CALIFORNIA
Water Boards

APPENDIX:
AFFORDABILITY ASSESSMENT METHODOLOGY

LAST UPDATED: JUNE 2026

CONTENTS

INTRODUCTION

The purpose of the Affordability Assessment is to identify community water systems and non-transient non-community water systems serving K-12 schools that are disadvantaged or severely disadvantaged communities (DAC or SDAC, respectively) and experiencing a high affordability burden. This assessment is required to ensure compliance with state and federal standards and helps to inform the State Water Board's annual Fund Expenditure Plan.[1]

WATER SYSTEMS ASSESSED

The Affordability Assessment is conducted annually for all community water systems and non-transient non-community water systems serving K-12 schools in California. Although there is some overlap, the Affordability Assessment includes systems that are not analyzed in the Risk Assessment for Public Water Systems. Table 1 summarizes the types of water systems included in the Affordability Assessment compared to the Risk Assessment.

Table 1: System Types Included in the Affordability and Risk Assessments

Water System Type	Affordability Assessment	Risk Assessment
Community		
Small No more than 3,300 service connections and a population of 100,000 or fewer	✓	✓
Medium Between 3,301 - 30,000 service connections and a population of 100,000 or fewer	✓	✓
Large More than 30,000 service connections or a population greater than 100,000	✓	
Wholesalers Supply water to other water systems	✓	
Non-Community		
Non-Transient Non-Community e.g. schools, hospitals	Only K-12 Schools	Only K-12 Schools
Transient Non-Community e.g. hotels, rest stops		

[1] California Health and Safety Code, section 116769, subd. (a)(2)(B)

While the Risk Assessment also includes non-transient non-community water systems serving K-12 schools, it only considers small and medium community water systems with no more than 30,000 service connections and that serve a population of 100,000 people or fewer. Both assessments exclude non-transient non-community water systems that do not serve K-12 schools, transient water systems, state small water systems and domestic wells.

AFFORDABILITY ASSESSMENT METHODOLOGY DEVELOPMENT PROCESS

The State Water Board, in partnership with UCLA, began developing the initial Affordability Assessment in 2019. The State Water Board and UCLA hosted four public webinar workshops in 2020 to solicit feedback and recommendations on the development of the Affordability Assessment. Approximately 683 individuals[2] participated in these workshops through either Zoom or CalEPA's live webcast. Since the initial launch of the Affordability Assessment in 2021, the methodology has been refined through additional public workshops. The State Water Board encourages public and stakeholder participation in the Affordability Assessment refinement process and strives to provide opportunities for feedback and recommendations. Proposed Affordability Assessment methodology updates are detailed in publicly available white papers, presented at public webinars, and public feedback is often incorporated into the final methodology and results. These materials are hosted on the Needs Assessment webpage.[3]

In 2022, the State Water Board partnered with the Office of Environmental Health Hazard Assessment (OEHHA) to host three public Affordability Workshops to re-evaluate previously utilized affordability indicators, research new affordability indicators, and explore how to incorporate a new affordability indicator that measures disposable income limitations into the 2023 Needs Assessment and beyond.[4] These workshops also analyzed different approaches for determining disadvantaged communities and establishing an "affordability threshold".

[2] Individuals that participated in more than one webinar workshop are double counted in this figure.

[3] State Water Board Needs Assessment Webpage: https://www.waterboards.ca.gov/drinking_water/certlic/drinkingwater/needs.html

[4] Workshop 1 (August 11, 2022); Presentation: https://bit.ly/3jsI4k8
Workshop 2 (September 20, 2022); Presentation: https://bit.ly/3juZwEI; White Paper: https://bit.ly/3HXrliS
Workshop 3 (November 1, 2022); Presentation: https://bit.ly/3CKoBIG; White Paper: https://bit.ly/3HVIsII

AFFORDABILITY ASSESSMENT METHODOLOGY

SB 200 calls for the identification of "any community water system that serves a disadvantaged community that must charge fees that exceed the affordability threshold established by the board in order to supply, treat, and distribute potable water that complies with federal and state drinking water standards".[5] Based on the legislative requirements, the Affordability Assessment is conducted following a two-step process summarized below:

STEP 1: Identify disadvantaged and severely disadvantaged community (DAC/SDAC) water systems that have instituted customer charges.

STEP 2: Of these DAC/SDAC water systems, the State Water Board must identify those that exceed an "Affordability Threshold" in order to provide drinking water that meets State and Federal standards.

STEP 1: DISADVANTAGED COMMUNITY DETERMINATION

SB 200 requires the identification of DAC and SDAC systems that meet the Affordability Threshold. For the purposes of the Affordability Assessment, the State Water Board determined DAC and SDAC economic status for water systems using median household income (MHI) data from the U.S. Census Bureau's American Community Survey (ACS).

> **Disadvantaged Community** (DAC) means the entire service area of a community water system in which the MHI is less than 80% of the statewide annual MHI level.
>
> **Severely Disadvantaged Community** (SDAC) means the entire service area of a community water system in which the MHI is less than 60% of the statewide MHI.

STEP 2: CONDUCT AFFORDABILITY ASSESSMENT

OVERVIEW OF AFFORDABILITY ASSESSMENT METHODOLOGY

To identify water systems serving communities that may be experiencing drinking water affordability challenges, the Affordability Assessment methodology utilizes affordability indicators and thresholds. These indicators correspond to the Affordability category risk indicators used in the Risk Assessment, although different thresholds are applied.

> **Affordability Indicators**: quantifiable measurements of key data points that allow the State Water Board to assess drinking water affordability challenges.
>
> **Affordability Indicator Thresholds**: the levels, points, or values associated with an individual affordability indicator that signal when a water system's customers may be experiencing affordability challenges.

[5] California Health and Safety Code section 116769 (a) (2) (B).

The Affordability Assessment evaluates the number of affordability indicator thresholds exceeded by each water system. Systems exceeding a greater number of indicators are considered to have a higher affordability burden, with systems exceeding all indicators representing the highest level of affordability burden.

AFFORDABILITY INDICATORS

Since 2020, the State Water Board and its partners have hosted workshops to further refine and update the Affordability indicators used in the Risk and Affordability Assessments as data availability changes. Affordability indicators can be categorized based on the following attributes:

Household vs. Community Affordability Indicators

- **Household** affordability indicators measure the ability of individual households to pay for an adequate supply of water. Indicators measuring affordability at this scale often include a count or measurement of the number of customers within a service area of a water system that may be struggling now or in the future to pay for water services. *Currently, the Affordability Assessment has no household affordability indicators.*
- **Community** affordability indicators measure the ability of a water system's entire service area to pay for water services to financially support a resilient water system. Metrics measuring community-level affordability often include data that span all customers served by the water system.

Although there may be some households struggling to pay for water services, overall community-level affordability may not be a challenge if the community on average is not struggling. The State Water Board recognizes the importance of considering household and community affordability together, however, there is currently insufficient statewide data to include household affordability indicators in the Affordability Assessment.

Water Rate-Based vs. Socioeconomic-Based Affordability Indicators

- **Water rate-based** affordability indicators rely on data that are either directly or indirectly related to a water system charging customers for water. Water rate-based indicators typically assess the proportion of a customer's income spent on water services or non-payment of water bills.
- **Socioeconomic-based** affordability indicators do not rely on a water system directly charging their customers for water services. These indicators may include income-based data or other data points that can assess the ability to access drinking water services. These types of indicators are important for measuring affordability challenges for customers who do not receive a water bill, such as mobile home park residents who pay for services in their rent.

Development of Affordability Indicators

Since the initial Affordability Assessment development began in 2019, the State Water Board has been working to enhance the Affordability Assessment through evaluation of affordability indicators and thresholds. In collaboration with UCLA and the Office of Environmental Health Hazard Assessment (OEHHA), the State Water Board has solicited feedback from the public through multiple webinars and encourages public and stakeholder participation in the

developing and refining its methodology. Affordability indicators have also shifted over time as some data used in earlier assessments has not been consistently collected.

Initial 2021 Affordability Indicators
In 2020, the State Water Board conducted an Affordability Assessment for community water systems, which analyzed one affordability indicator, water charges as a Percentage of Median Household Income (% MHI), for the FY 2020-21 Safe and Affordable Drinking Water Fund Expenditure Plan.[6] From April through October 2020, the State Water Board and UCLA conducted extensive research and engaged in public engagement efforts to identify potential affordability indicators for the Needs Assessment.[7] This effort identified 23 potential affordability indicators (2020 White Paper, Table 10).[8] In 2021, the State Water Board selected two new affordability indicators from the list of 23 to incorporate into the 2021 Risk and Affordability Assessments. These two indicators were 'Extreme Water Bill' and '% Shut-offs'.

2022 Added and Removed Affordability Indicators
In 2020, Governor Newsom issued an Executive Order that prohibited water shut-offs beginning March 4, 2020, through December 31, 2021.[9] Therefore, data for '% Shut-offs' were unavailable for the majority of 2020 and this information was not collected from water systems in the 2020 electronic Annual Report (eAR). Thus, the State Water Board removed this affordability indicator from the 2022 Needs Assessment.

The State Water Board replaced '% Shut-offs' with two new affordability indicators: 'Percentage of Residential Arrearages' and 'Residential Arrearage Burden'. Arrearage is a debt accrued for drinking water services for residential accounts when all or part of a bill balance remains unpaid for more than 60 days after the payment due date. These indicators were used to identify water systems that serve a community experiencing household affordability challenges and are a direct measure of household drinking water affordability.

2023 Added and Removed Affordability Indicators
The State Water Board removed two affordability indicators from the Affordability Assessment: 'Percentage of Residential Arrearages' and 'Residential Arrearage Burden'. The initial data

---

[6] The Fund Expenditure Plan used an affordability threshold of 1.5% MHI to identify DAC water systems that may have customer charges that are unaffordable: FY 2020-21 Fund Expenditure Plan: https://www.waterboards.ca.gov/water_issues/programs/grants_loans/sustainable_water_solutions/docs/sadwfep_2020_07_07.pdf

[7] The identification of additional affordability indicators was undertaken in conjunction with the identification of possible affordability risk indicators for the Risk Assessment. A full list of potential affordability indicators considered can be found in the white paper *Evaluation of Potential Indicators & Recommendations for Risk Assessment 2.0 for Public Water Systems:* October 7, 2020 White Paper: Evaluation of Potential Indicators & Recommendations for Risk Assessment 2.0 for Public Water Systems: https://www.waterboards.ca.gov/safer/docs/e_p_i_recommendations_risk_assessment_2_public_water_systems.pdf

[8] October 7, 2020 White Paper: Evaluation of Potential Indicators and Recommendations for Risk Assessment 2.0 for Public Water Systems: https://www.waterboards.ca.gov/safer/docs/e_p_i_recommendations_risk_assessment_2_public_water_systems.pdf

[9] Governor Newsom Executive Order: https://www.gov.ca.gov/2020/04/02/governor-newsom-issues-executive-order-protecting-homes-small-businesses-from-water-shutoffs/

used for these two risk indicators came from the State Water Board's 2021 Drinking Water Arrearage Payment Program.[10] Eligible community water system applicants were able to apply for a one-time payment to cover residential arrearages that accrued during the COVID-19 pandemic (March 4, 2020, through June 15, 2021). This dataset has not been updated since the program ended and does not reflect current affordability challenges. Therefore, these two indicators were removed from the Assessment until updated data become available.

The State Water Board and OEHHA incorporating stakeholder feedback from the three Affordability Workshops in developing a new affordability indicator, 'Household Socioeconomic Burden'. 'Household Socioeconomic Burden' is a composite indicator that combines a Poverty Prevalence Indicator and a Housing Burden indicator to measure the extent to which low-income customers may have affordability challenges now or in the future because their disposable income is constrained by high housing costs. This allows for the inclusion of water systems that do not charge customers directly for water in the Affordability Assessment.[11]

Table 2: Affordability Indicators (2021 – 2026)

Indicators	Household / Community	Water Rate-Based?	2021	2022	2023-26
Percentage of Median Household Income (%MHI)	Community	Yes	✓	✓	✓
Extreme Water Bill	Community	Yes	✓	✓	✓
% Shut-Offs (Removed 2022)	Household	Yes	✓		
Percentage of Residential Arrearages (Removed 2023)	Household	Yes		✓	
Residential Arrearage Burden (Removed 2023)	Community	Yes		✓	
Household Socioeconomic Burden	Community	No			✓

AFFORDABILITY INDICATOR THRESHOLDS

To develop thresholds for the affordability indicators in the Affordability Assessment and Risk Assessment, the State Water Board reviewed multiple available types of evidence, looking both within California, across other state agencies nationwide, and at the U.S. EPA's standards. The sections below provide more details about the rationale for the thresholds developed for each indicator. The **minimum** thresholds developed for the affordability

[10] California Water and Wastewater Arrearage Payment Program: https://www.waterboards.ca.gov/arrearage_payment_program/

[11] Before the inclusion of the Household Socioeconomic Burden in 2023, affordability indicators relied on water system customer charges. This was problematic since nearly 40% of DAC water systems were excluded from the 2022 Assessment because they did not charge for water (e.g., mobile home parks that include their water bill in rental charge).

indicators in the Risk Assessment are the same thresholds used in the Affordability Assessment. While the Risk Assessment uses tiered thresholds to capture varying degrees of risk within each affordability indicator, the Affordability Assessment uses only the minimum threshold associated with each indicator. In other words, the affordability indicator threshold indicates whether or not a system exceeds that minimum threshold for the affordability indicator.

Moving forward, the State Water Board will continue to refine the affordability indicator thresholds as data availability improves, and the SAFER Program matures. The process may include refining thresholds by analyzing historical data trends, such as looking at the relationship between historical thresholds and debt and shut-off data once it becomes available.

Table 3: Affordability Indicator Thresholds

Indicators	Affordability Threshold
Percentage of Median Household Income (% MHI)	**1.5% or more** of median household income spent on water
Extreme Water Bill	Charges are **150% or more** than statewide average water charge
Household Socioeconomic Burden	Combined Poverty Prevalence and Housing Burden score of **0.25 or higher**[12]

AGGREGATED AFFORDABILITY ASSESSMENT & THRESHOLD BURDENS

The Affordability Assessment utilizes the count of affordability thresholds met across all three affordability indicators. Unlike the Risk Assessment, the current approach does not include scoring or weighting of the individual affordability indicators. All indicators are assessed equally in the Affordability Assessment analysis.

Table 4: Current Aggregated Affordability Assessment Thresholds

Current Affordability Assessment Thresholds	Total Affordability Burden
0 Affordability Indicator Thresholds Exceeded	**None**
1 Affordability Indicator Thresholds Exceeded	**Low**
2 Affordability Indicator Thresholds Exceeded	**Medium**
3 Affordability Indicator Thresholds Exceeded	**High**

[12] A combined Poverty Prevalence and Housing Burden score of 0.25 or higher would mean that at least one of the Poverty Prevalence or Housing Burden Indicators is 'High Risk' or that both are 'Medium Risk'. For the Poverty Prevalence Indicator, medium risk is defined as 20 to 35% of the population having incomes below twice the federal poverty line, and high risk is more than 35% of the population. For the Housing Burden Indicator, medium risk is defined as 14 to 21% of households with housing cost burden, and high risk is more than 21% of households.

AFFORDABILITY INDICATOR DETAILS

PERCENTAGE OF MEDIAN HOUSEHOLD INCOME (% MHI)

This indicator measures the annual system-wide average residential water bill for 6 hundred cubic feet (HCF) of water usage per month relative to the annual median household income (MHI) of a water system's service area.

Calculation Methodology

Important Note: *In 2026, the State Water Board adjusted the calculation of MHI from the approach used in previous Needs Assessments to improve data coverage and more accurately identify water systems serving disadvantaged communities (DAC). The full methodology for all iterations is detailed in the Appendix: Median Household Income (MHI) and Economic Status Determination Methodology.*[13]

Required Affordability Indicator Data Points & Sources:

- California Drinking Water System Area Boundary Layer: SABL[14]
- Water System Median Household Income in the Past 12 months: most recently available 5-Year Estimates from U.S. Census Bureau's American Community Survey[15]
- Census Geography Boundaries for block groups, census tracts, places and Zip Code Tabulation Areas (ZCTAs): most recently available TIGER/Line Shapefiles [16]
- Assessor parcels data from Lightbox (internally accessed through the water49 database)[17]
- Income surveys accepted by the State Water Board[18]
- Average Monthly Drinking Water Customer Charges: electronic Annual Report (eAR)[19]

Average monthly drinking water customer charges are collected through the electronic Annual Report (eAR). Historically, this information was not required reporting, resulting in limited data coverage and inconsistent data quality. In 2020, extensive changes were made to the eAR to

---

[13] Appendix: Median Household Income (MHI) and Economic Status Determination Methodology: https://www.waterboards.ca.gov/drinking_water/certlic/drinkingwater/documents/needs/2026/2026mhi-calculation.pdf

[14] California Drinking Water System Boundaries (SABL): https://gispublic.waterboards.ca.gov/portal/home/item.html?id=fbba842bf134497c9d611ad506ec48cc

[15] American Community Survey Data Tables: https://data.census.gov/table

[16] TIGER/Line shapefiles (U.S. Census Bureau): https://www.census.gov/cgi-bin/geo/shapefiles/

[17] LightBox Parcel Data | Comprehensive Nationwide Property Data: https://www.lightboxre.com/data/lightbox-parcel-data/

[18] The income surveys used by the State Water Board are not publicly available and must be requested. Only valid surveys conducted in the last five years and accepted by the State Water Board are used as a water system's MHI estimate (27 total valid income surveys as of June 2026).

[19] Electronic Annual Report (eAR): https://www.waterboards.ca.gov/drinking_water/certlic/drinkingwater/ear.html

require reporting of customer charges and implement data validation checks. Since then, continued improvements to the eAR have led to a substantial reduction in reporting errors.

Affordability Indicator Calculation Methodology:

Water System Median Household Income
Water system-level MHI is calculated using data from the most recently available 5-Year ACS Estimates, as well as spatial data representing water system service area boundaries, census areas, and residential tax parcels. When available, income surveys conducted within the last five years accepted by the State Water Board are used to determine a water system's MHI rather than estimating MHI using census-based methods. A detailed explanation on how MHI is calculated can be found in Appendix: Median Household Income (MHI) and Economic Status Determination Methodology.[20]

Average Monthly Drinking Water Customer Charges
To capture the average affordability of water for systems across the state, the Needs Assessment utilizes the average monthly drinking water customer charges for 6 hundred cubic feet (HCF) of water usage per month. 6 HCF (4,488 gallons) of indoor water usage per month is roughly equivalent to 50 gallons per person per day for a three-person household for 30 days. This level of consumption is in line with statewide conservation goals of 55 gallons per capita daily.[21] This customer charge data is reported by public water systems through the electronic Annual Report (eAR), an annual survey administered by the State Water Board that collects information on system operations, finances, and capacity.[22] The 2026 Needs Assessment utilized data from the 2023 Reporting Year eAR (data queried on 12/31/2025), while water rate data from 2024 Reporting Year eAR are used starting 03/31/2026.[23] The 6 HCF charge is calculated based on rate structure information provided by each water system in Section 8 of the eAR; because systems bill customers in different ways (e.g. different unit of measurement, billing frequency, or rate structure), converting the rate to 6 HCF allows for a standardized, comparable measure of average monthly customer charges.

Prepare data:

Determine Systems the Charge for Water: The first step is to determine whether a water system charges customers for water service. If a system reports that it does not charge for water, the 6 HCF charge is marked as "Not Applicable". Non-transient non-community K-12 schools do not charge customers directly for water and therefore their water rate charge is also designated as "Not Applicable".

---

[20] Appendix: Median Household Income (MHI) and Economic Status Determination Methodology: https://www.waterboards.ca.gov/drinking_water/certlic/drinkingwater/documents/needs/2026/2026mhi-calculation.pdf
[21] California Water Code, § 10609.4, subd. (a): https://leginfo.legislature.ca.gov/faces/codes_displayText.xhtml?lawCode=WAT&division=6.&title=&part=2.55.&chapter=9.&article=
[22] Electronic Annual Report I State Water Board: https://www.waterboards.ca.gov/drinking_water/certlic/drinkingwater/ear.html
[23] The State Water Board began requiring the submission of average monthly residential customer charges for 6 HCF of water used in the 2019 electronic Annual Report (eAR).

Calculate the Monthly Charge for 6 HCF: For systems that charge for water, the standard approach is to calculate the monthly charge for 6 HCF of water based on the rate structure provided in the eAR. This calculation occurs automatically within the eAR survey, so the water system is not required to convert their own rate structure to a standardized charge for 6 HCF of monthly water usage. However, there are two situations in which the customer charges for 6 HCF calculated from the rate structure are not used.

- **Invalid or Missing Charge**: If the calculated charge falls outside a reasonable range – either less than $5 or more than $500 – it is flagged for review. In some instances, water systems indicate that they charge for water but do not report their rate structure information and therefore are missing an auto-calculated charge for 6 HCF. In cases where the data are invalid or missing, the system-provided alternative charge is used if available (see below). Otherwise, the monthly water rate is designated as "Missing".
- **Alternative Charge Provided**: Some systems experience issues when their reported rate structures are converted to a standardized 6 HCF monthly charge, typically due to reporting errors. To address this, the eAR allows systems to report an alternative monthly charge directly if the auto-calculated charge for 6 HCF is incorrect. When the water system indicates that they are providing an alternative charge, and the charge provided is between $5 and $500, this reported charge is used in place of the calculated charge. In the rare case that a water system provides an alternative charge that is invalid or indicates they are providing an alternative, but the charge is missing AND the auto-calculated charge is between $5 and $500, the auto-calculated charge is used instead of the alternative amount provided.

Calculate Percentage of MHI risk indicator: Once the median household income and average monthly customer charges for 6 HCF of water usage are determined for each water system, the % MHI indicator is calculated by multiplying the average customer charges by 12 to find the average drinking water customer charges per year and dividing by the annual MHI. % MHI is the percentage of annual MHI spent on drinking water and thus captures the relative affordability of drinking water for customers. The formula for % MHI is found in Equation 1.

Equation 1: Percentage of Median Household Income Risk Indicator Calculation

$$\textbf{Percentage of MHI (\% MHI)} = \frac{\text{Average Monthly Drinking Water Charges for 6 HCF} \times 12}{\text{Annual MHI of Water System Service Area}}$$

Threshold Determination

The percentage of MHI spent on water bills has been widely used for decades by state and federal agencies, as well as water industry stakeholders, to assess the affordability of water service at the community level. The State Water Resources Control Board primarily uses a 1.5% MHI threshold, while the U.S. EPA uses a standard of 2.5% of MHI to determine whether

the cost of drinking water service in a community is considered "affordable".[24] Other states, including Arkansas[25] and North Carolina[26], have used a threshold of 1.5% of MHI spent on water and sewer costs as a threshold for assessing affordability and informing funding decisions. The Office of Environmental Health Hazard Assessment (OEHHA) also incorporated the State Water Board's % MHI affordability threshold as part of its Human Right to Water (HR2W) Tool.[27] The Affordability Assessment uses a 1.5% MHI threshold when considering affordability.

Table 5: Thresholds for Percentage of MHI Affordability Indicator

Threshold Number	Threshold	Affordability Burden
0	**Less than 1.5%** of MHI spent on water	**No**
1	**1.5% or more** of MHI spent on water	**Yes**

[24] This metric has been criticized by academics, water system associations, and other stakeholders in the water sector for its limitations in accurately capturing affordability for low-income households and for relying on potentially arbitrary % MHI thresholds. These concerns that have also been acknowledged by the U.S. EPA in recent years. However, because the Needs Assessment incorporates additional factors when assessing affordability and risk, the State Water Board considers % MHI a useful metric for enabling consistent and comparable assessments of water system affordability across the state.

[25] Arkansas Natural Resources Commission (2020). Safe Drinking Water Fund Intended Use Plan SFY 2019 formerly available at: https://www.agriculture.arkansas.gov/wp-content/uploads/2020/05/0_-_2019_DWSRF_IUP_-_AMENDED_January_2019_01082019_1156hrs.pdf (link no longer active)

[26] North Carolina Department of Environmental Quality. Joint Legislative Economic Development and Global Engagement Oversight Committee (March 17, 2016): https://webservices.ncleg.gov/ViewDocSiteFile/29349

[27] The Human Right to Water in California: https://oehha.ca.gov/water/report/human-right-water-california

EXTREME WATER BILL

This indicator measures how affordable water is for each system relative to other California water systems. Extreme Water Bill assesses whether a water system's average customer charges meet or exceed 150% of statewide average customer charges for 6 hundred cubic feet (HCF) of drinking water consumption. This indicator allows for a relative comparison of customer water costs across systems.

Calculation Methodology

Required Affordability Indicator Data Points & Sources:

- Average Monthly Drinking Water Customer Charges: electronic Annual Report (eAR)[28]

Affordability Indicator Calculation Methodology:

To capture the average affordability of water for systems across the state, the Needs Assessment utilizes the average monthly drinking water customer charges for 6 hundred cubic feet (HCF) of water usage per month. 6 HCF (4,488 gallons) of indoor water usage per month is roughly equivalent to 50 gallons per person per day for a three-person household for 30 days. This level of consumption is in line with statewide conservation goals of 55 gallons per capita daily.[29] This customer charge data is reported by public water systems through the electronic Annual Report (eAR), an annual survey administered by the State Water Board that collects information on system operations, finances, and capacity.[30] The 2026 Needs Assessment utilized data from the 2023 Reporting Year eAR (data queried on 12/31/2025), while water rate data from 2024 Reporting Year eAR are used starting 03/31/2026.[31] The 6 HCF charge is calculated based on rate structure information provided by each water system in Section 8 of the eAR; because systems bill customers in different ways (e.g. different unit of measurement, billing frequency, or rate structure), converting the rate to 6 HCF allows for a standardized, comparable measure of average monthly customer charges.

Prepare data:

Determine Systems the Charge for Water: The first was to determine whether a water system charged customers for water service. If a system reported that it did not charge for

---

[28] Average monthly drinking water customer charges are collected through the electronic Annual Report (eAR). Historically, this information was not required reporting, resulting in limited data coverage and inconsistent data quality. In 2020, extensive changes were made to the eAR to require reporting of customer charges and implement data validation checks. Since then, continued improvements to the eAR have led to a substantial reduction in reporting errors. Electronic Annual Report (eAR) | California State Water Resources Control Board: https://www.waterboards.ca.gov/drinking_water/certlic/drinkingwater/ear.html

[29] California Water Code, § 10609.4, subd. (a): https://leginfo.legislature.ca.gov/faces/codes_displayText.xhtml?lawCode=WAT&division=6.&title=&part=2.55.&chapter=9.&article=

[30] Electronic Annual Report I State Water Board: https://www.waterboards.ca.gov/drinking_water/certlic/drinkingwater/ear.html

[31] The State Water Board began requiring the submission of average monthly residential customer charges for 6 HCF of water used in the 2019 electronic Annual Report (eAR).

water, the 6 HCF charge was marked as "Not Applicable". Non-transient non-community K-12 schools did not charge customers directly for water and therefore their water rate charge was also designated as “Not Applicable”.

Calculate the Monthly Charge for 6 HCF: For systems that charge for water, the standard approach is to calculate the monthly charge for 6 HCF of water based on the rate structure provided in the eAR. This calculation occurs automatically within the eAR survey, so the water system is not required to convert their own rate structure to a standardized charge for 6 HCF of monthly water usage. However, there are two situations in which the customer charges for 6 HCF calculated from the rate structure are not used.

- **Invalid or Missing Charge**: If the calculated charge falls outside a reasonable range – either less than $5 or more than $500 – it is flagged for review. In some instances, water systems indicate that they charge for water but do not report their rate structure information and therefore are missing an auto-calculated charge for 6 HCF. In cases where the data are invalid or missing, the system-provided alternative charge is used if available (see below). Otherwise, the monthly water rate is designated as “Missing”.
- **Alternative Charge Provided**: Some systems experience issues when their reported rate structures are converted to a standardized 6 HCF monthly charge, typically due to reporting errors. To address this, the eAR allows systems to report an alternative monthly charge directly if the auto-calculated charge for 6 HCF is incorrect. When the water system indicates that they are providing an alternative charge, and the charge provided is between $5 and $500, this reported charge is used in place of the calculated charge. In the rare case that a water system provides an alternative charge that is invalid or indicates they are providing an alternative, but the charge is missing AND the auto-calculated charge is between $5 and $500, the auto-calculated charge is used instead of the alternative amount provided.

Calculate the Statewide Average Monthly Charge for 6 HCF: Using the valid monthly charges calculated above, the average charge for 6 HCF of water usage for all community water systems is found. The Risk Assessment is applied to small and medium community water systems (serving 30,000 or less service connections and populations up to 100,000) as well as non-transient non-community K-12 schools. However, the statewide average used in the Extreme Water Bill calculation includes all community water systems, regardless of size, to better reflect water affordability for all of California’s residents. K-12 schools are excluded from the statewide average because they do not charge customers for water service (customer charge for 6 HCF is “Not Applicable”). The average is calculated at the water system level and are not weighted by population served. As a result, it reflects the characteristics of water systems rather than the populations they serve.

Calculate Extreme Water Bill risk indicator: The Extreme Water Bill risk indicator is calculated by dividing each water system’s average monthly drinking water customer charge for 6 HCF by the statewide average charge for customers of community water systems. This allows for a relative comparison of customer water costs across systems. Extreme Water Bill captures the relative affordability of drinking water for customers *compared to customers across the state*. The formula for Extreme Water Bill is found in Equation 2.

Equation 2: Extreme Water Bill Risk Indicator Calculation

$$\textbf{Extreme Water Bill} = \frac{\text{Average Monthly Drinking Water Charges for 6 HCF}}{\text{Statewide Average Monthly Drinking Water Charges for 6 HCF}}$$

Threshold Determination

The State Water Board's AB 401 report recommended a statewide low-income rate assistance program utilize a minimum affordability indicator threshold of 150% of the statewide average monthly charge for 6 HCF.[32] The Affordability Assessment uses the 150% threshold in the calculation of the Extreme Water Bill affordability indicator.

Table 6: Thresholds for Extreme Water Bill Affordability Indicator

Threshold Number	Threshold	Affordability Burden
0	Charges are **less than 150%** of the statewide average 6 HCF charge	**No**
1	Charges are **150% or more** than statewide average 6 HCF charge	**Yes**

[32] AB 401 Final Report: https://www.waterboards.ca.gov/water_issues/programs/conservation_portal/assistance/docs/ab401_report.pdf

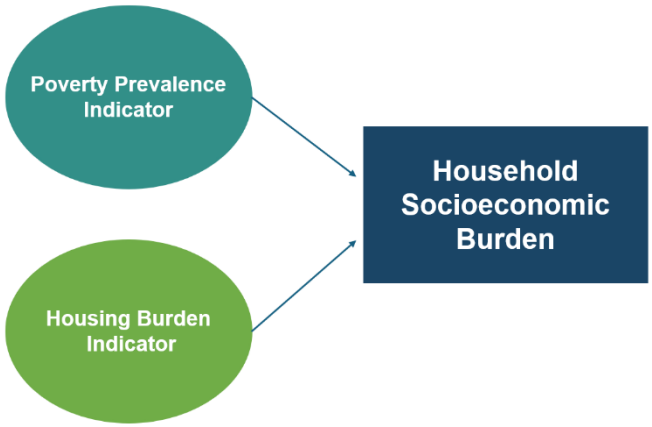
HOUSEHOLD SOCIOECONOMIC BURDEN

This indicator is intended to identify water systems that serve communities experiencing both high poverty rates and high housing costs for low-income households. These communities may already struggle to afford their current water bills with limited disposable income constrained by high housing costs and could face additional hardship if customer charges increase in the future. This indicator combines two metrics – Poverty Prevalence and Housing Burden – to capture the compounded financial strain on a water system's customers.

- **Poverty Prevalence Indicator (PPI)** measures the percentage of the population with incomes less than two times the federal poverty level.[33]
- **Housing Burden Indicator (HBI)** captures the percentage of households in a census tract that are both (1) Low-income, defined as making less than or equal to 80% of the Housing and Urban Development (HUD) Area Median Family Income (HAMFI); and (2) Severely burdened by housing costs, paying greater than 50% of their income to housing.

Together, these two indicators provide a more comprehensive picture of socioeconomic vulnerability by accounting for the varying levels of income and cost burdens across California.

Figure 1: Poverty Prevalence and Housing Burden Components Combined to Create Household Socioeconomic Burden Indicator



Calculation Methodology

Required Affordability Indicator Data Points & Sources:

- California Drinking Water System Area Boundary Layer: SABL[34]

[33] The federal poverty level used to assess poverty varies by family size and composition, and in some cases age. How the Census Bureau Measures Poverty: https://www.census.gov/topics/income-poverty/poverty/guidance/poverty-measures.html

[34] California Drinking Water System Boundaries (SABL): https://gispublic.waterboards.ca.gov/portal/home/item.html?id=fbba842bf134497c9d611ad506ec48cc

- Ratio of Income to Poverty Level in the Past 12 Months: most recently available 5-Year Block Group-Level Estimates from U.S. Census Bureau's American Community Survey[35]
- Table 8 – Tenure by Household Income, Housing Cost Burden and Substandard Housing: most recently available 5-Year Census Tract-Level Estimates from Comprehensive Housing Affordability Strategy data, U.S. Department of Housing and Urban Development (HUD)[36]
- Census Geography Boundaries for Block Groups and Census Tracts: most recently available TIGER/Line Shapefiles[37]

Affordability Indicator Calculation Methodology:

To calculate Household Socioeconomic Burden, two key data products are required: (1) percentage of the population with incomes less than 200% of the federal poverty level served by a water system, to capture overall economic vulnerability (Poverty Prevalence Indicator); and (2) percentage of households (both owner- and renter-occupied) served by a water system with incomes less than or equal to 80% of the HUD Area Median Family Income (HAMFI) and paying more than 50% of household income for housing, to capture particularly vulnerable populations that are both low-income and experiencing severe housing burden (Housing Burden Indicator). The calculations for the Poverty Prevalence Indicator and the Housing Burden Indicator can be found in Equation 3.

Since Poverty Prevalence and Housing Burden estimates are only available at the block group and census tract-level, respectively, it is necessary to combine these data with spatial data on water system service area boundaries to produce water system-level estimates. For each water system, area-weighted average Poverty Prevalence and Housing Burden are calculated based on the portions of either the block group or census tract that fall within the system's service area boundary. A detailed explanation on how these area-weighted estimates were calculated can be found in Appendix: GIS Methodology for Calculating Data.[38]

[35] Census Bureau data table C17002 (block group-level): Ratio of Income to Poverty Level in the Past 12 Months, from American Community Survey 5-Year Estimates: https://data.census.gov/table
[36] HUD Office of Policy Development and Research Comprehensive Housing Affordability Strategy (CHAS) data (census tract-level), based on most recently available ACS 5-Year estimates: https://www.huduser.gov/portal
[37] TIGER/Line shapefiles (U.S. Census Bureau): https://www.census.gov/cgi-bin/geo/shapefiles/
[38] Appendix: GIS Methodology for Calculating Data: https://www.waterboards.ca.gov/drinking_water/certlic/drinkingwater/documents/needs/2026/general-gis-methodology.pdf

Equation 3: Poverty Prevalence and Housing Burden Indicator Calculation

$$\textbf{Poverty Prevalence} = \frac{\text{Sum of population with incomes below 200\% of federal poverty line}}{\text{Total population for whom poverty status is determined}}$$

$$\textbf{Housing Burden} = \frac{\text{Sum of households with income } \leq \text{ 80\% of HAMFI \& housing costs > 50\% of income}}{\text{Total occupied housing units}}$$

Component Thresholds

Poverty Prevalence Indicator (PPI): Various thresholds have been used by organizations and researchers to assess poverty prevalence, including fixed cutoffs such as 30%[39] and tiered categories (e.g., less than 10%, 10-30%, 30-50%, and greater than 50%).[40] However, the most widely adopted thresholds were first proposed by Raucher et al. in their report for the American Water Works Association, 'Developing a New Framework for Household Affordability and Financial Capability Assessment in the Water Sector'.[41,42,43,44] In that report, the authors recommend the following PPI thresholds:

- No risk: less than 20%
- Medium risk: 20% to 35%
- High risk: more than 35%

The State Water Board and the Office of Environmental Health Hazard Assessment (OEHHA) evaluated these thresholds in the context of California data and proposed to adopt them for the Poverty Prevalence Indicator component of the Household Socioeconomic Burden affordability indicator.

---

[39] Lauren Patterson (2023): Water Affordability: https://journals.plos.org/water/article?id=10.1371/journal.pwat.0000123

[40] David Mitchell, and Elizabeth Stryjewski (2020): Technical Memorandum on Water/Sewer Service Affordability Analysis, formerly available at: https://www.cityofsantacruz.com/home/showpublisheddocument/83950/637553072866376248 (link no longer active)

[41] Developing a New Framework for Household Affordability and Financial Capability Assessment in the Water Sector (2019): https://www.acwa-us.org/wp-content/uploads/2019/05/Developing-New-Framework-for-Affordability-Report-Final.pdf

[42] American Water Works Association: Measuring Water Affordability and the Financial Capability of Utilities: https://awwa.onlinelibrary.wiley.com/doi/full/10.1002/aws2.1260

[43] Alliance for Water Efficiency (2020): An Assessment of Water Affordability and Conservation Potential in Detroit, Michigan: https://www.allianceforwaterefficiency.org/impact/our-work/assessment-water-affordability-and-conservation-potential-detroit-michigan

[44] Duke University, Nicholas Institute: Exploring the Affordability of Water Services within and across Utilities: https://nicholasinstitute.duke.edu/water-affordability/affordability/Affordability_Preprint.pdf

Table 7: Poverty Prevalence Indicator Component Thresholds & Scores

Component	Threshold	Score	Risk Level
Poverty Prevalence Indicator	**Threshold N/A** = Missing Poverty Prevalence data	**N/A**[45]	Unknown
	Threshold 0 = < 20%	**0**	None
	Threshold 1 = 20% - 35%	**0.25**	Medium
	Threshold 2 = > 35%	**1**	High

Housing Burden Indicator (HBI): Based on a nationwide literature review, consistent thresholds for housing burden have not yet been established by researchers or adopted by other organizations. One report by the University of North Carolina on housing conditions in North Carolina identified census tracts in the top 20% statewide for housing burden as severely housing burdened.[46] Similarly, a recent University of Southern California Master's thesis categorized census tracts in the top 75% of California as the "most impacted".[47] Another study found that 16% of children in Los Angeles County live in severely housing cost-burdened households, though this was based on survey data.[48] Given the lack of consistency, peer-reviewed evidence, and broad relevance across these sources, the Needs Assessment used the distribution of 2019 statewide housing burden data to define thresholds. Census tracts were divided into three categories (terciles), with thresholds rounded to the nearest whole number:

- No risk: fewer than 14% of households are housing cost burdened.
- Medium risk: 14% to 21% of households are housing cost burdened.
- High risk: more than 21% of households are housing cost burdened.

A matrix scoring approach was used to assign vulnerability values to each category, 0 for no vulnerability, 0.25 for medium vulnerability, and 1 for high vulnerability.

The State Water Board will continue to assess affordability indicators – such as arrearages and water shutoffs – over time to evaluate whether these housing burden thresholds should be adjusted in the future.

---

[45] A small number of water systems did not have available poverty prevalence data, typically in places where it is not statistically appropriate or meaningful to publish estimates – such as systems that serve detention centers or military installations with non-household populations. A risk score of "Not Applicable" is thus more appropriate than "Missing", because the data are unavailable for logical reasons (it is not appropriate to make inferences about socioeconomic conditions for these systems using census data).

[46] William Rohe, Todd Owen, and Sarah Kerns; The University of North Carolina at Chapel Hill, Center for Urban and Regional Studies (2017): Extreme Housing Conditions in North Carolina: https://nchousing.org/wp-content/uploads/2017/02/Extreme-Housing-Conditions-in-North-Carolina-1.pdf

[47] Lucresia Graham (2021): A Cartographic Exploration of Census Data on Select Housing Challenges Among California Residents: (Master's thesis, University of Southern California) https://www.proquest.com/openview/fc27343514f2d41361d1313accb00858/1.pdf?pq-origsite=gscholar&cbl=18750&diss=y

[48] Tabashir Z. Nobari, Shannon E. Whaley, Evelyn Blumenberg, Michael L. Prelip, and May C. Wanga (2018): Severe Housing-Cost Burden and Obesity Among Preschools-aged Low-Income Children in Lost Angeles County https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6305808/

Table 8: Housing Burden Indicator Component Thresholds & Scores

Component	Threshold	Score	Risk Level
Housing Burden Indicator	**Threshold N/A =** Missing Housing Burden data	**N/A**[49]	Unknown
	Threshold 0 = <14%	**0**	None
	Threshold 1 = 14% - 21%	**0.25**	Medium
	Threshold 2 = >21%	**1**	High

Threshold Determination

The two components of Household Socioeconomic Burden were combined using a matrix approach. The normalized scores for the Poverty Prevalence and Housing Burden Indicator components were added together and divided by the number of components (two) to produce a Household Socioeconomic Burden score for each water system (Equation 4). Figure 2 shows how much each calculated score represents a degree of Poverty Prevalence and Housing Burden within the matrix.

Equation 4: Calculating Household Socioeconomic Burden Score

$$\textbf{Household Socioeconomic Burden} = \frac{\text{Poverty Prevalence Indicator Score} + \text{Housing Burden Indicator Score}}{2}$$

[49] A small number of water systems did not have available housing burden data, typically in places where it is not statistically appropriate or meaningful to publish estimates – such as systems that serve detention centers or military installations with non-household populations. A risk score of "Not Applicable" is thus more appropriate than "Missing", because the data are unavailable for logical reasons (it is not appropriate to make inferences about socioeconomic conditions for these systems using census data).

Figure 2: Household Socioeconomic Burden Scores from Poverty Prevalence and Housing Burden Indicator Scores

Poverty Prevalence	**High Risk** ≥ 35%	Score = 1	*N/A*	**0.5**	**0.625**	**1**
	Med Risk 20 - 35%	Score = 0.25	*N/A*	**0.125**	**0.25**	**0.625**
	No Risk < 20%	Score = 0	*N/A*	**0**	**0.125**	**0.5**
	Unknown	Score = N/A	*N/A*	*N/A*	*N/A*	*N/A*
			Score = N/A	Score = 0	Score = 0.25	Score = 1
			Unknown	**No Risk** < 14%	**Med Risk** 14 - 21%	**High Risk** ≥ 21%
			Housing Burden			

These combined scores are converted into threshold Affordability Burden designations, as shown in Table 9.

Table 9: Thresholds for Household Socioeconomic Burden Affordability Indicator

Threshold Number	Threshold	Affordability Burden
0	Combined score of **0 – 0.125**	**No**
1	Combined score of **0.25 – 1**	**Yes**

AFFORDABILITY ASSESSMENT LIMITATIONS

The Affordability Assessment strives to identify communities that may be struggling with water affordability challenges. However, the State Water Board has identified the following limitations that are worth noting:

Affordability Assessment Scope

There are multiple lenses through which to assess water "affordability". SB 200 does not define how the State Water Board should measure affordability. Nor does it specify if the "Affordability Threshold" is meant to assess household affordability, community affordability, and/or a water system's financial capacity. All three aspects of affordability are interrelated, but metrics or indicators that measure each can differ greatly. More engagement with the public, water systems, and stakeholders is needed to better define the scope of the Affordability Assessment and how its results will be utilized.

Affordability Indicator Data

The State Water Board acknowledges that there are some data coverage issues and data quality uncertainties for all the affordability indicators utilized in the Affordability Assessment. Customer charges, median household income, poverty and/or housing burden data are not available for some water systems included in this assessment. Water system customer charges are also self-reported through the electronic Annual Report and difficult to verify systematically. Finally, water system boundaries, which are used to calculate MHI, DAC status, and the Household Socioeconomic Burden affordability indicator may be incomplete. In some cases, they reflect a water system's jurisdictional boundary rather than its service area boundary. Although there may be some incompleteness, the State Water Board has undertaken a project to review, add, and correct public water system boundaries that were collected under previous efforts. All missing community water system boundaries have been added to the SABL layer as of 2024. In 2025, the State Water Board verified 467 existing boundaries that were either pending or not verified, for a total of 4,963[50]. Efforts to verify and correct boundaries are ongoing and are expected to be completed by the end of 2027.

An additional factor that may influence the Affordability Assessment results is that customer charges often do not reflect the full costs water systems incur to maintain current operations and invest in future infrastructure. Many small water systems, for example, lack asset management plans, capital improvement plans, and financial strategies to guide appropriate rate setting. As a result, customer charges may be set too low to support long-term system resilience. If more systems adopted full-cost pricing, the outcomes of the Affordability Assessment could look different.

Affordability Indicators

% MHI has been criticized by academics, water system associations, and other stakeholders in the water sector for its limitations in accurately capturing affordability for low-income households and for relying on potentially arbitrary thresholds to delineate those experiencing affordability challenges. These concerns that have also been acknowledged by the U.S. EPA in recent years. Additionally, some affordability indicators may be more applicable to certain governance types than others. For example, feedback during public engagement on the Risk Assessment noted that rate-based indicators, such as % MHI and the Extreme Water Bill, may not capture how some systems finance the full cost of service provision. Another point raised was that some individual water systems are part of larger utility structures that help buffer affordability challenges – dynamics not currently reflected in the Affordability Assessment.

Many other state agencies are also developing or using affordability indicators as part of related efforts. In selecting indicators for the Needs Assessment, consideration was given to those used by the Office of Environmental Health Hazard Assessment (OEHHA), the Department of Water Resources (DWR), and the California Public Utilities Commission (CPUC). Nevertheless, the indicators chosen for the Needs Assessment differ in several respects from those used in these other initiatives. This variation in metrics and thresholds across state and federal agencies can contribute to confusion among water systems and

[50] The total count of 4,963 includes only Water Service Area types. It excludes Jurisdictional and Wholesaler types. Boundary counts reflect systems with Activity Status = A (active) and do not include those with Status = I (inactive) or P (pending).

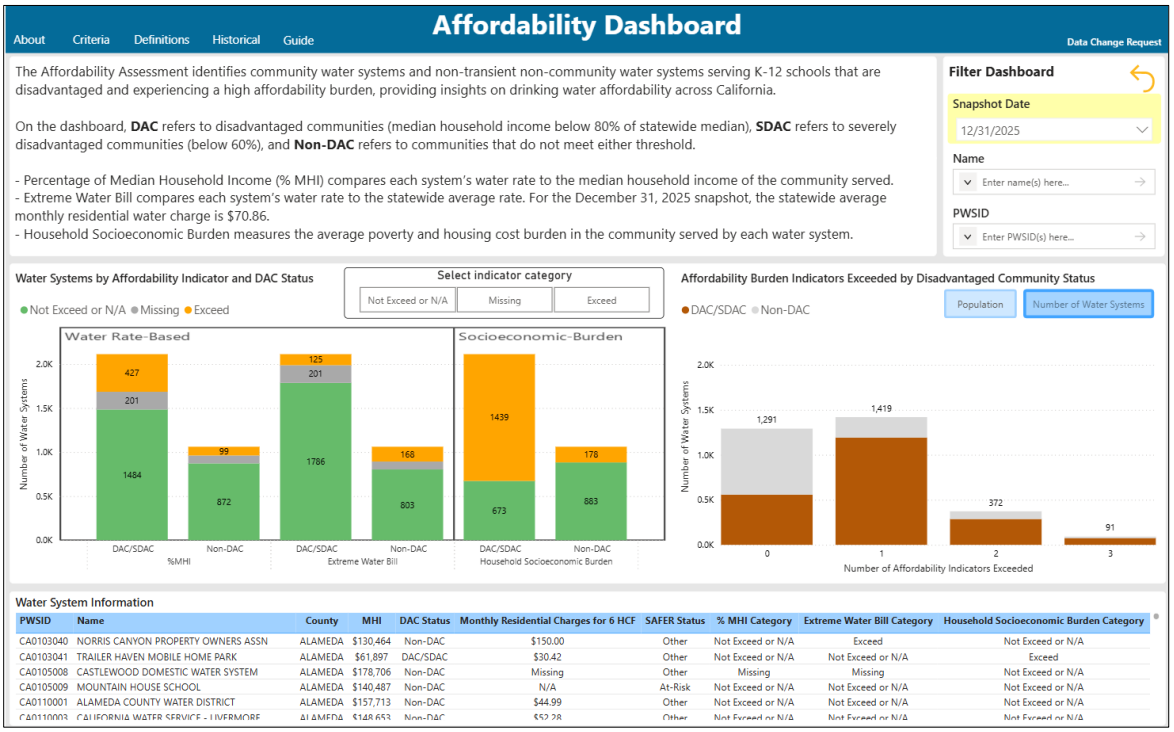
communities. The State Water Board remains committed to collaborating with other agencies to improve alignment moving forward.

AFFORDABILITY ASSESSMENT DASHBOARD

The results of the Affordability Assessment are accessible online through the State Water Board's Affordability Assessment Dashboard for Public Water Systems.[51] The Affordability Assessment Dashboard (Figure 3) provides an overview of the affordability burden experienced by community water systems and non-transient non-community water systems serving K-12 schools across California. A message displayed at the top of the dashboard describes the Affordability Assessment and the affordability indicators used to evaluate community affordability burden. The dashboard displays the number of water systems – or total population served, using a toggle feature – exceeding each affordability indicator. Additional visualizations summarize the total number of affordability indicators exceeded by each water system, representing overall affordability burden. A filterable data table allows users to view individual water system records, including median household income (MHI), disadvantaged community (DAC) status, monthly drinking water charge, SAFER status, and affordability indicator results. Reference buttons for About, Criteria, Definitions, Historical and Guide provide additional context on terminology and methodology. The Dashboard updates the Affordability Assessment results bi-annually.

[51] Affordability Assessment Dashboard for Public Water Systems: https://app.powerbigov.us/view?r=eyJrIjoiMGIyOWU3OTctNGZjNy00MDU2LTkwMmQtOGI5NjcxZDgyN2ZiIiwidCI6ImZlMTg2YTI1LTdkNDktNDFlNi05OTQxLTA1ZDIyODFkMzZjMSJ9

Figure 3: Affordability Assessment Dashboard for Public Water Systems



AFFORDABILITY ASSESSMENT REFINEMENT OPPORTUNITIES

The State Water Board conducts the Affordability Assessment on a bi-annual basis as part of the Needs Assessment. To address the limitations highlighted above, the State Water Board will begin exploring new opportunities to refine the next iteration of the Affordability Assessment:

Improved Data Collection Efforts

The State Water Board has taken important steps to improve data coverage and accuracy for the Affordability Assessment and will continue to do so going forward. Beginning with the 2020 reporting year, the eAR included new requirements focused on customer charges and affordability. Since then, eAR functionality has expanded to auto-calculate average residential customer charges for 6 HCF of water usage, helping to reduce data entry errors.

Refinement of Affordability Indicators and Thresholds

In 2022, the State Water Board hosted three public workshops to solicit feedback on current and future affordability indicators. Based on public feedback during these workshops, the State Water Board has begun developing a strategy to collect shut-off and customer assistance program data from water systems to further enhance the Affordability Assessment methodology. The State Water Board will conduct proper research and stakeholder engagement to develop new affordability indicators and determine the appropriate affordability thresholds necessary for inclusion in the Risk and Affordability Assessments.

Improved Aggregated Assessment

Further consideration will be given to how systems with extremely low customer charges, or those that have not raised their rates over an extended period, should be assessed for affordability and overall risk. Such systems may face a higher risk of falling out of compliance with water quality standards or may be placing hidden affordability burdens on customers in ways not captured by rate-based indicators alone.