCUS INC. Solutions for Land and Water Resources

Fall 2016 Deep Well Groundwater Elevation

San Mateo Plain Groundwater Subbasin
San Mateo County, California
July 2018
EKI B60024.00

Figure 6-29



Path: T:\Projects\San Mateo Basin Assessment 78001\GIS\Maps\Phase 2 Figures\Fig 6-28 DeepSpring-Summer2017WL.mxd

Legend

- Water Level Elevation (ft-msl)
- Groundwater Contour

Groundwater Basin

- Santa Clara Valley
- San Mateo Plain

eki environment & water
TODD GROUNDWATER
HYDROFOCUS INC. Solutions for Land and Water Resources

Spring/Summer 2017 Deep Well Groundwater Elevation

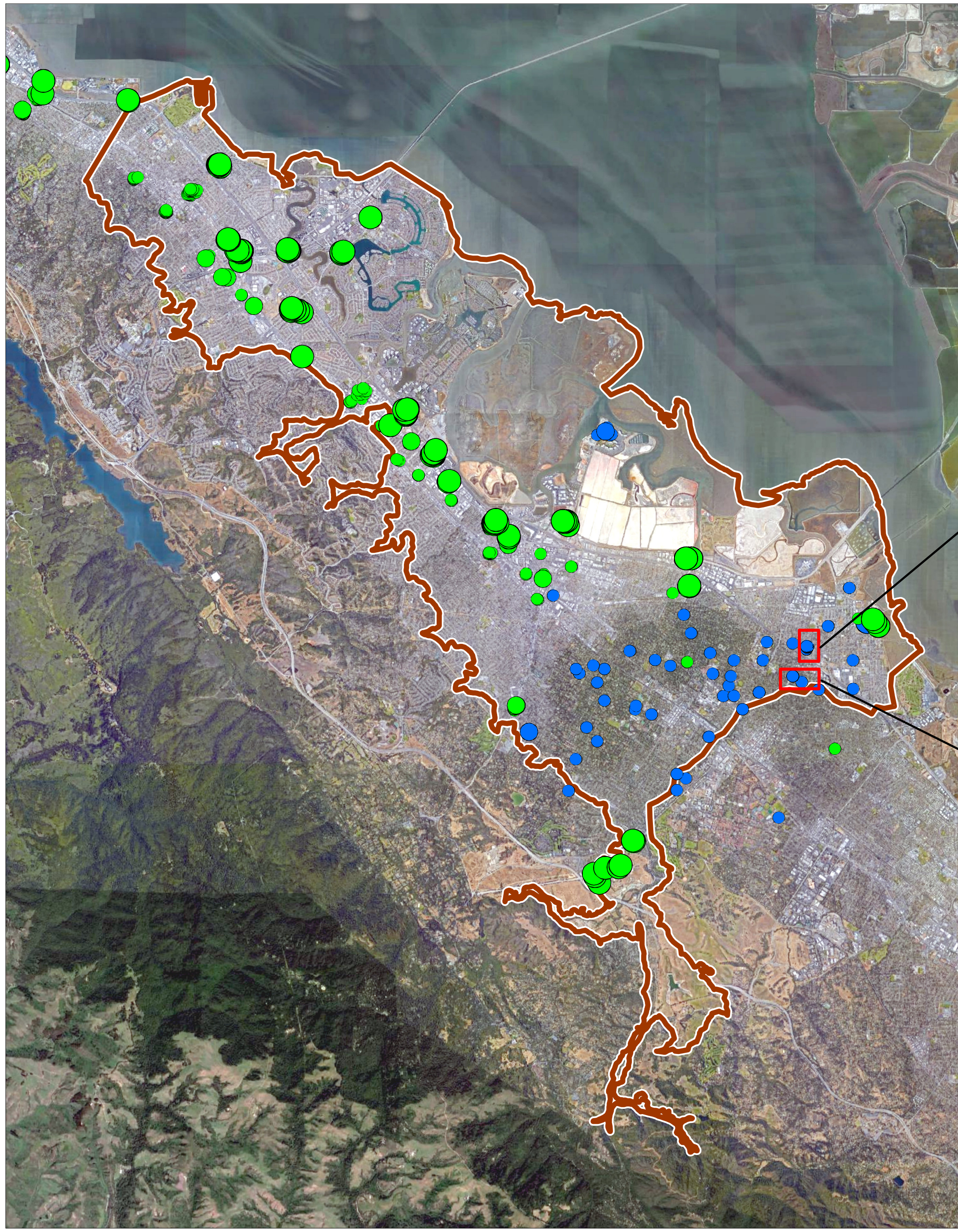
San Mateo Plain Groundwater Subbasin
San Mateo County, California
July 2018
EKI B60024.00

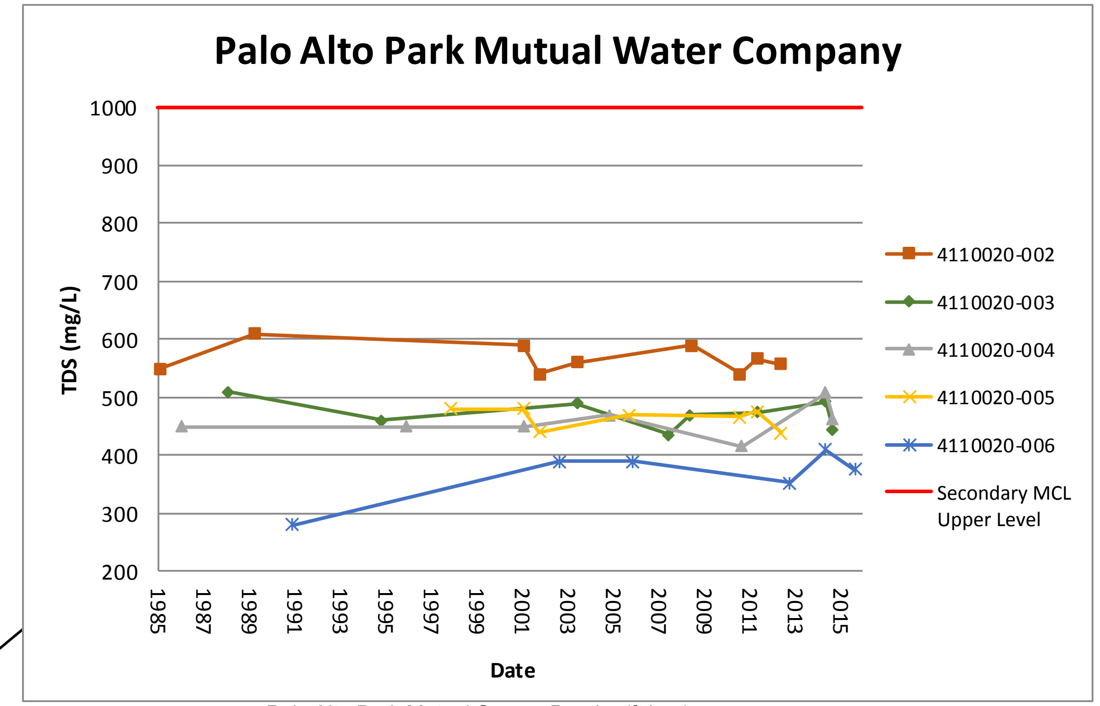
Figure 6-30

Attachment C

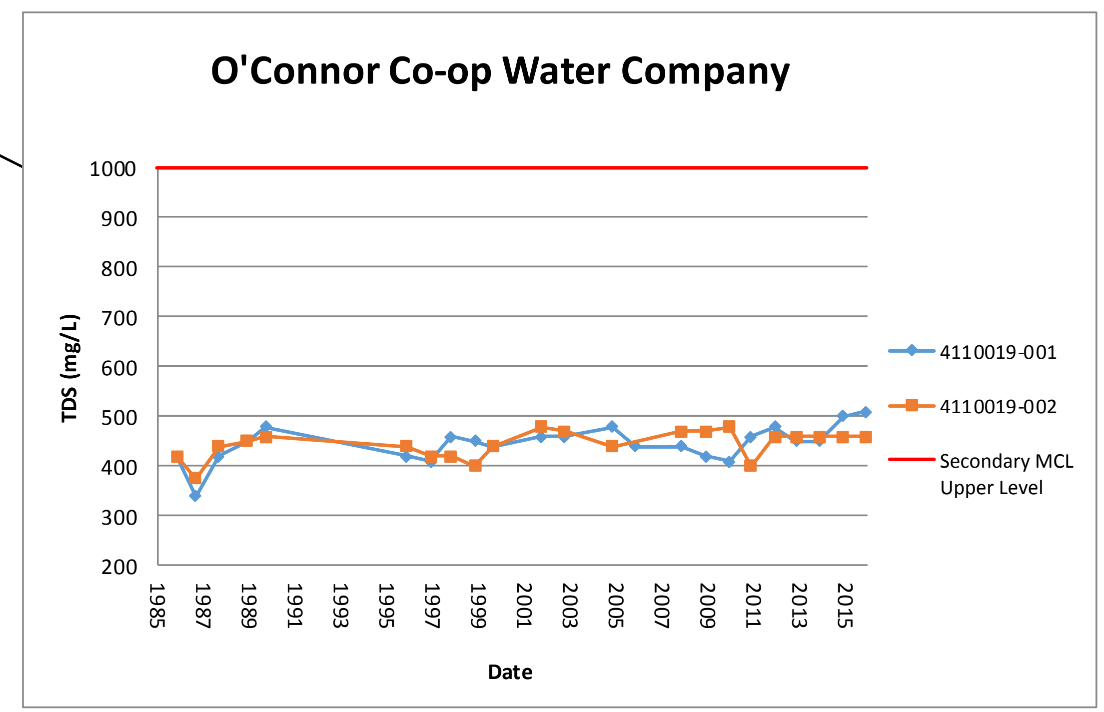
Groundwater Quality Maps

0 2 4
Miles





Palo Alto Park Mutual Screen Depths (ft bgs)
4110020-002: 60-67
4110020-003: 194-195, 219-235, 249-257, 269-285
4110020-004: 219-279
4110020-005: 247-251
4110020-006: 248-260, 290-300, 340-366, 378-388, 424-440



O'Connor Co-op Water Company Screen Depths (ft bgs)
4110019-001: 181-372, 396-489, 508-532
4110019-002: 72-90, 172-178, 184-200, 217-223, 233-237, 242-245, 252-265, 282-291

Legend

Historical Maximum TDS Concentration (mg/L)

- Shallow Well, <1000
- Shallow Well, 1000-2000
- Shallow Well, >2000
- Deep Well, <1000
- Deep Well, 1000-2000
- Deep Well, >2000
- San Mateo Plain Basin

Abbreviations:
TDS: Total Dissolved Solids
MCL: Maximum Contaminant Level
mg/L: milligrams per liter

eki environment & water
TODD GROUNDWATER
HYDROFOCUS INC. Solutions for Land and Water Resources

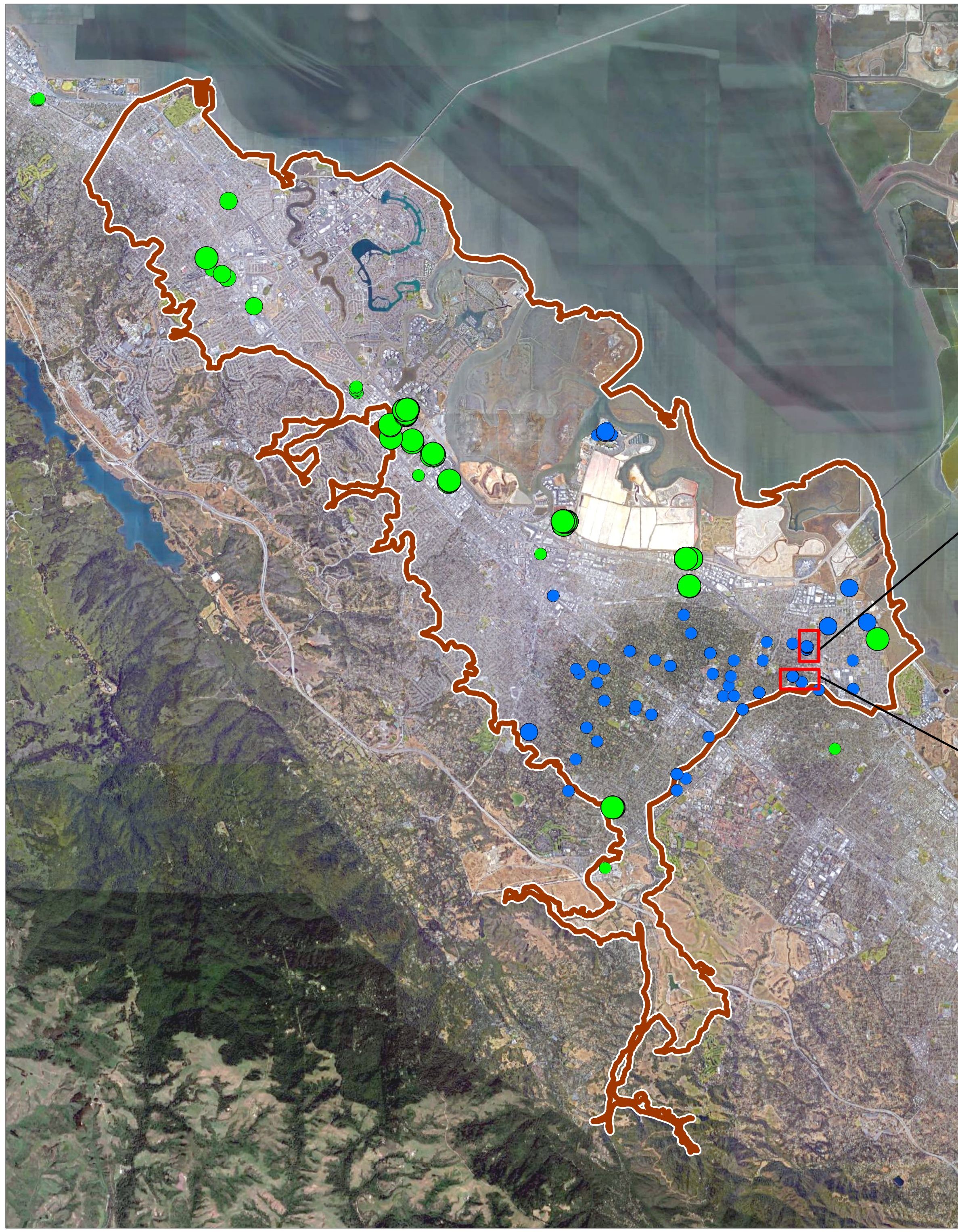
TDS in Groundwater

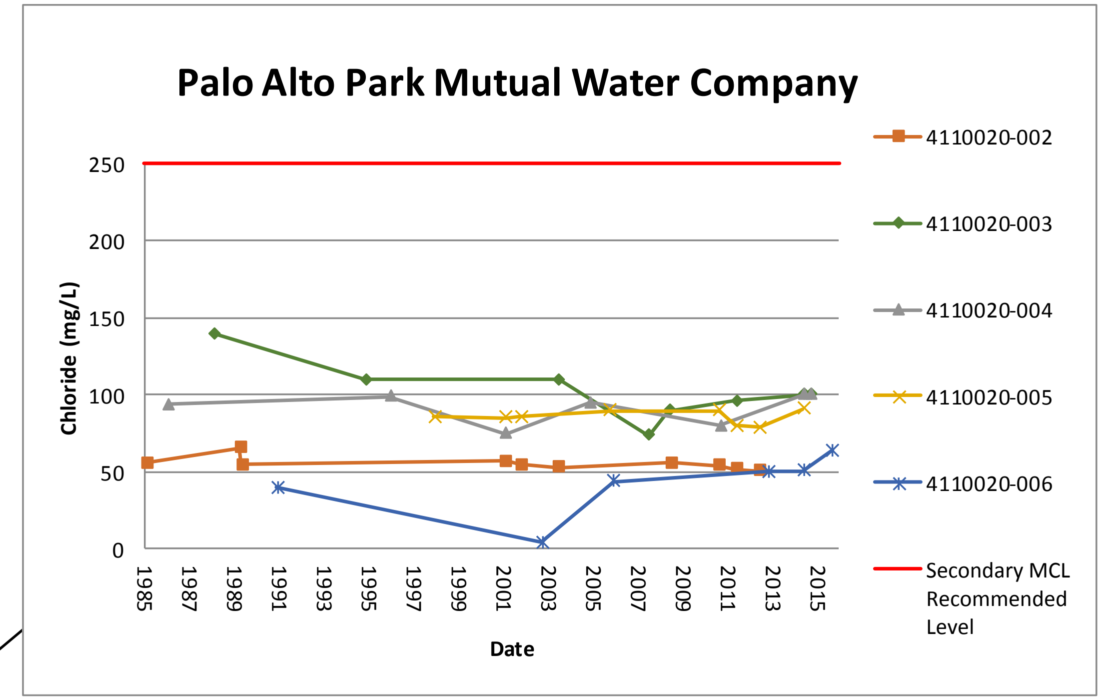
San Mateo Plain Groundwater Subbasin
San Mateo County, California
July 2018 EKI
B60024.00

Figure 5-1

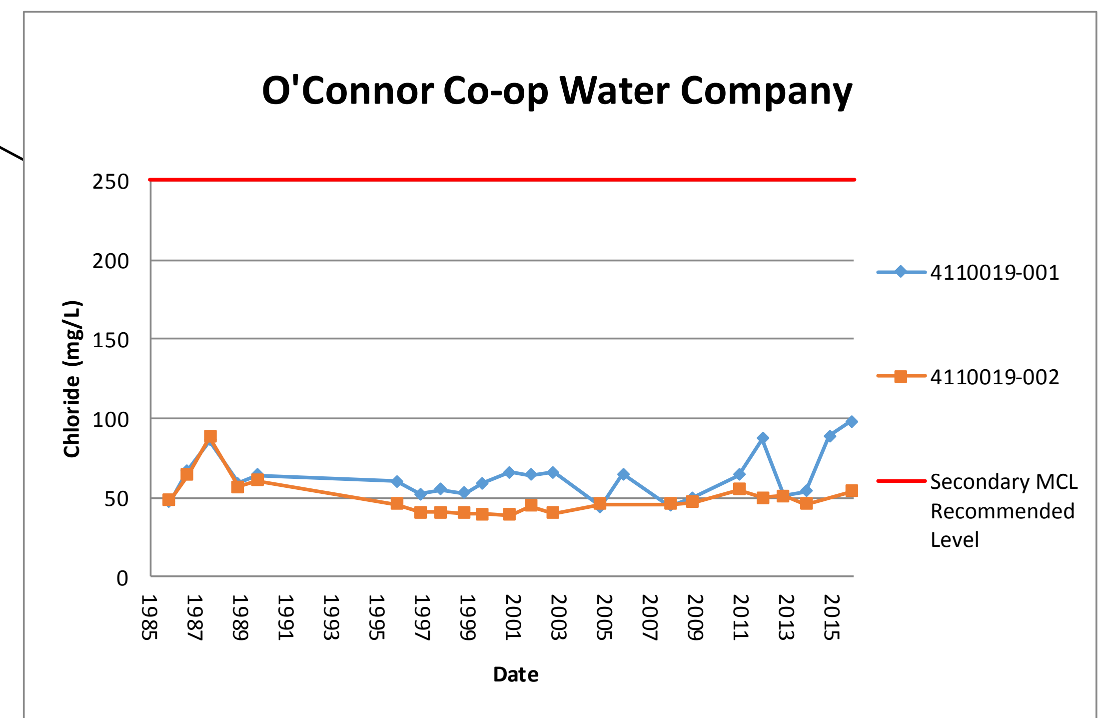
0 2 4
Miles

N





Palo Alto Park Mutual Screen Depths (ft bgs)
4110020-002: 60-67
4110020-003: 194-195, 219-235, 249-257, 269-285
4110020-004: 219-279
4110020-005: 247-251
4110020-006: 248-260, 290-300, 340-366, 378-388, 424-440



O'Connor Co-op Water Company Screen Depths (ft bgs)
4110019-001: 181-372, 396-489, 508-532
4110019-002: 72-90, 172-178, 184-200, 217-223, 233-237, 242-245, 252-265, 282-291

Legend

Historical Maximum Chloride Concentration (mg/L)

- Shallow Well, <250
- Shallow Well, 250-500
- Shallow Well >500
- Deep Well, <250
- Deep Well, 250-500
- Deep Well, >500
- San Mateo Plain Basin

Abbreviations:
MCL: Maximum Contaminant Level
mg/L: milligrams per liter

eki environment & water
TODD GROUNDWATER
HYDROFOCUS INC. Solutions for Land and Water Resources

Chloride in Groundwater

San Mateo Plain Groundwater Subbasin
San Mateo County, California
July 2018
EKI B60024.00
Figure 5-2

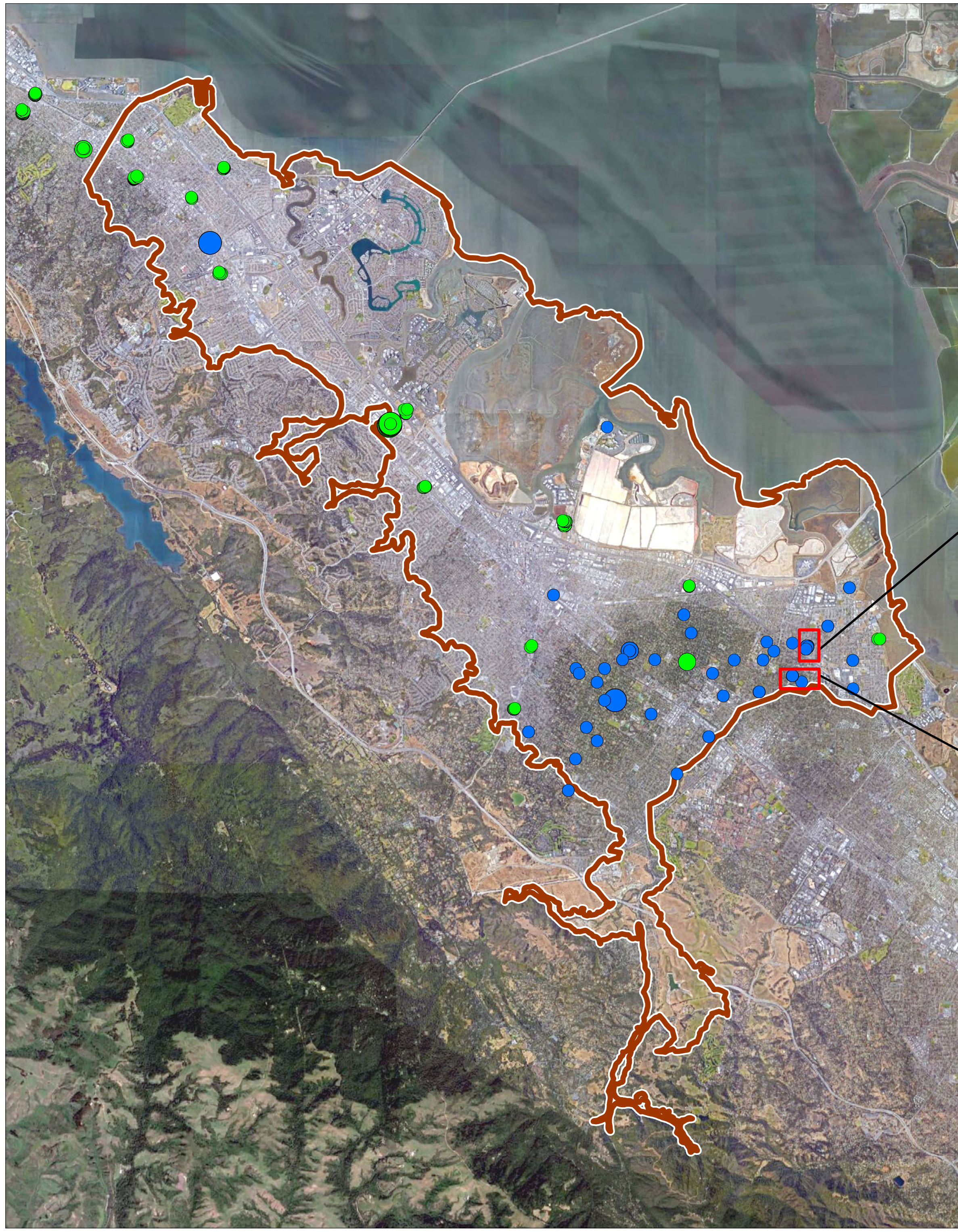
Legend

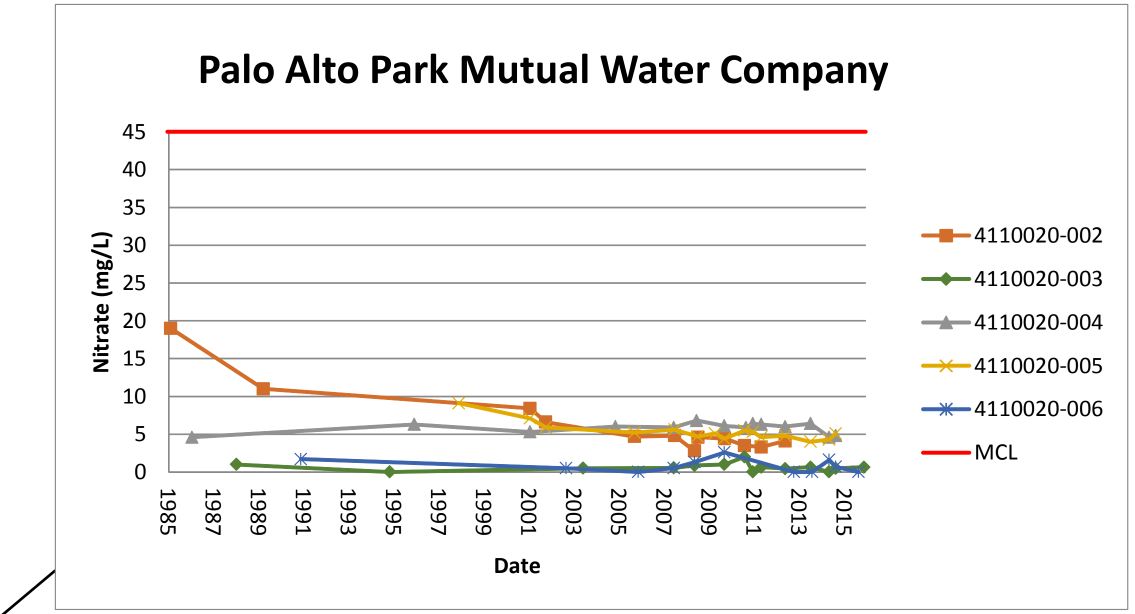
Historical Maximum Nitrate as NO3 Concentration (mg/L)

- Shallow Well, <45
- Shallow Well, 45-90
- Shallow Well, >90
- Deep Well, <45
- Deep Well, 45-90
- Deep Well, >90
- San Mateo Plain Basin

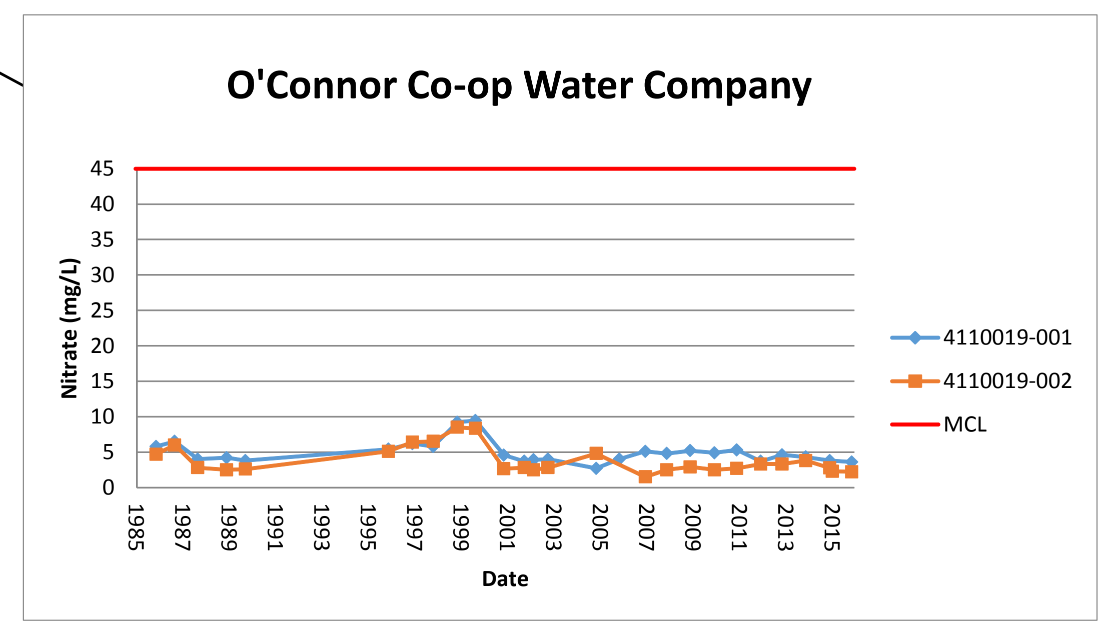
Abbreviations:
MCL: Maximum Contaminant Level
mg/L: milligrams per liter

*Non-Detect values plotted as 0 mg/L





Palo Alto Park Mutual Screen Depths (ft bgs)
4110020-002: 60-67
4110020-003: 194-195, 219-235, 249-257, 269-285
4110020-004: 219-279
4110020-005: 247-251
4110020-006: 248-260, 290-300, 340-366, 378-388, 424-440

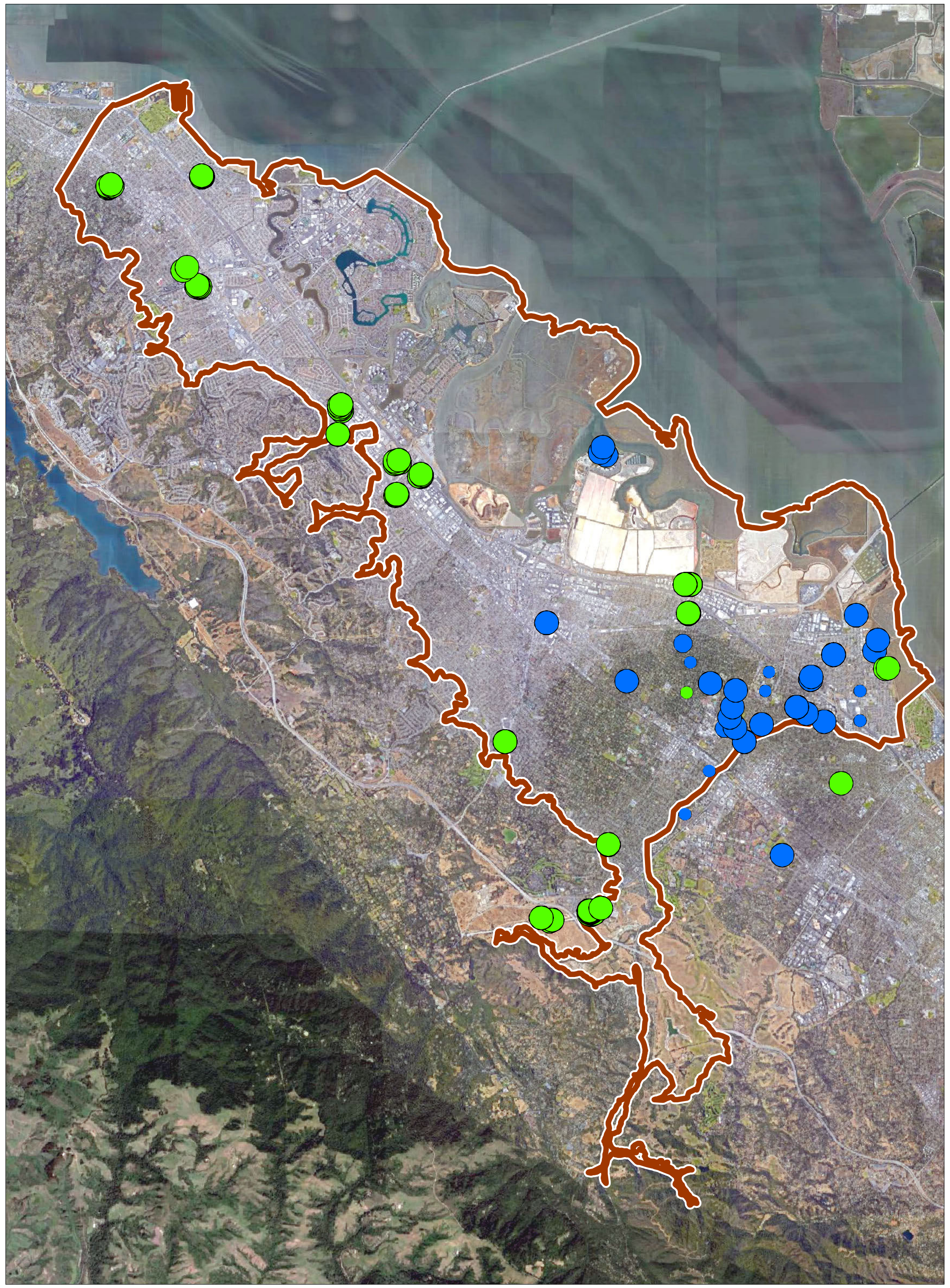


O'Connor Co-op Water Company Screen Depths (ft bgs)
4110019-001: 181-372, 396-489, 508-532
4110019-002: 72-90, 172-178, 184-200, 217-223, 233-237, 242-245, 252-265, 282-291

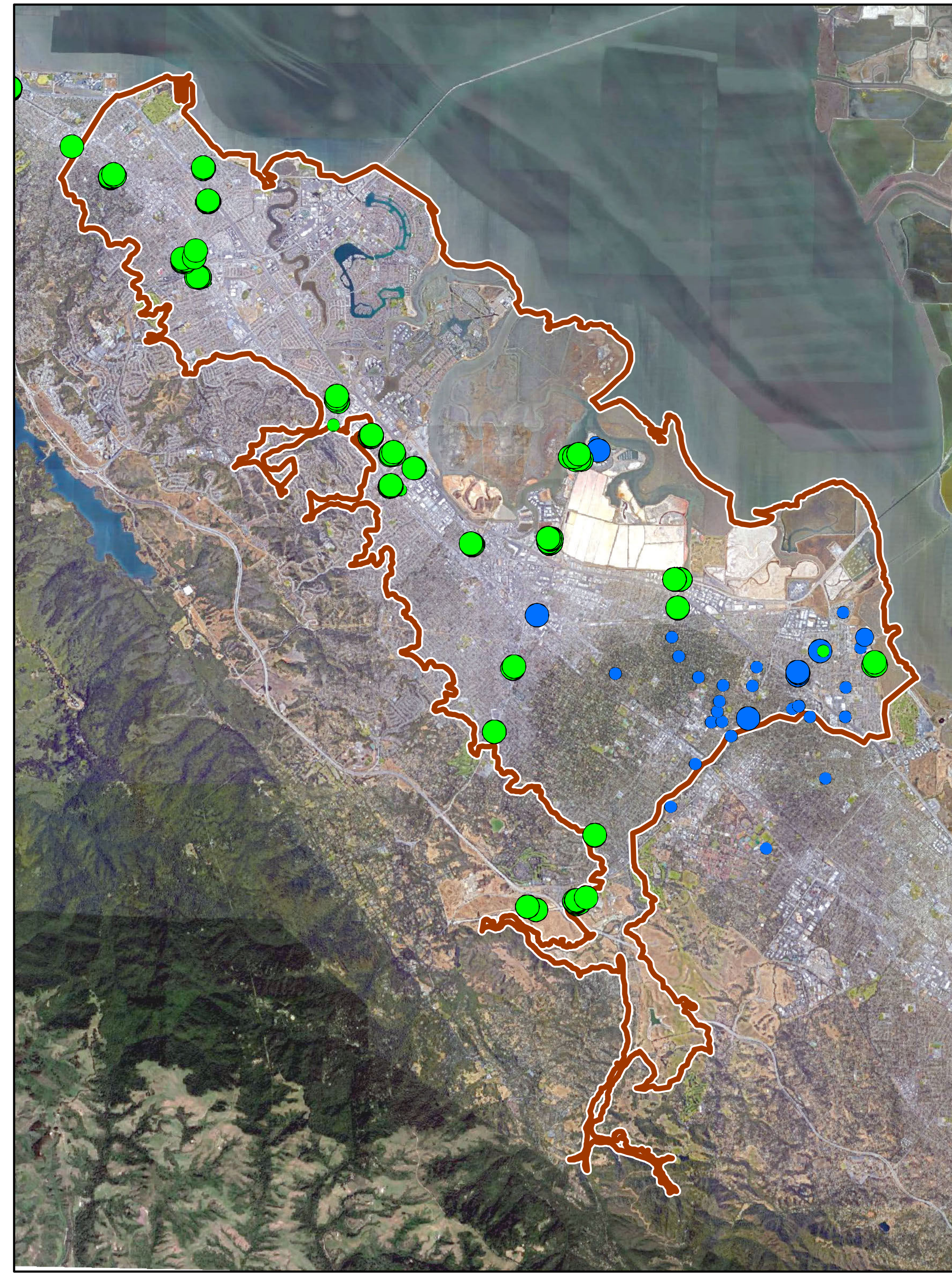
Nitrate in Groundwater

San Mateo Plain Groundwater Subbasin
San Mateo County, California
July 2018
EKI B60024.00
Figure 5-3

Manganese Concentrations



Iron Concentrations



0 2 4
Miles

Legend

San Mateo Plain Basin

Historical Maximum Manganese Concentration (mg/L)

- Shallow Well, <0.05
- Shallow Well, 0.05-0.10
- Shallow Well, >0.10
- Deep Well, <0.05
- Deep Well, 0.05-0.10
- Deep Well, >0.10

Historical Maximum Iron Concentration (mg/L)

- Shallow Well, <0.3
- Shallow Well, 0.3-0.6
- Shallow Well, >0.6
- Deep Well, <0.3
- Deep Well, 0.3-0.6
- Deep Well, >0.6

Abbreviations:
mg/L: milligrams per liter

*Non-Detect values plotted as 0 mg/L

eki environment & water
TODD GROUNDWATER
HYDROFOCUS INC. Solutions for Land and Water Resources

Iron and Manganese in Groundwater

San Mateo Plain Groundwater Subbasin
San Mateo County, California
July 2018
EKI B60024.00
Figure 5-4

Appendix H

Recycled Water Development Standards

ATTACHMENT U
CITY OF REDWOOD CITY

City of Redwood City

Recycled Water Development Standards

11-4-2019

Public Works Services Department
Water Resources Management
650-780-7464

Table of Contents

1. INTRODUCTION

Redwood City's Recycled Water Project provides disinfected tertiary recycled water to City customers for landscape irrigation and a variety of Title 22 approved non-potable uses including dust control, car washing, concrete mixing, toilet flushing, cooling, and other industrial uses.

Redwood City adopted a Recycled Water Use Ordinance in July 2008 that established the recycled water service area and requirements for use within the service area. The Ordinance (now City Code - Chapter 38 – Article VIII) identifies the required and voluntary uses of recycled water, including requirements for dual plumbing. Table 1.1 lists which uses are required and voluntary.

Redwood City's recycled water is approved by State Water Resources Control Board – Division of Drinking Water (DDW) for the following uses:

- Landscape Irrigation
- Toilet & Urinal Flushing
- Water features – Fountains, running streams, etc. *
- Wash-down *
- Cooling & Air Conditioning *
- Commercial Laundry
- Window Washing *
- Commercial Car Washing *
- Construction
- Dust control for Construction *
- Dust control for Industrial Process*
- Backfill consolidation & Soil Compaction
- Concrete Batching *
- Firefighting – installed fire control systems and/or fire hydrants

* Refer to Redwood City's Customer Guidelines for Recycled Water Use for specific use requirements.

Table 1.1 – City Code Recycled Water Required Uses

	LANDSCAPE	INTERNAL SEPARATE PLUMBING	INTERNAL COOLING	INDUSTRIAL PROCESS
Existing/Remodeled Commercial/Industrial Buildings	Required	Consider/ Encouraged*	Consider	Consider/ Encouraged*
New Commercial, Industrial, Institutional, and Government Projects	Required	Required	Consider	Consider/ Encouraged
Existing/Remodeled Apartments, Condos and Townhomes	Consider/ Encouraged	Consider/ Encouraged*	Consider	Not Applicable
New Apartments, Condos and Townhomes	Required	Required	Consider	Not Applicable
Single Family HOAs	Consider/ Encouraged	Not Applicable	Not Applicable	Not Applicable
Single Family Homes	Discouraged	Prohibited	Prohibited	Not Applicable

* Requires all plumbing systems to be identified and labeled in the same manner as for new uses.

1.1 Recycled Water Definitions

The following terms are defined for purposes of Redwood City's Recycled Water Use Ordinance (Chapter 38 Article VIII of the Redwood City Municipal Code):

A. **COMMERCIAL PROPERTY**: Any building for office or commercial uses with water requirements which include, but are not limited to, landscape irrigation, cooling, toilets, urinals and decorative fountains.

B. **RECYCLED WATER DISTRIBUTION SYSTEM**: A system of transmission and distribution pipelines, pump stations, storage reservoirs and minor appurtenant facilities intended for the delivery of recycled water only and which is separate from any potable water distribution system. The Recycled Water Distribution System is owned, operated and maintained by the City.

   Recycled water plumbing on the customer's side of the City's meter is owned, operated and maintained by the customer, but must still comply with all applicable requirements, including the requirements of California Code of Regulations, titles 17 and 22.

C. **LANDSCAPE AREAS OR LANDSCAPING**: A landscape area or landscaping includes, but is not limited to landscaped streets and medians, golf courses, cemeteries, common areas and parks.

D. **INDUSTRIAL PROCESS WATER**: Water used by any industrial facility with process water requirements which include, but are not limited to, rinsing, washing, cooling and or circulation.

E. **POTABLE WATER**: Means water which conforms to the federal, state and local standards for human consumption.

F. **RECYCLED WATER**: Non-potable tertiary treated water which, as a result of treatment of wastewater, is suitable for a direct beneficial use or controlled use that would not otherwise occur. (See California Water Code section 13050(n).)

G. **PROVIDE FOR THE USE OF RECYCLED WATER**: Means providing a separate plumbing system, independent of the plumbing system provided to serve potable water, to serve non-potable recycled water for all uses approved by title 22 of the California Code of Regulations ("CCR"), including but not limited to irrigation of landscape areas, toilet and urinal flushing, trap primers, outdoor decorative fountains and other appropriate landscaping, commercial and industrial uses approved by the State.

H. **DUAL PLUMBED SYSTEM OR DUAL PLUMBED**: Means a system that utilizes separate piping systems for recycled water and potable water within a facility and where the recycled water is used for either of the following purposes:

   a) to serve plumbing outlets (excluding fire suppression systems) within a building, or

   b) Outdoor landscape irrigation at individual residences.

1.2 Recycled Water Required Uses

The use and distribution of recycled water shall be in accordance with the City's Customer Guidelines for Recycled Water Use and all applicable federal, state and local laws, permits, and regulations, including titles 17 and 22 of the CCR, as may be amended from time to time.

The "Recycled Water Service Area" means the precise geographical area designated by the City and as adopted by resolution of the City Council to which the City will provide recycled water service where it has been determined to be or is expected to be available. The City will maintain a copy of the description of the Recycled Water Service Area, which may be updated by resolution from time to time, on file with the Office of the City Clerk.

A. **Requirement for Commercial Properties in Recycled Water Service Area:**

1. <u>Existing Commercial:</u> Existing commercial properties in the Recycled Water Service Area are required to use recycled water for landscape irrigation. Existing commercial properties must provide a feasibility study to apply for an exception to this Article.
2. <u>New Commercial:</u> Projects involving new commercial subdivision of land for which a tentative map or parcel map is required pursuant to California Government Code section 66426 and Chapter 30, Subdivisions, of the Municipal Code or which require a City permit, or both, and which are located within the Recycled Water Service Area, shall be conditioned to be dual plumbed to provide for the internal use of recycled water and to provide for the use of recycled water for landscape irrigation. The City Manager (or designee) will determine requirements for recycled water plumbing. These requirements and the use of recycled water will become conditions of approval.

B. **Requirement for Industrial Projects in the Recycled Water Service Area:**

1. <u>Existing Industrial</u>: Existing industrial properties in the Recycled Water Service Area are required to use recycled water for landscaping. Existing Industrial properties must provide a feasibility study to apply for an exception to this Article.
2. <u>New Industrial</u>: New industrial projects which require a City permit and which are located within the Recycled Water Service Area are required to provide dual plumbing for internal uses of recycled water and to provide for the use of recycled water for landscape irrigation. Such projects must also provide a feasibility study analyzing the possibility of using recycled water for industrial processes and cooling. The City Manager (or designee) will determine requirements for recycled water plumbing. The feasibility study and, if applicable, any City requirements for the use of recycled water will become conditions of approval.

C. **Requirement for Institutional and Governmental Use in the Recycled Water Service Area:**

1. <u>New Institutional and Governmental Projects</u>: New institutional and governmental projects which are located within the Recycled Water Service Area are required to be dual plumbed to provide for the internal use of recycled water and to provide for the use of recycled water for landscape irrigation. The City Manager (or designee) will determine requirements for recycled water plumbing. These requirements and the use of recycled water will become conditions of approval.

D. **Requirement for Residential Uses in the Recycled Water Service Area:**

1. <u>New Apartments and Condominiums</u>: Apartment and condominium projects involving new commercial subdivisions of land for which a tentative map or parcel map is required pursuant to California Government Code section 66426 and Chapter 30, Subdivisions, of the Municipal Code or which require a City permit, or both, and which are located within the Recycled Water Service Area, shall be conditioned to be dual plumbed to provide for the internal use of recycled water and to provide for the use of recycled water for landscape irrigation in common areas. The City Manager (or designee) will determine requirements for recycled water plumbing. These requirements and the use of recycled water will become conditions of approval.

E. **Construction and Dust Control Activities:** Any person applying for a construction permit for a project that includes dust control activities is required to use recycled water for those activities

PROCEDURES

A. **Recycled Water Application Process**: Upon a final determination by the City that a property shall be served with recycled water, or adoption of a condition of development approval requiring use or accommodation of the use of recycled water, the water customer, owner or applicant shall complete an application to use recycled water.

B. **Existing Potable Water Service**: Voluntary Retrofits: Certain existing potable water customers in the Recycled Water Service Area will be provided the opportunity by the City to retrofit their system to accept recycled water.

1.3 Recycled Water Voluntary Uses

A. **Existing Commercial Properties in the Recycled Water Service Area**:

1. Existing Commercial Properties: Existing commercial properties that are in the Recycled Water Service Area shall consider using recycled water for internal dual plumbing, internal cooling towers and evaporative coolers.

B. **Commercial Properties Outside of the Recycled Water Service Area**:

1. New and Remodeled Commercial Properties: New and remodeled commercial properties that are located outside of the Recycled Water Service Area shall consider the feasibility of providing for internal dual plumbing and providing for the use of recycled water for landscape irrigation, as recycled water may be extended beyond the current Recycled Water Service Area.

C. **Existing and New Institutional and Governmental Use**:

1. Existing Institutional and Governmental Properties: Existing institutional and governmental properties in the Recycled Water Service Area shall consider the feasibility of using recycled water for internal dual plumbing and landscape irrigation.

2. New Institutional and Governmental properties Outside of Recycled Water Service Area: New institutional and governmental properties that are located outside of the current Recycled Water Service Area shall consider the feasibility of using recycled water for internal dual plumbing and landscape irrigation, as recycled water is expected to be extended beyond the current Recycled Water Service Area.

D. **Residential Uses; Inside and Outside of Recycled Water Service Area**:

1. Remodeled Apartments and Condominiums: Remodeled apartment and condominium properties shall consider the feasibility of dual plumbing to provide for the internal use of recycled water and using recycled water for landscape irrigation in common areas.

2. Existing Apartments and Condominiums: Existing apartment and condominiums shall consider the feasibility of using recycled water for landscape irrigation in common areas.

3. Home Owner Associations: Home owner associations are encouraged to consider the feasibility of using recycled water for landscape irrigation in common areas.

   These statements apply to residential uses both within and outside of the current Recycled Water Service Area as recycled water is expected to be extended beyond the current Recycled Water Service Area.

E. **Industrial Projects; Inside and Outside of Recycled Water Service Area**: All existing and new industrial projects shall consider the feasibility of providing for the use of recycled water for industrial processes and cooling.

1.4 Recycled Water Use Requirement Checklists

Use these checklists to determine if a project is required to use recycled water for landscape irrigation or be dual plumbed for internal uses. Prior to completing this checklist refer to Section 1.1 of this document to review definitions of terms defined in the City's Recycled Water Use Ordinance and Section 1.2 to confirm the project meets the criteria for new development according to property type.

LANDSCAPE IRRIGATION CHECKLIST

1. Is the Project in the Recycled Water Service Area?
   ○ - YES – *continue to next question*
   ○ - NO – ***recycled water is NOT required for irrigation***

2. Does the Project meet the requirement for NEW or EXISTING Commercial or Industrial properties?
   ○ - YES – ***recycled water use IS REQUIRED for irrigation***
   ○ - NO – *continue to next question*

3. Does the Project meet the requirement for NEW Residential Apartments or Condominiums, Institutional, or Government properties?
   ○ - YES – ***recycled water use IS REQUIRED for irrigation***
   ○ - NO – *recycled water is NOT required for irrigation*

Is the project required to use recycled water for landscape irrigation?
YES ____ NO ____

DUAL PLUMBED CHECKLIST

1. Is the Project in the Recycled Water Service Area?
   ○ - YES – *continue to next question*
   ○ - NO – *go to question 4*

2. Does the Project meet the requirement for NEW Commercial, Industrial, Residential Apartments or Condominiums, Institutional, or Government properties?
   ○ - YES – ***dual plumbing for recycled water use IS REQUIRED***
   ○ - NO – *continue to next question*

3. Is the sole purpose of the project a food preparation facility (i.e. restaurants, coffee shops, catering facilities, grocery stores etc.)? ****
   ○ - YES – *dual plumbing for recycled water is NOT required*
   ○ - NO – ***dual plumbing for recycled water use IS REQUIRED***

4. Does the Project have an EIR or Water Supply Assessment, which includes requirements, mitigation measures, or conditions for the use of Recycled Water?
   ○ - YES – ***dual plumbing for recycled water use IS REQUIRED***
   ○ - NO – *dual plumbing for recycled water is NOT required*

Is the project required to dual plumb for internal uses of recycled water?
YES ____ NO ____

*** If your facility will include a cafeteria or tenant improvement area which is planned to or may be used to prepare food please refer to section 3.8 for more information.*

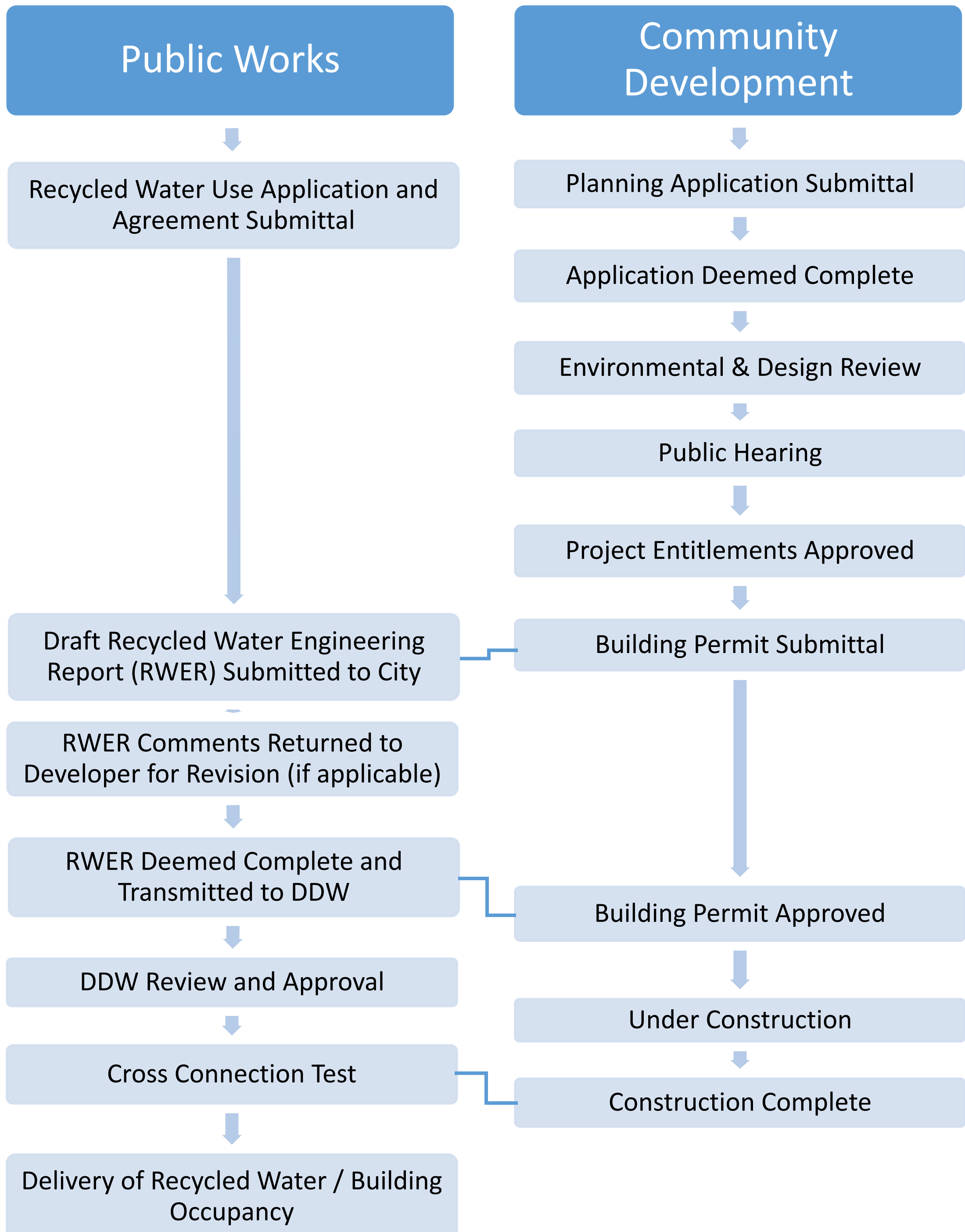
1.5 List of Acronyms

The following is a list of acronyms used in this document.

CA-NV AWWA	California Nevada Section of the American Water Works Association
DDW	The Division of Drinking Water of the California State Water Resources Control Board.
RWER	Recycled Water Engineering Report
RWSA	Recycled Water Service Area of the City of Redwood City
RWUA	Recycled Water Use Area
SWRCB	California, State Water Resources Control Board

2. PROJECT IMPLEMENTATION

In an effort to streamline the regulatory approval process for the use of recycled water, developers should become familiar with this document, and may choose to schedule a meeting with the Public Works Services Department at the beginning the project in order to ensure that plans meet State and City guidelines. Below is a process timeline to aid developers with the approval process.



2.1 City Contacts

Public Works is responsible for reviewing Recycled Water Engineering Reports, obtaining approval for the use of recycled water from DDW, and oversight for the ongoing uses of recycled water. Community Development is responsible for permitting projects including project environmental reviews, project entitlement, plan reviews and construction inspections, and enforcements of building codes, city/state/federal codes and city engineering standards. Contact information for each Department is listed in this section

<u>Public Works Services Department</u>
Recycled Water Specialist
1400 Broadway
Redwood City, CA 94063
Email: recycledwater@redwoodcity.org
Direct: (650) 780-5973
Main: (650) 780-7464
Fax: (650) 780-7445

<u>Community Development Department</u>
1017 Middlefield Rd.
Redwood City, CA 94063

Building Inspection & Code Enforcement
Email: permits@redwoodcity.org
Direct: (650) 780-7350
Fax: (650) 780-7348

Engineering & Transportation
Email: encroachment@redwoodcity.org
Direct: (650) 780-7380
Fax: (650) 780-7309

Planning & Housing
Email: planning@redwoodcity.org
Direct: (650) 780-7234
Fax: (650) 780-0128

2.2 Roles and Responsibilities

<u>Applicant/Developer/Contractor Responsibilities</u>

1) Design the site's recycled water system to conform with State and City regulatory guidelines, standards, and operate within the City's recycled water quality parameters.
2) Contact Public Works to review which recycled water use(s) are applicable to the project.
3) Prepare the site's Recycled Water Engineering Report using the City's template.
4) Submit a draft Recycled Water Engineering Report with submittal of the first building permit application for review. Review by the Public Works Services Department will be required prior to the issuance of any building or engineering permits. (When deemed complete Public Works will

submit the Engineering Report to the State Water Resources Control Board, Division of Drinking Water for approval).

5) Inform all parties involved with the construction of the facilities utilizing recycled water of the rules and requirements related to recycled water use.
6) The Contractor and any sub-contractors responsible for the construction of on-site plumbing systems used for drinking, irrigation, fire suppression, and recycled water shall appoint one individual to attend a Recycled Water Site Supervisor Training Program provided by the City.
    a. The contractor and each sub-contractor, for the duration of the project, shall have an assigned recycled water site supervisor.
    b. The appointed Recycled Water Site Supervisor(s) shall:
        i. Have the authority to prevent unauthorized use of recycled water.
        ii. Be familiar with construction practices, plumbing codes, and City rules and requirements relating to the use of recycled water for irrigation and/or internal plumbing systems including but not limited to:
            1. Pipeline separation,
            2. Labeling signage,
            3. Color coding,
            4. Approved uses, and
            5. Safe handling.
        iii. Be a primary point of contact to the Public Works Services Deptartment relating to recycled water use rules and regulations.
        iv. Be present for the cross-connection test.
7) Prior to temporary certificate of occupancy hire a Cross-Connection Specialist certified by the California Nevada Section of the American Water Works Association (CA-NV AWWA) to conduct an approved cross-connection test. (See Section 5 for additional details on the cross-connection test.)
    a. All end use devices and fixtures must be installed to conduct the test.
    b. All Backflow prevention assemblies shall have passed the initial performance test prior to the cross-connection test.
        i. Service Protection: The City will complete the initial performance test for all backflow prevention assemblies installed at the meter for the purpose of protecting the public water system.
        ii. Internal Protection: The Contractor is responsible for hiring a Backflow Prevention Assembly Tester from the City's Approved List to conduct the initial performance test on backflow prevention assemblies installed on the internal plumbing system, and report the results on the City's approved testing form
    c. The cross-connection test method must be approved by DDW and included in the Engineering Report.
    d. The Cross-Connection Specialist must submit a Cross-Connection Test Plan to Public Works prior to commencing the test.
    e. A representative from Public Works must observe the test.
    f. The test must be completed prior to:
        i. Temporary Certification of Occupancy (TCO), and
        ii. Connection to the Recycled Water System.
8) Coordinate all above steps within the permitting and inspection process at the Community Development Department.

City Responsibilities

Public Works Services and the Community Development Departments, will provide regulatory guidance and coordination throughout the development process.

1) Review site plans to ensure compliance with regulatory guidelines.
2) Review and submit developer's engineering report to the SWRCB DDW.
3) Provide inspection for construction
4) Public Works will provide the initial performance test on all backflow prevention assemblies provided for service protection (immediately downstream of the meter).
5) Review cross-connection test plan, and observe initial cross-connection test.
6) Provide Site Supervisor training to Contractors prior to the start of construction.
7) Provide Site Supervisor training to the individuals responsible for operations and maintenance of the site after construction is complete.
8) Perform physical connection (tapping and meter installation) of the project's recycled water services to the Recycled Water Distribution System

2.3 Delivery of Potable and Recycled Water During Construction

Article 5 Section 60313 (d) of Title 22 states: ***No recycled water agency shall deliver recycled water to a facility using a dual plumbed system unless the report required pursuant to section 13522.5 of the Water Code, and which meets the requirements set forth in section 60314, has been submitted to, and approved by, the regulatory agency.*** Further, approval by the regulatory agency (DDW) is conditioned upon the successful completion of an approved cross-connection control test.

To comply with this provision the following must be strictly observed:

1. To protect public health and safety Public Works Services has the sole authority to operate valves connected to the potable water, and recycled water distribution systems including, but not limited to; system valves, auxiliary hydrant valves, corporation stop valves, and curbstop valves. This includes valves on mains and service connections prior to project completion that have become part of the active water distribution network.
2. Only a SWRCB Certified Water Distribution Operator employed by the City of Redwood City under the direction of the designated Chief Operator in charge may operate and control the function of the Water Distribution system.
3. All service connections constructed for a project shall be locked at the curbstop by the City prior to installation of the city issued water meter.
4. Use of water for the purposes of construction shall be through a City issued construction meter. Use of fire services and un-metered water service connections for construction activities is strictly prohibited. Contractors found to be in violation of this will be cited and a stop work notice will be issued until a City issued construction meter has been obtained.
5. Potable water services will be turned on only after the city issued potable water meter and approved backflow prevention assembly is installed.
6. Recycled water services will be turned on after these conditions are met:
    a. DDW has approved the RWER.
    b. A cross-connection control test approved by DDW has been successfully completed, and all corrective actions have been sufficiently addressed.

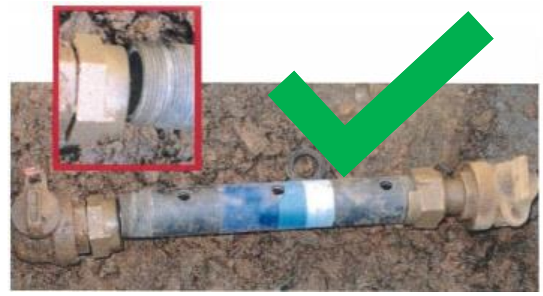
    c. The city issued meter is installed.

7. If for any reason water is needed in a plumbing system downstream of the city issued meter connection prior to the city issued meter being installed the contractor shall obtain a City issued potable water construction meter.
8. Contractors or sub-contractors **shall not install spacers or jumpers** in place of any city issued water meter that is capable of passing water or sustaining water pressure greater than 0 psi. Further, any spacer that is installed so the downstream plumbing connections are set to match the dimensions of the meter shall be constructed in a manner whereby it is immediately apparent to the City upon inspection that the spacer is not capable of passing water or sustaining water pressure greater than 0 psi. Examples of spacers or jumpers can be seen in *Figure 2.3.1*, and *Figure 2.3.2*. (This applies to all City metered connections including, but not limited to potable domestic water, irrigation, fire service connections, and recycled water.)
9. For the purposes of the cross-connection control test and prior to the use of any recycled water on the site the onsite recycled water plumbing system shall be temporarily supplied with potable water.
10. **In the interest of public health and in compliance with the regulations as set forth by the State of California the following shall be strictly adhered to. In the event that the developer, contractor, sub-contractor, or any unauthorized individual, with the exception of an authorized representative of the Public Works Services Department of the City of Redwood City, causes recycled water to pass through the city issued meter or a jumper connection, and enter onsite plumbing systems prior to the approval for use of recycled water by the SWRCB-DDW, the installation of the city issued water meter, and successful completion of an approved cross-connection control test the following, at minimum, will be implemented:**
    a. **All active water service connections to the project/property will be immediately deactivated and physically separated from the public drinking water system. (including removal of any installed city issued water meters). Deactivation of active fire services may be exempted from this requirement through coordination between the Fire Department and Public Works.**
    b. **All costs incurred by the City, including the cost of removing any installed water meters by City staff or at the expense of the City, will be billed to the project.**
    c. **All onsite uses of water for the project shall be provided through an approved air gap separation, break tank, and standalone pumping system, and shall be supplied through a city issued potable water construction meter.**
    d. **The approved air gap separation, break tanks, and standalone pumping system will remain as the sole source of water supply to the project until after:**
        i. **The SWRCB-DDW has approved the Engineering Report for dual-plumbed recycled water systems pursuant to CCR, Title 22**
        ii. **The cross-connection test approved by DDW in the Engineering Report has been completed, no cross-connections and/or unapproved uses of recycled water are found, and all punch list items identified on the cross-connection test report have been resolved or corrected.**
        iii. **The onsite drinking water plumbing systems have been thoroughly disinfected, flushed, and tested through an approved method and found to be absent of coliform bacteria.**

e. **Any other procedures or mitigation measures deemed necessary by the Public Works Services Department and/or the SWRCB-DDW in the interest of public health and safety.**

Figure 2.3.1
Illegal Water Meter Spacer/Jumper

Figure 2.3.2
Approved Water Meter Spacer/Jumper



3. RECYCLED WATER SYSTEM DESIGN

For protection of public health, recycled water systems must be completely separate from the potable water system and shall not have any direct connections including through a backflow prevention assembly or valve of any kind. All recycled water system components, such as interior pipes and fixtures, must be clearly labeled according to state guidelines. Developers should refer to the following resources when designing and constructing a recycled water system:

1.	California Code of Regulations Particularly, Titles: 17 and 22	http://www.waterboards.ca.gov/drinking_water/certlic/drinkingwater/Lawbook.shtml http://www.waterboards.ca.gov/water_issues/programs/grants_loans/water_recycling/statutes_regulations.shtml https://govt.westlaw.com/calregs/index?__lrTS=20170331145348850&transitionType=Default&contextData=(sc.Default)
2.	California Plumbing Code	http://www.bsc.ca.gov/codes.aspx
3.	City Municipal Code Chapter 38, Article VIII.	https://www.municode.com/library/ca/redwood_city/codes/code_of_ordinances?nodeId=CH38WASYRE_ARTVIIIREWAUS
4.	City Engineering Standards	http://www.redwoodcity.org/departments/community-development-department/engineering-transportation/engineering/engineering-standards
5.	City Customer Guidelines for Recycled Water Use	https://www.redwoodcity.org/departments/public-works/water/recycled-water
6.	Redwood City Recycled Water Development Standards	This document. Incorporated as part of the City Engineering Standards.
7.	Redwood City Recycled Water Quality Parameters	Section 6 of this document
8.	Landscaping and Irrigating with Recycled Water	Section 7 of this document

3.1 Division of Responsibility

The City is responsible for all recycled water facilities up to and including the recycled water meter. After the meter, the responsibility for all piping and appurtenances lies with the property owner or property manager, and is subject to monitoring and inspection by the City. Property owners are also responsible for monthly reporting to the City, and for notifying the City when any plumbing changes are made to the onsite potable and recycled water systems. The City shall be notified not less than 24 hours prior to any planned repairs, and within 24 hours following any emergency repairs. Notification can be made by phone or email to Public Works using the contact information provided in Section 2.1 of this document. Any plumbing modifications, additions or deletions made within a dual plumbed facility requires a plumbing permit and must be submitted to the City for review prior to commencing any work on the site.

3.2 Pipe Separation Requirements

Water Main and Supply Line Separation Requirements

Regulations for water main separation can be found in the California Code of Regulations, Title 22, Division 4, Chapter 16, California Waterworks Standards. Please refer to the state guidelines for the most up to date requirements.

As of April 2019, the requirements are:

- New potable water mains and supply lines must be installed at least 4 feet horizontally from, and one foot vertically above, any parallel pipeline conveying disinfected tertiary recycled water. All separations must be measured from the outside edge of the respective pipes.
- If crossing a pipeline conveying recycled water, the potable water main must be constructed no less than 45-degrees to and at least one foot above the recycled water pipeline. No connection joints can be made in the potable water main within eight horizontal feet of a recycled water pipeline.
- The one-foot vertical separation is only required when the horizontal distance between the potable and recycled water lines is less than ten feet.
- Exemptions to these requirements must be approved by the City and the SWRCB.

On-Site Facilities Buried Pipe Separation Requirements

Buried pipe separation requirements for on-site facilities includes all appurtenances and piping downstream of a City water meter.

Horizontal Pipe Separation:

- For new construction, a horizontal separation maintained at 10 feet between buried recycled and potable water lines is preferred. Where this separation is not feasible, either the potable pipe or the recycled water pipe must be sleeved. A horizontal separation of less than four feet is not permitted.

Vertical Pipe Separation for Retrofit Sites:

- Recycled water pipes must be at least one foot below potable water pipelines. Recycled water lines installed above a potable water line must be at least one foot above the potable water line, and the recycled water line must be sleeved a minimum of 10 feet on either side of the potable water pipe. Recycled water pipes less than one foot below or less than one foot above a potable water pipeline is not permitted.

3.3 Recycled Water System Pressure

Pressure varies from site to site. Developers shall consult with the City's Engineering & Transportation Division of the Community Development Department to determine the recycled water system pressure that will be delivered to the project site (typically 30 psi to 50 psi operating pressure range at the meter). The design shall include the appropriate booster pump and appurtenances to provide adequate pressure to the site. See City Engineering Standards for complete system design criteria.

- If a site requires less pressure than that being delivered, the User shall include a pressure reducing valve downstream of the recycled water meter.
- If a higher pressure than that being delivered is required, the User shall provide booster pumping downstream of the recycled water meter. Booster pressure applied on-site must first be approved by the City and will require installation of a backflow prevention assembly.
- Developers shall also consider pressure reductions resulting from the installation of approved backflow prevention assemblies, and friction losses due to pipe material and changes in direction.

3.4 Hose Bibs

Hose bibs are not permitted on recycled water systems. In place of hose bibs, quick couplers approved for recycled water shall be used.

Quick coupling valves, made specifically for recycled water use shall be:

- 3/4-inch or 1-inch nominal size of brass construction.
- Differ in size or other method such that quick couplers in use by potable water on the site are not interchangeable with recycled water quick couplers.
- Have a normal working pressure of 150 PSI.
- Covers must be permanently attached.
- Covers must be made of purple rubber or vinyl with the words “RECYCLED WATER” imprinted on the cover.
- Covers must be provided with a lock. To prevent unauthorized use, the valve must be operated only with a special coupler key for opening and closing the valve.
- Must be installed approximately 12 inches from sidewalks, pathways, trails, curbs, headboards or paved areas.
- Must be identified with an identification tag and installed in a marked valve box.

3.5 Backflow Prevention Assemblies

Developers shall consult with the City during the design phase to identify the backflow prevention assemblies necessary for the project. The location of backflow prevention assemblies shall be indicated on the plans, along with the size, make and model. All backflow prevention assemblies must be of a make and model approved by DDW and included in the current list of backflow prevention assemblies as approved by the University of Southern California, Foundation for Cross-Connection Control and Hydraulic Research. Backflow prevention assemblies must be tested annually by a certified backflow prevention assembly tester from the City’s approved list.

All potable water connections servicing a property that uses recycled water for any purpose must have an approved backflow prevention assembly installed directly downstream of the potable water meter and must conform with the following requirements.

1. Backflow protection must be a reduced pressure principle assembly and/or an approved air gap.
2. Fire Service connections shall utilize an approved a Reduced Pressure Detector Assembly.
3. Backflow prevention Assemblies shall not be bypassed.
4. There shall be no take-offs upstream of the backflow prevention assembly that do not have an approved backflow prevention assembly installed.

Recycled water systems are required to have a backflow prevention device in order to protect the recycled water distribution system under the following conditions:

1. Backpressure from:
    a. Multi-story buildings
    b. Plumbing systems with a pumping system or pressure vessels
2. Sites where chemical additions are made to the recycled water system.
3. Sites where industrial processes or equipment changes the chemical composition or concentration of chemicals and/or contaminants in the recycled water.

3.6 Plumbing Materials

Non-corrosive plastic pipe, such as polyethylene, polyvinylchloride, or other corrosion resistant plastic, is required to be used for the construction of recycled water plumbing systems. Other materials that may be used include: fusion-bonded epoxy-coated carbon steel, Type 316 stainless steel, or ceramic materials.

Due to the potential corrosiveness of recycled water cast iron, ductile iron, copper, steel, Type 304 stainless steel, and concrete are not approved materials for use in recycled water systems.

All selected materials should conform with the approved or current version of the California Plumbing Code.

A developer may request for an exception to use cast iron, ductile iron, copper, steel, Type 304 stainless steel, or concrete in place of approved pipe materials. Each request for exception must be made in writing. The City will consider exceptions for developments that provide onsite water treatment systems to mitigate the effects of corrosion. Developers are strongly encouraged to prepare a corrosion control treatment plan including but not limited to the following topics.

1. Detailed Plans for onsite treatment of the recycled water to prevent corrosion in the onsite plumbing system including but not limited to:
    a. Treatment method(s)
    b. Location of Treatment Facilities
    c. Chemical storage and containment (if applicable)
    d. Identification of waste streams and disposal methods
    e. Potential for treatment by-products and mitigation
    f. State and/or local permitting requirements
2. An Operations Plan including but not limited to:
    a. Standard Operating Procedures
    b. Operational Control Strategies and Personnel
    c. Maintenance Plan

Section 3.10 of this document lists optional methods of treatment, and Section 6 lists historical ranges and averages of water quality parameters found in recycled water which can be used in designing an effective treatment system. Upon request the City can provide additional available recycled water quality parameter data to assist Developers in the design and selection of onsite treatment systems. The City does not assume responsibility for the operation or maintenance of onsite treatment systems or their efficacy.

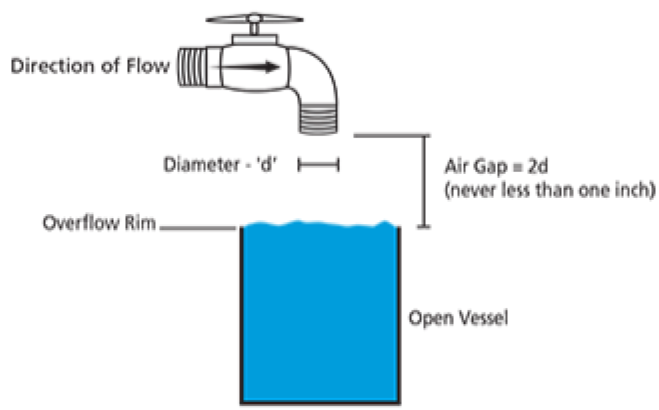
3.7 Optional Backup Water Source

In the event of a cross connection or failure of the recycled water distribution system, dual plumbed sites (Dual Plumbed: A site that uses recycled water for internal uses. i.e. toilet flushing, commercial laundry, cooling, and other approved internal uses.) may temporarily be without recycled water service. For facilities that are deemed critical or would like a redundant water supply the owner/developer should plan to install a backup potable water supply to temporarily supply the recycled water system for internal uses.

After recycled water has been supplied to a plumbing system, pipe, fixture, or any end use device a direct connection from a potable water source connected to the public drinking water system (including any supply through a backflow prevention assembly) is strictly prohibited. The only method for providing potable water to the recycled water system is through an approved air gap.

The potable backup source must be supplied through an approved air-gap and storage tank and may require a pump to re-pressurize the on-site recycled water system. Developers should appropriately size the storage tank and pump to meet the operational needs of the facility.

An air-gap is a physical separation between the free-flowing discharge end of a potable water supply pipeline and an open or non-pressure receiving vessel. An "approved air gap" shall be at least twice the diameter of the supply pipe measured vertically above the overflow rim of the receiving vessel; and in no case less than 1 inch (2.54 cm).



3.8 Recycled Water Use Area

The Recycled Water Use Area (RWUA) is the area on a property where recycled water is used, and where recycled water pipes and plumbing fixtures are located. For clarity the RWUA is not the same as the Recycled Water Service Area which is the geographic area in the City where recycled water is required to be used.

The RWUA should be broken into two use categories; irrigation and non-irrigation. Non-irrigation use areas include areas where recycled water is used for toilet flushing, cooling, commercial laundry, and other approved uses.

The RWUA shall not include commercial food preparation facilities, or other commercial facilities where food and drink are prepared onsite. Areas meeting these requirements shall be separately metered through a dedicated service connection to the Public Water System and be clearly defined in the Recycled Water Engineering Report. Sub-metering these facilities from a water service which also provides potable water to the RWUA is prohibited.

Food preparation facilities include: restaurants, cafes, coffee shops, catering facilities, grocery stores, juice bars where fresh fruit and vegetables are washed onsite, and any other areas of similar nature as determined by DDW and not approved for the use of recycled water.

Areas where food and drink are served, and areas where pre-packaged food and drinks are stored or distributed are allowed in the RWUA.

To comply with these requirements a project may need to exclude a small area on a single floor, an entire floor/wing of a building, or an entire building from the RWUA. Additionally, no pipes or plumbing fixtures using or intended for the use of recycled water shall be within or pass through food preparation areas.

All recycled water pipes, fixtures, end use devices, and irrigated areas beginning at the City issued recycled water meter shall be included within the RUWA.

3.8.1 Tennant Improvement Areas

Tennant Improvement (TI) areas in new and existing buildings intended to be used for retail sales, restaurants, personal services, business services, and entertainment establishments shall **not** be dual plumbed for the use of recycled water and must be excluded from the RWUA. Land use definitions may be revised and amended over time, and developers should consult with Public Works to assess suitability of any particular use with these recycled water development standards.

The following requirements must be met to exclude TI areas from the RWUA:

1. The TI shall be separately metered through a dedicated potable water service connection to the Public Water System provided by the City.
2. Recycled water service connections from the City shall not be provided to TI areas.
3. No pipes or plumbing using or intended for the use of recycled water shall be within or pass through the TI area, including recycled water pipes passing through the TI area servicing RUWAs within the same building.
4. Sub-metering TI areas from a potable water service which also provides potable water to a RWUA is prohibited.
5. A separate hot water system is required for TI areas.
6. Potable pipe labels for cold and hot water in TI areas shall be marked distinctly and shall differ from potable pipe labels within the RWUA. (i.e. DEDICATED DOMESTIC COLD, DEDICATED DOMESTIC HOT)
7. TI areas shall be included in the initial, 4-year, and any other required cross-connection tests performed on the building.

All tenant improvement areas must be specifically identified in the Engineering Report and include a list of potential/approved commercial uses for each area. Should a tenant improvement area use change to something that was not included in the Engineering Report, a retrofit plan and amended Engineering Report may be required and be approved by the City and DDW. Final determination of the use of recycled water in tenant improvement areas shall be made by the City.

3.8.2 Child Care Facilities

The use of recycled water in child care facilities is not prohibited, however, upon request child care facilities may be excluded from the RWUA and from using recycled water for toilet and urinal flushing, and for irrigation in outdoor play areas designated solely for child care.

Developers seeking to exclude child care facilities from using recycled water shall do so through the preparation of the RWER. The RWER shall clearly exclude the child care facility or area from the RWUA. Toilets and urinals shall be labeled as using potable water. Irrigation systems using potable water are required to have a dedicated potable irrigation water meter provided by the City and are subject to potable irrigation water budgets and rates. Potable irrigation systems shall not have any components that are colored or labeled in a way that would identify it as using recycled water.

3.9 System Identification

All recycled water equipment and appurtenances must be identified as conveying recycled water and that the water is not for drinking. Clearly identifying recycled water pipes and appurtenances, as well as other pipelines located near recycled water lines, will reduce the risk of mistakenly connecting a recycled water pipe or a non-recycled water pipe to pipelines conveying drinking water.

Recycled water systems and system components must be labeled according to state regulations and these standards, which ever may be more stringent. Terms such as "reclaimed water" or "non-potable water" shall not be used in place of "Recycled Water" for labeling and signage or for preparation of the RWER.

Examples:

3.9.1 Above Grade Piping

- Potable water pipelines must be labeled with a green background and white lettering having the words “DOMESTIC COLD WATER”. Hot water pipes supplied with potable shall be labeled with a yellow background and black lettering having the words “DOMESTIC HOT WATER” over the pipe insulation. Potable water pipes installed in unexposed areas such as walls, ceilings, or sub-floors shall be continuously labeled. When installed in exposed areas like in the example above labels can be spaced as required in the California Plumbing Code. For retrofit projects, all unexposed pipes shall be exposed and labeled.

- Recycled water pipelines shall be labeled with a purple background and black or white uppercase lettering having the words “RECYCLED WATER – DO NOT DRINK” visible in contrasting letters.
    - Flexible conduits or hoses must be clearly labeled “RECYCLED WATER – DO NOT DRINK” with each adapter or fitting painted purple.
    - Piping and fittings, newly installed or existing, must be identified by the application of Mylar tape with wording identifying the pipe as recycled-water piping.
    - Labels shall be continuous regardless of the location it is installed.
    - For retrofit projects, all unexposed pipes shall be exposed and labeled.

- Non-potable water pipelines must be appropriately labeled with a yellow background and black lettering having the words “NON-POTABLE WATER – DO NOT DRINK” visible in contrasting letters.

3.9.2 Below Grade or Buried Pipe

New Pipes:

- All buried potable lines must be identified by continuous lettering on 3-inch minimum width blue tape with 1-inch white lettering bearing the wording “POTABLE WATER” permanently affixed continuously atop all horizontal piping, laterals and mains.
    - Identification tape must extend to all valve boxes, vaults and exposed piping.
    - Identification tape is not necessary for extruded blue-colored PVC with continuous wording “POTABLE WATER” printed in contrasting lettering on opposite sides of the pipe.

- Buried recycled water piping must be purple colored and continuously marked with the wording “RECYCLED WATER – DO NOT DRINK” on opposite sides of the pipe.

- Tape that is at least 3-inches in width and runs continuously along the length of the pipe containing the words "RECYCLED WATER – DO NOT DRINK" is an acceptable alternative to printed pipe.
- The letters must be at least 1-inch in height and either black or white contrasting lettering.
- The tape must be permanently secured to the top of all pipes, mains and laterals.

Existing Pipes:

This section shall only apply to existing pipes for landscape irrigation systems. Any existing pipes used for dual plumbed retrofits shall be exposed and labeled in the same manner as new projects.

- Existing potable water piping need not be marked unless exposed during construction or maintenance. The exposed section of pipe shall be continuously marked as "POTABLE WATER".
- Existing recycled water piping need not be marked unless exposed during construction or maintenance. The exposed section of pipe shall be continuously marked as "RECYCLED WATER – DO NOT DRINK".

3.9.3 Purple Wrapping Tape Specifications

Where it is not feasible to use purple pipe, recycled water pipes should be wrapped with purple tape. Wrapping should be as follows:

- Tape shall be fabricated of polyvinyl chloride with a synthetic rubber adhesive and a clear polypropylene protective coating or approved equal.
- Wrapping tape shall have a minimum nominal thickness of five ten-thousandths (0.0005) inch and a minimum width of two (2) inches.
- Tape must be purple in color and shall be imprinted in black or white, uppercase letters, with the words "RECYCLED WATER – DO NOT DRINK".
- Wrapping tape is not required for buried PVC pipe manufactured with purple color integral to the plastic and marked on opposite sides to read "RECYCLED WATER – DO NOT DRINK" in intervals not to exceed three 3 feet.

3.9.4 Appurtenance Identification

Recycled water appurtenances must be identified with tags or labels as belonging to the recycled water system. Recycled water tags or labels must have a purple background with black lettering stating, "RECYCLED WATER – DO NOT DRINK".

Potable water appurtenances shall be tagged or labeled as part of the potable water system. Labels must have a blue background with "POTABLE WATER" in white lettering.

Exposed valve boxes, vaults, quick coupling valves, outlets and related appurtenance must be color-coded, labeled or tagged, to differentiate recycled water from potable water:

- For potable water: "POTABLE WATER" in white lettering on a blue background.
- For recycled water: "CAUTION – RECYCLED WATER – DO NOT DRINK" in black or white contrasting lettering on a purple background.
- For non-potable water: "NON-POTABLE WATER – -- DO NOT DRINK" in contrasting lettering on a yellow background.

Examples of appurtenances that must be identified are:

- Valves
    - Including air/vacuum relief valves, pressure reducing valves, pump control valves, etc. See below for specific valve identification requirements.
- Pumps
- Pressure regulators
- Flow meters
- Quick couplers
- Strainers
- Other related components (i.e. trap primers, shock arresters)

3.9.4.1 Valves

All valves must have an identification tag on the valve operator. Additionally, quick coupling valves must also be installed in a valve box with the valve box cover imprinted with the words "RECYCLED WATER".

Valves and Mechanical Equipment

- All valves, except fixture supply control valves, shall be equipped with a locking feature.
- All mechanical equipment, which is appurtenant to the recycled water system, shall be painted purple to match the wrapping tape.

Valve Seals

Seal each valve or appurtenance after the recycled water system has been approved, and placed into operation. These seals shall either be a crimped lead wire seal, or a plastic break-away seal which, if broken after system approval, shall be deemed conclusive evidence that the recycled water system has been accessed. The seals should be purple with the words "RECYCLED WATER".

3.9.5 Storage Tanks and Impoundment Identification

All storage tanks, either stationary or portable, must be structurally sound and free from leaks. Each tank must be conspicuously marked with signs with the words "RECYCLED WATER – DO NOT DRINK" in black letters 2-inches high on a purple background. The "Do Not Drink" symbol should be present on all recycled water storage tanks.

Impoundments (lakes) that receive recycled water are classified as:

- Unrestricted – Swimming and body contact allowed.
- Restricted – No swimming or body contact, but non-contact activities such as fishing and boating allowed.
- Ornamental – No recreational activities allowed.

All impoundments must have the recycled water valves and outlets marked or tagged with the words "RECYCLED WATER – DO NOT DRINK." At restricted and ornamental impoundments, adequate measures must be taken to prevent body contact. All recycled water impoundments must be kept separate from potable water wells and reservoirs.

If any storage tank or impoundment receives both recycled and potable water, the potable water supply must be properly equipped with an air-gap.

3.9.6 Use Area Signage

It is important that individuals in recycled water use areas are aware that the recycled water is not for drinking; therefore, signage at locations where recycled water is being used is imperative.

- Place recycled water signs at obvious locations in areas where recycled water is used.
- Where recycled water is used on landscapes; signs must be placed at obvious locations such as entrance points, specific work areas, and areas where recycled water equipment is housed or stored.
- When used in decorative fountains, signage should be included at or near the fountain.
- Where recycled water is used indoors, such as in industrial processes and for toilet flushing, the room or area must contain a clearly visible sign indicating that recycled water is being used and identify what the water is being used for.
- Design plans should indicate the location of signs planned for the site.

Signs to be used at a site must be approved by the City.

Below are common recycled water use signs:

- ***Room Entrance*** – Signs in water closets and/or urinals using recycled water shall contain 1/2-inch letters of a highly visible color on a contrasting background. Room entrance signs should contain text similar to the following:

  "TO CONSERVE WATER, THIS BUILDING USES RECYCLED WATER TO FLUSH TOILETS AND URINALS"

- ***Decorative Fountains*** – Signs to be placed at decorative fountains will be provided by the City and must be located on or near the fountain and clearly visible to passersby containing the wording:

  "THIS WATER FEATURES USES RECYCLED WATER, DO NOT DRINK"

- ***Equipment Room*** – Signs in equipment rooms containing recycled water equipment shall contain 1-inch letters on a purple background with text similar to the following:

  "CAUTION RECYCLED WATER, DO NOT DRINK. DO NOT CONNECT TO DRINKING WATER SYSTEM"
  "NOTICE CONTACT BUILDING MANAGEMENT BEFORE PERFORMING ANY WORK ON THIS WATER SYSTEM"

  Additionally, the signs shall contain an international symbol that conveys that the water is not intended for drinking. The symbol shall be similar to Figure 60310-A, Section 60310, Title 22, California Code of Regulations.

- ***Tank-type Water Closet*** – Signs for tank-type water closets that are flushed with recycled water should be labeled:

"RECYCLED WATER – DO NOT DRINK"

Additionally, the signs shall contain an international symbol that conveys that the water is not intended for drinking. The symbol shall be similar to Figure 60310-A, Section 60310, Title 22, California Code of Regulations.

- ***Valve Access Door*** – Each recycled water valve within a wall should have its access door into the wall equipped with a warning sign approximately 6 x 6 inches with wording in 1 and 1/2 inch letters on a purple background. Attach signs inside the access door-frame and hang in the center of the access door frame.

3.10 Optional On-Site Treatment

For sites using recycled water for uses other than landscape irrigation, additional on-site treatment may be necessary to address concerns for equipment susceptible to corrosion. Listed below are a few recommended on-site treatment options for users to consider. Upon request the City can provide additional recycled water quality parameter data it has on record, but does not assume responsibility for the operation or maintenance of on-site treatment systems or their efficacy. It is also the users responsibility to ensure treatment systems are designed by qualified professionals.

3.10.1 Ammonia and Chloride Treatment

Aerated Nitrification Filter and Ion-Exchange

This treatment approach is applicable to medium and large industrial users (>10,000GPD). An aerated nitrification filter removes hydrogen sulfide and ammonia, which is followed by demineralization through ion-exchange.

Ion-Exchange Pre-Treatment and Reverse Osmosis

An alternative option is reverse osmosis (RO) with ion-exchange pre-treatment. This method is applicable to users with demands less than 10,000 GPD. A typical RO treatment system consists of the following main components: RO pretreatment, RO unit, post-RO treatment, monitoring instruments and valves, storage tank and accessories, and re-pressurization system. Small packaged RO treatment systems are commonly available for water users of 500 to 10,000 GPD. If RO treatment is used care should be taken to prevent corrosion due to low pH in finished water, and chemical additions may be required to raise pH and alkalinity as a buffering agent.

3.10.2 Odor Control

A carbon-impregnated cartridge filter installed at the service connection is one possible method for reducing turbidity and odor of recycled water. These filters are commonly available at hardware stores and are relatively easy to install.

In order to remove odors, it is important to use filter elements that are impregnated with granular activated carbon (GAC). Filter housings should be rated for a working pressure of 100 psig, and should be protected from vandalism and direct sunlight.

3.11 Codes Covenants & Restrictions for Condominiums

California Water Code Section 13553 allows for the use of recycled water for toilet and urinal flushing in condominium projects subject to a number of provisions including but not limited to the following.

1. Potable water service to each condominium project will be provided with a backflow protection device approved by the State Water Resources Control Board to protect the agency's public water system, as defined in Section 116275 of the Health and Safety Code.

2. The condominium's declaration, as defined in Section 4135 or 6546 of the Civil Code, shall provide that the laws and regulations governing recycled water apply, shall not permit any exceptions to those laws and regulations, shall incorporate the report described in Section 4 of this document, and shall contain the following statement:

NOTICE OF USE OF RECYCLED WATER

This property is approved by the SWRCB Division of Drinking Water for the use of recycled water for toilet and urinal flushing. This water is not potable, is not suitable for indoor purposes other than toilet and urinal flushing, and requires dual plumbing. Alterations and modifications to the plumbing system require a permit and are prohibited without first consulting with the appropriate local building code enforcement agency and your property management company or owners' association to ensure that the recycled water is not mixed with the drinking water.

Property management company or owners' associations shall inform all new condominium owners, lessees, and tenants that recycled water is used on the property and/or within condominiums for the specific uses described in the Recycled Water Engineering Report, and that any alterations or modifications to the plumbing system require a permit issued by the City of Redwood City prior to the commencement of any work.

3.12 Tenant Notification for Residential Apartments

Property management shall inform all lessees, and tenants that recycled water is used on the property and/or within apartments for the specific uses described in the Recycled Water Engineering Report, and that any alterations or modifications to the plumbing system require a permit issued by the City of Redwood City prior to the commencement of any work. Property Management shall include the following notice in the rental/lease agreement or as a supplemental document to said agreement for each lessee/tenant to the property.

NOTICE OF USE OF RECYCLED WATER

This property is approved by the SWRCB Division of Drinking Water for the use of recycled water for toilet and urinal flushing. This water is not potable, is not suitable for indoor purposes other than toilet and urinal flushing, and requires dual plumbing. Alterations and modifications to the plumbing system require a permit and are prohibited without first consulting with property management and the appropriate local building code enforcement agency to ensure that the recycled water is not mixed with the drinking water.

4. RECYCLED WATER ENGINEERING REPORT

An engineering report must be submitted to and approved by the California State Water Resources Control Board, Division of Drinking Water (DDW) for all dual plumbed recycled water facilities in accordance with Title 22 requirements. The engineering report must be prepared by a qualified engineer licensed in California and experienced in the field of wastewater treatment, and contain a description of the recycled water system's design. Public Works has prepared a template Engineering Report to assist developers.

1. A Draft Engineering Report is due for Public Works review no later than with submittal of the first building permit application. Review by the Public Works Services Department will be required prior to issuance of any building or engineering permits.
2. Public Works will provide initial comments to the Developer that must be addressed prior to submission to DDW.
3. When deemed complete Public Works will submit the Report to DDW for Review and Approval.
    a. Additional comments may need to be addressed following initial review by DDW.
4. Following approval by DDW, no changes can be made to the design of the potable water or recycled water plumbing systems. If a design change is required, it must be approved by DDW.

Recycled water used for any dual plumbed uses is strictly prohibited prior to state approval of the engineering report and completion of cross-connection test. During construction and testing, plans should be made for temporary use of potable water (please refer to Section 2.3).

4.1 California SWRCB Requirements

Below is a list of the requirements set forth in Title 22. The Engineer preparing the report is responsible for confirming the current version of these requirements is used when drafting the Recylced Water Engineering Report (RWER). Redwood City has prepared a RWER Template which includes instructions and tips to aid Engineers. A Microsoft Word version of the template is available for download on the City's website.

§60314. Report submittal

(a) For dual-plumbed recycled water systems, **t**he report submitted pursuant to section 13522.5 of the Water Code shall contain the following information in addition to the information required by section 60323:

1) A detailed description of the intended use area identifying the following:
   (A) The number, location, and type of facilities within the use area proposing to use dual plumbed systems,
   (B) The average number of persons estimated to be served by each facility on a daily basis,
   (C) The specific boundaries of the proposed use area including a map showing the location of each facility to be served,
   (D) The person or persons responsible for operation of the dual plumbed system at each facility, and
   (E) The specific use to be made of the recycled water at each facility.

(2) Plans and specifications describing the following:
   (A) Proposed piping system to be used,
   (B) Pipe locations of both the recycled and potable systems,

(C) Type and location of the outlets and plumbing fixtures that will be accessible to the public, and

(D) The methods and devices to be used to prevent backflow of recycled water into the public water system.

(3) The methods to be used by the recycled water agency to assure that the installation and operation of the dual plumbed system will not result in cross connections between the recycled water piping system and the potable water piping system. This shall include a description of pressure, dye or other test methods to be used to test the system every four years.

(b) A master plan report that covers more than one facility or use site may be submitted provided the report includes the information required by this section. Plans and specifications for individual facilities covered by the report may be submitted at any time prior to the delivery of recycled water to the facility.

4.2 Redwood City Requirements

In order to streamline the review process, and reduce the number of revisions to the RWER Redwood City requires the following documents, plans, or plan sheets to be included in the report.

1. Plumbing Plans shall include color coded pipelines such that pipelines can be easily traced from the City meter to each end use device. Color coding shall include, but is not limited to, the following uses, and ideally colors should be as follows, but other color combinations may be used:
    a. Cold water: blue
    b. Hot water: red
    c. Recycled water: purple
    d. Irrigation: green
2. Plumbing plans shall include riser diagrams with a minimum of two dimensions. It is advised to include three-dimensional isometric riser diagrams with the plumbing plans. Isometric riser diagrams may be required to complete the review and obtain approval by DDW.
    a. Riser diagrams shall be color coded in the same manner as other plumbing plan sheets.
3. Landscape irrigation plans shall be included with the RWER.
4. Architectural plans should be included with the RWER submission to aid with the review of the report and for planning the Cross-Connection test.
5. Mechanical plans are required if equipment uses recycled water.
6. It is preferred the City's Recycled Water Engineering Report Template is used in order to streamline the review process. The template is available for download on the City's website.

5. CROSS CONNECTION & COVERAGE TESTS

A cross-connection is a connection or potential connection between a drinking water system and any other system that may contain harmful substances that could possibly enter the drinking water system. Cross connections between the potable drinking water system and the recycled water system are strictly prohibited. The drinking water plumbing system must be physically separated from any recycled water plumbing system. The only way to supply potable water to a recycled water system is through an approved air gap.

5.1 Cross-Connection Test

Prior to connecting to the City's recycled water distribution system, the site must pass a full shut-down cross connection test. This test must be performed by a Cross-Connection Control Specialist certified through the CA-NV Section of the AWWA and observed by Public Works staff.

- State DDW Approves the Engingineering Report (RWER)
- Schedule a Cross-Connection Control Pre-Meeting with PWS
- Provide PWS with the Site Specific Cross-Connection Test Procedure Approved in the (RWER)
- Schedule Pre-inpsection Walkthrough(s) with PWS
- Coordinate and schedule the Cross-Connection Test with PWS
- Complete all Corrective Actions Resulted from the Test
- Provide PWS with a Cross-Connection Test Report and Certification
- The Site is Ready to Receive Recycled Water

Cross Connection Tests must be performed on all dual plumbed facilities, and irrigation systems prior to the use of recycled water. The cross-connection testing procedures must be approved by DDW and included in the RWER. A separate and distinct test shall be performed for the irrigation system and each facility/building within the recycled water use area. For larger projects with multiple buildings and/or city metered connections a phased cross-connection test plan shall be included in the RWER. Projects with dedicated potable water services supplying retail tenant improvement areas which are not included in the Recycled Water Use Area shall include these areas in the cross-connection test. Provisions must be made by the contractor to supply the on-site recycled water plumbing system through a temporary metered source of potable water. Please refer to Section 2.3 of this guide for additional detail.

A full shut-down cross connection test is required:

- Prior to occupancy
- Anytime there is a plumbing change to onsite potable and/or recycled water systems, and
- Every four years in accordance with Title 22 regulations.

The standard shut-down test consists of three phases:

1. Test to confirm that all fixtures and end of use devices (potable and recycled) are pressurized.
2. Pressurize the potable water system and de-pressurize the recycled water system. Verify that all potable water fixtures are functional, and that no flow is observed from recycled water fixtures.
3. Pressurize the recycled water system and de-pressurize the potable water system. Verify that all recycled water fixtures are functional, and that no flow is observed from potable water fixtures.

Shut-down tests must be performed by a certified cross-connection control specialist and observed by Public Works. It is the property owner's responsibility to coordinate the shut-down test and submit the test report to Public Works.

The AWWA Certified Cross-Connection Specialist performing the test shall prepare a report following the completion of the on the City's approved form. The report shall include a list of any Corrective Actions which shall be completed prior to delivery of recycled water, and Punch List Items which shall be corrected prior to final certification of occupancy. Corrective actions include any and all items that, should recycled water be delivered, would violate the provisions of Title 22 and cause a direct health and safety concern to occupants or the public. Punch list items include all other items that must be completed prior to occupancy and do not pose a health and safety concern

The City will install the recycled water meter after the following conditions are met:

1. A successful cross-connection test has been completed.
2. All corrective actions have been performed (Some corrective actions may require the cross-connection test to be redone).
3. Public Works receives a completed Cross-Connection Test Report.
4. A Site Supervisor has been named and received training by Public Works.

5.2 Coverage Test

Irrigation Systems are required to have a coverage test. The coverage test is performed to ensure that spray heads and rotors are properly aligned to distribute water to the area intended to be irrigated and is not running off of the site. The coverage test also ensures that recycled water does not come in contact with drinking fountains or picnic tables. Coverage tests are not required for areas irrigated with subsurface systems, however, subsurface irrigation should not cause run-off from the site.

The initial coverage test shall be conducted after installation of the city issued recycled water meter and upon delivery of recycled water to the irrigation system and prior to final certification of occupancy. The Coverage test shall not be conducted through temporary supply connections to the irrigation system to ensure coverage during normal operating conditions.

5.3 Ongoing Inspections and Tests

After connecting to the recycled water system, the City will coordinate annual site inspections with the designated Site Supervisor. The annual inspection is a visual inspection to ensure that no plumbing changes have been made and that all use requirements are being met. For sites requiring a full shut-down test the City will send a notice to the Site Supervisor when the cross-connection test is due.

6. REDWOOD CITY RECYCLED WATER QUALITY PARAMETERS

Historical recycled water quality includes analysis of the parameters listed below from water samples taken at the Recycled Water Distribution Pump Station between December 2009 and June 2018.

Parameter	Units	Min	Max	Average	Median
Acetone	ug/L	4.20	9.00	6.56	6.90
Alkalinity (bicarbonate, as CaCO3)	mg/L	190	290	249	240
Alkalinity (carbonate, as CaCO3)	mg/L	ND	ND	ND	ND
Alkalinity (hydroxide, as CaCO3)	mg/L	ND	ND	ND	ND
Alkalinity (total, as CaCO3)	mg/L	190	290	249	240
Aluminum	mg/L	0.03	0.80	0.17	0.14
Ammonia (total, as N)	mg/L	28	52	39	38
Anionic Surfactants (MBAS)	mg/L	0.05	0.29	0.13	0.11
Antimony	mg/L	0.0010	0.0084	0.0018	0.0015
Arsenic	mg/L	0.001	0.006	0.002	0.002
Barium	mg/L	0.004	0.096	0.013	0.008
Benzene	mg/L	ND	ND	ND	ND
Bicarbonate (as HCO3)	mg/L	230	350	303	310
Biochemical Oxygen Demand / BOD	mg/L	3.3	81.0	22.2	13.0
Boron	mg/L	230	1300	344	300
Bromodichloromethane	ug/L	0.59	5.60	2.56	1.90
Bromoform	ug/L	0.54	6.10	3.29	3.10
Cadmium	mg/L	ND	ND	ND	ND
Calcium	mg/L	21	46	31	29
Carbon tetrachloride	mg/L	ND	ND	ND	ND
Chloride	mg/L	210	460	271	260
Chlorobenzene	mg/L	ND	ND	ND	ND
Chloroethane	ug/L	ND	ND	ND	ND
Chloroform	ug/L	1.30	7.20	3.89	3.80
Chromium	mg/L	0.00	0.00	0.00	0.00
cis-1,2-Dichloroethylene	mg/L	ND	ND	ND	ND
cis-1,3-Dichloropropene	ug/L	ND	ND	ND	ND
Cobalt	mg/L	0.44	3.00	0.72	0.61
Color	CU	11.00	60.00	22.30	18.00
Conductivity	uS/cm	1100	2100	1508	1500
Copper	mg/L	0.005	0.150	0.043	0.024
Dibromochloromethane	ug/L	0.59	5.70	2.34	1.50
Dichloromethane	mg/L	0.00057	0.00260	0.00157	0.00155
Ethylbenzene	mg/L	ND	ND	ND	ND
Ethylene dibromide / EDB	mg/L	ND	ND	ND	ND
Fluoride	mg/L	0.47	5.80	0.94	0.75
Hardness (total, as CaCO3)	mg/L	131	232	171	166
Iron	mg/L	0.077	0.730	0.172	0.140

Parameter	Units	Min	Max	Average	Median
Lead	mg/L	0.00007	0.03300	0.00212	0.00056
m- + p- Xylene	ug/L	ND	ND	ND	ND
Magnesium	mg/L	17	31	23	22
Manganese	mg/L	0.091	0.420	0.124	0.110
Mercury	mg/L	ND	ND	ND	ND
Methyl bromide	ug/L	ND	ND	ND	ND
Methyl chloride	ug/L	ND	ND	ND	ND
Methyl ethyl ketone (MEK) (2-Butanone)	ug/L	ND	1.30	1.30	1.30
Methyl isobutyl ketone (MIBK)	ug/L	ND	ND	ND	ND
Nickel	mg/L	0.0027	0.0062	0.0044	0.0043
Nitrate (as N)	mg/L	0.09	5.30	0.63	0.31
Nitrite (as N)	mg/L	0.04	14.00	2.00	1.20
o-Phosphate (as PO4)	mg/L	3.2	27.0	7.6	6.9
o-Xylene	ug/L	ND	ND	ND	ND
pH		7.18	7.60	7.38	7.38
Phosphorus	mg/L	0.38	4.20	2.69	2.95
Potassium	mg/L	14	22	18	17
Selenium	mg/L	0.00026	0.00410	0.00256	0.00280
Silicon (dissolved, as SiO2)	mg/L	6.40	38.00	11.97	11.00
Silver	mg/L	0.00	0.00	ND	ND
Sodium	mg/L	130.00	260.00	163.20	160.00
Sodium Absorption Ratio		4.16	8.25	5.52	5.34
Styrene	mg/L	ND	ND	ND	ND
Sulphate	mg/L	45.00	75.00	59.64	59.00
Tetrachloroethylene / PCE	mg/L	ND	ND	ND	ND
Tin	mg/L	ND	ND	ND	ND
Toluene	mg/L	0.00033	0.00060	0.00041	0.00036
Total Dissolved Solids / TDS	mg/L	520	980	693	680
Total Kjeldahl Nitrogen / TKN	mg/L	28	54	41	40
Total Nitrogen	mg/L	28	61	42	41
Total Suspended Solids / TSS	mg/L	1.00	2.90	1.92	2.00
trans-1,2-Dichloroethylene	mg/L	ND	ND	ND	ND
trans-1,3-Dichloropropene	ug/L	ND	ND	ND	ND
Trichloroethylene / TCE	mg/L	ND	ND	ND	ND
Vinyl chloride	mg/L	ND	ND	ND	ND
Xylenes (total)	mg/L	ND	ND	ND	ND
Zinc	mg/L	0.008	0.310	0.040	0.024
1,1,1-Trichloroethane	mg/L	ND	ND	ND	ND
1,1,2,2-Tetrachloroethane	mg/L	ND	ND	ND	ND
1,1,2-Trichloroethane	mg/L	ND	ND	ND	ND
1,1-Dichloroethane	mg/L	ND	ND	ND	ND
1,1-Dichloroethylene	mg/L	ND	ND	ND	ND
Parameter	**Units**	**Min**	**Max**	**Average**	**Median**

1,2-Dichlorobenzene	mg/L	ND	ND	ND	ND
1,2-Dichloroethane	mg/L	ND	ND	ND	ND
1,2-Dichloropropane	mg/L	ND	ND	ND	ND
1,3-Dichlorobenzene	ug/L	ND	ND	ND	ND
1,3-Dichloropropene	mg/L	ND	ND	ND	ND
1,4-Dichlorobenzene	mg/L	ND	ND	ND	ND

ND = Not Detected

mg/L = milligrams per liter

ug/L = micrograms per liter

uS/cm = microSiemens per centimeter

CU = color unit

7. LANDSCAPING AND IRRIGATING WITH RECYCLED WATER

Redwood City requires all existing commercial and industrial properties, and all new commercial, institutional, industrial, government, and multi-family residential properties within the Recycled Water Service Area to use recycled water for landscape irrigation. To promote plant health and plan for the use of recycled water this section contains important information developers and landscapers should consider when designing and maintaining landscapes irrigated with recycled water.

7.1 Plant Selection

Water quality parameters are used to evaluate landscape conditions as a function of the concentration of total salts [referred to as total dissolved solids (TDS) or electrical conductivity (EC)] as well as the concentration of several specific ions (chloride, sodium, boron), bicarbonate, pH, trace elements, and nutrients (nitrogen, phosphorus, potassium).

While potable water is suitable for irrigation of most any plant, recycled water which is higher in TDS and EC may affect the health and appearance of some plants which is why it is important to select plant species that are more tolerant or can thrive when irrigated with recycled water. Additionally, as water moves through the soil and is evaporated from the soil surface, some of the salts in the water stay behind. When present in high concentrations, some of these salts can damage sensitive plants. In some cases, the salts can cause plant damage when water is applied directly to the foliage by sprinklers.

For landscapes comprised of species having good salt tolerance and low water requirements it is likely that only small adjustments to the irrigation practices will be needed to maintain acceptable landscape appearance. For landscapes comprised of species having moderate salt tolerance and moderate to high water requirement, a significant increase in irrigation (frequency and duration) will likely be required to maintain acceptable plant appearance and health.

<u>Recommended Practices</u>:

- Select plant species from Redwood City's Recommended Plant List for Irrigating with Recycled Water
- Consider the type of irrigation system being used to minimize the amount of water coming in contact with foliage
- Refer to historical recycled water quality parameters provided in Table 7.4.1 when selecting plants

7.2 Soil Conditions

As a rooting environment, the soil holds the water and elements for root uptake. Some constituents in recycled water can have negative effects on the soil as they concentrate over time, and it may be necessary to amend the soil prior to planting. There are four soil characteristics of key importance.

a. **Chemical characteristics** – Soils with low concentrations of salts or low pH can accumulate more salts from the water before salt concentrations cause plant damage.
b. **Texture of the soil** – Clay (fine-textured) soils are more quickly degraded by excess sodium than sandy (coarse textured) soils.
c. **Soil profile** – The vertical gradation or layering with soil depth affects water percolation, salt accumulation and plant rooting patterns.
d. **Soil drainage** – Soils with poor drainage characteristics accumulate salts and cannot be easily leached. The poorer the drainage, the better-quality water required.

Recommended Practices:

- Consider implementing a leaching program to maintain soil salinity within the root zone. Leaching is accomplished by applying a large volume of water that carries salts accumulated in the root zone farther down into the soil profile. The volume of water required depends on the texture of the soil, the depth of the root zone, and the salt concentration reduction needed. For leaching treatments to be effective, the soil must drain. If layers are present in the soil profile that restrict leaching, they need to be broken through to allow drainage into the soil below, or drain lines must be installed to carry leach water away.
- Apply gypsum prior to leaching when indicated by soil analysis. Gypsum ($CaSO_4$) is a soil amendment that, when combined with leaching, helps lower soil sodium concentration. The calcium supplied by gypsum displaces sodium on clay particles so that the sodium can be leached below the root zone. To be effective, the soil must drain. The amount of gypsum needed and the frequency of application depend on site-specific soil and water characteristics, and is determined by laboratory analysis.
- Perform soil percolation tests to evaluate effectiveness of leaching programs and need for installation of sub-drainage systems.

7.3 Irrigation Method, Frequency, and Duration

Property owners are responsible for developing and adjusting irrigation. Supplying the right amount of water to the landscape at the right time requires determining appropriate irrigation frequency and duration. The amount of water available to plants depends on how much water the soil holds within the root zone – the soil water reservoir. Soil texture largely determines how much water a given volume of soil will hold. For instance, loamy sand holds 1.2” available water per foot of soil, while a clay loam holds twice that amount, 2.4”/ft.

When using recycled water, irrigation frequency should be increased as needed to maintain moist (but not wet) soil. Drought stress occurs at higher soil moisture as water quality declines because the salts increase the osmotic pressure. As the soil dries, the salts in the soil solution become more concentrated, and plant damage is more likely to occur. Irrigation systems with non-uniform application patterns may need to be upgraded to avoid dry areas.

To assist our landscape irrigation customers Redwood City provides water budgets for all sites using dedicated irrigation water meters. The budget is a calculation of the amount of water required for a given property during a billing period. The goal is for actual landscape water use to be similar to the budget. The budget is calculated daily from measurements of the landscape area (A), daily evapotranspiration (ETo), estimated water requirements of planting (landscape coefficient, KL), and the irrigation efficiency of the water application (IEL). The City has assigned values for KL and IEL based on whether the landscape is composed of turf or non-turf. KL values for turf are 0.8, and 0.4 for non-turf.

Recommended Practices:

- For sites using recycled water Redwood City recommends to irrigate between 100% and 125% of the water budget to maintain moist soil conditions and provide adequate leaching of salts past the root zone of plants.
- Perform an irrigation system audit at each site to quantify application rates and variability. This information is needed to irrigate effectively and to identify potential problem areas that need modification.

- Consider installing soil moisture monitoring equipment to measure the soil moisture at various depths within and below plant root zones. This information would be helpful in evaluating effectiveness of irrigation schedules and leaching treatments.

7.4 Landscape Water Quality

The quality of recycled water is dependent on a number of factors that can change the water quality parameters including but not limited to; wastewater sources, season, drought, water conservation, conditions of wastewater collection systems, the wastewater treatment process, and regulatory requirements. The Silicon Valley Clean Water Authority (SVCW) produces disinfected tertiary recycled water for distribution by the City of Redwood City which meets all treatment regulations and permit requirements under the authority of the San Francisco Regional Water Quality Control Board (RWQCB) and State Water Resources Control Board Division of Drinking Water (DDW). Table 7.4.1 lists water quality parameters that can be used when designing landscapes.

Sodium and chloride concentrations are particularly important if irrigation water will be supplied by sprinkler. Plants will absorb both ions through their foliage. Salt damage through foliar absorption will occur at much lower concentrations than through soil absorption, particularly under high evapotranspiration conditions. For this reason, interpretation of water quality is different for foliar applied (e.g. spray irrigation that wets plant foliage) than for soil applied (e.g. bubbler or drip irrigation) irrigation systems. Therefore, water quality may be identified as poor for foliar application and fair for soil application

Table 7.4.1 – Historic Recycled Water Quality Parameters for Landscapes

Parameter	Min	Max	Average	Median
Bicarbonate (mg/L)	230	350	303	310
Boron (mg/L)	0	1.3	0	0.3
Chloride (mg/L)	210	460	271	260
Conductivity (umho/cm)	1100	2100	1508	1500
pH	7.18	7.60	7.38	7.38
Phosphorus (mg/L)	0.38	4.20	2.69	2.95
Potassium (mg/L)	14	22	18	17
Sodium (mg/L)	130	260	163	160
Sodium Absorption Ratio (SAR)	4.16	8.25	5.52	5.34
TDS (mg/L)	520	980	693	680
Total Nitrogen	28	61	42	41

Appendix I

SFPUC and BAWSCA Common Language for 2020 UWMPs

Draft Common Language for BAWSCA Member Agencies' 2020 UWMPs

Tier One Drought Allocations

In July 2009, San Francisco and its Wholesale Customers in Alameda County, Santa Clara County, and San Mateo County (Wholesale Customers) adopted the Water Supply Agreement (WSA), which includes a Water Shortage Allocation Plan (WSAP) that describes the method for allocating water from the Regional Water System (RWS) between Retail and Wholesale Customers during system-wide shortages of 20 percent or less. The WSAP, also known as the Tier One Plan, was amended in the 2018 Amended and Restated WSA.

The SFPUC allocates water under the Tier One Plan when it determines that the projected available water supply is up to 20 percent less than projected system-wide water purchases. The following table shows the SFPUC (i.e, Retail Customers) share and the Wholesale Customers' share of the annual water supply available during shortages depending on the level of system-wide reduction in water use that is required. The Wholesale Customers' share will be apportioned among the individual Wholesale Customers based on a separate methodology adopted by the Wholesale Customers, known as the Tier Two Plan, discussed further below.

Level of System-Wide Reduction in Water Use Required	Share of Available Water	
	SFPUC Share	Wholesale Customers Share
5% or less	35.5%	64.5%
6% through 10%	36.0%	64.0%
11% through 15%	37.0%	63.0%
16% through 20%	37.5%	62.5%

The Tier One Plan allows for voluntary transfers of shortage allocations between the SFPUC and any Wholesale Customer as well as between Wholesale Customers themselves. In addition, water "banked" by a Wholesale Customer, through reductions in usage greater than required, may also be transferred.

As amended in 2018, the Tier One Plan requires Retail Customers to conserve a minimum of 5% during droughts. If Retail Customer demands are lower than the Retail Customer allocation (resulting in a "positive allocation" to Retail[1]) then the excess percentage would be re-allocated to the Wholesale Customers' share. The additional water conserved by Retail Customers up to the minimum 5% level is deemed to remain in storage for allocation in future successive dry years.

The Tier One Plan will expire at the end of the term of the WSA in 2034, unless mutually extended by San Francisco and the Wholesale Customers.

The Tier One Plan applies only when the SFPUC determines that a system-wide water shortage exists and issues a declaration of a water shortage emergency under California Water Code

[1] See Water Supply Agreement, Water Shortage Allocation Plan (Attachment H), Section 2.1.

Section 350. Separate from a declaration of a water shortage emergency, the SFPUC may opt to request voluntary cutbacks from its Retail and Wholesale Customers to achieve necessary water use reductions during drought periods.

Tier Two Drought Allocations

The Wholesale Customers have negotiated and adopted the Tier Two Plan, referenced above, which allocates the collective Wholesale Customer share from the Tier One Plan among each of the 26 Wholesale Customers. These Tier Two allocations are based on a formula that takes into account multiple factors for each Wholesale Customer including:

- Individual Supply Guarantee;
- Seasonal use of all available water supplies; and
- Residential per capita use.

The water made available to the Wholesale Customers collectively will be allocated among them in proportion to each Wholesale Customer's Allocation Basis, expressed in millions of gallons per day (mgd), which in turn is the weighted average of two components. The first component is the Wholesale Customer's Individual Supply Guarantee, as stated in the WSA, and is fixed. The second component, the Base/Seasonal Component, is variable and is calculated using the monthly water use for three consecutive years prior to the onset of the drought for each of the Wholesale Customers for all available water supplies. The second component is accorded twice the weight of the first, fixed component in calculating the Allocation Basis. Minor adjustments to the Allocation Basis are then made to ensure a minimum cutback level, a maximum cutback level, and a sufficient supply for certain Wholesale Customers.

The Allocation Basis is used in a fraction, as numerator, over the sum of all Wholesale Customers' Allocation Bases to determine each wholesale customer's Allocation Factor. The final shortage allocation for each Wholesale Customer is determined by multiplying the amount of water available to the Wholesale Customers' collectively under the Tier One Plan, by the Wholesale Customer's Allocation Factor.

The Tier Two Plan requires that the Allocation Factors be calculated by BAWSCA each year in preparation for a potential water shortage emergency. As the Wholesale Customers change their water use characteristics (e.g., increases or decreases in SFPUC purchases and use of other water sources, changes in monthly water use patterns, or changes in residential per capita water use), the Allocation Factor for each Wholesale Customer will also change. However, for long-term planning purposes, each Wholesale Customer shall use as its Allocation Factor, the value identified in the Tier Two Plan when adopted.

The Tier Two Plan, which initially expired in 2018, has been extended by the BAWSCA Board of Directors every year since for one additional calendar year. In November 2020, the BAWSCA Board voted to extend the Tier Two Plan through the end of 2021.

Individual Supply Guarantee

San Francisco has a perpetual commitment (Supply Assurance) to deliver 184 mgd to the 24 permanent Wholesale Customers collectively. San Jose and Santa Clara are not included in the Supply Assurance commitment and each has temporary and interruptible water supply contracts with San Francisco. The Supply Assurance is allocated among the 24 permanent Wholesale Customers through Individual Supply Guarantees (ISG), which represent each Wholesale Customer's allocation of the 184 mgd Supply Assurance.

[Name of Agency's] ISG is _______ mgd.

2028 SFPUC Decisions (formerly 2018 SFPUC Decisions)
[Note: This section is intended to be optional language that individual BAWSCA member agencies may use.]

In the 2009 WSA, the SFPUC committed to make three decisions before 2018 that affect water supply development:

- Whether or not to make the cities of San Jose and Santa Clara permanent customers,
- Whether or not to supply the additional unmet supply needs of the Wholesale Customers beyond 2018, and
- Whether or not to increase the wholesale customer Supply Assurance above 184 mgd.

Events since 2009 made it difficult for the SFPUC to conduct the necessary water supply planning and CEQA analysis required to make these three decisions before 2018. Therefore, in the 2018 Amended and Restated WSA, the decisions were deferred for 10 years to 2028.

Additionally, there have been recent changes to instream flow requirements and customer demand projections that have affected water supply planning beyond 2018. As a result, the SFPUC has established an Alternative Water Supply Planning program to evaluate several regional and local water supply options. Through this program, the SFPUC will conduct feasibility studies and develop an Alternative Water Supply Plan by July 2023 to support the continued development of water supplies to meet future needs.

Reliability of the Regional Water System

In 2008, the SFPUC adopted Level of Service (LOS) Goals and Objectives in conjunction with the adoption of WSIP. The SFPUC updated the LOS Goals and Objectives in February 2020.

The SFPUC's LOS Goals and Objectives related to water supply are:

Program Goal	System Performance Objective
Water Supply – *meet customer water needs in non-drought and drought periods*	• Meet all state and federal regulations to support the proper operation of the water system and related power facilities. • Meet average annual water demand of 265 mgd from the SFPUC watersheds for retail and Wholesale Customers during non–drought years for system demands consistent with the 2009 Water Supply Agreement. • Meet dry-year delivery needs while limiting rationing to a maximum 20 percent system-wide reduction in water service during extended droughts. • Diversify water supply options during non-drought and drought periods. • Improve use of new water sources and drought management, including groundwater, recycled water, conservation, and transfers.

.

Factors Impacting Supply Reliability

Adoption of the 2018 Bay-Delta Plan Amendment

In December 2018, the State Water Resources Control Board (SWRCB) adopted amendments to the Water Quality Control Plan for the San Francisco Bay/Sacramento-San Joaquin Delta Estuary (Bay-Delta Plan Amendment) to establish water quality objectives to maintain the health of the Bay-Delta ecosystem. The SWRCB is required by law to regularly review this plan. The adopted Bay-Delta Plan Amendment was developed with the stated goal of increasing salmonid populations in three San Joaquin River tributaries (the Stanislaus, Merced, and Tuolumne Rivers) and the Bay-Delta. The Bay-Delta Plan Amendment requires the release of 30-50% of the "unimpaired flow"[2] on the three tributaries from February through June in every year type. In SFPUC modeling of the new flow standard, it is assumed that the required release is 40% of unimpaired flow.

If the Bay-Delta Plan Amendment is implemented, the SFPUC will be able to meet the projected water demands presented in this UWMP in normal years but would experience supply shortages in single dry years or multiple dry years. Implementation of the Bay-Delta Plan Amendment will require rationing in all single dry years and multiple dry years. The SFPUC has initiated an Alternative Water Supply Planning Program to ensure that San Francisco can meet its Retail and Wholesale Customer water needs, address projected dry years shortages, and limit rationing to a maximum 20 percent system-wide in accordance with adopted SFPUC policies. This program is in early planning stages and is intended to meet future water supply challenges and vulnerabilities such as environmental flow needs and other regulatory changes; earthquakes, disasters, and emergencies; increases in population and employment; and climate

[2] "Unimpaired flow represents the natural water production of a river basin, unaltered by upstream diversions, storage, or by export or import of water to or from other watersheds." (Water Quality Control Plan for the San Francisco Bay/Sacramento-San Joaquin Delta Estuary (Dec. 12, 2018) p.17, fn. 14, available at https://www.waterboards.ca.gov/plans_policies/docs/2018wqcp.pdf.)

change. As the region faces future challenges – both known and unknown – the SFPUC is considering this suite of diverse non-traditional supplies and leveraging regional partnerships to meet Retail and Wholesale Customer needs through 2045.

The SWRCB has stated that it intends to implement the Bay-Delta Plan Amendment on the Tuolumne River by the year 2022, assuming all required approvals are obtained by that time. But implementation of the Plan Amendment is uncertain for multiple reasons.

First, since adoption of the Bay-Delta Plan Amendment, over a dozen lawsuits have been filed in both state and federal courts, challenging the SWRCB's adoption of the Bay-Delta Plan Amendment, including a legal challenge filed by the federal government, at the request of the U.S. Department of Interior, Bureau of Reclamation. This litigation is in the early stages and there have been no dispositive court rulings as of this date.

Second, the Bay-Delta Plan Amendment is not self-implementing and does not automatically allocate responsibility for meeting its new flow requirements to the SFPUC or any other water rights holders. Rather, the Bay-Delta Plan Amendment merely provides a regulatory framework for flow allocation, which must be accomplished by other regulatory and/or adjudicatory proceedings, such as a comprehensive water rights adjudication or, in the case of the Tuolumne River, may be implemented through the water quality certification process set forth in section 401 of the Clean Water Act as part of the Federal Energy Regulatory Commission's licensing proceedings for the Don Pedro and La Grange hydroelectric projects. It is currently unclear when the license amendment process is expected to be completed. This process and the other regulatory and/or adjudicatory proceedings would likely face legal challenges and have lengthy timelines, and quite possibly could result in a different assignment of flow responsibility (and therefore a different water supply impact on the SFPUC).

Third, in recognition of the obstacles to implementation of the Bay-Delta Plan Amendment, the SWRCB Resolution No. 2018-0059 adopting the Bay-Delta Plan Amendment directed staff to help complete a "Delta watershed-wide agreement, including potential flow measures for the Tuolumne River" by March 1, 2019, and to incorporate such agreements as an "alternative" for a future amendment to the Bay-Delta Plan to be presented to the SWRCB "as early as possible after December 1, 2019." In accordance with the SWRCB's instruction, on March 1, 2019, SFPUC, in partnership with other key stakeholders, submitted a proposed project description for the Tuolumne River that could be the basis for a voluntary substitute agreement with the SWRCB ("March 1st Proposed Voluntary Agreement"). On March 26, 2019, the Commission adopted Resolution No. 19-0057 to support the SFPUC's participation in the Voluntary Agreement negotiation process. To date, those negotiations are ongoing under the California Natural Resources Agency and the leadership of the Newsom administration.[3]

Water Supply – All Year Types

The SFPUC historically has met demand in its service area in all year types from its watersheds, which consist of:

- Tuolumne River watershed
- Alameda Creek watershed

[3] California Natural Resources Agency, "Voluntary Agreements to Improve Habitat and Flow in the Delta and its Watersheds," available at https://files.resources.ca.gov/voluntary-agreements/.

- San Mateo County watersheds

In general, 85 percent of the supply comes from the Tuolumne River through Hetch Hetchy Reservoir and the remaining 15 percent comes from the local watersheds through the San Antonio, Calaveras, Crystal Springs, Pilarcitos and San Andreas Reservoirs. The adopted WSIP retains this mix of water supply for all year types.

WSIP Dry Year Water Supply Projects

The WSIP authorized the SFPUC to undertake a number of water supply projects to meet dry-year demands with no greater than 20 percent system-wide rationing in any one year. Those projects include the following:

- **Calaveras Dam Replacement Project**

  Calaveras Dam is located near a seismically active fault zone and was determined to be seismically vulnerable. To address this vulnerability, the SFPUC constructed a new dam of equal height downstream of the existing dam. Construction on the project occurred between 2011 and July 2019. The SFPUC began impounding water behind the new dam in accordance with California Division of Safety of Dams (DSOD) guidance in the winter of 2018/2019.

- **Alameda Creek Recapture Project**

  As a part of the regulatory requirements for future operations of Calaveras Reservoir, the SFPUC must implement bypass and instream flow schedules for Alameda Creek. The Alameda Creek Recapture Project will recapture a portion of the water system yield lost due to the instream flow releases at Calaveras Reservoir or bypassed around the Alameda Creek Diversion Dam and return this yield to the RWS through facilities in the Sunol Valley. Water that naturally infiltrates from Alameda Creek will be recaptured into an existing quarry pond known as SMP (Surface Mining Permit)-24 Pond F2. The project will be designed to allow the recaptured water to be pumped to the Sunol Valley Water Treatment Plant or to San Antonio Reservoir. Construction of this project will occur from spring 2021 to fall 2022.

- **Lower Crystal Springs Dam Improvements**

  The Lower Crystal Springs Dam (LCSD) Improvements were substantially completed in November 2011. The joint San Mateo County/SFPUC Bridge Replacement Project to replace the bridge across the dam was completed in January 2019. A WSIP follow up project to modify the LCSD Stilling Basin for fish habitat and upgrade the fish water release and other valves started in April 2019. While the main improvements to the dam have been completed, environmental permitting issues for reservoir operation remain significant. While the reservoir elevation was lowered due to DSOD restrictions, the habitat for the Fountain Thistle, an endangered plant, followed the lowered reservoir elevation. Raising the reservoir elevation now requires that new plant populations be restored incrementally before the reservoir elevation is raised. The result is that it may be several years before pre-project water storage volumes can be restored.

- **Regional Groundwater Storage and Recovery Project**

  The Groundwater Storage and Recovery (GSR) Project is a strategic partnership between SFPUC and three San Mateo County agencies – the California Water Service Company (serving South San Francisco and Colma), the City of Daly City, and the City of San Bruno – to conjunctively operate the south Westside Groundwater Basin. The project sustainably manages groundwater and surface water resources in a way that provides supplies during times of drought. During years of normal or heavy rainfall, the project would provide additional surface water to the partner agencies in San Mateo County in lieu of groundwater pumping. Over time, reduced pumping creates water storage through natural recharge of up to 20 billion gallons of new water supply available during dry years.

The project's Final Environmental Impact Report was certified in August 2014, and the project also received Commission approval that month. Phase 1 of this project consists of construction of thirteen well sites and is over 99 percent complete. Phase 2 of this project consists of completing construction of the well station at the South San Francisco Main site and some carryover work that has not been completed from Phase 1. Phase 2 design work began in December 2019.

- **2 mgd Dry-year Water Transfer**

  In 2012, the dry-year transfer was proposed between the Modesto Irrigation District and the SFPUC. Negotiations were terminated because an agreement could not be reached. Subsequently, the SFPUC had discussions with the Oakdale Irrigation District for a one-year transfer agreement with the SFPUC for 2 mgd (2,240 acre-feet). No progress towards agreement on a transfer was made in 2019, but the irrigation districts recognize SFPUC's continued interest and SFPUC will continue to pursue transfers.

In order to achieve its target of meeting at least 80 percent of its customer demand during droughts with a system demand of 265 mgd, the SFPUC must successfully implement the dry-year water supply projects included in the WSIP.

Furthermore, the permitting obligations for the Calaveras Dam Replacement Project and the Lower Crystal Springs Dam Improvements include a combined commitment of 12.8 mgd for instream flows on average. When this is reduced for an assumed Alameda Creek Recapture Project recovery of 9.3 mgd, the net loss of water supply is 3.5 mgd.

Alternative Water Supply Planning Program

The SFPUC is increasing and accelerating its efforts to acquire additional water supplies and explore other projects that would increase overall water supply resilience through the Alternative Water Supply Planning Program. The drivers for the program include: (1) the adoption of the Bay-Delta Plan Amendment and the resulting potential limitations to RWS supply during dry years, (2) the net supply shortfall following the implementation of WSIP, (3) San Francisco's perpetual obligation to supply 184 MGD to the Wholesale Customers, (4) adopted Level of Service Goals to limit rationing to no more than 20 percent system-wide during droughts, and (5) the potential need to identify water supplies that would be required to offer permanent status to interruptible customers. Developing additional supplies through this program would reduce water supply shortfalls and reduce rationing associated with such shortfalls. The planning priorities guiding the framework of the Alternative Water Supply Planning Program are as follows:

1. Offset instream flow needs and meet regulatory requirements
2. Meet existing obligations to existing permanent customers
3. Make interruptible customers permanent
4. Meet increased demands of existing and interruptible customers

In conjunction with these planning priorities, the SFPUC considers how the program fits within the LOS Goals and Objectives related to water supply and sustainability when considering new water supply opportunities. The key LOS Goals and Objectives relevant to this effort can be summarized as:

- Meet dry-year delivery needs while limiting rationing to a maximum of 20 percent system-wide reduction in water service during extended droughts;
- Diversify water supply options during non-drought and drought periods;
- Improve use of new water sources and drought management, including groundwater, recycled water, conservation, and transfers;
- Meet, at a minimum, all current and anticipated legal requirements for protection of fish and wildlife habitat;
- Maintain operational flexibility (although this LOS Goal was not intended explicitly for the addition of new supplies, it is applicate here).

Together, the planning priorities and LOS Goals and Objectives provide a lens through which the SFPUC considers water supply options and opportunities to meet all foreseeable water supply needs.

In addition to the Daly City Recycled Water Expansion project[4], which was a potential project identified in the 2015 UWMP and had committed funding at that time, the SFPUC has taken action to fund the study of potential additional water supply projects. Capital projects under consideration to develop additional water supplies include surface water storage expansion, recycled water expansion, water transfers, desalination, and potable reuse. A more detailed list and descriptions of these efforts are provided below.

The capital projects that are under consideration would be costly and are still in the early feasibility or conceptual planning stages. Because these water supply projects would take 10 to 30 years to implement, and because required environmental permitting negotiations may reduce the amount of water that can be developed, the yield from these projects are not currently incorporated into SFPUC's supply projections. State and federal grants and other financing opportunities would be pursued for eligible projects, to the extent feasible, to offset costs borne by ratepayers.

- **Daly City Recycled Water Expansion** (Regional, Normal- and Dry-Year Supply)

  This project can produce up to 3 mgd of tertiary recycled water during the irrigation season (~7 months). On an average annual basis, this is equivalent to 1.25 mgd or 1,400 acre-feet per year. The project is envisioned to provide recycled water to 13 cemeteries and other smaller irrigation customers, offsetting existing groundwater pumping from the South Westside Groundwater Basin; this will free up groundwater, enhancing the reliability of the Basin. The project is a regional partnership between the SFPUC and Daly City. The irrigation customers are located largely within California Water Service's (Cal Water's) service area. RWS customers will benefit from the increased reliability of the South Westside Basin for additional drinking water supply during droughts. In this way, this project supports the GSR Project, which is under construction.

[4] While this potential project was identified in the 2015 UWMP, it has since been approved by Daly City following environmental review and has a higher likelihood of being implemented.

- **ACWD-USD Purified Water Partnership** (Regional, Normal- and Dry-Year Supply)

  This project could provide a new purified water supply utilizing Union Sanitary District's (USD) treated wastewater. Purified water produced by advanced water treatment at USD could be transmitted to the Quarry Lakes Groundwater Recharge Area to supplement recharge into the Niles Cone Groundwater Basin or put to other uses in Alameda County Water District's (ACWD) service area. With the additional water supply to ACWD, an in-lieu exchange with the SFPUC would result in more water left in the RWS. Additional water supply could also be directly transmitted to the SFPUC through a new intertie between ACWD and the SFPUC.

- **Crystal Springs Purified Water** (Regional, Normal- and Dry-Year Supply)

  The Crystal Springs Purified Water (PREP) Project is a purified water project that could provide 6-12 mgd of water supply through reservoir water augmentation at Crystal Springs Reservoir, which is a facility of the RWS. Treated wastewater from Silicon Valley Clean Water (SVCW) and/or the City of San Mateo would go through an advanced water treatment plant to produce purified water that meets state and federal drinking water quality standards. The purified water would then be transmitted 10-20 miles (depending on the alignment) to Crystal Springs Reservoir, blended with regional surface water supplies and treated again at Harry Tracy Water Treatment Plant. Project partners include the SFPUC, BAWSCA, SVCW, CalWater, Redwood City, Foster City, and the City of San Mateo. Partner agencies are contributing financial and staff resources towards the work effort.

- **Los Vaqueros Reservoir Expansion** (Regional, Dry Year Supply)

  The Los Vaqueros Reservoir Expansion (LVE) Project is a storage project that will enlarge the existing reservoir located in northeastern Contra Costa County from 160,000 acre-feet to 275,000 acre-feet. While the existing reservoir is owned and operated by the Contra Costa Water District (CCWD), the expansion will have regional benefits and will be managed by a Joint Powers Authority (JPA) that will be set up prior to construction. Meanwhile, CCWD is leading the planning, design and environmental review efforts. CCWD's Board certified the EIS/EIR and approved the LVE Project on May 13, 2020. The additional storage capacity from the LVE Project would provide a dry year water supply benefit to the SFPUC. BAWSCA is working in concert with the SFPUC to support their work effort on the LVE project.
  - **Conveyance Alternatives:** The SFPUC is considering two main pathways to move water from storage in a prospective LVE Project to the SFPUC's service area, either directly to RWS facilities or indirectly via an exchange with partner agencies. The SFPUC is evaluating potential alignments for conveyance.
  - **Bay Area Regional Reliability Shared Water Access Program (BARR SWAP):** As part of the BARR Partnership, a consortium of 8 Bay Area water utilities (including ACWD, BAWSCA, CCWD, EBMUD, Marin Municipal Water District (MMWD), SFPUC, Valley Water, and Zone 7 Water Agency) are exploring opportunities to move water across the region as efficiently as possible, particularly during times of drought and emergencies. The BARR agencies are proposing two separate pilot projects in 2020-2021 through the Shared Water Access Program (SWAP) to test conveyance pathways and identify potential hurdles to better prepare for sharing water during a future drought or emergency. A strategy report identifying opportunities and considerations will accompany these pilot transfers and will be completed in 2021.

- **Bay Area Brackish Water Desalination** (Regional, Normal- and Dry-Year Supply)

  The Bay Area Brackish Water Desalination (Regional Desalination) Project is a partnership between CCWD, the SFPUC, Valley Water, and Zone 7 Water Agency. East Bay Municipal Utilities District (EBMUD) and ACWD may also participate in the project. The project could provide a new drinking water supply to the region by treating brackish water from CCWD's existing Mallard Slough intake in Contra Costa County. While this project has independent utility as a water supply project, for the current planning effort the SFPUC is considering it as a source of supply for storage in LVE. While the allocations remain to be determined among partners, the SFPUC is considering a water supply benefit of between 5 and 15 mgd during drought conditions when combined with storage at LVE.

- **Calaveras Reservoir Expansion** (Regional, Dry Year Supply)

  Calaveras Reservoir would be expanded to create 289,000 AF additional capacity to store excess Regional Water System supplies or other source water in wet and normal years. In addition to reservoir enlargement, the project would involve infrastructure to pump water to the reservoir, such as pump stations and transmission facilities.

- **Groundwater Banking**

  Groundwater banking in the Modesto Irrigation District (MID) and Turlock Irrigation District (TID) service areas could be used to provide some additional water supply to meet instream releases in dry years reducing water supply impacts to the SFPUC service area. For example, additional surface water could be provided to irrigators in wet years, which would offset the use of groundwater, thereby allowing the groundwater to remain in the basin rather than be consumptively used. The groundwater that remains in the basin can then be used in a subsequent dry year for irrigation, freeing up surface water that would have otherwise been delivered to irrigators to meet instream flow requirements.

  A feasibility study of this option is included in the proposed Tuolumne River Voluntary Agreement. Progress on this potential water supply option will depend on the negotiations of the Voluntary Agreement.

- **Inter-Basin Collaborations**

  Inter-Basin Collaborations could provide net water supply benefits in dry years by sharing responsibility for in-stream flows in the San Joaquin River and Delta more broadly among several tributary reservoir systems. One mechanism by which this could be accomplished would be to establish a partnership between interests on the Tuolumne River and those on the Stanislaus River, which would allow responsibility for streamflow to be assigned variably based on the annual hydrology.

  As is the case with Groundwater Banking, feasibility of this option is included in the proposed Tuolumne River Voluntary Agreement.

If all the projects identified through the current planning process can be implemented, there would still be a supply shortfall to meet projected needs. Furthermore, each of the supply options being considered has its own inherent challenges and uncertainties that may affect the SFPUC's ability to implement it.

Given the limited availability of water supply alternatives - unless the supply risks are significantly reduced or our needs change significantly - the SFPUC will continue to plan, develop and implement all project opportunities that can help bridge the anticipated water supply gaps during droughts. In 2019, the SFPUC completed a survey among water and wastewater agencies within the service area to identify additional opportunities for purified water. Such opportunities remain limited, but the SFPUC continues to pursue all possibilities.

Projected SFPUC Regional Water System Supply Reliability

The SFPUC will provide tables presenting the projected RWS supply reliability under normal, single dry year, and multiple dry year scenarios.

Climate Change

The issue of climate change has become an important factor in water resources planning in the State, and is frequently considered in urban water management planning processes, though the extent and precise effects of climate change remain uncertain. There is convincing evidence that increasing concentrations of greenhouse gasses have caused and will continue to cause a rise in temperatures around the world, which will result in a wide range of changes in climate patterns. Moreover, observational data show that a warming trend occurred during the latter part of the 20th century and virtually all projections indicate this will continue through the 21st century. These changes will have a direct effect on water resources in California, and numerous studies have been conducted to determine the potential impacts to water resources. Based on these studies, climate change could result in the following types of water resource impacts, including impacts on the watersheds in the Bay Area:

- Reductions in the average annual snowpack due to a rise in the snowline and a shallower snowpack in the low and medium elevation zones, such as in the Tuolumne River basin, and a shift in snowmelt runoff to earlier in the year;
- Changes in the timing, annual average, intensity and variability of precipitation, and an increased amount of precipitation falling as rain rather than snow;
- Long-term changes in watershed vegetation and increased incidence of wildfires that could affect water quality and quantity;
- Sea level rise and an increase in saltwater intrusion;
- Increased water temperatures with accompanying potential adverse effects on some fisheries and water quality;
- Increases in evaporation and concomitant increased irrigation need; and
- Changes in urban and agricultural water demand.

Both the SFPUC and BAWSCA participated in the 2020 update of the Bay Area Integrated Regional Water Management Plan (BAIRWMP), which includes an assessment of the potential climate change vulnerabilities of the region's water resources and identifies climate change adaptation strategies. In addition, the SFPUC continues to study the effect of climate change on the Regional Water System (RWS). These works are summarized below.

Bay Area Integrated Regional Water Management Plan

Climate change adaptation continues to be an overarching theme for the 2019 BAIRWMP update. As stated in the BAIRWMP, identification of watershed characteristics that could potentially be vulnerable to future climate change is the first step in assessing vulnerabilities of water resources in the Bay Area Region (Region). Vulnerability is defined as the degree to which a system is exposed to, susceptible to, and able to cope with or adjust to, the adverse effects of climate change. A vulnerability assessment was conducted in accordance with the Department of Water Resources' (DWR's) *Climate Change Handbook for Regional Water Planning* and using the most current science available for the Region. The vulnerability assessment, summarized in the table below, provides the main water planning categories applicable to the Region and a general overview of the qualitative assessment of each category with respect to anticipated climate change impacts.

Summary of BAIRWMP Climate Change Vulnerability Assessment

Vulnerability Areas	General Overview of Vulnerabilities
Water Demand	**Urban and Agricultural Water Demand** – Changes to hydrology in the Region as a result of climate change could lead to changes in total water demand and use patterns. Increased irrigation (outdoor landscape or agricultural) is anticipated to occur with temperature rise, increased evaporative losses due to warmer temperature, and a longer growing season. Water treatment and distribution systems are most vulnerable to increases in maximum day demand.
Water Supply	**Imported Water** – Imported water derived from the Sierra Nevada sources and Delta diversions provide 66 percent of the water resources available to the Region. Potential impacts on the availability of these sources resulting from climate change directly affect the amount of imported water supply delivered to the Region. **Regional Surface Water** – Although future projections suggest that small changes in total annual precipitation over the Region will not change much, there may be changes to when precipitation occurs with reductions in the spring and more intense rainfall in the winter. **Regional Groundwater** – Changes in local hydrology could affect natural recharge to the local groundwater aquifers and the quantity of groundwater that could be pumped sustainably over the long-term in some areas. Decreased inflow from more flashy or more intense runoff, increased evaporative losses and warmer and shorter winter seasons can alter natural recharge of groundwater. Salinity intrusion into coastal groundwater aquifers due to sea-level rise could interfere with local groundwater uses. Furthermore, additional reductions in imported water supplies would lead to less imported water available for managed recharge of local groundwater basins and potentially more groundwater pumping in lieu of imported water availability.
Water Quality	**Imported Water** – For sources derived from the Delta, sea-level rise could result in increases in chloride and bromide (a disinfection by-product (DBP) precursor that is also a component of sea water),

Vulnerability Areas	General Overview of Vulnerabilities
	potentially requiring changes in treatment for drinking water. Increased temperature could result in an increase in algal blooms, taste and odor events, and a general increase in DBP formation **Regional Surface Water** – Increased temperature could result in lower dissolved oxygen in streams and prolong thermocline stratification in lakes and reservoirs forming anoxic bottom conditions and algal blooms. Decrease in annual precipitation could result in higher concentrations of contaminants in streams during droughts or in association with flushing rain events. Increased wildfire risk and flashier or more intense storms could increase turbidity loads for water treatment. **Regional Groundwater** – Sea-level rise could result in increases in chlorides and bromide for some coastal groundwater basins in the Region. Water quality changes in imported water used for recharge could also impact groundwater quality.
Sea-Level Rise	Sea-level rise is additive to tidal range, storm surges, stream flows, and wind waves, which together will increase the potential for higher total water levels, overtopping, and erosion. Much of the bay shoreline is comprised of low-lying diked baylands which are already vulnerable to flooding. In addition to rising mean sea level, continued subsidence due to tectonic activity will increase the rate of relative sea-level rise. As sea-level rise increases, both the frequency and consequences of coastal storm events, and the cost of damage to the built and natural environment, will increase. Existing coastal armoring (including levees, breakwaters, and other structures) is likely to be insufficient to protect against projected sea-level rise. Crest elevations of structures will have to be raised or structures relocated to reduce hazards from higher total water levels and larger waves.
Flooding	Climate change projections are not sensitive enough to assess localized flooding, but the general expectation is that more intense storms would occur thereby leading to more frequent, longer and deeper flooding. Changes to precipitation regimes may increase flooding. Elevated Bay elevations due to sea-level rise will increase backwater effects exacerbating the effect of fluvial floods and storm drain backwater flooding.

Vulnerability Areas	General Overview of Vulnerabilities
Ecosystem and Habitat	Changes in the seasonal patterns of temperature, precipitation, and fire due to climate change can dramatically alter ecosystems that provide habitats for California's native species. These impacts can result in species loss, increased invasive species ranges, loss of ecosystem functions, and changes in vegetation growing ranges. Reduced rain and changes in the seasonal distribution of rainfall may alter timing of low flows in streams and rivers, which in turn would have consequences for aquatic ecosystems. Changes in rainfall patterns and air temperature may affect water temperatures, potentially affecting coldwater aquatic species. Bay Area ecosystems and habitat provide important ecosystem services, such as: carbon storage, enhanced water supply and quality, flood protection, food and fiber production. Climate change is expected to substantially change several of these services. The region provides substantial aquatic and habitat-related recreational opportunities, including: fishing, wildlife viewing, and wine industry tourism (a significant asset to the region) that may be at risk due to climate change effects.
Hydropower	Currently, several agencies in the Region produce or rely on hydropower produced outside of the Region for a portion of their power needs. As the hydropower is produced in the Sierra, there may be changes in the future in the timing and amount of energy produced due to changes in the timing and amount of runoff as a result of climate change. Some hydropower is also produced within the region and could also be affected by changes in the timing and amount of runoff.

Source: 2019 Bay Area Integrated Regional Water Management Plan (BAIRWMP), Table 16-3.

SFPUC Climate Change Studies

The SFPUC views assessment of the effects of climate change as an ongoing project requiring regular updating to reflect improvements in climate science, atmospheric/ocean modeling, and human response to the threat of greenhouse gas emissions. Climate change research by the SFPUC began in 2009 and continues to be refined. In its 2012 report "Sensitivity of Upper Tuolumne River Flow to Climate Change Scenarios," the SFPUC assessed the sensitivity of runoff into Hetch Hetchy Reservoir to a range of changes in temperature and precipitation due to climate change. Key conclusions from the report include the following:

- With differing increases in temperature alone, the median annual runoff at Hetch Hetchy would decrease by 0.7-2.1% from present-day conditions by 2040 and by 2.6-10.2% from present-day by 2100. Adding differing decreases in precipitation on top of temperature increases, the median annual runoff at Hetch Hetchy would decrease by 7.6-8.6% from present-day conditions by 2040 and by 24.7-29.4% from present-day conditions by 2100.

- In critically dry years, these reductions in annual runoff at Hetch Hetchy would be significantly greater, with runoff decreasing up to 46.5% from present day conditions by 2100 utilizing the same climate change scenarios.
- In addition to the total change in runoff, there will be a shift in the annual distribution of runoff. Winter and early spring runoff would increase and late spring and summer runoff would decrease.
- Under all scenarios, snow accumulation would be reduced and snow would melt earlier in the spring, with significant reductions in maximum peak snow water equivalent under most scenarios.

Currently, the SFPUC is conducting a comprehensive assessment of the potential effects of climate change on water supply using a wide range of plausible increases in temperature and changes in precipitation to address the wide uncertainty in climate projections over the planning horizon 2020 to 2070. There are many uncertain factors such as climate change, changing regulations, water quality, growth and economic cycles that may create vulnerabilities for the Regional Water System's ability to meet levels of service. The uncertainties associated with the degree to which these factors will occur and how much risk they present to the water system is difficult to predict, but nonetheless they need to be considered in SFPUC planning. To address this planning challenge, the project uses a vulnerability-based planning approach to explore a range of future conditions to identify vulnerabilities, assess the risks associated with these vulnerabilities that could lead to developing an adaptation plan that is flexible and robust to a wide range of future outcomes.

Common Language for BAWSCA Member Agencies'

2020 UWMP Updates

BAWSCA

Description of BAWSCA

BAWSCA provides regional water reliability planning and conservation programming for the benefit of its 26 member agencies that purchase wholesale water supplies from the San Francisco Public Utilities Commission (SFPUC). Collectively, the BAWSCA member agencies deliver water to over 1.8 million residents and nearly 40,000 commercial, industrial and institutional accounts in Alameda, San Mateo and Santa Clara Counties.

BAWSCA also represents the collective interests of these wholesale water customers on all significant technical, financial, and policy matters related to the operation and improvement of the SFPUC's Regional Water System (RWS).

BAWSCA's role in the development of the 2020 Urban Water Management Plan (UWMP) updates is to work with its member agencies and the SFPUC to seek consistency among UWMP documents.

Regional Water Demand and Conservation Projections

In June 2020, BAWSCA completed the Regional Water Demand and Conservation Projections Report (Demand Study).[1] The goal of the Demand Study was to develop transparent, defensible, and uniform demand and conservation savings projections for each Wholesale Customer using a common methodology to support both regional and individual agency planning efforts and compliance with the new statewide water efficiency targets required by Assembly Bill (AB) 1668 and Senate Bill (SB) 606.

Through the Demand Study process, BAWSCA and the Wholesale Customers (1) quantified the total average-year water demand for each BAWSCA member agency through 2045, (2) quantified passive and active conservation water savings potential for each individual Wholesale Customer through 2045, and (3) identified 24 conservation programs with high water savings potential and/or member agency interest. Implementation of these conservation measures, along with passive conservation, is anticipated to yield an additional 37.3 MGD of water savings by 2045. Based on the revised water demand projections, the identified water conservation savings, increased development and use of other local supplies by the Wholesale Customers, and other actions, the collective purchases of the BAWSCA member agencies from the SFPUC are projected to stay below 184 MGD through 2045.

As part of the Demand Study, each Wholesale Customer was provided with a demand model that can be used to support ongoing demand and conservation planning efforts, including UWMP preparation.

[1] Phase III Final Report: http://bawsca.org/uploads/pdf/BAWSCA_Regional_Water_Demand_and_Conservation%20Projections%20Report_Final.pdf

Long-Term Reliable Water Supply Strategy

BAWSCA's Long-Term Reliable Water Supply Strategy (Strategy), completed in February 2015, quantified the water supply reliability needs of the BAWSCA member agencies through 2040, identified the water supply management projects and/or programs (projects) that could be developed to meet those needs, and prepared an implementation plan for the Strategy's recommendations.

When the 2015 Demand Study concluded it was determined that while there is no longer a regional normal year supply shortfall, there was a regional drought year supply shortfall of up to 43 MGD. In addition, key findings from the Strategy's project evaluation analysis included:

- Water transfers represent a high priority element of the Strategy.
- Desalination potentially provides substantial yield, but its high effective costs and intensive permitting requirements make it a less attractive drought year supply alternative.
- Other potential regional projects provide tangible, though limited, benefit in reducing dry-year shortfalls given the small average yields in drought years.

Since 2015, BAWSCA has completed a comprehensive update of demand projections and engaged in significant efforts to improve regional reliability and reduce the dry-year water supply shortfall.

Water Transfers. BAWSCA successfully facilitated two transfers of portions of Individual Supply Guarantee (ISG) between BAWSCA agencies in 2017 and 2018. Such transfers benefit all BAWSCA agencies by maximizing use of existing supplies. BAWSCA is currently working on an amendment to the Water Supply Agreement between the SFPUC and BAWSCA agencies to establish a mechanism by which member agencies that have an ISG may participate in expedited transfers of a portion of ISG and a portion of a Minimum Annual Purchase Requirement. In 2019, BAWSCA participated in a pilot water transfer that, while ultimately unsuccessful, surfaced important lessons learned and produced interagency agreements that will serve as a foundation for future transfers. BAWSCA is currently engaged in the Bay Area Regional Reliability Partnership[2] (BARR), a partnership among eight Bay Area water utilities (including the SFPUC, Alameda County Water District, BAWSCA, Contra Costa Water District, Santa Clara Valley Water District) to identify opportunities to move water across the region as efficiently as possible, particularly during times of drought and emergencies.

Regional Projects. Since 2015, BAWSCA has coordinated with local and State agencies on regional projects with potential dry-year water supply benefits for BAWSCA's agencies. These efforts include storage projects, indirect/direct water reuse projects, and studies to evaluate the capacity and potential for various conveyance systems to bring new supplies to the region.

BAWSCA continues to implement the Strategy recommendations in coordination with BAWSCA member agencies. Strategy implementation will be adaptively managed to account for changing conditions and to ensure that the goals of the Strategy are met in an efficient and cost-effective manner. On an annual basis, BAWSCA will reevaluate Strategy recommendations and results in conjunction with development of the BAWSCA's FY 2021-22 Work Plan. In this way, actions can be modified to accommodate changing conditions and new developments.

[2] https://www.bayareareliability.com/

Making Conservation a Way of Life Strategic Plan

Following the 2014-2016 drought, the State of California (State) developed the "Making Water Conservation a California Way of Life" framework to address the long-term water use efficiency requirements called for in executive orders issued by Governor Brown. In May of 2018, AB 1668 and SB 606 (collectively referred to as the efficiency legislation) went into effect, which built upon the executive orders implementing new urban water use objectives for urban retail water suppliers.

BAWSCA led its member agencies in a multi-year effort to develop and implement a strategy to meet these new legislative requirements. BAWSCA's Making Conservation a Way of Life Strategic Plan (Strategic Plan) provided a detailed roadmap for member agencies to improve water efficiency. BAWSCA implementing the following elements of the Strategic Plan:

- Conducted an assessment of the agencies' current practices and water industry best practices for three components of the efficiency legislation that, based on a preliminary review, present the greatest level of uncertainty and potential risk to the BAWSCA agencies. The three components were:
    1. Development of outdoor water use budgets in a manner that incorporates landscape area, local climate, and new satellite imagery data.
    2. Commercial, Industrial, and Institutional water use performance measures.
    3. Water loss requirements.
- Organized an Advanced Metering Infrastructure symposium to enable information exchange, including case studies, implementation strategies, and data analysis techniques.
- Initiated a regional CII audit pilot program, which BAWSCA aims to complete in 2021.[3]
- Implemented a regional program for water loss control to help BAWSCA agencies comply with regulatory requirements and implement cost-effective water loss interventions.
- Engaged with the SFPUC to audit meter testing and calibration practices for SFPUC's meters at BAWSCA agency turnouts.

Finally, BAWSCA's Demand Study developed water demand and conservation projections through 2045 for each BAWSCA agency. These projects are designed to provide valuable insights on long-term water demand patterns and conservation savings potential to support regional efforts, such as implementation of BAWSCA's Long-Term Reliable Water Supply Strategy.

[3] Efforts on the CII audit pilot program stalled in March 2020 due to the COVID 19 pandemic and related shelter-in-place orders.

Tier Two Drought Allocations

The Wholesale Customers have negotiated and adopted the Tier Two Plan, referenced above, which allocates the collective Wholesale Customer share from the Tier One Plan among each of the 26 Wholesale Customers. These Tier Two allocations are based on a formula that takes into account multiple factors for each Wholesale Customer including:

- Individual Supply Guarantee;
- Seasonal use of all available water supplies; and
- Residential per capita use.

The water made available to the Wholesale Customers collectively will be allocated among them in proportion to each Wholesale Customer's Allocation Basis, expressed in millions of gallons per day (mgd), which in turn is the weighted average of two components. The first component is the Wholesale Customer's Individual Supply Guarantee, as stated in the WSA, and is fixed. The second component, the Base/Seasonal Component, is variable and is calculated using the monthly water use for three consecutive years prior to the onset of the drought for each of the Wholesale Customers for all available water supplies. The second component is accorded twice the weight of the first, fixed component in calculating the Allocation Basis. Minor adjustments to the Allocation Basis are then made to ensure a minimum cutback level, a maximum cutback level, and a sufficient supply for certain Wholesale Customers.

The Allocation Basis is used in a fraction, as numerator, over the sum of all Wholesale Customers' Allocation Bases to determine each Wholesale Customer's Allocation Factor. The final shortage allocation for each Wholesale Customer is determined by multiplying the amount of water available to the Wholesale Customers' collectively under the Tier One Plan, by the Wholesale Customer's Allocation Factor.

The Tier Two Plan requires that the Allocation Factors be calculated by BAWSCA each year in preparation for a potential water shortage emergency. As the Wholesale Customers change their water use characteristics (e.g., increases or decreases in SFPUC purchases and use of other water sources, changes in monthly water use patterns, or changes in residential per capita water use), the Allocation Factor for each Wholesale Customer will also change. However, for long-term planning purposes, each Wholesale Customer shall use as its Allocation Factor, the value identified in the Tier Two Plan when adopted.

Per WSA Section 3.11, the Tier One and Tier Two Plans will be used to allocate water from the Regional Water System between Retail and Wholesale Customers during system-wide shortages of 20% or less. For Regional Water System shortages in excess of 20%, San Francisco shall (a) follow the Tier 1 Shortage Plan allocations up to the 20% reduction, (b) meet and discuss how to implement incremental reductions above 20% with the Wholesale Customers, and (c) make a final determination of allocations above the 20% reduction. After the SFPUC has made the final allocation decision, the Wholesale Customers shall be free to challenge the allocation on any applicable legal or equitable basis. For purposes of the 2020 UWMPs, for San Francisco Regional Water System (RWS) shortages in excess of 20%, the allocations among the Wholesale Customers is assumed to be equivalent among them and to equal the drought cutback to Wholesale Customer by the SFPUC.

The Tier Two Plan, which initially expired in 2018, has been extended by the BAWSCA Board of Directors every year since for one additional calendar year. In November 2020, the BAWSCA Board voted to extend the Tier Two Plan through the end of 2021.

SFPUC's Efforts to Develop of Alternative Water Supplies

With the adoption of the Bay-Delta Plan Phase 1 (Bay-Delta Plan) by the State Water Resources Control Board in December of 2018, coupled with the uncertainties associated with litigation and the development of Voluntary Agreements that, if successful, would provide an alternative to the 40% unimpaired flow requirement that is required by the Bay-Delta Plan, BAWSCA redoubled its efforts to ensure that the SFPUC took necessary action to develop alternative water supplies such that they would be in place to fill any potential gap in supply by implementation of the Bay-Delta Plan and that the SFPUC would be able to meet its legal and contractual obligations to its Wholesale Customers.

In 2019, BAWSCA held numerous meetings with the SFPUC encouraging them to develop a division within their organization whose chief mission was to spearhead alternative water supply development. On June 25, 2019, BAWSCA provided a written and oral statement to the Commissioners urging the SFPUC to focus on developing new sources of supply in a manner similar to how it addressed the implementation of the Water System Improvement Program (WSIP). BAWSCA urged that a new water supply program was called for, with clear objectives, persistent focus, a dedicated team, adequate funding, and a plan for successful execution. The SFPUC Commission supported BAWSCA's recommendation and directed staff to undertake such an approach.

In early 2020, the SFPUC began implementation of the Alternative Water Supply Planning Program (AWSP), a program designed to investigate and plan for new water supplies to address future long-term water supply reliability challenges and vulnerabilities on the RWS.

Included in the AWSP is a suite of diverse, non-traditional supply projects that, to a great degree, leverage regional partnerships and are designed to meet the water supply needs of the SFPUC Retail and Wholesale Customers through 2045. As of the most recent Alternative Water Supply Planning Quarterly Update, SFPUC has budgeted $264 million over the next ten years to fund water supply projects. BAWSCA is heavily engaged with the SFPUC on its AWSS efforts.

BAWSCA Conservation Programs

BAWSCA manages a Regional Water Conservation Program comprised of several programs and initiatives that support and augment member agencies' and customers' efforts to use water more efficiently. These efforts extend limited water supplies that are available to meet both current and future water needs; increase drought reliability of the existing water system; and save money for both the member agencies and their customers.

The implementation of the Regional Water Conservation Program builds upon both the Water Conservation Implementation Plan (WCIP, completed in September 2009) and the Regional Demand and Conservation Projections Project (Demand Study, completed in June of 2020). These efforts include both Core Programs (implemented regionally throughout the BAWSCA service area) and Subscription Programs (funded by individual member agencies that elect to participate and implement them within their respective service areas).

BAWSCA's Core Conservation Programs include organizing classes open to the public on topics such as water efficient landscape education and water-wise gardening, assistance related to automated metering infrastructure, and other associated programs that work to promote smart water use and practices. BAWSCA's Subscription Programs include numerous rebate programs, educational programs that can be offered to area schools, technical assistance to member agencies in evaluating water loss, and programs to train and certify contractors employed to install water efficient landscape. In total, BAWSCA offers 22 programs to its member agencies and that number continues to grow over time.

Each fiscal year, BAWSCA prepares an Annual Water Conservation Report that documents how all of BAWSCA's 26 member agencies have benefitted from the Core Conservation Programs. Additionally, the report highlights how all 26 member agencies participate in one or more of the Subscription Programs offered by BAWSCA, such as rebates, water loss management and large landscape audits. The Demand Study indicates that through a combination of active and passive conservation, 37.3 MGD will be conserved by BAWSCA's member agencies by 2045.

.

7. Additional language requested by the Member Agencies

SFPUC's Decision to use With Bay-Delta Plan Scenario in UWMP Submittal Tables

The adoption of the Bay-Delta Plan Amendment may significantly impact the supply available from the RWS. SFPUC recognizes that the Bay-Delta Plan Amendment has been adopted and that, given that it is now state law, we must plan for a future in which it is fully implemented. SFPUC also acknowledges that the plan is not self-implementing and therefore does not automatically go into effect. SFPUC is currently pursuing a voluntary agreement as well as a lawsuit which would limit implementation of the Plan. With both of these processes occurring on an unknown timeline, SFPUC does not know at this time when the Bay-Delta Plan Amendment is likely to go into effect. As a result, it makes sense to conduct future supply modeling for a scenario that doesn't include implementation of the Bay-Delta Plan Amendment, as that represents a potential supply reliability scenario.

Because of the uncertainty surrounding implementation of the Bay-Delta Plan Amendment, the SFPUC conducted water service reliability assessment that includes: (1) a scenario in which the Bay-Delta Plan Amendment is fully implemented in 2023, and (2) a scenario that considers the SFPUC system's current situation without the Bay-Delta Plan Amendment. The two scenarios provide a bookend for the possible future scenarios regarding RWS supplies. The standardized tables associated with the SFPUC's UWMP contain the future scenario that assumes implementation of the Bay-Delta Plan Amendment starting in 2023.

Bay-Delta Plan Implementation Starting Year

Because of the uncertainty surrounding implementation of the Bay-Delta Plan Amendment, the water service reliability assessment presented in the SFPUC's draft UWMP looks at two future supply scenarios, both with and without implementation of the Bay-Delta Plan Amendment. Although the SWRCB has stated it intends to implement the Bay-Delta Plan Amendment on the Tuolumne River by the year 2022, given the current level of uncertainty, it is assumed for the purposes of the SFPUC's draft UWMP that the Bay-Delta Plan Amendment will be fully implemented starting in 2023.

SFPUC's Decision to Present Both Modeling Results in its UWMP

A key input for the HHLSM model is the anticipated level of demand on the RWS. Supply modeling results presented in the text of the SFPUC's UWMP reflect an input of projected demands on the RWS consisting of (1) projected retail demands on the RWS (total retail demands minus local groundwater and recycled water supplies), and (2) projected Wholesale Customer purchases. The SFPUC has a Level of Service objective of meeting average annual water demand of 265 mgd from the SFPUC watersheds for retail and Wholesale Customers during non-drought years, as well as a contractual obligation to supply 184 mgd to the Wholesale Customers. Therefore, the SFPUC has also conducted modeling based on a demand of 265 mgd in order to facilitate planning that supports meeting this Level of Service goal and their contractual obligations.

Appendix J

SFPUC Regional Water System Supply Reliability and BAWSCA Tier 2 Drought Implementation Scenarios

San Francisco
Water Power Sewer
Services of the San Francisco Public Utilities Commission

525 Golden Gate Avenue, 13th Floor
San Francisco, CA 94102
T 415.554.3155
F 415.554.3161
TTY 415.554.3488

March 30, 2021

Danielle McPherson
Senior Water Resources Specialist
Bay Area Water Supply and Conservation Agency
155 Bovet Road, Suite 650
San Mateo, CA 94402

Dear Ms. McPherson,

Attached please find additional supply reliability modeling results conducted by the SFPUC. The SFPUC has conducted additional supply reliability modeling under the following planning scenarios:

- Projected supply reliability for years 2020 through 2045, assuming that demand is equivalent to the sum of the projected retail demands on the Regional Water System (RWS) and Wholesale Customer purchase request projections provided to SFPUC by BAWSCA on January 21st (see Table 1 below).
- Under the above demand conditions, projected supply reliability for scenarios both with and without implementation of the Bay-Delta Plan Amendment starting in 2023.

The SFPUC will be using this supply modeling in the text of its draft UWMP and moving the original modeling results into an appendix.

Table 1: Retail and Wholesale RWS Demand Assumptions Used for Additional Supply Reliability Modeling (mgd)

	2020	2025	2030	2035	2040	2045
Retail	66.5	67.2	67.5	68.6	70.5	73.7
Wholesale[1, 2]	132.1	146.0	147.9	151.9	156.3	162.8
Total	**198.6**	**213.2**	**215.4**	**220.5**	**226.8**	**236.5**

[1] Wholesale purchase request projections provided to the SFPUC by BAWSCA on January 21st, 2021
[2] Includes demands for Cities of San Jose and Santa Clara

Please note the following about the information presented in the attached tables:

- Assumptions about infrastructure conditions remain the same as what was provided in our January 22nd letter.
- The Tier 1 allocations were applied to the RWS supplies to determine the wholesale supply, as was also described in the January 22nd letter; for any system-wide shortage above 20%, the Tier 1 split for a 20% shortage was applied.
- The SFPUC water supply planning methodology, including simulation of an 8.5-year design drought, is used to develop these estimates of water supply available from the RWS for five dry years. In each demand scenario for 2020 through 2045, the RWS deliveries are estimated using the standard SFPUC procedure, which includes adding increased levels of rationing as needed to balance the demands on the RWS system with available water supply. Some simulations may have increased levels of rationing in the final years of the design drought sequence, which can influence the comparison of results in the first five years of the sequence.
- Tables 7 and 8 in the attached document provide RWS and wholesale supply availability for the five-year drought risk assessment from 2021 to 2025. SFPUC's modeling approach does not allow for varying demands over the course of a dry year sequence. Therefore, the supply projections for 2021 to 2025 are based on meeting 2020 levels of demand. However, in years when the Bay-Delta Plan Amendment is not in effect, sufficient RWS supplies will be available to meet the Wholesale Customers' purchase requests assuming that they are between the 2020 and 2025 projected levels. This is not reflected in Tables 7 and 8 because SFPUC did not want to make assumptions about the growth of purchase requests between 2020 and 2025.

In our draft UWMP, we acknowledge that we have a Level of Service objective of meeting average annual water demand of 265 mgd from the SFPUC watersheds for retail and Wholesale Customers during non-drought years, as well as a contractual obligation to supply 184 mgd to the Wholesale Customers. Therefore, we will still include the results of our modeling based on a demand of 265 mgd in order to facilitate planning that supports meeting this Level of Service objective and our contractual obligations. The results of this modeling will be in an appendix to the draft UWMP. As will be shown in this appendix, in a normal year the SFPUC can provide up to 265 mgd of supply from the RWS. The RWS supply projections shown in the attached tables are more accurately characterized as supplies that will be used to meet projected retail and Wholesale Customer demands.

It is our understanding that you will pass this information on to the Wholesale Customers. If you have any questions or need additional information, please do not hesitate to contact Sarah Triolo, at striolo@sfwater.org or (628) 230 0802.

Sincerely,

Paula Kehoe
Director of Water Resources

Table 2: Projected Total RWS Supply Utilized and Portion of RWS Supply Utilized by Wholesale Customers in Normal Years [For Table 6-9]:

Year	2020	2025	2030	2035	2040	2045
RWS Supply Utilized (mgd)	198.6	213.2	215.4	220.5	226.8	236.5
RWS Supply Utilized by Wholesale Customers[a] (mgd)	132.1	146.0	147.9	151.9	156.3	162.8

[a] RWS supply utilized by Wholesale Customers is equivalent to purchase request projections provided to SFPUC by BAWSCA on January 21, 2021, and includes Cities of San Jose and Santa Clara.

Basis of Water Supply Data: With Bay-Delta Plan Amendment

Table 3a: Basis of Water Supply Data [For Table 7-1], Base Year 2020, With Bay-Delta Plan Amendment

Year Type	Base Year	RWS Volume Available (mgd)	% of Average Supply	Wholesale Volume Available (mgd)	Notes on Calculation of Wholesale Supply
Average year	2020	198.6	100%	132.1	
Single dry year		198.6	100%	132.1	
Consecutive 1st Dry year		198.6	100%	132.1	
Consecutive 2nd Dry year		198.6	100%	132.1	
Consecutive 3rd Dry year[1]		119.2	60%	74.5	• At shortages 20% or greater, wholesale allocation is assumed to be 62.5%
Consecutive 4th Dry year		119.2	60%	74.5	• Same as above
Consecutive 5th Dry year		119.2	60%	74.5	• Same as above

[1] Assuming this year represents 2023, when Bay Delta Plan Amendment would come into effect.

Table 3b: Basis of Water Supply Data [For Table 7-1], Base Year 2025, With Bay-Delta Plan Amendment

Year Type	Base Year	RWS Volume Available (mgd)	% of Average Supply	Wholesale Volume Available (mgd)	Notes on Calculation of Wholesale Supply
Average year	2025	213.2	100%	146.0	
Single dry year		149.2	70%	93.3	• At shortages 20% or greater, wholesale allocation is assumed to be 62.5%
Consecutive 1st Dry year		149.2	70%	93.3	• Same as above
Consecutive 2nd Dry year		127.9	60%	80.0	• Same as above
Consecutive 3rd Dry year		127.9	60%	80.0	• Same as above
Consecutive 4th Dry year		127.9	60%	80.0	• Same as above
Consecutive 5th Dry year		127.9	60%	80.0	• Same as above

Table 3c: Basis of Water Supply Data [For Table 7-1], Base Year 2030, With Bay-Delta Plan Amendment

Year Type	Base Year	RWS Volume Available (mgd)	% of Average Supply	Wholesale Volume Available (mgd)	Notes on Calculation of Wholesale Supply
Average year	2030	215.4	100%	147.9	
Single dry year		150.8	70%	94.2	• At shortages 20% or greater, wholesale allocation is assumed to be 62.5%
Consecutive 1st Dry year		150.8	70%	94.2	• Same as above
Consecutive 2nd Dry year		129.2	60%	80.8	• Same as above
Consecutive 3rd Dry year		129.2	60%	80.8	• Same as above
Consecutive 4th Dry year		129.2	60%	80.8	• Same as above
Consecutive 5th Dry year		129.2	60%	80.8	• Same as above

Table 3d: Basis of Water Supply Data [For Table 7-1], Base Year 2035, With Bay-Delta Plan Amendment

Year Type	Base Year	RWS Volume Available (mgd)	% of Average Supply	Wholesale Volume Available (mgd)	Notes on Calculation of Wholesale Supply
Average year	2035	220.5	100%	151.9	
Single dry year		154.4	70%	96.5	• At shortages 20% or greater, wholesale allocation is assumed to be 62.5%
Consecutive 1st Dry year		154.4	70%	96.5	• Same as above
Consecutive 2nd Dry year		132.3	60%	82.7	• Same as above
Consecutive 3rd Dry year		132.3	60%	82.7	• Same as above
Consecutive 4th Dry year		132.3	60%	82.7	• Same as above
Consecutive 5th Dry year		121.3	55%	75.8	• Same as above

Table 3e: Basis of Water Supply Data [For Table 7-1], Base Year 2040, With Bay-Delta Plan Amendment

Year Type	Base Year	RWS Volume Available (mgd)	% of Average Supply	Wholesale Volume Available (mgd)	Notes on Calculation of Wholesale Supply
Average year	2040	226.8	100%	156.3	
Single dry year		158.8	70%	99.2	• At shortages 20% or greater, wholesale allocation is assumed to be 62.5%
Consecutive 1st Dry year		158.8	70%	99.2	• Same as above
Consecutive 2nd Dry year		136.1	60%	85.1	• Same as above
Consecutive 3rd Dry year		136.1	60%	85.1	• Same as above
Consecutive 4th Dry year		120.2	53%	75.1	• Same as above
Consecutive 5th Dry year		120.2	53%	75.1	• Same as above

Table 3f: Basis of Water Supply Data [For Table 7-1], Base Year 2045, With Bay-Delta Plan Amendment

Year Type	Base Year	RWS Volume Available (mgd)	% of Average Supply	Wholesale Volume Available (mgd)	Notes on Calculation of Wholesale Supply
Average year	2045	236.5	100%	162.8	
Single dry year		141.9	60%	88.7	• At shortages 20% or greater, wholesale allocation is assumed to be 62.5%
Consecutive 1st Dry year		141.9	60%	88.7	• Same as above
Consecutive 2nd Dry year		141.9	60%	88.7	• Same as above
Consecutive 3rd Dry year		141.9	60%	88.7	• Same as above
Consecutive 4th Dry year		120.6	51%	75.4	• Same as above
Consecutive 5th Dry year		120.6	51%	75.4	• Same as above

Table 3g: Projected RWS Supply Availability [Alternative to Table 7-1], Years 2020-2045, With Bay-Delta Plan Amendment

Year	2020	2025	2030	2035	2040	2045
Average year	100%	100%	100%	100%	100%	100%
Single dry year	100%	70%	70%	70%	70%	60%
Consecutive 1st Dry year	100%	70%	70%	70%	70%	60%
Consecutive 2nd Dry year	100%	60%	60%	60%	60%	60%
Consecutive 3rd Dry year[1]	60%	60%	60%	60%	60%	60%
Consecutive 4th Dry year	60%	60%	60%	60%	53%	51%
Consecutive 5th Dry year	60%	60%	60%	55%	53%	51%

[1] Assuming that at base year 2020, this year represents 2023, when Bay Delta Plan Amendment would come into effect.

Basis of Water Supply Data: Without Bay-Delta Plan Amendment

Table 4a: Basis of Water Supply Data [For Table 7-1], Base Year 2020, Without Bay-Delta Plan Amendment

Year Type	Base Year	RWS Volume Available (mgd)	% of Average Supply	Wholesale Volume Available (mgd)	Notes on Calculation of Wholesale Supply
Average year	2020	198.6	100%	132.1	
Single dry year		198.6	100%	132.1	
Consecutive 1st Dry year		198.6	100%	132.1	
Consecutive 2nd Dry year		198.6	100%	132.1	
Consecutive 3rd Dry year		198.6	100%	132.1	
Consecutive 4th Dry year		198.6	100%	132.1	
Consecutive 5th Dry year		198.6	100%	132.1	

Table 4b: Basis of Water Supply Data [For Table 7-1], Base Year 2025, Without Bay-Delta Plan Amendment

Year Type	Base Year	RWS Volume Available (mgd)	% of Average Supply	Wholesale Volume Available (mgd)	Notes on Calculation of Wholesale Supply
Average year	2025	213.2	100%	146.0	
Single dry year		213.2	100%	146.0	
Consecutive 1st Dry year		213.2	100%	146.0	
Consecutive 2nd Dry year		213.2	100%	146.0	
Consecutive 3rd Dry year		213.2	100%	146.0	
Consecutive 4th Dry year		213.2	100%	146.0	
Consecutive 5th Dry year		213.2	100%	146.0	

Table 4c: Basis of Water Supply Data [For Table 7-1], Base Year 2030, Without Bay-Delta Plan Amendment

Year Type	Base Year	RWS Volume Available (mgd)	% of Average Supply	Wholesale Volume Available (mgd)	Notes on Calculation of Wholesale Supply
Average year	2030	215.4	100%	147.9	
Single dry year		215.4	100%	147.9	
Consecutive 1st Dry year		215.4	100%	147.9	
Consecutive 2nd Dry year		215.4	100%	147.9	
Consecutive 3rd Dry year		215.4	100%	147.9	
Consecutive 4th Dry year		215.4	100%	147.9	
Consecutive 5th Dry year		215.4	100%	147.9	

Table 4d: Basis of Water Supply Data [For Table 7-1], Base Year 2035, Without Bay-Delta Plan Amendment

Year Type	Base Year	RWS Volume Available (mgd)	% of Average Supply	Wholesale Volume Available (mgd)	Notes on Calculation of Wholesale Supply
Average year	2035	220.5	100%	151.9	
Single dry year		220.5	100%	151.9	
Consecutive 1st Dry year		220.5	100%	151.9	
Consecutive 2nd Dry year		220.5	100%	151.9	
Consecutive 3rd Dry year		220.5	100%	151.9	
Consecutive 4th Dry year		220.5	100%	151.9	
Consecutive 5th Dry year		220.5	100%	151.9	

Table 4e: Basis of Water Supply Data [For Table 7-1], Base Year 2040, Without Bay-Delta Plan Amendment

Year Type	Base Year	RWS Volume Available (mgd)	% of Average Supply	Wholesale Volume Available (mgd)	Notes on Calculation of Wholesale Supply
Average year	2040	226.8	100%	156.3	
Single dry year		226.8	100%	156.3	
Consecutive 1st Dry year		226.8	100%	156.3	
Consecutive 2nd Dry year		226.8	100%	156.3	
Consecutive 3rd Dry year		226.8	100%	156.3	
Consecutive 4th Dry year		226.8	100%	156.3	
Consecutive 5th Dry year		226.8	100%	156.3	

Table 4f: Basis of Water Supply Data [For Table 7-1], Base Year 2045, Without Bay-Delta Plan Amendment

Year Type	Base Year	RWS Volume Available (mgd)	% of Average Supply	Wholesale Volume Available (mgd)	Notes on Calculation of Wholesale Supply
Average year	2045	236.5	100%	162.8	
Single dry year		236.5	100%	162.8	
Consecutive 1st Dry year		236.5	100%	162.8	
Consecutive 2nd Dry year		236.5	100%	162.8	
Consecutive 3rd Dry year		236.5	100%	162.8	
Consecutive 4th Dry year		212.8	90%	139.1	• At a 10% shortage level, the wholesale allocation is 64% of available supply • The retail allocation is 36% of supply, which resulted in a positive allocation to retail of 2.9 mgd, which was re-allocated to the Wholesale Customers
Consecutive 5th Dry year		212.8	90%	139.1	• Same as above

Table 4g: Projected RWS Supply [Alternative to Table 7-1], Years 2020-2045, Without Bay-Delta Plan Amendment

Year	2020	2025	2030	2035	2040	2045
Average year	100%	100%	100%	100%	100%	100%
Single dry year	100%	100%	100%	100%	100%	100%
Consecutive 1st Dry year	100%	100%	100%	100%	100%	100%
Consecutive 2nd Dry year	100%	100%	100%	100%	100%	100%
Consecutive 3rd Dry year	100%	100%	100%	100%	100%	100%
Consecutive 4th Dry year	100%	100%	100%	100%	100%	90%
Consecutive 5th Dry year	100%	100%	100%	100%	100%	90%

Supply Projections for Consecutive Five Dry Year Sequences

Table 5: Projected Multiple Dry Years Wholesale Supply from RWS [For Table 7-4], With Bay-Delta Plan Amendment

	2025	2030	2035	2040	2045
First year	93.3	94.2	96.5	99.2	88.7
Second year	80.0	80.8	82.7	85.1	88.7
Third year	80.0	80.8	82.7	85.1	88.7
Fourth year	80.0	80.8	82.7	75.1	75.4
Fifth year	80.0	80.8	75.8	75.1	75.4

Table 6: Projected Multiple Dry Years Wholesale Supply from RWS [For Table 7-4], Without Bay-Delta Plan Amendment

	2025	2030	2035	2040	2045
First year	146.0	147.9	151.9	156.3	162.8
Second year	146.0	147.9	151.9	156.3	162.8
Third year	146.0	147.9	151.9	156.3	162.8
Fourth year	146.0	147.9	151.9	156.3	139.1
Fifth year	146.0	147.9	151.9	156.3	139.1

Table 7: Projected Regional Water System Supply for 5-Year Drought Risk Assessment [For Table 7-5], With Bay-Delta Plan Amendment. This table assumes Bay Delta Plan comes into effect in 2023.

Year	2021	2022	2023	2024	2025
RWS Supply (mgd)	198.6	198.6	119.2	119.2	119.2
Wholesale Supply (mgd)	132.1	132.1	74.5	74.5	74.5

Table 8: Projected Regional Water System Supply for 5-Year Drought Risk Assessment [For Table 7-5], Without Bay Delta Plan

Year	2021	2022	2023	2024	2025
RWS Supply (mgd)	198.6	198.6	198.6	198.6	198.6
Wholesale Supply (mgd)	132.1	132.1	132.1	132.1	132.1

Section 1: Basis for Calculations. Projected Wholesale RWS Purchases Through 2045

Table A: Wholesale RWS Actual Purchases in 2020 and Projected Purchases for 2025, 2030, 2035, 2040, and 2045 (mgd)[a]

Agency	2020 Actual	Projected Wholesale RWS Purchases 2025	2030	2035	2040	2045
ACWD	7.87	7.68	7.68	7.68	7.68	9.11
Brisbane/GVMID	0.64	0.89	0.89	0.88	0.89	0.89
Burlingame	3.48	4.33	4.40	4.47	4.58	4.69
Coastside	1.02	1.40	1.38	1.36	1.33	1.33
CalWater Total	29.00	29.99	29.74	29.81	30.27	30.70
Daly City	3.97	3.57	3.52	3.49	3.46	3.43
East Palo Alto	1.57	1.88	1.95	2.10	2.49	2.89
Estero	4.34	4.07	4.11	4.18	4.23	4.38
Hayward	13.92	17.86	18.68	19.75	20.82	22.14
Hillsborough	2.62	3.26	3.25	3.26	3.26	3.26
Menlo Park	2.96	3.55	3.68	3.87	4.06	4.29
Mid-Peninsula	2.66	2.86	2.84	2.88	2.89	2.93
Millbrae	1.90	2.29	2.50	2.45	2.82	3.20
Milpitas	5.92	6.59	6.75	7.03	7.27	7.53
Mountain View	7.67	8.60	8.90	9.20	9.51	9.93
North Coast	2.37	2.34	2.33	2.34	2.34	2.34
Palo Alto	9.75	10.06	10.15	10.28	10.51	10.79
Purissima Hills	1.75	2.09	2.09	2.12	2.13	2.15
Redwood City	8.76	8.46	8.49	8.64	8.74	8.90
San Bruno	0.95	3.24	3.22	3.20	3.20	3.21
San Jose	4.26	4.50	4.50	4.50	4.50	4.50
Santa Clara	3.27	4.50	4.50	4.50	4.50	4.50
Stanford	1.43	2.01	2.18	2.35	2.53	2.70
Sunnyvale	9.33	9.16	9.30	10.70	11.44	12.10
Westborough	0.82	0.86	0.85	0.85	0.84	0.84
Total	**132.22**	**146.01**	**147.87**	**151.90**	**156.31**	**162.76**

[a] Wholesale RWS purchase projections for 2025, 2030, 2035, 2040, and 2045 were provided to BAWSCA between July 2020 and January 2021 by the Member Agencies following the completion of the June 2020 Demand Study.

Table B: Basis for the 5-Year Drought Risk Assessment Wholesale RWS Actual Purchases in 2020 and 2021-2025 Projected Purchases (mgd)

Agency	2020 Actual	Projected and Estimated Wholesale RWS Purchases 2021[b]	2022[b]	2023[c]	2024[c]	2025[c]
ACWD	7.87	9.44	9.46	9.46	9.46	9.46
Brisbane/GVMID	0.64	0.62	0.65	0.65	0.65	0.65
Burlingame	3.48	3.34	3.35	3.35	3.35	3.35
Coastside	1.02	1.54	1.23	1.23	1.23	1.23
CalWater Total	29.00	29.66	29.81	29.81	29.81	29.81
Daly City	3.97	4.00	4.01	4.01	4.01	4.01
East Palo Alto	1.57	1.63	1.69	1.69	1.69	1.69
Estero	4.34	4.48	4.51	4.51	4.51	4.51
Hayward	13.92	14.47	15.12	15.12	15.12	15.12
Hillsborough	2.62	2.95	3.05	3.05	3.05	3.05
Menlo Park	2.96	2.92	2.93	2.93	2.93	2.93
Mid-Peninsula	2.66	2.65	2.80	2.80	2.80	2.80
Millbrae	1.90	1.95	2.15	2.15	2.15	2.15
Milpitas	5.92	5.88	5.34	5.34	5.34	5.34
Mountain View	7.67	7.80	8.05	8.05	8.05	8.05
North Coast	2.37	2.58	2.66	2.66	2.66	2.66
Palo Alto	9.75	9.44	9.66	9.66	9.66	9.66
Purissima Hills	1.75	1.97	2.02	2.02	2.02	2.02
Redwood City	8.76	8.72	9.07	9.07	9.07	9.07
San Bruno	0.95	3.39	3.40	3.40	3.40	3.40
San Jose	4.26	4.31	4.51	4.51	4.51	4.51
Santa Clara	3.27	3.29	3.50	3.50	3.50	3.50
Stanford	1.43	1.40	1.54	1.54	1.54	1.54
Sunnyvale	9.33	9.35	9.45	9.45	9.45	9.45
Westborough	0.82	0.84	0.81	0.81	0.81	0.81
Total	**132.22**	**138.61**	**140.77**	**140.77**	**140.77**	**140.77**

[b] Wholesale RWS purchase projections for 2021 and 2022 were provided to Christina Tang, BAWSCA's Finance Manager, by the Member Agencies in January 2021.

[c] The SFPUC's supply reliability tables assume the Bay-Delta Plan takes effect in 2023. In the event of a shortage, the Tier 2 Plan specifies that each agencies' Allocation Factor would be calculated once at the onset of a shortage based on the previous year's use and remains the same until the shortage condition is over. Therefore, for the purpose of drought allocations for the 5-year Drought Risk Assessment, wholesale RWS demand is assumed to remain static from 2022 through the drought sequence.

Section 2: Drought Allocations ***With*** Bay-Delta Plan

Table C: RWS Supply Available to the Wholesale Customers (Combined Tables 3a-3f from the SFPUC's March 30th letter) *With* Bay-Delta Plan (mgd)

	2020[e]	2025	2030	2035	2040	2045
Projected Purchases[d]	132.2	146.0	147.9	151.9	156.3	162.8
Consecutive 1st Dry Year	138.6	93.3	94.2	96.5	99.2	88.7
Consecutive 2nd Dry Year	140.8	80.0	80.8	82.7	85.1	88.7
Consecutive 3rd Dry Year	74.5	80.0	80.8	82.7	85.1	88.7
Consecutive 4th Dry Year	74.5	80.0	80.8	82.7	75.1	75.4
Consecutive 5th Dry Year	74.5	80.0	80.8	75.8	75.1	75.4

[d] Values for 2020 are actual purchases. This row aligns with what is labeled as an "Average Year" in Tables 3a-3f in the SFPUC's March 30th letter. However, these values do not represent an average year and instead are actual purchases for 2020 or projected purchases for 2025 through 2045.

[e] In years when the Bay-Delta Plan is not in effect, sufficient RWS supplies will be available to meet the Wholesale Customers' purchase requests assuming that they are between the 2020 and 2025 projected levels. As such, RWS supply available to the Wholesale Customers in the 1st and 2nd consecutive dry years under base year 2020 is equal to the cumulative projected wholesale RWS purchases for 2021 and 2022, respectively.

Table D: Wholesale RWS Demand (Combined Totals from Tables A and B) (mgd)[f]

	2020	2025	2030	2035	2040	2045
Projected Purchases[d]	132.2	146.0	147.9	151.9	156.3	162.8
Consecutive 1st Dry Year	138.6	146.0	147.9	151.9	156.3	162.8
Consecutive 2nd Dry Year	140.8	146.0	147.9	151.9	156.3	162.8
Consecutive 3rd Dry Year	140.8	146.0	147.9	151.9	156.3	162.8
Consecutive 4th Dry Year	140.8	146.0	147.9	151.9	156.3	162.8
Consecutive 5th Dry Year	140.8	146.0	147.9	151.9	156.3	162.8

[f] The SFPUC's modeling approach does not allow for varying demands over the course of a dry year sequence. Additionally, the Tier 2 Plan calculates each agencies' Allocation Factor once at the onset of a drought and it remains the same until the shortage condition is over. When system-wide shortages are projected, wholesale RWS demand is assumed to be static for the remainder of the drought sequence.

Table E: Percent Cutback to the Wholesale Customers *With* Bay-Delta Plan[g]

	2020	2025	2030	2035	2040	2045
Projected Purchases[d]	0%	0%	0%	0%	0%	0%
Consecutive 1st Dry Year	0%	36%	36%	36%	37%	46%
Consecutive 2nd Dry Year	0%	45%	45%	46%	46%	46%
Consecutive 3rd Dry Year	47%	45%	45%	46%	46%	46%
Consecutive 4th Dry Year	47%	45%	45%	46%	52%	54%
Consecutive 5th Dry Year	47%	45%	45%	50%	52%	54%

[g] Agencies that wish to use new or different projected RWS purchases may use the percent cutbacks listed in this table to determine their drought allocation.

Table F1: Basis of Water Supply Data [For Tables 7-1 and 7-5], Base Year 2020, *With* Bay-Delta Plan (mgd)

Year Consecutive Dry Year	2020 Actual	2021 1st	2022 2nd	2023 3rd	2024 4th	2025 5th
Wholesale RWS Demand	132.2	138.6	140.8	140.8	140.8	140.8
Wholesale RWS Supply Available	132.2	138.6	140.8	74.5	74.5	74.5
Percent Cutback	0%	0%	0%	47%	47%	47%

Table F2: Individual Agency Drought Allocations [For Tables 7-1 and 7-5], Base Year 2020, *With* Bay-Delta Plan (mgd)

Agency	2020 Actual	Wholesale RWS Drought Allocations 2021	2022	2023	2024	2025
ACWD	7.87	9.44	9.46	5.01	5.01	5.01
Brisbane/GVMID	0.64	0.62	0.65	0.34	0.34	0.34
Burlingame	3.48	3.34	3.35	1.77	1.77	1.77
Coastside	1.02	1.54	1.23	0.65	0.65	0.65
CalWater Total	29.00	29.66	29.81	15.78	15.78	15.78
Daly City	3.97	4.00	4.01	2.12	2.12	2.12
East Palo Alto	1.57	1.63	1.69	0.89	0.89	0.89
Estero	4.34	4.48	4.51	2.39	2.39	2.39
Hayward	13.92	14.47	15.12	8.00	8.00	8.00
Hillsborough	2.62	2.95	3.05	1.61	1.61	1.61
Menlo Park	2.96	2.92	2.93	1.55	1.55	1.55
Mid-Peninsula	2.66	2.65	2.80	1.48	1.48	1.48
Millbrae	1.90	1.95	2.15	1.14	1.14	1.14
Milpitas	5.92	5.88	5.34	2.83	2.83	2.83
Mountain View	7.67	7.80	8.05	4.26	4.26	4.26
North Coast	2.37	2.58	2.66	1.41	1.41	1.41
Palo Alto	9.75	9.44	9.66	5.11	5.11	5.11
Purissima Hills	1.75	1.97	2.02	1.07	1.07	1.07
Redwood City	8.76	8.72	9.07	4.80	4.80	4.80
San Bruno	0.95	3.39	3.40	1.80	1.80	1.80
San Jose	4.26	4.31	4.51	2.39	2.39	2.39
Santa Clara	3.27	3.29	3.50	1.85	1.85	1.85
Stanford	1.43	1.40	1.54	0.82	0.82	0.82
Sunnyvale	9.33	9.35	9.45	5.00	5.00	5.00
Westborough	0.82	0.84	0.81	0.43	0.43	0.43
Total	**132.2**	**138.6**	**140.8**	**74.5**	**74.5**	**74.5**

Table G1: Basis of Water Supply Data [For Tables 7-1 and 7-4], Base Year 2025, *With* Bay-Delta Plan (mgd)

Consecutive Dry Year	1st	2nd	3rd	4th	5th
Wholesale RWS Demand	146.0	146.0	146.0	146.0	146.0
Wholesale RWS Supply Available	93.3	80.0	80.0	80.0	80.0
Percent Cutback	36%	45%	45%	45%	45%

Table G2: Individual Agency Drought Allocations [For Tables 7-1 and 7-4], Base Year 2025, *With* Bay-Delta Plan (mgd)

	Wholesale RWS Drought Allocations				
Consecutive Dry Year	1st	2nd	3rd	4th	5th
ACWD	4.91	4.21	4.21	4.21	4.21
Brisbane/GVMID	0.57	0.49	0.49	0.49	0.49
Burlingame	2.76	2.37	2.37	2.37	2.37
Coastside	0.89	0.77	0.77	0.77	0.77
CalWater Total	19.16	16.43	16.43	16.43	16.43
Daly City	2.28	1.96	1.96	1.96	1.96
East Palo Alto	1.20	1.03	1.03	1.03	1.03
Estero	2.60	2.23	2.23	2.23	2.23
Hayward	11.41	9.78	9.78	9.78	9.78
Hillsborough	2.08	1.79	1.79	1.79	1.79
Menlo Park	2.27	1.95	1.95	1.95	1.95
Mid-Peninsula	1.83	1.57	1.57	1.57	1.57
Millbrae	1.46	1.25	1.25	1.25	1.25
Milpitas	4.21	3.61	3.61	3.61	3.61
Mountain View	5.49	4.71	4.71	4.71	4.71
North Coast	1.49	1.28	1.28	1.28	1.28
Palo Alto	6.43	5.51	5.51	5.51	5.51
Purissima Hills	1.33	1.14	1.14	1.14	1.14
Redwood City	5.40	4.63	4.63	4.63	4.63
San Bruno	2.07	1.77	1.77	1.77	1.77
San Jose	2.88	2.47	2.47	2.47	2.47
Santa Clara	2.88	2.47	2.47	2.47	2.47
Stanford	1.28	1.10	1.10	1.10	1.10
Sunnyvale	5.85	5.02	5.02	5.02	5.02
Westborough	0.55	0.47	0.47	0.47	0.47
Total	**93.3**	**80.0**	**80.0**	**80.0**	**80.0**

Table H1: Basis of Water Supply Data [For Tables 7-1 and 7-4], Base Year 2030, *With* Bay-Delta Plan (mgd)

Consecutive Dry Year	1st	2nd	3rd	4th	5th
Wholesale RWS Demand	147.9	147.9	147.9	147.9	147.9
Wholesale RWS Supply Available	94.2	80.8	80.8	80.8	80.8
Percent Cutback	36%	45%	45%	45%	45%

Table H2: Individual Agency Drought Allocations [For Tables 7-1 and 7-4], Base Year 2030, *With* Bay-Delta Plan (mgd)

	Wholesale RWS Drought Allocations				
Consecutive Dry Year	1st	2nd	3rd	4th	5th
ACWD	4.89	4.20	4.20	4.20	4.20
Brisbane/GVMID	0.56	0.48	0.48	0.48	0.48
Burlingame	2.80	2.40	2.40	2.40	2.40
Coastside	0.88	0.75	0.75	0.75	0.75
CalWater Total	18.94	16.25	16.25	16.25	16.25
Daly City	2.24	1.92	1.92	1.92	1.92
East Palo Alto	1.24	1.07	1.07	1.07	1.07
Estero	2.62	2.24	2.24	2.24	2.24
Hayward	11.90	10.21	10.21	10.21	10.21
Hillsborough	2.07	1.78	1.78	1.78	1.78
Menlo Park	2.35	2.01	2.01	2.01	2.01
Mid-Peninsula	1.81	1.55	1.55	1.55	1.55
Millbrae	1.59	1.37	1.37	1.37	1.37
Milpitas	4.30	3.69	3.69	3.69	3.69
Mountain View	5.67	4.86	4.86	4.86	4.86
North Coast	1.48	1.27	1.27	1.27	1.27
Palo Alto	6.47	5.55	5.55	5.55	5.55
Purissima Hills	1.33	1.14	1.14	1.14	1.14
Redwood City	5.41	4.64	4.64	4.64	4.64
San Bruno	2.05	1.76	1.76	1.76	1.76
San Jose	2.87	2.46	2.46	2.46	2.46
Santa Clara	2.87	2.46	2.46	2.46	2.46
Stanford	1.39	1.19	1.19	1.19	1.19
Sunnyvale	5.92	5.08	5.08	5.08	5.08
Westborough	0.54	0.47	0.47	0.47	0.47
Total	**94.2**	**80.8**	**80.8**	**80.8**	**80.8**

Table I1: Basis of Water Supply Data [For Tables 7-1 and 7-4], Base Year 2035, *With* Bay-Delta Plan (mgd)

Consecutive Dry Year	1st	2nd	3rd	4th	5th
Wholesale RWS Demand	151.9	151.9	151.9	151.9	151.9
Wholesale RWS Supply Available	96.5	82.7	82.7	82.7	75.8
Percent Cutback	36%	46%	46%	46%	50%

Table I2: Individual Agency Drought Allocations [For Tables 7-1 and 7-4], Base Year 2035, *With* Bay-Delta Plan (mgd)

	Wholesale RWS Drought Allocations				
Consecutive Dry Year	1st	2nd	3rd	4th	5th
ACWD	4.88	4.18	4.18	4.18	3.83
Brisbane/GVMID	0.56	0.48	0.48	0.48	0.44
Burlingame	2.84	2.44	2.44	2.44	2.23
Coastside	0.86	0.74	0.74	0.74	0.68
CalWater Total	18.94	16.23	16.23	16.23	14.88
Daly City	2.22	1.90	1.90	1.90	1.74
East Palo Alto	1.33	1.14	1.14	1.14	1.05
Estero	2.66	2.28	2.28	2.28	2.09
Hayward	12.55	10.75	10.75	10.75	9.86
Hillsborough	2.07	1.78	1.78	1.78	1.63
Menlo Park	2.46	2.10	2.10	2.10	1.93
Mid-Peninsula	1.83	1.57	1.57	1.57	1.44
Millbrae	1.56	1.34	1.34	1.34	1.22
Milpitas	4.47	3.83	3.83	3.83	3.51
Mountain View	5.84	5.01	5.01	5.01	4.59
North Coast	1.49	1.27	1.27	1.27	1.17
Palo Alto	6.53	5.60	5.60	5.60	5.13
Purissima Hills	1.34	1.15	1.15	1.15	1.06
Redwood City	5.49	4.70	4.70	4.70	4.31
San Bruno	2.03	1.74	1.74	1.74	1.60
San Jose	2.86	2.45	2.45	2.45	2.25
Santa Clara	2.86	2.45	2.45	2.45	2.25
Stanford	1.49	1.28	1.28	1.28	1.17
Sunnyvale	6.80	5.83	5.83	5.83	5.34
Westborough	0.54	0.46	0.46	0.46	0.42
Total	**96.5**	**82.7**	**82.7**	**82.7**	**75.8**

Table J1: Basis of Water Supply Data [For Table 7-1 and 7-4], Base Year 2040, *With* Bay-Delta Plan (mgd)

Consecutive Dry Year	1st	2nd	3rd	4th	5th
Wholesale RWS Demand	156.3	156.3	156.3	156.3	156.3
Wholesale RWS Supply Available	99.2	85.1	85.1	75.1	75.1
Percent Cutback	37%	46%	46%	52%	52%

Table J2: Individual Agency Drought Allocations [For Tables 7-1 and 7-4], Base Year 2040, *With* Bay-Delta Plan (mgd)

	Wholesale RWS Drought Allocations				
Consecutive Dry Year	1st	2nd	3rd	4th	5th
ACWD	4.87	4.18	4.18	3.69	3.69
Brisbane/GVMID	0.56	0.48	0.48	0.43	0.43
Burlingame	2.91	2.49	2.49	2.20	2.20
Coastside	0.85	0.73	0.73	0.64	0.64
CalWater Total	19.21	16.48	16.48	14.54	14.54
Daly City	2.20	1.88	1.88	1.66	1.66
East Palo Alto	1.58	1.36	1.36	1.20	1.20
Estero	2.69	2.30	2.30	2.03	2.03
Hayward	13.21	11.34	11.34	10.00	10.00
Hillsborough	2.07	1.78	1.78	1.57	1.57
Menlo Park	2.58	2.21	2.21	1.95	1.95
Mid-Peninsula	1.84	1.58	1.58	1.39	1.39
Millbrae	1.79	1.53	1.53	1.35	1.35
Milpitas	4.62	3.96	3.96	3.49	3.49
Mountain View	6.03	5.18	5.18	4.57	4.57
North Coast	1.49	1.27	1.27	1.12	1.12
Palo Alto	6.67	5.72	5.72	5.05	5.05
Purissima Hills	1.35	1.16	1.16	1.03	1.03
Redwood City	5.55	4.76	4.76	4.20	4.20
San Bruno	2.03	1.74	1.74	1.54	1.54
San Jose	2.86	2.45	2.45	2.16	2.16
Santa Clara	2.86	2.45	2.45	2.16	2.16
Stanford	1.61	1.38	1.38	1.22	1.22
Sunnyvale	7.26	6.23	6.23	5.49	5.49
Westborough	0.54	0.46	0.46	0.41	0.41
Total	**99.2**	**85.1**	**85.1**	**75.1**	**75.1**

Table K1: Basis of Water Supply Data [For Tables 7-1 and 7-4], Base Year 2045, *With* Bay-Delta Plan (mgd)

Consecutive Dry Year	1st	2nd	3rd	4th	5th
Wholesale RWS Demand	162.8	162.8	162.8	162.8	162.8
Wholesale RWS Supply Available	88.7	88.7	88.7	75.4	75.4
Percent Cutback	46%	46%	46%	54%	54%

Table K2: Individual Agency Drought Allocations [For Tables 7-1 and 7-4], Base Year 2045, *With* Bay-Delta Plan (mgd)

	Wholesale RWS Drought Allocations				
Consecutive Dry Year	**1st**	**2nd**	**3rd**	**4th**	**5th**
ACWD	4.97	4.97	4.97	4.22	4.22
Brisbane/GVMID	0.49	0.49	0.49	0.41	0.41
Burlingame	2.56	2.56	2.56	2.17	2.17
Coastside	0.72	0.72	0.72	0.61	0.61
CalWater Total	16.73	16.73	16.73	14.22	14.22
Daly City	1.87	1.87	1.87	1.59	1.59
East Palo Alto	1.58	1.58	1.58	1.34	1.34
Estero	2.39	2.39	2.39	2.03	2.03
Hayward	12.07	12.07	12.07	10.26	10.26
Hillsborough	1.78	1.78	1.78	1.51	1.51
Menlo Park	2.34	2.34	2.34	1.99	1.99
Mid-Peninsula	1.59	1.59	1.59	1.36	1.36
Millbrae	1.74	1.74	1.74	1.48	1.48
Milpitas	4.11	4.11	4.11	3.49	3.49
Mountain View	5.41	5.41	5.41	4.60	4.60
North Coast	1.28	1.28	1.28	1.09	1.09
Palo Alto	5.88	5.88	5.88	5.00	5.00
Purissima Hills	1.17	1.17	1.17	1.00	1.00
Redwood City	4.85	4.85	4.85	4.12	4.12
San Bruno	1.75	1.75	1.75	1.49	1.49
San Jose	2.45	2.45	2.45	2.08	2.08
Santa Clara	2.45	2.45	2.45	2.08	2.08
Stanford	1.47	1.47	1.47	1.25	1.25
Sunnyvale	6.59	6.59	6.59	5.61	5.61
Westborough	0.46	0.46	0.46	0.39	0.39
Total	**88.7**	**88.7**	**88.7**	**75.4**	**75.4**

Section 3: Drought Allocations ***Without*** Bay-Delta Plan

Table L: RWS Supply Available to the Wholesale Customers (Combined Tables 4a-4f from the SFPUC's March 30th letter) *Without* Bay-Delta Plan (mgd)[h]

	2020	2025	2030	2035	2040	2045
Projected Purchases[i]	132.2	146.0	147.9	151.9	156.3	162.8
Consecutive 1st Dry Year	132.2	146.0	147.9	151.9	156.3	162.8
Consecutive 2nd Dry Year	132.2	146.0	147.9	151.9	156.3	162.8
Consecutive 3rd Dry Year	132.2	146.0	147.9	151.9	156.3	162.8
Consecutive 4th Dry Year	132.2	146.0	147.9	151.9	156.3	139.1
Consecutive 5th Dry Year	132.2	146.0	147.9	151.9	156.3	139.1

[h] The SFPUC's modeling approach does not allow for varying demands over the course of a dry year sequence. However, the SFPUC has indicated that sufficient supplies are available to meet wholesale RWS demand so long as they reasonably stay within 2020 and 2040 levels. The SFPUC's modeling does not indicate cutbacks will be required till the 4th and 5th consecutive dry year at 2045 levels.

[i] Values for 2020 are actual purchases. This row aligns with what is labeled as an "Average Year" in Tables 4a-4f in the SFPUC's March 30th letter. However, these values do not represent an average year and instead are actual purchases for 2020 or projected purchases for 2025 through 2045.

Table M: Wholesale RWS Demand (Combined Totals from Tables A and B) (mgd)

	2020	2025	2030	2035	2040	2045
Projected Purchases[i]	132.2	146.0	147.9	151.9	156.3	162.8
Consecutive 1st Dry Year	132.2	146.0	147.9	151.9	156.3	162.8
Consecutive 2nd Dry Year	132.2	146.0	147.9	151.9	156.3	162.8
Consecutive 3rd Dry Year	132.2	146.0	147.9	151.9	156.3	162.8
Consecutive 4th Dry Year	132.2	146.0	147.9	151.9	156.3	162.8
Consecutive 5th Dry Year	132.2	146.0	147.9	151.9	156.3	162.8

Table N: Percent Cutback to the Wholesale Customers *Without* Bay-Delta Plan

	2020	2025	2030	2035	2040	2045
Projected Purchases[i]	0%	0%	0%	0%	0%	0%
Consecutive 1st Dry Year	0%	0%	0%	0%	0%	0%
Consecutive 2nd Dry Year	0%	0%	0%	0%	0%	0%
Consecutive 3rd Dry Year	0%	0%	0%	0%	0%	0%
Consecutive 4th Dry Year	0%	0%	0%	0%	0%	15%
Consecutive 5th Dry Year	0%	0%	0%	0%	0%	15%

Table O1: Basis of Water Supply Data [For Tables 7-1 and 7-4], Base Year 2045, *Without* Bay-Delta Plan (mgd)

Consecutive Dry Year	1st	2nd	3rd	4th	5th
Wholesale RWS Demand	162.8	162.8	162.8	162.8	162.8
Wholesale RWS Supply Available	162.8	162.8	162.8	139.1	139.1
Percent Cutback	0%	0%	0%	Tier 2 Plan	Tier 2 Plan

Table O2: Individual Agency Drought Allocations [For Tables 7-1 and 7-4], Base Year 2045, *Without* Bay-Delta Plan (mgd)

	Wholesale RWS Drought Allocations					Tier 2 Drought Cutback
Consecutive Dry Year	**1st**	**2nd**	**3rd**	**4th**	**5th**	
ACWD	9.11	9.11	9.11	8.20	8.20	10.0%
Brisbane/GVMID	0.89	0.89	0.89	0.74	0.74	16.8%
Burlingame	4.69	4.69	4.69	4.02	4.02	14.3%
Coastside	1.33	1.33	1.33	1.19	1.19	10.0%
CalWater Total	30.70	30.70	30.70	26.73	26.73	12.9%
Daly City	3.43	3.43	3.43	3.01	3.01	12.4%
East Palo Alto	2.89	2.89	2.89	2.68	2.68	7.3%
Estero	4.38	4.38	4.38	3.94	3.94	10.0%
Hayward	22.14	22.14	22.14	18.67	18.67	15.7%
Hillsborough	3.26	3.26	3.26	2.93	2.93	10.2%
Menlo Park	4.29	4.29	4.29	3.58	3.58	16.5%
Mid-Peninsula	2.93	2.93	2.93	2.63	2.63	10.0%
Millbrae	3.20	3.20	3.20	2.54	2.54	20.7%
Milpitas	7.53	7.53	7.53	6.55	6.55	13.1%
Mountain View	9.93	9.93	9.93	8.91	8.91	10.3%
North Coast	2.34	2.34	2.34	2.11	2.11	10.0%
Palo Alto	10.79	10.79	10.79	9.71	9.71	10.0%
Purissima Hills	2.15	2.15	2.15	1.41	1.41	34.5%
Redwood City	8.90	8.90	8.90	7.92	7.92	11.1%
San Bruno	3.21	3.21	3.21	2.60	2.60	19.1%
San Jose	4.50	4.50	4.50	2.95	2.95	34.5%
Santa Clara	4.50	4.50	4.50	2.95	2.95	34.5%
Stanford	2.70	2.70	2.70	2.27	2.27	16.0%
Sunnyvale	12.10	12.10	12.10	10.11	10.11	16.5%
Westborough	0.84	0.84	0.84	0.76	0.76	10.0%
Total	**162.8**	**162.8**	**162.8**	**139.1**	**139.1**	

Appendix K

26 March 2021 SFPUC Commission Special Meeting – Water Workshop Number 3 Water Supply Planning Scenarios SFPUC Staff Presentation Materials

Operated by the San Francisco Public Utilities Commission

Water Workshop Number 3
Water Supply Planning Scenarios

March 26, 2021

Introduction

- Ten water supply planning scenarios were run using our HHLSM system modeling tool and the Regional Water System Supply and Demand Worksheet.
- For each scenario the ultimate result is either a surplus or deficit of supply, and each scenario produces different results, demonstrating the effect of the choices that are made.
- The assumptions and results for each scenario will be displayed in this presentation.
- The presentation concludes with a summary table of the bottom-line results for all the scenarios.

The Ten Scenarios

I. Previous Demand Estimates
II. Current Conditions
III. Tuolumne River Voluntary Agreement
IV. Bay-Delta Plan
V. Bay-Delta Plan with Alternative Water Supply Projects
VI. Bay-Delta Plan with Alternative Water Supply Projects and Modified Rationing Policy
VII. Bay-Delta Plan with Alternative Water Supply Projects, Modified Rationing Policy and Modified Design Drought
VIII. Water Quality Certification (401) with Alternative Water Supply Projects, Modified Rationing Policy and Modified Design Drought
IX. NGO scenario 1: Current system, 198 mgd constant demand, Bay-Delta Plan flows
X. NGO Scenario 2: Current system, 223 mgd constant demand, 7 ½ year design drought, Bay-Delta Plan flows

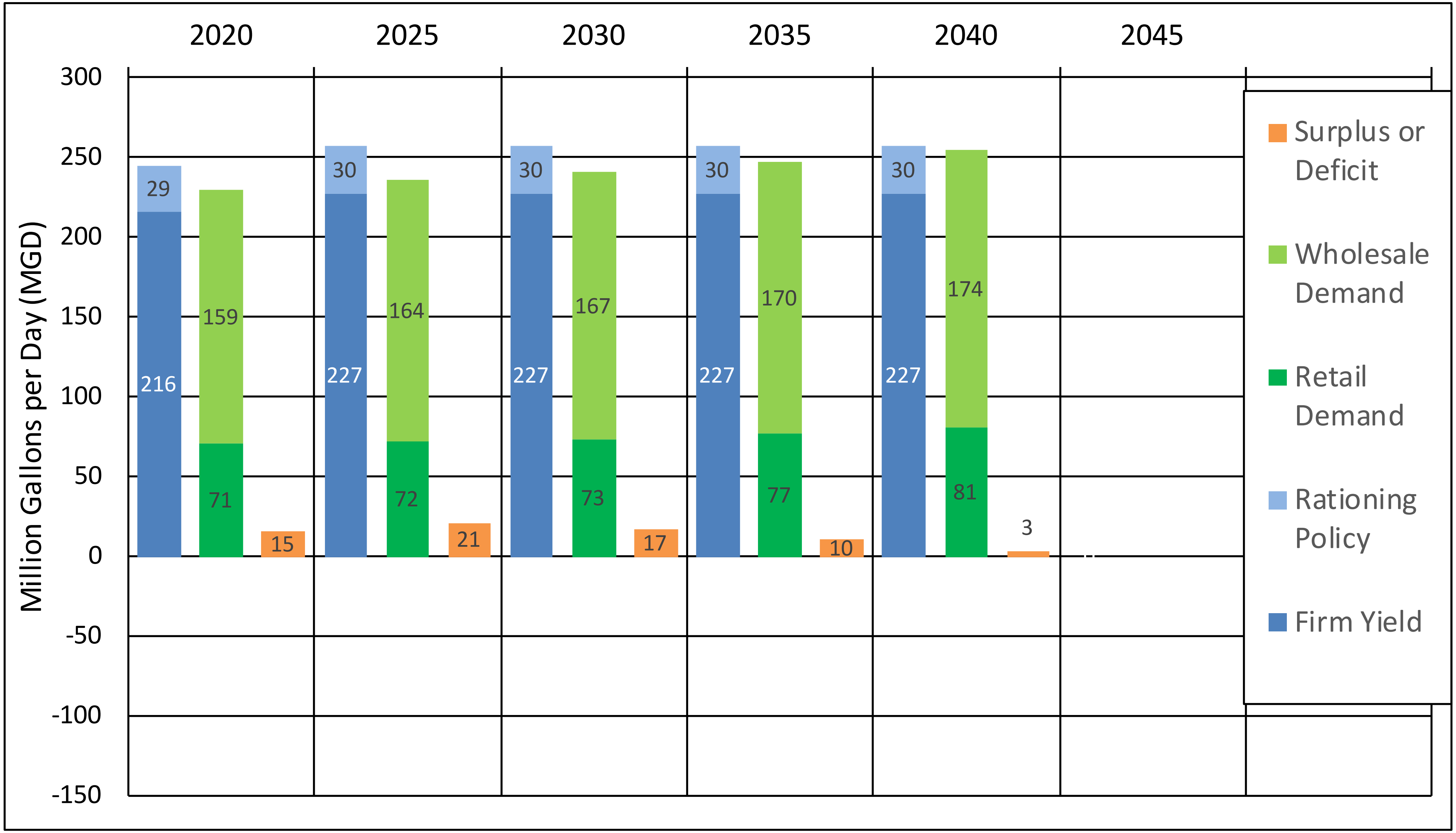
I. Prior Demand Estimates

- Includes retail demand projections from the 2015 Urban Water Management Plan
- Includes 2015 purchase projections from wholesale customers
- Includes current side agreement on flows in the lower Tuolumne River
- Yield values are based on the 8.5-year design drought and the adopted WSIP rationing policy

SFPUC Water Supply and Demand Worksheet Results
All values are in million gallons per day (MGD)

	2020	2025	2030	2035	2040	2045
Total Yield:	245	257	257	257	257	NA
RWS Demand:	230	236	241	247	255	NA
Lower Tuolumne Contribution:	NA	NA	NA	NA	NA	NA
Surplus or Deficit:	15	21	17	10	3	NA

I. Prior Demand Estimates



II. Current Conditions

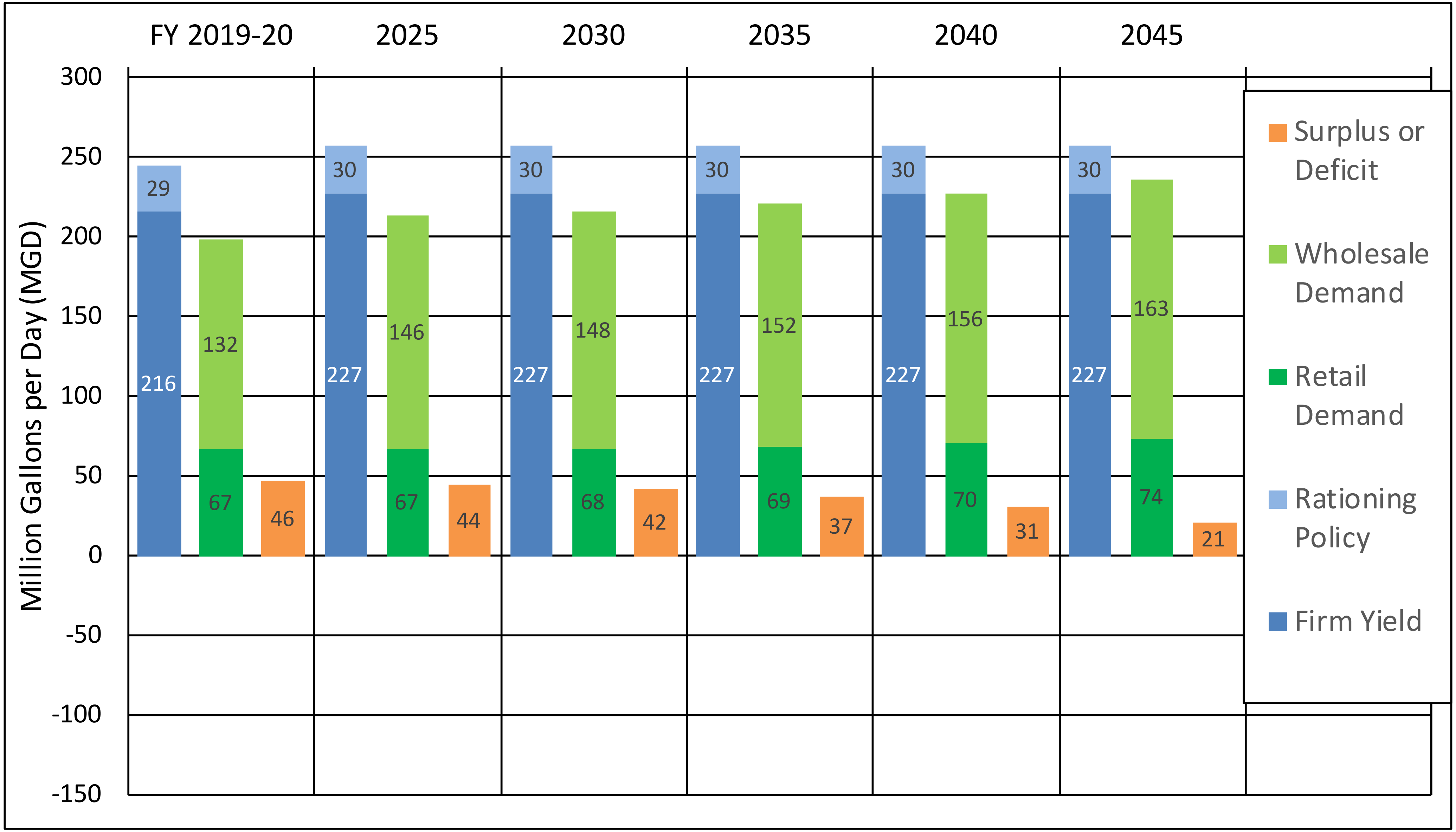
- Includes updated demand projections for anticipated development in retail service area*
- Includes most recent purchase projections from wholesale customers*
- Includes a total of 9 MGD for San Jose and Santa Clara*
- Includes the 1995 side agreement on flows in the lower Tuolumne River
- Yield values are based on the 8.5-year design drought and the adopted WSIP rationing policy

SFPUC Water Supply and Demand Worksheet Results
All values are in million gallons per day (MGD)

	FY 2019-20	2025	2030	2035	2040	2045
Total Yield:	245	257	257	257	257	257
RWS Demand:	198	213	215	220	227	236
Lower Tuolumne Contribution:	NA	NA	NA	NA	NA	NA
Surplus or Deficit:	46	44	42	37	31	21

* Base Conditions in later slides

II. Current Conditions



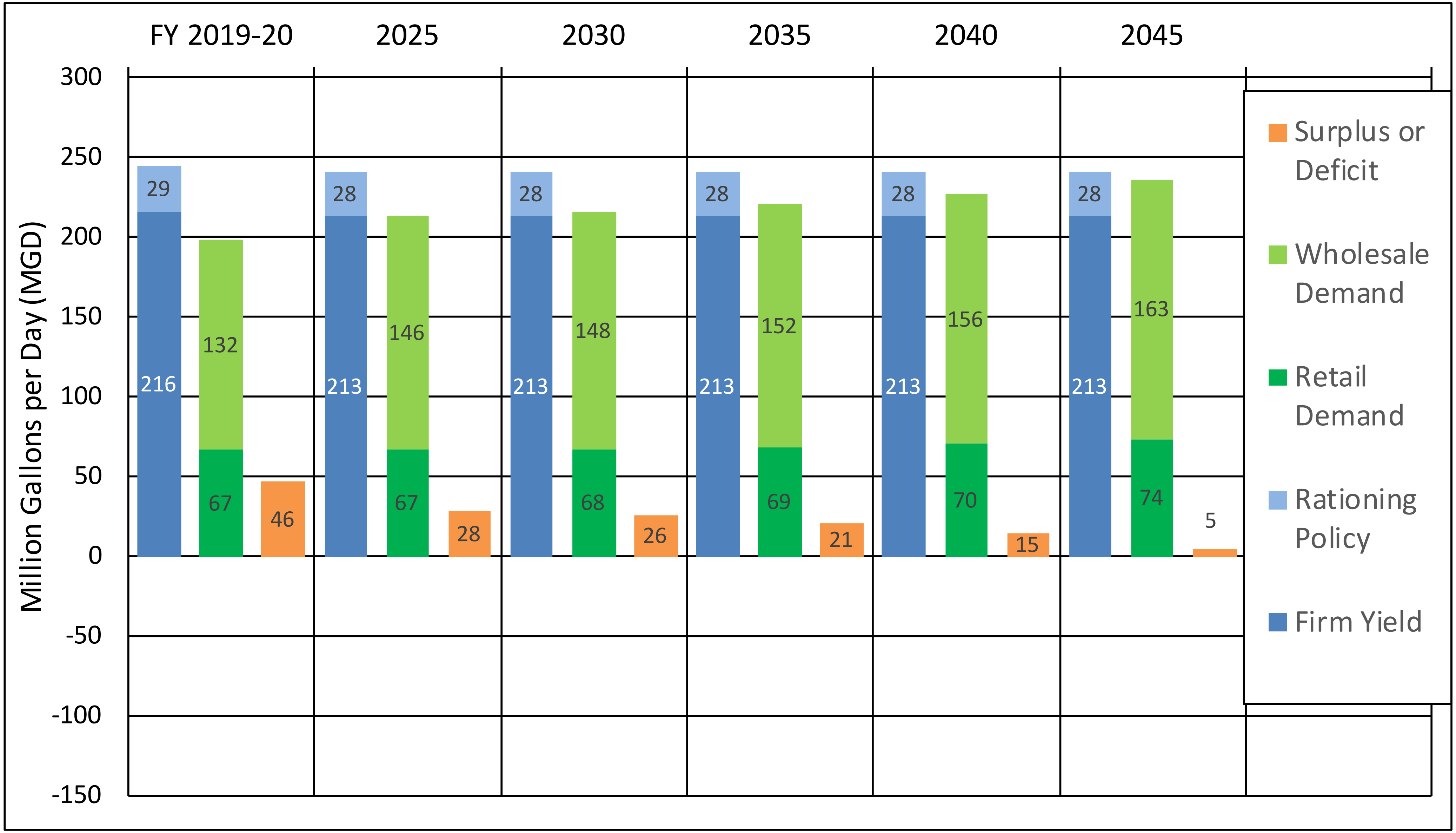
III. Tuolumne River Voluntary Agreement

- Base Conditions
- Yield values are based on the 8.5-year design drought and the adopted WSIP rationing policy
- Includes SFPUC contribution to the TRVA, displayed in the graph as a reduction in Firm Yield
- SFPUC contributions are calculated according to the 4th Agreement and assumes continuation of the 1995 side agreement.

SFPUC Water Supply and Demand Worksheet Results
All values are in million gallons per day (MGD)

	FY 2019-20	2025	2030	2035	2040	2045
Total Yield:	245	241	241	241	241	241
RWS Demand:	198	213	215	220	227	236
Lower Tuolumne Contribution:	NA	14	14	14	14	14
Surplus or Deficit:	46	28	26	21	15	5

III. Tuolumne River Voluntary Agreement



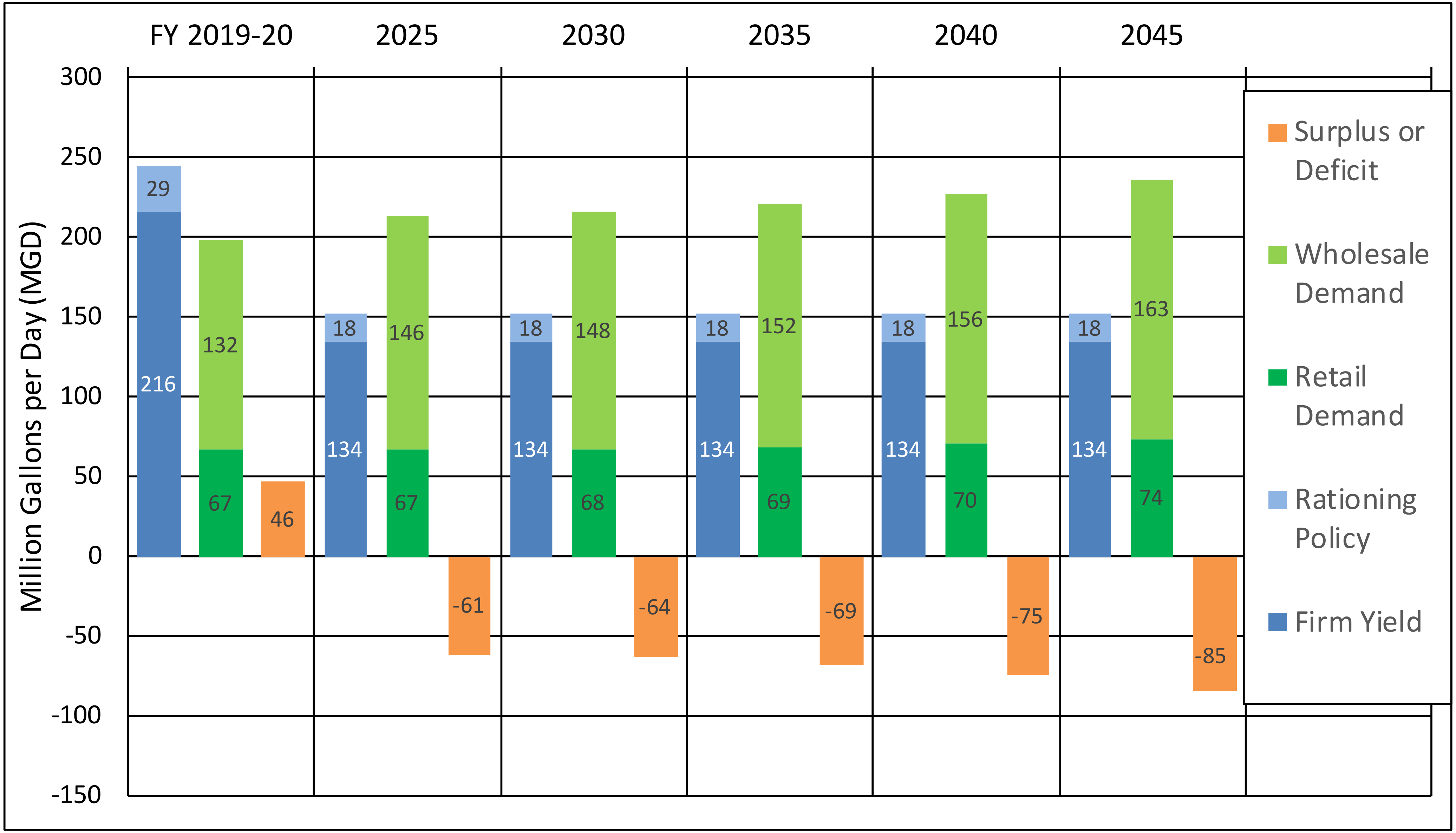
IV. Bay-Delta Plan

- Base Conditions
- Yield values are based on the 8.5-year design drought and the adopted WSIP rationing policy
- Includes SFPUC contribution to the Bay-Delta Plan displayed in the graph as a reduction in Firm Yield, assuming the flow requirement is 40% of unimpaired flow at La Grange from February through June. Current FERC flow requirements are assumed for the rest of the year.
- SFPUC contributions are calculated according to the 4th Agreement and assuming continuation of the 1995 side agreement.

SFPUC Water Supply and Demand Worksheet Results
All values are in million gallons per day (MGD)

	FY 2019-20	2025	2030	2035	2040	2045
Total Yield:	245	152	152	152	152	152
RWS Demand:	198	213	215	220	227	236
Lower Tuolumne Contribution:	NA	93	93	93	93	93
Surplus or Deficit:	46	-61	-64	-69	-75	-85

IV. Bay-Delta Plan



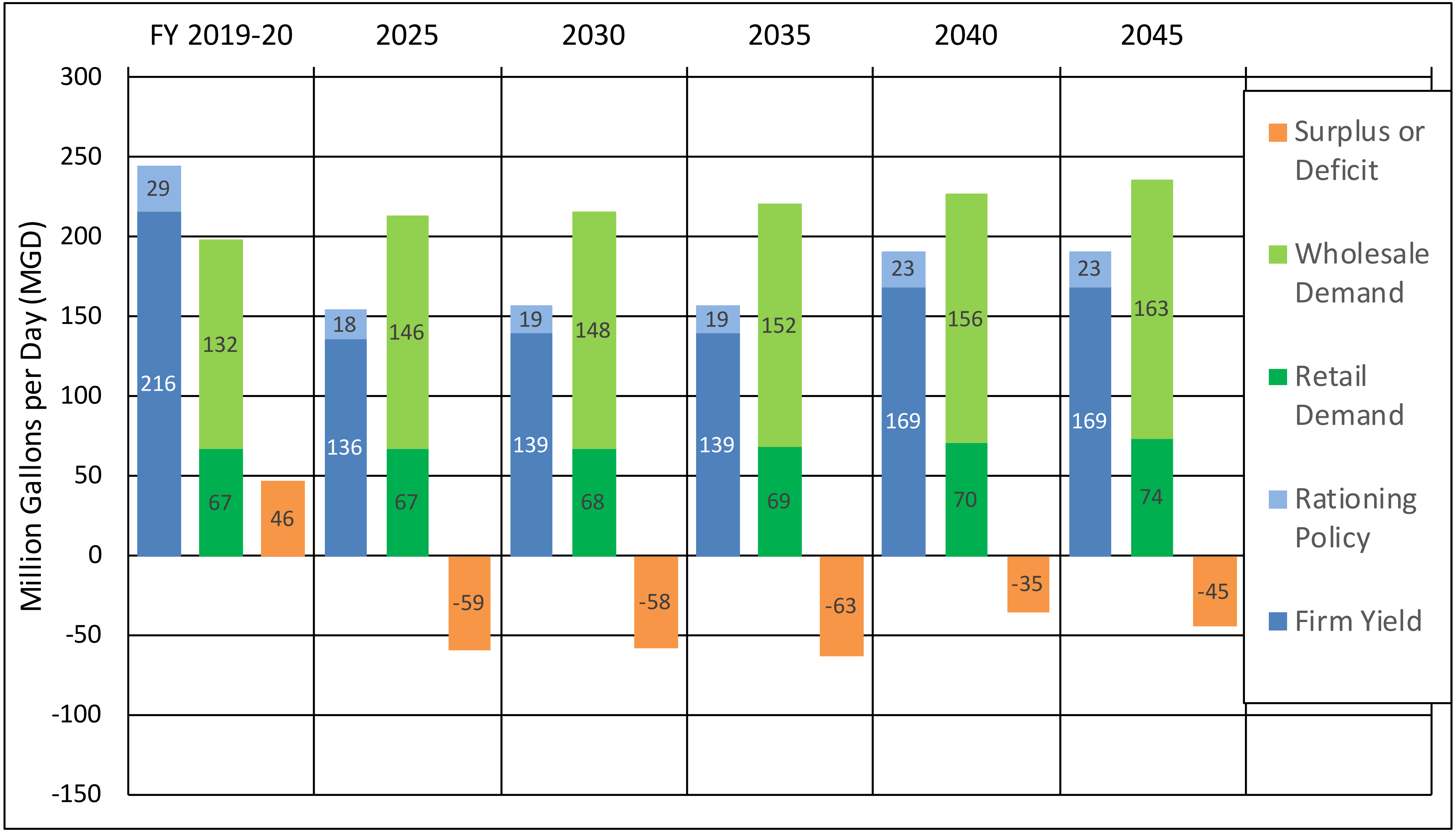
V. Bay-Delta Plan with Alternative Water Supply Projects

- Base Conditions
- Yield values are based on the 8.5-year design drought and the adopted WSIP rationing policy
- Includes SFPUC contribution to the Bay-Delta Plan displayed in the graph as a reduction in Firm Yield, assuming the flow requirement is 40% of unimpaired flow at La Grange from February through June. Current FERC flow requirements are assumed for the rest of the year.
- SFPUC contributions are calculated according to the 4th Agreement and continuation of the 1995 side agreement.
- Includes a total of 35 MGD of new water supply projects, which are assumed to be added between 2025 and 2040. The firm yield from the new projects is shown separately in the table to demonstrate the estimated development of the projects over time. The new project yield is also included in the Total Yield shown in the table.

SFPUC Water Supply and Demand Worksheet Results
All values are in million gallons per day (MGD)

	FY 2019-20	2025	2030	2035	2040	2045
Total Yield:	245	154	158	158	192	192
RWS Demand:	198	213	215	220	227	236
Lower Tuolumne Contribution:	NA	93	93	93	93	93
Alternative Water Supply Projects:	NA	2	5	5	35	35
Surplus or Deficit:	46	-59	-58	-63	-35	-45

V. Bay-Delta Plan with Alternative Water Supply Projects



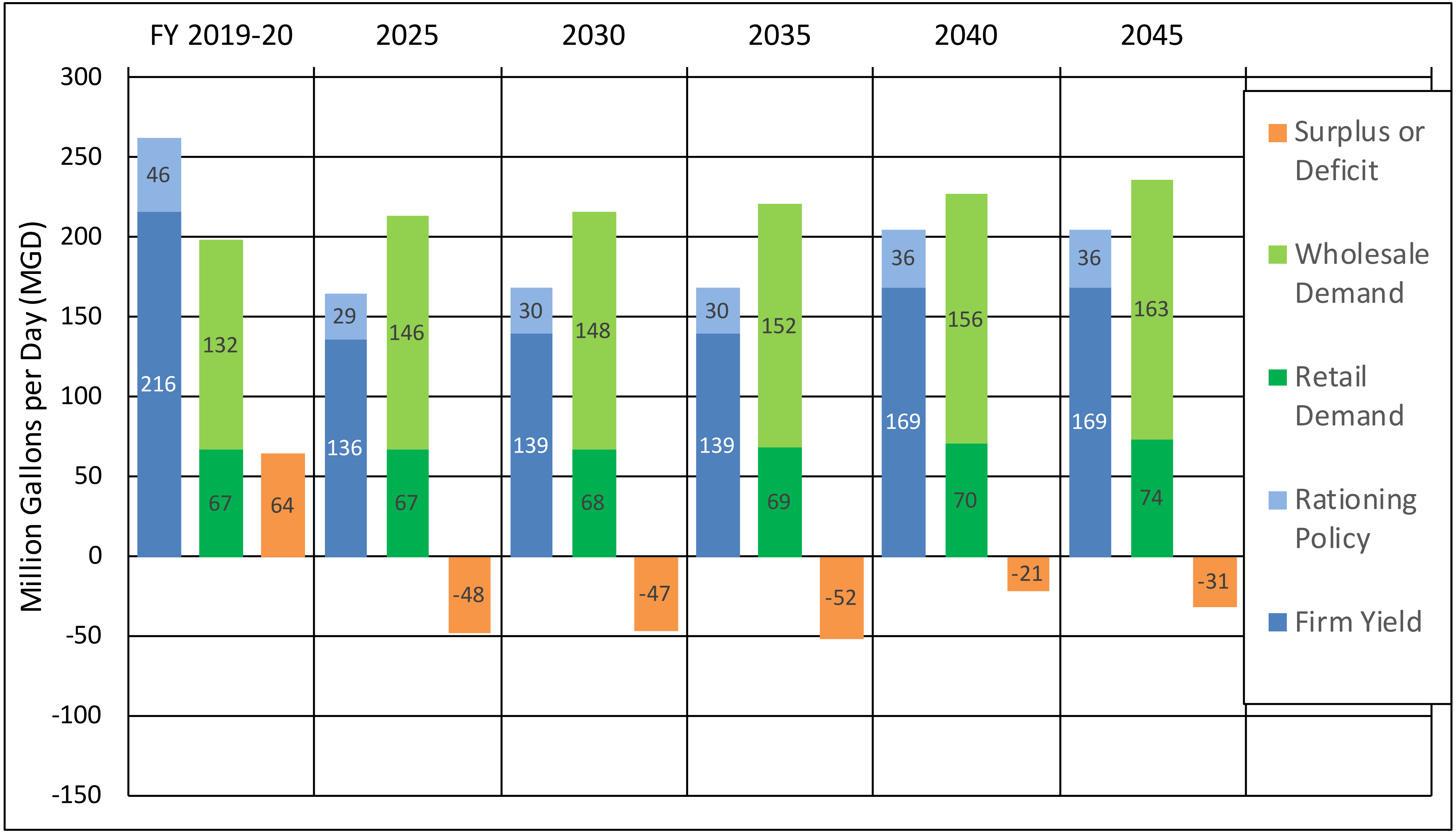
VI. Bay-Delta Plan with Alternative Water Supply Projects and Modified Rationing Policy

- Base Conditions
- Yield values are based on the 8.5-year design drought
- Includes SFPUC contribution to the Bay-Delta Plan displayed in the graph as a reduction in Firm Yield, assuming the flow requirement is 40% of unimpaired flow at La Grange from February through June. Current FERC flow requirements are assumed for the rest of the year.
- SFPUC contributions are calculated according to the 4th Agreement and assuming continuation of the 1995 side agreement.
- Includes a total of 35 MGD of new water supply projects, as described on slide 12 for scenario V
- Includes 7.5 years of rationing at 20% in the 8.5-year design drought sequence

SFPUC Water Supply and Demand Worksheet Results
All values are in million gallons per day (MGD)

	FY 2019-20	2025	2030	2035	2040	2045
Total Yield:	262	165	169	169	205	205
RWS Demand:	198	213	215	220	227	236
Lower Tuolumne Contribution:	NA	93	93	93	93	93
Surplus or Deficit:	64	-48	-47	-52	-21	-31

VI. Bay-Delta Plan with Alternative Water Supply Projects and Modified Rationing Policy



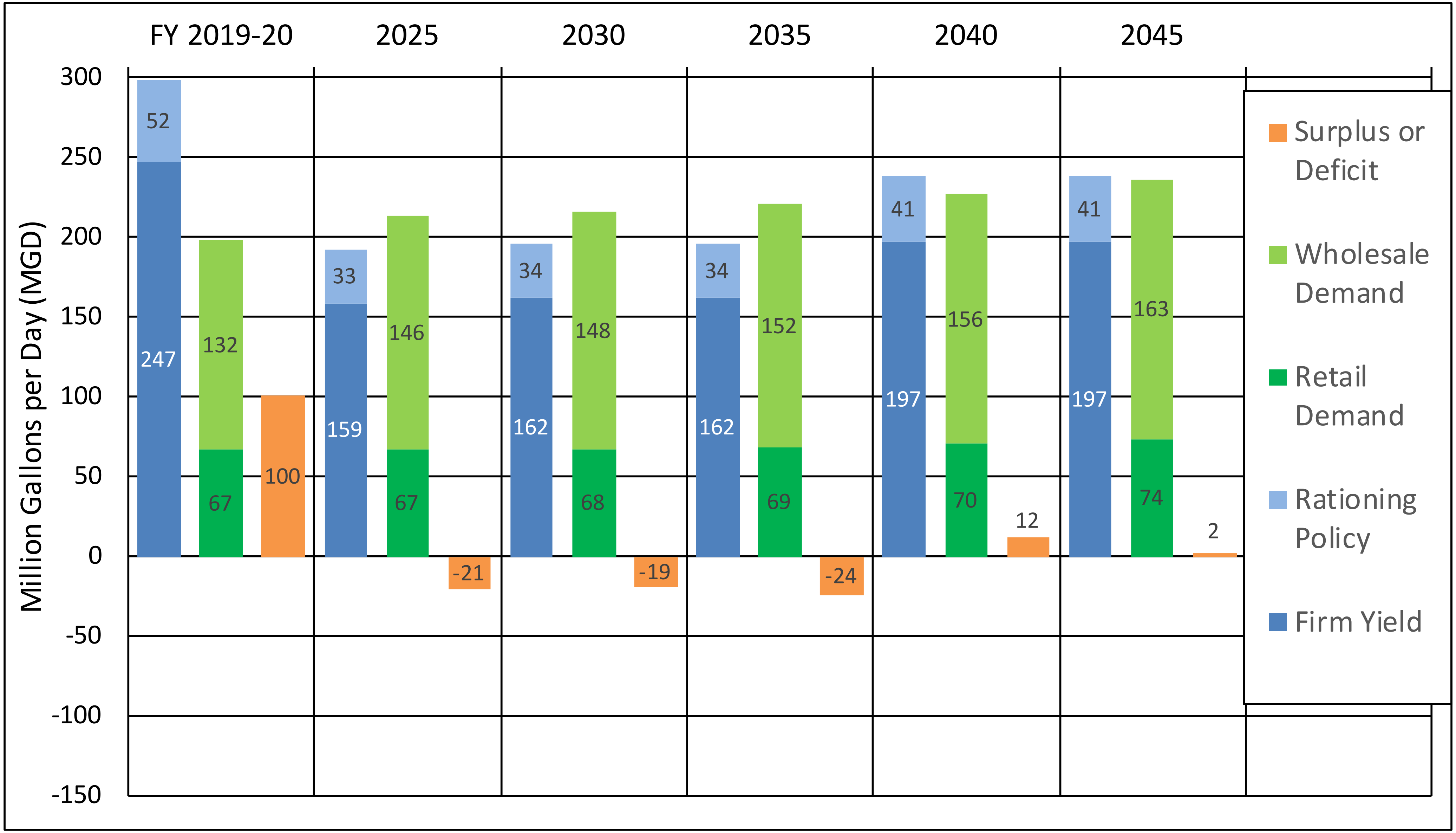
VII. Bay-Delta Plan with Alternative Water Supply Projects, Modified Rationing Policy and Modified Design Drought

- Base Conditions
- Includes SFPUC contribution to the Bay-Delta Plan displayed in the graph as a reduction in Firm Yield, assuming the flow requirement is 40% of unimpaired flow at La Grange from February through June. Current FERC flow requirements are assumed for the rest of the year.
- SFPUC contributions are calculated according to the 4th Agreement and assuming continuation of the 1995 side agreement.
- Includes a total of 35 MGD of new water supply projects, as described on slide 12 for scenario V
- Yield values are estimated using a 7.5-year design drought
- Includes 6.5 years of rationing at 20% in the 7.5-year design drought sequence.

SFPUC Water Supply and Demand Worksheet Results
All values are in million gallons per day (MGD)

	FY 2019-20	2025	2030	2035	2040	2045
Total Yield:	299	192	196	196	238	238
RWS Demand:	198	213	215	220	227	236
Lower Tuolumne Contribution:	NA	101	101	101	101	101
Surplus or Deficit:	100	-21	-19	-24	12	2

VII. Bay-Delta Plan with Alternative Water Supply Projects, Modified Rationing Policy and Modified Design Drought



VIII. Water Quality Certification (401) with Alternative Water Supply Projects, Modified Rationing Policy and Modified Design Drought

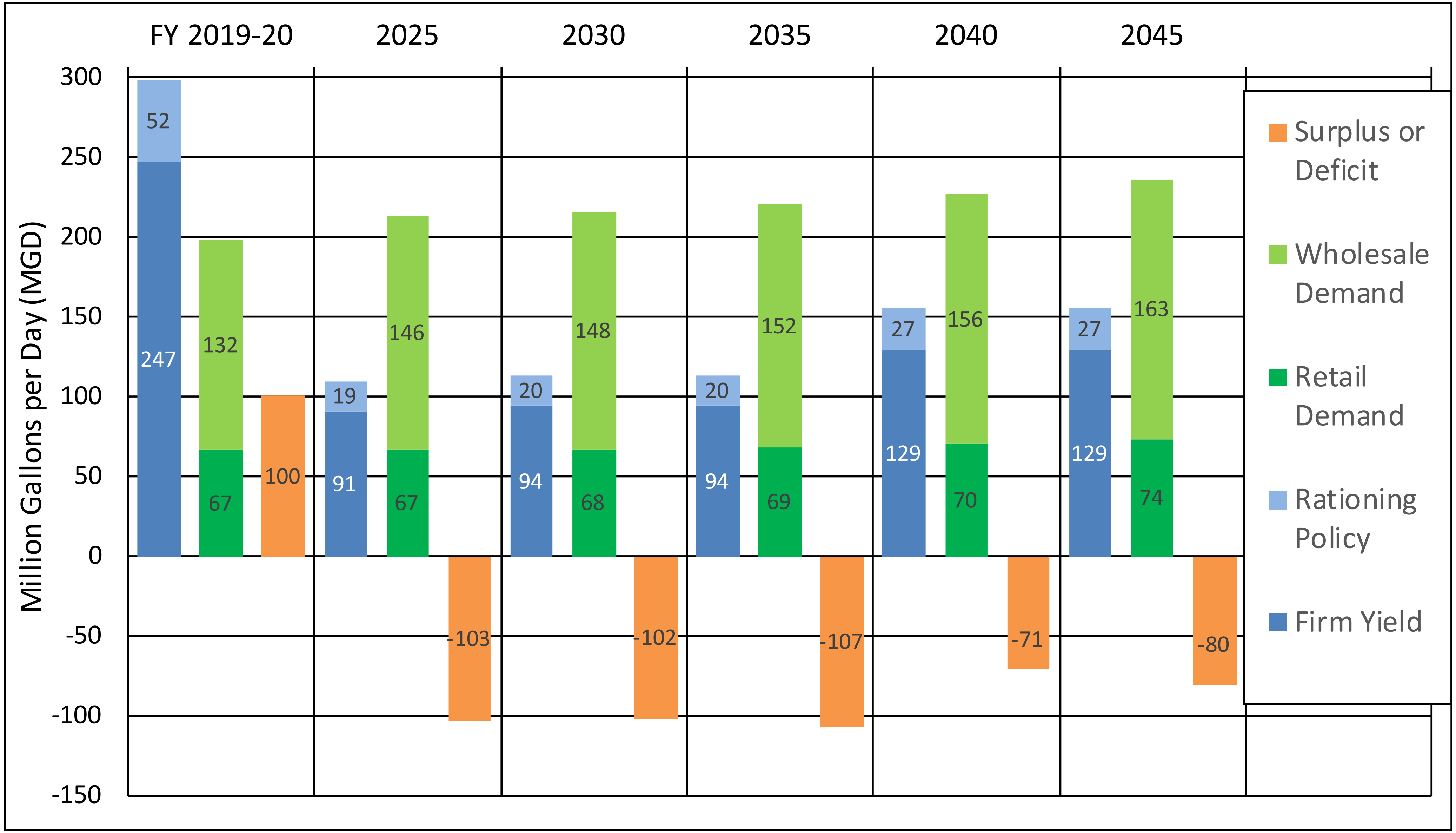
- Base Conditions
- Includes SFPUC contribution to the Section 401 water quality certification on the FERC license displayed in the graph as a reduction in Firm Yield.
- SFPUC contributions are calculated according to the 4th Agreement and assuming continuation of the 1995 side agreement.
- Includes a total of 35 MGD of new water supply projects, as described on slide 12 for scenario V
- Yield values are estimated using a 7.5-year design drought
- Includes 6.5 years of rationing at 20% in the 7.5-year design drought sequence.

SFPUC Water Supply and Demand Worksheet Results
All values are in million gallons per day (MGD)

	FY 2019-20	2025	2030	2035	2040	2045
Total Yield:	299	110	114	114	156	156
RWS Demand:	198	213	215	220	227	236
Lower Tuolumne Contribution:	NA	169	169	169	169	169
Surplus or Deficit:	100	-103	-102	-107	-71	-80

Hetch Hetchy Regional Water System

VIII. Water Quality Certification (401) with Alternative Water Supply Projects, Modified Rationing Policy and Modified Design Drought



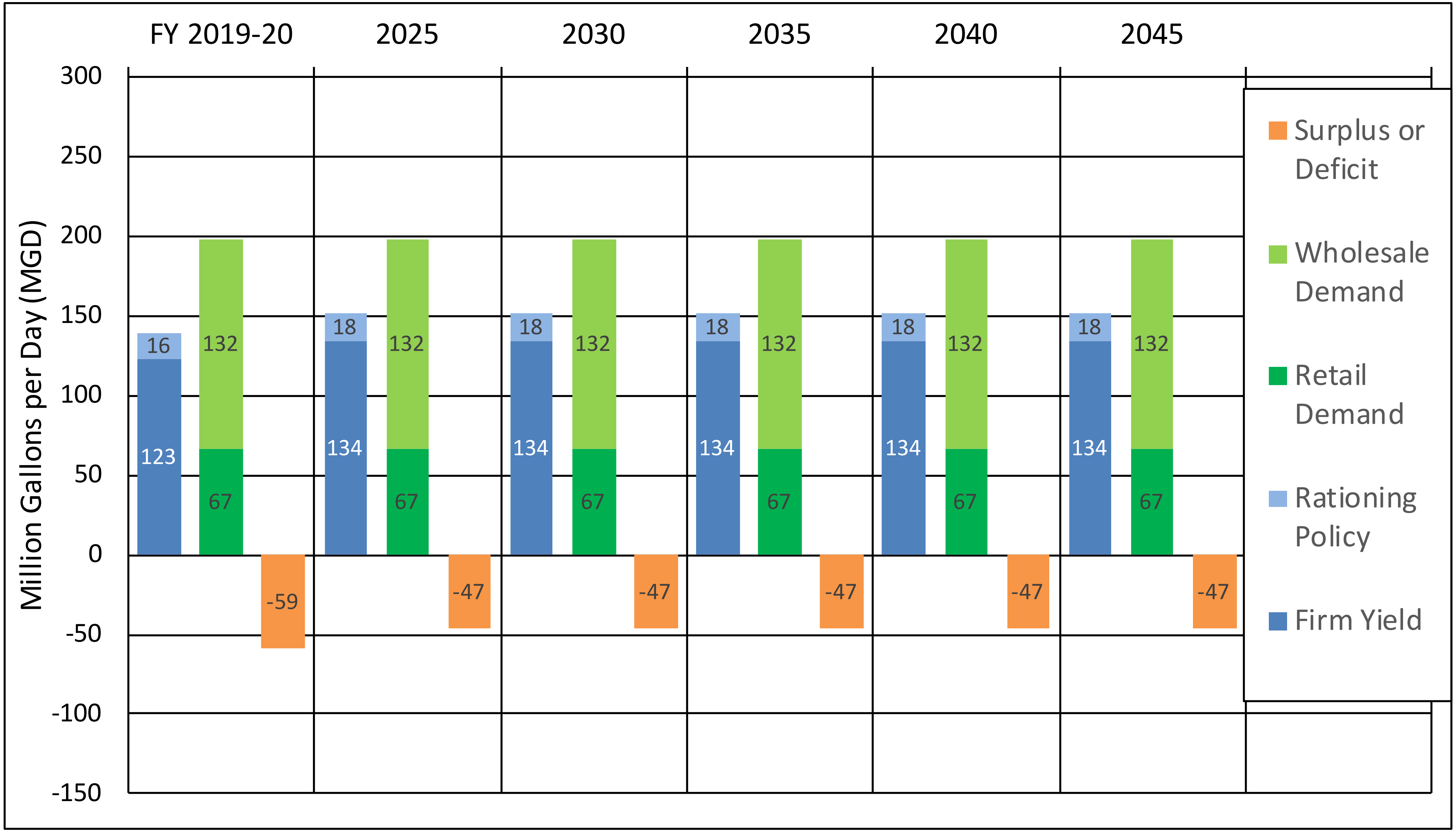
IX. NGO scenario 1: Current system, 198 mgd constant demand, Bay-Delta Plan flows

- Assumes that retail and wholesale demand on the RWS remain at the current level of approximately 198 MGD, and that SFPUC contributions to the Bay-Delta Plan are being made now
- Yield values are based on the 8.5-year design drought and the adopted WSIP rationing policy
- Includes SFPUC contribution to the Bay-Delta Plan, assuming the flow requirement is 40% of unimpaired flow at La Grange from February through June. Current FERC flow requirements are assumed for the rest of the year.
- SFPUC contributions are calculated according to the 4th Agreement and assuming continuation of the 1995 side agreement.

SFPUC Water Supply and Demand Worksheet Results
All values are in million gallons per day (MGD)

	FY 2019-20	2025	2030	2035	2040	2045
Total Yield:	139	152	152	152	152	152
RWS Demand:	198	198	198	198	198	198
Lower Tuolumne Contribution:	93	93	93	93	93	93
Surplus or Deficit:	-59	-47	-47	-47	-47	-47

IX. NGO scenario 1: Current system, 198 mgd constant demand, Bay-Delta Plan flows



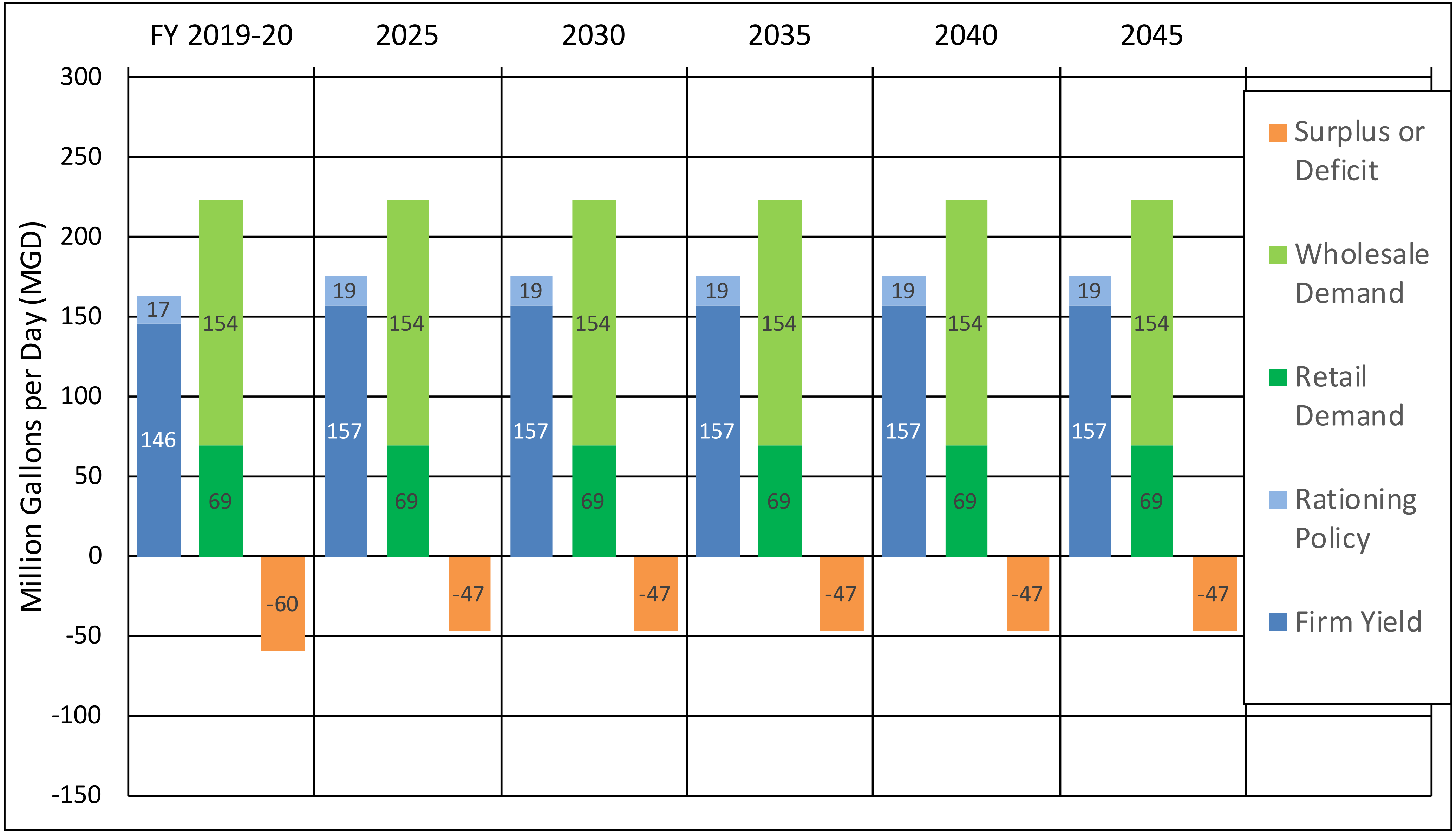
X. NGO scenario 2: Current system, 223 mgd constant demand, 7½ year design drought, Bay-Delta Plan flows

- Includes an assumed demand of 223 MGD for the SFPUC service area in all years
- Includes a total of 9 MGD for San Jose and Santa Clara
- Includes SFPUC contribution to the Bay-Delta Plan, assuming the flow requirement is 40% of unimpaired flow at La Grange from February through June. Current FERC flow requirements are assumed for the rest of the year. Assumes this contribution begins now.
- SFPUC contributions are calculated according to the 4th Agreement and assuming continuation of the 1995 side agreement.
- Yield values are estimated using a 7.5-year design drought and a truncated version of the adopted WSIP rationing policy

SFPUC Water Supply and Demand Worksheet Results
All values are in million gallons per day (MGD)

	FY 2019-20	2025	2030	2035	2040	2045
Total Yield:	163	176	176	176	176	176
RWS Demand:	223	223	223	223	223	223
Lower Tuolumne Contribution:	101	101	101	101	101	101
Surplus or Deficit:	-59	-47	-47	-47	-47	-47

X. NGO scenario 2: Current system, 223 mgd constant demand, 7½ year design drought, Bay-Delta Plan flows



SCENARIO SURPLUSES OR DEFICITS						
SCENARIOS	**FY19-20**	**2025**	**2030**	**2035**	**2040**	**2045**
I. Previous Demand Estimates	15	21	17	10	3	NA
II. Current Conditions	46	44	42	37	31	21
III. Tuolumne River Voluntary Agreement	46	28	26	21	15	5
IV. Bay-Delta Plan	46	-61	-64	-69	-75	-85
V. Bay-Delta Plan with Alternative Water Supply Projects	46	-59	-58	-63	-35	-45
VI. Bay-Delta Plan with Alternative Water Supply Projects and Modified Rationing Policy	64	-48	-47	-52	-21	-31
VII. Bay-Delta Plan with Alternative Water Supply Projects, Modified Rationing Policy and Modified Design	100	-21	-19	-24	12	2
VIII. Water Quality Certification (401) with Alternative Water Supply Projects, Modified Rationing Policy and Modified Design Drought	100	-103	-102	-107	-71	-80
IX. NGO scenario 1: Current system and 198 mgd constant demand and Bay-Delta Plan flows	-59	-47	-47	-47	-47	-47
X. NGO Scenario 2: Current system, 223 mgd constant demand, 7 ½ year design drought and Bay-Delta Plan	-60	-47	-47	-47	-47	-47

Appendix L

Water Shortage Contingency Plan

Water Shortage Contingency Plan

City of Redwood City

June 2021

TABLES

ATTACHMENTS

1. INTRODUCTION

☑ ***CWC § 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 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.

The City of Redwood City's (City's or Redwood City's) Water Shortage Contingency Plan (WSCP) has been developed to serve as a flexible framework of planned response measures to mitigate future water supply shortages. This WSCP builds upon and supersedes the WSCP that was presented in the 2015 Urban Water Management Plan (UWMP). Updates to the WSCP reflect lessons learned during the recent drought and implementation of the City's WSCP included the City's 2015 UWMP, and are intended to improve City's ability to respond effectively and efficiently in the event of a future water supply shortage or emergency.

The City developed this WSCP based on the following guiding principle:

> *Water cutbacks will focus on outdoor water use. Outdoor water use is an important, but relatively discretionary end use in comparison to indoor water uses related to drinking, cooking, and sanitary activities. Outdoor water use supplied with recycled water, however, may not need to be cut back as ample supplies of recycled water are likely to be available even during a drought.*
>
> *Water cutbacks are to be based on water needs, not historical water use, whenever possible. Customers knowing water shortage allocations are based on historic water use may tend to overuse water during non-drought periods so as to provide them with a greater allocation during a shortage. Expressed in a different way, customers implementing water conservation activities (demand hardened) should not be penalized by receiving the same percentage cutback as non-conserving customers.*

Practically, this principle guides the City to ask for a need-based, shared contribution from all of its customers towards meeting water use reduction goals during periods of water shortage through the Water Allocation Program. It further directs the City to focus its water conservation efforts on reducing discretionary water uses such as outdoor water use, while attempting to preserve uses that are essential to health and safety such as drinking, cooking, and sanitary activities. The WSCP focuses on potable water uses because there are ample supplies of recycled water available even during a drought.

2. WATER SUPPLY RELIABILITY ANALYSIS

☑ *CWC § 10632 (a) (1) The analysis of water supply reliability conducted pursuant to Section 10635.*

This section provides a summary of Redwood City's water supply reliability analysis in Chapter 7 of Redwood City's 2020 UWMP, recognizing that the WSCP is intended to be a standalone document that can be adopted and amended independently.

Redwood City relies on the San Francisco Public Utilities Commission (SFPUC) Regional Water System (RWS) for all of its potable water supply. In accordance with the SFPUC's perpetual obligation to Redwood City's Supply Assurance, Redwood City has an Individual Supply Guarantee (ISG) of 10.93 million gallons per day (MGD), or 12,243 acre-feet per year (AFY).

Redwood City also uses recycled water for non-potable uses. Recycled water currently supplies 8% of Redwood City's total demand and is anticipated to supply 14% of Redwood City's total demand by 2045. The recycled water supply is expected to be 100% reliable in all year types.

Redwood City's supply reliability relies largely on the reliability of the SFPUC RWS. The SFPUC has committed to, among other things, meeting the retail and wholesale customers' average annual water demand during non–drought years and meeting dry-year delivery needs while limiting rationing to a maximum 20% system-wide reduction in water service during extended droughts. However, several potential constraints have been identified on the future supply availability of the SFPUC RWS. One of the key factors is the adoption of the 2018 Bay-Delta Plan Amendment. If the Bay-Delta Plan Amendment is implemented, the SFPUC is anticipated to have sufficient supplies to meet the projected water demands in normal years but would experience significant supply shortages in single dry years and multiple dry years.

Based on the current allocation methodology[1] and SFPUC dry year cutbacks, Redwood City is anticipated to experience up to 4,774 AFY (40%) supply shortfall in single dry years and up to 5,592 AFY (47%) supply shortfall in multiple dry years by 2045.

However, numerous uncertainties remain in the implementation of the Bay-Delta Plan Amendment and the allocation of the available supply between the wholesale customers. The resultant actual supply reliability and the frequency of supply shortfalls for Redwood City cannot be known currently. Redwood City has placed high priority on working with SFPUC and the Bay Area Water Supply and Conservation

[1] The SFPUC and the wholesale customers have negotiated and adopted a plan to allocate the RWS supply during system-wide shortages of 20% or less. To address the instances where the supply shortfalls are projected to be greater than 20%, BAWSCA has developed a revised methodology to allocate the RWS supply. This allocation method is intended to serve as the preliminary basis for the 2020 UWMP supply reliability analysis and does not in any way imply an agreement by BAWSCA member agencies as to the exact allocation methodology. Details on the SFPUC RWS supply reliability are provided by the SFPUC and the BAWSCA and are documented in Sections 7.1 through 7.3 as well as Appendix I of the 2020 UWMP.

Agency (BAWSCA) to better refine the estimates of RWS supply reliability and may revise its UWMP accordingly. The SFPUC and BAWSCA have also been taking various actions to improve the reliability of the RWS supply, including implementing a number of dry year water supply projects, exploring alternative water supplies, and implementing Long-Term Reliable Water Supply Strategy recommendations.

As part of the supply reliability analysis, Redwood City has conducted a Drought Risk Assessment (DRA), which evaluates the effects on available water supply sources of an assumed five-year drought commencing the year after the assessment is completed (i.e., from 2021 through 2025). Prior to the assumed implementation of the Bay-Delta Plan Amendment in 2023, Redwood City's supply is expected to be sufficient to meet demands during the first two consecutive dry years (i.e., 2021 and 2022). However, based on the current allocation methodology and SFPUC dry year cutbacks, Redwood City is expected to experience significant shortfalls in subsequent years of the assumed drought through 2025. The largest shortfall is estimated to be 4,143 AFY in 2025.

Redwood City has developed this WSCP to address water shortage conditions resulting from any cause (e.g., droughts, impacted distribution system infrastructure, regulatory-imposed shortage restrictions, etc.). The WSCP identifies a variety of actions that Redwood City will implement to reduce demands and further ensure supply reliability at various levels of water shortage.

3. PRIOR DROUGHT ACTIONS

As described below, water savings achieved by the City during 2014 and 2015 in response to the recent historic drought support the findings of the baseline water use profile (i.e., that discretionary uses can be targeted to achieve significant water savings).

On April 1, 2015, Governor Brown issued the fourth in a series of Executive Orders regarding actions necessary to address California's severe drought conditions. Executive Order B-29-15 directed the State Water Resources Control Board (SWRCB) to impose the first ever mandatory restrictions on urban water suppliers to achieve a statewide 25% reduction in potable urban water usage through February 2016. The Executive Order also required commercial, industrial, and institutional (CII) users to implement water efficiency measures, prohibited irrigation with potable water of ornamental turf in public street medians, and prohibited irrigation with potable water outside newly constructed homes and buildings that was not delivered by drip or microspray systems, along with numerous other directives.

On May 5, 2015, the SWRCB adopted Resolution 2015-0032 that mandated minimum actions by water suppliers and their customers to conserve water supplies into 2016 and assigned a mandatory water conservation savings goal to each water supplier based on their residential-gallons per capita per day (R-GPCD). The Office of Administrative Law approved the regulations and modified the California Water Code (CWC) on 18 May 2015. On February 2, 2016, the SWRCB voted to extend the emergency regulations until October 2016 with some modifications. On May 9, 2016, the Governor issued Executive Order B-37-16, which directed the SWRCB to extend the emergency regulations through the end of January 2017 as well as make certain water use restrictions permanent. On May 18, 2016, the SWRCB adopted Resolution 2016-0029 that adjusts the water conservation savings goal and replaces the February 2016 emergency regulation. The SWRCB is expected to take separate actions to make some of the requirements of the regulations permanent in response to the Executive Order.

The mandatory conservation standards included in CWC Section 865(c) ranged from 8% for suppliers with a 2013 R-GPCD below 65 R-GPCD, up to 36% for suppliers with an R-GPCD of greater than 215 GPCD. As with previous emergency drought regulations adopted by the SWRCB in 2014, the new water conservation regulation was primarily intended to reduce outdoor urban water use. Based on its R-GPCD, Redwood City was required to reduce water use by 8% relative to its 2013 water use.

Prior to the 2015 SWRCB Resolution, the City Council had already declared Stage 2 of the 2010 WSCP to respond to 2014 SWRCB actions[2]. Stage 2 of the City's 2010 WSCP called for a 20% water reduction and restrictions on outdoor irrigation to two days per week. The City also requested a 27% cutback from irrigation accounts through the Water Allocation Program.

In 2015, the City implemented a vigorous water conservation outreach program to accelerate implementation of its conservation programs focusing on outdoor water use reductions. The City identified the sectors having the most water savings potential and focused programmatic assistance

[2] The 2014 SWRCB actions mandate that water suppliers shall implement the requirements of its WSCP that impose mandatory restrictions on outdoor irrigation of ornamental landscapes or turf with potable water.

towards these sectors and amongst top water users. A variety of outreach methods was utilized including direct mail, advertising, classes, events, website, and social media. The outreach message was tailored to each customer class and the specific programs that apply to each class. The City's recycled water fill station program also came online in 2015 and provided 12 AFY of recycled water to residential and commercial customers.

The City surpassed its reduction targets in each month starting in April 2015; during the June 2015 through October 2016 compliance period, the City surpassed its water use reduction target, with a cumulative savings of 23% relative to its 2013 use.

4. ANNUAL WATER SUPPLY AND DEMAND ASSESSMENT PROCEDURES

☑ ***CWC § 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.

☑ ***CWC § 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.

☑ ***CWC § 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.

On an annual basis, the City will conduct an Annual Supply-Demand Assessment (Annual Assessment) to identify whether there is likely to be a water shortage condition in the following year. Because the City's sole source of potable water supply is from the SFPUC RWS, the evaluation of City supplies for a particular year will be conducted as part of a coordinated effort lead by BAWSCA and SFPUC. The procedure used by BAWSCA and SFPUC in conducting an Annual Assessment is outlined in Attachment 1 of this WSCP.

As part of the Annual Assessment process, the City will provide unconstrained demand information to BAWSCA and SFPUC incorporating water demand from development projects which will be completed in the coming year. Furthermore, Public Works will coordinate with the Community Development and Transportation Department to identify if any infrastructure projects that will have an impact on water delivery.

5. WATER SHORTAGE LEVELS

☑ ***CWC § 10632 (a) (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.

Consistent with the requirements of California Water Code (CWC) § 10632(a)(3), this WSCP is based on the six water shortage levels (also referred to as "stages") shown in Table 5-1. These shortage stages are intended to address shortage caused by any condition, including the catastrophic interruption of water supplies. Table 5-1 summarizes the water supply reductions and supply conditions associated with each stage of action.

Table 6-1 and Table 6-2 describe the customer restrictions and prohibitions and actions to be taken by City staff associated with each stage of action. Specific prohibitions and City actions are discussed in more detail below. The monthly and cumulative annual water savings impacts associated with each restriction, prohibition and consumption reduction method were quantitatively estimated using the Drought Response Tool (DRT) for each stage of action (see Section 6.6).

Table 5-1 Stages of Water Shortage Contingency Plan

Shortage Level	Percent Shortage Range	Shortage Response Actions
1	Up to 10%	• Declaration by the City Council upon the determination that the SFPUC or another governing authority (e.g., the SWRCB) has required a voluntary or mandatory reduction in water use of up to 10% due to water supply shortages or an emergency. • Include implementation of voluntary restrictions on end uses and a Water Allocation Program (see Table 6-1) as well as agency actions (see Table 6-2).
2	Up to 20%	• Declaration by the City Council upon the determination that the SFPUC or another governing authority (e.g., the SWRCB) has required a voluntary or mandatory reduction in water use from 10% to 20% due to water supply shortages or an emergency. • Include implementation of a mandatory Water Allocation Program, voluntary restrictions on end uses (see Table 6-1), as well as agency actions (see Table 6-2).
3	Up to 30%	• Declaration by the City Council upon the determination that the SFPUC or another governing authority (e.g., the SWRCB) has required a voluntary or mandatory reduction in water use from 20% to 30% due to water supply shortages or an emergency. • Include implementation of a mandatory Water Allocation Program, voluntary restrictions on end uses (see Table 6-1), as well as agency actions (see Table 6-2).
4	Up to 40%	• Declaration by the City Council upon the determination that the SFPUC or another governing authority (e.g., the SWRCB) has required a voluntary or mandatory reduction in water use from 30% to 40% due to water supply shortages or an emergency. • Include implementation of a mandatory Water Allocation Program, voluntary restrictions on end uses (see Table 6-1), as well as agency actions (see Table 6-2).
5	Up to 50%	• Declaration by the City Council upon the determination that the SFPUC or another governing authority (e.g., the SWRCB) has required a voluntary or mandatory reduction in water use from 40% to 50% due to water supply shortages or an emergency. • Include implementation of a mandatory Water Allocation Program, voluntary restrictions on end uses (see Table 6-1), as well as agency actions (see Table 6-2).
6	>50%	• Declaration by the City Council upon the determination that the SFPUC or another governing authority (e.g., the SWRCB) has required a voluntary or mandatory reduction in water use greater than 50% due to water supply shortages or an emergency. • Include implementation of a mandatory Water Allocation Program, voluntary restrictions on end uses (see Table 6-1), as well as agency actions (see Table 6-2).

6. SHORTAGE RESPONSE ACTIONS

☑ ***CWC § 10632 (a) (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.

☑ ***CWC § 10632 (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.

This section describes the response actions the City will take to deal with the shortages associated with each of the six stages enumerated in Section 5 (Table 5-1).

6.1 Supply Augmentation

Redwood City relies on the SFPUC RWS for its potable supplies. There are currently no supply augmentation actions planned in the City's shortage response actions. However, as discussed in Section 6.7 of the City's 2020 UWMP, potential transfer and exchange opportunities exist within and outside of the SFPUC RWS.

The Water Shortage Allocation Plan (WSAP) adopted by all BAWSCA agencies and the SFPUC provides the basis for voluntary transfers of water among BAWSCA agencies during periods when mandatory rationing is in effect on the SFPUC RWS (see also Section 7.1.1 of the UWMP). Some BAWSCA agencies have the capacity to rely on groundwater or other sources during dry years and thus may be willing to transfer a portion of their wholesale water entitlement to other BAWSCA agencies in need of supply above their allocations. Securing water from willing sellers outside the SFPUC RWS is a more complex process than transfers within the RWS, which requires both a contract with the seller agency and approval by the SFPUC. BAWSCA has the authority to plan for and acquire supplemental water supplies and continues to evaluate the feasibility of water transfers as part of its implementation of its Long-Term Reliable Water Supply Strategy (see Section 7.1.1 of the 2020 UWMP).

6.2 Demand Reduction Methods

As discussed in Chapter 9 of the UWMP, the City has a Water Allocation Program that establishes informational water budgets for single family customers. These water budgets are based on, among others things, water use assumptions consistent with the use of common water efficient technologies and practices. Similarly, the City has developed a Large Landscape Program, wherein dedicated irrigation sites that are separately metered are given water budgets and billed accordingly. During implementation of the City's WSCP in a water shortage condition, it is expected that the City's water budget programs will extend to all sectors and that customers exceeding their water allocations will face higher water rates. Given that the City has these water budget programs in place, the focus of demand reduction methods in the WSCP is to identify the actions and measures that can assist the City and its customers to meet their water budgets.

The WSCP lists consumption reduction methods that the City will implement during each stage of action to reduce the City's own potable water consumption and encourage reduction in water use by its customers. Consumption reduction methods associated with each stage of action are presented in Table 6-1. The monthly and cumulative annual water savings impacts associated with each restriction, prohibition and consumption reduction method were quantitatively estimated using the DRT for each stage of action (see Attachment 2).

6.3 Operational Changes

The WSCP lists the operational changes that the City will implement during each stage of action including measures to: (1) reduce system losses through a reduction in flushing of water distribution mains, (2) increase enforcement and customer service, (3) implement a Water Allocation Program, and in certain conditions, (4) implement a moratorium on new service connections.

Table 6-1 Demand Reduction Actions (DWR Table 8-2)

Shortage Level	Demand Reduction Actions	How much is this going to reduce the shortage gap? (a)	Additional Explanation or Reference	Penalty, Charge, or Other Enforcement?
1	Other	5%	1. Water use shall not exceed Stage 1 water budgets for each customer. 2. Prohibit use of potable water through broken or defective plumbing and irrigation systems. 3. Irrigating outdoor ornamental landscapes or turf with potable water is limited to no more than three (3) days per week. 4. Irrigation with potable water outside of newly constructed homes and buildings not delivered by drip or microspray is prohibited.	Yes
2	Other	15%	1. Continue with actions and measures from Stage 1 except where superseded by more stringent requirements. 2. Irrigating outdoor ornamental landscapes or turf with potable water is limited to no more than two (2) days per week. 3. Water use shall not exceed Stage 2 water budgets for each customer.	Yes
3	Other	25%	1. Continue with actions and measures from Stage 2 except where superseded by more stringent requirements. 2. Irrigating outdoor ornamental landscapes or turf with potable water is limited to no more than one (1) day per week. 3. Vehicle washing is prohibited except at facilities using recycled or recirculating water. 4. Water use shall not exceed Stage 3 water budgets for each customer.	Yes
4	Other	35%	1. Continue with actions and measures from Stage 3 except where superseded by more stringent requirements. 2. Water use shall not exceed Stage 4 water budgets for each customer.	Yes

Shortage Level	Demand Reduction Actions	How much is this going to reduce the shortage gap? (a)	Additional Explanation or Reference	Penalty, Charge, or Other Enforcement?
5	Other	45%	1. Continue with actions and measures from Stage 4 except where superseded by more stringent requirements. 2. Potable water shall not be used for irrigation of turf grass or all outdoor uses. 3. Water use shall not exceed Stage 5 water budgets for each customer.	Yes
6	Other	55%	1. Continue with actions and measures from Stage 5 except where superseded by more stringent requirements. 2. Water use shall not exceed Stage 6 water budgets for each customer.	Yes
NOTES: (a) The percentages listed in this table are the cumulative savings for each shortage level with implementation of corresponding supply augmentation and other agency actions in Table 6-2. Detailed saving estimates based on end use, response action, and implementation rates can be found in Attachment 2.				

Table 6-2 Supply Augmentation and Other Actions (DWR Table 8-3)

Shortage Level	Supply Augmentation Methods and Other Actions by Water Supplier	How much is this going to reduce the shortage gap? (a)	Additional Explanation or Reference
1	Other	5%	1. Maintain water waste reporting portals, which may include a hotline, email address, and/or smart phone application. 2. Conduct public education. 3. Implement voluntary Water Allocation Program Stage 1. 4. Implement a conservation outreach program. 5. Conduct coordination with BAWSCA and SFPUC.
2	Other	15%	1. Continue with actions and measure from Stage 1 except where superseded by more stringent requirements. 2. Increase public education. 3. Accelerate water conservation program implementation. 4. Cut back flushing of water distribution mains for water quality purposes. 5. Implement mandatory Water Allocation Program Stage 2 with moderate water rate incentives and/or penalties for exceeding allocation/budget. 6. Schedule staff for enforcement and customer service. 7. Increase public outreach, including information regarding fines or penalties for non-compliance.
3	Other	25%	1. Continue with actions and measures from Stage 2 except where superseded by more stringent requirements. 2. Implement mandatory Water Allocation Program Stage 3 with significant water rate incentives and/or penalties for exceeding allocation/budget. 3. Increase enforcement and water waste patrols. 4. Suspend routine flushing of water mains except when necessary to address immediate health or safety concerns. 5. Moratorium on new water connections.

Shortage Level	Supply Augmentation Methods and Other Actions by Water Supplier	How much is this going to reduce the shortage gap? (a)	Additional Explanation or Reference
4	Other	35%	1. Continue with actions and measures from Stage 3 except where superseded by more stringent requirements. 2. Implement mandatory Water Allocation Program Stage 4 with significant water rate incentives and/or penalties for exceeding allocation/budget. 3. Continue increasing public outreach. 4. Continue increasing enforcement and water waste patrols.
5	Other	45%	1. Continue with actions and measures from Stage 4 except where superseded by more stringent requirements. 2. Implement mandatory Water Allocation Program Stage 5 with severe water rate incentives and/or penalties for exceeding allocation/budget. 3. Reduce distribution system pressures.
6	Other	55%	1. Continue with actions and measures from Stage 5 except where superseded by more stringent requirements. 2. Implement mandatory Water Allocation Program Stage 6 with severe water rate incentives and/or penalties for exceeding allocation/budget.
NOTES: (a) The percentages listed in this table are the cumulative savings for each shortage level with implementation of corresponding demand reduction actions in Table 6-1. Detailed saving estimates based on end use, response action, and implementation rates can be found in Attachment 2.			

6.4 Defining Water Features

☑ ***CWC § 10632 (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.

As required by CWC § 10632, the City distinguishes between "decorative water features" such as ponds, lakes, and fountains that are artificially supplied with water and "recreational water features" such as swimming pools and spas. Prohibitions on water use for decorative water features are listed separately from those for recreational water features (see Table 6-1).

6.5 Prohibitions on End Uses

Restrictions and prohibitions associated with each stage of action are presented in Table 6-1. As discussed above, these responses focus on the reduction of non-essential water uses such as ornamental landscape irrigation and are developed based on the water needs rather than past water use of City's customers whenever possible. Prohibitions become increasingly restrictive in higher WSCP stages.

As shown in Table 6-1, it is anticipated that the City will implement its Water Allocation Program to assign a water budget to each customer. The water budgets are developed for each Stage of Action and are enforced during higher stages (i.e., Stages 2 through 6). Table 6-3 further describes how the cutbacks will be distributed between water use sectors and end uses, in order to collectively achieve the targeted water savings associated with each stage of action. The measures and prohibitions described for each stage of action in Table 6-1 are designed to assist customers in meeting their target reductions and water budgets.

Table 6-3 Water Allocation Program Cutbacks by Customer Sector

Customer Sector	Stage 1	Stage 2	Stage 3	Stage 4	Stage 5	Stage 6
Residential Indoor Allocation	50 GPCD	45 GPCD	40 GPCD	34 GPCD	31 GPCD	27 GPCD
Residential Outdoor Reduction	15%	35%	65%	80%	90%	100%
Commercial (CII) Reduction	3%	7%	10%	20%	30%	35%
Irrigation Accounts Reduction	15%	35%	65%	80%	90%	100%
Recycled Water Reduction	0%	0%	0%	0%	0%	0%

6.6 Shortage Response Action Effectiveness

In order to evaluate and ensure that effective actions will be implemented with the proper level of intensity, Redwood City employed the Drought Response Tool (or DRT), an Excel spreadsheet model developed by EKI Environment and Water, Inc. The DRT model calculates monthly savings anticipated by implementing each stage of action as detailed below.

6.6.1 Baseline Water Use Profile

Using the DRT, the City developed a baseline water use profile that reflected usage patterns within the City's service area by major water use sector during 2018 and that was used to guide development of the WSCP. Key findings from this analysis are presented below.

Residential Per Capita Demand

The City's baseline residential water demand in 2018 was approximately 62 R-GPCD. As shown in Table 6-4 and associated chart, this R-GPCD is close to the average BAWSCA-wide average of 61 R-GPCD and is significantly less that the statewide average of 90 R-GPCD.

Residential Indoor Water Use

In 2020, the City participated in California Department of Water Resources' (DWR's) Indoor Residential Water Use Study (IRWUS), which estimated the City's residential indoor-per capita water use using the City's hourly Advance Metering Infrastructure (AMI) data. Comparing several different methods, the study estimated the City's single family residential indoor water use between 37 and 45 GPCD and multi-family residential water use between 38 and 41 GPCD. These estimates align with the baseline water use profile shown in Table 6-5.

Proportion of Outdoor Water Use

As shown on Table 6-5 and associated charts, outdoor water use, which can generally be considered as a "discretionary water use", was estimated to be approximately 36% of the City's potable consumption during the baseline time period (2018). Dedicated irrigation meters for potable water accounted for 21% of the total potable irrigation demand, indicating that approximately 79% of outdoor water use is not metered with a separate meter, and is therefore more difficult to track and directly target.

The proportion of outdoor water use within both residential and commercial sectors (37% and 23%, respectively) indicates that there is a potential to achieve significant potable water savings across these sectors, simply by focusing on outdoor uses. As further shown in Table 6-5 and associated charts, the seasonal variation in baseline potable water use reflects increased irrigation demands during the summer and fall months. Therefore, the greatest potential for reductions in non-essential water use are expected during these months.

Table 6-4 Baseline Residential Per Capita Water Demand

	Baseline Residential Per Capita Water Demand (R-GPCD)
Redwood City (a)	62
BAWSCA Agencies (b)	61
Statewide Average (c)	90

NOTES:
(a) Redwood City's baseline R-GPCD calculated using 2018 metering data.
(b) Average BAWSCA R-GPCD calculated from data provided in BAWSCA Annual Survey FY 2018-19 (BAWSCA, 2020).
(c) State-wide R-GPCD for 2018 obtained from data provided at California State Water Resources Control Board Water Conservation Portal - Conservation Reporting, http://www.waterboards.ca.gov/water_issues/programs/conservation_portal/conservation_reporting.shtml, accessed March 2021.

Chart 6-4 Baseline Residential Per Capita Water Demand

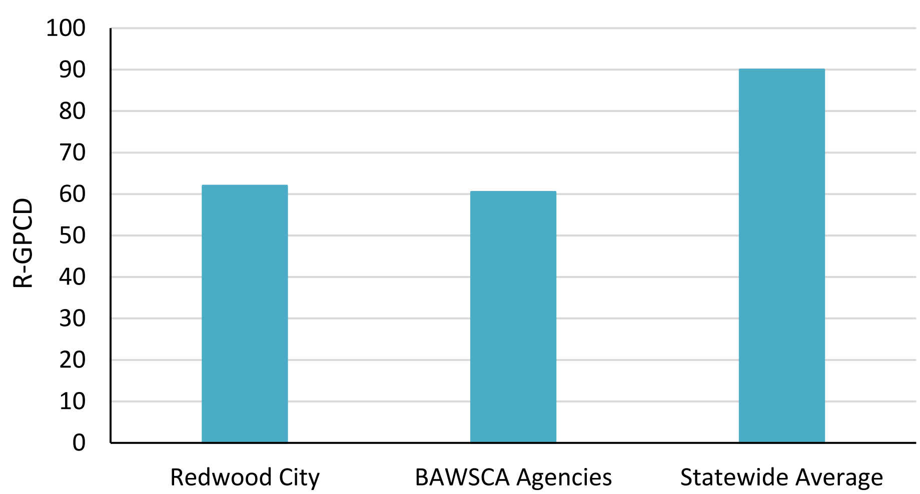


Table 6-5 Baseline Water Use Profile

Sector	End-Use	Baseline Water Use													Annual % of Total by Sector
		January	February	March	April	May	June	July	August	September	October	November	December	Annual	
Residential	Indoor	317	286	317	307	317	307	317	317	307	317	307	317	3,730	63%
	Outdoor	66	104	56	121	202	294	313	303	279	223	168	95	2,224	37%
	Subtotal Residential	*383*	*390*	*373*	*428*	*519*	*601*	*629*	*620*	*586*	*540*	*474*	*412*	*5,954*	-
CII	Indoor	116	105	116	112	116	112	116	116	112	116	112	116	1,365	77%
	Outdoor	11	30	18	40	51	54	71	53	33	49	9	0	418	23%
	Subtotal CII	*127*	*135*	*134*	*152*	*167*	*166*	*187*	*169*	*145*	*165*	*121*	*116*	*1,783*	-
Dedicated Irrigation	Outdoor	19	12	21	73	110	115	115	100	75	60	11	8	721	100%
Non-Revenue	Non-Revenue	50	84	85	177	90	106	71	69	-11	86	23	30	860	100%
Total	Indoor	433	391	433	419	433	419	433	433	419	433	419	433	5,096	55%
	Outdoor	96	146	95	234	363	463	499	456	388	332	188	103	3,363	36%
	Non-Revenue	50	84	85	177	90	106	71	69	-11	86	23	30	860	9.2%
	Total	**579**	**621**	**613**	**830**	**886**	**988**	**1,003**	**958**	**796**	**851**	**629**	**566**	**9,318**	-

NOTES:
(a) Volumes are in units of AF.
(b) Baseline water use from the City's monthly metering data for each sector.
(c) Indoor water use was estimated to be the lowest monthly water use for each sector, accounting for the number of days in each month. Outdoor water use for each sector was estimated to be the difference between the total water use and the estimated indoor water use.

Chart 6-5A Baseline Year Annual Water Use by Sector and End Use

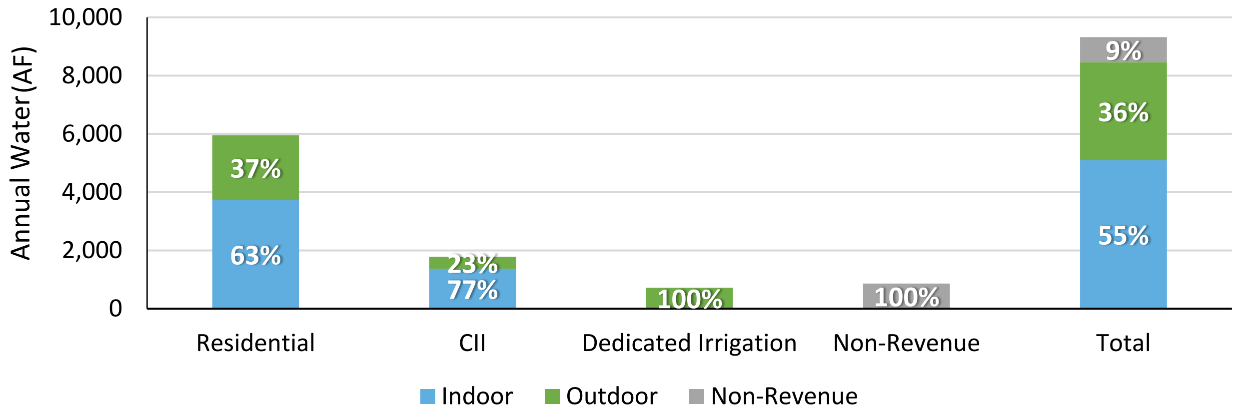
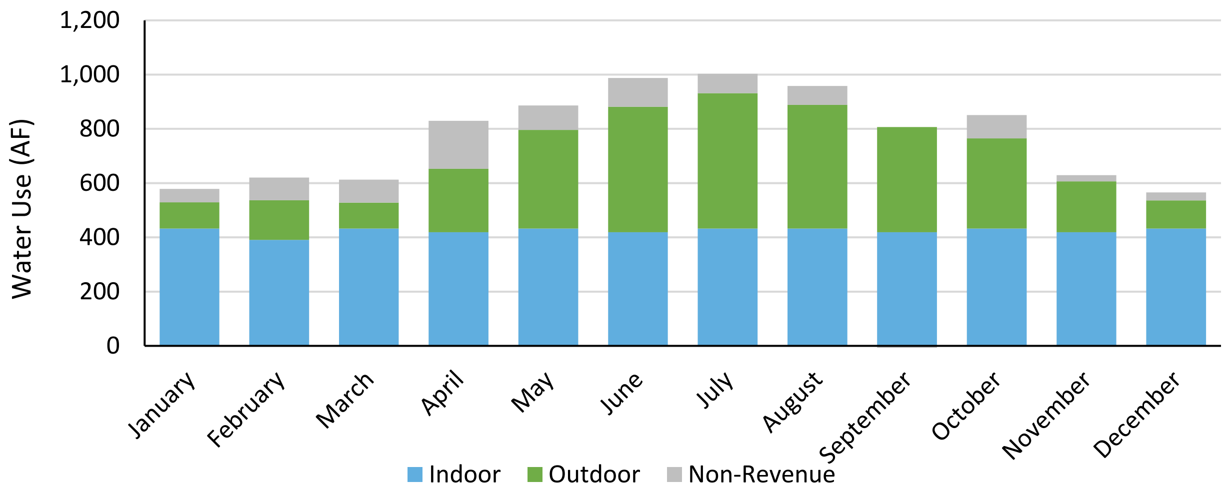


Chart 6-5B Baseline Year Monthly Indoor vs. Outdoor Water Use



6.6.2 Shortage Response Action Effectiveness

The DRT provides a quantitative framework that allows the City to systematically estimate the monthly and cumulative annual demand reductions expected to result from particular combinations of drought response actions and associated implementation rates. Data inputs to the DRT include total production, class-specific water use, population, and assumptions regarding the split between indoor and outdoor water use for each customer class.

For each drought response action, the user specifies:

- The customer class(es) and end use(s) that are affected;
- The percent savings for that end use for each account that implements the action. These are based on evaluations reported in the literature, or where such studies are not available, on best estimates based on City's experience; and
- The percentage of accounts assumed to implement the action, which is presumed to be the result of the intensity level of the City's program implementation, including but not limited to, marketing and enforcement activities.

An additional critical DRT user input is a set of constraints on demand reductions to ensure that usage levels do not endanger health and safety or result in unacceptable economic impacts. The DRT will not permit estimated usage reductions to violate these constraints, regardless of the demand reduction actions selected. The constraints are:

- A minimum residential indoor per capita daily usage of 25 gallons,
- A maximum residential outdoor usage reduction of 100%,
- A maximum Commercial, industrial, and institutional (CII) indoor usage reduction of 30%, and
- A maximum CII outdoor usage reduction of 100%.

Based on the foregoing data, the DRT model calculates the resulting monthly savings. Redwood City adjusted the combination of actions and implementation levels to achieve the targeted savings levels at each of the six stages of action.

For each of the stages of action, the modeling targeted the mid-range of the required demand reduction range, ergo:

- 5% for Stage 1,
- 15% for Stage 2,
- 25% for Stage 3,
- 35% for Stage 4,
- 45% for Stage 5, and
- 55% for Stage 6.

The key DRT inputs and outputs for each of the stages of action are reproduced in Attachment 2.

The City's shortage response actions are summarized in Table 6-1 and Table 6-3. Key DRT inputs and outputs for each of the stages of action are reproduced in Attachment 2, including the water shortage reduction actions, savings assumptions, and implementation rates that are required for the City to achieve the required annual demand reductions for each of the six stages of action. At each stage, there are two types of demand-reduction actions identified:

- Restrictions on customer water usage; and
- Consumption reduction actions by Redwood City to encourage decreased water usage.

Many actions are implemented across a number of stages, some at increasing implementation levels. Therefore, the actions are listed as a row under the first stage at which they are implemented, and the implementation rate is listed under each stage column heading at the right. The unit savings represent a percentage savings of the end uses indicated in the table.

6.7 Catastrophic Supply Interruption

Catastrophic supply interruptions may be caused by a regional power outage, natural disaster, or national security/terrorism emergencies. Catastrophic interruptions may occur in the SFPUC RWS and the City is also vulnerable to local failures in its water distribution system. In the event of a catastrophic supply interruption, the response procedures that the City would follow are described in:

- SFPUC Emergency Operations Plan (EOP);
- San Mateo County's Operational Area EOP Potable Water Procurement and Distribution Annex; and
- Redwood City Water System Emergency Response Plan (ERP).

Actions described in the SFPUC EOP focus on maintaining flow within, and from, the RWS pipelines. A summary of SFPUC's emergency response procedures is included as Attachment 3 hereto. Redwood City's Water System ERP (Redwood City, 2021) is consistent with the County of San Mateo's Operational Area EOP Potable Water Procurement and Distribution Annex (County of San Mateo, 2004).

Together, these EOPs provide the framework for responding to major emergencies or disasters associated with natural disasters, technological incidents, and national security/terrorism emergencies. Sections of these EOPs outline specific strategies to prepare for, mitigate, respond to, and recover from an emergency or disaster that affects the water utilities that serve the population within San Mateo County and the City, in particular.

Redwood City's emergency planning efforts are summarized below.

6.7.3 <u>Redwood City Water System Emergency Response Plan</u>

The Redwood City Water System ERP serves to guide the City's emergency management and Water Utility Emergency Response Manager in an organized response to water treatment and distribution emergencies. The plan provides information on personnel roles, responsibilities, emergency services, communication, recovery, and reporting procedures. Specifically, the ERP describes the following:

- San Mateo County/Operational Area emergency management organization to assist in mitigating any significant emergency or disaster.

- Authorities, policies, responsibilities, and procedures required, protecting the health and safety of San Mateo County.
- Operational concepts and procedures associated with field response to emergencies, Emergency Operations Center activity, and the recovery process.
- Standardized Emergency Management System for use within the City of Redwood City, San Mateo County/Operational Area, State Office of Emergency Services Coastal Region and state systems.
- Multi-agency and multi-jurisdictional coordination, particularly between local government (Redwood City) and San Mateo County; San Francisco Water Department and local, state, and federal agencies during emergency operations.
- Pre-event emergency planning as well as emergency operations procedures.

The procedures are designed to facilitate the acquisition and distribution of alternative potable water to Redwood City in the event of a local, Operational Area and/or Regional water emergency. These procedures require the support of public, private, and volunteer agencies.

A catastrophic supply interruption may result in a partial or full interruption of potable supply for Redwood City and adjacent water suppliers that also relies on the SFPUC RWS. Therefore, the City primarily relies upon emergency storage during such an interruption. Depending on the severity and interruption, the City plans for different emergency response actions:

- If an interruption is anticipated for several hours to one day, there may not be any action taken.
- If an interruption is anticipated for between one day to one week, the ERP calls for water demand to be reduced to 2 to 4 gallons per capita per day, based on World Health Organization estimates of water needed hydration, essential health and hygiene.

As discussed in the 2020 UWMP, the City currently has a total storage capacity of 21.2 million gallons and is in the process of constructing additional system storage.

An update to Redwood City's Water System Emergency Response Plan is currently in process and is planned to be completed in June 2021.

7. SEISMIC RISK ASSESSMENT

☑ ***CWC § 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.

G&E Engineering Systems, Inc. completed a Seismic Vulnerability Assessment (Seismic Assessment) on the City's water system infrastructure on September 2011 and recommended a number of improvements, including improving post-earthquake pipe repair capability, anchoring of essential equipment at pump stations, installing a saltwater firefighting system for Redwood Shores and the Port/Slough areas, and upgrading certain tanks, among others. The report is incorporated into the City's 2011 Water System Master Plan (Redwood City 2011). Since 2011, the City has completed over 70% of the seismic improvements identified in the assessment.

Impacts associated with earthquakes and liquefaction are discussed in the 2016 San Mateo County Hazard Mitigation Plan (County HMP; County of San Mateo, 2016). The County HMP includes a discussion of the probability of a seismic event affecting San Mateo County, citing a United States Geological Survey (USGS) estimate of a 63% probability of at least one 6.7 or greater magnitude earthquake before 2036 affecting the greater San Francisco Bay area. The County LHMP also includes an assessment of the County's vulnerability in the event of a major seismic event, and estimates that an earthquake on the Northern San Andreas Fault of magnitude 7.8 would result in a total building damage of approximately $39.7 billion, or 12.4% of the total assessed value for the planning area.

8. COMMUNICATION PROTOCOLS

☑ ***CWC § 10632 (a) (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.

Even before formal declaration of a water shortage, a public information program will be activated to provide customers with as much advance notice as possible. Following declaration of a shortage, City customers would need to be provided notice of water shortage rules and regulations via a variety of media and communications methods. The public information program will reach out to each customer sector notifying them of their reduction goals under the Water Allocation Program and what conservation programs are available. The public information program will also target outreach to sectors with the highest savings potential, high water users, and outdoor water uses.

Coordination between the City and with other public agencies can begin prior to formal declaration of a water shortage and can be accomplished through regular meetings, e-mail group updates, and presentations. In a regional water shortage scenario, the City would use the public outreach resources and materials provided by BAWSCA and/or the SFPUC. In addition to these materials, the City may develop its own materials to communicate with customers, such as a dedicated customer service hotline, and expand its normal public outreach to support its water conservation efforts (see Chapter 9 of the UWMP).

9. COMPLIANCE AND ENFORCEMENT

☑ ***CWC § 10632 (a) (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.*

Enforcement of the City's water use restrictions and prohibitions is focused on soliciting cooperation from water customers who are unaware of the restrictions or have failed to comply with the provisions of this WSCP. If discussions with the customer are unsuccessful in obtaining compliance, the City is authorized to issue penalties to customers that violate the restrictions and prohibitions listed in Table 6-1. The penalties, charges, and other enforcement actions that the City is authorized to take after each violation of the WSCP are described in the City's WSCP Resolution adopted by the City Council and are summarized in Table 9-1 and Table 9-2. Actions range from a warning after the first violation, up to a $500 fine and discontinuance of water service after the fifth violation. As shown in Table 9-2, customers will incur additional charges for installation and removal of flow restricting devices and disconnection and reconnection of service if the City deems these actions necessary.

City employees and members of the public may register water waste complaints through a telephone hotline, email, the Redwood City smartphone application, or bring the complaint directly to City staff. Staff will be available to provide information and respond to complaints. Staff may also seek assistance from other City Departments in responding to complaints and enforcing water use restrictions.

As discussed in Section 9.2.6 of the UWMP, the water conservation team consists of various City staff members led by the Public Works Director and Assistant Public Works Director. Staff time dedicated to water conservation and enforcement action will increase with the severity of a supply shortage. Additional duties may be assigned to current City employees or hiring of temporary staff may be considered to meet staffing needs during extreme water shortages.

Table 9-1 Enforcement of Water Use Restrictions and Prohibitions

Violation	Enforcement Action or Penalty
All	Each day in which a violation occurs shall be considered a separate offense. The fine for the infraction is in addition to, and does not supersede or limit, any other remedies, civil or criminal.
1st	Notice of violation door hanger/email/phone call to customer, resident, or business.
2nd	Certified letter from City notifying customer, resident, or business of violation and potential future fines.
3rd	One hundred dollars ($100) fine for a third violation of the same provision within one (1) year.
4th	Two hundred dollars ($200) fine for a fourth violation of the same provision within one (1) year.
5th and Above	Five hundred dollars ($500) fine for all subsequent violations of the same provision within one (1) year.

Table 9-2 Charges for Installation or Removal of Flow Restricting Devices

Meter Size	Installation Charge	Removal Charge
5/8” to 1”, inclusive	$50	$50
1-1/2” to 2”, inclusive	$100	$100
3” or larger	Actual Cost	Actual Cost

10. LEGAL AUTHORITIES

☑ ***CWC § 10632 (a) (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.

☑ ***CWC § 10632.3***

It is the intent of the Legislature that, upon proclamation by the Governor of a state of emergency under the California Emergency Services Act (Chapter 7 (commencing with Section 8550) of Division 1 of Title 2 of the Government Code) based on drought conditions, the board defer to implementation of locally adopted water shortage contingency plans to the extent practicable.

The City's WSCP is adopted by Resolution No. 15962, a Resolution of the City Council of the City of Redwood City Adopting a Water Shortage Contingency Plan and A Water Conservation Program.

The provisions of each water shortage stage of action are triggered upon determination by the City Council that the City must achieve a voluntary or mandatory reduction in water use because of water shortage conditions.

The provisions of each action stage will become effective after the City Council declares that a particular action stage and Redwood City has published notice of this determination to its customers. Once effective, the provisions of a water shortage stage of action will stay in effect until: (1) a different stage of action is declared; or (2) the City Council determines that the water shortfall condition no longer exists and City has published notice of this determination.

The City shall declare a water shortage emergency in accordance with Water Code Chapter 3 (commencing with Section 350) of Division 1. The City shall coordinate with any city or county within which it provides water supply services for the possible proclamation of a local emergency. A list of contacts for other cities and counties within the Redwood City service area is provided below:

- City of San Carlos
  City Manager
  600 Elm St.
  San Carlos, CA 94070
  (650) 802-4228
- Town of Woodside
  Town Manager
  2955 Woodside Rd.

Woodside, CA 94062
(650) 851-6790

- San Mateo County
  County Manager
  400 County Center, 1st Floor
  Redwood City, CA 94063
  (650) 363-4123

The City is a member of BAWSCA and anticipates coordinating with other Member Agencies via BAWSCA during a water shortage or emergency on the SFPUC RWS.

11. FINANCIAL CONSEQUENCES OF WSCP

☑ ***CWC § 10632 (a) (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.

Implementation of the WSCP will result in a decrease in water use and a corresponding decline in water sales revenues. During drought periods, water wholesale costs may also be higher due to increased drought rates. Water-related expenditures may also increase as a result of acceleration of water conservation program measures and implementation of public outreach. Without a plan in place to offset the impacts of these revenue decreases and cost increases, the City could face significant financial consequences due to a drought.

Pursuant to longstanding policies reflected in its guiding principles for managing the Water Enterprise Fund, Redwood City maintains an emergency reserve fund to address the potential financial impacts of severe drought and implementation of water conservation measures. Under its Water Financing Plan, the City is committed to maintaining a minimum fund reserve comprised of two components: (a) emergency operating reserves ($2 million, per City Council policy), and (b) 25% of operation and maintenance expenditures, to provide the City with a cushion for moderating the financial impacts of a drought. The City Council adjusts water rates and charges each fiscal year as necessary to maintain appropriate reserves while sustaining balanced Water Enterprise Fund revenues. The City's Water Financing Plan is also substantially driven by the policies described in this UWMP, including: (1) the implementation of recycling and related water conservation projects to minimize adverse financial impacts during periods of drought; and (2) structuring of water rates to encourage customers to conserve water (with higher unit prices for increasing increments of water use).

As shown in Table 6-1 and Table 6-3, the City will enforce a Water Allocation Program in each water shortage level, including assigning a water budget for residential customers based on a GPCD indoor allocation and a cutback from normal outdoor water use. The City's Water Allocation Program prohibits excessive water use pursuant to CWC §365 et seq. Therefore, the cost of compliance with CWC §365 et seq. has been considered in implementation of the WSCP discussed herein.

It is currently anticipated that Water Enterprise Fund reserves should be sufficient to compensate for lower revenues and/or higher expenditures during anticipated periods of drought. However, if sustained periods of drought require the City to sustain mandatory prohibitions, or if higher stages of water reduction are required, the City may be required to increase water rates to compensate for financial impacts of drought measures.

12. MONITORING AND REPORTING

☑ *CWC § 10632 (a) (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.*

Redwood City monitors water use through analysis of wholesale water purchases and customer meter readings. The City reads meters installed on each of its supply turnouts to monitor wholesale water purchases. In addition, each customer account is metered. Some non-residential and multi-family customers have irrigation meters to monitor water use for landscape irrigation separately from indoor uses. As part of the City's Water Allocation Program, each customer is able to access past water use online and compare their water use to their water budget.

City is currently in the process of installing AMI with approximately 75% of all meters on AMI. Implementation of AMI will allow the City to automate meter reading and provide real-time water use data to City staff and customers that can be used to aggressively target leaks and atypically high water use during normal years and periods of water shortage.

Pursuant to California Code of Regulations (CCR) Title 23 §991, the City reports monthly water use and production to the SWRCB[3]. Effective October 1, 2020, during a governor declared drought emergency or when an urban water supplier invokes a water shortage level to respond to a drought greater than 10%, each supplier is required to submit an expanded report that contains the supplier's actions and statistics in achieving planning reductions.

[3] Water supplier monthly reports can be accessed at https://www.waterboards.ca.gov/water_issues/programs/conservation_portal/conservation_reporting.html

13. WSCP REFINEMENT PROCEDURES

☑ ***CWC § 10632 (a) (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.*

The WSCP is implemented as an adaptive management plan. The City will evaluate the need to revise its WSCP every year after performing its Annual Assessment or commensurate with its UWMP updates. The evaluation will consider the effectiveness of WSCP actions and any anticipated water supply shortages assessed by the SDA. If the WSCP is revised, the City Council will adopt a new resolution adopting the revised WSCP and, if necessary, declare a water shortage level to implement.

14. PLAN ADOPTION, SUBMITTAL, AND AVAILABILITY

☑ ***CWC § 10632 (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.*

As described in Section 10, Redwood City informed the public and the appropriate agencies of: (1) its intent to prepare a WSCP, (2) where the WSCP was available for public review, and (3) when the public hearing regarding the WSCP would be held. All notifications were completed in compliance with the stipulations of Section 6066 of the Government Code.

A copy of the adopted WSCP including any amendments will be provided to DWR, the California State Library, San Mateo County, and SFPUC within 30 days of the adoption. An electronic copy of the adopted WSCP will be submitted to the DWR using the DWR online submittal tool.

A copy of the adopted WSCP will be available for public review in the City Hall during normal business hours and on the City's website within 30 days after filing the plan with DWR.

REFERENCES

BAWSCA, 2020. *Bay Area Water Supply and Conservation Agency Annual Survey FY 2018-19*, March 2020.

City of Redwood City, 2011. *City of Redwood City Water System Master Plan*, prepared by West Yost Associates, dated October 2011.

County of San Mateo, 2004. *San Mateo County/Operational Area Emergency Operations Plan, Potable Water Procurement and Distribution Annex, 3rd Edition*, dated July 2004.

County of San Mateo, 2016. *San Mateo County Hazard Mitigation Plan, prepared by Tetra Tech*, dated July 2016.

Redwood City, 2021. Redwood City Water Division Water System Emergency Response Plan, dated June 2021.

Attachment 1

Annual Water Supply and Demand Assessment Procedures

ANNUAL WATER SUPPLY AND DEMAND ASSESSMENT PROCEDURES

Each year the SFPUC evaluates the amount of total water storage expected to occur throughout the RWS and compares it to expected demands. This annual Water Supply and Demand Assessment (WSDA) is described in the subsections below, which are organized by the sequential steps the SFPUC takes to conduct the assessment each year and reference the relevant California Water Code requirements for a WSDA.[1]

The SFPUC's annual WSDA is a robust planning system that considers a range of input factors unique to the SFPUC's water supplies and system configuration while also providing the flexibility to consider new factors. Traditional surface water supplies from the SFPUC's up country, East Bay, and Peninsula reservoirs are the backbone of the water supply, but the SFPUC extends and protects those supplies in many additional ways by: (1) partnering with the community to help save water through robust conservation programs; (2) minimizing the need for additional water to serve new developments through an onsite water reuse program; (3) recycling wastewater resources to deliver water for large non-potable uses; (4) utilizing local groundwater supplies to supplement surface water supplies; (5) investigating new, alternative water supply options such as purified water and desalination; and (6) investing in innovations that allow for creative solutions to meet diverse needs. These efforts help the SFPUC conserve water and diversify supplies to reduce likelihood of a water shortage condition.

1.1 DEMAND ASSESSMENT [WATER CODE SECTION 10632(A)(2)(B)(I)]

To calculate unconstrained customer demand for the purpose of an annual WSDA, the SFPUC collects information on both the retail and wholesale system demands. Retail customer demand is estimated based on the best available information to date, and typically includes the previous year's demands as well as consideration of current demand use patterns or other conditions impacting demands, such as weather and growth. Each year, in February, the SFPUC receives from BAWSCA a report of estimated Wholesale Customer demand for the upcoming year. BAWSCA typically estimates unconstrained demands for the Wholesale Customers by using total water purchased by those customers in the prior year along with other relevant information. Relatively small demands from the two additional wholesale customers not part of the WSA are estimated based on the best available information to date, and typically includes the previous year's demands as well as consideration of current demand use patterns or other conditions impacting demands, such as weather and growth.

1.2 SUPPLY ASSESSMENT [WATER CODE SECTIONS 10632(A)(2)(B)(II) AND 10632(A)(2)(B)(V)]

The RWS collects water from the Tuolumne River watershed in the Sierra Nevada and from local reservoirs in the Alameda and Peninsula watersheds. The RWS draws an average of 85 percent of its supply from the Tuolumne River watershed. This water feeds into an aqueduct system delivering water 167 miles by gravity to Bay Area reservoirs and customers. The remaining RWS supply is drawn from local surface waters in the Alameda and Peninsula watersheds. The split between these resources varies from year to year depending on the water year hydrology and operational circumstances.

To project and evaluate water supply conditions, the SFPUC uses measurements of precipitation and snowpack in the watersheds above Hetch Hetchy, Cherry, and Eleanor Reservoirs. Snowpack conditions are evaluated regularly by the Cooperative Snow Survey (conducted by the SFPUC in partnership with state and federal agencies) beginning in late January of each year. The SFPUC also estimates snowpack conditions using information from airborne snow observatory (ASO) and other sources. The SFPUC maintains a hydrologic model

[1] California Water Code section 10632(a)(1) requires "*the analysis of water supply reliability conducted pursuant to Section 10635.*" Additional information about the SFPUC's water supply reliability analysis can be found in Chapter 7 of the SFPUC's 2020 UWMP.

of the watersheds that uses this information to project expected runoff for the coming year. This process also includes a statistical analysis of additional expected precipitation. In addition to projected runoff, the determination of projected available water supply also takes into account stored water throughout the RWS, water acquired by the SFPUC from non-SFPUC sources, inactive storage, reservoir losses, and allowances for carryover storage.

Additionally, the SFPUC accounts for groundwater provided by the San Francisco Groundwater Supply Project for the in-City retail system and recycled water provided for irrigation at Harding Park, Fleming and Sharp Park Golf Courses.

The RWS relies on precipitation and snowmelt captured and stored in its reservoirs. During droughts, water supply deliveries can exceed inflows, such that water stored in previous years is relied upon to meet demands. Because of the importance of carry-over storage, the SFPUC constantly monitors and evaluates water supply conditions in the RWS. Look-ahead forecasts are updated as a year's hydrology and operations change. Generally, in early winter of any year, SFPUC staff can begin providing a forecast of water supply conditions for the upcoming year based on known and anticipated winter and spring precipitation and snowpack. The predictive power of this forecast improves greatly through the spring. The annual precipitation, snowmelt, and carry-over storage together constitute the SFPUC's reservoir storage condition. Using data for each of these factors, the SFPUC can determine whether the reservoir system will be capable of serving full deliveries to its customers. Section 1.3 describes the system modeling SFPUC conducts

Table 0-1 shows the availability of RWS supplies for retail customers and Wholesale Customers in normal years. Table 0-2 shows the current and projected RWS supply needs to meet retail and wholesale demands based on information and projections presented in the SFPUC's 2020 UWMP.

The SFPUC sells water to 26 of its 28 wholesale customers under the terms of the 25-year contract known as the Water Supply Agreement between the City and County of San Francisco and Wholesale Customers in Alameda County, San Mateo County, and Santa Clara County (WSA) and associated individual water sales contracts with each Wholesale Customer. The WSA carries forward the SFPUC's "Supply Assurance" of 184 million gallons per day (mgd) to the Wholesale Customers. The SFPUC has agreed to deliver water to the Wholesale Customers up to the amount of the Supply Assurance, and this agreement is perpetual and survives the expiration of the WSA. The Supply Assurance is, however, subject to reduction due to water shortage, drought, scheduled RWS maintenance activities, and emergencies. The WSA also describes the temporary limitation on water sales established by the Phased Water System Improvement Plan (WSIP) in 2008. This "Interim Supply Limitation" (ISL) limits water sales from the RWS to an average annual amount of 265 mgd. The WSA allocations the ISL between the SFPUC's retail customers and Wholesale Customers as follows:

- Wholesale supply allocation: 184 mgd
- Retail supply allocation: 81 mgd[2]

Table 0-1. Regional Water System Supply Availability in Normal Years (mgd)

RWS Supply Allocation	Actual	Projected				
	2020	2025	2030	2035	2040	2045
Retail Customers[a, b]	81	81	81	81	81	81
Wholesale Customers[c, d]	184	184	184	184	184	184

[2] Groveland CSD is considered a retail customer of the SFPUC. Thus, RWS supplies to Groveland CSD are accounted for in the retail supply allocation of 81 mgd.

Total RWS Supplies	265	265	265	265	265	265

a Groundwater and recycled water are assumed to be used before RWS supplies to meet retail demand. However, if these alternative supplies are not available, up to 81 mgd of RWS supply could be used in normal years.

b Groveland CSD is reported as a wholesale customer for the purposes of this 2020 UWMP, but it is considered a retail customer of the SFPUC solely for purposes of allocating RWS supplies between retail and Wholesale Customers. Its demands would be met by the retail supply allocation of 81 mgd.

c Projected Wholesale Customer deliveries are limited to 184 mgd, including the demands of the Cities of San Jose and Santa Clara, which are supplied on a temporary and interruptible basis, with their total supply not exceeding 9 mgd assuming supply is available (decision to be made by end of 2028).

d Cordilleras MWC is not a party to the WSA, and it is not included in the wholesale supply allocation of 184 mgd. The demands of Cordilleras MWC are minor (projected to be less than 0.01 mgd) and are anticipated to be met with RWS supplies through 2045.

Table 0-2. Regional Water System Supply Utilized in Normal Years (mgd)

RWS Supply Allocation	Actual	Projected				
	2020	2025	2030	2035	2040	2045
Retail Customers[a, b]	66.5	67.2	67.5	68.6	70.5	73.7
Wholesale Customers[c, d]	132.1	146.0	147.9	151.9	156.3	162.8
Total RWS Supplies	198.6	213.2	215.4	220.5	226.8	236.5

a Groundwater and recycled water are assumed to be used before RWS supplies to meet retail demand. However, if these alternative supplies are not available, up to 81 mgd of RWS supply could be used in normal years.

b Groveland CSD is reported as a wholesale customer for the purposes of this 2020 UWMP, but it is considered a retail customer of the SFPUC solely for purposes of allocating RWS supplies between retail and Wholesale Customers. Its demands would be met by the retail supply allocation of 81 mgd.

c Projected Wholesale Customer deliveries are limited to 184 mgd, including the demands of the Cities of San Jose and Santa Clara, which are supplied on a temporary and interruptible basis, with their total supply not exceeding 9 mgd assuming supply is available (decision to be made by end of 2028).

d Cordilleras MWC is not a party to the WSA, and it is not included in the wholesale supply allocation of 184 mgd. The demands of Cordilleras MWC are minor (projected to be less than 0.01 mgd) and are anticipated to be met with RWS supplies through 2045.

1.3 INFRASTRUCTURE CONSIDERATIONS [WATER CODE SECTION 10632(A)(2)(B)(III)]

On an ongoing basis, the SFPUC's Hetch Hetchy Water and Power, Water Supply and Treatment Division, and Hydrology and Water Systems group conduct analyses of the RWS that incorporate planned facility outages and multiple levels of projected system demands to evaluate and plan for potential water delivery constraints. These groups meet quarterly to share plans and coordinate how facility outages, changes in service area demand, wet or dry weather, and other variables shape the operating plans each year. Facility outages due to maintenance or upgrades are coordinated in an adaptive manner to respond to changes as they occur. For new water supplies or new capital projects related to supply distribution, impacts on the system are evaluated extensively prior to initiation of any changes. Results from these modeling efforts are considered in the annual WSDA.

1.4 SYSTEM MODELING [WATER CODE SECTION 10632(A)(2)(B)(IV)]

To proactively plan for conditions that would result in a shortage of water supplies, the SFPUC models conditions using a hypothetical drought that is more severe than what the RWS has historically experienced. This drought sequence is referred to as the "design drought" and serves as the basis for planning and modeling of future scenarios. The design drought consists of an 8.5-year sequence of dry conditions.

In applying its water supply planning methodology, the SFPUC performs an initial model simulation of the system for the design drought sequence and then reviews the ability of the system to deliver water to the service area through the entire design drought sequence. If the projected water supply runs out before the end of the design drought sequence in the initial model run, system-wide water supply rationing is added and the scenario is re-run. This process continues iteratively until a model simulation of the system is achieved in which the water supply in storage at the end of the design drought sequence is brought to the system "dead pool," where no additional storage is available for delivery (currently simulated as 96,775 acre-feet). Drawing system storage down to the dead pool without going below it indicates that water supply delivery, including the adjusted amount of rationing, is maintained through the design drought sequence.

Estimated rationing levels and corresponding storage threshold values can then be used to simulate the operation of the system through the historical record of hydrology, or to evaluate system water supply conditions during an ongoing drought. While the design drought sequence does not occur in the historical hydrology, the rationing and storage threshold values that are adjusted to allow a system configuration to maintain water delivery through the design drought sequence can be used to evaluate system performance in the historical record, or as a comparison for real-time system conditions. Through use of this planning method, the SFPUC can simulate a response to declining water supply in storage that is appropriate for the system conditions being evaluated.

The SFPUC plans its water deliveries using indicators for water supply rationing that are developed through analysis with the design drought sequence. As a result, the SFPUC system operations are designed to provide sufficient carry-over water in SFPUC reservoirs to continue delivering water, although at reduced levels, during multiple-year droughts.

1.5 DECISION-MAKING PROCESS [WATER CODE SECTION 10632(A)(2)(A)]

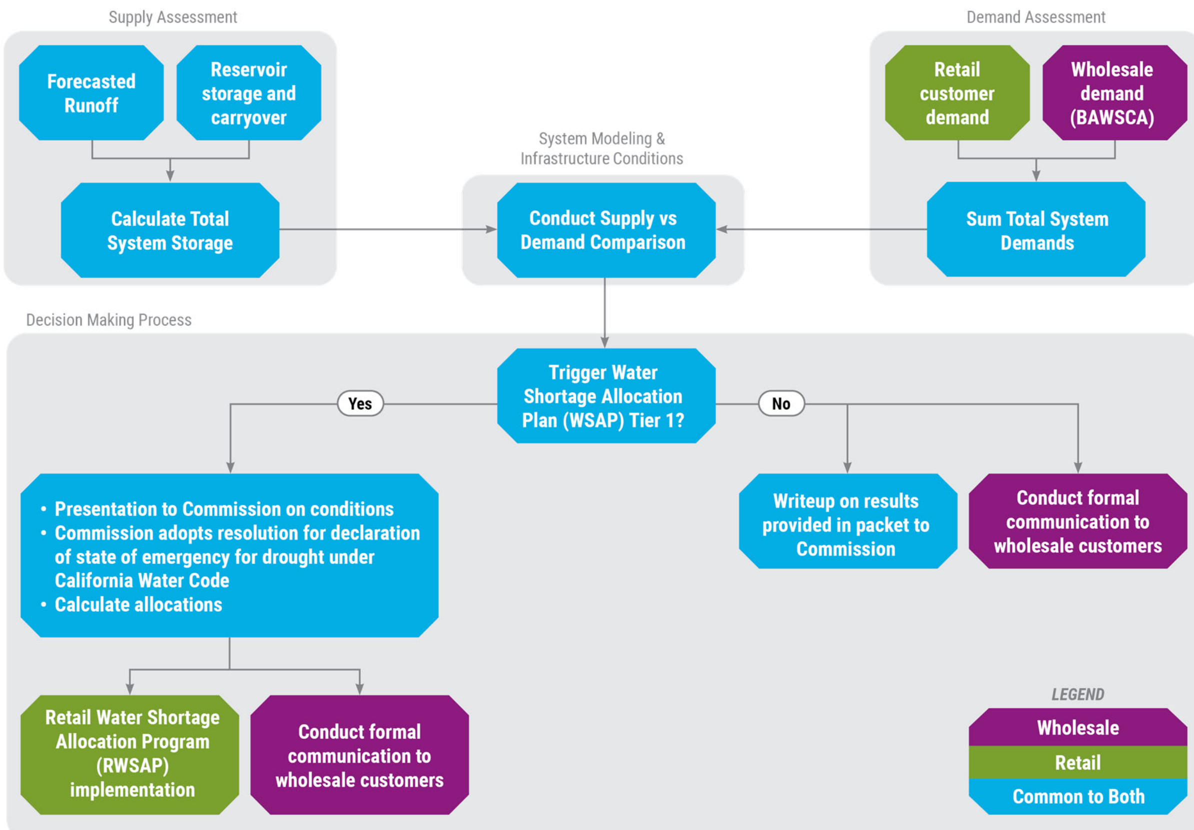
Regardless of the expectation of shortage conditions, as part of the normal course of business, the SFPUC provides a water supply condition update to its executive team every two weeks throughout the year. The SFPUC also provides water supply estimates to its Wholesale Customers on a monthly basis beginning February 1. A Wholesale Customer Annual Meeting is held in the last week of February at which the SFPUC makes a presentation on current water supply conditions and forecasts. The last snow survey of the season typically occurs within the first week of April, followed by a runoff forecast to determine total system storage expected as of July 1. By the middle of April, the SFPUC sends a formal letter to the Wholesale Customers summarizing the water supply availability for the coming year.

If the RWS appears incapable of meeting system-wide demand due to drought, the SFPUC is expected to declare a water shortage by March 31 of that drought year. The General Manager, or designee, is responsible for declaring such a shortage. A presentation would be made to the Commission as part of the General Manager's report, showing conditions of precipitation to date, snowpack, and storage levels with more information as necessary depending on the particulars of the supply forecast. Depending on the level of shortage, the Commission may adopt a resolution declaring a water shortage emergency under the California Water Code, or lesser actions such as a call for voluntary conservation efforts.

Prior to the initiation of any water delivery reductions to its retail customers, whether it be initial implementation of delivery reductions or implementing a different water shortage level, the SFPUC will outline a drought response plan to address the following: the water supply situation; proposed water use reduction objectives; alternatives to water use reductions; methods to calculate water use allocations and adjustments; compliance methodology and enforcement measures; and budget considerations. Details on the expected allocation program are described further in Section **Error! Reference source not found.**. This drought response plan will be presented at a regularly scheduled SFPUC Commission meeting and advertised in accordance with the requirements of Section 6066 of the California Government Code.

The overall WSDA process is described visually in the flowchart presented in Figure 0-1.

Figure 0-1: Water Supply and Demand Assessment Process



Attachment 2

Drought Response Tool Quantitative Assessment

1 - Home

City of Redwood City

Enter Agency Information	
Agency Name	City of Redwood City
Total Population Served	86,280
Conservation Goal (%)	5%
Drought Stage	Stage 1
Number of Residential Accounts	20,860
Number of Commercial, Industrial, and Institutional (CII) Accounts	1,597
Number of Dedicated Irrigation Accounts	433
Baseline Year(s)	2018
Percentage of Residential Indoor Use During Minimum Month (%)	85%
Percentage of CII Indoor Use During Minimum Month (%)	100%
Comments	

Navigation	
USER'S GUIDE	Download and read the guide before using this Tool
1 - HOME	Enter agency information
2 - INPUT BASELINE YEAR WATER USE	Enter Baseline Year production and use
3 - BASELINE YEAR WATER USE PROFILE	Review and confirm entered information
4 - DROUGHT RESPONSE ACTIONS	Select Drought Response Actions and input estimated water savings and implementation rates.
5 - ESTIMATED WATER SAVINGS	Review estimated water production and compare estimated savings to conservation target.

Drought Response Tool

Home | Input Baseline Year Water Use | Baseline Year Water Use Profile | Drought Response Actions | Estimated Water Savings | Drought Response Tracking

1 - Home

City of Redwood City

6 - DROUGHT RESPONSE TRACKING	Track production and water savings against the conservation target.

Drought Response Tool

Home | Input Baseline Year Water Use | Baseline Year Water Use Profile | Drought Response Actions | Estimated Water Savings | Drought Response Tracking

1 - Home

City of Redwood City

For questions about this tool or for additional information, contact:

Anona Dutton, P.G., C.Hg.
adutton@ekiconsult.com
(650) 292-9100

eki environment & water

__Disclaimer:__ This electronic file is being provided by EKI Environment & Water Inc. (EKI; fomerly Erler & Kalinowski, Inc.) at the request of (CLIENT). The Drought Response Tool was transmitted to CLIENT in electronic format, on a CD dated [DATE] (Original Document). Only the Original Document, provided to, and for the sole benefit of, CLIENT constitutes EKI's professional work product. An electronic copy of the Drought Response Tool is provided to CLIENT's Customer Agencies, for use only by CLIENT-designated Customer Agencies. The Drought Response Tool is copyrighted by EKI. All rights are reserved by EKI, and content may not be reproduced, downloaded, disseminated, published, or transferred in any form or by any means, except with the prior written permission of EKI. Customer Agencies may use the Drought Response Tool for reviewing potential drought response alternatives. The delivery to, or use by, Customer Agencies of the Drought Response Tool does not provide rights of reliance by Client Agencies or other third parties without the express written consent of EKI and subject to the execution of an agreement between such Customer Agency or other third party and EKI. EKI makes no warranties, either express or implied, of the electronic media or regarding its merchantability, applicability, compatibility with the recipients' computer equipment or software; of the fitness for any particular purpose; or that the electronic media contains no defect or is virus free. Use of EKI's Drought Response Tool, other electronic media, or other work product by Client Agency or others shall be at the party's sole risk. Further, by use of this electronic media, the user agrees, to the fullest extent permitted by law, to defend, indemnify and hold harmless EKI, CLIENT, and their officers, directors, employees, and subconsultants against all damages, liabilities or costs, including reasonable attorneys' fees and defense costs, arising from any use, modification or changes made to the electronic files by anyone other than EKI or from any unauthorized distribution or reuse of the electronic files without the prior written consent of EKI.

2 - Input Baseline Year (2018) Water Use

City of Redwood City

Input Baseline Year (2018) Production and Water Use

Units: (af)

Select the units to input monthly production and use data. Enter the total monthly potable water production for the Baseline Year. Next, enter monthly water use data by sector for the Baseline Year. If you bill on a bi-monthly basis, divide your billing data between the months that the billing cycle includes. If your single-family and multi-family accounts are tracked separately, enter the combined water use for both sectors in the Residential Water Use column. If your commercial, industrial, and institutional (CII) accounts are tracked separately, enter the combined water use for each sector in the CII Water Use column. Your non-revenue water use is calculated by subtracting your monthly residential, CII, and dedicated irrigation water uses from your monthly production. Your monthly residential gallons per capita per day (R-GPCD) is calculated by dividing your monthly residential water use by your population entered in Worksheet 1 - Home.

Date	Total Production (af)	Residential Water Use (af)	CII Water Use (af)	Dedicated Irrigation Water Use (af)	Non-Revenue Water Use (af)	Total R-GPCD	Comments
January	579	383	127	19	50	47	
February	621	390	135	12	84	53	
March	613	373	134	21	85	45	
April	830	428	152	73	177	54	
May	886	519	167	110	90	63	
June	988	601	166	115	106	76	
July	1,003	629	187	115	71	77	
August	958	620	169	100	69	76	
September	796	586	145	75	-11	74	
October	851	540	165	60	86	66	
November	629	474	121	11	23	60	
December	566	412	116	8	30	50	

3 - Baseline Year (2018) Water Use Profile

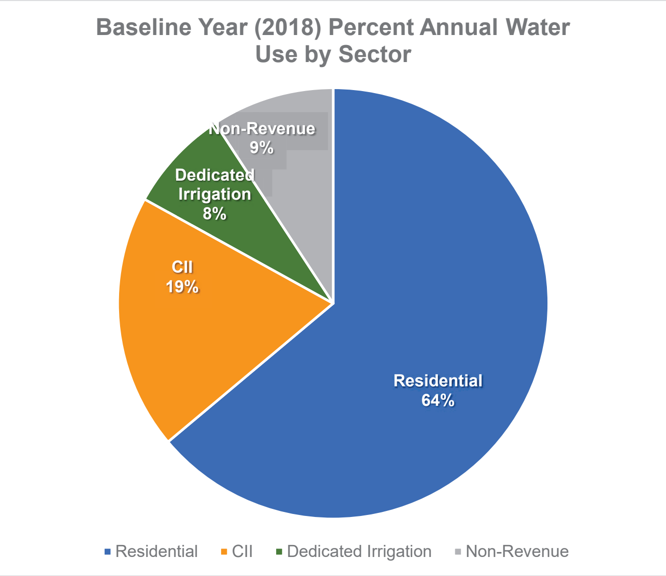
City of Redwood City

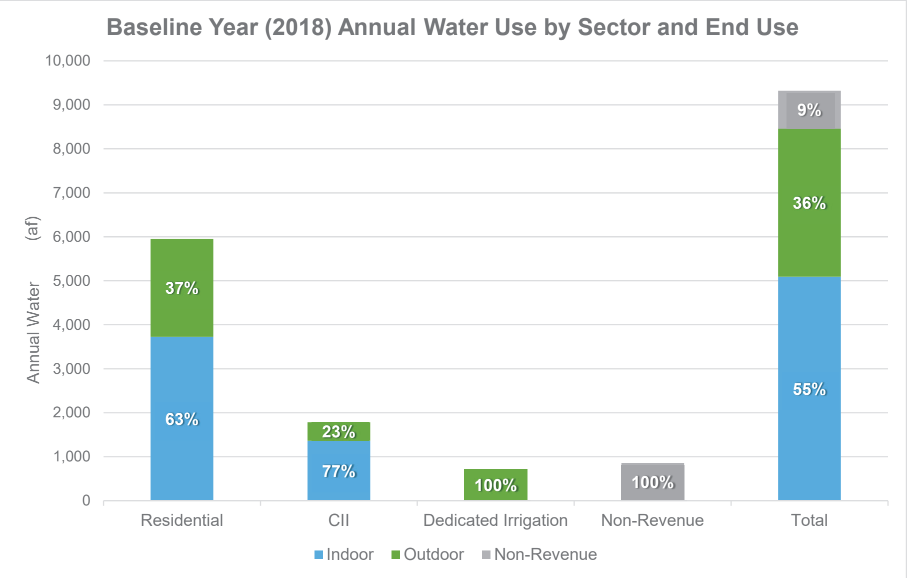
Baseline Year (2018) Annual Water Use Summary

Units: (af)

A summary of your Baseline Year water use by sector and major end use category is shown below. Select the units in which your production and use data are displayed.

Water Use	Total Production (af)	Water Use (af)				Comments
		Residential	CII	Dedicated Irrigation	Non-Revenue	
Total	9,318	5,954	1,783	721	860	
Total Indoor	5,096	3,730	1,365	--	--	
Total Outdoor	3,363	2,224	418	721	--	
Total Non-Revenue	860	--	--	--	860	
Total Indoor %	55%	63%	77%	0%	--	
Total Outdoor %	36%	37%	23%	100%	--	
Total Non-Revenue %	9%	--	--	--	100%	





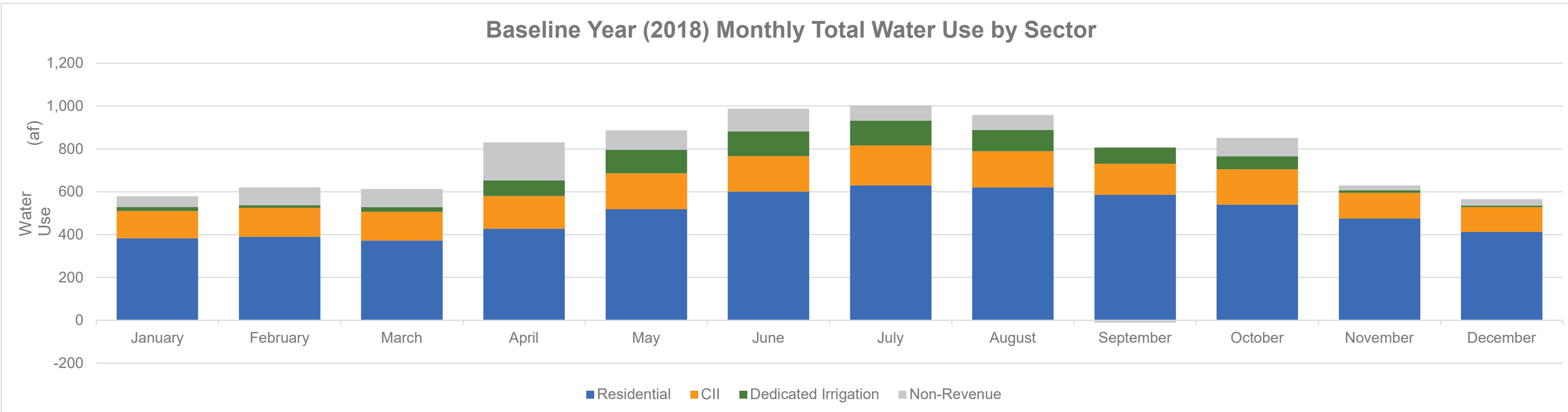
eki

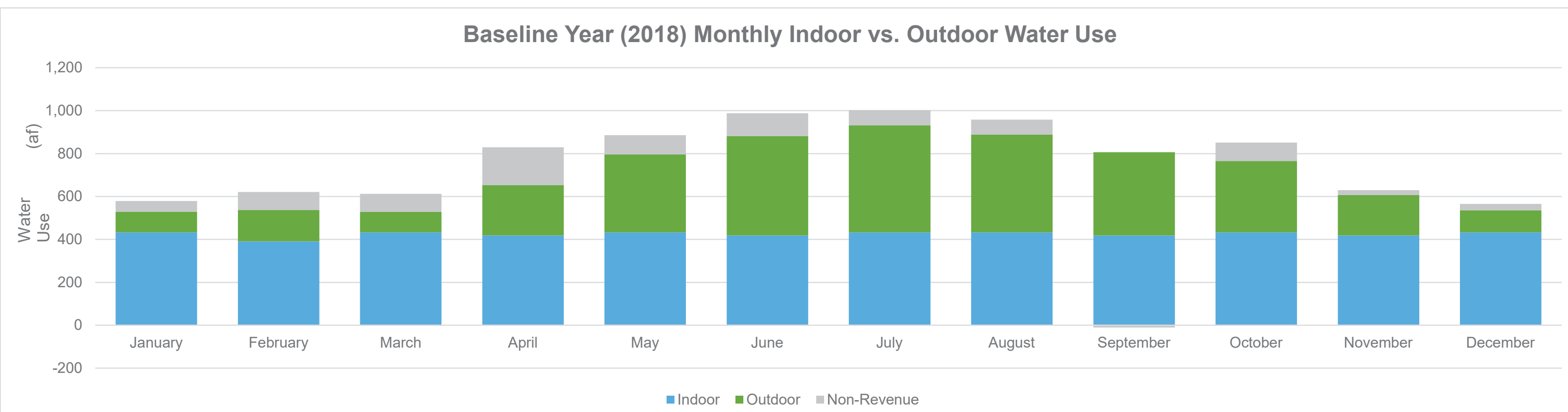
Drought Response Tool

Home | Input Baseline Year Water Use | Baseline Year Water Use Profile | Drought Response Actions | Estimated Water Savings | Drought Response Tracking

3 - Baseline Year (2018) Water Use Profile

City of Redwood City



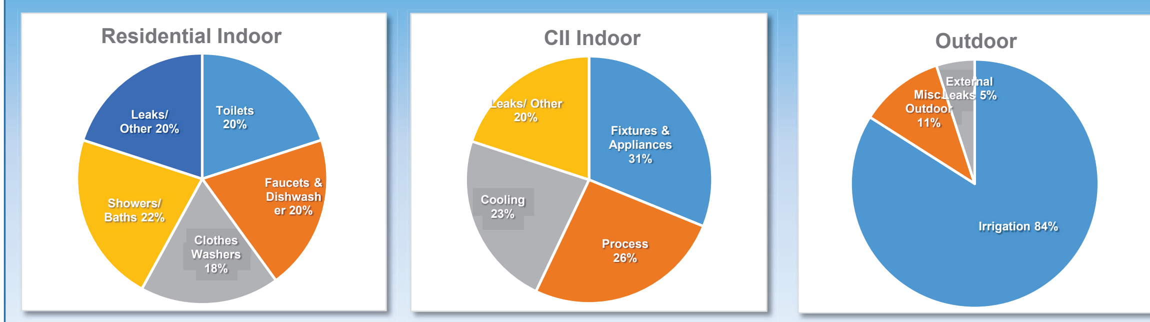


4 - Drought Response Actions - Stage 1

City of Redwood City

Maximum Savings Potential		
Use the default values or enter your own criteria for the maximum savings potential. Estimated water savings within each sector will not exceed the maximum savings criteria.		
Minimum Residential Indoor GPCD	25	R-GPCD
Maximum Residential Outdoor Savings	100%	of Baseline Residential Outdoor Water Use
Maximum CII Indoor Savings	30%	of Baseline CII Indoor Water Use
Maximum CII Outdoor Savings	100%	of Baseline CII Outdoor Water Use
Maximum Dedicated Irrigation Account Savings	100%	of Baseline Dedicated Irrigation Water Use
Maximum Non-Revenue Water Savings	50%	of Baseline Non-Revenue Water Use
Resulting Total Maximum Annual Savings Potential	**59%**	of Total Baseline Production

Assumed Proportion of Water Use by End Uses and Sector



4 - Drought Response Actions - Stage 1

City of Redwood City

Drought Response Actions

Select the Drought Response Actions you would like to include in your estimated savings calculations. For each selected action, use the default end use savings estimates and implementation rates or input your own values. The "End Use Savings" estimates the percent water use reduction that could occur at a particular end use as a result of a specific action. The "Implementation Rate" refers to the estimated percentage of accounts that will implement a specific action. The water savings potential at each end use is capped based on the assumed distribution of end use water demands shown in the pie charts above. A dash (--) indicates that professional judgement was used to establish the default value, or that savings are expected to be accounted for as part of a Public Information Program; additional basis for the default values are included in the User Manual.

Action Description	End Use(s)	Implement Program	End Use Savings (%)	Implementation Rate	Source of Default Savings Estimate	Source of Default Implementation Rate
▶ **Possible Mandatory Prohibitions**	All Outdoor	☑	14%	**65%**	--	--
Prohibit Irrigation with Potable Water Outside of Newly Constructed Homes and Buildings that is not Delivered by Drip or Microspray Systems	Irrigation	☐			--	--
Require Shut-Off Nozzles on Hoses for Vehicle Washing	Misc. Outdoor	☐	17%	50%	See Appendix D of the DRP	--
Prohibit Use of Potable Water to Wash Sidewalks and Driveways	Misc. Outdoor	☐	17%	50%		--
Prohibit the Use of Potable Water for Street Washing	Misc. Outdoor	☐	17%	50%		--
Prohibit Irrigation with Potable Water in a Manner that causes Runoff	Irrigation	☐	3%	50%	DeOreo et al., 2011	--
Prohibit Irrigation with Potable Water within 48 Hours following Measurable Rainfall	Irrigation	☐			--	--
Prohibit Irrigation of Ornamental Turf with Potable Water on Street Medians	Irrigation	☐			--	--
Prohibit Potable Water Use for Decorative Water Features that do not Recirculate Water	Misc. Outdoor	☑	50%	50%	EBMUD, 2008	--
Provide Linen Service Opt Out Options	Fixtures & Appliances	☑	0.5%	50%	EBMUD, 2011	--
Prohibit Serving Drinking Water other than upon Request in Eating or Drinking Establishments	Fixtures & Appliances	☑	0.5%	50%	EBMUD, 2011	--

4 - Drought Response Actions - Stage 1

City of Redwood City

Drought Response Actions						
Action Description	**End Use(s)**	**Implement Program**	**End Use Savings (%)**	**Implementation Rate**	**Source of Default Savings Estimate**	**Source of Default Implementation Rate**
▶ Agency Drought Actions / Restrictions						
▶ Agency Actions						
Media Campaign, Newspaper Articles, Website	All	☑	0.5%	50%	EBMUD, 2011	--
Promote Water Conservation / Rebate Programs	All	☐		50%	--	--
Water Efficiency Workshops, Public Events	All	☑	0.5%	25%	EBMUD, 2011	--
Water Bill Inserts	All	☑	0.5%	100%	EBMUD, 2011	--
Promote / Expand Use of Recycled Water	Irrigation	☐	100%		--	--
Home or Mobile Water Use Reports	All	☐	5%	10%	WaterSmart Software, 2015	--
Decrease Frequency and Length of Line Flushing	Non Revenue Water	☐	25%	50%	See Appendix D of the DRP	Reduced flushing by 50%.
Audit and Reduce System Water Loss	Non Revenue Water	☐	45%	50%	DWR, 2015	Target 50% of leakage.
Implement Drought Rate Structure / Water Budgets	All	☐	5%	100%	CUWCC, 2015	--
Establish Retrofit on Resale Ordinance	All Residential Indoor	☐	21%	6%	SFPUC, 2004	First Tuesday, 2015
Require Net Zero Demand Increase on New Connections	All	☐			--	--
Moratorium on New Connections	All	☐			--	--
Move to Monthly Metering / Billing	All	☐	5%	10%	See Appendix D of the DRP	--
Increase Water Waste Patrols / Enforcement	All	☐			--	--
Establish Drought Hotline	All	☑			--	--
Reduce Distribution System Pressures	Non Revenue Water	☐	4.5%	100%	CUWCC, 2010; DWR, 2015	--
▶ Dedicated Irrigation						
Conduct Irrigation Account Surveys	Irrigation	☐	30%	10%	EBMUD, 2011	--
Limit Irrigation Days, Time and Duration (Select One)						
Limit Irrigation to 3 Days/Week, 15 Minutes/Day, Between 9PM and 6AM	Irrigation	☑	**6%**	**65%**	UC IPM, 2014	--
Limit Irrigation to 1 Day/Week, 10 Minutes/Day, Between 9PM and 6AM	Irrigation	☐	79%	50%		
Prohibit use of Potable Water for Irrigation	Irrigation	☐	100%	50%		
Require Repair of all Leaks within 24 hours	External Leaks	☐	100%	5%	--	--
Customer Water Budgets						
Establish Water Budget - 25% Reduction	Irrigation	☐	25%	50%	--	--
Establish Water Budget - 50% Reduction	Irrigation	☐	50%	50%	--	--
Establish Water Budget - 75% Reduction	Irrigation	☐	75%	50%	--	--

4 - Drought Response Actions - Stage 1

City of Redwood City

Action Description	End Use(s)	Implement Program	End Use Savings (%)	Implementation Rate	Source of Default Savings Estimate	Source of Default Implementation Rate
▶ Agency Drought Actions / Restrictions						
▶ Residential						
Conduct Water Use Surveys Targeting High Water Users	All Residential Uses	☐	10%	10%	EBMUD, 2011	--
Limit Irrigation Days, Time and Duration (Select One)						
Limit Irrigation to 3 Days/Week, 15 Minutes/Day, Between 9PM and 6AM	Irrigation	☑	**6%**	**65%**	UC IPM, 2014	--
Limit Irrigation to 1 Day/Week, 10 Minutes/Day, Between 9PM and 6AM	Irrigation	☐	79%	50%		
Prohibit use of Potable Water for Irrigation	Irrigation	☐	100%	50%		
Prohibit Vehicle Washing Except with Recycled Water	Misc. Outdoor	☐	50%	50%	EBMUD, 2008	--
Require Repair of all Leaks within 24 hours	Leaks	☐	100%	5%	--	--
Require Pool Covers	Misc. Outdoor	☐	28%	25%	Maddaus & Mayer, 2001	--
Prohibit Filling of Pools	Misc. Outdoor	☐	55%	25%	DeOreo et al., 2011	--
Customer Water Budgets						
Establish Water Budget - 10% Reduction	All Residential Uses	☐	10%	50%	--	--
Establish Water Budget - 20% Reduction	All Residential Uses	☐	20%	50%	--	--
▶ CII						
Conduct CII Surveys Targeting High Water Users	All CII uses	☐	10%	10%	EBMUD, 2011	--
Limit Irrigation Days, Time and Duration (Select One)						
Limit Irrigation to 3 Days/Week, 15 Minutes/Day, Between 9PM and 6AM	Irrigation	☑	**6%**	**65%**	UC IPM, 2014	--
Limit Irrigation to 1 Day/Week, 10 Minutes/Day, Between 9PM and 6AM	Irrigation	☐	79%	50%		
Prohibit Use of Potable Water for Construction and Dust Control	Misc. Outdoor	☐		100%	--	--
Prohibit Single-Pass Cooling Systems	Cooling	☐	80%	1%	Vickers, 2001	--
Require Repair of all Leaks within 24 hours	Leaks	☐	100%	5%	--	--
Prohibit Vehicle Washing Except with Recycled Water	Misc. Outdoor	☐	50%	50%	EBMUD, 2008	--
Require Water-Efficient Pre-Rinse Spray Valves	Fixtures & Appliances	☐	0.8%	50%	EPA, 2015; Pacific Institute, 2003	--
Customer Water Budgets						
Establish Water Budget - 10% Reduction	All CII uses	☐	10%	50%	--	--
Establish Water Budget - 20% Reduction	All CII uses	☐	20%	50%	--	--
Establish Water Budget - 30% Reduction	All CII uses	☐	30%	50%	--	--

4 - Drought Response Actions - Stage 1

City of Redwood City

Drought Response Actions						
Action Description	**End Use(s)**	**Implement Program**	**End Use Savings (%)**	**Implementation Rate**	**Source of Default Savings Estimate**	**Source of Default Implementation Rate**
▶ Residential Customer Actions to Encourage						
Install Bathroom Faucet Aerators	Faucets and Dishwashers	☐			--	--
Install a Water-Efficient Showerhead	Showers/Baths	☐			--	--
Turn Off Water when Brushing Teeth, Shaving, Washing Dishes, or Cooking	Faucets and Dishwashers	☐			--	--
Fill the Bathtub Halfway	Showers/Baths	☐			--	--
Wash Only Full Loads of Clothes	Clothes Washers	☐			--	--
Install a High-Efficiency Toilet	Toilets	☐			--	--
Take Shorter Showers	Showers/Baths	☐			--	--
Run Dishwasher Only When Full	Faucets and Dishwashers	☐			--	--
Reduce Outdoor Irrigation	Irrigation	☐			--	--
Install Drip-Irrigation	Irrigation	☐			--	--
Use Mulch	Irrigation	☐			--	--
Plant Drought Resistant Trees and Plants	Irrigation	☐			--	--
Use a Broom to Clean Outdoor Areas	Misc. Outdoor	☐			--	--
Flush Less Frequently	Toilets	☐			--	--
Re-Use Shower or Bath Water for Irrigation	Irrigation	☐			--	--
Wash Car at Facility that Recycles the Water	Misc. Outdoor	☐			--	--

Drought Response Tool

Home | Input Baseline Year Water Use | Baseline Year Water Use Profile | Drought Response Actions | Estimated Water Savings | Drought Response Tracking

5 - Estimated Water Savings - Stage 1

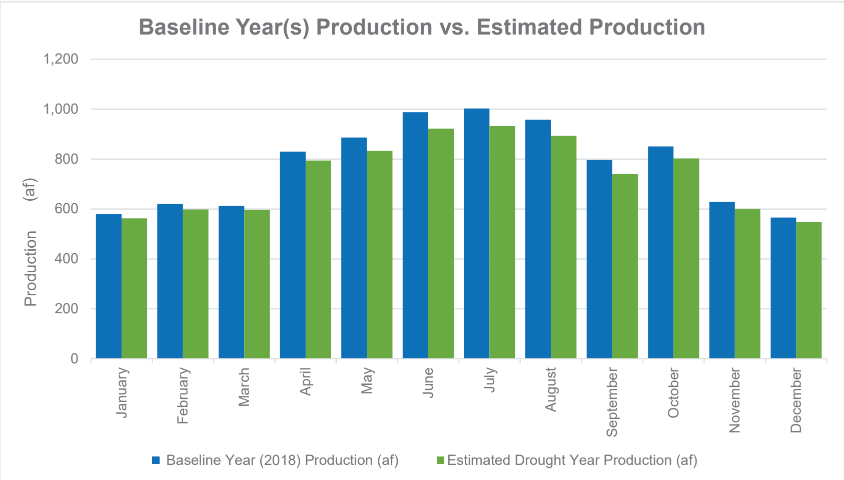
City of Redwood City

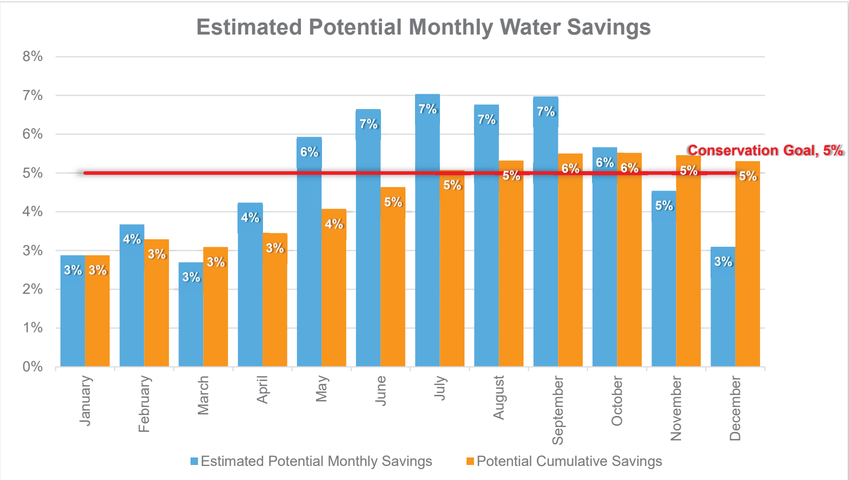
Estimated Monthly Water Use and Savings Summary

Units: (af)

This provides a summary of the estimated production relative to Baseline Year production and potential water savings, assuming implementation of selected actions at the water savings and implementation rates indicated in the Drought Response Actions worksheet. Select the units that your production data are displayed in.

Month	Baseline Year (2018) Production (af)	Estimated Drought Year Production (af)	Estimated Potential Monthly Savings	Potential Cumulative Savings	Conservation Goal	Comments
January	579	562	3%	3%	5%	
February	621	598	4%	3%	5%	
March	613	596	3%	3%	5%	
April	830	795	4%	3%	5%	
May	886	834	6%	4%	5%	
June	988	922	7%	5%	5%	
July	1,003	932	7%	5%	5%	
August	958	893	7%	5%	5%	
September	796	740	7%	6%	5%	
October	851	803	6%	6%	5%	
November	629	601	5%	5%	5%	
December	566	548	3%	5%	5%	





Drought Response Tool

Home | Input Baseline Year Water Use | Baseline Year Water Use Profile | Drought Response Actions | Estimated Water Savings | Drought Response Tracking

1 - Home

City of Redwood City

Enter Agency Information	
Agency Name	City of Redwood City
Total Population Served	86,280
Conservation Goal (%)	15%
Drought Stage	Stage 2
Number of Residential Accounts	20,860
Number of Commercial, Industrial, and Institutional (CII) Accounts	1,597
Number of Dedicated Irrigation Accounts	433
Baseline Year(s)	2018
Percentage of Residential Indoor Use During Minimum Month (%)	85%
Percentage of CII Indoor Use During Minimum Month (%)	100%
Comments	

Navigation	
USER'S GUIDE	Download and read the guide before using this Tool
1 - HOME	Enter agency information
2 - INPUT BASELINE YEAR WATER USE	Enter Baseline Year production and use
3 - BASELINE YEAR WATER USE PROFILE	Review and confirm entered information
4 - DROUGHT RESPONSE ACTIONS	Select Drought Response Actions and input estimated water savings and implementation rates.
5 - ESTIMATED WATER SAVINGS	Review estimated water production and compare estimated savings to conservation target.

1 - Home

City of Redwood City

6 - DROUGHT RESPONSE TRACKING	Track production and water savings against the conservation target.

Drought Response Tool

Home | Input Baseline Year Water Use | Baseline Year Water Use Profile | Drought Response Actions | Estimated Water Savings | Drought Response Tracking

1 - Home

City of Redwood City

For questions about this tool or for additional information, contact:

Anona Dutton, P.G., C.Hg.
adutton@ekiconsult.com
(650) 292-9100

eki environment & water

__Disclaimer:__ This electronic file is being provided by EKI Environment & Water Inc. (EKI; fomerly Erler & Kalinowski, Inc.) at the request of (CLIENT). The Drought Response Tool was transmitted to CLIENT in electronic format, on a CD dated [DATE] (Original Document). Only the Original Document, provided to, and for the sole benefit of, CLIENT constitutes EKI's professional work product. An electronic copy of the Drought Response Tool is provided to CLIENT's Customer Agencies, for use only by CLIENT-designated Customer Agencies. The Drought Response Tool is copyrighted by EKI. All rights are reserved by EKI, and content may not be reproduced, downloaded, disseminated, published, or transferred in any form or by any means, except with the prior written permission of EKI. Customer Agencies may use the Drought Response Tool for reviewing potential drought response alternatives. The delivery to, or use by, Customer Agencies of the Drought Response Tool does not provide rights of reliance by Client Agencies or other third parties without the express written consent of EKI and subject to the execution of an agreement between such Customer Agency or other third party and EKI. EKI makes no warranties, either express or implied, of the electronic media or regarding its merchantability, applicability, compatibility with the recipients' computer equipment or software; of the fitness for any particular purpose; or that the electronic media contains no defect or is virus free. Use of EKI's Drought Response Tool, other electronic media, or other work product by Client Agency or others shall be at the party's sole risk. Further, by use of this electronic media, the user agrees, to the fullest extent permitted by law, to defend, indemnify and hold harmless EKI, CLIENT, and their officers, directors, employees, and subconsultants against all damages, liabilities or costs, including reasonable attorneys' fees and defense costs, arising from any use, modification or changes made to the electronic files by anyone other than EKI or from any unauthorized distribution or reuse of the electronic files without the prior written consent of EKI.

2 - Input Baseline Year (2018) Water Use

City of Redwood City

Input Baseline Year (2018) Production and Water Use

Units: (af)

Select the units to input monthly production and use data. Enter the total monthly potable water production for the Baseline Year. Next, enter monthly water use data by sector for the Baseline Year. If you bill on a bi-monthly basis, divide your billing data between the months that the billing cycle includes. If your single-family and multi-family accounts are tracked separately, enter the combined water use for both sectors in the Residential Water Use column. If your commercial, industrial, and institutional (CII) accounts are tracked separately, enter the combined water use for each sector in the CII Water Use column. Your non-revenue water use is calculated by subtracting your monthly residential, CII, and dedicated irrigation water uses from your monthly production. Your monthly residential gallons per capita per day (R-GPCD) is calculated by dividing your monthly residential water use by your population entered in Worksheet 1 - Home.

Date	Total Production (af)	Residential Water Use (af)	CII Water Use (af)	Dedicated Irrigation Water Use (af)	Non-Revenue Water Use (af)	Total R-GPCD	Comments
January	579	383	127	19	50	47	
February	621	390	135	12	84	53	
March	613	373	134	21	85	45	
April	830	428	152	73	177	54	
May	886	519	167	110	90	63	
June	988	601	166	115	106	76	
July	1,003	629	187	115	71	77	
August	958	620	169	100	69	76	
September	796	586	145	75	-11	74	
October	851	540	165	60	86	66	
November	629	474	121	11	23	60	
December	566	412	116	8	30	50	

3 - Baseline Year (2018) Water Use Profile

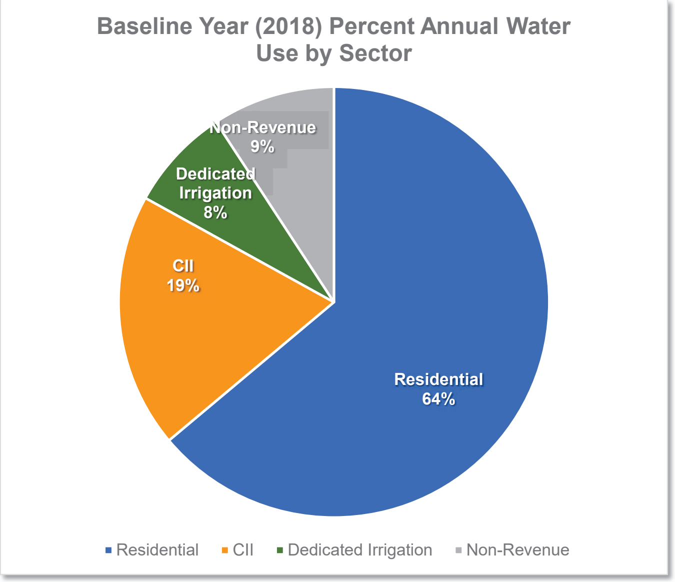
City of Redwood City

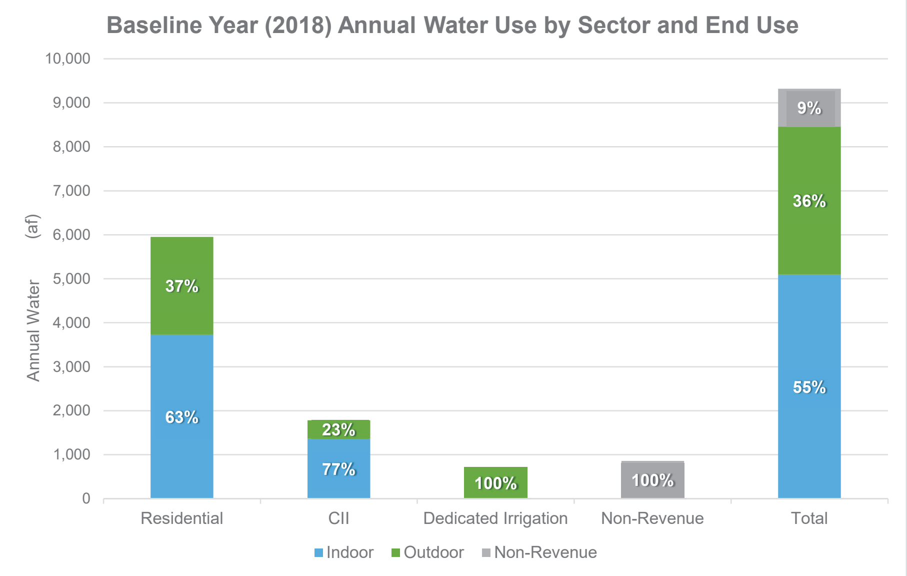
Baseline Year (2018) Annual Water Use Summary

Units: (af)

A summary of your Baseline Year water use by sector and major end use category is shown below. Select the units in which your production and use data are displayed.

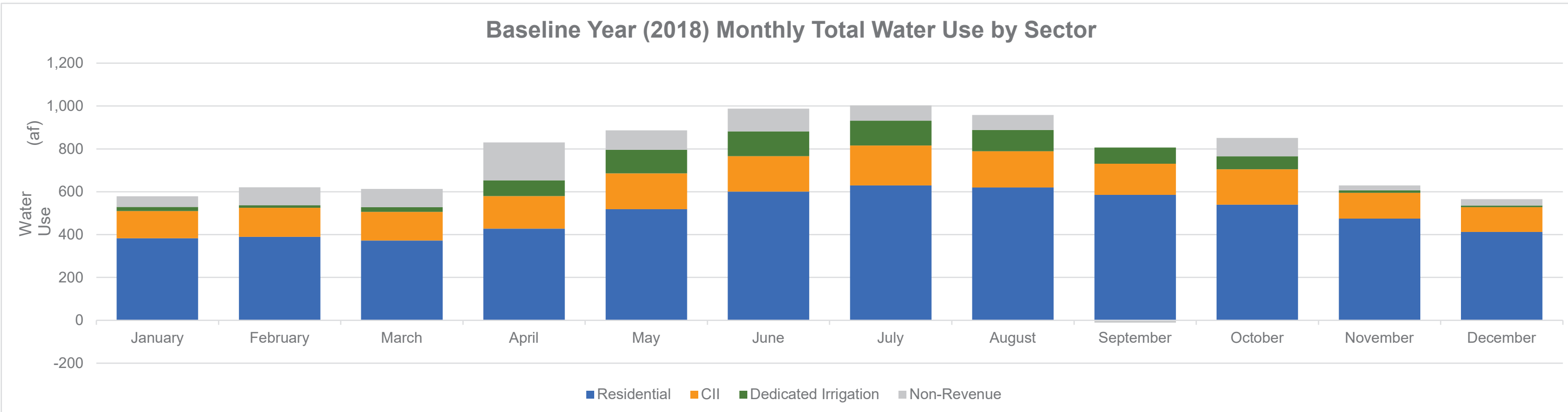
Water Use	Total Production (af)	Water Use (af)				Comments
		Residential	CII	Dedicated Irrigation	Non-Revenue	
Total	9,318	5,954	1,783	721	860	
Total Indoor	5,096	3,730	1,365	--	--	
Total Outdoor	3,363	2,224	418	721	--	
Total Non-Revenue	860	--	--	--	860	
Total Indoor %	55%	63%	77%	0%	--	
Total Outdoor %	36%	37%	23%	100%	--	
Total Non-Revenue %	9%	--	--	--	100%	

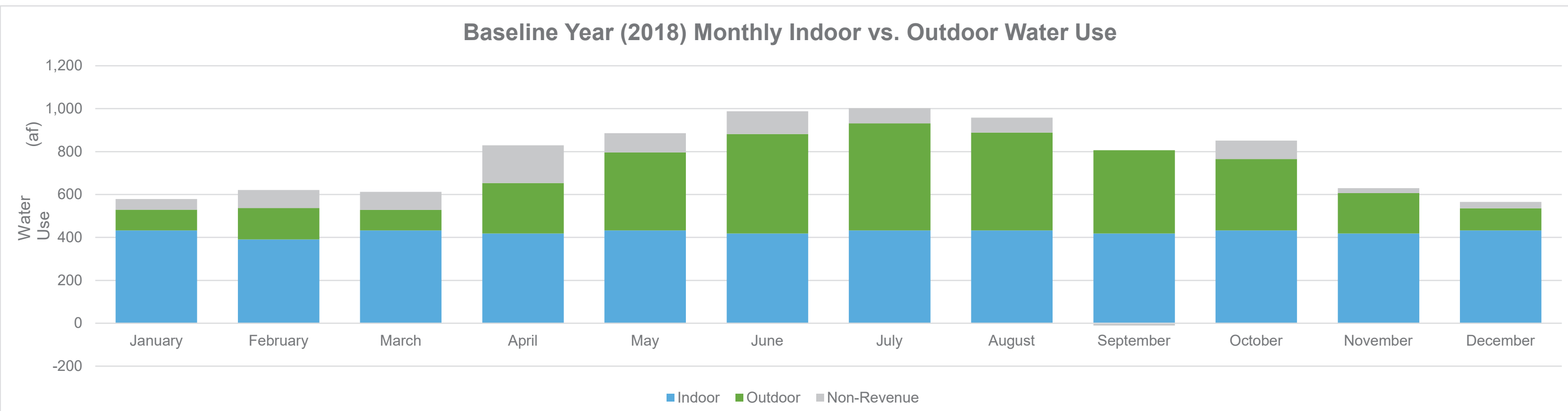




3 - Baseline Year (2018) Water Use Profile

City of Redwood City



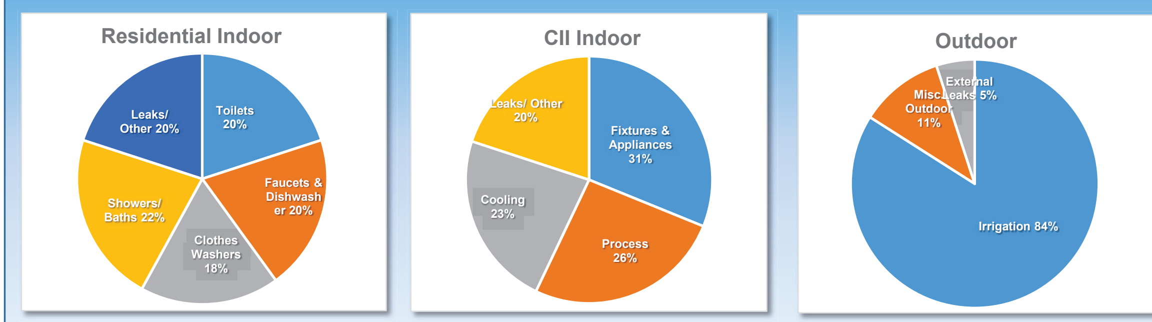


4 - Drought Response Actions - Stage 2

City of Redwood City

Maximum Savings Potential		
Use the default values or enter your own criteria for the maximum savings potential. Estimated water savings within each sector will not exceed the maximum savings criteria.		
Minimum Residential Indoor GPCD	25	R-GPCD
Maximum Residential Outdoor Savings	100%	of Baseline Residential Outdoor Water Use
Maximum CII Indoor Savings	30%	of Baseline CII Indoor Water Use
Maximum CII Outdoor Savings	100%	of Baseline CII Outdoor Water Use
Maximum Dedicated Irrigation Account Savings	100%	of Baseline Dedicated Irrigation Water Use
Maximum Non-Revenue Water Savings	50%	of Baseline Non-Revenue Water Use
Resulting Total Maximum Annual Savings Potential	**59%**	of Total Baseline Production

Assumed Proportion of Water Use by End Uses and Sector



Drought Response Tool

Home | Input Baseline Year Water Use | Baseline Year Water Use Profile | Drought Response Actions | Estimated Water Savings | Drought Response Tracking

4 - Drought Response Actions - Stage 2

City of Redwood City

Drought Response Actions

Select the Drought Response Actions you would like to include in your estimated savings calculations. For each selected action, use the default end use savings estimates and implementation rates or input your own values. The "End Use Savings" estimates the percent water use reduction that could occur at a particular end use as a result of a specific action. The "Implementation Rate" refers to the estimated percentage of accounts that will implement a specific action. The water savings potential at each end use is capped based on the assumed distribution of end use water demands shown in the pie charts above. A dash (--) indicates that professional judgement was used to establish the default value, or that savings are expected to be accounted for as part of a Public Information Program; additional basis for the default values are included in the User Manual.

Action Description	End Use(s)	Implement Program	End Use Savings (%)	Implementation Rate	Source of Default Savings Estimate	Source of Default Implementation Rate
▶ Possible Mandatory Prohibitions	All Outdoor	☑	14%	**70%**	--	--
Prohibit Irrigation with Potable Water Outside of Newly Constructed Homes and Buildings that is not Delivered by Drip or Microspray Systems	Irrigation	☐			--	--
Require Shut-Off Nozzles on Hoses for Vehicle Washing	Misc. Outdoor	☐	17%	50%	See Appendix D of the DRP	--
Prohibit Use of Potable Water to Wash Sidewalks and Driveways	Misc. Outdoor	☐	17%	50%		--
Prohibit the Use of Potable Water for Street Washing	Misc. Outdoor	☐	17%	50%		--
Prohibit Irrigation with Potable Water in a Manner that causes Runoff	Irrigation	☐	3%	50%	DeOreo et al., 2011	--
Prohibit Irrigation with Potable Water within 48 Hours following Measurable Rainfall	Irrigation	☐			--	--
Prohibit Irrigation of Ornamental Turf with Potable Water on Street Medians	Irrigation	☐			--	--
Prohibit Potable Water Use for Decorative Water Features that do not Recirculate Water	Misc. Outdoor	☑	50%	50%	EBMUD, 2008	--
Provide Linen Service Opt Out Options	Fixtures & Appliances	☑	0.5%	50%	EBMUD, 2011	--
Prohibit Serving Drinking Water other than upon Request in Eating or Drinking Establishments	Fixtures & Appliances	☑	0.5%	50%	EBMUD, 2011	--

4 - Drought Response Actions - Stage 2

City of Redwood City

Drought Response Actions						
Action Description	**End Use(s)**	**Implement Program**	**End Use Savings (%)**	**Implementation Rate**	**Source of Default Savings Estimate**	**Source of Default Implementation Rate**
▶ Agency Drought Actions / Restrictions						
▶ Agency Actions						
Media Campaign, Newspaper Articles, Website	All	☑	0.5%	**60%**	EBMUD, 2011	--
Promote Water Conservation / Rebate Programs	All	☑		50%	--	--
Water Efficiency Workshops, Public Events	All	☑	0.5%	25%	EBMUD, 2011	--
Water Bill Inserts	All	☑	0.5%	100%	EBMUD, 2011	--
Promote / Expand Use of Recycled Water	Irrigation	☐	100%		--	--
Home or Mobile Water Use Reports	All	☐	5%	10%	WaterSmart Software, 2015	--
Decrease Frequency and Length of Line Flushing	Non Revenue Water	☑	25%	50%	See Appendix D of the DRP	Reduced flushing by 50%.
Audit and Reduce System Water Loss	Non Revenue Water	☐	45%	50%	DWR, 2015	Target 50% of leakage.
Implement Drought Rate Structure / Water Budgets	All	☑	**2%**	100%	CUWCC, 2015	--
Establish Retrofit on Resale Ordinance	All Residential Indoor	☐	21%	6%	SFPUC, 2004	First Tuesday, 2015
Require Net Zero Demand Increase on New Connections	All	☐			--	--
Moratorium on New Connections	All	☐			--	--
Move to Monthly Metering / Billing	All	☐	5%	10%	See Appendix D of the DRP	--
Increase Water Waste Patrols / Enforcement	All	☑			--	--
Establish Drought Hotline	All	☑			--	--
Reduce Distribution System Pressures	Non Revenue Water	☐	4.5%	100%	CUWCC, 2010; DWR, 2015	--
▶ Dedicated Irrigation						
Conduct Irrigation Account Surveys	Irrigation	☐	30%	10%	EBMUD, 2011	--
Limit Irrigation Days, Time and Duration (Select One)						
Limit Irrigation to 2 Days/Week, 15 Minutes/Day, Between 9PM and 6AM	Irrigation	☑	38%	**65%**	UC IPM, 2014	--
Limit Irrigation to 1 Day/Week, 10 Minutes/Day, Between 9PM and 6AM	Irrigation	☐	79%	50%		
Prohibit use of Potable Water for Irrigation	Irrigation	☐	100%	50%		
Require Repair of all Leaks within 24 hours	External Leaks	☐	100%	5%	--	--
Customer Water Budgets						
Establish Water Budget - 25% Reduction	Irrigation	☐	25%	50%	--	--
Establish Water Budget - 50% Reduction	Irrigation	☐	50%	50%	--	--
Establish Water Budget - 75% Reduction	Irrigation	☐	75%	50%	--	--

4 - Drought Response Actions - Stage 2

City of Redwood City

Drought Response Actions

Action Description	End Use(s)	Implement Program	End Use Savings (%)	Implementation Rate	Source of Default Savings Estimate	Source of Default Implementation Rate
▶ Agency Drought Actions / Restrictions						
▶ Residential						
Conduct Water Use Surveys Targeting High Water Users	All Residential Uses	☐	10%	10%	EBMUD, 2011	--
Limit Irrigation Days, Time and Duration (Select One)						
Limit Irrigation to 2 Days/Week, 15 Minutes/Day, Between 9PM and 6AM	Irrigation	☑	38%	**65%**	UC IPM, 2014	--
Limit Irrigation to 1 Day/Week, 10 Minutes/Day, Between 9PM and 6AM	Irrigation	☐	79%	50%		
Prohibit use of Potable Water for Irrigation	Irrigation	☐	100%	50%		
Prohibit Vehicle Washing Except with Recycled Water	Misc. Outdoor	☐	50%	50%	EBMUD, 2008	--
Require Repair of all Leaks within 24 hours	Leaks	☐	100%	5%	--	--
Require Pool Covers	Misc. Outdoor	☐	28%	25%	Maddaus & Mayer, 2001	--
Prohibit Filling of Pools	Misc. Outdoor	☐	55%	25%	DeOreo et al., 2011	--
Customer Water Budgets						
Establish Water Budget - 10% Reduction	All Residential Uses	☐	10%	50%	--	--
Establish Water Budget - 20% Reduction	All Residential Uses	☐	20%	50%	--	--
▶ CII						
Conduct CII Surveys Targeting High Water Users	All CII uses	☐	10%	10%	EBMUD, 2011	--
Limit Irrigation Days, Time and Duration (Select One)						
Limit Irrigation to 2 Days/Week, 15 Minutes/Day, Between 9PM and 6AM	Irrigation	☑	38%	**65%**	UC IPM, 2014	--
Limit Irrigation to 1 Day/Week, 10 Minutes/Day, Between 9PM and 6AM	Irrigation	☐	79%	50%		
Prohibit Use of Potable Water for Construction and Dust Control	Misc. Outdoor	☐		100%	--	--
Prohibit Single-Pass Cooling Systems	Cooling	☐	80%	1%	Vickers, 2001	--
Require Repair of all Leaks within 24 hours	Leaks	☐	100%	5%	--	--
Prohibit Vehicle Washing Except with Recycled Water	Misc. Outdoor	☐	50%	50%	EBMUD, 2008	--
Require Water-Efficient Pre-Rinse Spray Valves	Fixtures & Appliances	☐	0.8%	50%	EPA, 2015; Pacific Institute, 2003	--
Customer Water Budgets						
Establish Water Budget - 10% Reduction	All CII uses	☐	10%	50%	--	--
Establish Water Budget - 20% Reduction	All CII uses	☐	20%	50%	--	--
Establish Water Budget - 30% Reduction	All CII uses	☐	30%	50%	--	--

4 - Drought Response Actions - Stage 2

City of Redwood City

Drought Response Actions						
Action Description	End Use(s)	Implement Program	End Use Savings (%)	Implementation Rate	Source of Default Savings Estimate	Source of Default Implementation Rate
▶ Residential Customer Actions to Encourage						
Install Bathroom Faucet Aerators	Faucets and Dishwashers	☐			--	--
Install a Water-Efficient Showerhead	Showers/Baths	☐			--	--
Turn Off Water when Brushing Teeth, Shaving, Washing Dishes, or Cooking	Faucets and Dishwashers	☐			--	--
Fill the Bathtub Halfway	Showers/Baths	☐			--	--
Wash Only Full Loads of Clothes	Clothes Washers	☐			--	--
Install a High-Efficiency Toilet	Toilets	☐			--	--
Take Shorter Showers	Showers/Baths	☐			--	--
Run Dishwasher Only When Full	Faucets and Dishwashers	☐			--	--
Reduce Outdoor Irrigation	Irrigation	☐			--	--
Install Drip-Irrigation	Irrigation	☐			--	--
Use Mulch	Irrigation	☐			--	--
Plant Drought Resistant Trees and Plants	Irrigation	☐			--	--
Use a Broom to Clean Outdoor Areas	Misc. Outdoor	☐			--	--
Flush Less Frequently	Toilets	☐			--	--
Re-Use Shower or Bath Water for Irrigation	Irrigation	☐			--	--
Wash Car at Facility that Recycles the Water	Misc. Outdoor	☐			--	--

5 - Estimated Water Savings - Stage 2

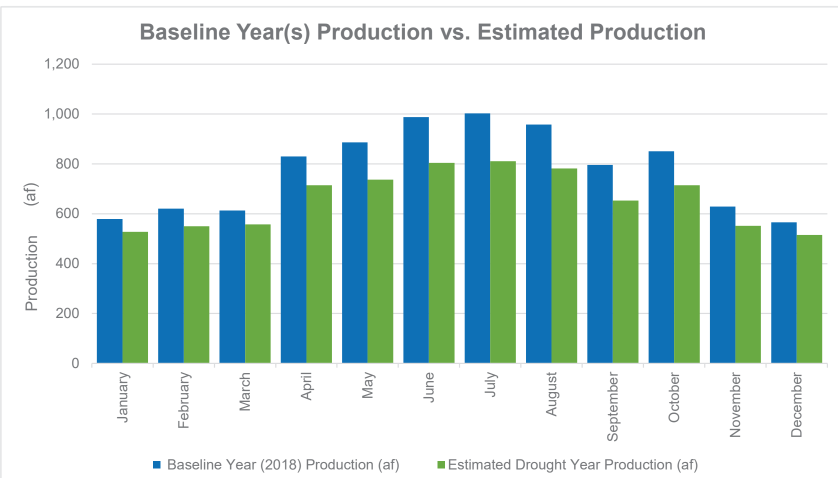
City of Redwood City

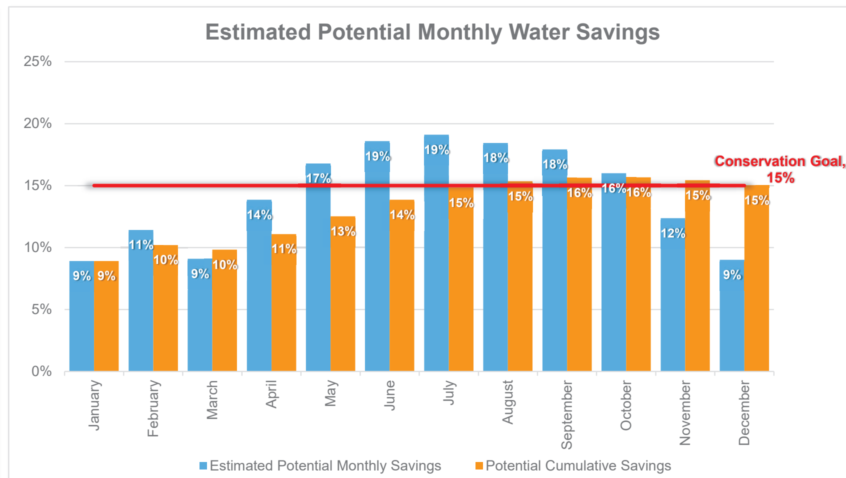
Estimated Monthly Water Use and Savings Summary

Units: (af)

This provides a summary of the estimated production relative to Baseline Year production and potential water savings, assuming implementation of selected actions at the water savings and implementation rates indicated in the Drought Response Actions worksheet. Select the units that your production data are displayed in.

Month	Baseline Year (2018) Production (af)	Estimated Drought Year Production (af)	Estimated Potential Monthly Savings	Potential Cumulative Savings	Conservation Goal	Comments
January	579	527	9%	9%	15%	
February	621	550	11%	10%	15%	
March	613	557	9%	10%	15%	
April	830	715	14%	11%	15%	
May	886	737	17%	13%	15%	
June	988	804	19%	14%	15%	
July	1,003	811	19%	15%	15%	
August	958	782	18%	15%	15%	
September	796	653	18%	16%	15%	
October	851	715	16%	16%	15%	
November	629	551	12%	15%	15%	
December	566	515	9%	15%	15%	





Drought Response Tool

Home | Input Baseline Year Water Use | Baseline Year Water Use Profile | Drought Response Actions | Estimated Water Savings | Drought Response Tracking

1 - Home

City of Redwood City

Enter Agency Information	
Agency Name	City of Redwood City
Total Population Served	86,280
Conservation Goal (%)	25%
Drought Stage	Stage 3
Number of Residential Accounts	20,860
Number of Commercial, Industrial, and Institutional (CII) Accounts	1,597
Number of Dedicated Irrigation Accounts	433
Baseline Year(s)	2018
Percentage of Residential Indoor Use During Minimum Month (%)	85%
Percentage of CII Indoor Use During Minimum Month (%)	100%
Comments	

Navigation	
USER'S GUIDE	Download and read the guide before using this Tool
1 - HOME	Enter agency information
2 - INPUT BASELINE YEAR WATER USE	Enter Baseline Year production and use
3 - BASELINE YEAR WATER USE PROFILE	Review and confirm entered information
4 - DROUGHT RESPONSE ACTIONS	Select Drought Response Actions and input estimated water savings and implementation rates.
5 - ESTIMATED WATER SAVINGS	Review estimated water production and compare estimated savings to conservation target.

Drought Response Tool

Home | Input Baseline Year Water Use | Baseline Year Water Use Profile | Drought Response Actions | Estimated Water Savings | Drought Response Tracking

1 - Home

City of Redwood City

6 - DROUGHT RESPONSE TRACKING	Track production and water savings against the conservation target.

Drought Response Tool

Home | Input Baseline Year Water Use | Baseline Year Water Use Profile | Drought Response Actions | Estimated Water Savings | Drought Response Tracking

1 - Home

City of Redwood City

For questions about this tool or for additional information, contact:

Anona Dutton, P.G., C.Hg.
adutton@ekiconsult.com
(650) 292-9100

eki environment & water

2 - Input Baseline Year (2018) Water Use

City of Redwood City

Input Baseline Year (2018) Production and Water Use

Units: (af)

Select the units to input monthly production and use data. Enter the total monthly potable water production for the Baseline Year. Next, enter monthly water use data by sector for the Baseline Year. If you bill on a bi-monthly basis, divide your billing data between the months that the billing cycle includes. If your single-family and multi-family accounts are tracked separately, enter the combined water use for both sectors in the Residential Water Use column. If your commercial, industrial, and institutional (CII) accounts are tracked separately, enter the combined water use for each sector in the CII Water Use column. Your non-revenue water use is calculated by subtracting your monthly residential, CII, and dedicated irrigation water uses from your monthly production. Your monthly residential gallons per capita per day (R-GPCD) is calculated by dividing your monthly residential water use by your population entered in Worksheet 1 - Home.

Date	Total Production (af)	Residential Water Use (af)	CII Water Use (af)	Dedicated Irrigation Water Use (af)	Non-Revenue Water Use (af)	Total R-GPCD	Comments
January	579	383	127	19	50	47	
February	621	390	135	12	84	53	
March	613	373	134	21	85	45	
April	830	428	152	73	177	54	
May	886	519	167	110	90	63	
June	988	601	166	115	106	76	
July	1,003	629	187	115	71	77	
August	958	620	169	100	69	76	
September	796	586	145	75	-11	74	
October	851	540	165	60	86	66	
November	629	474	121	11	23	60	
December	566	412	116	8	30	50	

Drought Response Tool

Home | Input Baseline Year Water Use | Baseline Year Water Use Profile | Drought Response Actions | Estimated Water Savings | Drought Response Tracking

3 - Baseline Year (2018) Water Use Profile

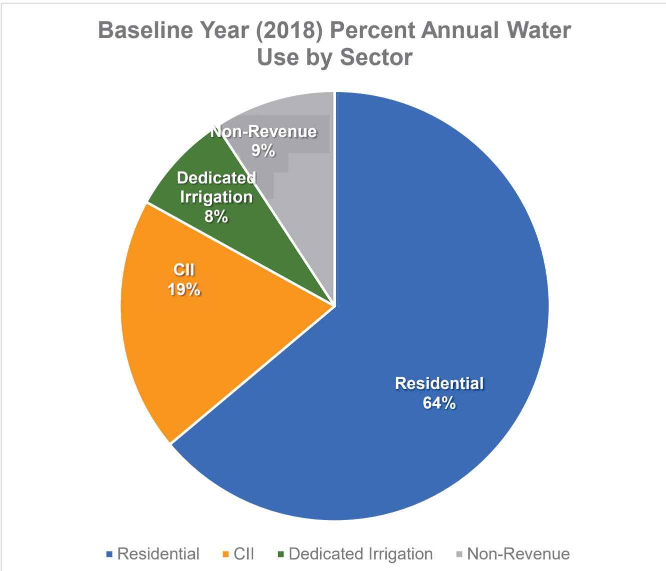
City of Redwood City

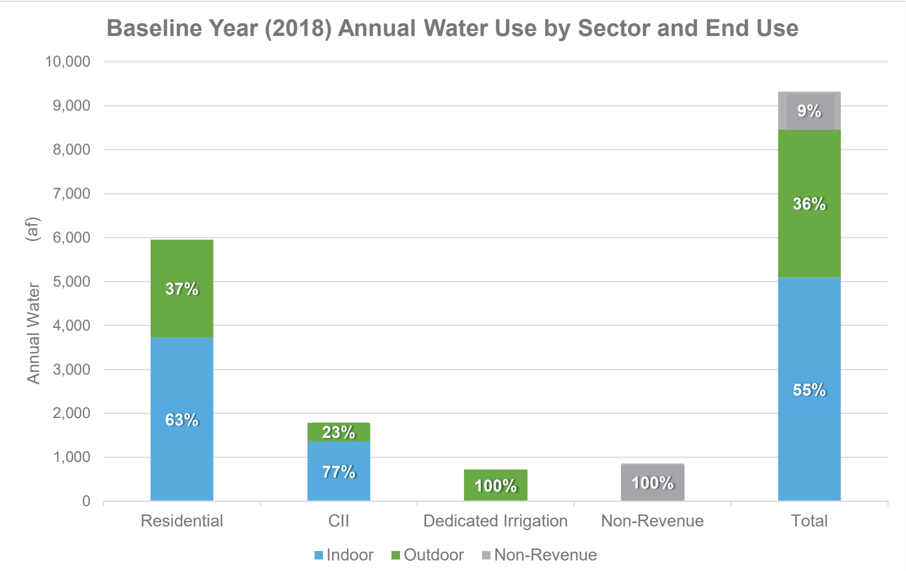
Baseline Year (2018) Annual Water Use Summary

Units: (af)

A summary of your Baseline Year water use by sector and major end use category is shown below. Select the units in which your production and use data are displayed.

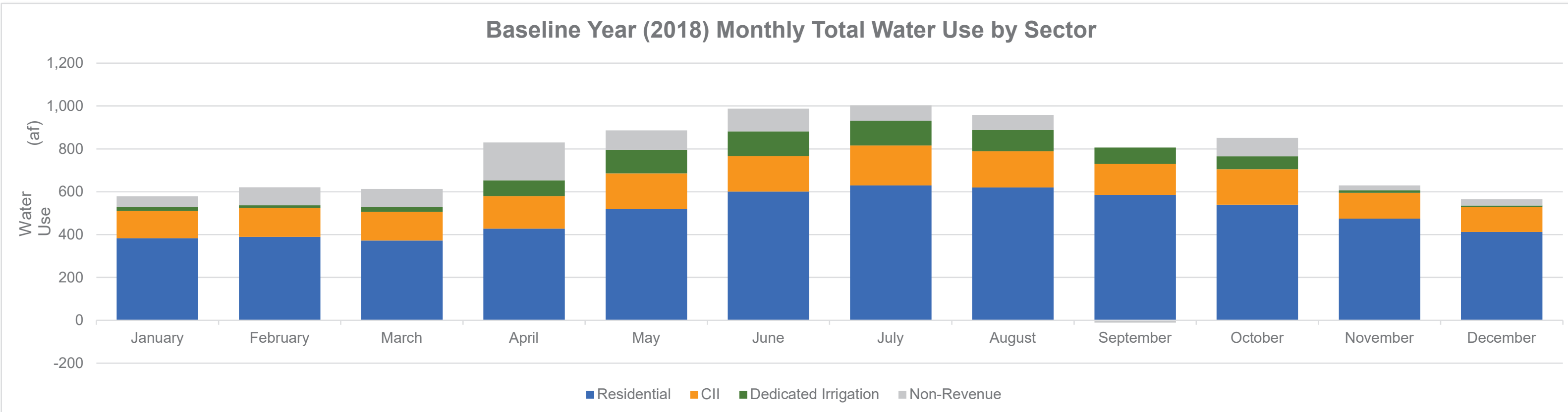
Water Use	Total Production (af)	Water Use (af)				Comments
		Residential	CII	Dedicated Irrigation	Non-Revenue	
Total	9,318	5,954	1,783	721	860	
Total Indoor	5,096	3,730	1,365	--	--	
Total Outdoor	3,363	2,224	418	721	--	
Total Non-Revenue	860	--	--	--	860	
Total Indoor %	55%	63%	77%	0%	--	
Total Outdoor %	36%	37%	23%	100%	--	
Total Non-Revenue %	9%	--	--	--	100%	

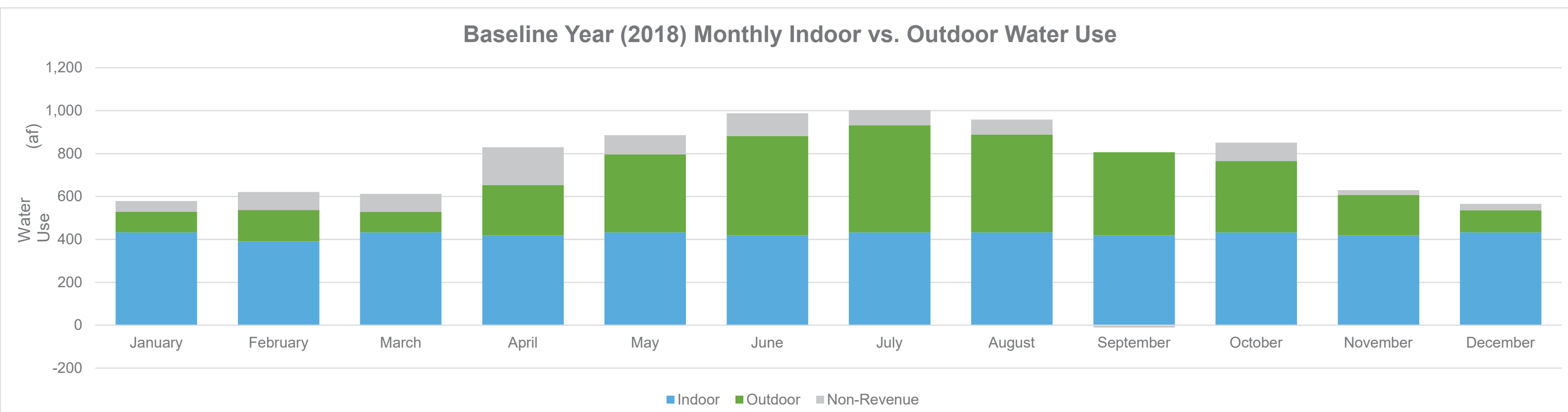




3 - Baseline Year (2018) Water Use Profile

City of Redwood City



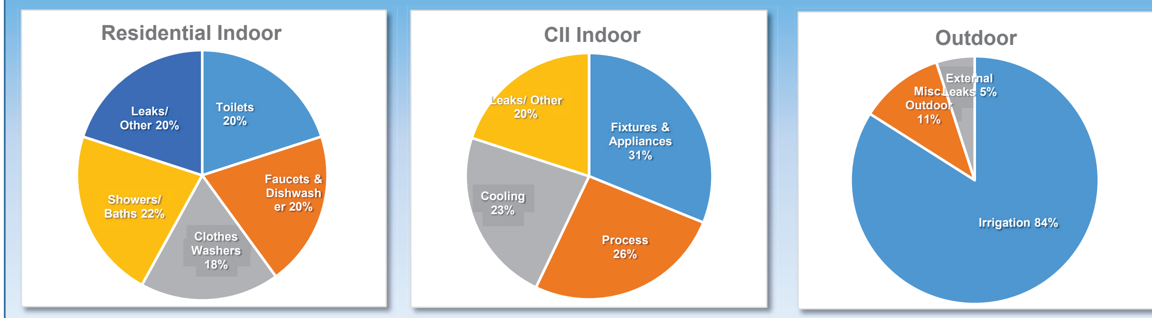


4 - Drought Response Actions - Stage 3

City of Redwood City

Maximum Savings Potential		
Use the default values or enter your own criteria for the maximum savings potential. Estimated water savings within each sector will not exceed the maximum savings criteria.		
Minimum Residential Indoor GPCD	25	R-GPCD
Maximum Residential Outdoor Savings	100%	of Baseline Residential Outdoor Water Use
Maximum CII Indoor Savings	30%	of Baseline CII Indoor Water Use
Maximum CII Outdoor Savings	100%	of Baseline CII Outdoor Water Use
Maximum Dedicated Irrigation Account Savings	100%	of Baseline Dedicated Irrigation Water Use
Maximum Non-Revenue Water Savings	50%	of Baseline Non-Revenue Water Use
Resulting Total Maximum Annual Savings Potential	**59%**	of Total Baseline Production

Assumed Proportion of Water Use by End Uses and Sector



Drought Response Tool

Home | Input Baseline Year Water Use | Baseline Year Water Use Profile | Drought Response Actions | Estimated Water Savings | Drought Response Tracking

4 - Drought Response Actions - Stage 3

City of Redwood City

Drought Response Actions

Select the Drought Response Actions you would like to include in your estimated savings calculations. For each selected action, use the default end use savings estimates and implementation rates or input your own values. The "End Use Savings" estimates the percent water use reduction that could occur at a particular end use as a result of a specific action. The "Implementation Rate" refers to the estimated percentage of accounts that will implement a specific action. The water savings potential at each end use is capped based on the assumed distribution of end use water demands shown in the pie charts above. A dash (--) indicates that professional judgement was used to establish the default value, or that savings are expected to be accounted for as part of a Public Information Program; additional basis for the default values are included in the User Manual.

Action Description	End Use(s)	Implement Program	End Use Savings (%)	Implementation Rate	Source of Default Savings Estimate	Source of Default Implementation Rate
Possible Mandatory Prohibitions	All Outdoor	☑	14%	**70%**	--	--
Prohibit Irrigation with Potable Water Outside of Newly Constructed Homes and Buildings that is not Delivered by Drip or Microspray Systems	Irrigation	☐			--	--
Require Shut-Off Nozzles on Hoses for Vehicle Washing	Misc. Outdoor	☐	17%	50%	See Appendix D of the DRP	--
Prohibit Use of Potable Water to Wash Sidewalks and Driveways	Misc. Outdoor	☐	17%	50%		--
Prohibit the Use of Potable Water for Street Washing	Misc. Outdoor	☐	17%	50%		--
Prohibit Irrigation with Potable Water in a Manner that causes Runoff	Irrigation	☐	3%	50%	DeOreo et al., 2011	--
Prohibit Irrigation with Potable Water within 48 Hours following Measurable Rainfall	Irrigation	☐			--	--
Prohibit Irrigation of Ornamental Turf with Potable Water on Street Medians	Irrigation	☐			--	--
Prohibit Potable Water Use for Decorative Water Features that do not Recirculate Water	Misc. Outdoor	☑	50%	50%	EBMUD, 2008	--
Provide Linen Service Opt Out Options	Fixtures & Appliances	☑	0.5%	50%	EBMUD, 2011	--
Prohibit Serving Drinking Water other than upon Request in Eating or Drinking Establishments	Fixtures & Appliances	☑	0.5%	50%	EBMUD, 2011	--

4 - Drought Response Actions - Stage 3

City of Redwood City

Drought Response Actions

Action Description	End Use(s)	Implement Program	End Use Savings (%)	Implementation Rate	Source of Default Savings Estimate	Source of Default Implementation Rate
▶ Agency Drought Actions / Restrictions						
▶ Agency Actions						
Media Campaign, Newspaper Articles, Website	All	☑	0.5%	**60%**	EBMUD, 2011	--
Promote Water Conservation / Rebate Programs	All	☑		50%	--	--
Water Efficiency Workshops, Public Events	All	☑	0.5%	25%	EBMUD, 2011	--
Water Bill Inserts	All	☑	0.5%	100%	EBMUD, 2011	--
Promote / Expand Use of Recycled Water	Irrigation	☐	100%		--	--
Home or Mobile Water Use Reports	All	☐	5%	10%	WaterSmart Software, 2015	--
Decrease Frequency and Length of Line Flushing	Non Revenue Water	☑	25%	**100%**	See Appendix D of the DRP	Suspend flushing.
Audit and Reduce System Water Loss	Non Revenue Water	☐	45%	50%	DWR, 2015	Target 50% of leakage.
Implement Drought Rate Structure / Water Budgets	All	☑	**3%**	100%	CUWCC, 2015	--
Establish Retrofit on Resale Ordinance	All Residential Indoor	☐	21%	6%	SFPUC, 2004	First Tuesday, 2015
Require Net Zero Demand Increase on New Connections	All	☐			--	--
Moratorium on New Connections	All	☑			--	--
Move to Monthly Metering / Billing	All	☐	5%	10%	See Appendix D of the DRP	--
Increase Water Waste Patrols / Enforcement	All	☑			--	--
Establish Drought Hotline	All	☑			--	--
Reduce Distribution System Pressures	Non Revenue Water	☐	4.5%	100%	CUWCC, 2010; DWR, 2015	--
▶ Dedicated Irrigation						
Conduct Irrigation Account Surveys	Irrigation	☐	30%	10%	EBMUD, 2011	--
Limit Irrigation Days, Time and Duration (Select One)						
Limit Irrigation to 2 Days/Week, 15 Minutes/Day, Between 9PM and 6AM	Irrigation	☐	38%	70%	UC IPM, 2014	--
Limit Irrigation to 1 Day/Week, 10 Minutes/Day, Between 9PM and 6AM	Irrigation	☑	79%	**65%**		
Prohibit use of Potable Water for Irrigation	Irrigation	☐	100%	50%		
Require Repair of all Leaks within 24 hours	External Leaks	☐	100%	5%	--	--
Customer Water Budgets						
Establish Water Budget - 25% Reduction	Irrigation	☐	25%	50%	--	--
Establish Water Budget - 50% Reduction	Irrigation	☐	50%	50%	--	--
Establish Water Budget - 75% Reduction	Irrigation	☐	75%	50%	--	--

4 - Drought Response Actions - Stage 3

City of Redwood City

Drought Response Actions						
Action Description	**End Use(s)**	**Implement Program**	**End Use Savings (%)**	**Implementation Rate**	**Source of Default Savings Estimate**	**Source of Default Implementation Rate**
▶ Agency Drought Actions / Restrictions						
▶ Residential						
Conduct Water Use Surveys Targeting High Water Users	All Residential Uses	☐	10%	10%	EBMUD, 2011	--
Limit Irrigation Days, Time and Duration (Select One)						
Limit Irrigation to 2 Days/Week, 15 Minutes/Day, Between 9PM and 6AM	Irrigation	☐	38%	70%	UC IPM, 2014	--
Limit Irrigation to 1 Day/Week, 10 Minutes/Day, Between 9PM and 6AM	Irrigation	☑	79%	**65%**		
Prohibit use of Potable Water for Irrigation	Irrigation	☐	100%	50%		
Prohibit Vehicle Washing Except with Recycled Water	Misc. Outdoor	☑	50%	50%	EBMUD, 2008	--
Require Repair of all Leaks within 24 hours	Leaks	☐	100%	5%	--	--
Require Pool Covers	Misc. Outdoor	☐	28%	25%	Maddaus & Mayer, 2001	--
Prohibit Filling of Pools	Misc. Outdoor	☐	55%	25%	DeOreo et al., 2011	--
Customer Water Budgets						
Establish Water Budget - 10% Reduction	All Residential Uses	☐	10%	50%	--	--
Establish Water Budget - 20% Reduction	All Residential Uses	☐	20%	50%	--	--
▶ CII						
Conduct CII Surveys Targeting High Water Users	All CII uses	☐	10%	10%	EBMUD, 2011	--
Limit Irrigation Days, Time and Duration (Select One)						
Limit Irrigation to 2 Days/Week, 15 Minutes/Day, Between 9PM and 6AM	Irrigation	☐	38%	70%	UC IPM, 2014	--
Limit Irrigation to 1 Day/Week, 10 Minutes/Day, Between 9PM and 6AM	Irrigation	☑	79%	**65%**		
Prohibit Use of Potable Water for Construction and Dust Control	Misc. Outdoor	☐		100%	--	--
Prohibit Single-Pass Cooling Systems	Cooling	☐	80%	1%	Vickers, 2001	--
Require Repair of all Leaks within 24 hours	Leaks	☐	100%	5%	--	--
Prohibit Vehicle Washing Except with Recycled Water	Misc. Outdoor	☑	50%	50%	EBMUD, 2008	--
Require Water-Efficient Pre-Rinse Spray Valves	Fixtures & Appliances	☐	0.8%	50%	EPA, 2015; Pacific Institute, 2003	--
Customer Water Budgets						
Establish Water Budget - 10% Reduction	All CII uses	☐	10%	50%	--	--
Establish Water Budget - 20% Reduction	All CII uses	☐	20%	50%	--	--
Establish Water Budget - 30% Reduction	All CII uses	☐	30%	50%	--	--

4 - Drought Response Actions - Stage 3

City of Redwood City

Action Description	End Use(s)	Implement Program	End Use Savings (%)	Implementation Rate	Source of Default Savings Estimate	Source of Default Implementation Rate
▶ Residential Customer Actions to Encourage						
Install Bathroom Faucet Aerators	Faucets and Dishwashers	☐			--	--
Install a Water-Efficient Showerhead	Showers/Baths	☐			--	--
Turn Off Water when Brushing Teeth, Shaving, Washing Dishes, or Cooking	Faucets and Dishwashers	☐			--	--
Fill the Bathtub Halfway	Showers/Baths	☐			--	--
Wash Only Full Loads of Clothes	Clothes Washers	☐			--	--
Install a High-Efficiency Toilet	Toilets	☐			--	--
Take Shorter Showers	Showers/Baths	☐			--	--
Run Dishwasher Only When Full	Faucets and Dishwashers	☐			--	--
Reduce Outdoor Irrigation	Irrigation	☐			--	--
Install Drip-Irrigation	Irrigation	☐			--	--
Use Mulch	Irrigation	☐			--	--
Plant Drought Resistant Trees and Plants	Irrigation	☐			--	--
Use a Broom to Clean Outdoor Areas	Misc. Outdoor	☐			--	--
Flush Less Frequently	Toilets	☐			--	--
Re-Use Shower or Bath Water for Irrigation	Irrigation	☐			--	--
Wash Car at Facility that Recycles the Water	Misc. Outdoor	☐			--	--

eki

Drought Response Tool

Home | Input Baseline Year Water Use | Baseline Year Water Use Profile | Drought Response Actions | **Estimated Water Savings** | Drought Response Tracking

5 - Estimated Water Savings - Stage 3

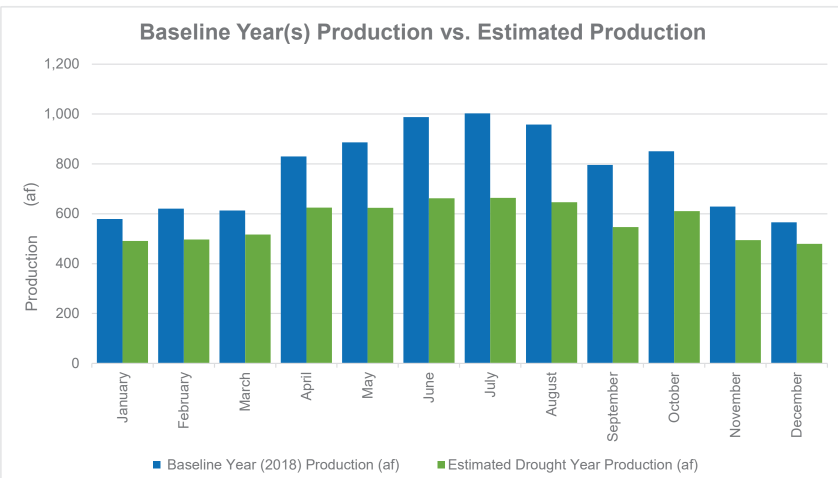
City of Redwood City

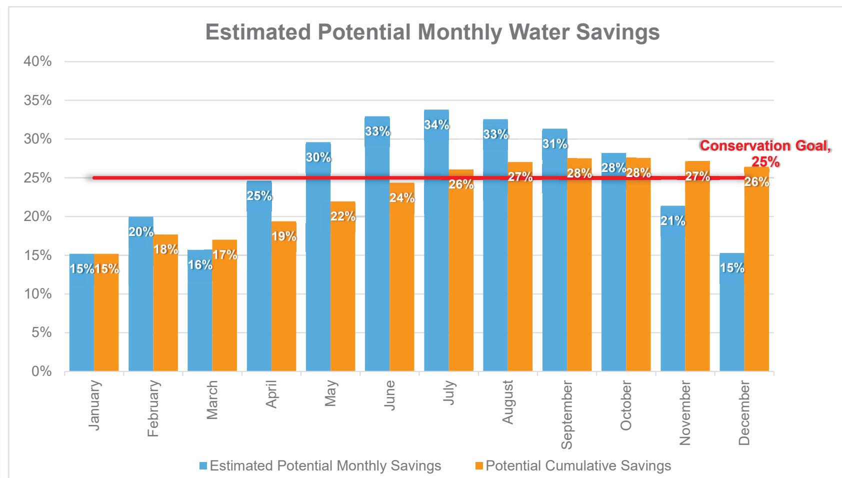
Estimated Monthly Water Use and Savings Summary

Units: (af)

This provides a summary of the estimated production relative to Baseline Year production and potential water savings, assuming implementation of selected actions at the water savings and implementation rates indicated in the Drought Response Actions worksheet. Select the units that your production data are displayed in.

Month	Baseline Year (2018) Production (af)	Estimated Drought Year Production (af)	Estimated Potential Monthly Savings	Potential Cumulative Savings	Conservation Goal	Comments
January	579	491	15%	15%	25%	
February	621	497	20%	18%	25%	
March	613	517	16%	17%	25%	
April	830	625	25%	19%	25%	
May	886	624	30%	22%	25%	
June	988	662	33%	24%	25%	
July	1,003	664	34%	26%	25%	
August	958	646	33%	27%	25%	
September	796	546	31%	28%	25%	
October	851	611	28%	28%	25%	
November	629	494	21%	27%	25%	
December	566	479	15%	26%	25%	





Drought Response Tool

Home | Input Baseline Year Water Use | Baseline Year Water Use Profile | Drought Response Actions | Estimated Water Savings | Drought Response Tracking

1 - Home

City of Redwood City

Enter Agency Information	
Agency Name	City of Redwood City
Total Population Served	86,280
Conservation Goal (%)	35%
Drought Stage	Stage 4
Number of Residential Accounts	20,860
Number of Commercial, Industrial, and Institutional (CII) Accounts	1,597
Number of Dedicated Irrigation Accounts	433
Baseline Year(s)	2018
Percentage of Residential Indoor Use During Minimum Month (%)	85%
Percentage of CII Indoor Use During Minimum Month (%)	100%
Comments	

Navigation	
USER'S GUIDE	Download and read the guide before using this Tool
1 - HOME	Enter agency information
2 - INPUT BASELINE YEAR WATER USE	Enter Baseline Year production and use
3 - BASELINE YEAR WATER USE PROFILE	Review and confirm entered information
4 - DROUGHT RESPONSE ACTIONS	Select Drought Response Actions and input estimated water savings and implementation rates.
5 - ESTIMATED WATER SAVINGS	Review estimated water production and compare estimated savings to conservation target.

1 - Home

City of Redwood City

6 - DROUGHT RESPONSE TRACKING	Track production and water savings against the conservation target.

Drought Response Tool

Home | Input Baseline Year Water Use | Baseline Year Water Use Profile | Drought Response Actions | Estimated Water Savings | Drought Response Tracking

1 - Home

City of Redwood City

For questions about this tool or for additional information, contact:

Anona Dutton, P.G., C.Hg.
adutton@ekiconsult.com
(650) 292-9100

eki environment & water

Disclaimer: *This electronic file is being provided by EKI Environment & Water Inc. (EKI; fomerly Erler & Kalinowski, Inc.) at the request of (CLIENT). The Drought Response Tool was transmitted to CLIENT in electronic format, on a CD dated [DATE] (Original Document). Only the Original Document, provided to, and for the sole benefit of, CLIENT constitutes EKI's professional work product. An electronic copy of the Drought Response Tool is provided to CLIENT's Customer Agencies, for use only by CLIENT-designated Customer Agencies. The Drought Response Tool is copyrighted by EKI. All rights are reserved by EKI, and content may not be reproduced, downloaded, disseminated, published, or transferred in any form or by any means, except with the prior written permission of EKI. Customer Agencies may use the Drought Response Tool for reviewing potential drought response alternatives. The delivery to, or use by, Customer Agencies of the Drought Response Tool does not provide rights of reliance by Client Agencies or other third parties without the express written consent of EKI and subject to the execution of an agreement between such Customer Agency or other third party and EKI. EKI makes no warranties, either express or implied, of the electronic media or regarding its merchantability, applicability, compatibility with the recipients' computer equipment or software; of the fitness for any particular purpose; or that the electronic media contains no defect or is virus free. Use of EKI's Drought Response Tool, other electronic media, or other work product by Client Agency or others shall be at the party's sole risk. Further, by use of this electronic media, the user agrees, to the fullest extent permitted by law, to defend, indemnify and hold harmless EKI, CLIENT, and their officers, directors, employees, and subconsultants against all damages, liabilities or costs, including reasonable attorneys' fees and defense costs, arising from any use, modification or changes made to the electronic files by anyone other than EKI or from any unauthorized distribution or reuse of the electronic files without the prior written consent of EKI.*

2 - Input Baseline Year (2018) Water Use

City of Redwood City

Input Baseline Year (2018) Production and Water Use

Units: (af)

Select the units to input monthly production and use data. Enter the total monthly potable water production for the Baseline Year. Next, enter monthly water use data by sector for the Baseline Year. If you bill on a bi-monthly basis, divide your billing data between the months that the billing cycle includes. If your single-family and multi-family accounts are tracked separately, enter the combined water use for both sectors in the Residential Water Use column. If your commercial, industrial, and institutional (CII) accounts are tracked separately, enter the combined water use for each sector in the CII Water Use column. Your non-revenue water use is calculated by subtracting your monthly residential, CII, and dedicated irrigation water uses from your monthly production. Your monthly residential gallons per capita per day (R-GPCD) is calculated by dividing your monthly residential water use by your population entered in Worksheet 1 - Home.

Date	Total Production (af)	Residential Water Use (af)	CII Water Use (af)	Dedicated Irrigation Water Use (af)	Non-Revenue Water Use (af)	Total R-GPCD	Comments
January	579	383	127	19	50	47	
February	621	390	135	12	84	53	
March	613	373	134	21	85	45	
April	830	428	152	73	177	54	
May	886	519	167	110	90	63	
June	988	601	166	115	106	76	
July	1,003	629	187	115	71	77	
August	958	620	169	100	69	76	
September	796	586	145	75	-11	74	
October	851	540	165	60	86	66	
November	629	474	121	11	23	60	
December	566	412	116	8	30	50	

3 - Baseline Year (2018) Water Use Profile

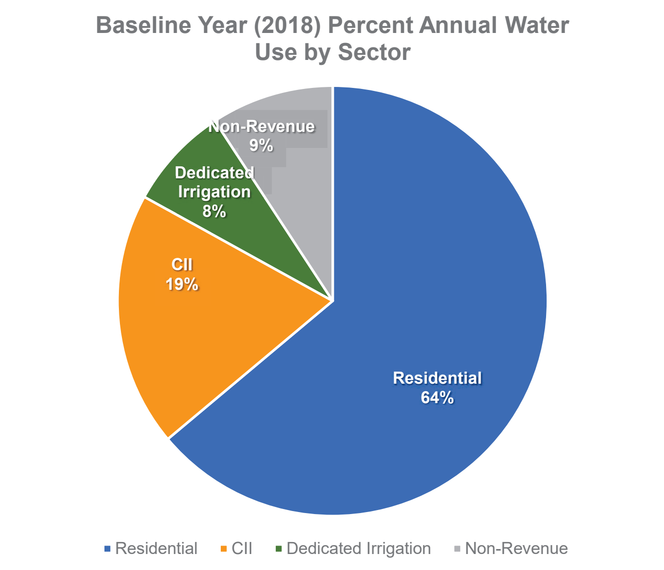
City of Redwood City

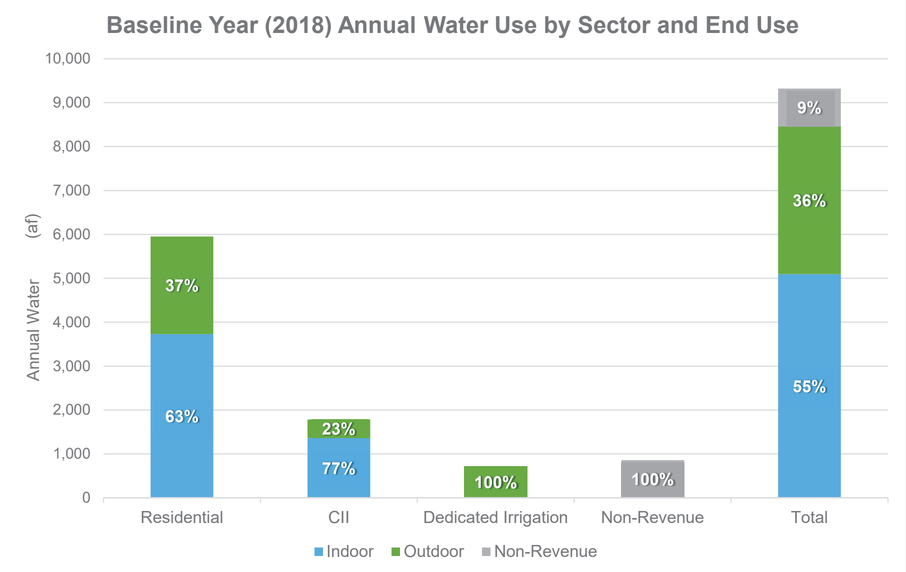
Baseline Year (2018) Annual Water Use Summary

Units: (af)

A summary of your Baseline Year water use by sector and major end use category is shown below. Select the units in which your production and use data are displayed.

Water Use	Total Production (af)	Water Use (af)				Comments
		Residential	CII	Dedicated Irrigation	Non-Revenue	
Total	9,318	5,954	1,783	721	860	
Total Indoor	5,096	3,730	1,365	--	--	
Total Outdoor	3,363	2,224	418	721	--	
Total Non-Revenue	860	--	--	--	860	
Total Indoor %	55%	63%	77%	0%	--	
Total Outdoor %	36%	37%	23%	100%	--	
Total Non-Revenue %	9%	--	--	--	100%	



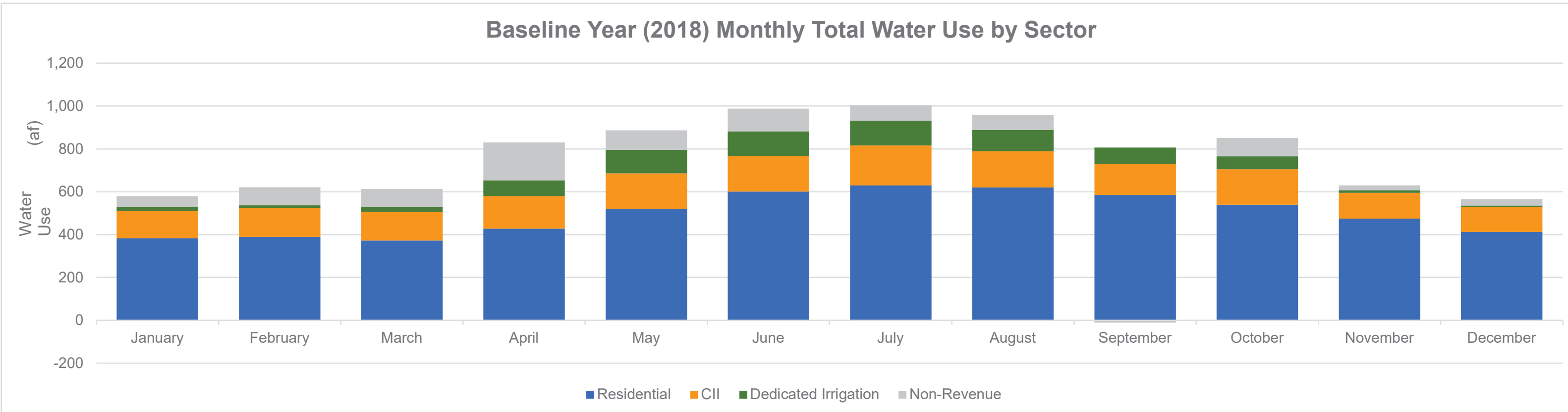


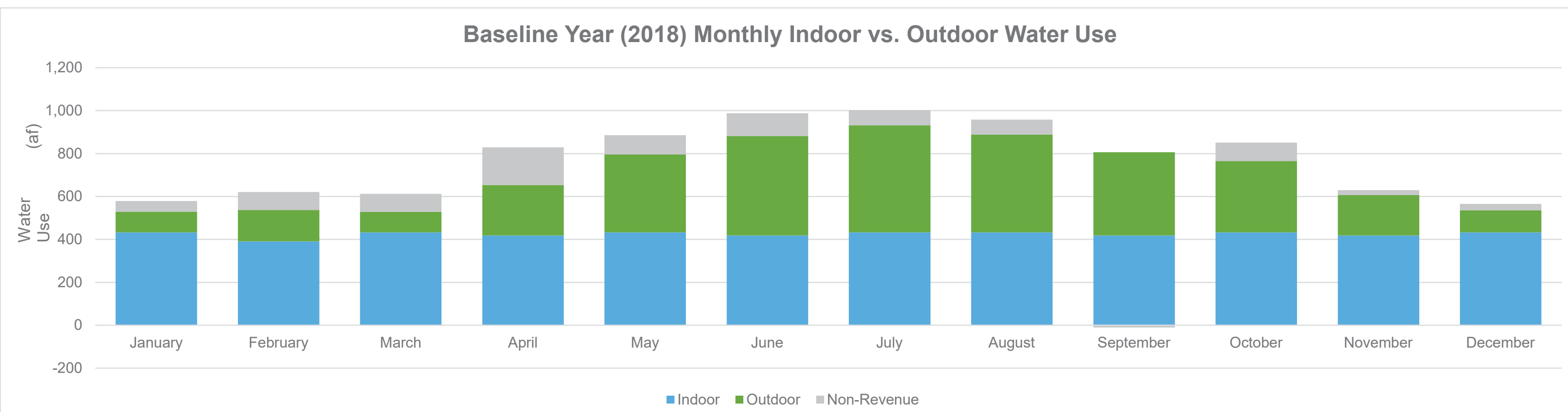
Drought Response Tool

Home | Input Baseline Year Water Use | Baseline Year Water Use Profile | Drought Response Actions | Estimated Water Savings | Drought Response Tracking

3 - Baseline Year (2018) Water Use Profile

City of Redwood City





Drought Response Tool

Home | Input Baseline Year Water Use | Baseline Year Water Use Profile | Drought Response Actions | Estimated Water Savings | Drought Response Tracking

4 - Drought Response Actions - Stage 4

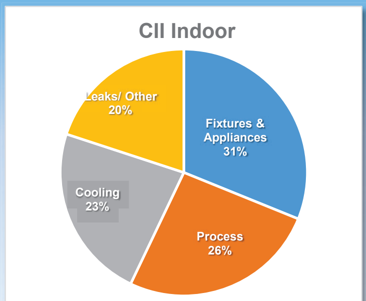
City of Redwood City

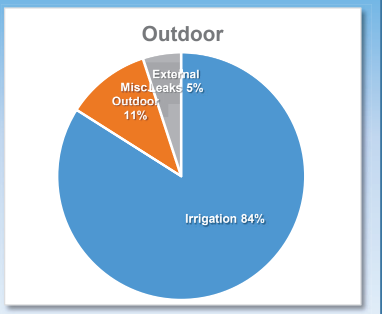
Maximum Savings Potential

Use the default values or enter your own criteria for the maximum savings potential. Estimated water savings within each sector will not exceed the maximum savings criteria.

Minimum Residential Indoor GPCD	25	R-GPCD
Maximum Residential Outdoor Savings	100%	of Baseline Residential Outdoor Water Use
Maximum CII Indoor Savings	30%	of Baseline CII Indoor Water Use
Maximum CII Outdoor Savings	100%	of Baseline CII Outdoor Water Use
Maximum Dedicated Irrigation Account Savings	100%	of Baseline Dedicated Irrigation Water Use
Maximum Non-Revenue Water Savings	50%	of Baseline Non-Revenue Water Use
Resulting Total Maximum Annual Savings Potential	**59%**	of Total Baseline Production

Assumed Proportion of Water Use by End Uses and Sector





Drought Response Tool

Home | Input Baseline Year Water Use | Baseline Year Water Use Profile | Drought Response Actions | Estimated Water Savings | Drought Response Tracking

4 - Drought Response Actions - Stage 4

City of Redwood City

Drought Response Actions

Select the Drought Response Actions you would like to include in your estimated savings calculations. For each selected action, use the default end use savings estimates and implementation rates or input your own values. The "End Use Savings" estimates the percent water use reduction that could occur at a particular end use as a result of a specific action. The "Implementation Rate" refers to the estimated percentage of accounts that will implement a specific action. The water savings potential at each end use is capped based on the assumed distribution of end use water demands shown in the pie charts above. A dash (--) indicates that professional judgement was used to establish the default value, or that savings are expected to be accounted for as part of a Public Information Program; additional basis for the default values are included in the User Manual.

Action Description	End Use(s)	Implement Program	End Use Savings (%)	Implementation Rate	Source of Default Savings Estimate	Source of Default Implementation Rate
▶ **Possible Mandatory Prohibitions**	All Outdoor	☑	14%	**80%**	--	--
Prohibit Irrigation with Potable Water Outside of Newly Constructed Homes and Buildings that is not Delivered by Drip or Microspray Systems	Irrigation	☐			--	--
Require Shut-Off Nozzles on Hoses for Vehicle Washing	Misc. Outdoor	☐	17%	50%	See Appendix D of the DRP	--
Prohibit Use of Potable Water to Wash Sidewalks and Driveways	Misc. Outdoor	☐	17%	50%		--
Prohibit the Use of Potable Water for Street Washing	Misc. Outdoor	☐	17%	50%		--
Prohibit Irrigation with Potable Water in a Manner that causes Runoff	Irrigation	☐	3%	50%	DeOreo et al., 2011	--
Prohibit Irrigation with Potable Water within 48 Hours following Measurable Rainfall	Irrigation	☐			--	--
Prohibit Irrigation of Ornamental Turf with Potable Water on Street Medians	Irrigation	☐			--	--
Prohibit Potable Water Use for Decorative Water Features that do not Recirculate Water	Misc. Outdoor	☑	50%	50%	EBMUD, 2008	--
Provide Linen Service Opt Out Options	Fixtures & Appliances	☑	0.5%	50%	EBMUD, 2011	--
Prohibit Serving Drinking Water other than upon Request in Eating or Drinking Establishments	Fixtures & Appliances	☑	0.5%	50%	EBMUD, 2011	--

4 - Drought Response Actions - Stage 4

City of Redwood City

Drought Response Actions						
Action Description	**End Use(s)**	**Implement Program**	**End Use Savings (%)**	**Implementation Rate**	**Source of Default Savings Estimate**	**Source of Default Implementation Rate**
▶ Agency Drought Actions / Restrictions						
▶ Agency Actions						
Media Campaign, Newspaper Articles, Website	All	☑	0.5%	**65%**	EBMUD, 2011	--
Promote Water Conservation / Rebate Programs	All	☑		50%	--	--
Water Efficiency Workshops, Public Events	All	☑	0.5%	**30%**	EBMUD, 2011	--
Water Bill Inserts	All	☑	0.5%	100%	EBMUD, 2011	--
Promote / Expand Use of Recycled Water	Irrigation	☐	100%		--	--
Home or Mobile Water Use Reports	All	☐	5%	10%	WaterSmart Software, 2015	--
Decrease Frequency and Length of Line Flushing	Non Revenue Water	☑	25%	**100%**	See Appendix D of the DRP	Suspend flushing.
Audit and Reduce System Water Loss	Non Revenue Water	☐	45%	50%	DWR, 2015	Target 50% of leakage.
Implement Drought Rate Structure / Water Budgets	All	☑	5%	100%	CUWCC, 2015	--
Establish Retrofit on Resale Ordinance	All Residential Indoor	☐	21%	6%	SFPUC, 2004	First Tuesday, 2015
Require Net Zero Demand Increase on New Connections	All	☐			--	--
Moratorium on New Connections	All	☑			--	--
Move to Monthly Metering / Billing	All	☐	5%	10%	See Appendix D of the DRP	--
Increase Water Waste Patrols / Enforcement	All	☑			--	--
Establish Drought Hotline	All	☑			--	--
Reduce Distribution System Pressures	Non Revenue Water	☐	4.5%	100%	CUWCC, 2010; DWR, 2015	--
▶ Dedicated Irrigation						
Conduct Irrigation Account Surveys	Irrigation	☐	30%	10%	EBMUD, 2011	--
Limit Irrigation Days, Time and Duration (Select One)						
Limit Irrigation to 2 Days/Week, 15 Minutes/Day, Between 9PM and 6AM	Irrigation	☐	38%	70%	UC IPM, 2014	--
Limit Irrigation to 1 Day/Week, 10 Minutes/Day, Between 9PM and 6AM	Irrigation	☑	79%	**90%**	UC IPM, 2014	--
Prohibit use of Potable Water for Irrigation	Irrigation	☐	100%	50%	UC IPM, 2014	--
Require Repair of all Leaks within 24 hours	External Leaks	☐	100%	5%	--	--
Customer Water Budgets						
Establish Water Budget - 20% Reduction	Irrigation	☐	**20%**	**85%**	--	--
Establish Water Budget - 50% Reduction	Irrigation	☐	50%	50%	--	--
Establish Water Budget - 75% Reduction	Irrigation	☐	75%	50%	--	--

4 - Drought Response Actions - Stage 4

City of Redwood City

Action Description	End Use(s)	Implement Program	End Use Savings (%)	Implementation Rate	Source of Default Savings Estimate	Source of Default Implementation Rate
▶ Agency Drought Actions / Restrictions						
▶ Residential						
Conduct Water Use Surveys Targeting High Water Users	All Residential Uses	☐	10%	10%	EBMUD, 2011	--
Limit Irrigation Days, Time and Duration (Select One)						
Limit Irrigation to 2 Days/Week, 15 Minutes/Day, Between 9PM and 6AM	Irrigation	☐	38%	70%	UC IPM, 2014	--
Limit Irrigation to 1 Day/Week, 10 Minutes/Day, Between 9PM and 6AM	Irrigation	☑	79%	**90%**		
Prohibit use of Potable Water for Irrigation	Irrigation	☐	100%	50%		
Prohibit Vehicle Washing Except with Recycled Water	Misc. Outdoor	☑	50%	50%	EBMUD, 2008	--
Require Repair of all Leaks within 24 hours	Leaks	☐	100%	5%	--	--
Require Pool Covers	Misc. Outdoor	☐	28%	25%	Maddaus & Mayer, 2001	--
Prohibit Filling of Pools	Misc. Outdoor	☐	55%	25%	DeOreo et al., 2011	--
Customer Water Budgets						
Establish Water Budget - 5% Reduction	All Residential Uses	☐	**5%**	**70%**	--	--
Establish Water Budget - 20% Reduction	All Residential Uses	☐	20%	50%	--	--
▶ CII						
Conduct CII Surveys Targeting High Water Users	All CII uses	☐	10%	10%	EBMUD, 2011	--
Limit Irrigation Days, Time and Duration (Select One)						
Limit Irrigation to 2 Days/Week, 15 Minutes/Day, Between 9PM and 6AM	Irrigation	☐	38%	70%	UC IPM, 2014	--
Limit Irrigation to 1 Day/Week, 10 Minutes/Day, Between 9PM and 6AM	Irrigation	☑	79%	**90%**		
Prohibit Use of Potable Water for Construction and Dust Control	Misc. Outdoor	☐		100%	--	--
Prohibit Single-Pass Cooling Systems	Cooling	☐	80%	1%	Vickers, 2001	--
Require Repair of all Leaks within 24 hours	Leaks	☐	100%	5%	--	--
Prohibit Vehicle Washing Except with Recycled Water	Misc. Outdoor	☑	50%	50%	EBMUD, 2008	--
Require Water-Efficient Pre-Rinse Spray Valves	Fixtures & Appliances	☐	0.8%	50%	EPA, 2015; Pacific Institute, 2003	--
Customer Water Budgets						
Establish Water Budget - 5% Reduction	All CII uses	☐	**5%**	**70%**	--	--
Establish Water Budget - 20% Reduction	All CII uses	☐	20%	50%	--	--
Establish Water Budget - 30% Reduction	All CII uses	☐	30%	50%	--	--

4 - Drought Response Actions - Stage 4

City of Redwood City

Drought Response Actions						
Action Description	**End Use(s)**	**Implement Program**	**End Use Savings (%)**	**Implementation Rate**	**Source of Default Savings Estimate**	**Source of Default Implementation Rate**
► Residential Customer Actions to Encourage						
Install Bathroom Faucet Aerators	Faucets and Dishwashers	☐			--	--
Install a Water-Efficient Showerhead	Showers/Baths	☐			--	--
Turn Off Water when Brushing Teeth, Shaving, Washing Dishes, or Cooking	Faucets and Dishwashers	☐			--	--
Fill the Bathtub Halfway	Showers/Baths	☐			--	--
Wash Only Full Loads of Clothes	Clothes Washers	☐			--	--
Install a High-Efficiency Toilet	Toilets	☐			--	--
Take Shorter Showers	Showers/Baths	☐			--	--
Run Dishwasher Only When Full	Faucets and Dishwashers	☐			--	--
Reduce Outdoor Irrigation	Irrigation	☐			--	--
Install Drip-Irrigation	Irrigation	☐			--	--
Use Mulch	Irrigation	☐			--	--
Plant Drought Resistant Trees and Plants	Irrigation	☐			--	--
Use a Broom to Clean Outdoor Areas	Misc. Outdoor	☐			--	--
Flush Less Frequently	Toilets	☐			--	--
Re-Use Shower or Bath Water for Irrigation	Irrigation	☐			--	--
Wash Car at Facility that Recycles the Water	Misc. Outdoor	☐			--	--

eki

Drought Response Tool

Home | Input Baseline Year Water Use | Baseline Year Water Use Profile | Drought Response Actions | Estimated Water Savings | Drought Response Tracking

5 - Estimated Water Savings - Stage 4

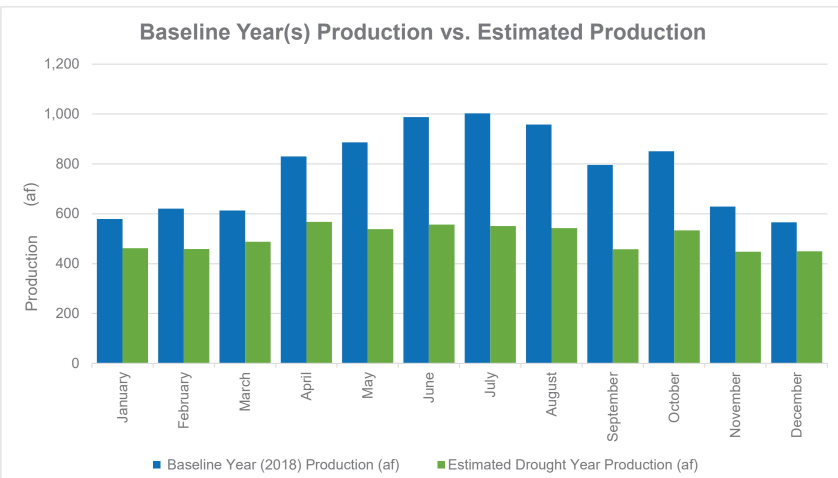
City of Redwood City

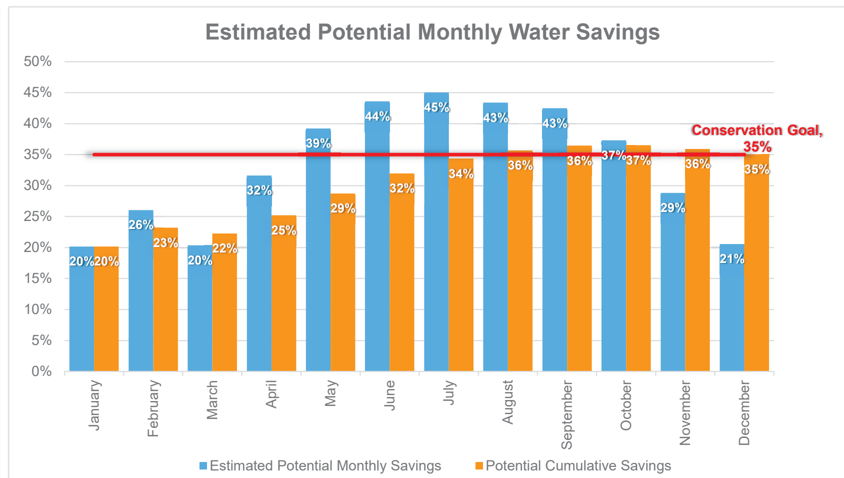
Estimated Monthly Water Use and Savings Summary

Units: (af)

This provides a summary of the estimated production relative to Baseline Year production and potential water savings, assuming implementation of selected actions at the water savings and implementation rates indicated in the Drought Response Actions worksheet. Select the units that your production data are displayed in.

Month	Baseline Year (2018) Production (af)	Estimated Drought Year Production (af)	Estimated Potential Monthly Savings	Potential Cumulative Savings	Conservation Goal	Comments
January	579	462	20%	20%	35%	
February	621	459	26%	23%	35%	
March	613	488	20%	22%	35%	
April	830	567	32%	25%	35%	
May	886	539	39%	29%	35%	
June	988	557	44%	32%	35%	
July	1,003	551	45%	34%	35%	
August	958	542	43%	36%	35%	
September	796	458	43%	36%	35%	
October	851	533	37%	37%	35%	
November	629	448	29%	36%	35%	
December	566	449	21%	35%	35%	





1 - Home

City of Redwood City

Enter Agency Information	
Agency Name	City of Redwood City
Total Population Served	86,280
Conservation Goal (%)	45%
Drought Stage	Stage 5
Number of Residential Accounts	20,860
Number of Commercial, Industrial, and Institutional (CII) Accounts	1,597
Number of Dedicated Irrigation Accounts	433
Baseline Year(s)	2018
Percentage of Residential Indoor Use During Minimum Month (%)	85%
Percentage of CII Indoor Use During Minimum Month (%)	100%
Comments	

Navigation	
USER'S GUIDE	Download and read the guide before using this Tool
1 - HOME	Enter agency information
2 - INPUT BASELINE YEAR WATER USE	Enter Baseline Year production and use
3 - BASELINE YEAR WATER USE PROFILE	Review and confirm entered information
4 - DROUGHT RESPONSE ACTIONS	Select Drought Response Actions and input estimated water savings and implementation rates.
5 - ESTIMATED WATER SAVINGS	Review estimated water production and compare estimated savings to conservation target.

1 - Home

City of Redwood City

6 - DROUGHT RESPONSE TRACKING	Track production and water savings against the conservation target.

Drought Response Tool

Home | Input Baseline Year Water Use | Baseline Year Water Use Profile | Drought Response Actions | Estimated Water Savings | Drought Response Tracking

1 - Home

City of Redwood City

For questions about this tool or for additional information, contact:

Anona Dutton, P.G., C.Hg.
adutton@ekiconsult.com
(650) 292-9100

eki environment & water

__Disclaimer:__ This electronic file is being provided by EKI Environment & Water Inc. (EKI; fomerly Erler & Kalinowski, Inc.) at the request of (CLIENT). The Drought Response Tool was transmitted to CLIENT in electronic format, on a CD dated [DATE] (Original Document). Only the Original Document, provided to, and for the sole benefit of, CLIENT constitutes EKI's professional work product. An electronic copy of the Drought Response Tool is provided to CLIENT's Customer Agencies, for use only by CLIENT-designated Customer Agencies. The Drought Response Tool is copyrighted by EKI. All rights are reserved by EKI, and content may not be reproduced, downloaded, disseminated, published, or transferred in any form or by any means, except with the prior written permission of EKI. Customer Agencies may use the Drought Response Tool for reviewing potential drought response alternatives. The delivery to, or use by, Customer Agencies of the Drought Response Tool does not provide rights of reliance by Client Agencies or other third parties without the express written consent of EKI and subject to the execution of an agreement between such Customer Agency or other third party and EKI. EKI makes no warranties, either express or implied, of the electronic media or regarding its merchantability, applicability, compatibility with the recipients' computer equipment or software; of the fitness for any particular purpose; or that the electronic media contains no defect or is virus free. Use of EKI's Drought Response Tool, other electronic media, or other work product by Client Agency or others shall be at the party's sole risk. Further, by use of this electronic media, the user agrees, to the fullest extent permitted by law, to defend, indemnify and hold harmless EKI, CLIENT, and their officers, directors, employees, and subconsultants against all damages, liabilities or costs, including reasonable attorneys' fees and defense costs, arising from any use, modification or changes made to the electronic files by anyone other than EKI or from any unauthorized distribution or reuse of the electronic files without the prior written consent of EKI.

2 - Input Baseline Year (2018) Water Use

City of Redwood City

Input Baseline Year (2018) Production and Water Use

Units: (af)

Select the units to input monthly production and use data. Enter the total monthly potable water production for the Baseline Year. Next, enter monthly water use data by sector for the Baseline Year. If you bill on a bi-monthly basis, divide your billing data between the months that the billing cycle includes. If your single-family and multi-family accounts are tracked separately, enter the combined water use for both sectors in the Residential Water Use column. If your commercial, industrial, and institutional (CII) accounts are tracked separately, enter the combined water use for each sector in the CII Water Use column. Your non-revenue water use is calculated by subtracting your monthly residential, CII, and dedicated irrigation water uses from your monthly production. Your monthly residential gallons per capita per day (R-GPCD) is calculated by dividing your monthly residential water use by your population entered in Worksheet 1 - Home.

Date	Total Production (af)	Residential Water Use (af)	CII Water Use (af)	Dedicated Irrigation Water Use (af)	Non-Revenue Water Use (af)	Total R-GPCD	Comments
January	579	383	127	19	50	47	
February	621	390	135	12	84	53	
March	613	373	134	21	85	45	
April	830	428	152	73	177	54	
May	886	519	167	110	90	63	
June	988	601	166	115	106	76	
July	1,003	629	187	115	71	77	
August	958	620	169	100	69	76	
September	796	586	145	75	-11	74	
October	851	540	165	60	86	66	
November	629	474	121	11	23	60	
December	566	412	116	8	30	50	

3 - Baseline Year (2018) Water Use Profile

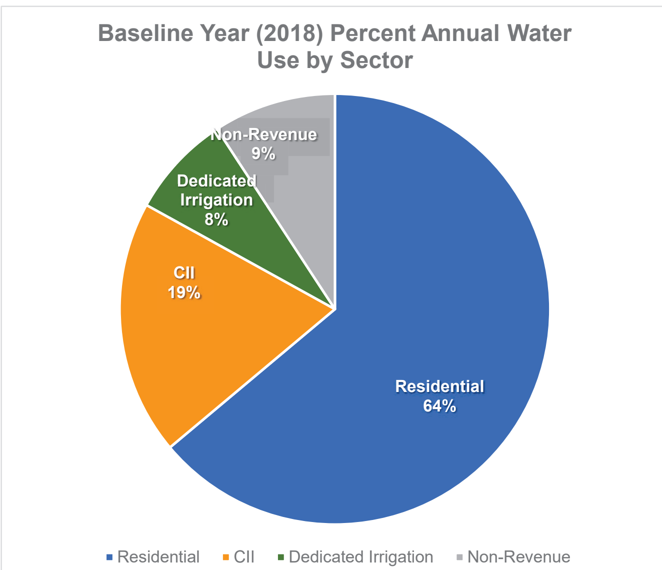
City of Redwood City

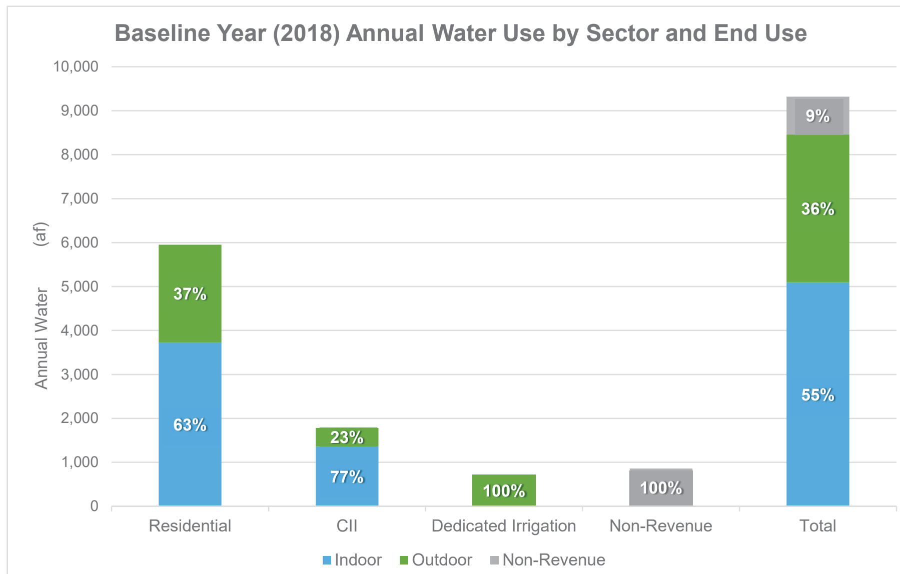
Baseline Year (2018) Annual Water Use Summary

Units: (af)

A summary of your Baseline Year water use by sector and major end use category is shown below. Select the units in which your production and use data are displayed.

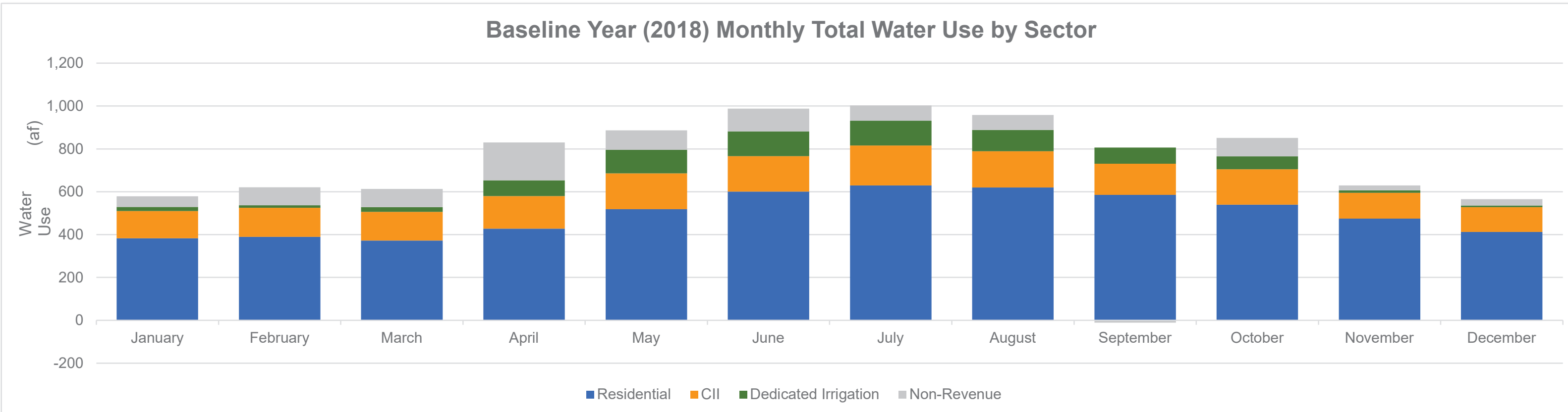
Water Use	Total Production (af)	Water Use (af)				Comments
		Residential	CII	Dedicated Irrigation	Non-Revenue	
Total	9,318	5,954	1,783	721	860	
Total Indoor	5,096	3,730	1,365	--	--	
Total Outdoor	3,363	2,224	418	721	--	
Total Non-Revenue	860	--	--	--	860	
Total Indoor %	55%	63%	77%	0%	--	
Total Outdoor %	36%	37%	23%	100%	--	
Total Non-Revenue %	9%	--	--	--	100%	

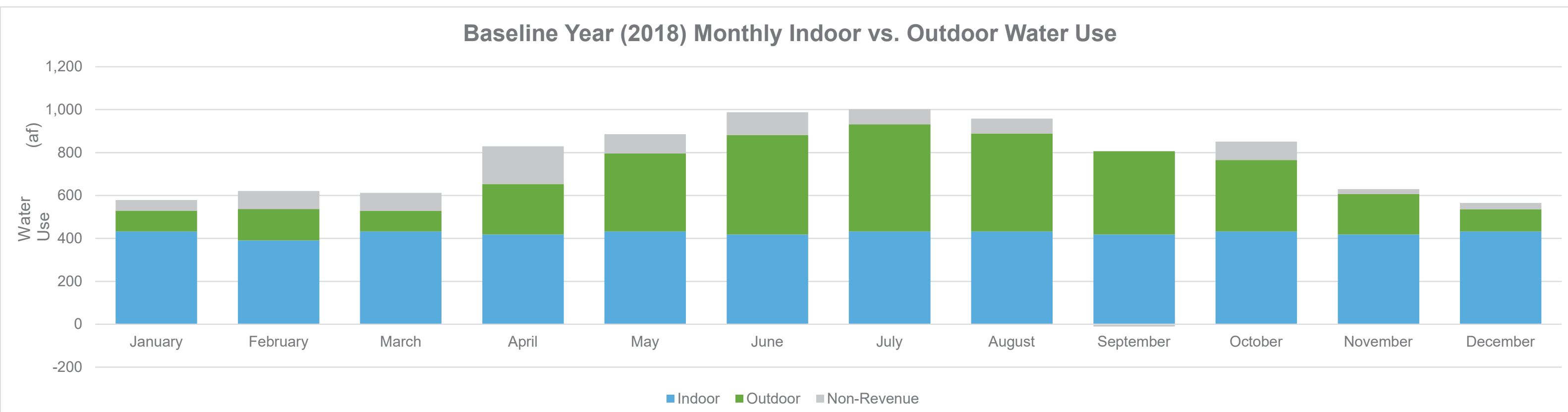




3 - Baseline Year (2018) Water Use Profile

City of Redwood City



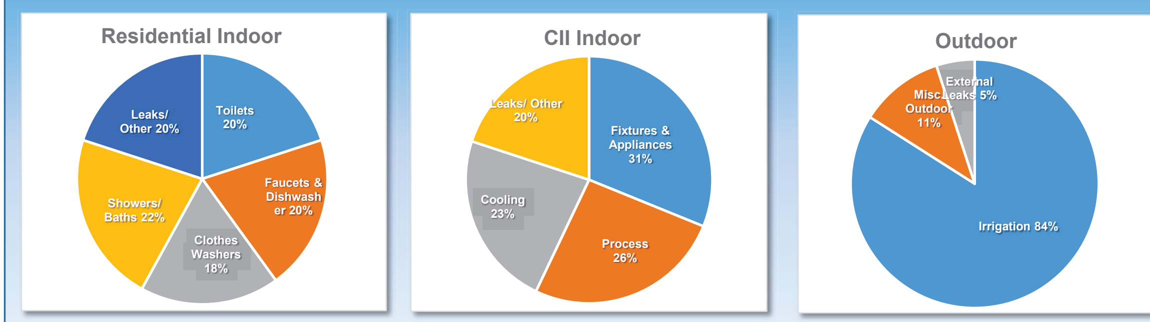


4 - Drought Response Actions - Stage 5

City of Redwood City

Maximum Savings Potential		
Use the default values or enter your own criteria for the maximum savings potential. Estimated water savings within each sector will not exceed the maximum savings criteria.		
Minimum Residential Indoor GPCD	25	R-GPCD
Maximum Residential Outdoor Savings	100%	of Baseline Residential Outdoor Water Use
Maximum CII Indoor Savings	30%	of Baseline CII Indoor Water Use
Maximum CII Outdoor Savings	100%	of Baseline CII Outdoor Water Use
Maximum Dedicated Irrigation Account Savings	100%	of Baseline Dedicated Irrigation Water Use
Maximum Non-Revenue Water Savings	50%	of Baseline Non-Revenue Water Use
Resulting Total Maximum Annual Savings Potential	**59%**	of Total Baseline Production

Assumed Proportion of Water Use by End Uses and Sector



Drought Response Tool

Home | Input Baseline Year Water Use | Baseline Year Water Use Profile | Drought Response Actions | Estimated Water Savings | Drought Response Tracking

4 - Drought Response Actions - Stage 5

City of Redwood City

Drought Response Actions

Select the Drought Response Actions you would like to include in your estimated savings calculations. For each selected action, use the default end use savings estimates and implementation rates or input your own values. The "End Use Savings" estimates the percent water use reduction that could occur at a particular end use as a result of a specific action. The "Implementation Rate" refers to the estimated percentage of accounts that will implement a specific action. The water savings potential at each end use is capped based on the assumed distribution of end use water demands shown in the pie charts above. A dash (--) indicates that professional judgement was used to establish the default value, or that savings are expected to be accounted for as part of a Public Information Program; additional basis for the default values are included in the User Manual.

Action Description	End Use(s)	Implement Program	End Use Savings (%)	Implementation Rate	Source of Default Savings Estimate	Source of Default Implementation Rate
▶ **Possible Mandatory Prohibitions**	All Outdoor	☑	14%	**80%**	--	--
Prohibit Irrigation with Potable Water Outside of Newly Constructed Homes and Buildings that is not Delivered by Drip or Microspray Systems	Irrigation	☐			--	--
Require Shut-Off Nozzles on Hoses for Vehicle Washing	Misc. Outdoor	☐	17%	50%	See Appendix D of the DRP	--
Prohibit Use of Potable Water to Wash Sidewalks and Driveways	Misc. Outdoor	☐	17%	50%		--
Prohibit the Use of Potable Water for Street Washing	Misc. Outdoor	☐	17%	50%		--
Prohibit Irrigation with Potable Water in a Manner that causes Runoff	Irrigation	☑	3%	50%	DeOreo et al., 2011	--
Prohibit Irrigation with Potable Water within 48 Hours following Measurable Rainfall	Irrigation	☐			--	--
Prohibit Irrigation of Ornamental Turf with Potable Water on Street Medians	Irrigation	☐			--	--
Prohibit Potable Water Use for Decorative Water Features that do not Recirculate Water	Misc. Outdoor	☑	50%	50%	EBMUD, 2008	--
Provide Linen Service Opt Out Options	Fixtures & Appliances	☑	0.5%	50%	EBMUD, 2011	--
Prohibit Serving Drinking Water other than upon Request in Eating or Drinking Establishments	Fixtures & Appliances	☑	0.5%	50%	EBMUD, 2011	--

4 - Drought Response Actions - Stage 5

City of Redwood City

Drought Response Actions						
Action Description	**End Use(s)**	**Implement Program**	**End Use Savings (%)**	**Implementation Rate**	**Source of Default Savings Estimate**	**Source of Default Implementation Rate**
▶ Agency Drought Actions / Restrictions						
▶ Agency Actions						
Media Campaign, Newspaper Articles, Website	All	☑	0.5%	**65%**	EBMUD, 2011	--
Promote Water Conservation / Rebate Programs	All	☑		50%	--	--
Water Efficiency Workshops, Public Events	All	☑	0.5%	**30%**	EBMUD, 2011	--
Water Bill Inserts	All	☑	0.5%	100%	EBMUD, 2011	--
Promote / Expand Use of Recycled Water	Irrigation	☐	100%		--	--
Home or Mobile Water Use Reports	All	☐	5%	10%	WaterSmart Software, 2015	--
Decrease Frequency and Length of Line Flushing	Non Revenue Water	☑	25%	**100%**	See Appendix D of the DRP	Suspend flushing.
Audit and Reduce System Water Loss	Non Revenue Water	☐	45%	50%	DWR, 2015	Target 50% of leakage.
Implement Drought Rate Structure / Water Budgets	All	☑	**6%**	100%	CUWCC, 2015	--
Establish Retrofit on Resale Ordinance	All Residential Indoor	☐	21%	6%	SFPUC, 2004	First Tuesday, 2015
Require Net Zero Demand Increase on New Connections	All	☐			--	--
Moratorium on New Connections	All	☑			--	--
Move to Monthly Metering / Billing	All	☐	5%	10%	See Appendix D of the DRP	--
Increase Water Waste Patrols / Enforcement	All	☑			--	--
Establish Drought Hotline	All	☑			--	--
Reduce Distribution System Pressures	Non Revenue Water	☑	4.5%	100%	CUWCC, 2010; DWR, 2015	--
▶ Dedicated Irrigation						
Conduct Irrigation Account Surveys	Irrigation	☐	30%	10%	EBMUD, 2011	--
Limit Irrigation Days, Time and Duration (Select One)						
Limit Irrigation to 2 Days/Week, 15 Minutes/Day, Between 9PM and 6AM	Irrigation	☐	38%	70%	UC IPM, 2014	--
Limit Irrigation to 1 Day/Week, 10 Minutes/Day, Between 9PM and 6AM	Irrigation	☐	79%	80%		
Prohibit use of Potable Water for Irrigation	Irrigation	☑	100%	**80%**		
Require Repair of all Leaks within 24 hours	External Leaks	☐	100%	5%	--	--
Customer Water Budgets						
Establish Water Budget - 25% Reduction	Irrigation	☐	25%	**70%**	--	--
Establish Water Budget - 50% Reduction	Irrigation	☐	50%	**75%**	--	--
Establish Water Budget - 75% Reduction	Irrigation	☐	75%	**80%**	--	--

4 - Drought Response Actions - Stage 5

City of Redwood City

Action Description	End Use(s)	Implement Program	End Use Savings (%)	Implementation Rate	Source of Default Savings Estimate	Source of Default Implementation Rate
▶ Agency Drought Actions / Restrictions						
▶ Residential						
Conduct Water Use Surveys Targeting High Water Users	All Residential Uses	☐	10%	10%	EBMUD, 2011	--
Limit Irrigation Days, Time and Duration (Select One)						
Limit Irrigation to 2 Days/Week, 15 Minutes/Day, Between 9PM and 6AM	Irrigation	☐	38%	70%	UC IPM, 2014	--
Limit Irrigation to 1 Day/Week, 10 Minutes/Day, Between 9PM and 6AM	Irrigation	☐	79%	80%		
Prohibit use of Potable Water for Irrigation	Irrigation	☑	100%	**80%**		
Prohibit Vehicle Washing Except with Recycled Water	Misc. Outdoor	☑	50%	50%	EBMUD, 2008	--
Require Repair of all Leaks within 24 hours	Leaks	☐	100%	5%	--	--
Require Pool Covers	Misc. Outdoor	☐	28%	25%	Maddaus & Mayer, 2001	--
Prohibit Filling of Pools	Misc. Outdoor	☐	55%	25%	DeOreo et al., 2011	--
Customer Water Budgets						
Establish Water Budget - 15% Reduction	All Residential Uses	☐	**15%**	**70%**	--	--
Establish Water Budget - 20% Reduction	All Residential Uses	☐	20%	50%	--	--
▶ CII						
Conduct CII Surveys Targeting High Water Users	All CII uses	☐	10%	10%	EBMUD, 2011	--
Limit Irrigation Days, Time and Duration (Select One)						
Limit Irrigation to 2 Days/Week, 15 Minutes/Day, Between 9PM and 6AM	Irrigation	☐	38%	70%	UC IPM, 2014	--
Prohibit use of Potable Water for Irrigation	Irrigation	☑	**100%**	**80%**		
Prohibit Use of Potable Water for Construction and Dust Control	Misc. Outdoor	☐		100%	--	--
Prohibit Single-Pass Cooling Systems	Cooling	☐	80%	1%	Vickers, 2001	--
Require Repair of all Leaks within 24 hours	Leaks	☐	100%	5%	--	--
Prohibit Vehicle Washing Except with Recycled Water	Misc. Outdoor	☑	50%	50%	EBMUD, 2008	--
Require Water-Efficient Pre-Rinse Spray Valves	Fixtures & Appliances	☐	0.8%	50%	EPA, 2015; Pacific Institute, 2003	--
Customer Water Budgets						
Establish Water Budget - 10% Reduction	All CII uses	☐	10%	**75%**	--	--
Establish Water Budget - 25% Reduction	All CII uses	☐	**25%**	**70%**	--	--
Establish Water Budget - 30% Reduction	All CII uses	☐	30%	50%	--	--

4 - Drought Response Actions - Stage 5

City of Redwood City

Action Description	End Use(s)	Implement Program	End Use Savings (%)	Implementation Rate	Source of Default Savings Estimate	Source of Default Implementation Rate
▶ Residential Customer Actions to Encourage						
Install Bathroom Faucet Aerators	Faucets and Dishwashers	☐			--	--
Install a Water-Efficient Showerhead	Showers/Baths	☐			--	--
Turn Off Water when Brushing Teeth, Shaving, Washing Dishes, or Cooking	Faucets and Dishwashers	☐			--	--
Fill the Bathtub Halfway	Showers/Baths	☐			--	--
Wash Only Full Loads of Clothes	Clothes Washers	☐			--	--
Install a High-Efficiency Toilet	Toilets	☐			--	--
Take Shorter Showers	Showers/Baths	☐			--	--
Run Dishwasher Only When Full	Faucets and Dishwashers	☐			--	--
Reduce Outdoor Irrigation	Irrigation	☐			--	--
Install Drip-Irrigation	Irrigation	☐			--	--
Use Mulch	Irrigation	☐			--	--
Plant Drought Resistant Trees and Plants	Irrigation	☐			--	--
Use a Broom to Clean Outdoor Areas	Misc. Outdoor	☐			--	--
Flush Less Frequently	Toilets	☐			--	--
Re-Use Shower or Bath Water for Irrigation	Irrigation	☐			--	--
Wash Car at Facility that Recycles the Water	Misc. Outdoor	☐			--	--

5 - Estimated Water Savings - Stage 5

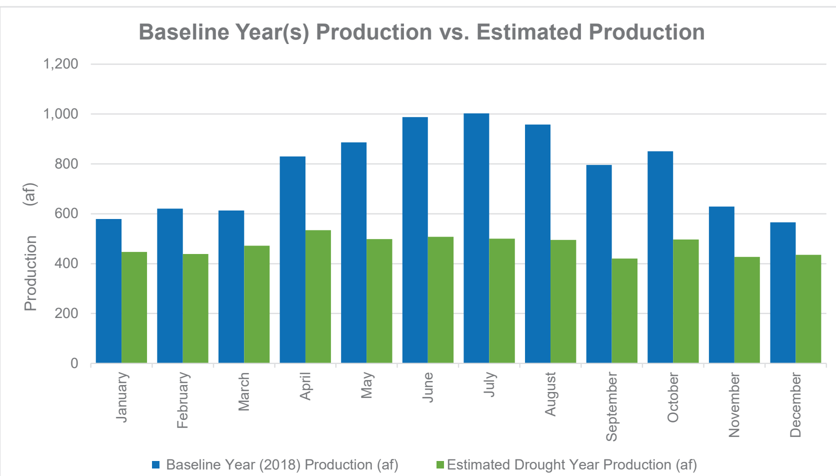
City of Redwood City

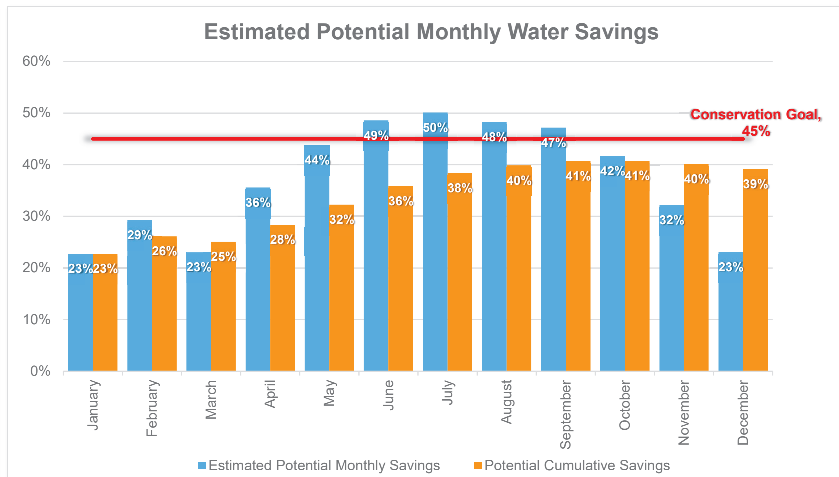
Estimated Monthly Water Use and Savings Summary

Units: (af)

This provides a summary of the estimated production relative to Baseline Year production and potential water savings, assuming implementation of selected actions at the water savings and implementation rates indicated in the Drought Response Actions worksheet. Select the units that your production data are displayed in.

Month	Baseline Year (2018) Production (af)	Estimated Drought Year Production (af)	Estimated Potential Monthly Savings	Potential Cumulative Savings	Conservation Goal	Comments
January	579	447	23%	23%	45%	
February	621	439	29%	26%	45%	
March	613	472	23%	25%	45%	
April	830	535	36%	28%	45%	
May	886	498	44%	32%	45%	
June	988	508	49%	36%	45%	
July	1,003	500	50%	38%	45%	
August	958	496	48%	40%	45%	
September	796	420	47%	41%	45%	
October	851	497	42%	41%	45%	
November	629	427	32%	40%	45%	
December	566	435	23%	39%	45%	





Drought Response Tool

Home | Input Baseline Year Water Use | Baseline Year Water Use Profile | Drought Response Actions | Estimated Water Savings | Drought Response Tracking

1 - Home

City of Redwood City

Enter Agency Information	
Agency Name	City of Redwood City
Total Population Served	86,280
Conservation Goal (%)	55%
Drought Stage	Stage 6
Number of Residential Accounts	20,860
Number of Commercial, Industrial, and Institutional (CII) Accounts	1,597
Number of Dedicated Irrigation Accounts	433
Baseline Year(s)	2018
Percentage of Residential Indoor Use During Minimum Month (%)	85%
Percentage of CII Indoor Use During Minimum Month (%)	100%
Comments	

Navigation	
USER'S GUIDE	Download and read the guide before using this Tool
1 - HOME	Enter agency information
2 - INPUT BASELINE YEAR WATER USE	Enter Baseline Year production and use
3 - BASELINE YEAR WATER USE PROFILE	Review and confirm entered information
4 - DROUGHT RESPONSE ACTIONS	Select Drought Response Actions and input estimated water savings and implementation rates.
5 - ESTIMATED WATER SAVINGS	Review estimated water production and compare estimated savings to conservation target.

eki

Drought Response Tool

Home | Input Baseline Year Water Use | Baseline Year Water Use Profile | Drought Response Actions | Estimated Water Savings | Drought Response Tracking

1 - Home

City of Redwood City

6 - DROUGHT RESPONSE TRACKING	Track production and water savings against the conservation target.

Drought Response Tool

Home | Input Baseline Year Water Use | Baseline Year Water Use Profile | Drought Response Actions | Estimated Water Savings | Drought Response Tracking

1 - Home

City of Redwood City

For questions about this tool or for additional information, contact:

Anona Dutton, P.G., C.Hg.
adutton@ekiconsult.com
(650) 292-9100

eki environment & water

Disclaimer: This electronic file is being provided by EKI Environment & Water Inc. (EKI; fomerly Erler & Kalinowski, Inc.) at the request of (CLIENT). The Drought Response Tool was transmitted to CLIENT in electronic format, on a CD dated [DATE] (Original Document). Only the Original Document, provided to, and for the sole benefit of, CLIENT constitutes EKI's professional work product. An electronic copy of the Drought Response Tool is provided to CLIENT's Customer Agencies, for use only by CLIENT-designated Customer Agencies. The Drought Response Tool is copyrighted by EKI. All rights are reserved by EKI, and content may not be reproduced, downloaded, disseminated, published, or transferred in any form or by any means, except with the prior written permission of EKI. Customer Agencies may use the Drought Response Tool for reviewing potential drought response alternatives. The delivery to, or use by, Customer Agencies of the Drought Response Tool does not provide rights of reliance by Client Agencies or other third parties without the express written consent of EKI and subject to the execution of an agreement between such Customer Agency or other third party and EKI. EKI makes no warranties, either express or implied, of the electronic media or regarding its merchantability, applicability, compatibility with the recipients' computer equipment or software; of the fitness for any particular purpose; or that the electronic media contains no defect or is virus free. Use of EKI's Drought Response Tool, other electronic media, or other work product by Client Agency or others shall be at the party's sole risk. Further, by use of this electronic media, the user agrees, to the fullest extent permitted by law, to defend, indemnify and hold harmless EKI, CLIENT, and their officers, directors, employees, and subconsultants against all damages, liabilities or costs, including reasonable attorneys' fees and defense costs, arising from any use, modification or changes made to the electronic files by anyone other than EKI or from any unauthorized distribution or reuse of the electronic files without the prior written consent of EKI.

2 - Input Baseline Year (2018) Water Use

City of Redwood City

Input Baseline Year (2018) Production and Water Use

Units: (af)

Select the units to input monthly production and use data. Enter the total monthly potable water production for the Baseline Year. Next, enter monthly water use data by sector for the Baseline Year. If you bill on a bi-monthly basis, divide your billing data between the months that the billing cycle includes. If your single-family and multi-family accounts are tracked separately, enter the combined water use for both sectors in the Residential Water Use column. If your commercial, industrial, and institutional (CII) accounts are tracked separately, enter the combined water use for each sector in the CII Water Use column. Your non-revenue water use is calculated by subtracting your monthly residential, CII, and dedicated irrigation water uses from your monthly production. Your monthly residential gallons per capita per day (R-GPCD) is calculated by dividing your monthly residential water use by your population entered in Worksheet 1 - Home.

Date	Total Production (af)	Residential Water Use (af)	CII Water Use (af)	Dedicated Irrigation Water Use (af)	Non-Revenue Water Use (af)	Total R-GPCD	Comments
January	579	383	127	19	50	47	
February	621	390	135	12	84	53	
March	613	373	134	21	85	45	
April	830	428	152	73	177	54	
May	886	519	167	110	90	63	
June	988	601	166	115	106	76	
July	1,003	629	187	115	71	77	
August	958	620	169	100	69	76	
September	796	586	145	75	-11	74	
October	851	540	165	60	86	66	
November	629	474	121	11	23	60	
December	566	412	116	8	30	50	

Drought Response Tool

Home | Input Baseline Year Water Use | Baseline Year Water Use Profile | Drought Response Actions | Estimated Water Savings | Drought Response Tracking

3 - Baseline Year (2018) Water Use Profile

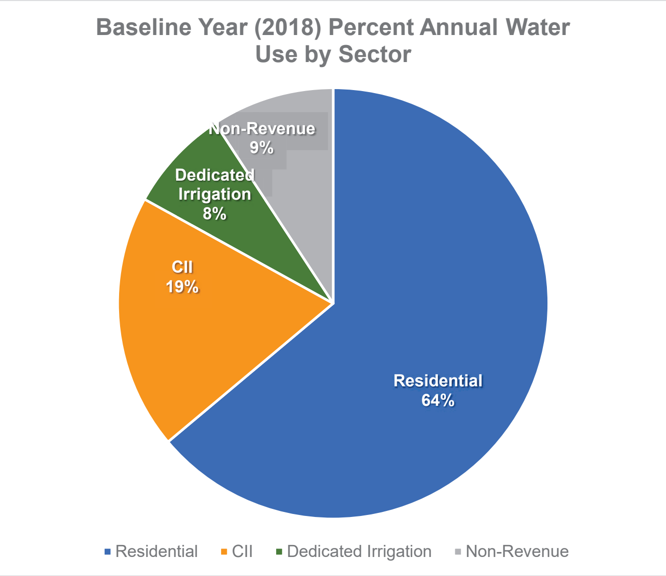
City of Redwood City

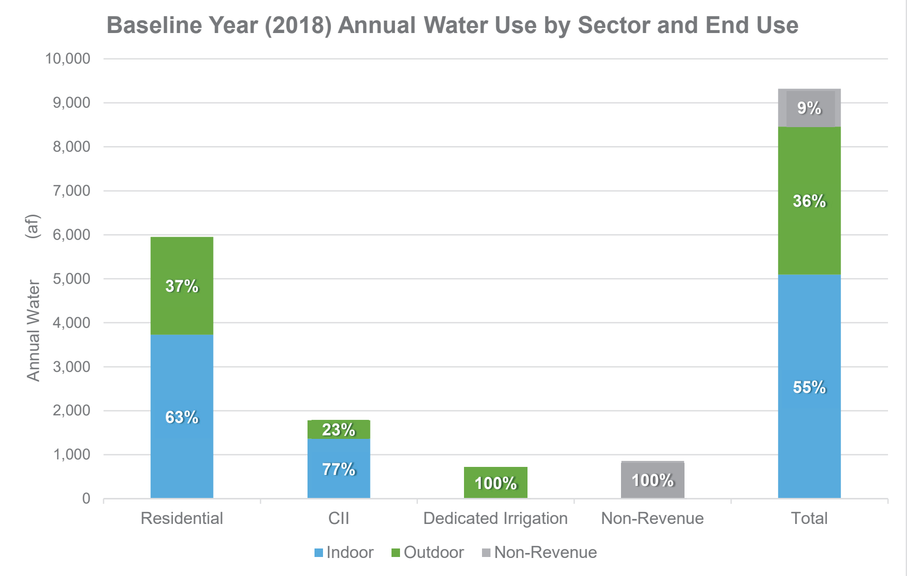
Baseline Year (2018) Annual Water Use Summary

Units: (af)

A summary of your Baseline Year water use by sector and major end use category is shown below. Select the units in which your production and use data are displayed.

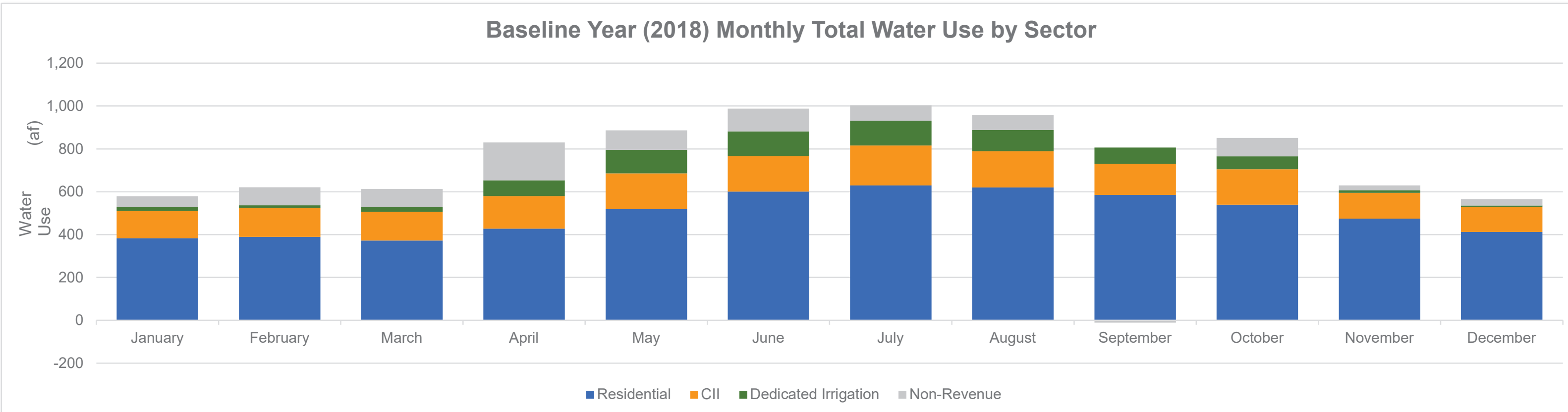
Water Use	Total Production (af)	Water Use (af)				Comments
		Residential	CII	Dedicated Irrigation	Non-Revenue	
Total	9,318	5,954	1,783	721	860	
Total Indoor	5,096	3,730	1,365	--	--	
Total Outdoor	3,363	2,224	418	721	--	
Total Non-Revenue	860	--	--	--	860	
Total Indoor %	55%	63%	77%	0%	--	
Total Outdoor %	36%	37%	23%	100%	--	
Total Non-Revenue %	9%	--	--	--	100%	

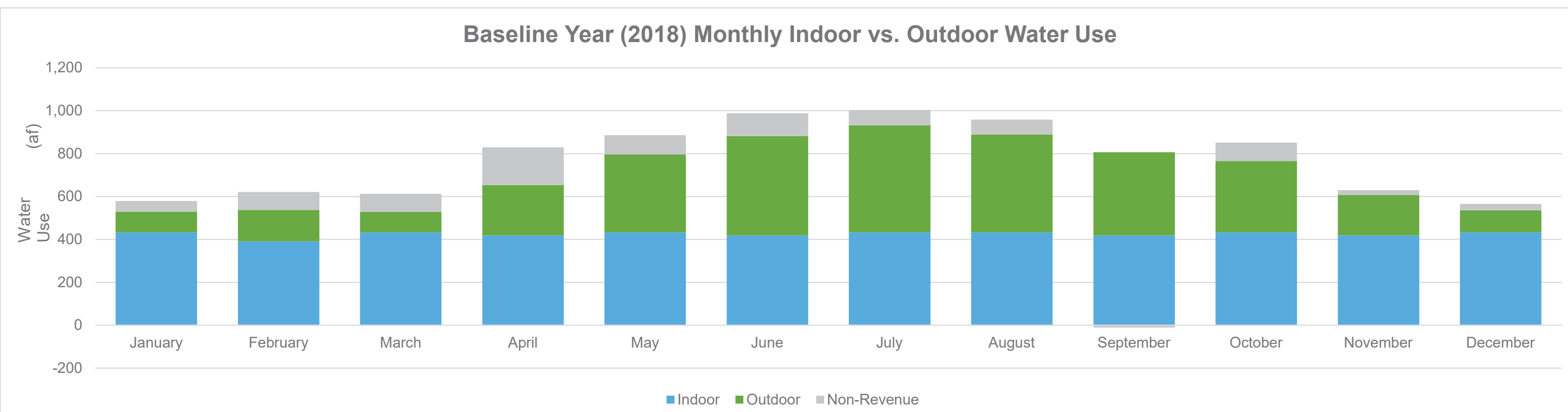




3 - Baseline Year (2018) Water Use Profile

City of Redwood City





4 - Drought Response Actions - Stage 6

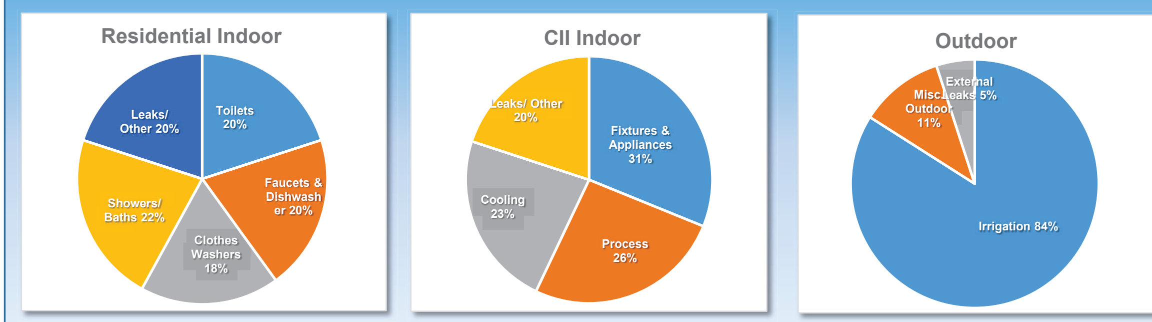
City of Redwood City

Maximum Savings Potential

Use the default values or enter your own criteria for the maximum savings potential. Estimated water savings within each sector will not exceed the maximum savings criteria.

Minimum Residential Indoor GPCD	25	R-GPCD
Maximum Residential Outdoor Savings	100%	of Baseline Residential Outdoor Water Use
Maximum CII Indoor Savings	30%	of Baseline CII Indoor Water Use
Maximum CII Outdoor Savings	100%	of Baseline CII Outdoor Water Use
Maximum Dedicated Irrigation Account Savings	100%	of Baseline Dedicated Irrigation Water Use
Maximum Non-Revenue Water Savings	50%	of Baseline Non-Revenue Water Use
Resulting Total Maximum Annual Savings Potential	**59%**	of Total Baseline Production

Assumed Proportion of Water Use by End Uses and Sector



Drought Response Tool

Home | Input Baseline Year Water Use | Baseline Year Water Use Profile | Drought Response Actions | Estimated Water Savings | Drought Response Tracking

4 - Drought Response Actions - Stage 6

City of Redwood City

Drought Response Actions

Select the Drought Response Actions you would like to include in your estimated savings calculations. For each selected action, use the default end use savings estimates and implementation rates or input your own values. The "End Use Savings" estimates the percent water use reduction that could occur at a particular end use as a result of a specific action. The "Implementation Rate" refers to the estimated percentage of accounts that will implement a specific action. The water savings potential at each end use is capped based on the assumed distribution of end use water demands shown in the pie charts above. A dash (--) indicates that professional judgement was used to establish the default value, or that savings are expected to be accounted for as part of a Public Information Program; additional basis for the default values are included in the User Manual.

Action Description	End Use(s)	Implement Program	End Use Savings (%)	Implementation Rate	Source of Default Savings Estimate	Source of Default Implementation Rate
▶ **Possible Mandatory Prohibitions**	All Outdoor	☑	14%	**90%**	--	--
Prohibit Irrigation with Potable Water Outside of Newly Constructed Homes and Buildings that is not Delivered by Drip or Microspray Systems	Irrigation	☐			--	--
Require Shut-Off Nozzles on Hoses for Vehicle Washing	Misc. Outdoor	☐	17%	50%	See Appendix D of the DRP	--
Prohibit Use of Potable Water to Wash Sidewalks and Driveways	Misc. Outdoor	☐	17%	50%		--
Prohibit the Use of Potable Water for Street Washing	Misc. Outdoor	☐	17%	50%		--
Prohibit Irrigation with Potable Water in a Manner that causes Runoff	Irrigation	☑	3%	50%	DeOreo et al., 2011	--
Prohibit Irrigation with Potable Water within 48 Hours following Measurable Rainfall	Irrigation	☐			--	--
Prohibit Irrigation of Ornamental Turf with Potable Water on Street Medians	Irrigation	☐			--	--
Prohibit Potable Water Use for Decorative Water Features that do not Recirculate Water	Misc. Outdoor	☑	50%	50%	EBMUD, 2008	--
Provide Linen Service Opt Out Options	Fixtures & Appliances	☑	0.5%	50%	EBMUD, 2011	--
Prohibit Serving Drinking Water other than upon Request in Eating or Drinking Establishments	Fixtures & Appliances	☑	0.5%	50%	EBMUD, 2011	--

4 - Drought Response Actions - Stage 6

City of Redwood City

Drought Response Actions						
Action Description	**End Use(s)**	**Implement Program**	**End Use Savings (%)**	**Implementation Rate**	**Source of Default Savings Estimate**	**Source of Default Implementation Rate**
▶ Agency Drought Actions / Restrictions						
▶ Agency Actions						
Media Campaign, Newspaper Articles, Website	All	☑	0.5%	**65%**	EBMUD, 2011	--
Promote Water Conservation / Rebate Programs	All	☑		50%	--	--
Water Efficiency Workshops, Public Events	All	☑	0.5%	**30%**	EBMUD, 2011	--
Water Bill Inserts	All	☑	0.5%	100%	EBMUD, 2011	--
Promote / Expand Use of Recycled Water	Irrigation	☐	100%		--	--
Home or Mobile Water Use Reports	All	☐	5%	10%	WaterSmart Software, 2015	--
Decrease Frequency and Length of Line Flushing	Non Revenue Water	☑	25%	**100%**	See Appendix D of the DRP	Suspend flushing.
Audit and Reduce System Water Loss	Non Revenue Water	☐	45%	50%	DWR, 2015	Target 50% of leakage.
Implement Drought Rate Structure / Water Budgets	All	☑	5%	100%	CUWCC, 2015	--
Establish Retrofit on Resale Ordinance	All Residential Indoor	☐	21%	6%	SFPUC, 2004	First Tuesday, 2015
Require Net Zero Demand Increase on New Connections	All	☐			--	--
Moratorium on New Connections	All	☑			--	--
Move to Monthly Metering / Billing	All	☐	5%	10%	See Appendix D of the DRP	--
Increase Water Waste Patrols / Enforcement	All	☑			--	--
Establish Drought Hotline	All	☑			--	--
Reduce Distribution System Pressures	Non Revenue Water	☑	4.5%	100%	CUWCC, 2010; DWR, 2015	--
▶ Dedicated Irrigation						
Conduct Irrigation Account Surveys	Irrigation	☐	30%	10%	EBMUD, 2011	--
Limit Irrigation Days, Time and Duration (Select One)						
Limit Irrigation to 2 Days/Week, 15 Minutes/Day, Between 9PM and 6AM	Irrigation	☐	38%	70%	UC IPM, 2014	--
Limit Irrigation to 1 Day/Week, 10 Minutes/Day, Between 9PM and 6AM	Irrigation	☐	79%	80%		
Prohibit use of Potable Water for Irrigation	Irrigation	☑	100%	**90%**		
Require Repair of all Leaks within 24 hours	External Leaks	☐	100%	5%	--	--
Customer Water Budgets						
Establish Water Budget - 25% Reduction	Irrigation	☐	25%	70%	--	--
Establish Water Budget - 50% Reduction	Irrigation	☐	50%	75%	--	--
Establish Water Budget - 100% Reduction	Irrigation	☑	**100%**	**90%**	--	--

4 - Drought Response Actions - Stage 6

City of Redwood City

Drought Response Actions						
Action Description	**End Use(s)**	**Implement Program**	**End Use Savings (%)**	**Implementation Rate**	**Source of Default Savings Estimate**	**Source of Default Implementation Rate**
▶ Agency Drought Actions / Restrictions						
▶ Residential						
Conduct Water Use Surveys Targeting High Water Users	All Residential Uses	☐	10%	10%	EBMUD, 2011	--
Limit Irrigation Days, Time and Duration (Select One)						
Limit Irrigation to 2 Days/Week, 15 Minutes/Day, Between 9PM and 6AM	Irrigation	☐	38%	70%	UC IPM, 2014	--
Limit Irrigation to 1 Day/Week, 10 Minutes/Day, Between 9PM and 6AM	Irrigation	☐	79%	80%		
Prohibit use of Potable Water for Irrigation	Irrigation	☑	100%	**85%**		
Prohibit Vehicle Washing Except with Recycled Water	Misc. Outdoor	☑	50%	50%	EBMUD, 2008	--
Require Repair of all Leaks within 24 hours	Leaks	☐	100%	5%	--	--
Require Pool Covers	Misc. Outdoor	☐	28%	25%	Maddaus & Mayer, 2001	--
Prohibit Filling of Pools	Misc. Outdoor	☐	55%	25%	DeOreo et al., 2011	--
Customer Water Budgets						
Establish Water Budget - 15% Reduction	All Residential Uses	☐	15%	70%	--	--
Establish Water Budget - 40% Reduction	All Residential Uses	☑	**40%**	**80%**	--	--
▶ CII						
Conduct CII Surveys Targeting High Water Users	All CII uses	☐	10%	10%	EBMUD, 2011	--
Limit Irrigation Days, Time and Duration (Select One)						
Limit Irrigation to 2 Days/Week, 15 Minutes/Day, Between 9PM and 6AM	Irrigation	☐	38%	70%	UC IPM, 2014	--
Prohibit use of Potable Water for Irrigation	Irrigation	☑	**100%**	**85%**		
Prohibit Use of Potable Water for Construction and Dust Control	Misc. Outdoor	☐		100%	--	--
Prohibit Single-Pass Cooling Systems	Cooling	☐	80%	1%	Vickers, 2001	--
Require Repair of all Leaks within 24 hours	Leaks	☐	100%	5%	--	--
Prohibit Vehicle Washing Except with Recycled Water	Misc. Outdoor	☑	50%	50%	EBMUD, 2008	--
Require Water-Efficient Pre-Rinse Spray Valves	Fixtures & Appliances	☐	0.8%	50%	EPA, 2015; Pacific Institute, 2003	--
Customer Water Budgets						
Establish Water Budget - 10% Reduction	All CII uses	☐	10%	75%	--	--
Establish Water Budget - 25% Reduction	All CII uses	☐	25%	70%	--	--
Establish Water Budget - 50% Reduction	All CII uses	☑	**50%**	**80%**	--	--

4 - Drought Response Actions - Stage 6

City of Redwood City

Action Description	End Use(s)	Implement Program	End Use Savings (%)	Implementation Rate	Source of Default Savings Estimate	Source of Default Implementation Rate
▶ **Residential Customer Actions to Encourage**						
Install Bathroom Faucet Aerators	Faucets and Dishwashers	☐			--	--
Install a Water-Efficient Showerhead	Showers/Baths	☐			--	--
Turn Off Water when Brushing Teeth, Shaving, Washing Dishes, or Cooking	Faucets and Dishwashers	☐			--	--
Fill the Bathtub Halfway	Showers/Baths	☐			--	--
Wash Only Full Loads of Clothes	Clothes Washers	☐			--	--
Install a High-Efficiency Toilet	Toilets	☐			--	--
Take Shorter Showers	Showers/Baths	☐			--	--
Run Dishwasher Only When Full	Faucets and Dishwashers	☐			--	--
Reduce Outdoor Irrigation	Irrigation	☐			--	--
Install Drip-Irrigation	Irrigation	☐			--	--
Use Mulch	Irrigation	☐			--	--
Plant Drought Resistant Trees and Plants	Irrigation	☐			--	--
Use a Broom to Clean Outdoor Areas	Misc. Outdoor	☐			--	--
Flush Less Frequently	Toilets	☐			--	--
Re-Use Shower or Bath Water for Irrigation	Irrigation	☐			--	--
Wash Car at Facility that Recycles the Water	Misc. Outdoor	☐			--	--

eki

Drought Response Tool

Home | Input Baseline Year Water Use | Baseline Year Water Use Profile | Drought Response Actions | Estimated Water Savings | Drought Response Tracking

5 - Estimated Water Savings - Stage 6

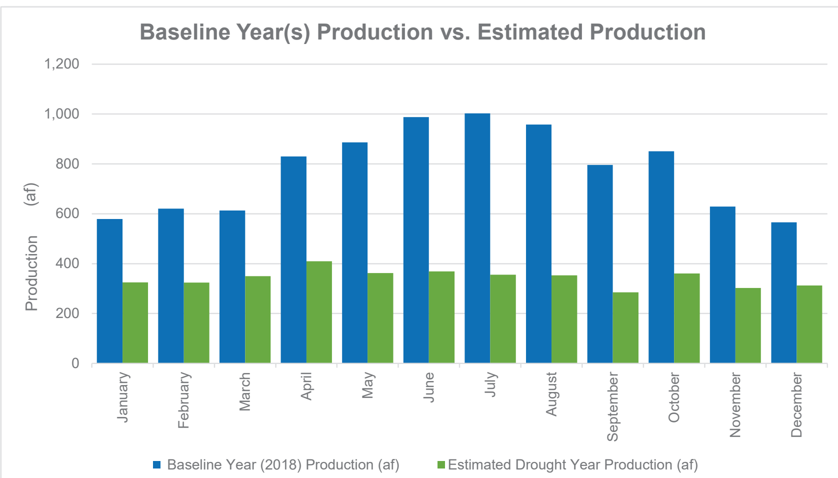
City of Redwood City

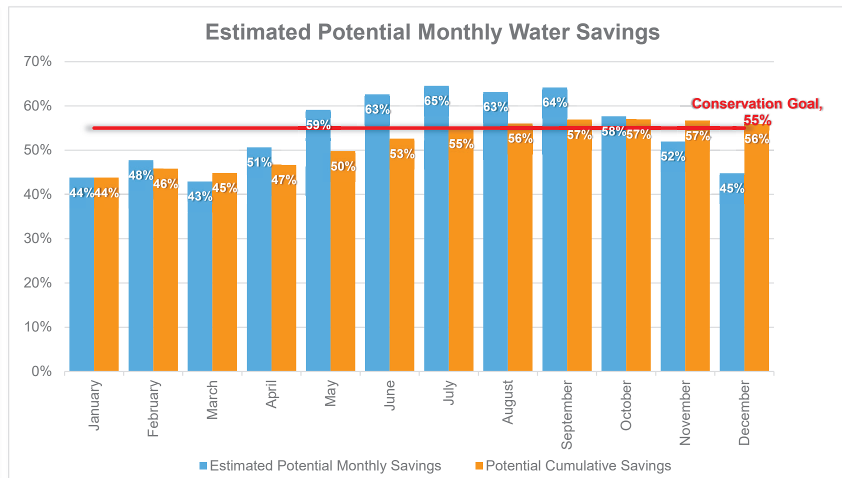
Estimated Monthly Water Use and Savings Summary

Units: (af)

This provides a summary of the estimated production relative to Baseline Year production and potential water savings, assuming implementation of selected actions at the water savings and implementation rates indicated in the Drought Response Actions worksheet. Select the units that your production data are displayed in.

Month	Baseline Year (2018) Production (af)	Estimated Drought Year Production (af)	Estimated Potential Monthly Savings	Potential Cumulative Savings	Conservation Goal	Comments
January	579	325	44%	44%	55%	
February	621	324	48%	46%	55%	
March	613	350	43%	45%	55%	
April	830	409	51%	47%	55%	
May	886	362	59%	50%	55%	
June	988	369	63%	53%	55%	
July	1,003	355	65%	55%	55%	
August	958	353	63%	56%	55%	
September	796	285	64%	57%	55%	
October	851	360	58%	57%	55%	
November	629	302	52%	57%	55%	
December	566	312	45%	56%	55%	





Attachment 3

SFPUC Emergency Response Procedures

PREPARATION FOR CATASTROPHIC SUPPLY INTERRUPTION

The SFPUC maintains various planning documents which collectively address its emergency preparedness and planned response in the event of a catastrophic interruption of water supplies due to power outages, earthquakes, or other disasters. These plans are described in sections 1.1 (Emergency Preparedness Plans), 1.2 (Emergency Drinking Water Planning), and 1.3 (Power Outage Preparedness and Response) below. Section 1.4 addresses the seismic risk assessment and mitigation plan required by California Water Code Section 10632.5.(a). Should a catastrophic interruption occur, the SFPUC will coordinate with any city or county within which it provides water for the possible proclamation of a local emergency (California Government Code, California Emergency Services Act Article 2, Section 8558).

1.1 EMERGENCY PREPAREDNESS PLANS

Following the 1989 Loma Prieta Earthquake, the SFPUC created a departmental Emergency Operations Plan (EOP). The SFPUC EOP was originally released in 1992 and has been updated as necessary ever since. Most recently, the SFPUC developed a Water System Emergency Response Plan (Water ERP) to comply with the America's Water Infrastructure Act (AWIA) passed in 2018. The Water ERP acts as a unifying document, integrating and referencing common components of SFPUC plans and programs that have been developed to date. The Water ERP is intended to address water transmission and distribution systems and identify the Enterprises, Divisions, and Bureaus with direct roles and responsibilities. The Water ERP integrates directly into, and functions as an annex to, the SFPUC Emergency Operations Plan (EOP). The SFPUC EOP addresses a broad range of potential emergency situations that may affect the SFPUC and supplements the City's Emergency Response Plan, which was prepared by the Department of Emergency Management and most recently updated in 2017. Specifically, the purpose of the SFPUC EOP is to describe its emergency management organization, roles and responsibilities, and emergency policies and procedures.

In addition, SFPUC divisions and bureaus each have their own Division Emergency Operations Plans (DEOP) (in alignment with the SFPUC EOP), which detail that entity's specific emergency management organization, roles and responsibilities, and emergency policies and procedures. The SFPUC tests its DEOPs on a regular basis by conducting emergency exercises. Through these exercises, the SFPUC learns how well the plans and procedures will or will not work in response to an emergency. DEOP improvements are based on the results of these exercises and real-world event response and evaluation. The SFPUC also has an emergency response training plan that is based on federal, State, and local standards and exercise and incident improvement plans. SFPUC employees have emergency training requirements that are based on their emergency response roles.

The SFPUC EOP functions as a front end for the SFPUC's DEOPs, covering emergency response at the Department level; while each DEOP covers Division-specific information on the Division's emergency organization and response procedures specific to Division responsibilities, assets, technical scope, and operations. The types of events affecting SFPUC that may require emergency plans include but are not limited to:

- Major earthquake
- Loss of power
- Loss of water supply
- Major fire
- Hazardous material release that threatens water supply or environment
- Major pipeline breaks
- Dam break
- Significant outage of SFPUC services
- Man-made or intentional acts of terrorism resulting in damage to the system or interruption in service

In addition to the documents described above, the SFPUC also maintains various plans and procedures that deal with the possibility of alternate supply schemes and options. These include:

- Emergency Disinfection and Recovery Plan (EDRP)
- Emergency Response Action Plan (ERAP)
- Emergency Drinking Water Equipment and Alternatives Report
- Disinfection of SFPUC Water Trailers Procedure
- City Distribution Division Hydrant Manifold Standard Operating Procedure
- Pilot plant trailer (Mobile Pilot Plan O&M Plan)

1.2 EMERGENCY DRINKING WATER PLANNING

In February 2005, the SFPUC published the City Emergency Drinking Water Alternatives report. The purpose of this report was to outline a plan for supplying emergency drinking water in the City after damage and/or contamination of the SFPUC raw and/or treated water systems resulting from a major disaster. Since the publication of this report, the SFPUC has implemented a number of projects to increase its capability to support the provision of emergency drinking water during an emergency. These projects include:

- Completion of many Water System Improvement Program (WSIP) projects and other capital upgrades to improve security, detection, and communication (see Section 1.4);

- Public Information and materials for home and business;

- Construction of a disinfection and fill station at the existing San Francisco Zoo well, and obtaining a permit to utilize this well as a standby emergency drinking water source;

- Constructed six wells as part of the San Francisco Groundwater Supply Project, two of which also serve as emergency drinking water supplies, including a distribution system to fill emergency water tankers;

- Purchase and engineering of emergency-related equipment, including water tanker trucks and water distribution manifolds, to help with distribution post-disaster; and

- Coordination of planning with other City departments, neighboring jurisdictions, and other public and private partners to maximize resources and supplies for emergency response.

The SFPUC has also prepared the RWS Water Quality Notifications and Communications Plan. This plan, which was first prepared in 1996 and was most recently updated in 2017, provides contact information, procedures, and guidelines to be implemented by several SFPUC divisions, wholesale customers, and BAWSCA in the event of water quality impacts. The plan treats water quality issues as potential or actual supply problems, which fall under the emergency response structure of the SFPUC ERP.

1.3 POWER OUTAGE PREPAREDNESS AND RESPONSE

The SFPUC's water transmission system is primarily gravity fed from Hetch Hetchy Reservoir to the City. Within the in-City distribution system, key pump stations have generators on site and all others have connections in place that would allow portable generators to be used.

Although water conveyance throughout the RWS would not be greatly impacted by power outages because it is gravity fed, the SFPUC has prepared for potential regional power outages as follows:

- The Tesla Treatment Facility, the Sunol Valley Water Treatment Plant (SVWTP), and the San Antonio Pump Station have back-up power on site in the form of generators or diesel-powered pumps. Additionally, both the SVWTP and San Antonio Pump Station would not be impacted by a failure of the regional power grid because these facilities are powered by hydropower generated by the Hetch Hetchy Water and Power System.

- Both the Harry Tracy Water Treatment Plant (HTWTP) and the Baden Pump Station (part of the Peninsula System) have back-up generators in place.

- Administrative facilities that will act as emergency operation centers also have back-up power.

- The SFPUC has an emergency water supply connection with the Santa Clara Valley Water District (SCVWD), the SCVWD intertie, which also has back-up generators in place.

- Additionally, as described in the next section, the WSIP includes projects that expand the SFPUC's ability to remain in operation during power outages and other emergency situations.

1.4 SEISMIC RISK ASSESSMENT AND MITIGATION PLAN

As part of the Facilities Reliability Program and the Water System Improvement Program (WSIP), the SFPUC performed an extensive multi-year evaluation of seismic risks to its water system that resulted in major capital improvements to increase seismic reliability. The goals of WSIP include enhancing the ability of the SFPUC water system to meet identified service goals for water quality, seismic reliability, delivery reliability, and water supply. One of the original goals of WSIP was to limit rationing to no more than 20 percent on a system-wide basis; the WSIP was developed to reduce the likelihood of shortages, thereby reducing the likelihood of needing to implement the WSCP.

The WSIP projects include several projects located in San Francisco to improve the seismic reliability of the in-City distribution system, including more wells that can be used as emergency drinking water sources. The WSIP also incorporates many projects related to the RWS to address both seismic reliability and overall system reliability. As of August 2018, the WSIP is over 96 percent complete. Local San Francisco projects are 100 percent complete as of June 2020. The current forecasted date to complete the overall WSIP is December 2021.

WSIP seismic levels of service (LOS) informed development of capital projects and guided program implementation. The LOS established post-earthquake delivery and recovery objectives under the following seismic scenarios:

- Magnitude 7.9 event on the San Andreas fault
- Magnitude 7.3 event on the Hayward fault
- Magnitude 6.9 event on the Calaveras fault

An assessment of seismic risk and resilience is contained in the body of analysis performed to support the WSIP. The risks associated with the seismic scenarios considered are reflected in the delivery objectives established in the LOS, specifically:

- Delivery of winter month demand 24 hours after a major earthquake, and
- Delivery of average day demand 30 days after a major earthquake

In addition to the improvements that have or will come from the WSIP, the City has already constructed system interties for use during catastrophic emergencies, short-term facility maintenance and upgrade activities, and times of water shortages. These are listed below:

- A 35 mgd intertie with the EBMUD allowing EBMUD to serve the City of Hayward's demand and/or supply the SFPUC directly (and vice versa);
-
- A 40-mgd system intertie between the SFPUC and SCVWD; and,
-
- One permanent and one temporary intertie to the South Bay Aqueduct, which would enable the SFPUC to receive State Water Project water.

The WSIP also includes projects related to standby power facilities at various locations. These projects provide for standby electrical power at six critical facilities to keep them in operation during power outages and other emergency situations. Permanent engine generators are located at four locations (San Pedro Valve Lot, Millbrae Facility, Alameda West, and HTWTP), while hookups for portable engine generators are at two locations (San Antonio Reservoir and Calaveras Reservoir).The City of San Francisco also has a Hazard Mitigation Plan which was last updated in June 2014 and includes sections describing earthquakes hazards and mitigation for assets within the City's boundary, including state-regulated reservoirs (Sutro, Sunset North and South, and University Mound North and South).

Appendix M

Letters to SFPUC and BAWSCA

PUBLIC WORKS DEPARTMENT

1400 Broadway Street
Redwood City, CA 94063
PHONE: (650) 780-7464
FAX: (650) 780-7445
www.redwoodcity.org

February 23, 2017
Jeanine Townsend, Clerk to the Board
State Water Resources Control Board
Cal/EPA Headquarters
1001 "I" Street, 24th Floor
Sacramento, CA 95814-0100
commentletters@waterboards.ca.gov

Re: Comment Letter – 2016 Bay-Delta Plan Amendment & SED

Dear Ms. Townsend:

The City of Redwood City submits the following comments regarding the *Recirculated Draft Substitute Environmental Document in Support of Potential Changes to the Water Quality Control Plan for the San Francisco Bay-Sacramento/San Joaquin Delta Estuary: San Joaquin River Flows and Southern Delta Water Quality* (SED). In addition, Redwood City would like to incorporate by reference separate comments submitted by the Bay Area Water Supply and Conservation Agency (BAWSCA) and the San Francisco Public Utilities Commission (SFPUC) that provide more detail of the SED proposal's impact on Redwood City's service area and the region.

Under the SED, the State Water Resources Control Board (SWRCB) proposes substantial changes to flow objectives for the Tuolumne River. These changes are anticipated to result in significantly reduced surface water available for diversions, thereby causing significant, potentially unavoidable impacts to water supply and the environment. Below we provide relevant information that the SWRCB must consider in conducting its analysis of the SED's impacts:

- As a wholesale customer of SFPUC that purchases 100% of its potable water supply from the San Francisco Regional Water System, water supply available to Redwood City under the SED proposal could be reduced more than 50% under drought conditions for multiple consecutive years.

- Redwood City has made significant strides in water conservation in the past 16 years. Residential per capita water use decreased 44% from 91 gallons per capita per day (r-gpcd) to 51 r-gpcd, and gross per capita potable water use has decreased 45% from 139 gpcd to 76 gpcd.

- Based on Redwood City's 2015 Urban Water Management Plan, this significant cut to water supply would force Redwood City to take a number of significant actions including, but not limited to; prohibiting outdoor irrigation with potable water, a moratorium on new water connections and development, reducing water system pressure, suspending all flushing activities, implement mandatory water allocations with severe penalties including reducing residential and commercial uses more than 50%, and to minimize nonessential uses of water so that water is available for human consumption, sanitation, and fire protection.

- Redwood City serves water to 87,000 residential customers and over 2,500 businesses and other non-residential customers. Potential consequences of the SED proposal include health and safety concerns due to lack of potable supplies, major job losses, slower economic growth and delayed community development in Redwood City's service area. It is likely that further environmental impacts will result due to the displacement of jobs and residents to other parts of California should Redwood City not have the water resources to continue to support our community, and Redwood City feels these impacts should be evaluated as well.

- In Chapter 22 of the current draft of the SED it states several water supply management alternatives for urban water suppliers in response to reduced surface water supplies including; expanding ground water pumping and recharge in place of surface water use, developing recycled water sources, purchasing water from other parties, and water conservation. Redwood City has invested heavily in water conservation, and recycled water to increase our supplies of drinking water, and there may not be much room for growth beyond what is currently planned for these sources. Redwood City has also investigated the use of groundwater as a domestic supply, finding that the aquifer and groundwater quality within our jurisdiction would require considerable treatment with relatively small amounts of supply. Additionally, Chapter 22 appears to focus on the impacts to the areas directly affected by the San Joaquin River and its tributaries, and does not include environmental impacts that would be realized when Water Suppliers like Redwood City must find new sources of domestic water supplies.

- Since outdoor use represents a relatively small proportion of Redwood City's commercial, industrial, and institutional water demand, commercial, industrial, and institutional customers generally have fewer opportunities to reduce water use without changing their operations or incurring significant economic impacts.

In light of these aforementioned impacts as well as those articulated in the BAWSCA and SFPUC comment letters incorporated here by reference, Redwood City requests that environmental and economic impacts of any shortage on the San Francisco Regional Water System, and the associated lost jobs and delayed development, be fully and adequately analyzed as part of the SWRCB's proposed flow alternatives. Such full and adequate analysis should be given at least equal weight with all other elements of the SWRCB's subsequent deliberations and decision making.

Last, the Governor has indicated his strong support for negotiated voluntary agreements to resolve these issues. Redwood City requests that the SWRCB provide adequate time for voluntary agreements to be reached amongst the stakeholders prior to any action on the SED. Please give this settlement process a chance for success instead of expediting implementation of the current proposal. Redwood City shares BAWSCA's commitment to continue working closely with the diverse interests and stakeholders to develop that shared solution.

Sincerely,

Ramana

Ramana Chinnakotla
Public Works Director
(650) 780-7474
rchinnakotla@redwoodcity.org

PUBLIC WORKS SERVICES
WATER UTILITIES DIVISION

1400 Broadway Street
Redwood City, CA 94063
(650) 780-7464
Fax (650) 780-7445

Nicole M. Sandkulla
Chief Executive Officer/General Manager
Bay Area Water Supply and Conservation Agency
155 Bovet Road, Suite 650
San Mateo, CA 94402

May 19, 2021

RE: Bay Delta Plan Water Supply Impacts and 2020 Urban Water Management Plan

Redwood City is writing this letter to express our concern regarding information provided by the San Francisco Public Utilities Commission (SFPUC) and BAWSCA in preparation of the 2020 update to the Urban Water Management Plan (UWMP), and the water supply reliability resulting from the implementation of the Phase 1 Water Quality Control Plan for the San Francisco Bay/Sacramento-San Joaquin Delta Estuary (Bay-Delta Plan).

As you are aware implementation of the Bay Delta Plan will result in significant cutbacks greater than 50% in water supply during dry years for Redwood City, which purchases all of its drinking water from the SFPUC. This reduction in water supply represents a substantial challenge for Redwood City's water customers and community, and if such a reduction in demand is required the City will be forced to impose severe measures to meet the available supply. Some of these measures include a prohibition on irrigation with potable water; suspension of distribution system flushing; cutbacks for commercial, industrial and institutional customers by 30%; a moratorium on new development; and a reduction of residential indoor water uses to 27 gallons per person per day which raises concerns whether there will be sufficient water available to meet the basic health and safety needs, and economic vitality of our community.

Redwood City would like to bring to your attention two specific concerns regarding the information provided by the SFPUC and BAWSCA for inclusion and preparation of the 2020 UWMP. First is the fact that the Regional Water System supply allocations provided by SFPUC do not meet the Level of Service Goals included in the Water Supply Agreement and, therefore, SFPUC will not be meeting its contractual obligations to the Wholesale Customers. Second is the methodology used by BAWSCA to allocate an equal percent reduction across all agencies when average Wholesale Customers' shortages are greater than 20%. Redwood City is using this methodology in the 2020 UWMP, but is not agreeing to or adopting this methodology. We appreciate that BAWSCA recognizes this methodology is not ideal, and encourage BAWSCA to continue to facilitate discussions between all member agencies to develop a Tier 2 allocation plan that consider basic health and safety needs, identifies water needs of critical customers, and minimizes economic impacts across the region.

Redwood City has been and continues to be committed to using our limited water resources wisely through robust water conservation programs, and development of new supplies with recycled water. This past year Redwood City's Recycled Water Project supplied 856 acre-feet of water for non-potable uses that otherwise would have used potable water from SFPUC benefitting all users of the Regional Water System. The City continues to expand recycled water use, and in November of 2019 the City adopted a Recycled Water Development Standard which establishes guidelines for the safe use of recycled water for toilet and urinal flushing and other requirements which helps to ensure new buildings meet dual plumbing requirements, and are ultimately approved to use recycled water when completed and as the recycled water system expands.

Through our Recycled Water Project, Redwood City has the ability to assist neighboring member agencies with their plans to utilize recycled water, and offset potable water use from the Regional Water System. Currently Redwood City has identified up to 273 acre-feet per year of recycled water available to other agencies.

Thank you for taking the time to review our concerns, and we look forward to working through these issues with you, the other member agencies, and SFPUC.

Regards,

Justin Chapel
Public Works Superintendent
City of Redwood City
650-780-7469
jchapel@redwoodcity.org

PUBLIC WORKS SERVICES
WATER UTILITIES DIVISION

1400 Broadway Street
Redwood City, CA 94063
(650) 780-7464
Fax (650) 780-7445

Mr. Steve Ritchie
Assistant General Manager, Water
San Francisco Public Utilities Commission
525 Golden Gate Avenue
San Francisco, CA 94102

May 19, 2021

RE: Bay Delta Plan Water Supply Impacts and 2020 Urban Water Management Plan

Redwood City is writing this letter to express our concern regarding information provided by the San Francisco Public Utilities Commission (SFPUC) in preparation of the 2020 update to the Urban Water Management Plan (UWMP), and the water supply reliability resulting from the implementation of the Phase 1 Water Quality Control Plan for the San Francisco Bay/Sacramento-San Joaquin Delta Estuary (Bay-Delta Plan).

As you are aware implementation of the Bay Delta Plan will result in significant cutbacks to the Regional Water System. For Redwood City, which purchases all of its drinking water from the SFPUC, these cutbacks are expected to be as high as 49% of available supply in multiple dry year scenarios. This reduction in water supply represents a substantial challenge for Redwood City's water customers and community, and if such a reduction in demand is required the City will be forced to impose severe measures to meet the available supply. Some of these measures include a prohibition on irrigation with potable water; suspension of distribution system flushing; cutbacks for commercial, industrial and institutional customers by 30%; a moratorium on new development; and a reduction of residential indoor water uses to 27 gallons per person per day which raises concerns whether there will be sufficient water available to meet the basic health and safety needs, and economic vitality of our community.

The SFPUC has adopted Level of Service Goals to limit rationing to no more than 20% systemwide during droughts. Additionally, the SFPUC has a perpetual obligation to supply the Wholesale Customers with the 184 mgd Supply Assurance. For these reasons, Redwood City respectfully requests the SFPUC to fully commit to the voluntary agreement process and fund the Alternative Water Supply Planning Program at levels necessary to meet its Level of Service Goals and perpetual obligation to the Wholesale Customers.

Redwood City has been and continues to be committed to using our limited water resources wisely through robust water conservation programs, and development of new supplies with recycled water. This past year Redwood City's Recycled Water Project supplied 856 acre-feet of water for non-potable uses that otherwise would have used potable water from SFPUC benefitting all users of the Regional Water System. The City continues to expand recycled water use, and in November of 2019 the City adopted a Recycled Water

Development Standard which establishes guidelines for the safe use of recycled water for toilet and urinal flushing and other requirements which helps to ensure new buildings meet dual plumbing requirements, and are ultimately approved to use recycled water when completed and as the recycled water system expands.

Redwood City is also a partner with SFPUC, BAWSCA, and other BAWSCA Members in the Crystal Springs Purified Water Project included in the SFPUC Alternative Water Supply Program. It is our belief that this project represents one of the best near-term solutions for providing a new source of drinking water for the region, and respectfully request the SFPUC to prioritize this project accordingly.

Thank you for taking the time to review our concerns, and we look forward to working through these issues with BAWSCA and the SFPUC.

Regards,

Justin Chapel
Public Works Superintendent
City of Redwood City
650-780-7469
jchapel@redwoodcity.org

cc: Terence Kyaw, Redwood City
Nicole Sandkula, BAWSCA
Alison Kastama, SFPUC

Appendix N

Resolution 15961, Urban Water Management Plan, 2020 Update

RESOLUTION NO. 15961

A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF REDWOOD CITY ADOPTING REDWOOD CITY'S 2020 URBAN WATER MANAGEMENT PLAN AND AUTHORIZING THE PUBLIC WORKS SERVICES DIRECTOR TO COMPILE AND SUBMIT THE 2020 URBAN WATER MANAGEMENT PLAN TO THE STATE OF CALIFORNIA DEPARTMENT OF WATER RESOURCES PRIOR TO JULY 1, 2021

WHEREAS, the Urban Water Management Planning Act, contained in the California Water Code Section 10610 et seq., requires that urban water suppliers serving more than 3,000 customers or providing more than 3,000 acre - feet of water annually to develop an Urban Water Management Plan every fifth year ending in six and one; and

WHEREAS, the City of Redwood City is an urban supplier of more than 3,000 acre-feet of water annually to greater than 3,000 customers; and

WHEREAS, Public Works Services has prepared Redwood City's 2020 Urban Water Management Plan pursuant to the State of California's Urban Water Management Planning Act; and

WHEREAS, the Urban Water Management Plan will facilitate local and regional water planning activities and support the City of Redwood City's long-term water resource planning goals; and

WHEREAS, in accordance with Section 10642 of the California Water Code, the active involvement of diverse social, cultural, and economic elements of the population within the service area prior to and during the prepare of the plan was encouraged through public outreach; and

WHEREAS, local water retailers, public agencies, and special interest groups were notified of the City's intent to prepare a 2020 Urban Water Management Plan; and

WHEREAS, a community meeting was held on June 10, 2021 to provide information and to receive input on the Urban Water Management Plan, and notice of the meeting was provided through the City's social media channels and published on the City's events calendar; and

WHEREAS, Senate Bill X7-7, otherwise known as the Water Conservation Bill of 2009, requires a public hearing to discuss the method of determining urban water use targets and the impacts to the local economy from meeting said requirements; and

WHEREAS, the City of Redwood City has prepared and circulated for public review a draft 2020 Urban Water Management Plan, and on June 14, 2021 the City Council held a duly noticed public hearing and considered the Urban Water Management Plan, the Water Shortage Contingency Plan, staff report and all public testimony in compliance with the requirements of California Water Code Section 10642 and California Government Code Section 6066.

NOW, THEREFORE, BE IT RESOLVED BY THE COUNCIL OF THE CITY OF REDWOOD CITY, AS FOLLOWS:

Section 1. The recitals set forth above are true and correct, and hereby incorporated herein by this reference as if fully set forth in their entirety.

Section 2. Pursuant to Section 10652 of the California Water Code, the California Environmental Quality Act (CEQA) does not apply to the preparation and adoption of an Urban Water Management Plan; additionally, it is statutorily exempt from CEQA pursuant to CEQA Guidelines Section 15307 because it is an action authorized by state or local ordinance to assure the maintenance of a natural resource.

Section 3. The City of Redwood City 2020 Urban Water Management Plan, a copy of which is on file in the offices of the Public Works Services Department and on the City of Redwood City's website, to which copy reference is hereby made for the full particulars thereof, is hereby adopted.

Section 4. The Public Works Services Director is hereby authorized and directed to file the aforesaid Plan with the California Department of Water Resources, the California State Library, and the County of San Mateo within thirty (30) days of the adoption of this resolution and prior to July 1, 2021.

Section 5. The Public Works Services Department is hereby authorized and directed to implement the City of Redwood City 2020 Urban Water Management Plan adopted hereby, including the Water Conservation and Recycling Programs set forth therein.

Section 6. This Resolution shall go into effect immediately upon its adoption.

Passed and adopted by the Council of the City of Redwood City at a Joint City Council/Successor Agency Board/Public Financing Authority Meeting thereof held on the 14th day of June 2021 by the following votes:

AYES:	Aguirre, Espinoza-Garnica, Gee, Hale, Reddy, Smith and Mayor Howard
NOES:	None
ABSENT:	None
ABSTAINED:	None
RECUSED:	None

Diane Howard
Mayor of the City of Redwood City

Attest:

Pamela Aguilar, CMC
City Clerk of Redwood City

I hereby approve the foregoing resolution this 15th day of June 2021.

Diane Howard
Mayor of the City of Redwood City

RESO. # 15961
MUFF # 802

Appendix O

Resolution 15962, Water Shortage Contingency Plan, June 2021

RESOLUTION NO. 15962

A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF REDWOOD CITY ADOPTING REDWOOD CITY'S WATER SHORTAGE CONTINGENCY PLAN AND WATER CONSERVATION PROGRAM AND AUTHORIZING THE PUBLIC WORKS SERVICES DIRECTOR TO COMPILE AND SUBMIT THE WATER SHORTAGE CONTINGENCY PLAN TO THE STATE OF CALIFORNIA DEPARTMENT OF WATER RESOURCES PRIOR TO JULY 1, 2021

WHEREAS, in California, water is a precious and limited resource that must be used wisely; and

WHEREAS, California Water Code Section 10632(a) requires urban water suppliers to prepare and adopt a Water Shortage Contingency Plan (WSCP) which include stages of action to be undertaken in response to water supply shortages; and

WHEREAS, on October 17, 2016 the City Council of the City of Redwood City adopted Resolution No. 15530 adopting a WSCP and Water Conservation Program (WCP); and

WHEREAS, on May 9, 2016, Governor Brown signed an executive order permanently prohibiting the use of potable water for specific outdoor water uses; and

WHEREAS, in 2018 Senate Bill 606 and Assembly Bill 1668 together referred to as "Making Water Conservation a California Way of Life" or the "2018 Water Conservation Legislation" was signed into California law amending the requirements for Water Shortage Contingency Plans; and

WHEREAS, the City of Redwood City's 2020 Urban Water Management Plan (UWMP) was adopted on June 14, 2021, and includes a WSCP that complies with the 2018 Water Conservation Legislation and sets forth stages of action for water conservation at increased levels of water shortages; and

WHEREAS, pursuant to California Water Code Section 375, the City Council is authorized adopt a WCP to prohibit nonessential water use, water waste, and conserve the City's water supplies of the public entity; and

WHEREAS, the City has prepared a WCP to prohibit nonessential water use, water waste, and conserve the City's water supplies.

NOW, THEREFORE, BE IT RESOLVED BY THE COUNCIL OF THE CITY OF REDWOOD CITY, AS FOLLOWS:

Section 1. The recitals set forth above are true and correct, and hereby incorporated herein by this reference as if fully set forth in their entirety.

Section 2. The City Council hereby finds that the WSCP and WCP are in the public interest and necessary for the purposes of anticipating increased levels of water shortages and conserving the water supplies of the public entity.

Section 3. The WSCP and WCP are categorically exempt from the California Environmental Quality Act (CEQA) pursuant to CEQA Guidelines 15307 (Actions by Regulatory Agencies for Protection of Natural Resources) because they are actions authorized by state or local ordinance to assure the maintenance of a natural resource.

Section 4. Resolution No. 15530 is hereby rescinded.

Section 5. The City hereby adopts the WSCP, attached as Exhibit A and incorporated herein, and the WCP, attached as Exhibit B and incorporated herein.

Section 6. The Public Works Services Director is hereby authorized and directed to file the aforesaid WSCP with the California Department of Water Resources, the California State Library, and the County of San Mateo within thirty (30) days of the adoption of this resolution and prior to July 1, 2021.

Section 7. This Resolution shall go into effect immediately upon its adoption.

*   *   *

EXHIBIT "A"

WATER SHORTAGE CONTINGENCY PLAN (WSCP)

1. WATER SHORTAGE DECLARATION

The City Manager may recommend the City Council adopt a resolution to declare a water shortage when there is a reasonable probability that there will be a supply shortage necessitating a demand reduction in order to ensure that sufficient supplies will be available to meet anticipated demands. Upon declaration of a water shortage emergency, the Public Works Services Director of the City of Redwood City shall take action to implement the prohibitions identified in this WSCP, as applicable to the declared water shortage stage. The declared water shortage shall remain in effect until rescinded or otherwise modified by subsequent resolution of the City Council.

A. Stage 1 water shortage (up to ten (10) percent reduction).
B. Stage 2 water shortage (up to twenty (20) percent reduction).
C. Stage 3 water shortage (up to thirty (30) percent reduction).
D. Stage 4 water shortage (up to forty (40) percent reduction).
E. Stage 5 water shortage (up to fifty (50) percent reduction).
F. Stage 6 water shortage (greater than fifty (50) percent reduction).

2. DEFINITIONS

The following terms are defined for purposes of this Article:

A. CITY: means the City of Redwood City, a charter city.
B. DIRECTOR: means the Public Works Services Director of the City of Redwood City, or his/her designee or representative.
C. CUSTOMER: means any individual, firm, partnership, unincorporated association, corporation, company, organization or governmental entity or agency, whether within or without the geographic boundaries of the City of Redwood City who uses water supplied by the city.
D. BAWSCA: the Bay Area Water Supply and Conservation Agency.
E. SFPUC: the San Francisco Public Utilities Commission and the City's potable water supplier.
F. POTABLE WATER: Means water which conforms to the federal, state and local standards for human consumption.
G. GPCD: means gallons per person per day.

3. WATER SHORTAGE STAGES

3.1 STAGE 1 WATER SHORTAGE

A Stage 1 water shortage exists when the City Council declares that a water supply shortage exists and a demand reduction of up to ten (10) percent is necessary to appropriately respond to existing supply conditions. Upon declaration of a Stage 1 water shortage by the City Council, the Director shall instruct staff to:

i. Maintain water waste reporting portals, which may include a hotline, email address, and/or smart phone application
ii. Conduct public education;
iii. Implement voluntary Water Allocation Program Stage 1;
iv. Implement a water conservation outreach program.
v. Conduct coordination with BAWSCA and SFPUC.

The following actions are prohibited during a declared Stage 1, water shortage.

A. Water use shall not exceed Stage 1 water allocations for each customer
B. Irrigation of ornamental landscapes or turf not supplied through a dedicated irrigation meter with potable water not more than 3 days per week as follows:
    i. Addresses ending with an odd number shall only irrigate on Mondays, Thursdays, and Saturdays;
    ii. Customers with no address shall onlyirrigate on Mondays, Thursdays, and Saturdays;
    iii. Addresses ending with an even number shall only irrigate on Tuesdays, Fridays, and Sundays.
C. Irrigation with potable water outside of newly constructed homes and buildings not delivered by drip or microspray is prohibited.
D. Serving of drinking water other than upon request in eating or drinking establishments, including but not limited to restaurants, hotels, cafes, cafeterias, bars, or other public places where food or drink are served and/or purchased;
E. To promote water conservation, operators of hotels and motels shall provide guests with the option of choosing not to have towels and linens laundered daily. The hotel or motel shall prominently display notice of this option in each guestroom using clear and easily understood language.

3.2 STAGE 2 WATER SHORTAGE

A Stage 2 water shortage exists when the city council declares that a water supply shortage exists and a demand reduction of up to twenty (20) percent is necessary to appropriately respond to existing supply conditions. Upon declaration of a Stage 2 water shortage by the City Council, the Director shall instruct staff to:

i. Continue with actions and measures from Stage 1;
ii. Increase public education;
iii. Accelerate water conservation program implementation;
iv. Cut back flushing of water distribution mains for water quality purposes;
v. Implement mandatory Water Allocation Program Stage 2 with moderate water rate incentives and/or penalties for exceeding allocation/budget;
vi. Schedule staff for enforcement and customer service;
vii. Increase public outreach, including information regarding fines or penalties for noncompliance.

In addition to the actions in Stage 1 except where superseded by more stringent requirements the following actions are mandatory during a declared Stage 2, water shortage.

A. Water use shall not exceed Stage 2 water allocations for each customer.
B. Irrigation of ornamental landscapes or turf not supplied through a dedicated irrigation meter with potable water not more than 2 days per week as follows:
    i. Addresses ending with an odd number shall only irrigate on Mondays and Thursdays;
    ii. Customers with no address shall only irrigate on Mondays and Thursdays;
    iii. Addresses ending with an even number shall only irrigate on Tuesdays and Fridays.

3.3 STAGE 3 WATER SHORTAGE

A Stage 3 water shortage exists when the city council declares that a water supply shortage exists and a demand reduction of up to thirty (30) percent is necessary to appropriately respond to existing supply conditions. Upon declaration of a Stage 3 water shortage by the City Council, the Director shall instruct staff to:

i. Continue with actions and measures from Stage 2;
ii. Implement mandatory Water Allocation Program Stage 3 with significant water rate incentives and/or penalties for exceeding allocation/budget.;
iii. Increase enforcement and water waste patrols;
iv. Suspend routine flushing of water mains except when necessary to address immediate health or safety concerns;
v. Moratorium on new water connections.

In addition to the actions in Stage 2 except where superseded by more stringent requirements the following actions are mandatory during a declared Stage 3, water shortage.

A. Water use shall not exceed Stage 3 water allocations for each customer.
B. Irrigation of ornamental landscapes or turf not supplied through a dedicated irrigation meter with potable water not more than 1 day per week as follows:
    i. Addresses ending with an odd number shall only irrigate on Mondays;
    ii. Customers with no address shall only irrigate on Mondays;
    iii. Addresses ending with an even number shall only irrigate on Tuesdays.
C. Vehicle washing is prohibited except at facilities using recycled or recirculating water;
D. Operating a commercial car wash system that does not utilize recycled or water recirculating technologies is prohibited.

3.4 STAGE 4 WATER SHORTAGE

A Stage 4 water shortage exists when the City Council determines that a water supply shortage exists and a demand reduction of up to forty (40) percent is necessary to make more efficient use of water and appropriately respond to existing water conditions. Upon declaration of a Stage 4 water shortage by the City Council, the Director shall instruct staff to:

i. Continue with actions and measures from Stage 3;
ii. Implement mandatory Water Allocation Program Stage 4 with significant water rate incentives and/or penalties for exceeding allocation/budget;
iii. Continue increasing public outreach;
iv. Continue increasing enforcement and water waste patrols.

In addition to the actions in Stage 3 except where superseded by more stringent requirements the following actions are mandatory during a declared Stage 4, water shortage.

A. Water use shall not exceed Stage 4 water allocations for each customer
B. Irrigation of ornamental landscapes or turf supplied with potable water through a dedicated irrigation meter billed by Redwood City to customers through budget based water rates, the customer shall reduce irrigation usage of potable water by 70% and not exceed 30% of their allotted irrigation water budget.
C. Filling Swimming pools or spas with potable water is prohibited.

3.5 STAGE 5 WATER SHORTAGE

A Stage 5 water shortage exists when the City Council determines that a water supply shortage exists and a demand reduction of up to fifty (50) percent is necessary to make more efficient use of water and appropriately respond to existing water conditions. Upon declaration of a Stage 5 water shortage by the City Council, the Director shall instruct staff to:

i. Continue with actions and measures from Stage 4;
ii. Implement mandatory Water Allocation Program Stage 5 with severe water rate incentives and/or penalties for exceeding allocation/budget;
iii. Reduce water system pressures as applicable in a manner not to endanger public health or safety;

In addition to the actions in Stage 4 except where superseded by more stringent requirements the following actions are prohibited during a declared Stage 5, water shortage.

A. Water use shall not exceed Stage 5 water allocations for each customer
B. Potable water use for irrigation of turf grass or all outdoor uses is prohibited with the exception of:
    i. Maintenance of existing landscape necessary for fire protection,
    ii. Maintenance of existing landscape for soil erosion control,
    iii. Maintenance of plant materials identified to be rare or essential to the well-being of protected species,
    iv. Maintenance of landscapes or turf not supplied through a dedicated irrigation meter with potable water within active public parks and playing fields, day-care centers, golf course greens and school grounds, provided

that such irrigation does not exceed one (1) day per week and does not occur between 9:00 a.m. and 5:00 p.m.,

a. Addresses ending with an odd number shall only irrigate on Mondays;
b. Customers with no address shall only irrigate on Mondays;
c. Addresses ending with an even number shall only irrigate on Tuesdays.

v. Actively irrigated environmental mitigation projects.

3.6 STAGE 6 WATER SHORTAGE

A Stage 6 water shortage exists when the City Council determines that a water supply shortage exists and a demand reduction of greater than fifty (50) percent is necessary to make more efficient use of water and appropriately respond to existing water conditions. Upon declaration of a Stage 6 water shortage by the City Council, the Director shall instruct staff to:

i. Continue with actions and measures from Stage 5;
ii. Implement mandatory Water Allocation Program Stage 6 with severe water rate incentives and/or penalties for exceeding allocation/budget;

In addition to the actions in Stage 6 except where superseded by more stringent requirements the following actions are prohibited during a declared Stage 6, water shortage.

A. Water use shall not exceed Stage 6 water allocations for each customer
B. Potable water shall not be used for irrigation of turf grass or all other outdoor uses.

3.7 WATER ALLOCATIONS

Water allocations for residential outdoor uses and irrigation accounts are calculated according to the City's Water Budget Methodology available on the City's website at https://www.redwoodcity.org/departments/public-works/water/rates utilizing daily rainfall and evapotranspiration rates.

Commercial, Industrial, and Institutional customers' water allocations will be based on the same or similar billing period prior to the onset of a declared water shortage

Customer Sector	Stage 1	Stage 2	Stage 3	Stage 4	Stage 5	Stage 6
Residential Indoor Allocation	50 GPCD	45 GPCD	40 GPCD	34 GPCD	31 GPCD	27 GPCD
Residential Outdoor Reduction	15%	35%	65%	80%	90%	100%

Commercial (CII) Reduction	3%	7%	10%	20%	30%	35%
Irrigation Accounts Reduction	15%	35%	65%	80%	90%	100%
Recycled Water Reduction	0%	0%	0%	0%	0%	0%

4. EXCEPTIONS AND APPEALS

The procedures for exceptions and appeals shall be as set forth below.

4.1 EXCEPTIONS

Written applications for an exception to the provisions of this article shall be made to the Director. A written determination will be made on all requests for exceptions within ten (10) business days from receipt of an application for an exception and mailed to the applicant.

The director's determination shall consider the following criteria:

A. Whether all practical water conservation measures have been previously adopted;

B. Whether failure to grant the application would cause an emergency condition adversely affecting the health, sanitation, fire protection or safety of the customer or the public; or

C. Whether undue hardship would result to the applicant if the application were denied or the flow-restricting device were installed, including adverse economic impact such as loss of production or loss of jobs.

4.2 APPEALS

Denials of any application for an exception or a decision of the director to install a flow-restricting device or discontinue water service may be appealed to the City Manager, or his/her designee, whose decision shall be final. An application for an appeal shall be filed with the City Clerk in writing within seven (7) calendar days after the director's decision and shall state the specific grounds for the appeal. The city manager shall issue a written decision within fifteen (15) calendar days after the appeal has been filed with the City Clerk.

5. ENFORCEMENT

The enforcement of the water conservation provisions of this article shall be as set forth below.

5.1 INSTALLATION OF FLOW-RESTRICTING DEVICES AS ENFORCEMENT

A. Upon the receipt of reliable information confirming an alleged violation of this article, the Director shall issue a written warning to the suspected violator. The Director may, after one (1) or more written warnings, determine whether to require installation of a flow-restricting device on the service line of any customer violating any of the provisions of this article.

B. If the Director determines installation of a flow-restricting device is necessary, written notification of the director's decision shall be mailed to the customer. The customer shall have ten (10) calendar days from the decision to contest the director's decision by submitting written documentation to the Director. If the customer does not contest the decision, the decision will become final without further notification. If the customer contests the Director's decision, the director shall have ten (10) business days to issue a final written decision. If the customer contests the director's decision, they may appeal the Director's decision pursuant to Section 4.2 Appeals.

C. Charges for installation or removal of flow restricting devises is as follows:

Charges for Installation or Removal of Flow Restricting Devises		
Meter Size	Installation Charge	Removal Charge
5/8" to 1", inclusive	$50	$50
1-1/2" to 2", inclusive	$100	$100
3" or larger	Actual Cost	Actual Cost

6.2 DISCONTINUANCE OF WATER SERVICE

Continued water use in violation of any of the provisions of this article, after written warning by the Director and installation of flow-restricting devices, may result in the discontinuation of water service by the City of Redwood City. The director shall mail a written notice of discontinuation of water service. A customer may appeal pursuant to Section 4.2 Appeals. The charge for reactivating or restoring water service shall be fixed by resolution of the City Council, based on the city's cost for labor, equipment, materials and overhead.

6.3 USE OF POTABLE WATER THROUGH DEFECTIVE EQUIPMENT

A. Use of potable water through any meter when written notice has been given by the director to repair broken or defective plumbing, sprinkler, watering or irrigation systems and has failed to effect such repairs. The failure of any customer to effect said repairs within the applicable time period after said written notification by director shall constitute grounds for immediate discontinuance of water service pursuant to Sec. 38.65.2

B. The time period within which repair shall be made of the broken or defective plumbing, sprinkler, watering or irrigation systems after receiving written notice is determined by the water supply condition as follows:

   i. A maximum of ten (10) days under normal supply conditions.
   ii. A maximum of ten (10) days during a Stage 1 water shortage.
   iii. A maximum of five (5) days during a Stage 2 water shortage.
   iv. A maximum of three (3) days during a Stage 3 water shortage.
   v. A maximum of twenty-four (24) hours during a Stage 4 water shortage.
   vi. A maximum of twenty-four (24) hours during a Stage 5 water shortage.

vii. A maximum of twenty-four (24) hours during a Stage 6 water shortage

6.4 PENALTIES

The taking of any action prohibited in this article is an infraction punishable by a fine of up to five hundred dollars ($500) for each day in which the violation occurs. Prior to issuance of a fine, the City shall follow the enforcement procedures set forth below:

A. 1st Violation: notice of violation door hanger/email/phone call to customer, resident or business;
B. 2nd Violation: certified letter from City notifying customer, resident or business of violation and potential future fines;
C. 3rd Violation: one hundred dollars ($100) for a third violation of the same provision within one (1) year;
D. 4th Violation: two hundred dollars ($200) for a fourth violation of the same provision within one (1) year;
E. Five hundred dollars ($500) for all subsequent violations of the same provision within one (1) year.
F. Each day in which a violation occurs shall be considered a separate offense. The fine for the infraction is in addition to, and does not supersede or limit, any other remedies, civil or criminal.

7. WATER SHORTAGE CONTINGENCY PLAN – APPENDIX L TO 2020 URBAN WATER MANAGEMENT PLAN

This Water Shortage Contingency Plan shall incorporate all terms, procedures and requirements set forth in Appendix L (Water Shortage Contingency Plan) to the 2020 Urban Water Management Plan. Appendix L is hereby incorporated by reference.

EXHIBIT "B"

WATER CONSERVATION PROGRAM

1. DEFINITIONS

A. CITY: means the City of Redwood City, a charter city.
B. DIRECTOR: means the Public Works Services Director of the City of Redwood City, or his/her designee or representative.
C. CUSTOMER: means any individual, firm, partnership, unincorporated association, corporation, company, organization or governmental entity or agency, whether within or without the geographic boundaries of the City of Redwood City who uses water supplied by the city.
D. BAWSCA: the Bay Area Water Supply and Conservation Agency.
E. SFPUC: the San Francisco Public Utilities Commission and the City's potable water supplier.
F. IRRIGATION STATION: means an area of irrigated landscape controlled by a single irrigation valve.
G. HARD-SURFACED AREAS: means sidewalks, walkways, driveways, parking areas, tennis courts, patios, alleys or other paved areas.
H. SINGLE-PASS COOLING SYSTEM: means equipment where water is circulated only once to cool equipment before being disposed.
I. DECORATIVE WATER FEATURE: means a design element where open water performs an aesthetic function, including, but not limited to, ponds, fountains, waterfalls and artificial streams.
J. RECYCLED WATER: Non-potable tertiary treated water which, as a result of treatment of wastewater, is suitable for a direct beneficial use or controlled use that would not otherwise occur. (See California Water Code section 13050(n).)
K. POTABLE WATER: Means water which conforms to the federal, state and local standards for human consumption.
L. ARCHITECTURAL OR LANDSCAPING GUIDELINES OR POLICIES: includes any formal or informal rules other than the governing documents of a common interest development.
M. HOMEOWNERS' ASSOCIATION: means an "association" as defined in section 4080 of the Civil Code.
N. COMMON INTEREST DEVELOPMENT: has the same meaning as in section 4100 of the Civil Code.
O. COMMUNITY SERVICE ORGANIZATION OR SIMILAR ENTITY: has the same meaning as in section 411 O of the Civil Code.
P. GOVERNING DOCUMENTS: has the same meaning as in section 4150 of the Civil Code.
Q. SEPARATE INTEREST: has the same meaning as in section 4185 of the Civil Code.

2. GENERAL PROVISIONS AND PROHIBITED WATER USES

At all times to prevent the waste and unreasonable use of water and to promote water conservation, each of the following actions is prohibited. In the event of a declared water shortage, any prohibited water uses imposed by this article in which two (2) or more prohibitions apply to the same water use, the most restrictive prohibition shall apply.

A. The following actions are prohibited at all times and in a declared water shortage except where necessary to address an immediate health and safety need or to comply with a term or condition in a permit issued by a state or federal agency.
   1. The application of potable water to outdoor landscapes in a manner that causes runoff such that water flows onto adjacent property, non-irrigated areas, private and public walkways, roadways, parking lots, or structures;
   2. The use of a hose that dispenses potable water to wash a motor vehicle, except where the hose is fitted with a shut-off nozzle or device attached to it that causes it to cease dispensing water immediately when not in use;
   3. The application of potable water to driveways and sidewalks;
   4. The use of potable water in a fountain or other decorative water feature, except where the water is part of a recirculating system;
   5. The application of potable water to outdoor landscapes during and within 48 hours after measurable rainfall;
   6. The irrigation with potable water of ornamental turf on public street medians;
   7. The irrigation with potable water of landscapes outside of newly constructed homes and buildings in a manner inconsistent with regulations or other requirements established by the California Building Standards Commission and the Department of Housing and Community Development.
   8. Use of potable water through broken or defective plumbing and irrigation systems.
   9. Use of potable water in single-pass cooling systems.

B. To prevent the waste and unreasonable use of water and to promote water conservation, any homeowners' association or community service organization or similar entity is prohibited from:
   1. Taking or threatening to take any action to enforce any provision of the governing documents or architectural or landscaping guidelines or policies of a common interest development where that provision is void or unenforceable under section 4735, subdivision (a) of the Civil Code; or
   2. Imposing or threatening to impose a fine, assessment, or other monetary penalty against any owner of a separate interest for reducing or eliminating the watering of vegetation or lawns during a declared water shortage, as described in section 4735, subdivision (c) of the Civil Code.

Passed and adopted by the Council of the City of Redwood City at a Joint City Council/Successor Agency Board/Public Financing Authority Meeting thereof held on the 14th day of June 2021 by the following votes:

AYES:	Aguirre, Espinoza-Garnica, Gee, Hale, Reddy, Smith and Mayor Howard
NOES:	None
ABSENT:	None
ABSTAINED:	None
RECUSED:	None

Diane Howard

Diane Howard
Mayor of the City of Redwood City

Attest:

Pamela Aguilar

Pamela Aguilar, CMC
City Clerk of Redwood City

I hereby approve the foregoing resolution this 15th day of June 2021.

Diane Howard

Diane Howard
Mayor of the City of Redwood City

RESO. # 15962
MUFF # 802