

This guide is provided to explain how to use the SFPUC Supply and Demand Worksheet (worksheet). The worksheet is found on the tab “Supply and Demand Worksheet” in file “Water Supply and Demand Worksheet draft 5Jan2021” provided by SFPUC staff. The worksheet is organized into two main sections: estimates of water demand for the Regional Water System (RWS) and estimates of water supply yield for the RWS. These estimates are presented in five-year intervals for 2025 through 2040. Actual water deliveries in FY 2019-2020 are also presented. At the bottom of the worksheet, the estimated demand is subtracted from the estimated yield, and the result is presented as either a positive number, indicating a surplus, or a negative number, indicating a deficit. Unless otherwise noted, all numbers in the worksheet are in units of million gallons per day (MGD).

The worksheet has been developed to communicate important information and concepts about the SFPUC water supply planning process and the results of that process. The worksheet presents summaries of detailed estimates of current and future demands for water and compares them with estimated SFPUC system operations and resulting water supply yield. This presentation is intended to be educational and to provide a sound basis for discussion of SFPUC policies. While it contains the best available estimates of SFPUC water demand and yield, this worksheet is not the tool that is used to develop those estimates. If large changes are made in the worksheet that result in significant deviation from the summarized water demand or yield estimates, an appropriate next step will be to make those same changes in the source models to confirm the results estimated in the worksheet.

Each section of the worksheet is described below. Descriptions are presented in this guide in the order that the sections occur in the worksheet, from top to bottom of the worksheet. User input options are also described. In general, users can make inputs in the areas of the worksheet that are white boxes, and users cannot make changes in other areas of the worksheet.

**Demand section:**

Future projections of water demand for the RWS are based on estimates that were developed for the Urban Water Management Plans from 2015. Updated estimates are currently being prepared for the 2020 Urban Water Management Plans, and those updated values will be incorporated into the worksheet when they are available. This is expected to be in spring 2021.

The demand section of the worksheet is divided into retail demand and wholesale demand. The retail demand for RWS water is added to the wholesale demand for RWS water to represent the total demand for RWS water.

The retail demand section presents estimates of total water demand within the retail service area, and also presents estimates of how much retail demand is met by conservation, retail groundwater projects, and other retail water projects that offset potable use of RWS supply. The conservation, retail groundwater supply, and other potable offsets are subtracted from the total retail demand to produce an estimate of net retail demand for water supply from the RWS.

The wholesale demand section presents estimates of total demand for water supply within the wholesale service area of the RWS. Conservation and non-RWS supplies used to meet that demand are subtracted from the total demand to estimate the amount of water that wholesale customers will need to purchase from the RWS.

The wholesale demands are separated into permanent customers of the RWS and interruptible customers. This separation allows worksheet users to explore policy choices around continued deliveries to the interruptible customers and modifications to supply assurances for the RWS.

#### **User input options in demand section:**

**Retail Demand:** In the retail demand section, worksheet users can suggest the use of additional groundwater supplies and can also suggest other retail water projects to offset potable use. The inclusion of a positive number in either of these areas will reduce the estimated retail demand on the RWS. Users can also suggest a modification to the retail demand assumptions. Inclusion of a positive number in this section would increase the estimated retail demand for RWS supply, and inclusion of a negative number would decrease it.

**Wholesale Demand:** The wholesale demand section also includes the option for users to suggest a modification to wholesale purchase projections from the RWS. Inclusion of a positive number in this section would increase the estimated wholesale demand for RWS supply, and inclusion of a negative number would decrease it.

The choice to include the purchase requests of interruptible customers in 2025 through 2040 is also available to worksheet users. Four choices are provided: San Jose purchase request up to 4.5 MGD, San Jose purchase request in excess of 4.5 MGD, Santa Clara purchase request up to 4.5 MGD, and Santa Clara purchase request in excess of 4.5 MGD. To include these purchase requests, the user should type an “x” into the boxes provided in this portion of the worksheet (cells F88 through F91 in the 5Jan2021 version).

#### **Water supply yield section:**

Water supply yield for the RWS is calculated using the following concepts:

- Firm yield is the average water supply that can be delivered to the service area in a simulation of the design drought sequence while bringing the usable system storage to a specified value at the end of the sequence. The firm yield values included in the 5Jan2021 version of the worksheet are calculated with the SFPUC model of the RWS (Hetch Hetchy/Local Simulation Model, or HHLMS) using the established SFPUC design drought parameters that include an eight-and-a-half-year drought sequence. The design drought sequence is preceded by a wet year, so the RWS generally has full storage at the beginning of the design drought sequence. In established SFPUC practice, RWS operations and water deliveries are simulated through the design drought sequence that lead to zero usable storage at the end of the sequence.
- Rationing policy is the amount of delivery that is withheld through a simulation of the design drought sequence. The value of the rationing policy is input in the worksheet as a percentage of

the total RWS demand in each year of the design drought. For example, the rationing policy in the adopted WSIP program (the WSIP 2018 Variant) includes an annual rationing sequence of 0%, 0%, 10%, 10%, 20%, 10%, 20%, 20%, 20% over the eight-and-a-half-year design drought. The rationing policy can also be expressed as the annual average of the rationing imposed over the design drought sequence in units of MGD. For example, using the estimated firm yield as of 2020, the rationing policy for the adopted WSIP program results in an average annual rationing of 29 MGD over the eight-and-a-half-year design drought.

- Total system yield is the sum of firm yield plus the rationing policy. For example, given the estimated 2020 firm yield of 216 MGD and the corresponding WSIP 2018 rationing policy of 29 MGD, the estimated total system yield is 245 MGD. This is the total unrationed water supply that can be provided by the RWS that would allow system operation consistent with the rationing policy through the design drought sequence with the specified ending storage. Total system yield is calculated in the worksheet from the firm yield and the rationing policy.
- Firm yield and rationing policy are quantified by SFPUC staff using HHLSM. The values presented in the worksheet are summarized from detailed simulations performed in that model. These values can be manipulated by the worksheet user, as described in this user manual. Some detail may be lost in the manipulations within the worksheet, so follow-up HHLSM model runs performed by staff may be necessary to confirm large changes from starting values.

The firm yield of the RWS is presented prior to the development of the Water System Improvement Program (WSIP), and the changes in firm yield caused by elements of the WSIP program are added, which gives the RWS firm yield inclusive of WSIP program development. The estimated firm yield as of 2020 incorporates WSIP status to date, including a partial refill of Calaveras Reservoir, and partial fill of the SFPUC groundwater account in the Westside Basin. The estimated firm yield as of 2025 assumes that Calaveras Reservoir and the groundwater account will be filled and also assumes that the Alameda Creek Recapture Project will be built and operating. No additional development of WSIP projects that affects RWS firm yield is assumed, so the firm yield estimates from 2025 through 2040 are the same.

#### **User input options in water supply yield section:**

**Alternative Water Supply:** Alternative water supply projects are being developed by SFPUC. The projects listed are being studied, but the planning process has not reached the point that firm yield estimates are available. When planning for these projects has progressed to the point that HHLSM runs can be performed to determine the resulting firm yield, the results will be shared with worksheet users. The list of projects is included so that worksheet users can explore the effect of including a project and an estimated contribution to firm yield on the overall design drought water balance. Other projects can also be suggested by the user. To include any of these alternative water supply projects in the estimate of firm yield, the user should enter a four-digit starting year and an estimated firm yield value for the project in the designated areas in the worksheet (cells F118 through G130 in the 5Jan2021 version). If the worksheet user includes an alternative project in this section, the suggested firm yield value will be added to an updated estimate of RWS firm yield.

**Tuolumne River Instream Flow Requirements:** These contributions are quantified based on the effect on RWS firm yield. Two different levels of contribution have been calculated that reflect the effect on

firm yield of the adopted Phase 1 update to the Sacramento-San Joaquin Delta Water Quality Control Plan (Bay-Delta Plan) and the Tuolumne River Voluntary Agreement. To include either of these levels of SFPUC contribution in the calculation of firm yield, the user should input the four-digit start year and end year values in the designated area (cells F135 through G136 in the 5Jan2021 version). The user can also suggest another level of SFPUC contribution by including start and end years and a suggested firm yield value in the row below. Any of these options that are selected by the worksheet user will be included in an updated estimate of RWS firm yield. If desired, SFPUC staff can help users quantify the firm yield of a suggested level of contribution to Tuolumne River instream flow requirements.

Updated firm yield estimates that incorporate user choices in the alternative water supply project section and the SFPUC contributions to Tuolumne River instream flow requirements section are shown in the green-highlighted row (row 141 in the 5Jan2021 version). The values in this row are updated automatically within the worksheet when the user makes choices in the sections above.

**Design Drought Modifications:** Policy revisions with firm yield impacts include modifications to the design drought sequence and modifications to the specified carry-over storage at the end of the design drought sequence. The worksheet user can request that the second-to-last year or the last year (or both) be removed from the design drought sequence. The user can also specify a value for carry-over storage (or usable water supply in storage) at the end of the design drought sequence. These choices will affect the RWS firm yield values used in the worksheet. The resulting changes in firm yield are not updated automatically within the worksheet; they will be calculated by SFPUC staff using HHLISM. To request any changes to the design drought sequence or carry-over storage, the user should fill out the designated areas of the worksheet (cells F144, F145 and F148 in the 5Jan2021 version) and return it to SFPUC staff at the email address: [worksheet@sfgwater.org](mailto:worksheet@sfgwater.org). Note that changes to these parameters will affect all values in the worksheet that are expressed in terms of firm yield. The 5Jan2021 version of the worksheet is populated with firm yield values that are calculated using the established SFPUC design drought parameters that include an eight-and-a-half-year drought sequence and RWS operations that lead to zero usable storage at the end of the sequence.

**Rationing Policy Modifications:** Revisions to rationing policy can be suggested by the worksheet user. Rationing policy determines the level of rationing to be implemented during each year of the design drought sequence. Therefore, if changes to the duration of the design drought sequence are suggested by the user, the rationing policy should be specified for the suggested drought duration. The rationing sequence that was adopted as part of the WSIP program is included as an option. There is also an option available for the user to specify an alternative rationing sequence. To do so, the user should remove the "x" from the WSIP row and mark the alternative row with an "x" (cells F152 and F153, respectively, in the 5Jan2021 version), and specify the alternative rationing (as a percentage of total yield) in the designated area (cells G153 through O153 in the 5Jan2021 version). The rationing policy contribution to total yield is calculated automatically within the spreadsheet. This calculation uses the firm yield values that are included in the spreadsheet. The calculated contribution to total yield is shown below the user-input section, and the average annual reduction in delivery over the design drought period due to the selected rationing policy. Note that the automatic calculation performed by the worksheet assumes the standard eight-and-a-half-year design drought. If the user has suggested changes to the design drought sequence or carry-over storage, the automatic calculations will not be accurate and should be disregarded – in that case, SFPUC staff will provide updated values from HHLISM runs that incorporate the requested changes.

The updated firm yield, selected rationing policy, and resulting total yield are shown in the green-highlighted section below the rationing policy section (rows 163 through 166 in the 5Jan2021 version). The values in this area are updated automatically within the worksheet when the user makes choices in the sections above. Users that wish to request modifications to the design drought sequence should disregard the automatically calculated values and refer to values provided by SFPUC staff in response to the user request.

#### **User input options that affect the Wholesale Supply Assurance:**

This section allows the worksheet user to specify additional supply assurances. The current Wholesale Supply Assurance of 184 MGD is incorporated, and the user has the option to add additional supply assurances to make the interruptible customers permanent, or to add other assurances. The user can select these options by adding an “x” in the designated area (cells F169 through F171 in the 5Jan2021 version). If the user specifies an alternative assurance in the “other potential demands” row, the value of the proposed assurance should be entered in the designated area (cell H171 in the 5Jan2021 version). If the user inputs a negative value as an “other potential demand” the supply assurance will be reduced by the input amount.

#### **Bottom Line Comparison:**

The last three rows of the worksheet (rows 177 through 179 in the 5Jan2021 version) compare the total RWS yield to the total RWS demand and calculate whether a surplus or a deficit exists. The yield and demand values used here reflect the calculations that are done within the worksheet, including user selections. The calculation of surplus or deficit is done by subtracting total demand from total yield (yield minus demand). If this calculation produces a positive value, it is considered a surplus of yield. If the value is negative, it is considered a deficit.

#### **Summary tab:**

The summary tab is provided in an attempt to draw the important values from the main worksheet onto a single page. This allows users to see summarized demand and yield values together, including the effects of choices made in the main worksheet. There are no user input options on the summary tab – all values are drawn from the main worksheet. Below the main summary table, a summary of user choices from the main worksheet is provided.

#### **Example modifications to the design drought sequence:**

Two tabs are provided in the worksheet file that demonstrate the effects of example modifications to the design drought sequence, as described below. There are no user input options on these example tabs.

**Supply and Demand DD example 1 tab:** This tab summarizes the effect of removing the last year of the design drought sequence and specifying a carry-over storage volume of 240,000 acre feet (AF). An alternative rationing policy is also selected that indicates rationing for the updated design drought sequence. The updated firm yield and rationing policy estimates are shown in the green-highlighted section, and are incorporated into the bottom-line calculation of surplus or deficit.

**Supply and Demand DD example 2 tab:** This tab summarizes the effect of removing the last year of the design drought sequence and specifying a carry-over storage volume of 0 acre feet (AF). An alternative rationing policy is also selected that indicates rationing for the updated design drought sequence. The updated firm yield and rationing policy estimates are shown in the green-highlighted section and are incorporated into the bottom-line calculation of surplus or deficit.

#### **References for this User Guide:**

BAWSCA, 2020. Annual Survey, Fiscal Year 2018-19, Bay Area Water Supply & Conservation Agency. March 2020.

[http://bawasca.org/uploads/userfiles/files/Annual%20Survey%202018-19\\_FINAL\(2\).pdf](http://bawasca.org/uploads/userfiles/files/Annual%20Survey%202018-19_FINAL(2).pdf)

SF Planning, 2008. Final Program Environmental Impact Report for the San Francisco Public Utilities Commission's Water System Improvement Program, San Francisco Planning Department File No. 2005.0159E, State Clearinghouse No. 2005092026. October 30, 2008.

<https://sfgov.org/sfplanningarchive/sfpuc-negative-declarations-eirs>

SFPUC, 2016. 2015 Urban Water Management Plan for the City and County of San Francisco. Prepared by: The San Francisco Public Utilities Commission.

<https://sfwater.org/modules/showdocument.aspx?documentid=9300>

SFPUC, 2020. Alternative Water Supply Planning Quarterly Report. December 8, 2020.

<https://sfpuc.sharefile.com/share/view/sfa8dd2a0511246d9a4633deef6677378>