# 2013 Water Availability Study

## for the City and County of San Francisco

Prepared by:

The San Francisco Public Utilities Commission

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Water Power Sewer
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# 1.0 Introduction and Background

## *1.1 Purpose of this Study*

Water Code Sections 10910-10915 require 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 recent 5 year 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.

The SFPUC's most recent UWMP adopted in 2010 relied on the San Francisco Planning Department's (SF Planning) 2009 Land Use Allocation (LUA) projections of housing and employment growth in San Francisco to estimate future retail water demands. In summer 2012, SF Planning updated the 2009 LUA to incorporate the Association of Bay Area Government's (ABAG) Sustainable Community Strategy Jobs-Housing Connections Scenario as detailed in a memorandum from SF Planning to the SFPUC dated January 28, 2013 (Appendix A). SF Planning's 2012 LUA projects an additional 11,235 new dwelling units and 35,068 new jobs in San Francisco by 2035 over the previous 2009 LUA projections considered in the SFPUC's 2010 Urban Water Management Plan (UWMP).[1]

As a result of 2012 LUA projections, the SFPUC concluded that its 2010 UWMP no longer accounted for all projected retail water demands. The SFPUC will not be preparing an updated UWMP until 2015. Therefore, during this interim period, the SFPUC has developed this Water Availability Study (Study) to document the SFPUC's current and projected retail water supplies when compared to projected retail water demands associated with these projects and anticipated new growth in San Francisco under the 2012 LUA projections. This Study incorporates and utilizes the information in the 2010 UWMP, but includes the following:

- Updated retail demand projections based on the 2012 LUA housing and employment projections, and updates to the SF Retail Demand Model as detailed in a memorandum from the SFPUC dated February 22, 2013 (Appendix B).
- Updated project description and schedule for the San Francisco Groundwater Supply Project based on the SFPUC San Francisco Groundwater Supply Project Draft Environmental Impact Report (EIR) (March 2013).
- Updated schedule for the Eastside Recycled Water Project based on SFPUC planning efforts to date.
- Updated schedules for dry-year water supply projects.

[1] The projected increase in demand results largely from the incorporation of Senate Bill (SB) 375 in retail demand projections. SB 375 requires ABAG and the Metropolitan Transportation Commission to develop a Bay Area Sustainable Communities Strategy that 1) achieves a greenhouse gas emissions reduction target set by the California Air Resources Board by reducing vehicle travel through colocation of housing and mass transit, and 2) identifies a strategy to meet the Bay Area's entire housing need by income level within the Bay Area.

The information and conclusions of this Study, in concert with the background information provided in the 2010 UWMP that is incorporated into this Study, can be used in the development of water supply assessments for pending water demand projects.

## *1.2 Background*

This section provides a broad overview of the Regional Water System (RWS); the SFPUC water rights; the Water System Improvement Program (WSIP); the relationship of the SFPUC's retail water customers to wholesale customers; and historic trends in retail and wholesale water demands.

### 1.2.1 The SFPUC Regional Water System[2]

The SFPUC, a department of the City and County of San Francisco, owns and operates the RWS. The RWS supplies water to both SFPUC wholesale customers and retail customers, the latter primarily in San Francisco. Historically, the RWS has supplied approximately 96% of the SFPUC's retail water demands. The remaining portion of the SFPUC's retail water supply comes from local groundwater and secondary treated recycled water. Groundwater in San Francisco is used primarily for irrigation at local parks and on highway medians. Recycled water is used mostly at municipal facilities for wastewater treatment process water, sewer box flushing, and similar wash down operations. These local supplies are discussed in greater detail in Section 2.1.

In 1934, San Francisco combined the Hetch Hetchy system and Spring Valley system to create the SFPUC RWS. The rights to store and divert water at Pilarcitos, San Andreas, Crystal Springs, and Calaveras Reservoirs were originally held by the Spring Valley Water Company, which was formed in 1862. San Francisco purchased Spring Valley in 1930.

The RWS currently delivers an annual average of approximately 219 million gallons per day (mgd) to 2.6 million users in Tuolumne, Alameda, Santa Clara, San Mateo, and San Francisco counties. The RWS is a complex system, shown in Figure 1, and supplies water from two primary sources:

- Tuolumne River through the Hetch Hetchy Reservoir, and
- Local runoff into Bay Area reservoirs in the Alameda and Peninsula watersheds.

Water from Hetch Hetchy Reservoir provides the majority of the water supply available to the SFPUC. On average, the Hetch Hetchy Project provides over 85% of the water delivered to the SFPUC's service area. The amount of water available to the SFPUC from the RWS is constrained by hydrology, physical facilities, and institutional parameters such as the 1913 Raker Act (38 Stat. 242) that allocate the water supply of the Tuolumne River between San Francisco and the Modesto and Turlock Irrigation Districts downstream. Due to these constraints, the SFPUC is very dependent on reservoir storage to maximize the reliability of its water supplies. During dry years, the SFPUC has a very small share of Tuolumne River runoff available and the local Bay Area watersheds produce very little water. Reservoir storage is critical during drought cycles because it enables the SFPUC to carry over water supply from wet years to dry years. During droughts the water received from the Hetch Hetchy system can amount to over 93% of the total water delivered. As explained in Section 1.2.3, the SFPUC is implementing a Water System Improvement Program ("WSIP") to assure the long-term adequacy of its water system. The SFPUC developed WSIP water supply objectives based on RWS supplies forecasted for a conservative "design drought" of 8.5 years.[3]

[2] For more detailed information on the RWS, see Section 2.1 of the SFPUC's 2010 UWMP.

[3] For more detailed information on use of the design drought, see Section 5.1.2 of the 2010 UWMP.

Bay Area reservoirs provide on average approximately 15% of the water delivered by the SFPUC RWS. The local watershed facilities are operated to conserve local runoff for delivery. On the San Francisco Peninsula, the SFPUC utilizes Crystal Springs Reservoir, San Andreas Reservoir, and Pilarcitos Reservoir to capture local watershed runoff. In the Alameda Creek watershed, the SFPUC constructed the Calaveras Reservoir and San Antonio Reservoir. In addition to capturing runoff, San Antonio, Crystal Springs, and San Andreas reservoirs also provide storage for Hetch Hetchy diversions. The local watershed facilities also serve as an emergency water supply in the event of an interruption to Hetch Hetchy diversions.

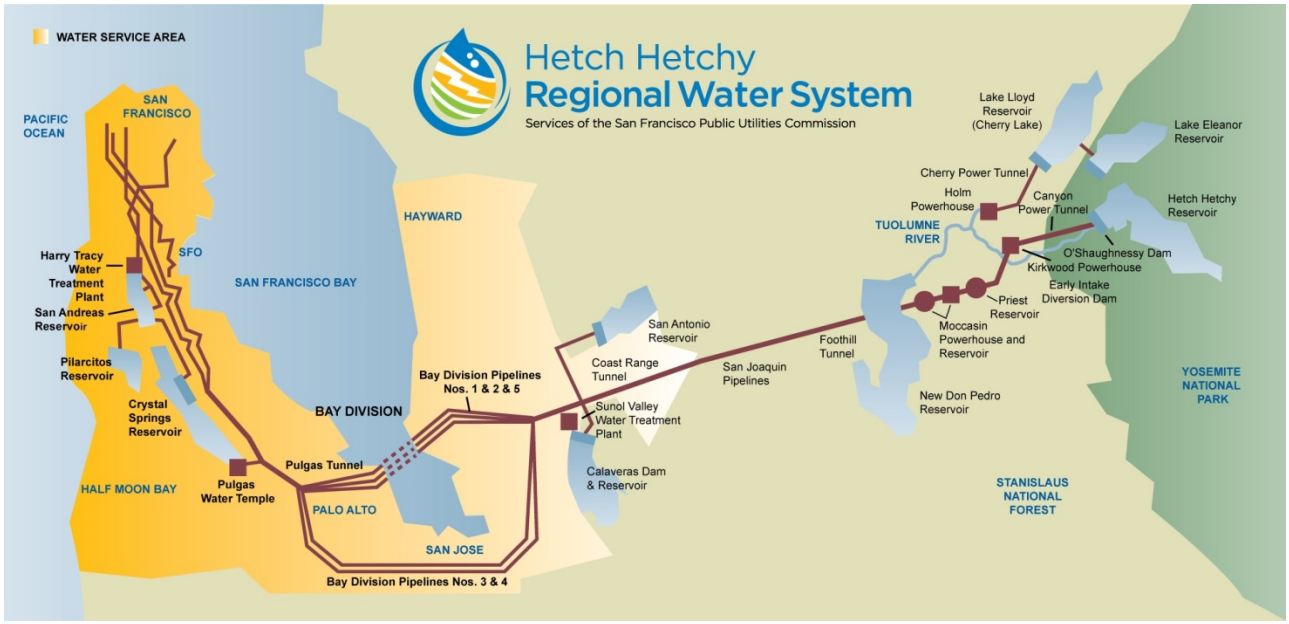


**Figure 1: SFPUC Regional Water System**

### 1.2.2 Water Rights

San Francisco owns "pre-1914" appropriative water rights to store and deliver water from Hetch Hetchy, Cherry and Eleanor Reservoirs in the Tuolumne River watershed and locally from the Alameda and Peninsula watersheds. The SFPUC also diverts and stores water in San Antonio Reservoir under an appropriative water right license granted by the State Water Resources Control Board (SWRCB) in 1976.

Appropriative water rights allow the holder to divert water from a source to a place of use not connected to the water source. These rights are based on seniority and use of water must be reasonable, beneficial, and not wasteful. In 1914, California established a formal water rights permit system, which is administered by the SWRCB. The SWRCB has sole authority to issue and administer post-1914 appropriative water rights, but has limited jurisdiction over pre-1914 appropriative water rights.

The 1912 Freeman Report identified the ultimate diversion rate from the Tuolumne River to the Bay Area as 400 mgd, and the City used this as the basis for designing the export capacity of the Hetch Hetchy project. The City has sufficient water rights for current diversions and the ultimate planned export of 400 mgd to the Bay Area.

In the 1913 Raker Act, the United States granted rights-of-way to the San Francisco over public land for purposes of constructing the Hetch Hetchy project. The Act recognizes the senior water rights of the Turlock and Modesto Irrigation Districts (TID and MID) to divert water from the Tuolumne River, and the City must bypass certain flows through its Tuolumne River reservoirs to TID and MID. By agreement, the City, TID, and MID have supplemented these Raker Act obligations to increase the TID and MID

entitlements to account for other senior Tuolumne River water rights and allow the City to "pre-pay" TID and MID their entitlement by storing water in the Don Pedro water bank. The City is required to bypass inflow to TID and MID totaling 2,416 cubic feet per second (cfs) or natural daily flow, whichever is less, at all times (as measured at La Grange), except for April 15 to June 13, when the requirement is 4,066 cfs or natural daily flow as measured at La Grange, whichever is less.

### 1.2.3 The Water System Improvement Program

To enhance the ability of the SFPUC water system to meet the service goals for water quality, seismic reliability, delivery reliability, and water supply, the SFPUC is undertaking the WSIP. The WSIP is a $4.6 billion, multi-year, capital program to upgrade the RWS. The program will deliver improvements that enhance the SFPUC's ability to provide reliable, affordable, high-quality drinking water to its wholesale customers and retail customers in an environmentally sustainable manner.[4]

As required under the California Environmental Quality Act (CEQA), SF Planning prepared a Program Environmental Impact Report (PEIR) for the WSIP. The PEIR analyzed the water supply effects of the WSIP at a project-level of detail and analyzed the WSIP facility improvement projects at a program-level of detail. The PEIR was certified by the San Francisco Planning Commission on October 30, 2008. On the same day, the SFPUC adopted the Phased WSIP Variant option in Resolution No. 08-200. The phased WSIP includes the following program elements:

- Full implementation of all WSIP facility improvement projects;
- Water supply delivery to RWS customers through 2018;
- Water supply sources (265 mgd average annual from SFPUC watersheds;10 mgd of conservation, recycled water, and groundwater in San Francisco; and 10 mgd of conservation, recycled water, and groundwater from the wholesale service area);
- Dry-year water transfers coupled with the Westside Groundwater Basin Conjunctive Use project to ensure drought reliability;
- Reevaluation of 2030 demand projections, RWS wholesale water purchase requests, and water supply options by 2018 and a separate SFPUC decision by 2018 regarding water deliveries after 2018; and
- Provision of financial incentives to limit water sales to an average annual 265 mgd "interim supply limitation" from the SFPUC watersheds through 2018.

The WSIP facility improvement projects approved by the SFPUC in 2008 included the implementation of groundwater, recycled water, and conservation projects in San Francisco. Since then, the SFPUC has been completing project-level review of projects requiring further environmental review, and proceeding to implement these projects. The WSIP identified that recycled water and groundwater projects would provide a total of approximately 6 mgd of additional water supply for retail customers, and another 4 mgd would be derived from active and passive conservation measures. The water supply goal in Resolution No. 08-200 was established to meet customer water needs in non-drought and drought periods. The water supply goal would be achieved under the following WSIP system performance objectives:

- Meet average annual water demand of 265 mgd (the interim supply limitation) from the SFPUC watersheds for retail and wholesale customers during non-drought years for system demands through 2018.

[4] For more information on the WSIP, see Sections 3.1.1 and 3.1.2 of the 2010 UWMP.

- Meet dry-year delivery needs through 2018 while limiting rationing to a maximum 20% system-wide reduction in water service during extended droughts.[5]
- Diversify water supply options during non-drought and drought periods.
- Improve use of new water sources and drought management, including groundwater, recycled water, conservation, and transfers.

Although the Phased WSIP Variant is designed to keep deliveries from exceeding an annual average target level of about 265 mgd, the SFPUC may deliver more than this interim supply limitation if necessary. In the event the SFPUC must deliver more than 265 mgd to its customers from its watersheds, the SFPUC must implement the WSIP PEIR mitigation measures associated with these impacts in proportion to the extent of the exceedance. In implementing the Phased WSIP Variant, the need could arise to temporarily increase deliveries from the watersheds over the 265 mgd interim supply limitation to meet customer water delivery needs in the near term, because of public health and safety considerations and because it might not be possible to implement all proposed local conservation, recycling, and groundwater projects and actions in time to meet unanticipated increases in customer demands. The mitigation measures identified in the PEIR to address potential impacts that could arise from RWS deliveries in excess of the interim supply limitation are:[6]

- Avoidance of flow changes in the lower Tuolumne River below La Grange dam by reducing demand for water from Don Pedro Reservoir (i.e., via a water transfer agreement with MID/TID and/or other water agencies such that the acquired water is developed through actions that result in reduction of demand on Don Pedro Reservoir and subsequently no change in the release pattern from La Grange dam)
- Fishery habitat enhancement
- Lower Tuolumne River Riparian Habitat Enhancement

As an incentive to keep RWS deliveries below the 265 mgd interim supply limitation, the SFPUC and its wholesale customers agreed to pay "environmental enhancement surcharges" for deliveries in excess of 265 mgd, as described in the next section.

### 1.2.4 Allocation of Water Between SFPUC Retail and Wholesale Customers[7]

The SFPUC provides water to both retail and wholesale customers. While this Study concerns water availability for retail customers, it is important to understand the contractual relationship between retail and wholesale customers to properly characterize the amount of water available to retail customers in normal and drought years. Approximately 2.6 million people within San Francisco, San Mateo, Santa Clara, Alameda, and Tuolumne Counties rely entirely or in part on the water supplied from the RWS by the SFPUC. Approximately one-third of RWS supplies are served directly to retail customers, primarily in San Francisco, and about two-thirds to wholesale customers outside San Francisco by contractual agreement. There are limited numbers of retail customers outside San Francisco.

The wholesale customers, except the cities of San Jose and Santa Clara, are collectively entitled to 184 mgd – the so called "Supply Assurance" – from the RWS under the terms of a 1984 contract and

[5] This 20% rationing level applies to retail and wholesale customers combined. No rationing level is specified for retail customers only.

[6] For a full description of these mitigation measures, see Section 6.4.2 of the WSIP PEIR, Measures 5.3.6-4a, 5.3.6-4b, and 5.3.7.-6.

[7] For more detailed information on the allocation of water, see Section 4.3.1 of the 2010 UWMP.

settlement agreement. The Supply Assurance represents a dedication of water supply by the City of San Francisco to the wholesale customer group. San Jose and Santa Clara are temporary, interruptible customers that are not included within the 184 mgd Supply Assurance. But for purposes of defining the interim supply limitation of 265 mgd, the total 184 mgd wholesale share of the interim supply limitation, while equal to the Supply Assurance, also includes a total of 9 mgd (4.5 mgd each) for San Jose and Santa Clara, who retain their temporary, interruptible status. One of the decisions deferred by the SFPUC in the adoption of the Phased WSIP Variant was whether or not to increase the Supply Assurance above 184 mgd. The 2009 wholesale Water Supply Agreement requires the SFPUC to make this decision by December 31, 2018, along with deciding whether or not to make San Jose and Santa Clara permanent customers.[8]

The SFPUC memorialized many of the WSIP commitments in the 2009 Water Supply Agreement with its 26 wholesale customers approved by the SFPUC in Resolution No. 08-0201 following adoption of the WSIP. The Supply Assurance continues to be in effect during the 25-year term of the 2009 Water Supply Agreement. In the wholesale Water Supply Agreement, the SFPUC agreed to:

- Meet average annual demand of 265 mgd (the interim supply limitation) from the SFPUC RWS for retail and wholesale customers during non-drought years for system demands through 2018;
- Achieve levels of service during extended droughts, including by implementing an agreed upon Water Shortage Allocation Plan (WSAP) for the allocation of water between wholesale and retail customers during shortages of up to 20%; and
- Allocate the 265 mgd interim supply limitation as follows: 81 mgd for San Francisco retail customers and 184 mgd for wholesale customers. If deliveries from the RWS exceed 265 mgd, San Francisco retail and wholesale customers would be charged volumetric environmental enhancement surcharges based on their respective amount(s) of excess use, i.e., retail customers would pay the surcharge if retail use exceeds 81 mgd, and individual wholesale customers would pay the surcharge if water deliveries exceed their allotted share (their individual "interim supply allocations") of the total 184 mgd wholesale interim supply limitation.

The wholesale Water Supply Agreement allows the SFPUC to temporarily reduce water deliveries to wholesale customers to a volume that is less than the Supply Assurance in response to emergencies, scheduled maintenance activities, and drought. During droughts, the WSAP outlines procedures for allocating water from the RWS to retail and wholesale customers during system-wide shortages of 20% or less (Tier 1 Plan).[9] Section 3.11.C of the Water Supply Agreement authorizes the wholesale customers to adopt a methodology for allocating the collective wholesale allocation among the individual wholesale customers (Tier 2 Plan). For shortages in excess of 20%, the SFPUC will meet with the wholesale customers to determine if modifications to the Tier 1 Plan can be agreed upon by the SFPUC and the wholesale customers. If they cannot agree, the SFPUC may allocate water in its discretion, subject to challenge by the wholesale customers, unless all of the wholesale customers direct that a particular Tier 2 allocation methodology be used.[10] The WSAP Tier 1 Plan allocates the available water supply between retail and wholesale customers as follows.

[8] See Section 4.06 of the wholesale Water Supply Agreement.

[9] Refer to the 2010 Urban Water Management Plan Appendix G for full text of the WSAP.

[10] Generally speaking, the differential allocation of water between retail and wholesale customers during droughts by the SFPUC must be reasonable and may include factors such as relative percentage of indoor/outdoor water use, per capita use, and other discretionary criteria.

**Table 1: Retail/Wholesale Water Allocation during System-wide Water Shortage**

| Level of System-wide Reduction in Water Use Required | SFPUC Retail Share of Available Water | Wholesale Customer Share (Collectively) |
|---|---|---|
| 5% or less | 35.5% | 64.5% |
| 6% to 10% | 36.0% | 64.0% |
| 11% to 15% | 37.0% | 63.0% |
| 16% to 20% | 37.5% | 62.5% |

Based on the WSAP allocations presented above in Table 1, Table 2 shows SFPUC RWS retail supply schedules during normal-, single dry-, and multiple dry-year periods. For the purposes of developing these allocations, the SFPUC assumed a delivery goal of 265 mgd. System-wide shortages were applied to a demand of 265 mgd and the subsequent allocations between retail and wholesale collectively.

**Table 2: SFPUC Retail RWS Allocations in Normal, Dry, and Multiple Dry Years**

| Normal Year[1] | | Single Dry Year[1] | | Multiple Dry Years[1,2] | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Year 1 | | Year 2 | | Year 3 | |
| (mgd) | (%) | (mgd) | (%) | (mgd) | (%) | (mgd) | (%) | (mgd) | (%) |
| 81.0 | 100 | 81.0 | 100 | 81.0 | 100 | 79.5 | 98.1 | 79.5 | 98.1 |

Notes:
1. The allocations presented are valid throughout the 20-year projection.
2. Under the WSAP, the SFPUC retail allocations at a 10% shortage are 85.86 mgd. However, due to the Phased WSIP Variant, only 81 mgd of RWS supply is shown.

The greater reductions in water supply that are required of wholesale customers, as shown in Table 1, reflect the fact that wholesale customers, to varying degrees, can conserve more water than retail customers in San Francisco due to much greater use of water for landscape irrigation in suburban areas. According to the WSAP allocations, the SFPUC's retail water supplies would decrease by 1.5 mgd, or 1.9%, to 79.5 mgd beginning in Year 2 of multiple dry-year periods. It is well within the ability of retail customers to collectively reduce their demand by this amount through voluntary conservation or rationing. In comparison, during the 1987-1992 drought in San Francisco, the SFPUC experienced system-wide shortages of 25 to nearly 45%. As the drought progressed, SFPUC retail customers were required to reduce total consumption by 14%, up to approximately 32%. A Retail Water Shortage Allocation Plan was adopted by the SFPUC in 2001 to formalize a three-stage program of action to be taken in San Francisco to reduce water use during a drought.[11] The first stage of action targets a reduction of 5-10% via voluntary measures. Table 2 shows water available to retail customers from the RWS over the next 20 years during Years 2 and 3 of multiple dry years, excluding existing and potentially available local water supplies such as groundwater.

The SFPUC remains committed to implementing conservation as an important component of its water supply portfolio. The retail water demands presented in this Study reflect passive and active conservation measures, including a total savings potential of up to 4 mgd by 2018 from active conservation, and 5 mgd by 2035. For more detailed information on the SFPUC's demand management programs, see Section 6 of the 2010 UWMP.

[11] For more detailed information on the Retail Water Shortage Allocation Plan, see Section 5.4.2 of the 2010 UWMP.

# 2.0 Retail Water Supply Analysis

This section reviews San Francisco's existing and projected retail water supplies.

## *2.1 Existing Retail Supplies*

### 2.1.1 Retail Supplies from the Regional Water System

The SFPUC retail customer share of the 265 mgd interim supply limitation from the RWS is 81 mgd. While the RWS is physically capable of delivering more water than the 265 mgd interim supply limitation to wholesale and retail customers, the Phased WSIP Variant adopted by the SFPUC seeks to limit water sales to 265 mgd in order to allow the SFPUC and its wholesale customers to further evaluate locally available supplies prior to reaching a decision to increase diversions from the Tuolumne River within the SFPUC's established water rights. This Study assumes that the normal-year retail share of 81 mgd will continue to be available through the Study horizon of 2035. As described in Section 1.2, the SFPUC can increase deliveries from the RWS over 265 mgd to meet combined retail and wholesale needs during normal years. To do so, the SFPUC would need to implement mitigation measures required in the WSIP PEIR and impose the environmental enhancement surcharges described in Section 1.2.4.

### 2.1.2 Local Groundwater Supplies

San Francisco overlies all or part of seven un-adjudicated groundwater basins. These groundwater basins include the Westside, Lobos, Marina, Downtown, Islais Valley, South, and Visitation Valley basins. The Lobos, Marina, Downtown and South basins are located wholly within the City limits, while the remaining three extend south into San Mateo County. The portion of the Westside Basin aquifer located within San Francisco is referred to as the North Westside Basin. With the exception of the Westside and Lobos basins, all of the basins are generally inadequate to supply groundwater for municipal supply due to low yield, contamination, or potential subsidence concerns. There is currently no adopted groundwater management plan for the SFPUC's groundwater basins.

Early in its history, San Francisco made use of the local groundwater, springs, and spring-fed surface water, using between 6.0 mgd and 8.5 mgd prior to 1934. After imports of water from the Hetch Hetchy Reservoir began in October 1934, the municipal water supply system began to rely almost exclusively on surface water from the Alameda and Peninsula watersheds and from the Hetch Hetchy Water and Power Project. Local groundwater use, however, has continued in the City.

*Westside Groundwater Basin – San Francisco*[12]

With an area of about 45 square miles, the Westside Groundwater Basin is the largest in San Francisco and is currently used to meet retail water demands for some irrigation customers. The Westside Groundwater Basin is separated from the Lobos Basin to the north by a northwest-trending bedrock ridge through the northeastern part of Golden Gate Park. San Bruno Mountain and San Francisco Bay form the eastern boundary, and the San Andreas Fault and Pacific Ocean form the western boundary. The southern limit of the Westside Groundwater Basin is defined by an area of high bedrock that separates it from the San Mateo Plain Groundwater Basin. The basin opens to the Pacific Ocean on the northwest and San Francisco Bay on the southeast. Portions of the Westside Groundwater Basin, primarily from Lake Merced south, contain three aquifers known as the Shallow Aquifer, Primary Production Aquifer, and Deep Aquifer. The Shallow and Primary Production Aquifers also occur north of Lake Merced

[12] The primary source of information provided in this section is the SFPUC San Francisco Groundwater Supply Project Draft EIR (March 2013).

depending on the presence or absence of subsurface clay layers. The basin has not been adjudicated nor has it been identified by DWR as overdrafted, or as projected to be overdrafted in the future.

The Westside Groundwater Basin can be subdivided into northern and southern portions by the county line separating San Francisco and San Mateo counties. No geologic features restrict groundwater flow between the northern and southern parts of the groundwater basin. The 14-square-mile portion of the Westside Groundwater Basin north of the San Francisco/San Mateo County line is referred to as the North Westside Groundwater Basin, and the 31-square-mile portion of the Westside Groundwater Basin south of the San Francisco/San Mateo County line is referred to as the South Westside Groundwater Basin. Existing retail groundwater sources are pumped from the North Westside Groundwater Basin.

Since 1926, groundwater has been pumped from wells located in Golden Gate Park and the San Francisco Zoo in the North Westside Groundwater Basin. Based on flow meter data, about 1.5 mgd is produced by these wells.

The SFPUC has implemented a groundwater monitoring program to evaluate groundwater elevations and quality, along with water elevations at Lake Merced. The monitoring system includes a single well or clusters of two or more wells at 19 locations. Groundwater levels in each well are monitored continuously using pressure transducers or are measured quarterly by hand. Based on regular groundwater monitoring conducted in the North Westside Groundwater Basin since 2004, groundwater levels along the Pacific Coast and north of Lake Merced have generally remained above sea level in the Shallow and Primary Production Aquifers.

The SFPUC samples groundwater at five monitoring well locations semiannually to monitor general water quality in the groundwater basin, including four locations near Lake Merced and one at the West Sunset Playground. Three of the locations near Lake Merced include both a Shallow Aquifer and Primary Production Aquifer monitoring well. The monitored parameters include total alkalinity, calcium, magnesium, sodium, potassium, bicarbonate, hardness, chloride, nitrate, sulfate, TDS, pH, and specific conductance. In addition, some wells have been monitored for iron and manganese.

*Central Groundwater Sub Basin – Livermore/Amador Valley*

The SFPUC delivers about 0.4 mgd of groundwater to the Castlewood community in Pleasanton from a well field operated by the SFPUC. These deliveries are historic artifacts of Spring Valley Water Company groundwater exports to San Francisco in the early decades of the 20th century. This groundwater is drawn from the Central Groundwater Sub Basin in the Livermore/Amador Valley. DWR has not identified this basin as over-drafted, nor as projected to be over-drafted in the future. These wells are metered and have been in operation for several decades. The system serving Castlewood is not connected to the RWS.

*Sunol Infiltration Gallery Subsurface Diversion – Sunol*

The Sunol Infiltration Gallery (SIG) is located adjacent to Alameda Creek in Sunol, south of the SFPUC's Sunol Pump Station. The SIG is approximately 2,000 feet long and consists of a concrete box structure with 10-foot 8-inch height and a 6-foot width. The bottom of the box structure is open to allow infiltration. The SIG discharges into the Sunol Aqueduct at the Water Temple. About 0.3 mgd of groundwater is delivered to the Sunol Valley Golf Club from the SIG prior to any connection to the RWS.

### 2.1.3 Local Recycled Water Supplies

From 1932 to 1981, the City's McQueen Treatment Plant, using an activated sludge process, provided recycled water to Golden Gate Park for irrigation and flow augmentation of its streams and lakes. Due to changes in State regulations, the plant could no longer meet standards, and the City closed the McQueen plant and discontinued use of recycled water in Golden Gate Park.

Currently, recycled water use in San Francisco is limited, but the SFPUC is moving forward with expanding the use within the City. Disinfected secondary-treated recycled water from the SFPUC's Southeast Water Pollution Control Plant is used on a limited basis for wash-down operations, and is provided to construction contractors for soil compaction and dust control and other nonessential construction purposes. Current use of recycled water for these purposes does not materially contribute to reducing the retail demands.

The Harding Park Recycled Water Project uses available recycled water from the North San Mateo County Sanitation District (NSMCSD) located in Daly City, to irrigate Harding Park and Fleming Park golf courses in San Francisco. The SFPUC partnered with the NSMCSD for this project which completed construction and began using recycled water in October 2012. Average annual use of recycled water at Harding Park is estimated at 0.23 mgd.

The Pacifica Recycled Water Project will provide recycled water to irrigate the Sharp Park Golf Course in Pacifica (which is owned by the City) and other nearby areas. When completed, the project will save approximately 40 million gallons of drinking water each year. SFPUC has partnered with the North Coast County Water District on this project. Major project construction was completed in spring 2012 and customer retrofits are underway, with recycled water deliveries anticipated to begin in 2013.

## *2.2 Planned Retail Water Supply Sources*

To reliably and sustainably meet the future water needs of its retail customers, the SFPUC has several WSIP facility projects in the planning stages for maintaining normal- and dry-year water supplies for both wholesale and retail customers, and is diversifying its water supply portfolio through the development of local water supplies such as increasing recycled water and groundwater production. These sources of supply were described and analyzed programmatically in the WSIP PEIR and in the 2010 UWMP. Projects related to these efforts are described below.

### 2.2.1 San Francisco Groundwater Supply Project[13]

The San Francisco Groundwater Supply Project proposes two phases for the construction of up to six wells and associated facilities in the western part of San Francisco to extract up to 4 mgd of groundwater from the North Westside Groundwater Basin for potable use and distribution in the City. Phase 1 would include the construction and operation of four new well facilities to supply an annual average of approximately 2.5 to 3.0 mgd of groundwater. Phase 1 is anticipated to come online and begin water delivery in mid-2016. At initial startup, project well operation would be limited to a maximum combined capacity of 1 mgd as part of an adaptive management program. After one year of monitoring for possible seawater intrusion and adverse effects on Lake Merced, the SFPUC may increase annual pumping by 1 mgd each year, up to a total of 3 mgd during Phase 1 of the project and 4 mgd when Phase 2 is implemented.

Phase 2 would include the conversion of the two existing Golden Gate Park irrigation well facilities currently in use and the operation of the converted irrigation wells to provide an additional annual average of approximately 1.0 to 1.5 mgd of groundwater. Phase 2 of the project would only be implemented after the Westside Recycled Water Project is approved and constructed (anticipated 2018) to provide a new recycled water supply for irrigation uses at Golden Gate Park and nearby golf courses. The extracted groundwater, which would be used both for regular and emergency potable water supply purposes, would

[13] The primary source of information provided in this section is the SFPUC San Francisco Groundwater Supply Project Draft EIR (March 2013), which analyzes this project at a project-level of environmental review.

be disinfected and blended with imported surface water before entering the municipal drinking water system.

A distribution system (including pipelines and connection points) would connect five of the groundwater well facilities to Sunset Reservoir. The sixth well would connect to the Lake Merced Pump Station (which pumps water to both Sutro and Sunset Reservoirs). The groundwater would be blended with San Francisco's municipal water supply and distributed to local customers through the Sunset and Sutro Reservoirs. Figure 2 provides an overview schematic of the project and identifies the locations of all wells and the boundaries of the North Westside Groundwater Basin.

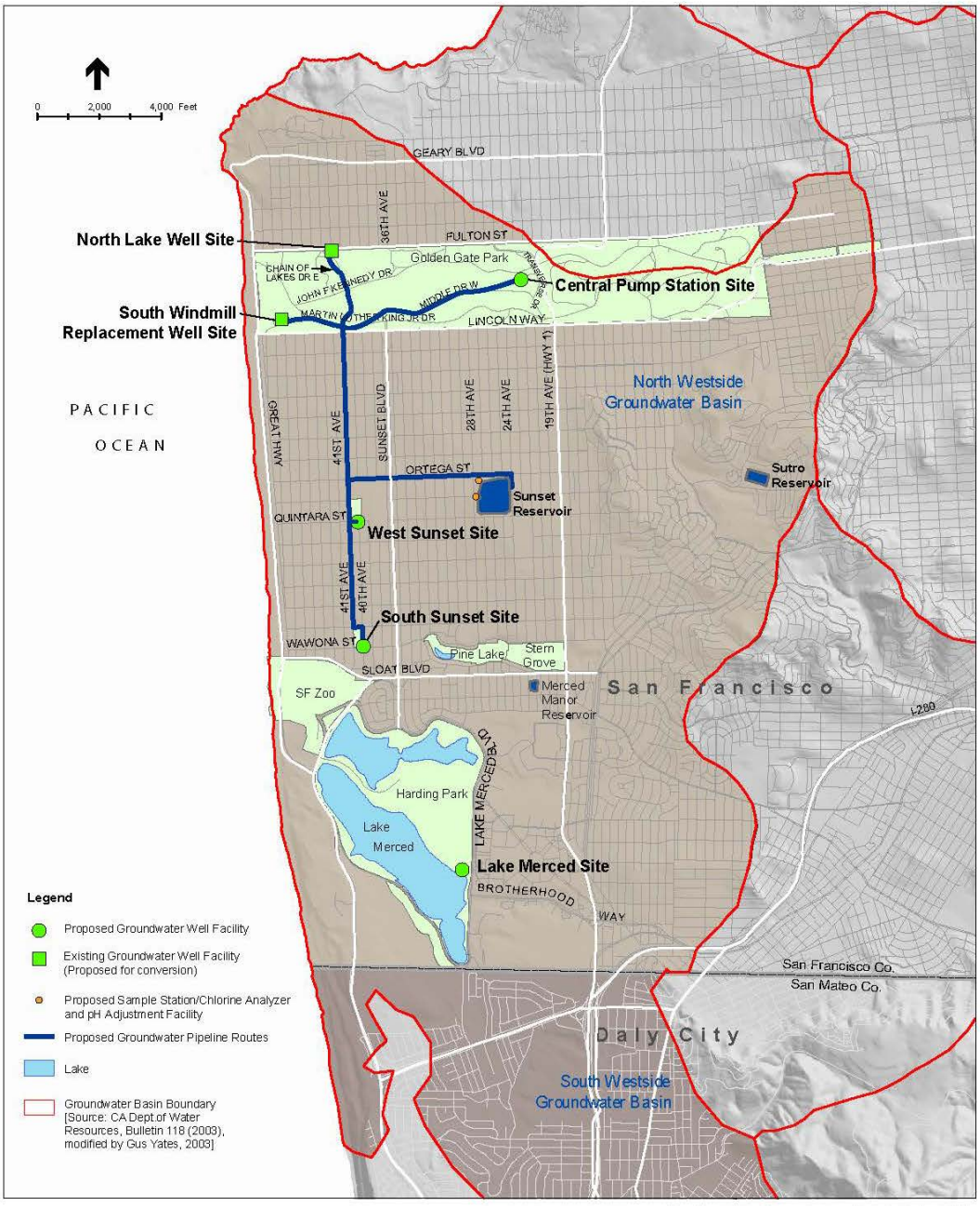


**Figure 2: San Francisco Groundwater Supply Project**

### 2.2.2 Future Recycled Water Supply Projects

The SFPUC also has plans to develop the proposed Westside and Eastside Recycled Water Projects in San Francisco (retail service area). These projects would provide up to 4 mgd of recycled water to a variety of users in San Francisco – primarily for landscape irrigation, toilet flushing, and industrial purposes – and are detailed below. Figure 3 shows areas on the western and eastern sides of the City that are designated for municipal recycled water use.

- The proposed Westside Project would construct a tertiary recycled water plant and associated pipelines to replace surface and groundwater currently used to irrigate Golden Gate Park, Lincoln Park and Golf Course, and the Presidio Golf Course. Additionally recycled water would be used for various non-potable uses in Golden Gate Park, including those at the California Academy of Sciences. The proposed treatment facility site was relocated to the SFPUC's Oceanside Plant in early 2012, and preliminary design for the new site is underway. The project-level environmental review for the new project is anticipated to begin in mid-2013.
- The SFPUC completed a recycled water demand assessment of potential customers on the eastern side of San Francisco, and identified a demand potential of up to 2 mgd to be served by the proposed Eastside Recycled Water Project. The planning of Eastside Recycled Water Project treatment and distribution facilities was initiated in late 2011, with the goal of identifying a preferred project in 2013. The WSIP contains funding for planning, design, and project-level environmental review for the proposed Eastside Recycled Water Project.

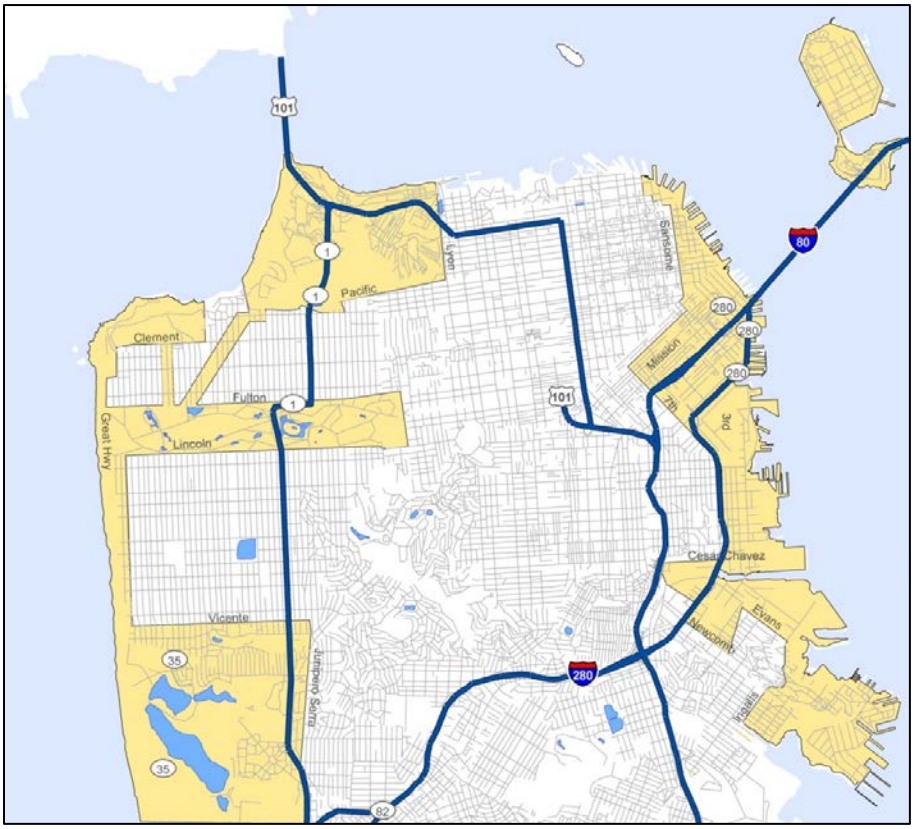


**Figure 3: San Francisco's Designated Recycled Water Use Areas**

## 2.3 Summary of Current and Future Retail Water Supplies

Table 3 provides a breakdown of current and projected water supply sources for meeting SFPUC retail water demand over the next 20 years.

**Table 3: SFPUC Retail Water Supplies 2015-2035 in a Normal Year (mgd)**

| Water Supply Sources | 2015 | 2020 | 2025 | 2030 | 2035 |
|---|---|---|---|---|---|
| **Existing Supply Sources** | | | | | |
| RWS Watersheds - Retail Allocation | 81.0 | 81.0 | 81.0 | 81.0 | 81.0 |
| Suburban Groundwater & Subsurface Diversions[1] | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 |
| North Westside Groundwater Basin[2] | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 |
| Recycled Water - Harding Park & Sharp Park | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 |
| **Existing Supplies Subtotal** | **83.5** | **83.5** | **83.5** | **83.5** | **83.5** |
| **Future Supply Sources[3]** | | | | | |
| Future North Westside Groundwater Basin Expansion[2] | 0.0 | 2.8 | 2.8 | 2.8 | 2.8 |
| Future Recycled Water Projects | 0.0 | 2.0 | 4.0 | 4.0 | 4.0 |
| **Future Supplies Subtotal** | **0.0** | **4.8** | **6.8** | **6.8** | **6.8** |
| **TOTAL PROJECTED SUPPLIES** | **83.5** | **88.3** | **90.3** | **90.3** | **90.3** |

Notes:

1. These sources consist of groundwater use at Castlewood (not connected to RWS) of approximately 0.4 mgd, and subsurface diversions to Sunol Golf of approximately 0.3 mgd taken from the Sunol Infiltration Gallery.
2. The North Westside Groundwater Basin is currently used for irrigation. In-City groundwater use will be expanded for potable use with the San Francisco Groundwater Supply Project. Approximately 1.2 mgd of existing groundwater use will be converted to potable use (for a total of 4.0 mgd) once the Westside Recycled Water project is completed as a substitute irrigation water supply.
3. The implementation of proposed future supply sources is contingent on completion of necessary project-level environmental review and project approval. If these supplies are not available as planned, and if retail demand exceeds the available water supply, the Water Supply Agreement allows the SFPUC to import additional water from the RWS, with mitigation implemented by the SFPUC and potential environmental surcharges if RWS deliveries exceed the 265 mgd interim supply limitation. (Total RWS deliveries in FY11/12 were 219.4 mgd.)

## 2.4 Dry-Year Water Supplies

As an established major water supplier for the Bay Area region, the SFPUC is responsible for securing and managing its existing RWS supplies and planning for future needs, as well as securing its own retail supplies. During a drought, the SFPUC projects that retail and wholesale customers would experience a reduction in the amount of water received from the RWS. The WSIP water supply program includes development of the following dry-year supplies for the RWS:

- Restoration of Calaveras Reservoir capacity via the Calaveras Dam Replacement Project, which is currently under construction and anticipated to be completed in 2018;
- Restoration of Crystal Springs Reservoir capacity via the Lower Crystal Springs Dam Improvements Project, which was completed in 2013;

- Recapture of Calaveras Reservoir releases via the Upper Alameda Creek Filter Gallery Project[14], which is currently in the design phase and anticipated to be completed in 2019;
- Increase in groundwater storage volume and recapture via the Regional Groundwater Storage and Recovery (GSR) Project (a.k.a. Westside Basin Groundwater Conjunctive Use Project), for which the project-level Draft EIR was published on April 10, 2013, and construction is anticipated to be completed in 2016; and
- Water transfers, which are currently under negotiation.

The total available water supply during droughts would be allocated between wholesale and retail customers as described in Section 1.2.4.

Table 4 provides a breakdown of water supplies for meeting SFPUC retail demand over the next 20 years during Years 2 and 3 of multiple dry years. Local groundwater and recycled water supplies are assumed to remain constant regardless of a normal or dry year.

**Table 4: SFPUC Retail Water Supplies 2015-2035 in Years 2 and 3 of Multiple Dry Years (mgd)**

| Water Supply Sources | 2015 | 2020 | 2025 | 2030 | 2035 |
|---|---|---|---|---|---|
| **Existing Supply Sources** | | | | | |
| RWS Watersheds - Retail Allocation | 79.5 | 79.5 | 79.5 | 79.5 | 79.5 |
| Groundwater & Subsurface Diversions[1] | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 |
| North Westside Groundwater Basin[2] | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 |
| Recycled Water - Harding Park & Sharp Park | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 |
| **Existing Supplies Subtotal** | **82.0** | **82.0** | **82.0** | **82.0** | **82.0** |
| **Future Supply Sources[3]** | | | | | |
| Future North Westside Groundwater Basin Expansion[2] | 0.0 | 2.8 | 2.8 | 2.8 | 2.8 |
| Future Recycled Water Projects | 0.0 | 2.0 | 4.0 | 4.0 | 4.0 |
| **Future Supplies Subtotal** | **0.0** | **4.8** | **6.8** | **6.8** | **6.8** |
| **TOTAL PROJECTED MULTIPLE DRY-YEAR SUPPLIES** | **82.0** | **86.8** | **88.8** | **88.8** | **88.8** |

Notes:
1. These sources consist of groundwater use at Castlewood (not connected to RWS) of approximately 0.4 mgd, and subsurface diversions to Sunol Golf of approximately 0.3 mgd taken from the Sunol Infiltration Gallery.
2. The North Westside Groundwater Basin is currently used for irrigation. In-City groundwater use will be expanded for potable use with the San Francisco Groundwater Supply Project. Approximately 1.2 mgd of existing groundwater use will be converted to potable use (for a total of 4.0 mgd) once the Westside Recycled Water project is completed as a substitute irrigation water supply.
3. The implementation of proposed future supply sources is contingent on completion of necessary project-level environmental review and project approval. These sources are intended to diversify normal-year supplies and meet dry-year needs as well.

[14] Although the Upper Alameda Creek Filter Gallery Project is not listed as a dry-year water supply project under WSIP, it is listed in this section because the infrastructure required to make the releases are included in the Calaveras Dam Replacement Project scope.

Continued progress on the dry-year supply projects is an important component of the SFPUC's dry-year water supply program. As part of the reservoir capacity projects, the SFPUC agreed to provide instream flow releases below Calaveras Dam and Lower Crystal Springs Dam, as well as bypass flows below Alameda Creek Diversion Dam, to obtain required federal and state resource agency permits for construction of those projects. The instream flow release requirements for Alameda Creek and San Mateo Creek represent a potential decrease in available annual average water supply of 3.9 mgd and 3.5 mgd, respectively, for a total shortfall of 7.4 mgd on an average annual basis. These instream flow releases could potentially create a shortfall in meeting the SFPUC system wide demands of 265 mgd and slightly increase the SFPUC's dry-year water supply needs. The effects of such a shortfall, if any, would occur upon completion of construction of both the Calaveras Dam Replacement Project and the Lower Crystal Springs Dam Improvements Project, at the time when the SFPUC will be required to provide the instream flow releases. The SFPUC is currently exploring other future supplies to offset the 7.4 mgd, including:

- Development of additional conservation and recycling.
- Development of additional groundwater supplies.
- Securing of additional water transfer volumes.
- Increasing Tuolumne River supply.
- Revising the Upper Alameda Creek Filter Gallery Project capacity.
- Development of a desalination project.

If multiple dry years occur before the planned dry-year supply projects are implemented, then the SFPUC may impose measures to ensure a balance of supplies and demands. These measures include reducing system deliveries and imposing customer rationing.

# 3.0 Retail Water Demand Analysis

Retail water demands for the SFPUC are separated into In-City customers and suburban customers. Suburban customers are retail customers outside of San Francisco that are billed and served directly by the SFPUC and not through a wholesale agency (including San Francisco County Jail, San Francisco International Airport, NASA Ames Research Center, residents in Sunol and other commercial and residential customers). Suburban retail customer demands have remained relatively constant over the last 20 years. The suburban retail customer demands are not generated by the SFPUC's Retail Water Use Models, but are instead based on historic water use.

## *3.1 Revised City of San Francisco Growth Projections*

SF Planning used the updated growth projections to develop 2012 LUA projections, as detailed in Section 1.1 and in a memorandum from SF Planning to the SFPUC dated January 28, 2013 (Appendix A). This analysis results in a 2035 growth projection that differs from the 2010 UWMP. Table 5 compares the new 2012 LUA growth projections to those used in the 2010 UWMP in 5-year increments from 2015 to 2035.

**Table 5: 2035 Growth Projections for Households and Employment**

| | 2015 | 2020 | 2025 | 2030 | 2035 |
|---|---|---|---|---|---|
| **Housing Units Projections** | | | | | |
| 2009 LUA Projections (used in 2010 UWMP) | 363,213 | 376,109 | 389,463 | 403,292 | 415,000 |
| 2012 LUA Projections | 361,452 | 377,684 | 393,630 | 410,227 | 426,235 |
| **Net Change** | **(1,761)** | **1,575** | **4,167** | **6,935** | **11,235** |
| **Employment Projections** | | | | | |
| 2009 LUA Projections (used in 2010 UWMP) | 569,720 | 599,060 | 631,790 | 665,030 | 698,790 |
| 2012 LUA Projections | 621,722 | 677,531 | 691,342 | 706,848 | 733,858 |
| **Net Change** | **52,002** | **78,471** | **59,552** | **41,818** | **35,068** |

## *3.2 Projected Retail Water Demands*

In-City retail water demands are estimated using the City's Retail Water Use Models. The models were first developed in 2004 and updated in 2010 and again in 2012, as detailed below. The models incorporate economic and demographic forecast data, including projections of population, housing stock and employment. For additional information in regards to the model methodology, please see Section 4.1.5 of the 2010 UWMP.

In late 2012, SFPUC staff compared the last four years of actual conservation measure savings through fiscal year 2012 with forecasted savings for 2013 to 2018. The comparison showed that some measures could fall short of future estimates (mainly multi-family coin operated washing machines and multi-family toilet direct installs). In response, the SFPUC adjusted forecasted production for these measures. In light of the new growth projections and the model updates, the SFPUC reran the demand model and developed new water demand projections for In-City uses, as detailed in a memo from SFPUC staff dated February 22, 2013 (Appendix B). A summary of all retail water demands for SFPUC is presented in Table 6.

**Table 6: San Francisco Retail Water Demands (mgd)**

| Water Use Entity | 2012[1] | 2015 | 2020 | 2025 | 2030 | 2035 |
|---|---|---|---|---|---|---|
| **In-City Retail Customers** | | | | | | |
| Single-Family Residential[2] | 16.1 | 16.7 | 15.5 | 14.8 | 14.4 | 14.3 |
| Multi-Family Residential[2] | 24.9 | 28.1 | 27.7 | 27.6 | 27.9 | 28.6 |
| Non-Residential[2] | 23.2 | 26.5 | 27.7 | 27.5 | 27.7 | 28.7 |
| Other In-City Demands[4,7] | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 |
| In-City Irrigation Uses[5,7] | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 |
| Losses[2,3] | 6.9 | 5.1 | 5.2 | 5.2 | 5.2 | 5.3 |
| **In-City Retail Subtotal** | **72.8** | **78.1** | **77.8** | **76.8** | **76.9** | **78.6** |
| **Suburban Retail Customers** | | | | | | |
| Single-Family Residential[7] | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 |
| Non-Residential[7] | 3.7 | 4.3 | 4.3 | 4.3 | 4.3 | 4.3 |
| Hetch Hetchy Water & Power Customers[6,7] | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 |
| **Suburban Retail Subtotal** | **5.0** | **5.6** | **5.6** | **5.6** | **5.6** | **5.6** |
| **Total Retail Demand** | **77.8** | **83.7** | **83.4** | **82.4** | **82.5** | **84.2** |

Notes:

1. 2012 data are based on actual billing data.
2. 2015-2035 projections were generated using the SFPUC Retail Demand Model and include savings from passive and active conservation.
3. Losses reported for 2012 include meter under-registration. Losses for 2015-2035 exclude meter under-registration because they are included in the retail demand projections for residential and non-residential sectors. Meter under-registration losses are estimated at 2.2% of residential and 2.1% of non-residential sector demands. System losses excluding meter under-registration are estimated at 6.86% of sector demand.
4. Builders and Contractors, Docks and Ships.
5. Irrigation at Golden Gate Park, the Great Highway, and the San Francisco Zoo.
6. Hetch Hetchy Water & Power Customers include Lawrence Livermore National Laboratory, Groveland Community Services District and other incidental uses.
7. 2015-2035 projections are based on average historic consumption, which has remained relatively constant over the past 20 years.

# 4.0 Supply and Demand Comparison

This section compares the SFPUC's retail water supplies and demands through 2035 utilizing the information presented in Sections 2.0 and 3.0. Table 7 compares the SFPUC's retail supplies and demand during normal-year, single dry-, and multiple dry-year periods. Currently, San Francisco has access to an annual average 83.4 mgd from all existing water supply sources. Beginning in 2016, the SFPUC's retail water supplies are projected to increase if the local groundwater and recycled water projects are approved and implemented. The demands estimated in this Study show that the 2012 LUA projections from SF Planning result in an increase in City retail demand. By 2035, the retail demand is estimated at 84.2 mgd, as shown in the figures below. Figure 4 compares the demand to normal-year supplies (from on Table 3), and Figure 5 compares demand to dry-year supplies (from Table 4).

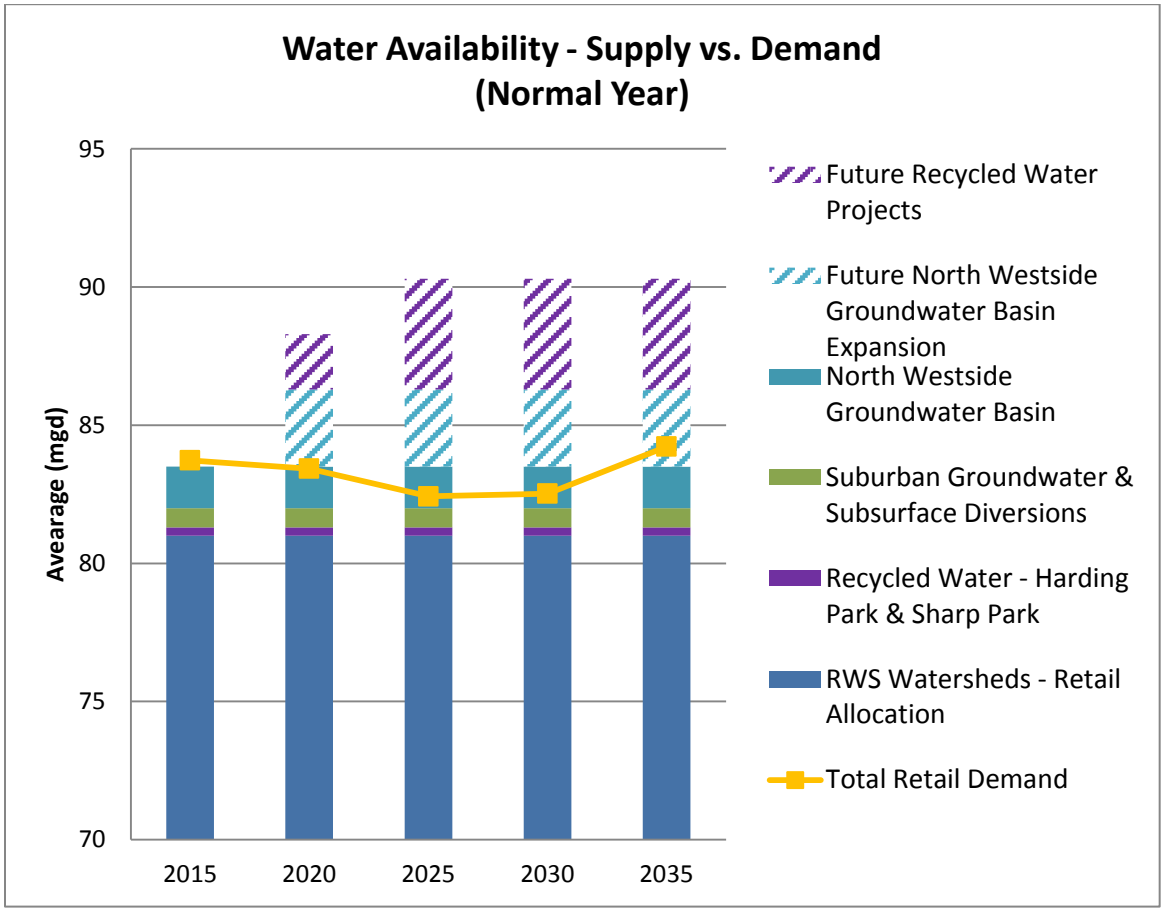


**Figure 4: Normal-Year Supply and Demand Comparison**

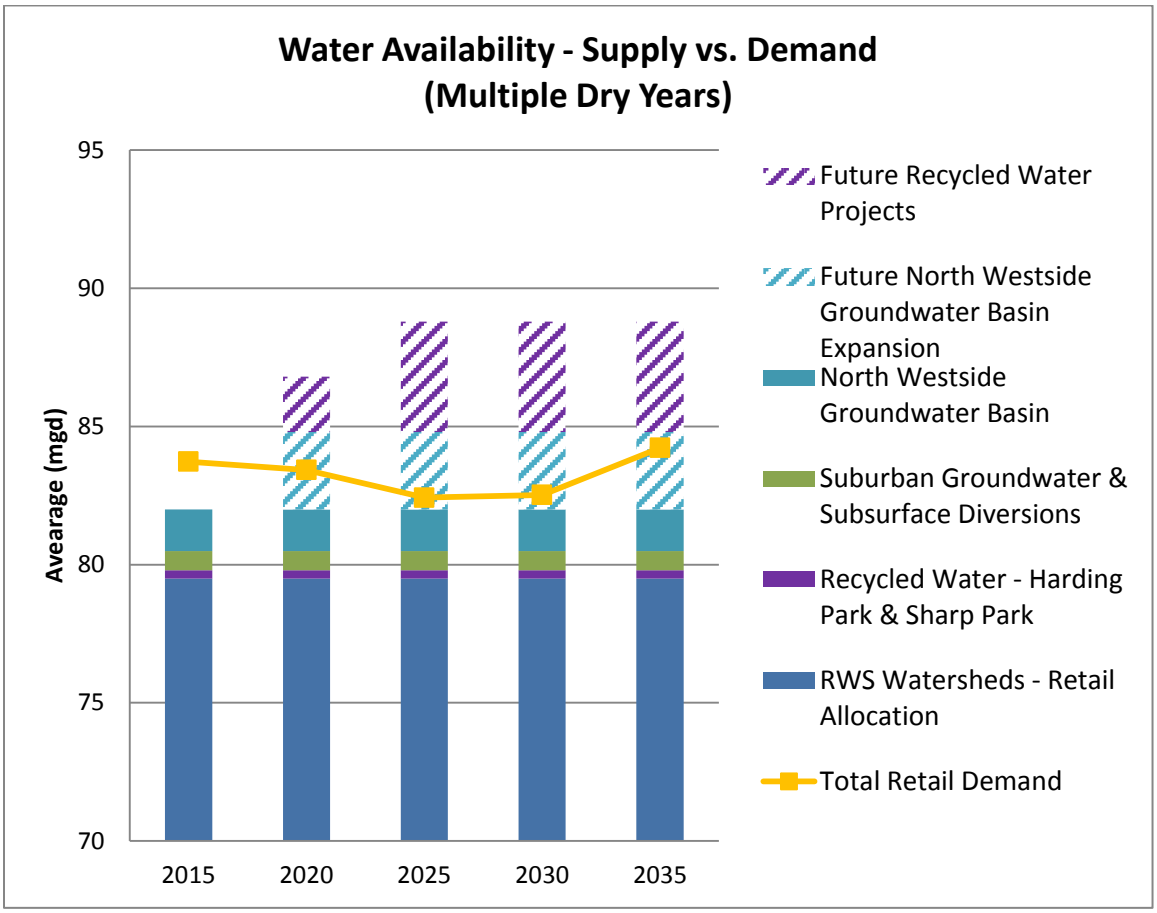


**Figure 5: Multiple Dry-Year Supply and Demand Comparison**

As shown in Table 7, the SFPUC, with its existing and future supplies, can meet the future demands of its retail customers in normal-, single dry-, and multiple dry-year events, with the exception of 2015. The deficit shown in 2015 can be attributed to a number of factors, including being within the margin of error and/or conservative assumptions of the demand model; propagated from aggressive near term employment and housing projections; and/or the result of demand increases prior to full implementation of the 10 mgd of new supplies under the Phased WSIP Variant. The deficit for 2015 in a normal year is 0.2 mgd, which represents less than a 0.25% shortfall. The deficit for 2015 in a multiple dry-year drought event is 1.7 mgd, which represents a 2.0% shortfall. These deficits could be easily managed through voluntary conservation measures or rationing. The SFPUC would have to declare a drought in 2014 to reach Year 2 of a multiple year event by 2015. As shown previously in Table 6, retail demand is currently lower than the 2015 projected demand (FY11/12 demand was 77.8 mgd). In the last 10 years, SFPUC's retail water demand has decreased by almost 10 mgd.

The other deficits shown in Table 7 are projected to occur if future supplies are not implemented as planned. The normal year deficits range from 0.2 to 0.7 mgd, which represent shortfalls of less than 1%. The multiply dry-year deficits range from 0.4 to 2.2 mgd, which represent shortfalls of up to 2.7%. These deficits are comparable to those described above for 2015 under normal-year conditions with future supplies, and could be easily managed through voluntary conservation measures or rationing.

**Table 7: Projected Supply and Demand Comparison (mgd)**

| | | Normal Year[1,2] | Single Dry Year[1,2] | Multiple Dry Years | | |
|---|---|---|---|---|---|---|
| | | | | Year 1[1,2] | Year 2[2,3] | Year 3[2,3] |
| 2015 | Total Retail Demand | 83.7 | 83.7 | 83.7 | 83.7 | 83.7 |
| | Total Retail Supply – Existing Supplies Only[4] | 83.5 | 83.5 | 83.5 | 82.0 | 82.0 |
| | Surplus/(Deficit) | (0.2) | (0.2) | (0.2) | (1.7) | (1.7) |
| | Total Retail Supply – Existing & Future Supplies[4] | 83.5 | 83.5 | 83.5 | 82.0 | 82.0 |
| | Surplus/(Deficit)[5] | (0.2) | (0.2) | (0.2) | (1.7) | (1.7) |
| 2020 | Total Retail Demand | 83.4 | 83.4 | 83.4 | 83.4 | 83.4 |
| | Total Retail Supply – Existing Supplies Only[4] | 83.5 | 83.5 | 83.5 | 82.0 | 82.0 |
| | Surplus/(Deficit) | 0.1 | 0.1 | 0.1 | (1.4) | (1.4) |
| | Total Retail Supply – Existing & Future Supplies[4] | 88.3 | 88.3 | 88.3 | 86.8 | 86.8 |
| | Surplus/(Deficit) | 4.9 | 4.9 | 4.9 | 3.4 | 3.4 |
| 2025 | Total Retail Demand | 82.4 | 82.4 | 82.4 | 82.4 | 82.4 |
| | Total Retail Supply – Existing Supplies Only[4] | 83.5 | 83.5 | 83.5 | 82.0 | 82.0 |
| | Surplus/(Deficit) | 1.1 | 1.1 | 1.1 | (0.4) | (0.4) |
| | Total Retail Supply – Existing & Future Supplies[4] | 90.3 | 90.3 | 90.3 | 88.8 | 88.8 |
| | Surplus/(Deficit) | 7.9 | 7.9 | 7.9 | 6.4 | 6.4 |
| 2030 | Total Retail Demand | 82.5 | 82.5 | 82.5 | 82.5 | 82.5 |
| | Total Retail Supply – Existing Supplies Only[4] | 83.5 | 83.5 | 83.5 | 82.0 | 82.0 |
| | Surplus/(Deficit) | 1.0 | 1.0 | 1.0 | (0.5) | (0.5) |
| | Total Retail Supply – Existing & Future Supplies[4] | 90.3 | 90.3 | 90.3 | 88.8 | 88.8 |
| | Surplus/(Deficit) | 7.8 | 7.8 | 7.8 | 6.3 | 6.3 |
| 2035 | Total Retail Demand | 84.2 | 84.2 | 84.2 | 84.2 | 84.2 |
| | Total Retail Supply – Existing Supplies Only[4] | 83.5 | 83.5 | 83.5 | 82.0 | 82.0 |
| | Surplus/(Deficit)[6] | (0.7) | (0.7) | (0.7) | (2.2) | (2.2) |
| | Total Retail Supply – Existing & Future Supplies[4] | 90.3 | 90.3 | 90.3 | 88.8 | 88.8 |
| | Surplus/(Deficit) | 6.1 | 6.1 | 6.1 | 4.6 | 4.6 |

Notes:

1. Normal-year retail water supplies per Table 3.
2. Retail water demands per Table 6.
3. Year 2 and 3 of multiple dry years per Table 4.
4. Existing and future supply sources per Table 3 (repeated in Table 4).
5. The deficit shown for 2015 in a normal year with existing and future supplies represents less than a 0.25% shortfall and during a multiple dry-year drought event represents a 2.0% shortfall, which can be easily managed through voluntary conservation measures or rationing. Current retail demand in FY11/12 was 77.8 mgd. If retail demand exceeds the available water supply of 83.5 mgd, the Water Supply Agreement allows the SFPUC to import additional water from the RWS, with mitigation implemented by the SFPUC and potential environmental surcharges if RWS deliveries exceed the 265 mgd interim supply limitation. (Total RWS deliveries in FY11/12 were 219.4 mgd.)
6. The deficit shown for 2035 is projected if none of the local groundwater and recycled water projects are implemented as described in Section 2.2.

Whether or not future supplies are available, if the SFPUC determines in a particular year that projected total RWS storage is less than target storage levels devised in relation to the design drought, it may implement the terms of the WSAP to achieve a combined average reduction in wholesale and retail water use of up to 20 percent. In addition, the SFPUC currently serves approximately 1.0 mgd to retail irrigation lessees on an interruptible basis. It is anticipated that the San Francisco Groundwater Supply Project will provide an additional 1.0 mgd of water supplies beginning in mid-2016.

In addition, if retail demand exceeds the available water supply of 83.5 mgd in normal years, the Water Supply Agreement allows the SFPUC to import additional water from the RWS. If combined retail and wholesale RWS deliveries exceed the 265 mgd interim supply limitation, the SFPUC retail customers would be required to pay an environmental enhancement surcharge for RWS deliveries over 81 mgd as detailed previously in Section 1.2.4. In addition, the SFPUC would need to implement mitigation measures per the WSIP PEIR as described in Section 1.2.3. (Total RWS deliveries in FY11/12 were 219.4 mgd.)

## *4.1 Conclusion*

The updated 2012 SF Planning projections result in a retail demand in 2035 of 84.2 mgd, which represents a 3.3 mgd, or 4%, increase over the 2035 demand projections estimated in the 2010 UWMP. The ability to meet the demand of the retail customers is in large part due to development of 10 mgd of local WSIP supplies, including conservation, groundwater, and recycled water. These supplies are anticipated to be fully implemented over the next 10 years.

If planned, future water supply projects (i.e., San Francisco Groundwater Supply Project [or Westside Groundwater Basin Expansion], Westside Recycled Water Project, and Eastside Recycled Water Project) are not implemented, normal-year supplies may not be enough to meet projected retail demands. To balance any water supply deficits during normal years, the SFPUC may import additional water from the RWS, with mitigation implemented by the SFPUC and potential environmental surcharges if RWS deliveries exceed the 265 mgd interim supply limitation.

If dry-year supply projects (i.e., Calaveras Dam Replacement Project, Lower Crystal Springs Dam Improvements Project, Upper Alameda Creek Filter Gallery Project, GSR Project, and water transfers) are not implemented, existing dry year supplies may not be enough to meet projected retail demands. To balance any water supply deficits during dry years, the SFPUC may reduce system deliveries and impose customer rationing.

The SFPUC remains committed to meeting the level of service goals and objectives outlined under WSIP. In addition, the SFPUC is currently exploring other future supplies, including:

- Development of additional conservation and recycling.
- Development of additional groundwater supplies.
- Securing of additional water transfer volumes.
- Increasing Tuolumne River supply.
- Revising the Upper Alameda Creek Filter Gallery Project capacity.
- Development of a desalination project.

# Appendix A - SF Planning Memorandum

SAN FRANCISCO
**PLANNING DEPARTMENT**

1650 Mission St.
Suite 400
San Francisco,
CA 94103-2479

Reception:
**415.558.6378**

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Planning
Information:
**415.558.6377**

January 28, 2013

Michael P. Carlin
Deputy General Manager, SFPUC
525 Golden Gate Street
San Francisco, CA 94102

**Subject: Projections of growth 2015-2035**

Dear Michael:

I am forwarding you the Department's current growth projections as requested by Paula Kehoe, Manager, Water Resources Planning, SFPUC. Table 1 shows the projections for the requested years 2015-2035 from the Planning Department's long range Land Use Allocation (LUA) 2012.

**Table 1: Development Projections**

| | 2015 | 2020 | 2025 | 2030 | 2035 |
|---|---|---|---|---|---|
| Households | 361,452 | 377,684 | 393,630 | 410,227 | 426,235 |
| Jobs | 621,772 | 677,531 | 691,342 | 706,848 | 733,858 |

***Source:*** ABAG SCS 2012 (May). SF Planning, Land Use Allocation 2012.

The Planning Department routinely updates its long range LUA when ABAG updates their regional projections, typically, every two years. The Department uses the LUA for a variety of purposes, including analyzing impacts of plans and projects undergoing the environmental review process. This past summer, the Department updated its LUA for the recently released ABAG Sustainable Community Strategy Jobs-Housing Connections Scenario (ABAG SCS 2012).

In updating the LUA, the Department's method uses the best information available to allocate the growth to location. That information includes proposed and entitled projects (the "pipeline"), area plan development potential, and parcels with high development potential located outside area plan boundaries. The Planning Department assumed full buildout over the forecast period of the six large development projects at the beginning of their environmental review, namely Giants/Mission Rock (Sea Wall Lot 337 & Pier 48), Warriors Arena (Piers 30-32), Pier 70 Master Plan, 5M (901 Mission Street-Chronicle Building), Moscone Center Expansion, and the Central Corridor Plan.

If you or your staff have any questions, please contact Scott Edmondson, AICP, by email (Scott.Edmondson@sfgov.org) or telephone (415-575-6818).

Sincerely,

John Rahaim
Director of Planning

CC: Paula Kehoe (SFPUC), Scott Edmondson & Aksel Olsen (Planning Department)

# Appendix B - SFPUC Memorandum

San Francisco Water Power Sewer
Services of the San Francisco Public Utilities Commission

525 Golden Gate Avenue, 13th Floor
San Francisco, CA 94102
T 415.554.3155
F 415.554.3161
TTY 415.554.3488

# MEMO

February 22, 2013

To: Steve Ritchie, Assistant General Manager, Water Enterprise

From: Paula Kehoe, Water Resources Director

Re: Updates to 2011 Retail Conservation Plan

This memo summarizes two areas of updated data that revise some conservation and demand estimates noted in the SFPUC's 2011 Retail Water Conservation Plan.

**1) Updated Conservation Measure Production**

The 2011 Retail Water Conservation Plan published in June 2011 notes a maximum conservation potential of 5 mgd demand reduction by 2018. The Plan also notes that the SFPUC regularly evaluates and reports on conservation activities. To that end, in late 2012, the SFPUC compared the last four years of actual conservation measure production through fiscal year 2012 with forecasted production for 2013 to 2018. The comparison showed that some measures could fall short of future estimates (mainly multi-family coin operated washing machines and multi-family toilet direct installs). In response, the SFPUC adjusted forecasted production for these measures, which resulted in a reduction of the overall estimated conservation potential to 4.1 mgd savings in 2018. The SFPUC intends to prepare a complete update of the Retail Water Conservation Plan every five years along with the Urban Water Management Plan. The next major update will be in 2015.

**2) Updated Population and Employment Data**

In January 2013, the San Francisco Planning Department provided the SFPUC updated population and employment projections for 2015 through 2035 from the Planning Department's long range Land Use Allocation (LUA) 2012. The Planning Department routinely updates its long range LUA when the Association of Bay Area Governments (ABAG) updates its regional projections, typically, every two years. These updated projections represent an increase in households in 2020 through 2035 and jobs in 2015 through 2035 used in the version of the SFPUC's forecast model that provided demand projections in the 2011 Retail Water Conservation Plan.

The attached, revised Tables 16 and 17 from the *SFPUC Retail Demand Model Update and Calibration Technical Memo* contained in Appendix A of the 2011 Retail Water Conservation Plan incorporate the updated conservation measure production, population and employment data noted in items 1 and 2 above.

**Table 16 - Revised 2/2013 to Reflect Updates to Measure Production, Housing and Employment Data**
**SFPUC In-City Retail Demand Projection: 2005 - 2035**
**(mgd)**

| **Single Family In-City Retail Demand (mgd)** | **2005** | **2010** | **2015** | **2020** | **2025** | **2030** | **2035** |
|---|---|---|---|---|---|---|---|
| **Basline Demand without Codes or SFPUC Conservation Programs** | **19.6** | **20.3** | **20.4** | **20.5** | **20.5** | **20.6** | **20.9** |
| *Less Savings from Codes* | *0.9* | *1.6* | *2.4* | *3.4* | *4.0* | *4.6* | *5.0* |
| **Adjusted Baseline Demand** | **18.7** | **18.7** | **17.9** | **17.1** | **16.5** | **16.0** | **15.8** |
| *Less Savings from 2005-30 SFPUC Conservation Programs* | *0.0* | *0.6* | *1.3* | *1.6* | *1.7* | *1.7* | *1.5* |
| **Demand with Codes & SFPUC Conservation Programs** | **18.7** | **18.1** | **16.7** | **15.5** | **14.8** | **14.4** | **14.3** |
| ***Savings from Codes & SFPUC Conservation Programs*** | ***0.9*** | ***2.2*** | ***3.7*** | ***4.9*** | ***5.8*** | ***6.3*** | ***6.5*** |
| **Multi Family In-City Retail Demand (mgd)** | **2005** | **2010** | **2015** | **2020** | **2025** | **2030** | **2035** |
| **Basline Demand without Codes or SFPUC Conservation Programs** | **29.8** | **32.1** | **33.0** | **34.7** | **36.2** | **37.9** | **39.7** |
| *Less Savings from Codes* | *1.3* | *2.7* | *4.3* | *6.2* | *7.7* | *9.0* | *10.1* |
| **Adjusted Baseline Demand** | **28.4** | **29.3** | **28.8** | **28.5** | **28.6** | **28.9** | **29.6** |
| *Less Savings from 2005-30 SFPUC Conservation Programs* | *0.0* | *0.2* | *0.6* | *0.8* | *0.9* | *1.0* | *1.0* |
| **Demand with Codes & SFPUC Conservation Programs** | **28.4** | **29.1** | **28.1** | **27.7** | **27.6** | **27.9** | **28.6** |
| ***Savings from Codes & SFPUC Conservation Programs*** | ***1.3*** | ***2.9*** | ***4.9*** | ***7.0*** | ***8.6*** | ***10.0*** | ***11.2*** |
| **Non Residential In-City Retail Demand (mgd)** | **2005** | **2010** | **2015** | **2020** | **2025** | **2030** | **2035** |
| **Basline Demand without Codes or SFPUC Conservation Programs** | **25.7** | **25.2** | **28.9** | **31.4** | **32.0** | **32.8** | **33.9** |
| *Less Savings from Codes* | *0.1* | *0.5* | *1.0* | *1.6* | *1.9* | *2.3* | *2.5* |
| **Adjusted Baseline Demand** | **25.6** | **24.7** | **27.9** | **29.9** | **30.0** | **30.5** | **31.4** |
| *Less Savings from 2005-30 SFPUC Conservation Programs* | *0.01* | *0.50* | *1.45* | *2.17* | *2.51* | *2.79* | *2.70* |
| **Demand with Codes & SFPUC Conservation Programs** | **25.6** | **24.2** | **26.5** | **27.7** | **27.5** | **27.7** | **28.7** |
| ***Savings from Codes & SFPUC Conservation Programs*** | ***0.1*** | ***1.0*** | ***2.5*** | ***3.7*** | ***4.5*** | ***5.1*** | ***5.2*** |
| **Other (mgd)** | **2005** | **2010** | **2015** | **2020** | **2025** | **2030** | **2035** |
| Builders & Contractors, Docks & Shipping | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 |
| **System Losses Excluding Meter Under-Registration (mgd)[1]** | **2005** | **2010** | **2015** | **2020** | **2025** | **2030** | **2035** |
| **Calculated as % of Adjusted Baseline Demand** | 5.0 | 5.0 | 5.1 | 5.2 | 5.2 | 5.2 | 5.3 |
| **Total In-City Retail Demand (mgd)** | **2005** | **2010** | **2015** | **2020** | **2025** | **2030** | **2035** |
| **Basline Demand without Codes or SFPUC Conservation Programs** | **80.3** | **82.8** | **87.7** | **92.0** | **94.2** | **96.7** | **100.0** |
| *Less Savings from Codes* | *2.3* | *4.8* | *7.7* | *11.1* | *13.7* | *15.8* | *17.7* |
| **Adjusted Baseline Demand** | **78.0** | **78.0** | **80.0** | **80.9** | **80.5** | **80.9** | **82.4** |
| *Less Savings from 2005-30 SFPUC Conservation Programs* | *0.0* | *1.3* | *3.3* | *4.6* | *5.2* | *5.5* | *5.2* |
| **Demand with Codes & SFPUC Conservation Programs** | **78.0** | **76.6** | **76.7** | **76.4** | **75.3** | **75.4** | **77.1** |
| ***Savings from Codes & SFPUC Conservation Programs*** | ***2.3*** | ***6.2*** | ***11.0*** | ***15.6*** | ***18.8*** | ***21.3*** | ***22.9*** |
| **Per Capita Demand (Gal/Day/Person)** | | | | | | | |
| Population (1,000) | 787 | 835 | 855 | 875 | 896 | 917 | 963 |
| Basline Demand without Codes or SFPUC Conservation Programs | 102 | 99 | 103 | 105 | 105 | 105 | 104 |
| Adjusted Baseline Demand | 99 | 93 | 94 | 92 | 90 | 88 | 86 |
| Demand with Codes & SFPUC Conservation Programs | 99 | 92 | 90 | 87 | 84 | 82 | 80 |

[1] Meter under-registration losses are included in the retail demands for residential and non-residential sectors.

Meter under-registration losses estimated at 2.2% of residential and 2.1% of non-residential sector demands. System losses exluding meter under-registration estimated at 6.86% of sector demand of the "codes only" demand projection.

**Table 17 - Revised 2/2013 to Reflect Updates to Measure Production, Housing and Employment Data**
**SFPUC In-City Retail Water Demand Projections: 2010 - 2020**
**(mgd)**

| **Single Family In-City Retail Demand (mgd)** | **2010** | **2012** | **2014** | **2016** | **2018** | **2020** |
|---|---|---|---|---|---|---|
| **Basline Demand without Codes or SFPUC Conservation Programs** | **20.3** | **20.3** | **20.3** | **20.4** | **20.4** | **20.5** |
| *Less Savings from Codes* | *1.6* | *1.9* | *2.3* | *2.6* | *3.0* | *3.4* |
| **Adjusted Baseline Demand** | **18.7** | **18.4** | **18.1** | **17.8** | **17.4** | **17.1** |
| *Less Savings from 2005-30 SFPUC Conservation Programs* | *0.6* | *0.9* | *1.1* | *1.3* | *1.5* | *1.6* |
| **Demand with Codes & SFPUC Conservation Programs** | **18.1** | **17.5** | **16.9** | **16.4** | **16.0** | **15.5** |
| ***Savings from Codes & SFPUC Conservation Programs*** | ***2.2*** | ***2.8*** | ***3.4*** | ***3.9*** | ***4.4*** | ***4.9*** |
| **Multi Family In-City Retail Demand (mgd)** | **2010** | **2012** | **2014** | **2016** | **2018** | **2020** |
| **Basline Demand without Codes or SFPUC Conservation Programs** | **32.1** | **32.5** | **32.8** | **33.4** | **34.0** | **34.7** |
| *Less Savings from Codes* | *2.7* | *3.3* | *4.0* | *4.6* | *5.4* | *6.2* |
| **Adjusted Baseline Demand** | **29.3** | **29.1** | **28.9** | **28.7** | **28.6** | **28.5** |
| *Less Savings from 2005-30 SFPUC Conservation Programs* | *0.2* | *0.4* | *0.5* | *0.7* | *0.7* | *0.8* |
| **Demand with Codes & SFPUC Conservation Programs** | **29.1** | **28.7** | **28.3** | **28.0** | **27.9** | **27.7** |
| ***Savings from Codes & SFPUC Conservation Programs*** | ***2.9*** | ***3.7*** | ***4.5*** | ***5.3*** | ***6.1*** | ***7.0*** |
| **Non Residential In-City Retail Demand (mgd)** | **2010** | **2012** | **2014** | **2016** | **2018** | **2020** |
| **Basline Demand without Codes or SFPUC Conservation Programs** | **25.2** | **26.7** | **28.2** | **29.4** | **30.4** | **31.4** |
| *Less Savings from Codes* | *0.5* | *0.7* | *0.9* | *1.1* | *1.3* | *1.6* |
| **Adjusted Baseline Demand** | **24.7** | **26.0** | **27.3** | **28.3** | **29.1** | **29.9** |
| *Less Savings from 2005-30 SFPUC Conservation Programs* | *0.5* | *0.9* | *1.3* | *1.6* | *1.9* | *2.2* |
| **Demand with Codes & SFPUC Conservation Programs** | **24.2** | **25.1** | **26.0** | **26.7** | **27.2** | **27.7** |
| ***Savings from Codes & SFPUC Conservation Programs*** | ***1.0*** | ***1.6*** | ***2.2*** | ***2.7*** | ***3.2*** | ***3.7*** |
| **Other (mgd)** | **2010** | **2012** | **2014** | **2016** | **2018** | **2020** |
| Builders & Contractors, Docks & Shipping | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 |
| **System Losses Excluding Meter Under-Registration (mgd)[1]** | **2010** | **2012** | **2014** | **2016** | **2018** | **2020** |
| **Calculated as % of Adjusted Baseline Demand** | 5.0 | 5.1 | 5.1 | 5.1 | 5.2 | 5.2 |
| **Total In-City Retail Demand (mgd)** | **2010** | **2012** | **2014** | **2016** | **2018** | **2020** |
| **Basline Demand without Codes or SFPUC Conservation Programs** | **82.8** | **84.8** | **86.7** | **88.6** | **90.3** | **92.0** |
| *Less Savings from Codes* | *4.8* | *6.0* | *7.1* | *8.4* | *9.7* | *11.1* |
| **Adjusted Baseline Demand** | **78.0** | **78.8** | **79.6** | **80.2** | **80.5** | **80.9** |
| *Less Savings from 2005-30 SFPUC Conservation Programs* | *1.3* | *2.1* | *2.9* | *3.6* | *4.1* | *4.6* |
| **Demand with Codes & SFPUC Conservation Programs** | **76.6** | **76.6** | **76.6** | **76.6** | **76.5** | **76.4** |
| ***Savings from Codes & SFPUC Conservation Programs*** | ***6.2*** | ***8.1*** | ***10.1*** | ***12.0*** | ***13.8*** | ***15.6*** |
| **Per Capita Demand (Gal/Day/Person)** | | | | | | |
| **Population (1,000)** | 835 | 843 | 851 | 859 | 867 | 875 |
| Basline Demand without Codes or SFPUC Conservation Programs | 99 | 101 | 102 | 103 | 104 | 105 |
| Adjusted Baseline Demand | 93 | 93 | 94 | 93 | 93 | 92 |
| Demand with Codes & SFPUC Conservation Programs | 92 | 91 | 90 | 89 | 88 | 87 |

[1] Meter under-registration losses are included in the retail demands for residential and non-residential sectors. Meter under-registration losses estimated at 2.2% of residential and 2.1% of non-residential sector demands. System losses exluding meter under-registration estimated at 6.86% of sector demand of the "codes only" demand projection.