

2021

DRINKING WATER NEEDS ASSESSMENT

Informing the 2021-22 Safe & Affordable
Drinking Water Fund Expenditure Plan

EXECUTIVE SUMMARY

Full Report:

https://www.waterboards.ca.gov/drinking_water/certlic/drinkingwater/documents/needs/2021_needs_assessment.pdf



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Water Boards

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DEFINITION OF TERMS

This report includes the following defined terms.

“Affordability Threshold” means the level, point, or value that delineates if a water system’s residential customer charges, designed to ensure the water systems can provide drinking water that meets State and Federal standards, are unaffordable. For the purposes of the 2021 Affordability Assessment, the State Water Board employed affordability thresholds for the following indicators: Percent Median Household Income; Extreme Water Bill; and Percent Shut-Offs. Learn more about current and future indicators and affordability thresholds in Appendix E.

“Adequate supply” means sufficient water to meet residents’ health and safety needs at all times. (Health & Saf. Code, § 116681, subd. (a).)

“Administrator” means an individual, corporation, company, association, partnership, limited liability company, municipality, public utility, or other public body or institution which the State Water Board has determined is competent to perform the administrative, technical, operational, legal, or managerial services required for purposes of Health and Safety Code section 116686, pursuant to the Administrator Policy Handbook adopted by the State Water Board. (Health & Saf. Code, §§ 116275, subd. (g), 116686, subd. (m)(1).)

“Affordability Assessment” means the identification of any community water system that serves a disadvantaged community that must charge fees that exceed the affordability threshold established by the State Water Board in order to supply, treat, and distribute potable water that complies with Federal and state drinking water standards. The Affordability Assessment evaluates several different affordability indicators to identify communities that may be experiencing affordability challenges. (Health & Saf. Code, § 116769, subd. (2)(B).)

“At-Risk public water systems” or **“At-Risk PWS”** means community water systems with 3,300 service connections or less and K-12 schools that are at risk of failing to meet one or more key Human Right to Water goals: (1) providing safe drinking water; (2) accessible drinking water; (3) affordable drinking water; and/or (4) maintaining a sustainable water system.

“At-Risk state small water systems and domestic wells” or **“At-Risk SSWS and domestic wells”** means state small water systems and domestic wells that are located in areas where groundwater is at high risk of containing contaminants that exceed safe drinking water standards. This definition may be expanded in future iterations of the Needs Assessment as more data on domestic wells and state small water systems becomes available.

“California Native American Tribe” means Federally recognized California Native American Tribes, and non-Federally recognized Native American Tribes on the contact list maintained by the Native American Heritage Commission for the purposes of Chapter 905 of the Statutes of 2004. (Health & Saf. Code, § 116766, subd. (c)(1).) Typically, drinking water systems for Federally recognized tribes fall under the regulatory jurisdiction of the United States Environmental Protection Agency (U.S. EPA), while public water systems operated by non-Federally recognized tribes currently fall under the jurisdiction of the State Water Board.

“Capital costs” means the costs associated with the acquisition, construction, and development of water system infrastructure. These costs may include the cost of infrastructure (treatment solutions, consolidation, etc.), design and engineering costs, environmental compliance costs, construction management fees, general contractor fees, etc. Full details of the capital costs considered and utilized in the Needs Assessment are in Appendix C.

“Community water system” or **“CWS”** means a public water system that serves at least 15 service connections used by yearlong residents or regularly serves at least 25 yearlong residents of the area served by the system. (Health & Saf. Code, § 116275, subd. (i).)

“Consistently fail” means a failure to provide an adequate supply of safe drinking water. (Health & Saf. Code, § 116681, subd. (c).)

“Consolidation” means joining two or more public water systems, state small water systems, or affected residences into a single public water system, either physically or managerially. For the purposes of this document, consolidations may include voluntary or mandatory consolidations. (Health & Saf. Code, § 116681, subd. (e).)

“Contaminant” means any physical, chemical, biological, or radiological substance or matter in water. (Health & Saf. Code, § 116275, subd. (a).)

“Cost Assessment” means the estimation of funding needed for the Safe and Affordable Drinking Water Fund for the next fiscal year based on the amount available in the fund, anticipated funding needs, and other existing State Water Board funding sources. Thus, the Cost Assessment estimates the costs related to the implementation of interim and/or emergency measures and longer-term solutions for HR2W list systems and At-Risk public water systems, state small water systems, and domestic wells. The Cost Assessment also includes the identification of available funding sources and the funding and financing gaps that may exist to support interim and long-term solutions. (Health & Saf. Code, § 116769.)

“Disadvantaged community” or **“DAC”** means the entire service area of a community water system, or a community therein, in which the median household income is less than 80% of the statewide annual median household income level. (Health & Saf. Code, § 116275, subd. (aa).)

“Domestic well” means a groundwater well used to supply water for the domestic needs of an individual residence or a water system that is not a public water system and that has no more than four service connections. (Health & Saf. Code, § 116681, subd. (g).)

“Drinking Water Needs Assessment” or **“Needs Assessment”** means the comprehensive identification of California drinking water needs. The Needs Assessment consist of three core components: the Affordability Assessment, Risk Assessment, and Cost Assessment. The results of the Needs Assessment inform the State Water Board’s annual Fund Expenditure Plan for the Safe and Affordable Drinking Water Fund and the broader activities of the SAFER Program. (Health & Saf. Code, § 116769.)

“Fund Expenditure Plan” or **“FEP”** means the plan that the State Water Board develops pursuant to Article 4 of Chapter 4.6 of the Health and Safety Code for the Safe and Affordable Drinking Water Fund, established pursuant to Health and Safety Code § 116766.

“Human consumption” means the use of water for drinking, bathing or showering, hand washing, oral hygiene, or cooking, including, but not limited to, preparing food and washing dishes. (Health & Saf. Code, § 116275, subd. (e).)

“Human Right to Water” or **“HR2W”** means the recognition that “every human being has the right to safe, clean, affordable, and accessible water adequate for human consumption, cooking and sanitary purposes,” as defined in Assembly Bill 685 (AB 685). (California Water Code § 106.3, subd. (a).)

“Human Right to Water list” or **“HR2W list”** means the list of public water systems that are out of compliance or consistently fail to meet primary drinking water standards. Systems that are assessed for meeting the HR2W list criteria include Community Water Systems and Non-Community Water Systems that serve K-12 schools and daycares. The HR2W list criteria were expanded in April 2021 to better align with statutory definitions of what it means for a water system to “consistently fail” to meet primary drinking water standards. (California Health and Safety Code § 116275(c).)

“Interim replacement water” or **“Interim solution”** includes, but is not limited to; bottled water, vended water, and point-of-use or point-of-entry treatment units. (Health & Saf. Code, § 116767, subd. (q).)

“Loan” means any repayable financing instrument, including a loan, bond, installment sale agreement, note, or other evidence of indebtedness.

“Local cost share” means a proportion of the total interim and/or long-term project cost that is not eligible for a State grant and would therefore be borne by water systems, their ratepayers, and/or domestic well owners. Some local cost share needs may be eligible for public or private financing (i.e. a loan). Some local costs share needs may not be eligible for financing and is typically funded through available reserves or cash on hand.

“Maximum contaminant level” or **“MCL”** means the maximum permissible level of a contaminant in water. (Health & Saf. Code, § 116275, subd. (f).)

“Median household income” or **“MHI”** means the household income that represents the median or middle value for the community. The methods utilized for calculating median household income are included in Appendix A and Appendix E. Median household incomes in this document are estimated values for the purposes of this statewide assessment. Median household income for determination of funding eligibility is completed on a system by system basis by the State Water Board’s Division of Financial Assistance.

“Net present worth” or **“NPW”** means the estimate of the total sum of funds that need to be set aside today to cover all expenses (capital, including other essential infrastructure costs, and annual O&M) during the potential useful life of the infrastructure investment, which is conservatively estimated at 20-years. The estimate of the total sum of funds is adjusted by an annual discount rate which accounts for the higher real cost of financial outlays in the immediate future when compared to the financial outlays in subsequent years.

“Non-Community Water System” means a public water system that is not a community water system. (Health & Saf. Code, § 116275, subd. (j).)

“Non-transient Non-Community Water System” means a public water system that is not a community water system and that regularly serves at least 25 of the same persons for six months or more during a given year, such as a school. (Health & Saf. Code, § 116275, subd. (k).)

“Operations and maintenance” or **“O&M”** means the functions, duties and labor associated with the daily operations and normal repairs, replacement of parts and structural components, and other activities needed by a water system to preserve its capital assets so that they can continue to provide safe drinking water.

“Other essential infrastructure” or **“OEI”** encompasses a broad category of additional infrastructure needed for the successful implementation of the Cost Assessment’s long-term modeled solutions and to enhance the system’s sustainability. OEI includes storage tanks, new wells, well replacement, upgraded electrical, added backup power, replacement of distribution system, additional meters, and land acquisition.

“Potentially At-Risk” means community water systems with 3,300 service connections or less and K-12 schools that are potentially at risk of failing to meet one or more key Human Right to Water goals: (1) providing safe drinking water; (2) accessible drinking water; (3) affordable drinking water; and/or (4) maintaining a sustainable water system.

“Primary drinking water standard” means: (1) Maximum levels of contaminants that, in the judgment of the state board, may have an adverse effect on the health of persons. (2) Specific treatment techniques adopted by the state board in lieu of maximum contaminant levels pursuant to Health & Saf. Code, § 116365, subd. (j). (3) The monitoring and reporting requirements as specified in regulations adopted by the state board that pertain to maximum contaminant levels. (Health & Saf. Code, § 116275, subd. (c).)

“Public water system” or **“PWS”** means a system for the provision to the public of water for human consumption through pipes or other constructed conveyances that has 15 or more service connections or regularly serves at least 25 individuals daily at least 60 days out of the year. A PWS includes any collection, pretreatment, treatment, storage, and distribution facilities under control of the operator of the system that are used primarily in connection with the system; any collection or pretreatment storage facilities not under the control of the operator that are used primarily in connection with the system; and any water system that treats water on behalf of one or more public water systems for the purpose of rendering it safe for human consumption. (Health & Saf. Code, § 116275, subd. (h).)

“Refined grant needs” means the estimated costs, generated from the Cost Assessment Model, that have been adjusted by removing costs for water systems that have existing funding agreements with the State Water Board and identifying the proportion of costs that are grant-eligible.

“Resident” means a person who physically occupies, whether by ownership, rental, lease, or other means, the same dwelling for at least 60 days of the year. (Health & Saf. Code, § 116275, subd. (t).)

“Risk Assessment” means the identification of public water systems, with a focus on community water systems and K-12 schools, that may be at risk of failing to provide an

adequate supply of safe drinking water. It also includes an estimate of the number of households that are served by domestic wells or state small water systems in areas that are at high-risk for groundwater contamination. Different Risk Assessment methodologies have been developed for different system types: (1) public water systems; (2) state small water systems and domestic wells; and (3) tribal water systems. (Health & Saf. Code, § 116769)

“Risk indicator” means the quantifiable measurements of key data points that allow the State Water Board to assess the potential for a community water system or a transient non-community water system that serves a K-12 school to fail to sustainably provide an adequate supply of safe drinking water due to water quality, water accessibility, affordability, institutional, and/or TMF capacity issues.

“Risk threshold” means the levels, points, or values associated with an individual risk indicator that delineates when a water system is more at-risk of failing, typically based on regulatory requirements or industry standards.

“Safe and Affordable Drinking Water Fund” or **“SADWF”** means the fund created through the passage of Senate Bill 200 (SB 200) to help provide an adequate and affordable supply of drinking water for both the near and long terms. SB 200 requires the annual transfer of 5 percent of the annual proceeds of the Greenhouse Gas Reduction Fund (GGRF) (up to \$130 million) into the Fund until June 30, 2030. (Health & Saf. Code, § 116766)

“Safe and Affordable Funding for Equity and Resilience Program” or **“SAFER Program”** means a set of State Water Board tools, funding sources, and regulatory authorities designed to meet the goals of ensuring safe, accessible, and affordable drinking water for all Californians.

“Safe drinking water” means water that meets all primary and secondary drinking water standards, as defined in Health and Safety Code section 116275.

“Score” means a standardized numerical value that is scaled between 0 and 1 for risk points across risk indicators. Standardized scores enable the evaluation and comparison of risk indicators.

“Secondary drinking water standards” means standards that specify maximum contaminant levels that, in the judgment of the State Water Board, are necessary to protect the public welfare. Secondary drinking water standards may apply to any contaminant in drinking water that may adversely affect the public welfare. Regulations establishing secondary drinking water standards may vary according to geographic and other circumstances and may apply to any contaminant in drinking water that adversely affects the taste, odor, or appearance of the water when the standards are necessary to ensure a supply of pure, wholesome, and potable water. (Health & Saf. Code, § 116275, subd. (d).)

“Service connection” means the point of connection between the customer’s piping or constructed conveyance, and the water system’s meter, service pipe, or constructed conveyance, with certain exceptions set out in the definition in the Health and Safety Code. (See Health & Saf. Code, § 116275, subd. (s).)

“Severely disadvantaged community” or **“SDAC”** means the entire service area of a community water system in which the MHI is less than 60% of the statewide median household income. (See Water Code § 13476, subd. (j))

“Small community water system” means a CWS that serves no more than 3,300 service connections or a yearlong population of no more than 10,000 persons. (Health & Saf. Code, § 116275, subd. (z).)

“Small disadvantaged community” or **“small DAC”** means the entire service area, or a community therein, of a community water system that serves no more than 3,300 service connections or a year-round population of no more than 10,000 in which the median household income is less than 80% of the statewide annual median household income.

“State small water system” or **“SSWS”** means a system for the provision of piped water to the public for human consumption that serves at least five, but not more than 14, service connections and does not regularly serve drinking water to more than an average of 25 individuals daily for more than 60 days out of the year. (Health & Saf. Code, § 116275, subd. (n).)

“State Water Board” means the State Water Resources Control Board.

“Technical, Managerial and Financial capacity” or **“TMF capacity”** means the ability of a water system to plan for, achieve, and maintain long term compliance with drinking water standards, thereby ensuring the quality and adequacy of the water supply. This includes adequate resources for fiscal planning and management of the water system.

“Waterworks Standards” means regulations adopted by the State Water Board entitled “California Waterworks Standards” (Chapter 16 (commencing with Section 64551) of Division 4 of Title 22 of the California Code of Regulations). (Health & Saf. Code, § 116275, subd. (q).)

“Weight” means the application of a multiplying value or weight to each risk indicator and risk category within the Risk Assessment, as certain risk indicators and categories may be deemed more critical than others.



EXECUTIVE SUMMARY

In 2016, the California State Water Resources Control Board (State Water Board) adopted a Human Right to Water Resolution¹ making the Human Right to Water (HR2W), as defined in Assembly Bill 685, a primary consideration and priority across all of the state and regional boards' programs. The HR2W recognizes that "every human being has the right to safe, clean, affordable, and accessible water adequate for human consumption, cooking and sanitary purposes."

In 2019, to advance the goals of the HR2W, California passed Senate Bill 200 (SB 200), which enabled the State Water Board to establish the Safe and Affordable Funding for Equity and Resilience (SAFER) Program. SB 200 established a set of tools, funding sources, and regulatory authorities that the State Water Board harnesses through the SAFER Program to help struggling water systems sustainably and affordably provide safe drinking water.

The annual Drinking Water Needs Assessment (Needs Assessment) required to be carried out by the SAFER Program provides foundational information and recommendations to guide this work.² The Needs Assessment is comprised of Risk Assessment, Affordability Assessment, and Cost Assessment components. Development of the Needs Assessment consisted of stages between September 2019 and March 2021, each of which were detailed in publicly-available white papers and presented at public webinars. The public feedback was incorporated into the final methodology and results.



¹ [State Water Resources Control Board Resolution No. 2016-0010](https://www.waterboards.ca.gov/board_decisions/adopted_orders/resolutions/2016/rs2016_0010.pdf)

https://www.waterboards.ca.gov/board_decisions/adopted_orders/resolutions/2016/rs2016_0010.pdf

² California Health and Safety Code Section 116769 (b) states "The fund expenditure plan shall be based on data and analysis drawn from the drinking water needs assessment..."

Four different water system types: public water systems, tribal water systems, state small water systems and domestic wells, are analyzed within the Needs Assessment. Different methodologies were developed for these system types based on data availability and reliability.

The results of the 2021 Needs Assessment will be utilized by the State Water Board and the SAFER Advisory Group³ to inform the prioritization of available state funding and technical assistance within the Safe and Affordable Drinking Water Fund (SADWF) Fund Expenditure Plan (FEP).⁴ The State Water Board will also be hosting a series of workshops between April and June 2021 to inform the FEP.

The Needs Assessment is not a static analysis. The State Water Board will annually update the assessment and it provides a valuable snapshot of the overall resources needed to bring failing systems into compliance with drinking water standards and prevent At-Risk water systems from failing. By incorporating this Needs Assessment into the SAFER Program and implementation of SADWF, the State Water Board will continue to lead on long term drinking water solutions. At the same time, this Needs Assessment gives clarity of the work that must collectively be done by state, federal, local and stakeholder partners. Only together will we be successful in achieving the Human Right to Water goal for all Californians.

HIGHLIGHTS

The results from the 2021 Needs Assessment illustrate the breadth and depth of challenges to safe and affordable water supply provision across system types in California for the first time. The Needs Assessment identifies water systems that are failing and those that are at-risk of failing to provide safe and affordable drinking water. The results of the assessment also show possible interim and long-term solution pathways to addressing identified challenges. Solution pathways include addressing the fragmentation and proliferation of small, underperforming systems through consolidation and regionalization. The gap between estimated implementation costs and available funding for solutions, however, clearly illustrates that, despite the passage of the SADWF, more resources are likely needed statewide to fully realize the goals of the HR2W.

Failing Water Systems: The HR2W list criteria, that identifies failing water systems, were expanded as a part of the Needs Assessment effort and now better align with the legislative mandates and authorities of the drinking water program and the goals of the HR2W. Approximately 30 community water systems were added to the expanded HR2W list 2021 due to issues which include E. coli violations, treatment technique violations, and/or repeated/unresolved monitoring and reporting violations.

At-Risk Public Water Systems: Approximately 620 public water systems were determined to be at-risk of failing to sustainably provide a sufficient amount of safe and affordable drinking

³ [SAFER Advisory Group](https://www.waterboards.ca.gov/safer/advisory_group.html)

https://www.waterboards.ca.gov/safer/advisory_group.html

⁴ [Safe and Affordable Drinking Water Fund](https://www.waterboards.ca.gov/water_issues/programs/grants_loans/sustainable_water_solutions/safer.html)

https://www.waterboards.ca.gov/water_issues/programs/grants_loans/sustainable_water_solutions/safer.html

water. These systems are referred to as the “At-Risk” public water systems. Approximately 47 new water systems are added to the HR2W system list each year. Supporting these At-Risk systems, to proactively address identified risks, will reduce the probability of these issues resulting in violations or other public health concerns.

At-Risk State Small Water Systems & Domestic Wells: Approximately 610 state small water systems and 80,000 domestic wells were assessed via modelling as at high risk of exceeding health-based drinking water standards due to their location in aquifers with high risk of groundwater contaminants. Further sampling and investigation will be needed to assess the actual water quality concerns for these state small water systems and domestic wells.

Current Capital Cost Needs: The total estimated capital costs of addressing the challenges faced by currently failing HR2W list and At-Risk systems are approximately \$4.5 billion for modeled long-term solutions and \$1.6 billion for the estimated duration of modeled emergency/interim solutions.

Failing Water System O&M Needs for Long-term Solutions: The operations and maintenance costs of long-term modeled solutions for HR2W list systems over a 20-year period are estimated to be approximately \$2.5 billion. These costs do not include the full O&M costs of running a sustainable water system, only the costs associated with the modeled solutions identified by the Cost Assessment Model.

Projected Cost of Implementing Long-term and Interim Solutions: The estimated total cost of implementing the interim and long-term solutions, for the projected number of water systems and domestic wells that need assistance within the next 5-years, is approximately \$10.25 billion. This projected cost includes estimated grant-eligible costs of \$3.25 billion, such as capital, planning, technical assistance costs, etc. The total cost estimate also includes the long-term local cost share needs of \$7 billion. The local cost share needs represent non-grant eligible costs that are typically borne by communities through loans, cash on hand, or rate increases. Local cost share includes non-grant eligible capital costs, interest payments,⁵ long-term solutions,⁶ O&M for interim solutions.⁷ This represents the total estimated cost of implementing interim and long-term solutions for HR2W list systems, At-Risk water systems and well owners.

Funding and Financing Gaps: An additional estimated \$2.1 billion in grant funding and \$2.6 billion in loan funding (financing) is needed to address failing and At-Risk systems and domestic wells over the next five years, after using all currently available State Water Board funding sources. It is important to highlight that other State, Federal, and private funding and financing may be available to meet some of these needs, and that large regionalization

⁵ This is based on a 20-year loan for non-grant eligible capital costs.

⁶ This was based on a 20-year O&M cost for the long-term modeled solutions of projects initiated within the 5-year period.

⁷ Interim solution O&M costs are based on the assumption that 6-years of interim solutions are necessary for HR2W list systems (in order to allow for adequate time to obtain funding and install solutions) and 9-years for those domestic wells and state smalls utilizing point of entry/point of use solutions.

projects may reduce cost needs as well. See Appendix D for a summary of non-State Water Board funding and financing sources.

Affordability Challenges: Approximately 512 water systems (33% of systems analyzed) that serve economically disadvantaged communities exceeded at least one of three affordability indicator thresholds.

FAILING WATER SYSTEMS: THE HR2W LIST

The HR2W, as defined in Assembly Bill 685, recognizes that “every human being has the right to safe, clean, affordable, and accessible water adequate for human consumption, cooking and sanitary purposes.” The State Water Board assesses water systems that fail to meet the goals of the HR2W and maintains a list and map of these systems on its website. The specific HR2W criteria were expanded in April 2021 to meet the new statutory definition of what it means for a water system to “consistently fail” to meet primary drinking water standards.⁸ Expanded HR2W criteria includes unresolved E. coli violations, treatment technique violations, and repeated unresolved monitoring and reporting violations. This statutory change resulted in approximately 38 systems being added to this list of consistently failing systems. This change was necessary to ensure that broader issues, e.g. bacteriological violations, were being addressed in addition to chemical violations.

NEEDS ASSESSMENT RESULTS

RISK ASSESSMENT

The purpose of the Risk Assessment is to identify public water systems, tribal water systems,⁹ and state small water systems and regions where domestic wells are at-risk of failing to sustainably provide a sufficient amount of safe and affordable drinking water.¹⁰ Approximately 47 new water systems are added to the HR2W system list each year. The identification of At-Risk water systems and domestic wells allows the State Water Board to proactively target technical assistance and funding towards communities to prevent systems from failing to achieve the goals of the HR2W.

The State Water Board has developed two different Risk Assessment methodologies to identify At-Risk water systems and domestic wells. The first methodology is for community water systems with 3,300 service connections or less and K-12 schools. The second methodology identifies state small water systems and domestic wells that are at a high risk of

⁸ Primary drinking water standards are defined in CHSC Section 116275(c).

⁹ Tribal water systems are not included in the 2021 Risk Assessment Public Water System results. Appendix F details an alternative methodology developed to identify At-Risk equivalent tribal water systems. The State Water Board is partnering with Indian Health Services and the U.S. Environmental Protection Agency to collect data and adapt the Risk Assessment methodology for State and Federal tribal water systems located in California.

¹⁰ Primary drinking water standards are defined in CHSC Section 116275(c).

accessing source water that may contain contaminants that exceed primary drinking water standards.

At-Risk Public Water Systems

The 2021 Risk Assessment was conducted for 2,779 public water systems and evaluated their performance across 19 risk indicators within the following four categories: Water Quality, Accessibility, Affordability, and Technical, Managerial, and Financial (TMF) Capacity. The results identified 617 (25%) At-Risk water systems, 552 (23%) Potentially At-Risk water systems, and 1,284 (52%) Not At-Risk water systems (Figure 1). The distribution of At-Risk systems varies substantially across the state, as shown in Figure 2.

Figure 1: Number of HR2W List, At-Risk, and Potentially At-Risk Systems

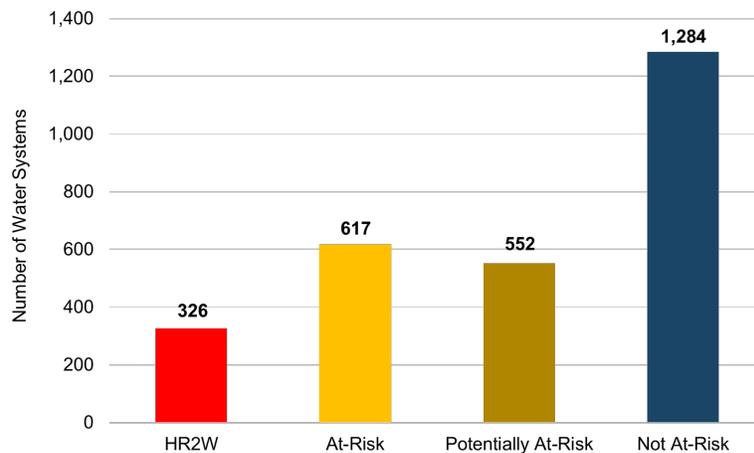
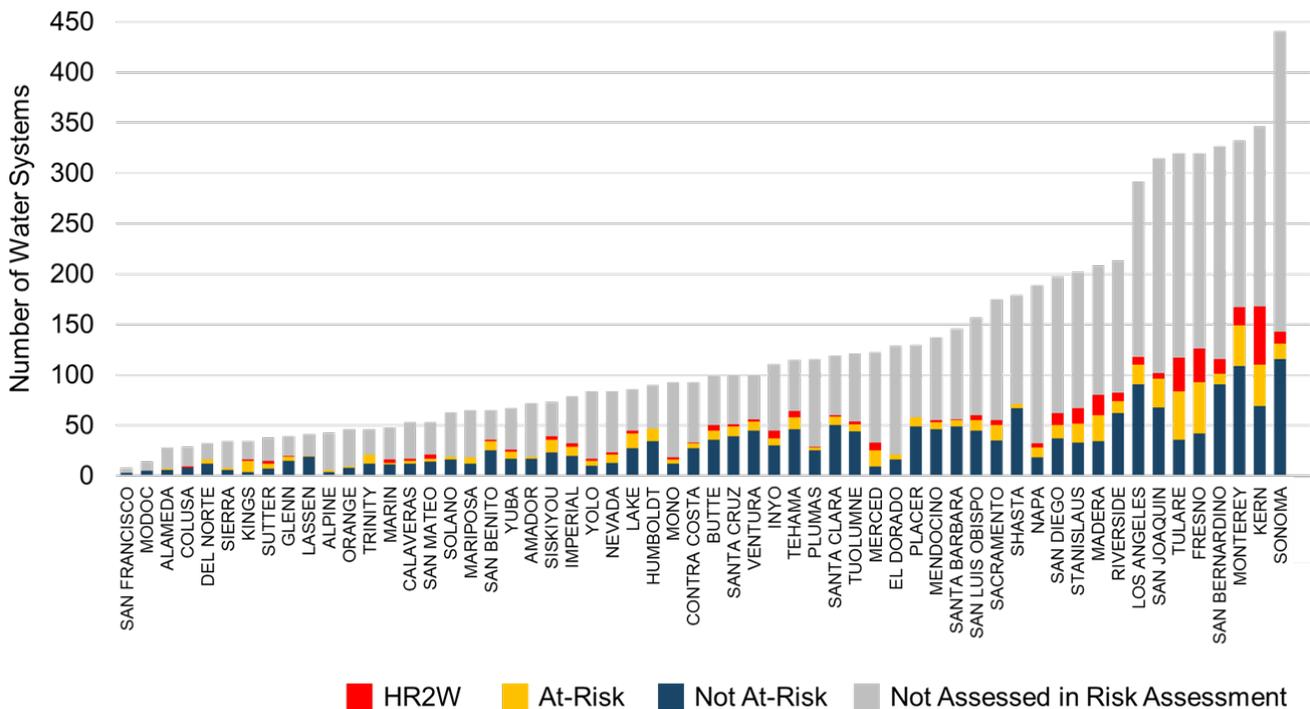


Figure 2: Proportion of HR2W and At-Risk Water Systems in Each County



At-Risk State Small Water Systems & Domestic Wells

The Risk Assessment methodology developed for state small water systems and domestic wells is designed to identify areas where groundwater is likely to be at high risk of containing contaminants that exceed safe drinking water standards and where groundwater is used or likely to be used as a drinking water source. Statewide, the top contaminants that contributed to higher risk designations in domestic wells and state small water systems are nitrate, arsenic, 1,2,3-trichloropropane, gross alpha, uranium, and hexavalent chromium.¹¹

Just under one-third (32%) of the assessed domestic wells were classified as high risk. Among 1,236 state small water systems with available data, nearly one half (49%) were assessed as at high risk. However, it is important to note this portion of the risk analysis uses proxy data based on modelled groundwater quality. Thus, the presence of a given state small water system or domestic well within a high-risk area does not necessarily signify that they are accessing groundwater above primary drinking water standards, but does indicate that owners may wish to perform water quality testing.

¹¹ Hexavalent chromium does not currently have a maximum contaminant level. However, an MCL of 10 micrograms per liter was adopted in 2014 and rescinded in 2017. For the purposes of analysis of domestic wells and state small water systems a 10 microgram per liter concentration was utilized for the high-risk determination. The State Water Board anticipates that a new hexavalent chromium standard will be adopted in the future.

Table 1: State Small Water System and Domestic Wells by Section Water Quality Risk Designation

Section Water Quality Risk Designation	Domestic Wells ¹²	State Small Water Systems
High Risk	77,973	611
Medium Risk	15,791	71
Low Risk	147,185	554
No Data	84,800	227

COST ASSESSMENT

The Cost Assessment methodology utilizes modeling to estimate the financial costs of both interim measures and longer-term solutions to bring HR2W list systems into compliance and address the challenges faced by At-Risk public water systems, as well as At-Risk state small water systems and domestic wells where data was available. The goal of the Cost Assessment is to inform the prioritization of existing funding sources, particularly via the SB 200-mandated annual Safe and Affordable Drinking Water Fund Expenditure Plan and to estimate the size of the current funding gap to continue to advance the HR2W for all Californians. Future versions of the Cost Assessment, which will be conducted annually alongside the Risk Assessment, will continue to incorporate new data and enhance existing data quality.

The embedded assumptions and cost estimates detailed in this report are purely for the purposes of the Needs Assessment. **Local solutions and actual costs will vary from system to system and will depend on site-specific details and community input. Therefore, the Cost Assessment will not be used to inform site-specific decisions but rather give an informative analysis on a statewide basis.**

Statewide Capital Cost Estimate for Long-Term Solutions

For HR2W list systems, the Cost Assessment Model identified multiple potential solutions based on the system’s identified challenges and additional site-specific information. These long-term solutions included: treatment, physical consolidation, Point-of-use (POU) or point-of-entry (POE) treatment technologies, other essential infrastructure (OEI), and technical assistance (TA). A sustainability and resiliency assessment was conducted for each system’s set of identified potential solutions to identify the top two most sustainable model solutions. The Cost Assessment Model then compared the long-term costs of these potential model solutions to select the best model solution of the system. The selected solution counts are summarized in Table 2.

¹² Domestic well locations are approximated using the OSWCR domestic well completion records. Learn more in Appendix B.

Table 2: Count of Selected Modeled Long-Term Solutions

System Type	# of Systems	Treatment	Physical Consol.	POU/ POE	OEI & TA	No Solution
HR2W list	305	138 (45%)	61 (20%)	106 (35%)	305 (100%)	0
At-Risk¹³ PWS	630	N/A	145 (23%)	N/A	630 (100%)	0
At-Risk SSWS	455	N/A	142 (31%)	303 (67%)	N/A	10 (2%) ¹⁴
At-Risk Domestic Well	62,607	N/A	25,696 (41%)	36,911 ¹⁵ (59%)	N/A	0

As shown in Table 3, the total estimated capital cost range of long-term solutions for all HR2W list and At-Risk PWSs, SSWSs and domestic wells is estimated between \$2.3 and \$9.1 billion.¹⁶

Table 3: Selected Modeled Solution Capital Cost, by System Type

System Type	# of Systems	Total Capital Cost Range Total
HR2W	305	\$887 M - \$3,550 M
At-Risk PWS	630	\$819 M - \$3,280 M
At-Risk SSWS	445	\$27 M - \$106 M
At-Risk Domestic Wells	62,607	\$548 M - \$2,190 M
TOTAL:		\$2,280 M - \$9,120 M

¹³ The At-Risk number for the purposes of the cost analysis included some Expanded HR2W list systems because for costing purposes they modeled more closely to the At-Risk systems methodology (e.g. significant monitoring and reporting violations).

¹⁴ Nitrate in 10 Monterey County systems has been measured above 25 mg/L as N, so POU is not considered a viable long-term treatment alternative and the systems are too far for consolidation to be cost effective.

¹⁵ Nitrate modeled above 25 mg/L as N in 1,216 domestic wells and 15 SSWS. POU treatment is not a viable option if the nitrate concentration is this high. Water quality samples should be collected to determine which sources are above this threshold. POU treatment has been budgeted as the modeled solution.

¹⁶ The long-term Cost Assessment results summarized in this report correspond with a Class 5 cost estimate as defined by Association for the Advancement of Cost Engineering (AACE) International. The full range of estimates is thus -50% to +100%. A Class 5 cost estimate is standard for screening construction project concepts.

The Cost Assessment results detailed in this report illustrate that there are relatively higher per connection costs associated with bringing small water systems into compliance, and thus the advantages of economies of scale.

Table 4: Average Long-Term Capital Cost per Connection by System Size for HR2W List and At-Risk Systems

System Type	3,300+ ¹⁷	3,300 – 1,001 ¹⁸	1,000 – 501	500 – 101	100 or less
HR2W	\$4,900	\$6,800	\$11,700	\$18,200	\$86,900
HR2W Annual O&M	\$230	\$320	\$560	\$300	\$910
At-Risk PWS	\$3,620	\$17,300	\$15,500	\$26,200	\$90,700

Additional analysis of long-term solution costs included a breakdown of average costs for the selected modeled solutions categorized by contaminant. Nitrate is estimated to be the most expensive to address on average using all three cost measures.

Consolidation costs for the Cost Assessment were developed for HR2W list systems based on a one-system to one-system methodology. Regional consolidations were separately modeled for areas where significant numbers of water systems exist. Attachment C5 provides additional details of this work.¹⁹ The analysis found significant potential cost savings can occur with regionalization. It is important to note that the results of the regional consolidation analysis were not included in the aggregated cost estimate.

The State Water Board recognizes that additional cost efficiencies and better long-term solutions can occur where there are regional consolidation projects resulting in larger water systems with economies of scale. For example, Figure 3 shows a larger water system in Monterey County where 85 water systems are located in the vicinity of a larger water system. The average cost per connection of the project decreases from \$39,000 per connection to \$7,000 per connection when all the systems are included in the project.

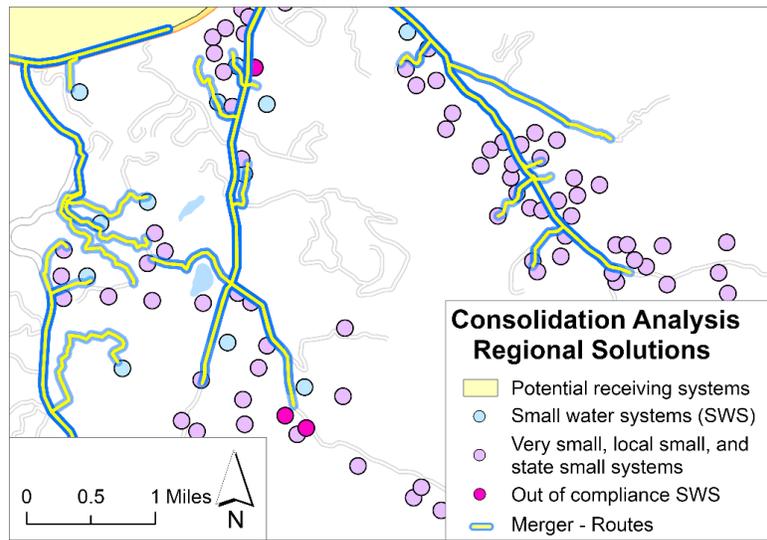
¹⁷ Larger water systems typically have multiple sources. Modeled treatment is based on addressing only those sources that have known contamination. Under the additional infrastructure costs, no additional wells were assumed to be needed for redundancy if there is more than one source. For these reasons and economies of scale, the costs for larger systems are significantly lower for smaller systems.

¹⁸ Larger water systems typically have multiple sources. Modeled treatment is based on addressing only those sources that have known contamination. Under the additional infrastructure costs, no additional wells were assumed to be needed for redundancy if there is more than one source. For these reasons and economies of scale, the costs for larger systems are significantly lower for smaller systems.

¹⁹ [Attachment C5: Additional Cost Assessment Results & Regionalization Analysis](#)

https://www.waterboards.ca.gov/drinking_water/certlic/drinkingwater/documents/needs/c5.pdf

Figure 3: Example of Regional Consolidation Analysis



Operations & Maintenance Costs for Long-Term Solutions

Table 5 shows the annual estimated operations and maintenance (O&M) costs for HR2W list systems. Estimated O&M costs allows for the estimate of the 20-year net present worth (NPW) of the modeled solutions for HR2W list systems. Here, the NPW estimates the total sum of funds that need to be set aside today to cover all the expenses during the potential useful life of the infrastructure investment, which is conservatively estimated at 20-years.

There is a large difference in the total annual costs for POE/POU O&M versus treatment O&M costs, \$1.6 million and \$52.4 million, respectively. However, the estimated O&M costs per connection favors treatment, at \$1,500 per connection (or approximately \$125 per month) addition to rates for POE/POU and \$780 per connection (or approximately \$65 per month) addition to rates for treatment.²⁰

Table 5: Selected HR2W List Modeled Long-Term Solution Annual O&M Costs & Total 20-Year NPW Range²¹

Cost Type	Treatment	POU/POE	Total Annual O&M Range	Total 20-Yr. NPW Range
Total Cost for HR2W List Systems (n=305)	\$52.4 M	\$1.60 M	\$24 M - \$108 M	\$1.25 B - \$5.02 B

²⁰ It should be recognized that there are equity issues around the use of POU as it does not provide whole house treatment and only allows drinking water from one location in the home.

²¹ Long-term modeled solution annual O&M costs and 20-Year NPW costs were not estimated for any At-Risk systems and domestic wells. This estimate also excluded physical consolidation O&M costs, which were based on electric costs for pumping. These costs were, in most cases, negligible and therefore excluded from this table.

Cost Type	Treatment	POU/POE	Total Annual O&M Range	Total 20-Yr. NPW Range
Average Cost Per Connection	\$780	\$1,500	\$1,140 - \$4,560	\$127,000 - \$506,000

Interim Solution Costs

Interim solution costs were calculated for a six-year term for populations served by HR2W list systems, and a nine-year term for At-Risk SSWSs and domestic wells.²² Table 6 shows the estimated costs of providing interim solutions to all populations served by HR2W list systems and At-Risk SSWSs and domestic wells. The total NPW cost for the entire population in need is estimated at nearly \$1.6 billion, with over \$1 billion in cost for HR2W list systems alone. Estimated annual interim solution costs for bottled water are \$850.00 per residential connection, and \$54.00 per person in school settings.

Table 6: Total First Year and NPW Cost of Interim Solutions²³ (\$ in Millions)

System Type	Total Systems Analyzed	Total First Year Cost Estimate	NPW Cost of Duration of Interim Solution
HR2W list	343	\$216 M	\$1,000 M
At-Risk SSWS	496	\$18 M	\$35 M
At-Risk Domestic Wells	59,370	\$280 M	\$547 M
TOTAL:		\$514 M	\$1,580 M

Funding & Financing Gap Analysis

For the purposes of analyzing the gap in available funding and financing to address these costs (Gap Analysis), the breakdown of funding needs were refined based on the assumption that a proportion of the total estimated cost needs would be borne by water systems, their ratepayers, and/or domestic well owners, and thus, not fully borne by the State Water Board's grant funding sources. Costs that are not grant eligible are referred to as "Local Cost Share" since these costs will need to be financed through a loan, rate increases, or any available cash on hand.

The Gap Analysis also identified available funding sources that could be used to support the identified funding needs based on potential project and borrower/grantee eligibilities. The Gap

²² The six-year interim period for HR2W lists was chosen to allow adequate time for water systems to obtain funding and to return to compliance. The nine-year term for At-Risk SSWS and domestic wells was assumed to be the full length of the SADWF program.

²³ Interim costs were calculated for a six-year term for populations served by HR2W list systems, and a nine-year term for At-Risk SSWSs and domestic wells.

Analysis evaluated both the gap in available State Water Board grant dollars and the gap in State Water Board financing dollars (e.g. loan dollars).

Table 7 summarizes that of the total funding needed over the next five years, \$3.25 billion is *eligible* for existing State Water Board grant programs. However, only \$1.2 billion is available over that period, leaving approximately \$2 billion more needed in grant funding over the next five years. It is important to highlight that in order to conduct the Gap Analysis, the methodology assumes the total project’s costs are allocated the full amount of funding needs within a year. This does not align with actual State Water Board capital and technical assistance financing practices, which often stretch the allocation of committed funding over a span of many years.

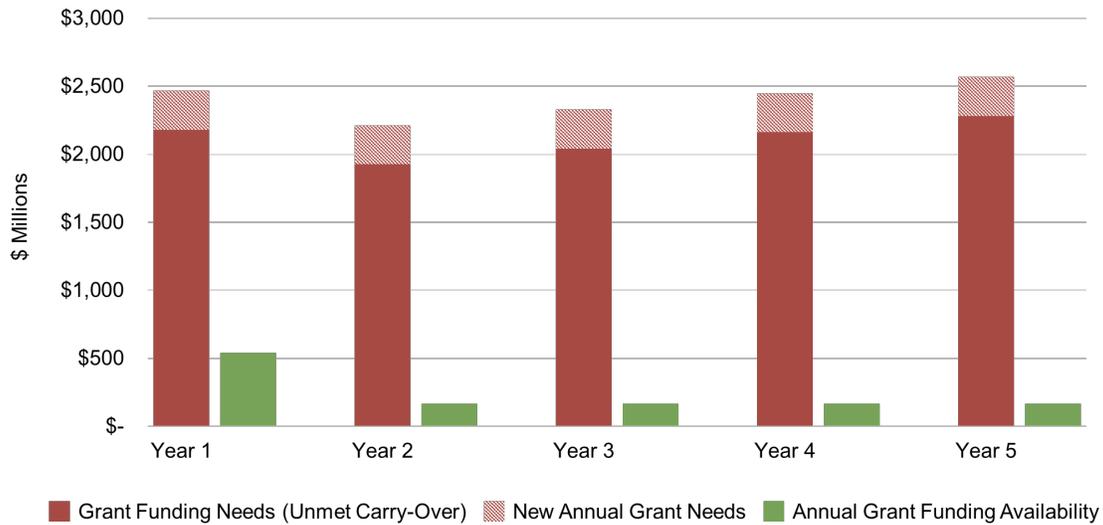
Table 7: Estimated 5-Year Grant Funding Gap²⁴

State Water Board Funding Programs	5-Yr. Est. <u>Grant</u> Funding Availability	5-Yr. Est. <u>Grant</u> Eligible Needs	5-Yr. Est. <u>Grant</u> Funding Gap
All <u>Grant</u> Funding Programs	\$1,200 M	\$3,250 M	\$2,050 M

The estimated additional new grant-eligible and loan-eligible needs are expected to exceed the State Water Board’s grant and loan funds available, into perpetuity. Therefore, without additional funds, the future funding gap is expected to grow (Figure 4). However, it is important to highlight that other State, Federal, and private funding and financing may be available to meet some of these needs. See Appendix D for a summary of non-State Water Board funding and financing sources.

²⁴ Based on an analysis of State Water Board grant funding programs only.

Figure 4: 5-Year Grant Funding Needs & Funding Availability



Existing State Water Board funding eligibilities were used to calculate 5-year local cost share estimates. The total amount of local cost share needs, which includes non-grant eligible capital expenses and 5-year O&M, is estimated to be approximately \$5 billion. Of that, approximately \$4 billion may be eligible for loans, but only \$1.5 billion is available from current State Water Board loan sources over the next five years, leaving a \$2.55 billion more needed in loan financing capacity. Additionally, approximately \$1 billion is estimated to be needed for costs that are not currently eligible for any existing state grant or loan programs and expected to be funded locally by ratepayers or other cash on hand.

Table 8: Estimated 5-Year Financing Gap²⁵ (\$ in Millions)

5-Yr. Est. Local Cost Share Needs	5-Yr. Est. Local Cost Share SWB ²⁶ Loan Eligible	5-Yr. Est. SWB Loan Capacity	5-Yr. Est. Financing Gap
\$5,040 ²⁷	\$4,050	\$1,500	\$2,550

To better assess the potential costs of implementing the Cost Assessment’s modeled solutions, the Gap Analysis calculated the loan interest payment costs and annual O&M costs

²⁵ Based on an analysis of the State Water Board’s financing program (Drinking Water State Revolving Loan Fund) only.

²⁶ “SWB” means State Water Board.

²⁷ 5-year local cost share includes non-grant eligible capital costs and 5 years of O&M for long-term and interim solutions.

for the estimated useful life of the solutions: 20 years.²⁸ Table 9 summarizes the estimated 20-year local cost share burden for all interim and long-term modeled 5-year solution costs which are not eligible for grant funding. The total cumulative estimated 20-year local cost share burden statewide is \$7 billion.

Table 9: Estimated Total 20-Yr. Local Cost Share

Water System Types	Total 20-Yr. Local Cost Share Burden ²⁹	Average 20-Yr. Local Cost Share Burden per System	Average 20-Yr. Local Cost Share Burden per Connection
HR2W List Systems	\$2,770 M	\$6.4 M	\$11,300
At-Risk PWSs	\$1,930 M	\$1.6 M	\$14,700
At-Risk SSWSs	\$65 M	\$78,300	\$9,500
At-Risk Domestic Wells	\$2,210 M	\$22,500	\$22,500
TOTAL:	\$6,980 M		

The total refined cost estimate for the 5-year projected number of HR2W list and At-Risk systems and domestic wells is approximately \$10.25 billion. This includes the estimated 5-year grant-eligible costs of \$3.25 billion plus the long-term 20-year local cost share costs of \$7 billion (non-grant eligible capital costs, 20-year interest payments, 20-year annual O&M for modeled long-term solutions, and 6 or 9 years of O&M for interim solutions). **\$10.25 billion represents the total estimated cost of implementing interim and long-term solutions for HR2W list systems, At-Risk water systems and well owners.**

AFFORDABILITY ASSESSMENT

The purpose of the Affordability Assessment is to identify disadvantaged community water systems, that have instituted customer charges that exceed the “Affordability Threshold” established by the State Water Board in order to provide drinking water that meets State and Federal standards.³⁰ Figure 5 illustrates the nexus of affordability definitions that exist.

²⁸ Total estimated 20-year local cost share burden includes non-grant eligible capital costs, 20-year interest costs (for loan eligible capital costs), 20-year O&M for long-term solutions (not met by a grant) and 6 or 9 years of O&M for interim solutions. Details on how local cost share was calculated is detailed in Appendix D.

²⁹ Refer to Appendix D for more information on how local cost share is calculated.

³⁰ California Health and Safety Code, Section 116769, subd. (a)(2)(B)

Figure 5: Nexus of Affordability Definitions



- (1) Household Affordability:** The ability of individual households to pay for an adequate supply of water.
- (2) Community Affordability:** The ability of households within a community to pay for water services to financially support a resilient water system.
- (3) & (4) Water System Financial Capacity:** The ability of the water system to financially meet current and future operations and infrastructure needs to deliver safe drinking water. The financial capacity of water systems affects future rate impacts on households. The inability to provide adequate services may lead households served by the system to rely on expensive alternatives such as bottled water.

The Affordability Assessment was conducted for 2,877 California community water systems. The Affordability Assessment included large and small community water systems but excluded non-transient, non-community water systems, like schools. It also excluded tribal water systems, SWSs, and households supplied by domestic wells.

For the Affordability Assessment, the State Water Board analyzed three affordability indicators that were also utilized in the Risk Assessment.

% Median Household Income: average residential customer charges for 6 hundred cubic feet per month meet or exceed 1.5% of the annual Median Household Income within a water system’s service area.

Extreme Water Bill: customer charges that meet or exceed 150% and 200% of statewide average drinking water customer charges at the 6 hundred cubic feet level.

% Shut-Offs: 10% or more of a water system’s residential customer base experienced service shut-offs due to non-payment in 2019.

Figure 6 shows the relationship between systems, by DAC status, and the number of Affordability indicator thresholds they exceeded. The analysis indicated that 1,911 systems do not exceed any of the affordability indicator thresholds.

Figure 6: Number of DAC/SDAC Water Systems that Exceeded Each Minimum Affordability Indicator Threshold

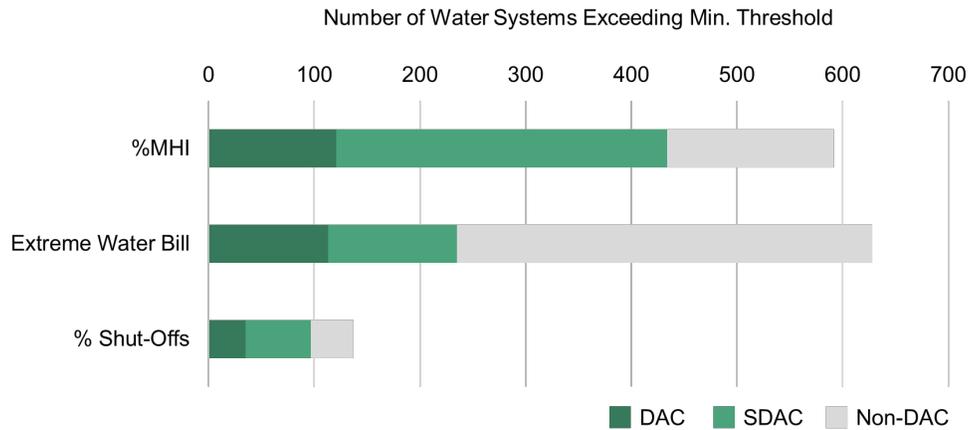
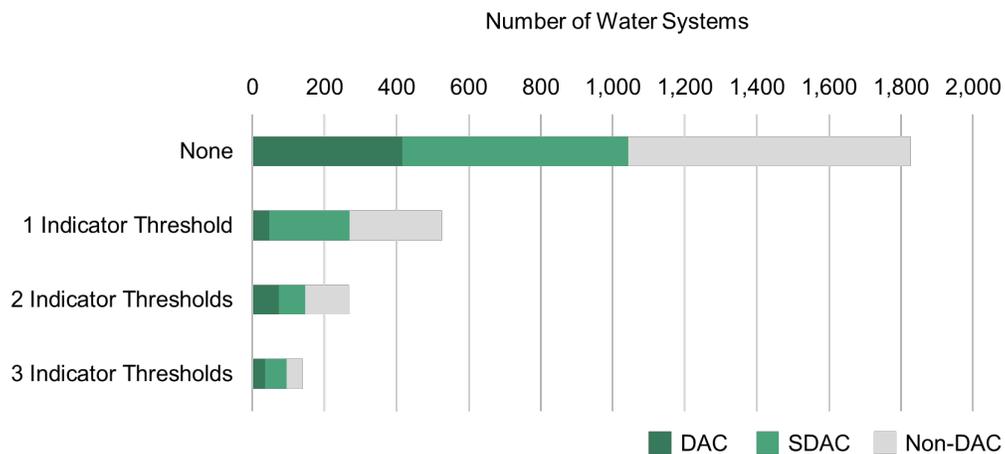


Figure 7 shows the cumulative number of affordability indicator thresholds exceeded by individual DAC and SDAC systems.

Figure 7: Total Number of DAC/SDAC Water Systems that Exceeded an Affordability Indicator Threshold



The State Water Board recognizes the need to refine the affordability indicators utilized in the Affordability Assessment. New affordability indicators will ultimately be included in the Assessment, while others, like % Shut-Offs will be removed (due to the 2020 shut-off moratorium Executive Order). The State Water Board will begin conducting research and stakeholder engagement needed to develop a more refined Affordability Assessment and appropriate affordability thresholds.

TRIBAL NEEDS ASSESSMENT RESULTS

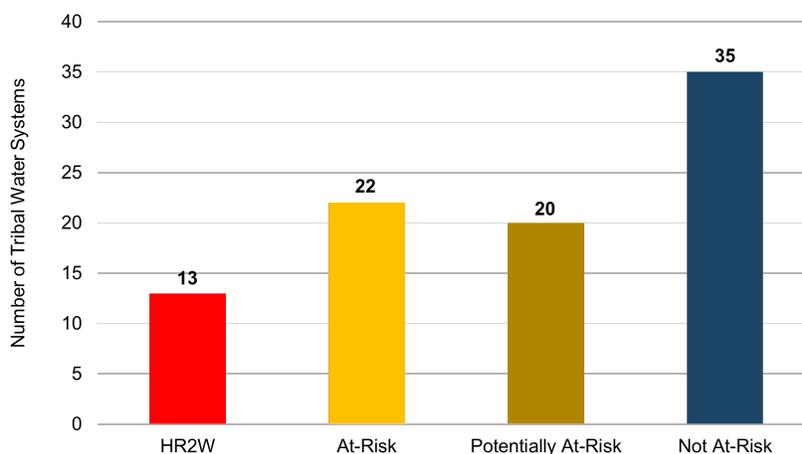
The Needs Assessment is an iterative process and tribal community inclusion is a fundamental principle of the SAFER Program. The State Water Board recognizes tribal governments as sovereign nations within California's boundaries. In June 2021, the State Water Board's Office of Public Participation anticipates conducting outreach to tribal leaders and members to inform them of the SAFER Program to ensure they can fully participate, if desired. Tribal representatives and Federal partners are part of the SAFER Advisory Group and help provide additional specialized expertise on tribal outreach and inclusion.

Due to data limitations, the State Water Board was unable to assess the needs of tribal water systems in the 2021 Needs Assessment using the same methodology employed for evaluation of public water systems, state small water systems, and domestic wells. Therefore, the State Water Board developed an alternative approach for conducting a tribal water system Needs Assessment which relies upon approximating of HR2W list equivalent and At-Risk equivalent water systems (Appendix F). The State Water Board was able to conduct a Risk Assessment and Cost Assessment for tribal water systems. However, the State Water Board did not have access to the data necessary to conduct an Affordability Assessment or Gap Analysis for tribal water systems. The State Water Board, in coordination with Indian Health Services (IHS), U.S. EPA, and other partners, will be reaching out to tribal water systems and tribal leaders to explore interest in data sharing which may enable a tribal water system Affordability Assessment and more comprehensive Risk and Cost Assessments in the future.

HR2W LIST AND AT-RISK EQUIVALENT

State Water Board staff reviewed violation data across the Southwest to review tribal water system violation data to proportionally relate that data to California statewide violations. State Water Board staff then worked with U.S. EPA tribal drinking water personnel to calibrate their assumptions on the number of tribal equivalent HR2W list systems. Using the State Water Board's expanded HR2W list criteria, U.S. EPA identified 13 tribal community water systems that met the criteria.

Figure 8: Estimated Tribal HR2W List and At-Risk Water Equivalent Systems



TRIBAL COST ASSESSMENT

The Cost Assessment methodology for tribal water systems generally follows the statewide methodology (Appendix C). However, two significant changes were made: 1) physical consolidation was not considered as a modeled solution, and 2) the sustainability and resiliency analysis for potential modeled solutions was not performed for tribal water systems due to inadequate data availability. For the purposes of this assessment, it was generally assumed that consolidation would not be a preferred option based on the special sovereign status of Federally recognized tribal water systems and previous input from tribal members. As with the statewide Cost Assessment, these modeled solutions are utilized for broad policy efforts and are not a substitute for individual evaluations and outreach for the actual solution implementation for each water system.

The total estimated capital costs to address both the tribal equivalent HR2W list and At-Risk is \$98.3 million. The estimated O&M cost for the three tribal water systems associated with a treatment solution for equivalent HR2W list systems is \$152,000 per year, or \$10 million dollars for 20 years. Interim costs were also estimated for tribal HR2W list equivalent water systems. The total estimated 6-year tribal emergency/interim equivalent estimated costs were \$6.7 million.

OPPORTUNITIES FOR REFINEMENT

Future iterations of the annual Needs Assessment carried out by the SAFER Program will build upon the foundational information and recommendations provided in this year's work. Expected improvements to the Assessment include the incorporation of additional and better-quality risk and cost data; experience and analysis of trends from implementing the SAFER Program; refinement of the Affordability Assessment; and further input from the State Water Board, public, and the SAFER Advisory Group. The following summarizes some Needs Assessment refinement opportunities:

Improved Data: The State Water Board has already begun taking necessary steps to improve data coverage and accuracy for the Needs Assessment by improving data collection and validation through the Electronic Annual Report (EAR); developing strategies to capture more detailed funded project and technical assistance cost data; and hosting tools to improve the water system area boundaries dataset. A concerted effort will be made to begin collecting data related to water system TMF capacity, water source capacity, and domestic well location/water quality.

Expanded Outreach to Tribal Water Systems: Additional outreach strategies to Federally regulated California tribal water systems are planned for May and June 2021. These outreach efforts will be centered on informing tribal leaders about the purpose of the SAFER Program and informing them of the benefits of sharing information so that they may be included in future Risk Assessments. In the interim, SAFER Program staff will continue to work with individual tribes, as requested by tribal leaders or in response to requests from the U.S. EPA.

Alignment with other State Efforts: The Department of Water Resources (DWR), the Office of Environmental Health Hazard Assessment (OEHHA) and the California Public Utilities

Commission (CPUC) have recently begun assessing different aspects of drinking water systems' risks and performance with respect to the HR2W. The State Water Board has begun coordination with these agencies to try to avoid duplication of efforts and ensure the most productive long-term statewide assessment of water system performance possible. The State Water Board is also making this information publicly available so other statewide efforts can incorporate the Needs Assessment into their programs.

Refinement of the Affordability Assessment: The State Water Board will begin working with the public to further refine the affordability indicators and thresholds utilized in the Affordability Assessment. The State Water Board will continue to collaborate with other State agencies and work towards better alignment amongst complimentary affordability efforts.

Learning by Doing – SAFER Program Maturation: As the State Water Board's SAFER Program matures, better tracking of systems that come on and off the HR2W list and At-Risk list will take place. Deeper investigation into areas where results did not fully reflect the breadth or depth of staff or community experiences (e.g. complexity of urban areas, emerging contaminants, and self-supplied homes using unfiltered surface water) will be incorporated into future efforts.

Continued Public Engagement: The State Water Board is committed to engaging the public and key stakeholder groups to solicit feedback and recommendations as it refines its Needs Assessment methodologies. The State Water Board will continue to provide opportunities for stakeholders to learn about and contribute to the refinement process.

WATER SYSTEM REQUESTS FOR DATA UPDATES

The State Water Board is accepting inquiries related to underlying data change requests for the Risk Assessment and Affordability Assessment. The data used for both Assessments are drawn from multiple sources and are detailed in Appendix A and Appendix E. Water systems are encouraged to reach out via the online webform below:

Water System Data Change Request Webform: <https://bit.ly/2Q5DLML>

The State Water Board will be updating the Risk Assessment Results in Attachment A1 as data changes occur.³¹ Therefore, the list of water systems designated At-Risk and Potentially At-Risk in this Attachment will evolve from the aggregated assessment results summarized in this report over time.

³¹ [Attachment A1: 2021 Risk Assessment Results](#)

https://www.waterboards.ca.gov/drinking_water/certlic/drinkingwater/docs/a1.xlsx