2023 Interim Water Demand Projections

for the City and County of San Francisco

Prepared by:

San Francisco Public Utilities Commission

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San Francisco Water Power Sewer

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1.0 Introduction

1.1 Purpose of Water Supply Assessments

The California Water Code (Sections 10910 through 10915) requires urban water suppliers to evaluate water supply availability to inform environmental review for qualifying projects ("water demand projects") defined in Water Code Section 10912(a). Water Code Section 10910 requires the preparation of a "water supply assessment" (WSA) for water demand projects that include a determination of whether available water supplies are sufficient to serve the demand generated by the project, as well as reasonably foreseeable cumulative demand over a 20 year period, including years of normal precipitation, single dry, and multiple dry years. If the water supplies needed by a water demand project were accounted for in the water supplier's most recently adopted Urban Water Management Plan (UWMP), under Water Code Section 10910(c)(2), the water supplier may incorporate the requested information from the UWMP in preparing a WSA for a water demand project.

1.2 Purpose of this Document

The SFPUC most recently adopted the 2020 UWMP update for the City and County of San Francisco in June 2021. As described in the 2020 UWMP, Section 4.1.2, Projected Retail Demands, the 2020 UWMP relied on the San Francisco Planning Department's (SF Planning) housing projections based on the Housing Element 2022 Update, which was still under development when the 2020 UWMP was adopted. One of the objectives of the Housing Element 2022 Update was to produce an average of 5,000 housing units per year with adjustments for certain large development plans. Since the SFPUC's adoption of the 2020 UWMP in June 2021, the Planning Commission certified the Housing Element 2022 Update Environmental Impact Report (Housing Element EIR) in November 2022. The Housing Element EIR, which supported the City's adoption of the Housing Element in January 2023, assumed slightly higher housing unit projections than those used in the 2020 UWMP, but was still in line with the objective to produce an average of 5,000 housing units per year. Nonetheless, as a result of the slightly higher housing unit projections associated with the Housing Element EIR, the SFPUC determined that its 2020 UWMP no longer accounted for all projected retail water demands.

The SFPUC will not be updating its UWMP until 2025. Therefore, during this interim period, the SFPUC has prepared the 2023 Interim Water Demand Projections herein to document the SFPUC's projected retail water supplies when compared to projected retail water demands associated with the adopted Housing Element 2022 Update. This document also adjusts the retail water supply projections to meet the updated retail water demands.

The information in this document, in concert with the background information provided in the 2020 UWMP that are not superseded by the 2023 Interim Water Demand Projections herein, can be used in the development of WSAs for pending water demand projects.

1.3 What this Document Does and Does Not Address

This document only updates the following items from the 2020 UWMP as they are directly related to the change in housing unit projections:

- Retail water demand projections, specifically demands of the in-City multi-family residential sector, through 2045
- Retail water supply and demand comparisons (i.e., surpluses and shortfalls) during normal, single dry, and multiply dry years through 2045

This document does not update the following items from the 2020 UWMP as they are not directly related to the change in housing unit projections:

- Population projections associated with the Housing Element 2022 Update
- Employment projections associated with the Housing Element 2022 Update
- Retail water demands for the single family residential and non-residential sectors
- Retail water loss
- Retail water savings associated with Conservation and Onsite Water Reuse programs
- Suburban retail water demands
- Wholesale water demands
- Status of water supply projects

2.0 Housing Unit Projections

SF Planning provided updated housing unit projections in alignment with the Housing Element EIR in a memorandum to the SFPUC dated August 18, 2023 (Appendix A). Per SF Planning's recommendation, it is assumed that the number of single-family detached houses will not increase from existing stock and that all future net housing growth will take the form of multi-family structures.

Table 1 compares the updated housing unit projections to those used in the 2020 UWMP in 5-year increments from 2025 to 2045. SFPUC used the updated housing unit projections as inputs to the same water demand forecasting model (i.e., econometric model) that was developed for the 2020 UWMP, described in the next section.

Table 1: Housing Unit Projections

	2025	2030	2035	2040	2045
Used in 2020 UWMP	425,118	450,923	476,728	502,533	528,338
2023 Update	432,667	458,333	483,600	509,000	534,000
Net Change	**7,549**	**7,410**	**6,872**	**6,467**	**5,662**

3.0 Retail Water Demands

As described in the 2020 UWMP, Section 3.2, Retail Service Area, retail customers include the residents, businesses, and industries located within City limits, referred to as the in-City retail service area. Retail service is also provided to a patchwork of customers located outside the City, such as the Town of Sunol, San Francisco International Airport, Lawrence Livermore National Laboratory, and Castlewood County Service Area. These areas are not contiguous and are collectively referred to as the suburban retail service area.

The SFPUC uses econometric models to project the demands for its in-City single family residential, multi-family residential, and commercial/industrial sectors. Other in-City non-residential demands (i.e., irrigation and municipal) and suburban retail demands are estimated based on historical consumption and supplement the demands projected by the econometric models. Water loss is forecasted separately. For

more information about how retail water demand projections were developed for the 2020 UWMP, refer to Section 4.1.2, Projected Retail Demands, of the 2020 UWMP.

The SFPUC, with the support of its consultant team that developed the econometric models used for the 2020 UWMP, re-ran the model specific to the multi-family residential sector using the updated housing unit projections described in the previous section. No other model inputs were changed from those that were used for the 2020 UWMP. The resulting model outputs are detailed in Appendix B and summarized in Table 2 below. Multi-family residential demands increased by about 0.5 to 0.6 mgd, or 1.5 to 2.5%, compared to those in the 2020 UWMP.

Table 2: Multi-Family Residential Water Demands (million gallons per day [mgd])

	2025	2030	2035	2040	2045
Used in 2020 UWMP	23.7	25.6	27.9	30.3	33.0
2023 Update	24.3	26.2	28.4	30.9	33.5
Difference	**0.6**	**0.6**	**0.6**	**0.5**	**0.5**
% Difference from 2020 UWMP	**2.5%**	**2.3%**	**2.0%**	**1.8%**	**1.5%**

Total retail water demand projections are shown in Table 3, which supersedes Table 4-1 of the 2020 UWMP. These projections comprise the updated multi-family residential demands from Table 2 and the unchanged demands for the remaining sectors. The demands of the remaining sectors are not updated as they are not directly related to the change in housing unit projections. Total retail demands increased by about 0.6 to 0.8% compared to those in the 2020 UWMP.

Table 3: Retail Water Demands (mgd)

Retail Sector or Use Type	Actual[a]	Projected[b]				
	2020	2025	2030	2035	2040	2045
In-City Retail						
Single-Family Residential	14.5	13.7	13.5	13.4	13.5	13.5
Multi-Family Residential	22.9	24.3	26.2	28.4	30.9	33.5
Non-residential	20.9	22.9	22.9	22.8	23.1	23.6
Water Loss[c]	7.2	6.0	6.0	6.0	6.0	6.0
Subtotal In-City Retail Demand	65.3	66.9	68.6	70.6	73.5	76.7
Suburban Retail						
Single-Family Residential[d]	0.1	0.1	0.1	0.1	0.1	0.1
Non-Residential	3.1	4.0	4.0	4.0	4.0	4.0
Groveland CSD[e]	0.3	0.3	0.3	0.3	0.3	0.3
Water Loss[c]	0.0	0.0	0.0	0.0	0.0	0.0
Subtotal Suburban Retail Demand	3.5	4.4	4.4	4.4	4.4	4.4
Total Retail Demand	**68.8**	**71.3**	**73.0**	**75.0**	**77.9**	**81.1**
% Difference from 2020 UWMP	**N/A**	**0.8%**	**0.8%**	**0.8%**	**0.7%**	**0.6%**

a Actual consumption data are obtained from customer billing data.

b Single family residential and multi-family residential demand projections are from an econometric model developed for the SFPUC. Non-residential demands include commercial/industrial demands, which are also from an econometric model, as well as municipal and irrigation demands, which are assumed to remain constant at the previous five-year average level.

c Water losses include both apparent and real losses. Suburban retail water losses are considered to be negligible. Actual water loss in 2020 is based on SFPUC's July 2019 – June 2020 water loss audit.

d Suburban retail residential demands are for single family only as no multi-family residential buildings are served.

e Groveland Community Services District (CSD) is accounted for as a retail customer for the purpose of this table and subsequent retail supply and demand comparisons in the 2020 UWMP. Demand projections were provided by Groveland CSD based on its population projections and assumed per capita water use of 107 GPCD (projections are subject to change as part of its UWMP process). In the corresponding standardized tables in UWMP 2020 Appendix B, Groveland CSD is not reported as retail, but rather wholesale.

4.0 Water Supply and Demand Comparisons

This section compares the SFPUC's retail water supplies (unchanged from the 2020 UWMP) and demands (updated in Table 3) through 2045 during normal, single dry, and multiple dry years. The supply and demand comparisons are presented for two Regional Water System (RWS) supply scenarios: (1) with full implementation of the Bay-Delta Plan Amendment and (2) without implementation of the Bay-Delta Plan Amendment. For more information about these scenarios and how their corresponding supplies were estimated, refer to Section 8, Water Supply Reliability Assessment, of the 2020 UWMP[1].

4.1 With Bay-Delta Plan Amendment

The instream flow requirements of the Bay-Delta Plan Amendment would impact the RWS supplies in single dry years and multiple dry years. The comparison of retail demands and supplies under the Bay-Delta Plan Amendment is presented in Table 4, which supersedes Table 8-4 of the 2020 UWMP and demonstrates the following:

- **Normal Years:** During normal hydrologic years, the SFPUC will have adequate supplies to meet its projected retail water demands. This is unchanged from the 2020 UWMP.
- **Single Dry Year:** During single dry years, there would be an anticipated 30 to 40% shortage of RWS supplies. When the supplies available to retail customers (RWS plus local supplies) are compared to the projected retail demands, a retail supply shortfall of 15% to 26% (11 to 21 mgd) is expected in single dry year conditions. These shortfalls are less than 1%, or 1 mgd, higher than estimated in the 2020 UWMP.
- **Multiple Dry Years:** If a multiple dry year event occurs, there would be anticipated shortages in RWS supplies of 30 to 49%, depending on demand levels. When the supplies available to retail customers (RWS plus local supplies) are compared to the projected retail demands, there is an anticipated shortfall of almost 36%, or 29 mgd, by the fifth dry year at 2045 projected levels of demand. This shortfall is less than 1%, or 1 mgd, higher than estimated in the 2020 UWMP.

4.2 Without Bay-Delta Plan Amendment

Without implementation of the Bay-Delta Plan Amendment, existing and planned supplies would meet all projected RWS demands in all years except deep into a multi-year drought at 2045 projected levels of demand. The comparison of retail demands and supplies is presented in Table 5, which supersedes Table 8-6 of the 2020 UWMP and demonstrates the following:

- **Normal Years:** During normal hydrologic years, the SFPUC will have adequate supplies to meet its projected retail water demands. This is unchanged from the 2020 UWMP.
- **Single Dry Year:** During single dry years, there are no anticipated shortages of RWS supplies. This is unchanged from the 2020 UWMP.
- **Multiple Dry Years:** In the multiple dry year scenario, the SFPUC would only experience system-wide shortages in RWS supplies of 10% during years 4 and 5 of an extended drought at 2045

[1] Section 7.3.1, page 7-5, of the 2020 UWMP states, "Although the [State Water Resources Control Board] has stated it intends to implement the Bay-Delta Plan Amendment on the Tuolumne River by the year 2022, given the current level of uncertainty, it is assumed for the purposes of this draft UWMP that the Bay-Delta Plan Amendment will be fully implemented starting in 2023." To date, the Bay-Delta Plan Amendment has not been implemented and the SFPUC currently does not have an anticipated date for implementation.

levels of demand. In a 10% shortage, retail customers would reduce their demands by 5% as required by the Water Supply Agreement between SFPUC and its Wholesale Customers. As a result of this demand reduction, there is a projected surplus of 5.3%, or 4.1 mgd, which is 0.1 mgd greater than that estimated in the 2020 UWMP.

Table 4: Retail Supply and Demand Comparison for Projected Normal & Dry Year Scenarios With Bay-Delta Plan Amendment (mgd)

		Normal Year	Single Dry Year[a]	Multiple Dry Years[b]				
				Year 1	Year 2	Year 3	Year 4	Year 5
2025	Total Retail Demand	71.3	71.3	71.3	71.3	71.3	71.3	71.3
	Baseline Retail Demand[c]	*71.3*	*71.3*	*71.3*	*71.3*	*71.3*	*71.3*	*71.3*
	5% Retail Demand Reduction[d]	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*
	Total Retail Supply	70.7	59.5	59.5	51.5	51.5	51.5	51.5
	Retail Groundwater[e]	*1.4*	*1.4*	*1.4*	*1.4*	*1.4*	*1.4*	*1.4*
	Retail Recycled Water[f]	*2.1*	*2.1*	*2.1*	*2.1*	*2.1*	*2.1*	*2.1*
	RWS Supply Utilized by Retail[g]	*67.2*	*56.0*	*56.0*	*48.0*	*48.0*	*48.0*	*48.0*
	Difference (Supply Surplus or Shortfall)	0.0	-11.8	-11.8	-19.8	-19.8	-19.8	-19.8
	Difference as Percentage of Demand	0.0%	-16.5%	-16.5%	-27.8%	-27.8%	-27.8%	-27.8%
2030	Total Retail Demand	73.0	73.0	73.0	73.0	73.0	73.0	73.0
	Baseline Retail Demand[c]	*73.0*	*73.0*	*73.0*	*73.0*	*73.0*	*73.0*	*73.0*
	5% Retail Demand Reduction[d]	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*
	Total Retail Supply	72.4	61.4	61.4	53.4	53.4	53.4	53.4
	Retail Groundwater[e]	*2.4*	*2.4*	*2.4*	*2.4*	*2.4*	*2.4*	*2.4*
	Retail Recycled Water[f]	*2.5*	*2.5*	*2.5*	*2.5*	*2.5*	*2.5*	*2.5*
	RWS Supply Utilized by Retail[g]	*67.5*	*56.5*	*56.5*	*48.5*	*48.5*	*48.5*	*48.5*
	Difference (Supply Surplus or Shortfall)	0.0	-11.6	-11.6	-19.6	-19.6	-19.6	-19.6
	Difference as Percentage of Demand	0.0%	-15.9%	-15.9%	-26.8%	-26.8%	-26.8%	-26.8%
2035	Total Retail Demand	75.0	75.0	75.0	75.0	75.0	75.0	75.0
	Baseline Retail Demand[c]	*75.0*	*75.0*	*75.0*	*75.0*	*75.0*	*75.0*	*75.0*
	5% Retail Demand Reduction[d]	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*
	Total Retail Supply	74.5	63.8	63.8	55.5	55.5	55.5	51.4
	Retail Groundwater[e]	*3.4*	*3.4*	*3.4*	*3.4*	*3.4*	*3.4*	*3.4*
	Retail Recycled Water[f]	*2.5*	*2.5*	*2.5*	*2.5*	*2.5*	*2.5*	*2.5*
	RWS Supply Utilized by Retail[g]	*68.6*	*57.9*	*57.9*	*49.6*	*49.6*	*49.6*	*45.5*
	Difference (Supply Surplus or Shortfall)	0.0	-11.2	-11.2	-19.5	-19.5	-19.5	-23.6
	Difference as Percentage of Demand	0.0%	-14.9%	-14.9%	-26.0%	-26.0%	-26.0%	-31.5%

		Normal Year	Single Dry Year[a]	Multiple Dry Years[b]				
				Year 1	Year 2	Year 3	Year 4	Year 5
2040	Total Retail Demand	77.9	77.9	77.9	77.9	77.9	77.9	77.9
	Baseline Retail Demand[c]	*77.9*	*77.9*	*77.9*	*77.9*	*77.9*	*77.9*	*77.9*
	5% Retail Demand Reduction[d]	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*
	Total Retail Supply	77.4	66.4	66.4	57.9	57.9	52.0	52.0
	Retail Groundwater[e]	*4.4*	*4.4*	*4.4*	*4.4*	*4.4*	*4.4*	*4.4*
	Retail Recycled Water[f]	*2.5*	*2.5*	*2.5*	*2.5*	*2.5*	*2.5*	*2.5*
	RWS Supply Utilized by Retail[g]	*70.5*	*59.5*	*59.5*	*51.0*	*51.0*	*45.1*	*45.1*
	Difference (Supply Surplus or Shortfall)	0.0	-11.5	-11.5	-20.0	-20.0	-25.9	-25.9
	Difference as Percentage of Demand	0.0%	-14.8%	-14.8%	-25.7%	-25.7%	-33.2%	-33.2%
2045	Total Retail Demand	81.1	81.1	81.1	81.1	81.1	81.1	81.1
	Baseline Retail Demand[c]	*81.1*	*81.1*	*81.1*	*81.1*	*81.1*	*81.1*	*81.1*
	5% Retail Demand Reduction[d]	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*
	Total Retail Supply	80.6	60.1	60.1	60.1	60.1	52.1	52.1
	Retail Groundwater[e]	*4.4*	*4.4*	*4.4*	*4.4*	*4.4*	*4.4*	*4.4*
	Retail Recycled Water[f]	*2.5*	*2.5*	*2.5*	*2.5*	*2.5*	*2.5*	*2.5*
	RWS Supply Utilized by Retail[g]	*73.7*	*53.2*	*53.2*	*53.2*	*53.2*	*45.2*	*45.2*
	Difference (Supply Surplus or Shortfall)	0.0	-21.0	-21.0	-21.0	-21.0	-29.0	-29.0
	Difference as Percentage of Demand	0.0%	-25.9%	-25.9%	-25.9%	-25.9%	-35.8%	-35.8%

Normal, single dry, and multiple dry year conditions are on a water year basis.

a During a single dry year, system-wide shortages of 30 – 40% are in effect (see Table 8-3 of the 2020 UWMP). For this analysis, shortages greater than 20% are considered to have the same retail/wholesale allocation as the maximum Stage 4, 16-20% system-wide shortage in the Water Shortage Allocation Plan (WSAP).

b During multiple dry years, system-wide shortages of 30 – 55% are in effect (see Table 8-3 of the 2020 UWMP). For this analysis, shortages greater than 20% are considered to have the same retail/wholesale allocation as the maximum Stage 4, 16-20% system-wide shortage in the WSAP.

c Total retail demands correspond to those in Table 3 and reflect passive and active conservation, onsite water reuse savings, and water loss. Demands for Groveland Community Services District is included in the table above.

d As amended in 2018, the WSAP Tier One Allocation Plan requires retail customers to conserve a minimum of 5% during droughts. If, during a declared water shortage, retail demands on the Regional Water System (RWS) are lower than the retail allocation in a dry year, retail demands on the RWS will be reduced by 5%. An N/A on this row means that either this 5% rationing requirement doesn't apply (i.e. no declared water shortage), or retail customers are already rationing greater than 5%.

e Groundwater supplies are assumed to be equivalent to projected demands for the San Francisco Groundwater Supply Project (ramping up to 4 mgd by 2040) and Castlewood County Service Area (0.4 mgd). Groundwater availability would not be affected by dry year conditions.

f Recycled water supplies are assumed to be equivalent to projected demands related to the Westside Recycled Water Project (1.6 mgd by 2021 and 1.8 mgd by 2030), Harding Park and Fleming Golf Courses (0.23 mgd), and Sharp Park Golf Course (up to 0.1 mgd) and Treasure Island (0.2 mgd by 2025 and 0.4 mgd by 2030). Recycled water availability would not be affected by dry year conditions.

g Procedures for RWS allocations and the WSAP are described in Section 8.3 of the 2020 UWMP. Groundwater and recycled water are assumed to be used before RWS supplies to meet retail demand. However, in normal years, if groundwater and recycled water supplies are not available, up to 81 mgd of RWS supply could be used.

Table 5: Retail Supply and Demand Comparison for Projected Normal & Dry Year Scenarios Without Bay-Delta Plan Amendment (mgd)

		Normal Year	Single Dry Year[a]	Multiple Dry Years[b]				
				Year 1	Year 2	Year 3	Year 4	Year 5
2025	Total Retail Demand	71.3	71.3	71.3	71.3	71.3	71.3	71.3
	Baseline Retail Demand[c]	*71.3*	*71.3*	*71.3*	*71.3*	*71.3*	*71.3*	*71.3*
	5% Retail Demand Reduction[d]	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*
	Total Retail Supply	71.3	71.3	71.3	71.3	71.3	71.3	71.3
	Retail Groundwater[e]	*1.4*	*1.4*	*1.4*	*1.4*	*1.4*	*1.4*	*1.4*
	Retail Recycled Water[f]	*2.1*	*2.1*	*2.1*	*2.1*	*2.1*	*2.1*	*2.1*
	RWS Supply Utilized by Retail[g]	*67.8*	*67.8*	*67.8*	*67.8*	*67.8*	*67.8*	*67.8*
	Difference (Supply Surplus or Shortfall)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Difference as Percentage of Demand	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
2030	Total Retail Demand	73.0	73.0	73.0	73.0	73.0	73.0	73.0
	Baseline Retail Demand[c]	*73.0*	*73.0*	*73.0*	*73.0*	*73.0*	*73.0*	*73.0*
	5% Retail Demand Reduction[d]	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*
	Total Retail Supply	73.0	73.0	73.0	73.0	73.0	73.0	73.0
	Retail Groundwater[e]	*2.4*	*2.4*	*2.4*	*2.4*	*2.4*	*2.4*	*2.4*
	Retail Recycled Water[f]	*2.5*	*2.5*	*2.5*	*2.5*	*2.5*	*2.5*	*2.5*
	RWS Supply Utilized by Retail[g]	*68.1*	*68.1*	*68.1*	*68.1*	*68.1*	*68.1*	*68.1*
	Difference (Supply Surplus or Shortfall)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Difference as Percentage of Demand	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
2035	Total Retail Demand	75.0	75.0	75.0	75.0	75.0	75.0	75.0
	Baseline Retail Demand[c]	*75.0*	*75.0*	*75.0*	*75.0*	*75.0*	*75.0*	*75.0*
	5% Retail Demand Reduction[d]	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*
	Total Retail Supply	75.0	75.0	75.0	75.0	75.0	75.0	75.0
	Retail Groundwater[e]	*3.4*	*3.4*	*3.4*	*3.4*	*3.4*	*3.4*	*3.4*
	Retail Recycled Water[f]	*2.5*	*2.5*	*2.5*	*2.5*	*2.5*	*2.5*	*2.5*
	RWS Supply Utilized by Retail[g]	*69.1*	*69.1*	*69.1*	*69.1*	*69.1*	*69.1*	*69.1*
	Difference (Supply Surplus or Shortfall)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Difference as Percentage of Demand	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

		Normal Year	Single Dry Year[a]	Multiple Dry Years[b]				
				Year 1	Year 2	Year 3	Year 4	Year 5
2040	Total Retail Demand	77.9	77.9	77.9	77.9	77.9	77.9	77.9
	Baseline Retail Demand[c]	*77.9*	*77.9*	*77.9*	*77.9*	*77.9*	*77.9*	*77.9*
	5% Retail Demand Reduction[d]	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*
	Total Retail Supply	77.9	77.9	77.9	77.9	77.9	77.9	77.9
	Retail Groundwater[e]	*4.4*	*4.4*	*4.4*	*4.4*	*4.4*	*4.4*	*4.4*
	Retail Recycled Water[f]	*2.5*	*2.5*	*2.5*	*2.5*	*2.5*	*2.5*	*2.5*
	RWS Supply Utilized by Retail[g]	*71.0*	*71.0*	*71.0*	*71.0*	*71.0*	*71.0*	*71.0*
	Difference (Supply Surplus or Shortfall)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Difference as Percentage of Demand	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
2045	Total Retail Demand	81.1	81.1	81.1	81.1	81.1	77.0	77.0
	Baseline Retail Demand[c]	*81.1*	*81.1*	*81.1*	*81.1*	*81.1*	*81.1*	*81.1*
	5% Retail Demand Reduction[d]	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*-4.1*	*-4.1*
	Total Retail Supply	81.1	81.1	81.1	81.1	81.1	81.1	81.1
	Retail Groundwater[e]	*4.4*	*4.4*	*4.4*	*4.4*	*4.4*	*4.4*	*4.4*
	Retail Recycled Water[f]	*2.5*	*2.5*	*2.5*	*2.5*	*2.5*	*2.5*	*2.5*
	RWS Supply Utilized by Retail[g]	*74.2*	*74.2*	*74.2*	*74.2*	*74.2*	*74.2*	*74.2*
	Difference (Supply Surplus or Shortfall)	0.0	0.0	0.0	0.0	0.0	4.1	4.1
	Difference as Percentage of Demand	0.0%	0.0%	0.0%	0.0%	0.0%	5.3%	5.3%

Normal, single dry, and multiple dry year conditions are on a water year basis.

a During all single dry years, no RWS system-wide shortages are in effect.

b During multiple dry years, no RWS system-wide shortages are in effect until years 4 and 5 at 2045 levels of demand. During those years, a 10% system-wide shortage is in effect.

c Total retail demands correspond to those in Table 3 and reflect passive and active conservation, onsite water reuse savings, and water loss. Demands for Groveland Community Services District is included in the table above.

d As amended in 2018, the Water Shortage Allocation Plan (WSAP) Tier One Allocation Plan requires retail customers to conserve a minimum of 5% during droughts. If, during a declared water shortage, retail demands on the Regional Water System (RWS) are lower than the retail allocation in a dry year, retail demands on the RWS will be reduced by 5%. An N/A on this row means that either this 5% rationing requirement doesn't apply (i.e. no declared water shortage), or retail customers are already rationing greater than 5%.

e Groundwater supplies are assumed to be equivalent to projected demands for the San Francisco Groundwater Supply Project (ramping up to 4 mgd by 2040) and Castlewood County Service Area (0.4 mgd). Groundwater availability would not be affected by dry year conditions.

f Recycled water supplies are assumed to be equivalent to projected demands related to the Westside Recycled Water Project (1.6 mgd by 2021 and 1.8 mgd by 2030), Harding Park and Fleming Golf Courses (0.23 mgd), and Sharp Park Golf Course (up to 0.1 mgd) and Treasure Island (0.2 mgd by 2025 and 0.4 mgd by 2030). Recycled water availability would not be affected by dry year conditions.

g Procedures for RWS allocations and the WSAP are described in Section 8.3 of the 2020 UWMP. Groundwater and recycled water are assumed to be used before RWS supplies to meet retail demand. However, in normal years, if groundwater and recycled water supplies are not available, up to 81 mgd of RWS supply could be used.

Appendix A – San Francisco Planning Memorandum

San Francisco Planning

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August 18, 2023

Paula Kehoe
Director of Water Resources, SFPUC
525 Golden Gate Street, 10th Floor
San Francisco, CA 94102

Re: Projections of growth for San Francisco through 2050

Dear Paula:

On October 27, 2020, the Planning Department provided SFPUC household and job growth projections to inform the citywide water demand projections in the 2020 update of the SFPUC's Urban Water Management Plan (UWMP). The SFPUC adopted the 2020 UWMP in June 2021. Since that time, the Planning Commission certified the Housing Element 2022 Update Environmental Impact Report (Housing Element EIR or EIR) in November 2022. The EIR, which supported the City's adoption of the Housing Element in January 2023, assumed slightly higher household projections than those used in the UWMP. As you requested, this memo provides the EIR's household projections[1] to inform a minor update to SFPUC's water demand projections.

Citywide Growth Projections

Table 1 shows the Planning Department's housing projections for the years 2020-2050. We recognize that the 2020 UWMP water planning horizon extends only to 2045.

Table 1: Development Projections

	2020	2025	2030	2035	2040	2045	2050
Housing Units	407,000	432,667	458,333	483,600	509,000	534,000	559,000

The Housing Element update is required to be adopted every eight years by state law and was approved by the Board of Supervisors in January 2023 and certified by the state Department of Housing and Community Development on February 1, 2023. One of the primary goals of the Housing Element 2022 Update is to improve housing affordability by increasing the rate of housing production compared with the past several decades. The projections are based on the Housing Element objective of producing an average of approximately 5,000

[1] The Housing Element EIR assumed slightly less job growth than that assumed in the Planning Department's October 27, 2020 memo used to inform the 2020 UWMP water demand projections (i.e., EIR assumed 869,000 jobs in 2045 whereas October 2020 memo assumed 894,255 jobs). Given that the 2020 UWMP water demand projections used more conservative (i.e., slightly higher) job growth assumptions, there is no need to update the water demand projections to account for the Housing Element EIR job growth assumptions.

housing units per year, with adjustments for certain large development plans. These projections were analyzed in the Housing Element EIR. (The projections can be found in Appendix C of the EIR.) The Housing Element EIR considered two projection years – 2035 and 2050. For the purposes of generating the 5-year incremental projections required by the SFPUC through 2045, the Planning Department assumes a constant, straight-line average pace of housing production for the periods of 2020-2035 and 2035-2050.

Regarding the typology of projected new housing stock, our memo provided to SFPUC dated October 27, 2020, to inform preparation of the 2020 UWMP, contained analysis supporting a Planning Department recommendation that the SFPUC assume for the purposes of modelling citywide projected housing development in San Francisco that **the number of single-family detached houses will not increase from existing stock and that all future net housing growth will take the form of multi-family structures.** This recommendation is unchanged.

Sincerely,

Joshua Switzky
Acting Director of Citywide Planning

cc:
Fan Lau, SFPUC
Lisa Gibson, Planning
Wade Wietgrefe, Planning
Debra Dwyer, Planning
Julie Moore, Planning
Scott Edmondson, Planning
Peter Miljanich, City Attorney
Andrea Ruiz-Esquide, City Attorney

Appendix B – Woodard & Curran Memorandum

TECHNICAL MEMORANDUM

TO: Paula Kehoe, Director of Water Resources, San Francisco Public Utilities Commission

Fan Lau, Water Resources Division, San Francisco Public Utilities Commission

PREPARED BY: Chris Hewes, Woodard & Curran

REVIEWED BY: Katie Cole, Woodard & Curran

DATE: August 25, 2023

RE: SFPUC Demand Forecast Model Re-Run with Updated Housing Unit Forecast

In 2020, the San Francisco Public Utilities Commission (SFPUC) engaged The Brattle Group to develop an econometric-based water demand forecast model (Model) to generate retail water demands for the SFPUC's 2020 Urban Water Management Plan (UWMP). A key input to the Model was household development forecasts provided by the San Francisco Planning Department (October 27, 2020 memo from Joshua Switzky, Land Use & Community Planning Program Manager). At the time, these forecasts were in draft form, developed during preparation of the city's General Plan Housing Element (Housing Element 2022 Update). Since June 2021 when the 2020 UWMP was published, the Planning Commission certified the Housing Element 2022 Update Environmental Impact Report (EIR) in November 2022. The EIR, which supported the City's adoption of the Housing Element in January 2023, assumed slightly higher household forecasts than those used in the UWMP.

Woodard & Curran worked with the Model developers to re-run it with the updated housing development forecasts provided by the San Francisco Planning Department (see Section 1 – Updated Model Inputs). The resulting Model outputs (water demands) were combined with other values external to the Model that together provide full retail water demand for SFPUC (see Section 2 – Updated Results).

1. UPDATED MODEL INPUTS

See **Table 1** for the updated housing development forecast provided by the San Francisco Planning Department (August 18, 2023 memo from Joshua Switzky, Acting Director of Citywide Planning). Per SFPUC's guidance in the previous Model effort, and re-confirmed by the San Francisco Planning Department for the current Model effort, it was assumed that there will not be an increase in the number of single-family detached houses from the existing stock. Therefore, the water demand forecast for the single-family sector is the same as the prior outputs. All future housing growth is expected to occur in the multi-family residential sector. No other inputs to the Model were changed (e.g., employment forecast, econometric variables, etc.).

Table 1: Housing Development Forecast

Housing Units	2020	2025	2030	2035	2040	2045
For 2020 UWMP	399,313	425,118	450,923	476,728	502,533	528,338
For 2023 Update	407,000	432,667	458,333	483,600	509,000	534,000

2. UPDATED RESULTS

See **Table 2** for the updated outputs directly from the Model. **Table 3** shows the updated multi-family residential sector forecast details. Tables 2 and 3 contain rows that specify the water savings associated with the Onsite Water Reuse Program. These savings were estimated for the 2020 UWMP but are not updated for this memo as (1) they are estimated separately from the Model and (2) the types of new multi-family residential projects and their participation in the Onsite Water Reuse Program are currently unknown.

See **Table 4** for a comparison of the previous and updated multi-family residential sector forecasts.

See **Table 5** for the updated retail demand forecast, which incorporates additional information that is external to the Model, as it was presented in the 2020 UWMP (e.g., municipal and irrigation demands in the "non-residential" sector, as well as Suburban Retail demands).

Table 2: Model Outputs (mgd)

		FY2019-20	FY2024-25	FY2029-30	FY2034-35	FY2039-40	FY2044-45
Single Family Residential							
Unadjusted Baseline Demand		14.32	13.83	13.63	13.60	13.63	13.65
Conservation:	*Active*	0.00	-0.15	-0.18	-0.17	-0.13	-0.11
Total		14.32	13.68	13.45	13.43	13.49	13.54
Multifamily Residential							
Unadjusted Baseline Demand		23.09	24.63	26.74	29.21	31.85	34.46
Conservation:	*Active*	0.00	-0.15	-0.20	-0.18	-0.11	-0.06
	Non-Potable / Onsite Reuse	-0.07	-0.21	-0.35	-0.63	-0.91	-0.91
Other Accounts:	*Fire*	0.01	0.01	0.01	0.01	0.01	0.01
Total		23.03	24.28	26.19	28.41	30.85	33.51
Commercial and Industrial							
Unadjusted Baseline Demand		17.81	17.25	17.33	17.49	17.93	18.38
Conservation:	*Active*	0.00	-0.28	-0.30	-0.30	-0.28	-0.23
	Non-Potable / Onsite Reuse	-0.03	-0.09	-0.15	-0.27	-0.39	-0.39
Other Accounts:	*Docks / Ships*	0.02	0.02	0.02	0.02	0.02	0.02
	Builders / Contractors	0.18	0.18	0.18	0.18	0.18	0.18
	Fire	0.04	0.04	0.04	0.04	0.04	0.04
Total		18.02	17.12	17.11	17.16	17.51	18.00
Grand Total		55.38	55.08	56.76	59.00	61.85	65.05

Notes:

FY2019-20: This column is a forecast that assumes no COVID-19 pandemic and average weather conditions. Actual demand for FY2019-20 is shown in Table 5 of this memo.
Unadjusted Baseline Demand: This is the raw output of the statistical forecast model.
Conservation Adjustments: These estimates are the output of the SFPUC Conservation model and have not been updated in this memo.
Multifamily Residential Fire Accounts: These values were supplied by SFPUC and have not been updated in this memo.
Commercial and Industrial: These forecasts are unchanged from the previous forecasts.
Grand Total: This row does not include water losses, suburban accounts, irrigation accounts, or municipal accounts. The volumes from these additional sector types are included in Table 5 of this memo and are unchanged from the previous forecasts.

Table 3: Multi-Family Demand Forecast Details

	FY2019-20	FY2024-25	FY2029-30	FY2034-35	FY2039-40	FY2044-45
Number of Units	282,814	308,481	334,147	359,414	384,814	409,814
Residents per Unit	2.30	2.30	2.30	2.30	2.30	2.30
Avg. Consumption per Capita (gal / day)						
Unadjusted Baseline Demand	35.50	34.71	34.79	35.34	35.99	36.56
Conservation: *Active*	0.00	-0.21	-0.27	-0.23	-0.12	-0.06
Non-Potable / Onsite Reuse	-0.11	-0.30	-0.47	-0.78	-1.05	-0.98
Demand per Capita	35.39	34.20	34.05	34.33	34.82	35.52
Avg. Consumption per Unit (gal / day)						
Unadjusted Baseline Demand	81.66	79.84	80.01	81.27	82.78	84.09
Conservation: *Active*	0.00	-0.49	-0.63	-0.52	-0.29	-0.14
Non-Potable / Onsite Reuse	-0.25	-0.70	-1.07	-1.79	-2.41	-2.25
Demand per Unit	81.40	78.65	78.31	78.97	80.09	81.70
Total Consumption (MGD)						
Unadjusted Baseline Demand	23.09	24.63	26.74	29.21	31.85	34.46
Conservation: *Active*	0.00	-0.15	-0.20	-0.18	-0.11	-0.06
Non-Potable / Onsite Reuse	-0.07	-0.21	-0.35	-0.63	-0.91	-0.91
Total Demand	23.02	24.27	26.18	28.40	30.84	33.50

Notes:

FY2019-20: This column is a forecast that assumes no COVID-19 pandemic and average weather conditions. Actual demand for FY2019-20 is shown in Table 5 of this memo.
Unadjusted Baseline Demand: This is the raw output of the statistical forecast model.
Conservation Adjustments: These estimates are the output of the SFPUC Conservation model and have not been updated in this memo.

Table 4: Multi-Family Residential Water Demand Forecast (mgd)

Multi-Family Residential	Actual[a]	Projected[b]				
	2020	2025	2030	2035	2040	2045
From 2020 UWMP	22.9	23.7	25.6	27.9	30.3	33.0
From 2023 Update (from Table 3)	22.9	24.3	26.2	28.4	30.9	33.5
Difference	0.0	0.6	0.6	0.6	0.5	0.5

a Actual consumption data are obtained from customer billing data.

b Multi-family residential demand projections are from an econometric model developed for the SFPUC.

Table 5: Retail Water Demand Forecast (mgd)

Retail Sector or Use Type	Actual[a]	Projected[b]				
	2020	2025	2030	2035	2040	2045
In-City Retail						
Single-Family Residential	14.5	13.7	13.5	13.4	13.5	13.5
Multi-Family Residential	22.9	24.3	26.2	28.4	30.9	33.5
Non-residential	20.9	22.9	22.9	22.8	23.1	23.6
Water Loss[c]	7.2	6.0	6.0	6.0	6.0	6.0
Subtotal In-City Retail Demand	65.3	66.9	68.6	70.6	73.5	76.7
Suburban Retail						
Single-Family Residential[d]	0.1	0.1	0.1	0.1	0.1	0.1
Non-Residential	3.1	4.0	4.0	4.0	4.0	4.0
Groveland CSD[e]	0.3	0.3	0.3	0.3	0.3	0.3
Water Loss[c]	0.0	0.0	0.0	0.0	0.0	0.0
Subtotal Suburban Retail Demand	3.5	4.4	4.4	4.4	4.4	4.4
Total Retail Demand	**68.8**	**71.3**	**73.0**	**75.0**	**77.9**	**81.1**

a Actual consumption data are obtained from customer billing data.

b Single family residential and multi-family residential demand projections are from an econometric model developed for the SFPUC. Non-residential demands include commercial/industrial demands, which are also from an econometric model, as well as municipal and irrigation demands, which are assumed to remain constant at the previous five-year average level.

c Water losses include both apparent and real losses. Suburban retail water losses are considered to be negligible. Actual water loss in 2020 is based on SFPUC's July 2019 – June 2020 water loss audit.

d Suburban retail residential demands are for single family only as no multi-family residential buildings are served.

e Groveland Community Services District (CSD) is accounted for as a retail customer for the purpose of this table and subsequent retail supply and demand comparisons in the 2020 UWMP. Demand projections were provided by Groveland CSD based on its population projections and assumed per capita water use of 107 GPCD (projections are subject to change as part of its UWMP process). In the corresponding standardized tables in UWMP 2020 Appendix B, Groveland CSD is not reported as retail, but rather wholesale.