WATER RECYCLING AND POTABLE REUSE

WHITE PAPER

Bay Area Water Supply and Conservation Agency

July 2017

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1.0 Introduction

BAWSCA's Board and member agencies have an ongoing interest in supplemental water supply opportunities, including those regarding recycled water. Additional documentation on this topic was desired. This white paper was prepared to detail the work being done on recycled water by BAWSCA and its member agencies.

California water agencies, including several BAWSCA member agencies, produce recycled water and rely on it as a component of their overall water supply. Moreover, advanced purified water projects, aimed at producing potable (drinking) water are in the planning stage throughout the BAWSCA service area. The amount of water recycling, for both potable and nonpotable uses, is expected to greatly expand in the coming years.

Water recycling, also known as water reclamation or reuse, is a reliable, economically feasible and environmentally sensitive means to expand California's available water resources and reduce the demand on freshwater systems. Recycled water can be safely used to irrigate landscape, golf courses, crops and freeway medians; replenish groundwater basins; flush toilets; and when injected into coastal groundwater basins, act as a barrier to seawater intrusion.[1] Recycled water is also increasingly being used by industry in cooling processes, new home construction, dust control, and for other purposes.

The California Department of Water Resources notes that over 525,000 acre-feet of wastewater is recycled each year, with about half of that volume (48%) used for agricultural irrigation. Another 20% is used for landscape irrigation, and about 12% for groundwater recharge. In future years, experts predict California will recycle even more wastewater. The state has set a target of achieving close to 1 million acre-feet of recycled wastewater in coming decades. That level of recycling will help toward meeting the needs of California's growing population.[2]

In its 2016 update to the Municipal Recycled Water Resources Management Strategy, the State includes the following introductory comment "California is increasing its integration of municipal recycled water into its water supply portfolio. In some regions of the state, recycled water meets approximately 7 percent of water supply demands…Municipal recycled water benefits the state and individual water users by reducing long-distance water conveyance needs, providing local water supplies, and being a drought-resistant resource."[3]

Although one can point to a continued growth of water recycling throughout California, there are concerns that arise when discussing recycled water opportunities, including:

- Public acceptance - The recent drought in California has led to a broader acceptance of recycled water opportunities and uses. As noted in the media, "as the drought has taken hold in California, opposition to the idea (of recycled water) has been drying up, and recycled water is winning acceptance."[4] However, there are still significant public hurdles associated with the "toilet to tap" concept of using highly-treated wastewater as a source of potable supply.
- Cost - While cost is just one issue to consider, and technologies continue to improve and treatment capabilities expand, it must be noted that recycled water projects are expensive to build and operate, due in no small part to the fact that they are energy intensive.

As work on recycled water continues, both statewide and within the BAWSCA service area, BAWSCA is well positioned to take an active role in helping to promote its use and to help address the concerns that may arise.

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[1] WateReuse studies on these topics can be found at https://watereuse.org/water-reuse-101/fact-sheets/
[2] As referenced in the 2013 California Water Plan, available at http://www.water.ca.gov/waterplan/docs/cwpu2013/Final/Vol3_Ch12_Municpal-Recycled-Water.pdf
[3] http://www.water.ca.gov/waterplan/docs/rms/2016/11_Municpal_Recycled_Water_July2016.pdf
[4] http://www.sacbee.com/news/local/article2595660.html

2.0 Terminology

This section presents a subset of the terms used in this white paper. A more complete glossary of terms commonly used in discussions regarding recycled water is provided in Attachment A. Definitions provided in this document, including Attachment A, were sourced from WaterReUse, a membership-based industry organization whose primary focus is on the topic. WaterReUse promotes consistency in defining terms around recycled water, to assist the understanding of this field.[5]

a. Common Terms

The following terms are used significantly within the text that follows. Note that the terms “reused” and “recycled” are often used interchangeably. Reclaimed water is not considered reused or recycled until it is put to some purpose. It can be reclaimed and be usable for a purpose, but not recycled until somebody uses it.

- **Recycled Water** - treated domestic wastewater that is used more than once before it passes back into the water cycle. Recycled water is not meant for human consumption
- **Water Reuse** – this term is used interchangeably with the term ‘Water Recycling’. An adjective is often applied to the sub-term ‘reuse’ to indicate that advanced treatment is being applied, hence the terms ‘indirect potable reuse’ and ‘direct potable reuse’ (see the discussion below for further details)
- **Direct Potable Reuse (DPR)** water is distributed directly into a potable water supply distribution system downstream of a water treatment plant or into the source water supply immediately upstream of the water treatment plant
- **Indirect Potable Reuse (IPR)** water is blended with other environmental systems such as a river, reservoir, or groundwater basin, before the water is reused
- **Potable Reuse** refers to recycled water you can drink. The reclaimed water is purified sufficiently to meet or exceed federal and state drinking water standards and is safe for human consumption
- **Advanced Purified Water or Purified Water** has passed through proven treatment processes and has been verified through monitoring to be safe for augmenting drinking water supplies. The source water for advanced treatment is often clean water from a wastewater treatment or resource recovery plant. Purification processes can involve a multistage process such as microfiltration, reverse osmosis and advanced oxidation, as well as Soil Aquifer Treatment. Any of these options are capable of producing water quality that has been verified through monitoring to be safe for augmenting drinking water supplies.
- **Full Advanced Treatment (FAT)** is terminology used interchangeably with Advanced Water Treatment, and denote waters that the water used in an IPR scheme has been beyond the secondary treatment level to further purify it. Advanced treatment implies that reverse osmosis and advanced oxidation (or other known and proven treatment technologies) have been applied**.**
- **MGD** is the abbreviation for million gallons per day. This term is often used to describe the volumes of water treated and discharged from a treatment plant
- **Primary Treatment** is a process where solid matter is removed. The remaining liquid may be discharged or subjected to further treatment
- **Secondary Treatment** is a process where dissolved and suspended biological matter is removed to a nonpotable level so that the water may be disinfected and discharged into a stream or river, or used for irrigation at controlled locations

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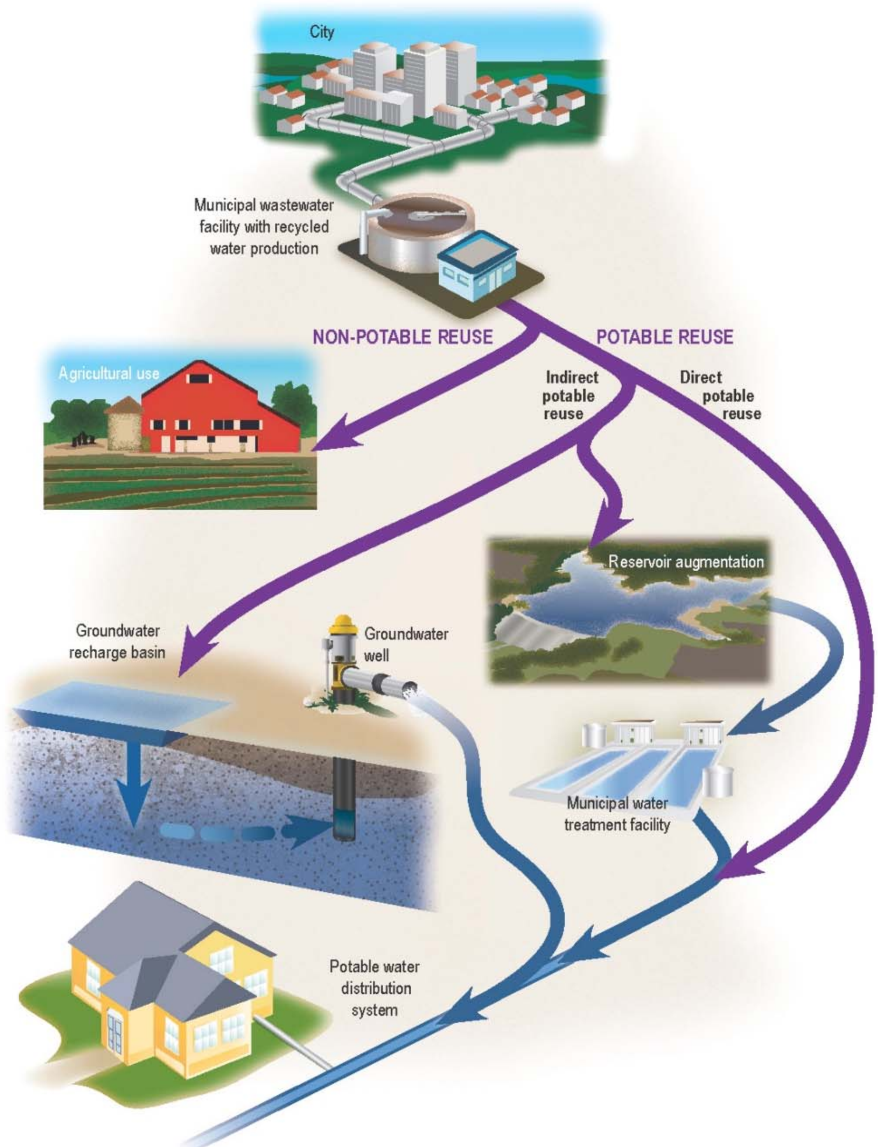
[5] https://watereuse.org/water-reuse-101/glossary/

- **Title 22 Standards** are the water quality requirements established by the State Water Resources Control Board Division of Drinking Water for the production and use of recycled water

Figure 1 graphically depicts many of the terms defined in this section.[6]

Figure 1 – Potable and Non-Potable Recycled Water



[6] http://www.water.ca.gov/waterplan/docs/cwpu2013/Final/Vol3_Ch12_Municpal-Recycled-Water.pdf

3.0 Regulatory Framework

This section provides regulatory information regarding recycled water for nonpotable uses, for indirect potable reuse and for direct potable reuse. Discussion includes details regarding California agencies mandated to serve in oversight role(s). Allowable uses of recycled water for nonpotable use as well as treatment requirements for potable reuse are provided.

a. Regulation Administration

As of July 1, 2014, the administration of the California Drinking Water Program (DWP) was transferred from the Department of Public Health (DPH) to the State Water Resources Control Board (SWRCB). This transfer of responsibility aligned the state's drinking water and water quality programs in an integrated organizational structure to best position the state to both effectively protect water quality and the public health as it relates to water quality, while meeting current needs and future demands on water supplies.

Within the SWRCB, the Division of Drinking Water (DDW) has primary responsibility for regulating the application and use of recycled water. Planning and implementing water recycling projects entails numerous interactions with this regulatory agency prior to project approval.

The DDW establishes the statewide effluent bacteriological and treatment reliability standards for recycled water uses in Title 22 of the California Administrative Code. Under Title 22, the standards are established for each general type of use based on the potential for human contact with recycled water. The DDW is also charged with establishing and enforcing requirements for the application and use of recycled water within the state. Permits are required for each water recycling operation. As part of the permit application process, applicants are required to demonstrate that the proposed recycled water operation will not exceed the ground and surface water quality objectives in a region's basin management plan, and that the proposed project follows Title 22 requirements.

b. Recycled Water

Recycled water has been used in California since the late 1800s. Public health restrictions have been in effect since the early part of the 20th century. The regulations covering recycled water in California are found in California Health and Safety Code (CH&SC) Division 104, Part 12; California Water Code (CWC), Division 7; California Code of Regulations (CCR), Title 22, Division 4; and CCR, Title 17, Division 1, Chapter 5, Group 4.

c. SWRCB Order WQ 2016-0068-DDW

In June of 2016 the SWRCB adopted updated water recycling requirements, Order WQ 2016-0068-DDW.[7] The update was viewed as necessary to further encourage the use of recycled water, given that the State was experiencing a significant drought, and the Governor had identified expanded use of recycled water as one avenue available to address the drought. The new regulations accomplished the following purposes:

- Streamlined permitting for recycled water uses that typically present a relatively low threat to water quality so long as the uses were consistent with Title 22 requirements and pose no unreasonable risk to public health
- Relieved new individual recycled water end users from the requirements to apply for water recycling requirements or individual Waste Discharge Requirements
- Provided coverage for other recycled water uses that are not currently addressed by other Conditional Waivers, General Orders, or Master Reclamation Permits

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[7] https://www.waterboards.ca.gov/board_decisions/adopted_orders/water_quality/2016/wqo2016_0068_ddw.pdf

d. Title 22

Title 22 of the California Code of Regulations defines water-recycling criteria. It includes sections that detail how recycled water, treated to varying degrees, can be applied to irrigate various land surfaces. Title 22 requirements are referenced in the above-noted SWRCB Order.

California has twenty-eight titles in its Administrative Codes.[8] Title 22 contains environmental health regulations, generally known as the "Title 22" standards. Recycled water standards are found in Title 22, Division 4 of the California Administrative Code. First developed in 1978, those standards were last update in June of 2014. They address the types of allowable uses for recycled water, treatment levels, and performance and design parameters.

Recycled water can be treated to varying degrees, and based on that level of treatment it can be put to different uses (the higher the treatment, the more allowable uses). Treatment levels include: disinfected tertiary recycled water (the highest level of treatment); disinfected secondary 2.2 recycled water; disinfected secondary 23 recycled water; and undisinfected secondary recycled water (the lowest level of treatment).

Undisinfected secondary recycled water is suitable for applications that have a very minimal public exposure level, such as irrigation for fodder crops, and there are levels of secondary treatment that can be provided based on desired application. Disinfected tertiary recycled water goes through higher levels of treatment, sufficient for applications with more public exposure, such as irrigation of parks, decorative fountains, or artificial snowmaking for commercial outdoor use.[9]

Table 1 provides a breakdown of approved uses by treatment provided.

[8] https://govt.westlaw.com/calregs/Index?transitionType=Default&contextData=%28sc.Default%29
[9] https://www.waterboards.ca.gov/drinking_water/certlic/drinkingwater/documents/rw_genorder_faq.pdf)

Table 1 - Allowable Uses of Recycled Water (Per State of California Regulations)[10]

<table>
<tr><th rowspan="2">Recycled Water Use</th><th colspan="4">Treatment Level</th></tr>
<tr><th>Disinfected Tertiary Recycled Water</th><th>Disinfected Secondary 2.2 Recycled Water</th><th>Disinfected Secondary 23 Recycled Water</th><th>Undisinfected Secondary Recycled Water</th></tr>
<tr><td colspan="5">Irrigation for:</td></tr>
<tr><td>Food crops where recycled water contacts the edible portion of the crop, including all root crops</td><td rowspan="15">Allowed</td><td rowspan="6">Not Allowed</td><td rowspan="7">Not Allowed</td><td rowspan="13">Not Allowed</td></tr>
<tr><td>Parks and playgrounds</td></tr>
<tr><td>School grounds</td></tr>
<tr><td>Residential landscaping</td></tr>
<tr><td>Unrestricted-access: golf courses</td></tr>
<tr><td>Any other irrigation uses not specifically prohibited by other provisions of the California Code of Regulations</td></tr>
<tr><td>Food crops, surface-irrigated, above-ground edible portion, not contacted by recycled water</td><td rowspan="9">Allowed</td></tr>
<tr><td>Cemeteries</td><td rowspan="8">Allowed</td></tr>
<tr><td>Freeway landscaping</td></tr>
<tr><td>Restricted-access golf courses</td></tr>
<tr><td>Ornamental nursery stock and sod farms with unrestricted public access</td></tr>
<tr><td>Pasture for milk animals for human consumption</td></tr>
<tr><td>Nonedible vegetation with access control to prevent use as a park, playground or school grounds</td></tr>
<tr><td>Orchards with no contact between edible portion and recycled water</td><td rowspan="2">Allowed</td></tr>
<tr><td>Vineyards with no contact between edible portion and recycled water</td></tr>
</table>

[10] https://watereuse.org/wp-content/uploads/2015/05/Title-22-uses-table.pdf

Recycled Water Use	Treatment Level			
	Disinfected Tertiary Recycled Water	Disinfected Secondary 2.2 Recycled Water	Disinfected Secondary 23 Recycled Water	Undisinfected Secondary Recycled Water
Non food-bearing trees, including Christmas trees not irrigated less than 14 days before harvest				
Fodder and fiber crops and pasture for animals not producing milk for human consumption				
Seed crops not eaten by humans				
Food crops undergoing commercial pathogen-destroying processing before consumption by humans				
Ornamental nursery stock, sod farms not irrigated less than 14 days before harvest				
Supply for Impoundment:				
Nonrestricted recreational impoundments, with supplemental monitoring for pathogenic organisms	Allowed[2]	Not Allowed	Not Allowed	Not Allowed
Restricted recreational impoundments and publicly accessible fish hatcheries	Allowed	Allowed		
Landscape impoundments without decorative fountains			Allowed	
Supply for cooling or air conditioning:				
Industrial or commercial cooling or air conditioning involving cooling tower, evaporative condenser, or spraying that creates a mist	Allowed[3]	Not Allowed	Not Allowed	Not Allowed
Industrial or commercial cooling or air conditioning not involving cooling tower, evaporative condenser, or spraying that creates a mist	Allowed	Allowed	Allowed	
Other Uses:				
Groundwater Recharge	Allowed under special case-by-case permits by the RWQCB[4]			
Flushing toilets and urinals	Allowed	Not Allowed	Not Allowed	Not Allowed
Priming drain traps				
Industrial process water that may contact workers				

<table>
<tr><th rowspan="2">Recycled Water Use</th><th colspan="4">Treatment Level</th></tr>
<tr><th>Disinfected Tertiary Recycled Water</th><th>Disinfected Secondary 2.2 Recycled Water</th><th>Disinfected Secondary 23 Recycled Water</th><th>Undisinfected Secondary Recycled Water</th></tr>
<tr><td>Structural fire fighting</td><td rowspan="11"></td><td rowspan="5"></td><td rowspan="5"></td><td rowspan="10"></td></tr>
<tr><td>Decorative fountains</td></tr>
<tr><td>Commercial laundries</td></tr>
<tr><td>Consolidation of backfill material around potable water pipelines</td></tr>
<tr><td>Artificial snow making for commercial outdoor use</td></tr>
<tr><td>Industrial process water that will not come in contact with workers</td><td rowspan="6">Allowed</td><td rowspan="6">Allowed</td></tr>
<tr><td>Industrial boiler feed</td></tr>
<tr><td>Nonstructural fire fighting</td></tr>
<tr><td>Backfill consolidation around nonpotable piping</td></tr>
<tr><td>Soil compaction</td></tr>
<tr><td>Mixing concrete</td><td>Allowed</td></tr>
</table>

Notes:

1. Refer to the latest listing by State of California, Division of Drinking Water, for any updates to this table
2. Allowable with “Conventional tertiary treatment”, however additional monitoring for two years of more is necessary with direct filtration
3. Drift eliminators and/or biocides are required if public or employees can be exposed to mist
4. Refer to Groundwater Recharge Guidelines available from the State of California Link = https://archive.cdph.ca.gov/services/DPOPP/regs/Pages/DPH14-003EGroundwaterReplenishmentUsingRecycledWater.aspx

4.0 Advanced Purification

Efforts are underway in California that expand on the treatment as required under the Title 22 recycled water rules to produce a more purified water (i.e., advanced water purification). Such water is proposed to be for used as a drinking water source either directly or indirectly, following prolonged storage and mixing in either a surface or groundwater body.

For example, the Santa Clara Valley Water District (SCVWD) recently constructed the Silicon Valley Advanced Water Purification Center (SVAWPC), a state-of-the-art treatment facility in San Jose that can produce purified water using microfiltration, reverse osmosis, and ultraviolet disinfection. At this time, purified water from the SVAWPC is blended with tertiary-treated recycled water from the nearby South Bay Water Recycling facility. The blended water improves water quality for nonpotable purposes and allows for a wider variety of uses. This new advanced treatment facility is also being used for potable reuse demonstration testing by the SCVWD. Specifically, SCVWD has identified that the purified water produced at the SVAWPC may serve as a means to augment their groundwater resources.

The discussion that follows details the various advanced water purification options that are being moved forward at the state-level.

a. Indirect and Direct Potable Reuse

Potable reuse is the process of treating water to a level that it is safe to drink (suitable for potable consumption) and reusing that water for drinking. California has developed laws for Indirect Potable Reuse (the process of blending water with other environmental systems such as a reservoir prior to consumption) and is in the process of developing laws for Direct Potable Reuse (the process of treating wastewater to a potable level and introducing it directly into a drinking water distribution system).

Brine is generated as part of the full advanced treatment process (during reverse osmosis). Typically, brine rejection is on the order of 20% of total flow. Therefore, IPR alternatives that require advanced water purification need to take into consideration that waste generation component.

i. Indirect Potable Reuse (IPR)

Indirect Potable Reuse (IPR) is the potable reuse of recycled water through advanced water purification and then an environmental buffer prior to introduction into a drinking water distribution system. Regulations on the introduction of recycled water through IPR groundwater recharge or groundwater replenishment and reuse (GRR) were issued by the SWRCB in 2014. Surface water augmentation (SWA) is the augmentation of potable surface water reservoirs using advanced purified recycled water. Regulations regarding SWA have yet to be finalized.

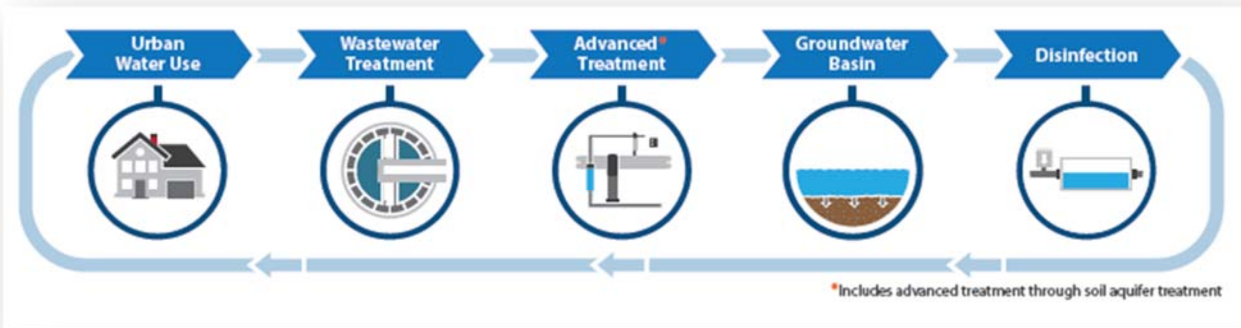
ii. IPR Requirements: Groundwater Recharge

Groundwater replenishment and reuse (GRR) has been implemented for many years, most notably by the Groundwater Replenishment System in Orange County and the Montebello Forebay Project in Los Angeles County. Final GRR regulations were adopted as part of Title 22 and went into effect June 18, 2014. The groundwater recharge regulations are organized by type of project:

- Surface application (surface spreading)
- Subsurface application (injection or vadose zone wells)

Depending on the application (surface spreading or subsurface application), there are differing levels of treatment that DDW requires of the reuse water. More specifically, DDW requires a higher level of treatment for subsurface application of reuse water than for surface application. For subsurface application, full advanced treatment is required prior to injection of water into the ground. For surface application, tertiary treated water can be used, provided that minimum underground retention times (or travel times) are met. Figure 2 provides a schematic of GRR.

Figure 2 – Groundwater Replenishment and Reuse[11]



California has adopted regulations for groundwater recharge IPR projects that address both pathogens and chemical constituents. For pathogens, DDW requires IPR treatment to achieve stipulated reductions in particular pathogens (enteric virus, Giardia cysts, and Cryptosporidium oocysts) present in raw wastewater. Treatment systems are designed considering the various reduction credits that may be applied across the particular treatment processes proposed. For example, a very large groundwater basin that allows the treated reuse water to be mixed and stored with the native groundwater for a long time (many months) before extraction will receive more reduction credits than a smaller groundwater basin where the treated reuse water residence (storage) time is just a few months. The characteristics of the groundwater basin therefore determine the level of advanced treatment that is required.

The regulations also include limits for chemical constituents (e.g., maximum contaminant levels [MCLs]), notification levels (NLs), and other constituents specified by DDW. Monitoring and removal requirements for constituents of emerging concern (CECs) are also specified.

Regarding pathogen control, before a project can be permitted, California requires that the groundwater body be shown as large enough (in size) that pathogen removal is assured (specific logarithmic reduction goals are given in Title 22 for the pathogens of concern). Engineering reports are prepared by the project proponents to demonstrate the log reduction called for by DDW. DDW requires studies of the groundwater residence and mixing time as verification. Actual field studies (using tracers) are accepted, as is numerical modeling and analytical modeling. The regulations require that if a tracer study is performed for field verification, it must be initiated within three months of project start-up.

For surface application projects that use groundwater basins to provide a portion of the water treatment, water must be treated to Title 22 disinfected tertiary effluent standards, and the

[11] Figures 2, 3, 4 and 5 were prepared by WaterReUse to inform legislative efforts regarding water recycling and potable reuse

underground retention time must be at least six months to be credited with the required pathogen reduction.

Within the portions of the BAWSCA member agencies' service areas that are highly developed, it would be difficult to develop surface spreading basins of the size that potentially is needed for GRR. In those areas, GRR IPR would need to utilize groundwater injection.

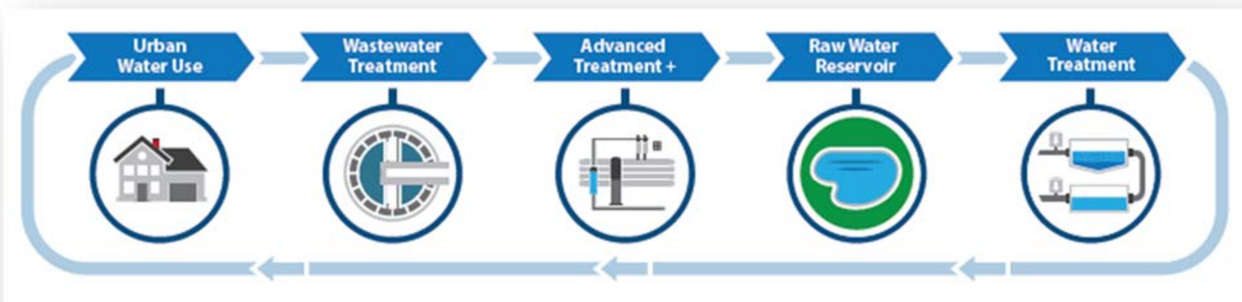
iii. IPR Requirements: Surface Water Augmentation

Per Section 13562 of the California Water Code, the Division of Drinking Water was required to adopt uniform recycling criteria for surface water augmentation (SWA) by December 31, 2016. As of the date of this report, final criteria have not been released. However, based on draft regulations the following requirements are likely:

- Full advanced treatment meeting specified log reduction goals (for pathogens)
- Minimum reservoir retention time of 6 months
- Miscellaneous dilution requirements

The draft regulations will contain additional criteria regarding reservoir ownership stipulations, operational history, modeling, and tracer studies. Figure 3 provides a schematic of SWA.

Figure 3 – Surface Water Augmentation and Reuse



Surface water augmentation is currently being proposed by the City of San Diego at their San Vicente Reservoir.

Similar to the issue facing GRR IPR, there are issues faced within the BAWSCA service area in finding reservoirs of a size such that they provide sufficient retention time and are located close enough to the region's wastewater treatment plants. Reservoirs located outside of BAWSCA's service area (i.e., those operated by SCVWD, EBMUD, etc.) may prove more suitable for SWA.

iv. Direct Potable Reuse

There has been considerable research conducted on direct potable reuse (DPR), where purified water is introduced directly into the raw water supply immediately upstream of a water treatment plant (raw water augmentation DPR) or into a potable water distribution system (finished water DPR and or treated water augmentation DPR). In Dec. 2016, DDW submitted a report to the Legislature on the feasibility of developing uniform water recycling criteria for direct potable reuse.

The DWR feasibility report concluded that it was technically feasible to develop uniform water recycling criteria for DPR. However, the report also identified that additional public health research was needed to enhance the understanding and acceptance of DPR in California. Figure 4 provides a schematic of raw water augmentation DPR and Figure 5 provides a schematic of treated water augmentation DPR.

Figure 4 – Raw Water Augmentation

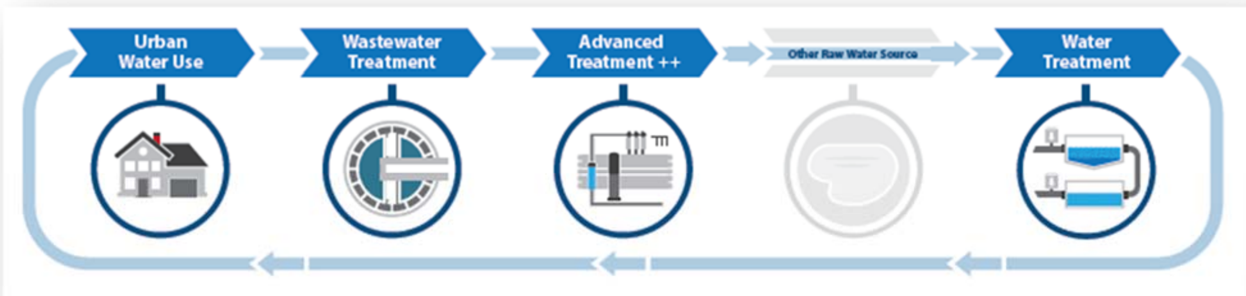


Figure 5 – Treated Water Augmentation

DPR regulations are anticipated to be developed sometime within the next 5 to 10 years. DPR is expected to require full advanced treatment as well as additional treatment redundancy, extensive real-time controls, and possibly some level of engineered storage (i.e., large storage tanks / enclosures).

5.0 BAWSCA Area Wastewater Facilities

A primary driver in the development of recycled water opportunities is related to the relationship that water agencies have (or do not have) with the local wastewater service provider. The greater the cooperation and partnership interest that exists, the more likely that recycled water projects will be evaluated as water supply alternatives and potentially developed.

In the BAWSCA service area, there are some instances where the water utility is also the wastewater service provider (such is the case for the City of Hayward). However, for the most part within the BAWSCA service area, the wastewater service provider is separate from the water utility. Figure 6 is a map of the locations of the wastewater treatment plants that operate within the BAWSCA service area. Table 2 (below) shares pertinent information regarding the wastewater plants.

Table 2 – Wastewater Treatment Plants in the BAWSCA Service Area

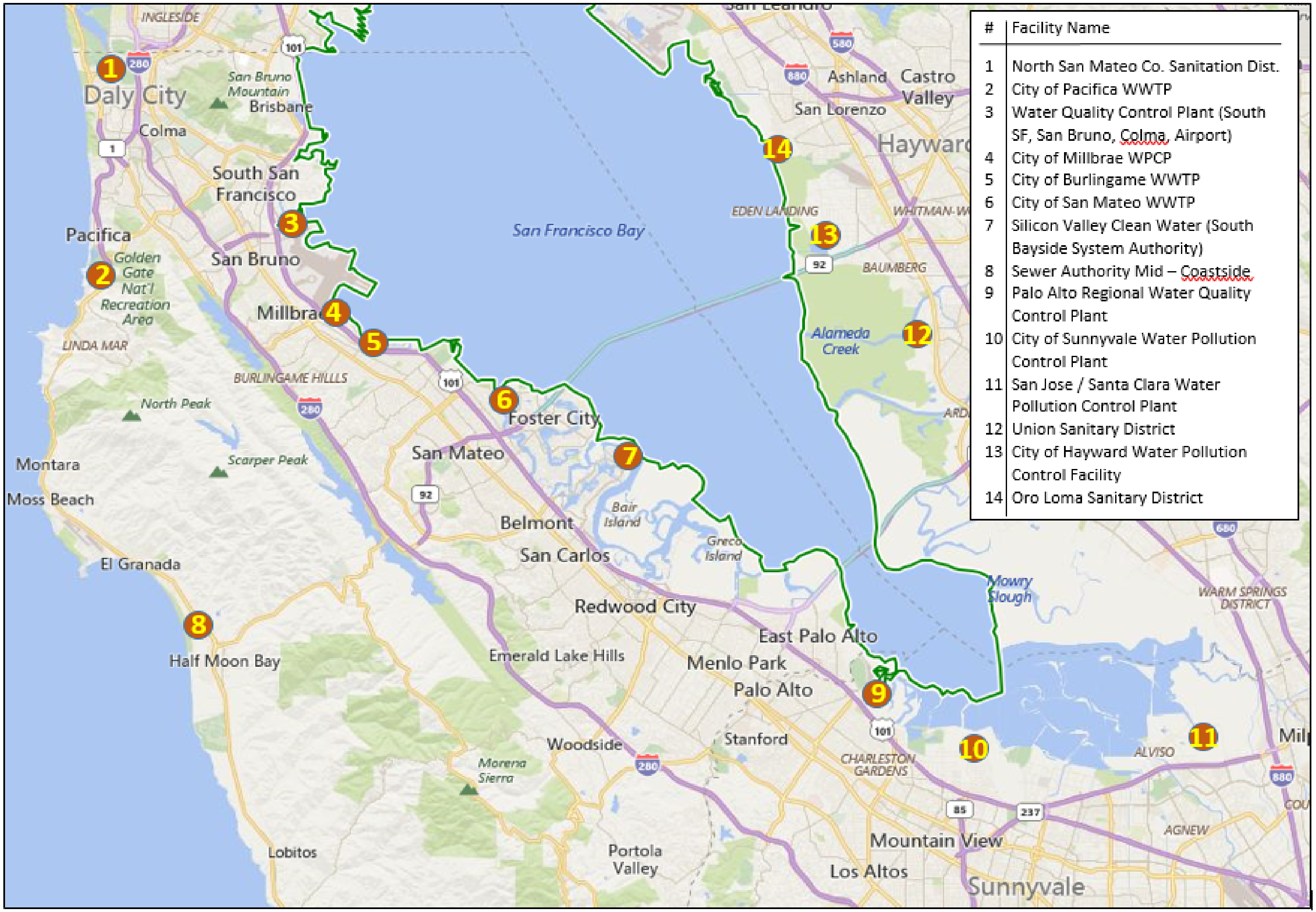
Plant	Information	Dry Weather Avg. Design Flow (MGD)
1. North San Mateo Co. Sanitation District (Daly City)	Contractual agreements with San Francisco, South San Francisco, Colma, the San Francisco County Jail, and the Westborough Water District; the District is operated by the City of Daly City.	8
2. Calera Creek Water Treatment Plant	The City of Pacifica operates the Calera Creek Wastewater Treatment Plant, and recycled water is provided via their Calera Creek Water Recycling Plant (that serves the North Coast County Water District)	4
3. Water Quality Control Plant	Operated by the City of South San Francisco, this facility provides secondary wastewater treatment for the cities of South San Francisco, San Bruno, and Colma. It also provides an outfall to the Bay for the cities of Burlingame, Millbrae, and the San Francisco International Airport prior to discharging the treated wastewater into San Francisco Bay.	13
4. City of Millbrae Water Pollution Control Plant	The City of Millbrae owns and operates their Water Pollution Control Plant (WPCP) to serve its residents.	3
5. City of Burlingame Wastewater Treatment Plant	The City of Burlingame's wastewater treatment plant is operated and maintained by Veolia Water North America through a public-private partnership.	5.5

Plant	Information	Dry Weather Avg. Design Flow (MGD)
6. City of San Mateo Wastewater Treatment Plant	The City of San Mateo and Foster City/EMID jointly own the San Mateo Wastewater Treatment Plant through a Joint Powers Agreement (JPA) and San Mateo operates the plant as the Lead Agency of the JPA. The facility treats wastewater for the citizens of the City of San Mateo and Foster City/EMID, in addition to surrounding communities, including Crystal Springs County Sanitation District, a portion of unincorporated San Mateo County, and the southern portion of Hillsborough. Foster City/EMID owns 25 percent of the WWTP.	15.7
7. Silicon Valley Clean Water (formerly South Bayside System Authority)	SVCW's Wastewater Conveyance System takes wastewater from each of the JPA member agencies (Belmont, San Carlos, Redwood City, and West Bay Sanitary District) collection systems and pumps the wastewater to its wastewater treatment plant located adjacent San Francisco Bay at the northeast end of Redwood Shores. The individual members of the JPA own and operate the sanitary sewer collection systems within their respective jurisdictions, and West Bay Sanitary District (WBSD) also owns the existing Flow Equalization Facility (FEF) which can be used to store their wastewater during wet weather conditions. SVCW owns and operates the wastewater treatment plant (WWTP) as well as the conveyance system force main and pump stations that convey the sewage to the treatment plant.	29
8. Sewer Authority Mid – Coastside (SAM)	SAM was founded as a Joint Powers Authority in 1976 to provide wastewater treatment services to its member agencies: the City of Half Moon Bay, the Granada Sanitary District, and the Montara Sanitary District. SAM also provides contract services to clean and maintain the sewer collection system and lift stations for the member agencies.	4
9. Palo Alto Regional Water Quality Control Plant	Owned and operated by the City of Palo Alto, the Plant treats wastewater for the communities of Los Altos, Los Altos Hills, Mountain View, Palo Alto, Stanford University and the East Palo Alto Sanitary District.	39
10. City of Sunnyvale Water Pollution Control Plant	The City of Sunnyvale Water Pollution Control Plant (a.k.a, the Donald M. Somers Water Pollution Control Plant) is an advanced wastewater treatment facility serving residents, businesses and industries in the city of Sunnyvale.	29.5

Plant	Information	Dry Weather Avg. Design Flow (MGD)
11. San Jose / Santa Clara Water Pollution Control Plant	The San Jose / Santa Clara Water Pollution Control Plant is a regional advanced wastewater treatment plant that serves the following eight cities and four sanitation districts: Cities of San Jose, Santa Clara, Milpitas, Cupertino Sanitary District (Cupertino), West Valley Sanitation District (Campbell, Los Gatos, Monte Sereno, and Saratoga), County Sanitation Districts 2-3 and Burbank Sanitary District (both unincorporated). The Facility is jointly owned by the cities of San Jose and Santa Clara, and is managed and operated by the City of San Jose's Environmental Services Department.	167
12. Union Sanitary District	Union Sanitary District operates the wastewater treatment facility in Union City and provides collection, treatment and disposal services for the residents of Fremont, Newark and Union City, California.	33
13. City of Hayward Water Pollution Control Facility	The City of Hayward Water Pollution Control Facility (WPCF) is a class IV plant that provides secondary treatment to flows from Hayward. Note that a portion of the wastewater generated in Hayward flows to OLSD (vs. to the City's Water Pollution Control Facility). Treated wastewater from Hayward's Water Pollution Control Facility is discharged to the Bay via the East Bay Dischargers Authority's Deepwater Outfall	18.5
14. Oro Loma Sanitary District	OLSD serves the communities of unincorporated Alameda County, including San Lorenzo, Ashland, Cherryland, Fairview, portions of Castro Valley, and designated areas of the Cities of Hayward and San Leandro. Oro Loma serves approximately 47,110 customers within the District's jurisdiction, comprised of: 45,836 residential (97.3%); 1,271 commercial and light industrial (2.69%), and 3 significant industrial users (0.01%). Treatment services are also provided to approximately 21,400 customers from Castro Valley and the Cities of San Leandro and Hayward. Treated wastewater from OLSD is discharged to the Bay via the East Bay Dischargers Authority's Deepwater Outfall.	20

Note: the locations of each plant are shown on Figure 6.

Figure 6 – Wastewater Treatment Plants within the BAWSCA Service Area



6.0 BAWSCA Interest in Recycled Water

This section presents the overall context for a discussion of the reasoning behind BAWSCA's continued interest in the development and promotion of nonpotable and potable recycled water opportunities.

a. Long Term Reliable Water Supply Strategy Implementation

In 2009, BAWSCA launched the Long Term Reliably Water Supply Strategy (Strategy). BAWSCA's water management objective is to ensure that a reliable, high-quality supply of water is available where and when people within the BAWSCA member agency service area need it. The purpose of the Strategy is to quantify the water supply reliability needs of the BAWSCA member agencies through 2040, identify the water supply management projects and/or programs (projects) that could be developed to meet those regional water reliability needs, and develop an implementation plan for the Strategy. Successful implementation of the Strategy is essential to ensuring that there will be reliable water supplies for the BAWSCA member agencies and their customers in the future.

The Strategy findings were shared with the BAWSCA Board on January 15, 2015, and the five recommended actions presented in the Strategy serve to guide BAWSCA in developing projects to meet BAWSCA's water management objectives. The need to develop and follow a Strategy was a part of BAWSCA's annual Work Plans since FY 2009-10. The Strategy continues to be a part of BAWSCA's Work Plan activities and will continue to be in future years. Efforts by BAWSCA staff on recycled water projects, including indirect potable reuse opportunities, are consistent with the Strategy. In addition to working with member agencies on their nonpotable recycled water projects, BAWSCA is interested in advanced water purification and will continue to provide input as a stakeholder and as a project partner in several projects with the SFPUC.

b. Recent BAWSCA Board Interest

During the discussion that took place at the January 19, 2017 Board Meeting regarding development of the FY 2017-18 Work Plan, the Board expressed interest in greater focus on recycled water project opportunities. There was the desire to have BAWSCA staff further assist member agencies as they embarked upon recycled water projects, promote regional potable reuse partnership opportunities, and to become more involved in State legislation and regulatory development surrounding recycled water.

The adopted FY 2017-18 work plan reflects this increased focus with the following elements:

- Regular focused communications to the BAWSCA Board and member agencies on project opportunities and issues surrounding recycled water
- Continued participation in existing water recycling and reuse partnership opportunities
  - BAWSCA currently has two MOUs for feasibility studies with multiple partners
- Participation in specific statewide discussions
  - BAWSCA joined WateReUse in February of 2017 to keep current with ongoing legislation
  - BAWSCA will leverage participation in WaterReUse and the Association of California Water Agencies to participate as appropriate in statewide discussions

In addition, it was determined that it was important to document the significant strides related to recycled water made in the years since the Phase II Final Strategy Report was published in February 2015. This white paper is a means to accomplish that documentation need.

7.0 SFPUC Interest in Recycled Water

The SFPUC has responsibilities and obligations regarding the commitments they've made to BAWSCA member agencies. Those commitments entail addressing their contractual water supply obligations, as well as working to make interruptible customers permanent, if a new supply can be secured. Several potential project opportunities are being pursued, currently at a pre-feasibility level, to identify if and how IPR opportunities can be developed to assist in meeting obligations and or augmenting supply requirements. In each case, BAWSCA is a separate and independent partner with SFPUC as they investigate these opportunities.

a. SFPUC WaterMAP

The SFPUC has compiled information to begin developing a water supply program for the 2019 to 2040 planning horizon. This planning effort is called the 2040 Water Management Action Plan (WaterMAP). The SFPUC intends that the WaterMAP will guide its efforts to continue to meet its commitments and responsibilities to its customers, including the BAWSCA member agencies.

In the WaterMAP document, five key questions are posed to guide the SFPUC's water supply planning through 2040.

1. How should the SFPUC maintain delivery reliability while addressing reductions in supply availability caused by new instream flow requirements?
2. What options should the SFPUC consider to make the City of San Jose a permanent customer of the Regional Water System?
3. What options should the SFPUC consider to make the City of Santa Clara a permanent customer of the Regional Water System?
4. What options should the SFPUC consider to provide an additional supply to meet East Palo Alto's projected demands above the Individual Supply Guarantee?
5. Should the SFPUC revise its current performance objective on rationing to increase drought year reliability of the Regional Water System?

The SFPUC's WaterMAP includes prioritized water supply needs as shown in Table 3.

Table 3 – SFPUC's WaterMAP - Prioritized Needs

Prioritized Water Supply Needs Identified in the WaterMAP		Quantity of Need
1	Meeting existing obligations to existing permanent customers.	3.5 mgd
2	Meet new obligations to existing permanent customers.	1.5 mgd
3	Make current interruptible customers permanent.	9 mgd
4	Meet increased demands of interruptible customers.	5.5 mgd
5	Revise current performance objective on rationing to increase drought year reliability (no action proposed in the short-term).	

To identify how best to address priorities 3 and 4, the SFPUC has started to review purified water opportunities.

- The SFPUC, in partnership with BAWSCA, is working with the Santa Clara Valley Water District on a portion of their Expedited Purified Water Program, to determine the feasibility of partnering on indirect potable reuse in the future
- The SFPUC together with BAWSCA and California Water Service Company (Cal Water) are reviewing a reuse opportunity in partnership with Silicon Valley Clean Water (SVCW) treatment plant in Redwood Shores

Details regarding the above examples are shared in Section 8 of this white paper.

There are other opportunities that SFPUC and BAWSCA have discussed as follows:

- In December of 2016 BAWSCA and the SFPUC met with the City of San Mateo regarding the potential to develop an IPR project using effluent from the City's Wastewater Treatment Plant. A portion of that project has since been investigated within the above-mentioned SVCW study, the details of which are described in Section 8 of this white paper
- In the fall of 2016, as part a Recycled Water Feasibility Study effort, ACWD identified an opportunity to partner with SFPUC, BAWSCA and Union Sanitary District on an IPR project. Some initial discussions have taken place, and the concept was included in the Bay Area Regional Reliability (BARR) Drought Contingency Plan (DCP), discussed in Section 9 of this white paper

8.0 BAWSCA Efforts Related to Recycled Water Including Partnerships

This section provides details regarding BAWSCA's efforts on potable reuse feasibility studies through FY 2017-18. Appendix C includes the Memorandum of Agreements (MOAs) as entered for the two potable reuse feasibility studies detailed in this section.

a. Current Work Underway

BAWSCA is presently working on two studies of IPR opportunities that, when developed, could provide water supply benefits to BAWSCA member agencies. Both projects are early in their respective feasibility study stages and both efforts include multiple partners. Details about the efforts are provided below.

i. SCVWD-SFPUC-BAWSCA IPR Partnership

As part of its long-range water supply planning efforts, SCVWD's Expedited Purified Water Program (Program) is currently evaluating the potential to develop 45,000 acre-feet per year ("AFY") or 40 million gallons per day ("MGD") of purified water capacity by 2025 to augment water supply in Santa Clara County via indirect and potential direct potable reuse. That supply would be used to augment the water supply they derive from their existing groundwater and State Water Project sources. The Program is part of SCVWD's strategy to respond to the drought, which prompted increasing urgency for SCVWD to expedite the Program to mitigate the risk of land subsidence and salt water intrusion.

As part of its Program, SCVWD may develop capacity to produce additional water supplies that could be available to the BAWSCA member agencies common to the SCVWD. The SFPUC and SCVWD both share eight "common customers" in Santa Clara County, and those customers are BAWSCA member agencies. Further, the SFPUC-SCVWD system intertie, located in the City of Milpitas, can help facilitate partnership efforts and participation in a joint project.

In March 2017, SCVWD, SFPUC and BAWSCA (Parties) entered into an MOU for a planning feasibility study. The feasibility study will determine whether a water supply project can be developed to mutually benefit the Parties and provide greater water supply reliability. The project has the potential to provide between 5 and 15 mgd of new water supply to SFPUC and the BAWSCA member agencies, while providing SCVWD with the financial benefit resulting from increased use of their purified water facilities.

The feasibility study includes two distinct phases:

1) Prepare an initial screening with sufficient information for the Parties to determine whether to proceed with continued analysis of a water supply project(s) to supply between 5-15 MGD in excess of SCVWD's needs, which can be made available to SFPUC/BAWSCA agencies within Santa Clara County.

2) If the initial screening demonstrates that a project(s) is viable, prepare a technical memorandum specifying in detail an arrangement in which the SFPUC/BAWSCA can commit financial and other resources to the SCVWD in exchange for the right to receive 5-15 MGD from SCVWD's Program, should the SCVWD decide to implement that program.

SCVWD is the lead on the study. The estimated cost of the feasibility study is $59,000, which will be split between SCVWD and SFPUC, with the BAWSCA agencies' share of the study collected through the Wholesale Revenue Requirement. Completion of the feasibility study is anticipated in FY 2017-18.

The approved scope of work excerpted from the MOU is provided in Attachment B

ii. Silicon Valley Clean Water Potable Reuse Exploratory Plan (PREP)

In early 2015, BAWSCA began discussions on potable reuse opportunities with Silicon Valley Clean Water (SVCW), a water resource recovery facility for Belmont, San Carlos, Redwood City, and West Bay Sanitary District. SVCW currently provides approximately 2 mgd of tertiary treated recycled water to Redwood City for nonpotable reuse purposes. SVCW's interest in potable reuse was driven by anticipated new effluent regulations from the San Francisco Regional Water Quality Control Board to reduce the concentration of nutrients in its effluent. To address these new regulations, SVCW identified recycled water as an option to reduce effluent nutrient concentrations, reduce costs to treat, and help reduce nutrients to the Bay.

In November 2016, BAWSCA entered an MOU with Cal Water, SFPUC, and SVCW to study the potential opportunities for potable reuse and develop a Potable Reuse Exploratory Plan (PREP).

The PREP is evaluating the feasibility of producing highly treated, potable quality, recycled water (i.e., advanced purified water) near the Silicon Valley Clean Water wastewater treatment facilities and using an environmental buffer to reuse it (i.e., indirect potable reuse). That water would be transported via distribution lines for storage and mixing in the local groundwater basin (via GRR) or in local surface water reservoirs (via SWA). The PREP will explore the benefits, challenges, and feasibility of potable reuse to address water supply reliability concerns and drought preparedness through development of a drought-proof water supply.

As noted earlier in this white paper, IPR regulations for groundwater replenishment and reuse were adopted in 2014 and there is some information regarding what the likely regulations will be regarding surface water augmentation. Both options are being considered as part of the scope of work. As regulations for DPR are likely several years out, DPR is not being considered at this time as part of the work effort.

Early in the development of the PREP, the partners were approached by the City of San Mateo. San Mateo operates a wastewater treatment plant just north of the SCVW facility. The partners agreed to consider, as part of the PREP evaluation, the possibility to expand the project to include highly treated wastewater from both the San Mateo WWTP as well as from SVCW.

The not-to-exceed cost for the PREP feasibility study was originally $56,000, of which $31,000 was paid by SFPUC, with the BAWSCA agencies' share of the study collected through the Wholesale Revenue Requirement. The cost of expanding the study to include a preliminary investigation of the San Mateo WWTP effluent (an $8,000 study expense) was covered by Cal Water and the City of San Mateo. The PREP is anticipated to be complete in Fall 2017. The project scope of work excerpted from the MOU is provided in Attachment B.

Additional phases of the work may follow dependent on recommendations for next steps included as part of the PREP final report.

9.0 Bay Area Regional Reliability (BARR)

Inspired to better leverage existing resources and assets, eight of the region's largest water agencies formed the Bay Area Regional Reliability (BARR) partnership to collectively tackle drought issues. Partnership principles were adopted in 2014 and a Memorandum of Agreement was executed in 2015.

As a work product, BARR agencies prepared a Drought Contingency Plan (DCP) — funded in part by a grant from the U.S. Bureau of Reclamation — to identify drought mitigation and response measures at a regional, integrated perspective, taking stock of BARR agencies' existing water resources and assets and exploring new strategies to improve drought resilience.

Fifteen drought mitigation measures are identified in the DCP that utilize or expand existing assets, while also providing some new facilities — such as interties, storage, and treatment — to fully leverage those assets. More details on each project can be found on the BARR website.[12]

Four of the 15 drought mitigation actions involve IPR opportunities, including both BAWSCA partnership opportunities described in Section 8. Another project included in the DCP is a potential partnership between ACWD, SFPUC, BAWSCA and the local wastewater service provider, Union Sanitary District. BAWSCA supports this project and has been included in discussions between ACWD and SFPUC about moving forward on this project.

The project summary that appears in the BARR DCP is provided in Figure 7.

[12] Website = http://www.bayareareliability.com/

Figure 7 – ACWD-SFPUC IPR Project (BARR)

ACWD-SFPUC Intertie and IPR

ALAMEDA COUNTY

This project builds on the ACWD-SFPUC Intertie and Local Supply (BARR Drought Mitigation Measure 3a), which involves constructing an intertie pipeline and booster pump station to enable water transfers from ACWD's Newark Brackish Groundwater Desalination Facility (NDF) to SFPUC's Bay Division Pipeline (BDP) during normal or wet years.

To address the dry-year constraint, this variation on the project involves constructing a 4 million gallons per day (mgd) facility providing advanced treatment to effluent from the Union Sanitary District Alvarado Wastewater Treatment Plant for indirect potable reuse (IPR). ACWD could inject the newly purified water into the Niles Cone Groundwater Basin and/or infiltrate it in the Quarry Lakes Groundwater Recharge System, thus allowing for more brackish groundwater to be extracted and treated at the NDF.

While Union Sanitary District's wastewater flows could produce up to 15 mgd of advanced treated water, ACWD cannot accommodate that level without massively redesigning the water supply system. Further, since ACWD alone cannot use more than approximately 4 mgd given projected demands, the additional supply could benefit SFPUC (and other regional partners) if transferred.

While the intertie pipeline would be located in Newark, proximate to ACWD's NDF, the location for an advanced water treatment facility has not yet been identified.

AT A GLANCE

PROJECT TYPE	Intertie
STATUS	Conceptual
ENGAGED BARR AGENCIES	ACWD, BAWSCA, and SFPUC
AVAILABILITY	All years
POTENTIAL YIELD	Dry years: 4,480 to 17,000 AFY Normal/wet years: 10,000 to 22,600 AFY
COST	Capital: $93M to $500M O&M: TBD (high)

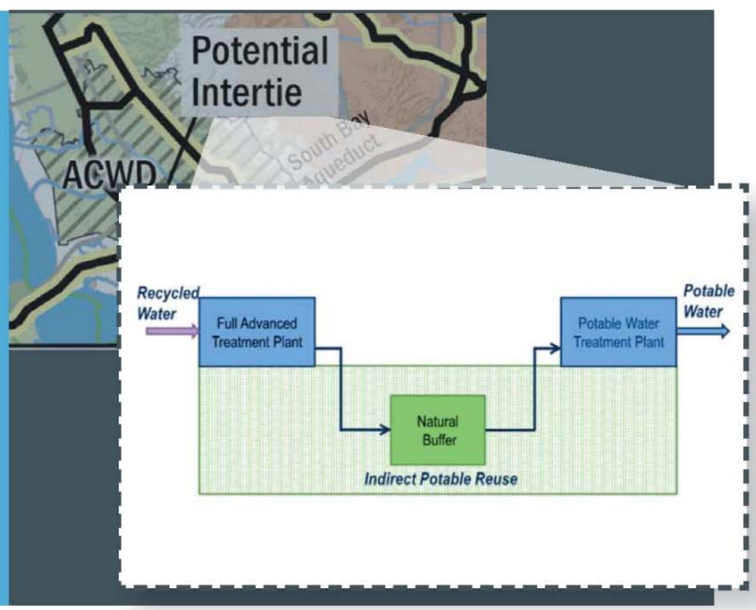


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Figure 7 Continued - ACWD–SFPUC IPR Project (BARR)

Water Supply Yield and Availability

Enables treatment and conveyance of about 4,480 to 17,000 AFY in dry years and about 10,000 to 22,600 AFY in normal and wet years.

Regional Resilience

Facilitates water transfers from ACWD to SFPUC to provide emergency supply and/or to bank water within SFPUC's storage reservoir system for both agencies to use in all year types. Increases supply reliability and resilience to droughts, climate change impacts, planned outages, Delta levee failures, and other emergencies (e.g., earthquakes). ACWD and SFPUC have not conducted mutual water supply reliability analyses.

Efficiency

Leverages NDF's available treatment capacity. Connects existing water and wastewater system infrastructure. Stretches existing supply sources and recovers wastewater as a new, local, drought-resistant supply.

Flexibility/Sustainability

Provides ability for bi-directional transfers between ACWD and SFPUC in both wet and dry years. Increases flexibility for in-lieu exchanges and transfers using excess delivery capacity in SFPUC's system turnouts to ACWD.

Water Quality Considerations

Requires evaluation to determine the impact of blending and ensure that water quality stability is not affected (e.g., ensure corrosion protection to transmission and distribution pipelines; minimize potential taste and odor issues). Anticipated to maintain/improve groundwater quality in ACWD's Niles Cone Groundwater Basin (because of increased desalination of trapped brackish groundwater).

Advanced treatment, stabilization, and monitoring of purified water would protect groundwater quality from brackish inflow, dilute micro-contaminants already present in the native groundwater, and decrease nutrient discharges to the San Francisco Bay.

Timing

This project is in the conceptual phase and could be implemented within 5 to 10 years.

Implementability

Constructing the intertie pipeline necessitates permits. An operating plan and booster pump station would also be needed to address the differential in system operating pressures—SFPUC's BDP operating pressure (141 psi) exceeds that of ACWD's system (80 psi).

Additional limnological studies would be needed to evaluate the effect of advanced treated water for IPR into Quarry Lakes given its current use as park facility recreational activities and beneficial uses including human contact (e.g., swimming and fishing).

Social and Environmental Considerations

The project may provide environmental benefits by reducing demand on surface water supplies within ACWD's service area. Any additions or modifications to water supply would involve outreach and communications with customers. The partner agencies would conduct studies to ensure appropriate measures are taken to continue the recreational beneficial uses at Quarry Lakes and to provide related customer communications.

BENEFITS

- Leverages existing supply sources and connects existing infrastructure for exchanges/transfers.
- Increases water supplies in emergencies, planned outages, and droughts.
- Increases resilience to climate change and future Delta constraints.
- Increase groundwater quality (because of increased reclamation of trapped brackish groundwater).

CHALLENGES

- Warrants significant customer outreach and communications before modifying water supply..
- Requires an evaluation of the impacts of IPR discharges to Quarry Lakes.

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10.0 BAWSCA Member Agency Efforts in Recycled Water

This section presents updated information on recycled water programs for the BAWSCA agencies. This summary was prepared by using information from agency-specific water resource planning documents, primarily the most recent updates of the respective agencies' urban water management plans.

Table 2 provides a listing of which BAWSCA members currently have recycled water projects, use recycled water and/or have active recycled water programs. Figure 8 shows the locations of these agencies.

Table 4 - BAWSCA Members with Active Recycled Water Programs

Agency	Current (2015-16) Recycled Water Production (MGD)[1,5]
Burlingame	0.30
Daly City	0.19
Hayward	1.5[2]
Millbrae	0.02
Milpitas	0.67
Mountain View	0.41
North Coast CWD	0.03[3]
Palo Alto	0.73
Redwood City	0.58
San Jose	0.71
Santa Clara	3.05
Stanford	0.01[4]
Sunnyvale	0.80

Notes:

1 *In some cases, recycled water produced was slightly less than the potential demand (and/or ability to produce) due to statewide drought-related use restrictions.*

2 *The City of Hayward currently produces recycled water and provides that supply to Russell City Energy Center (1.5 mgd on average; 2.1 mgd on peak summer days in calendar year 2015). That number is not included by Hayward in their demand and water use documentation in Hayward's 2015 urban water management plan.*

3 *North Coast CWD's service area used a nominal amount of recycled water in FY 2015-16.*

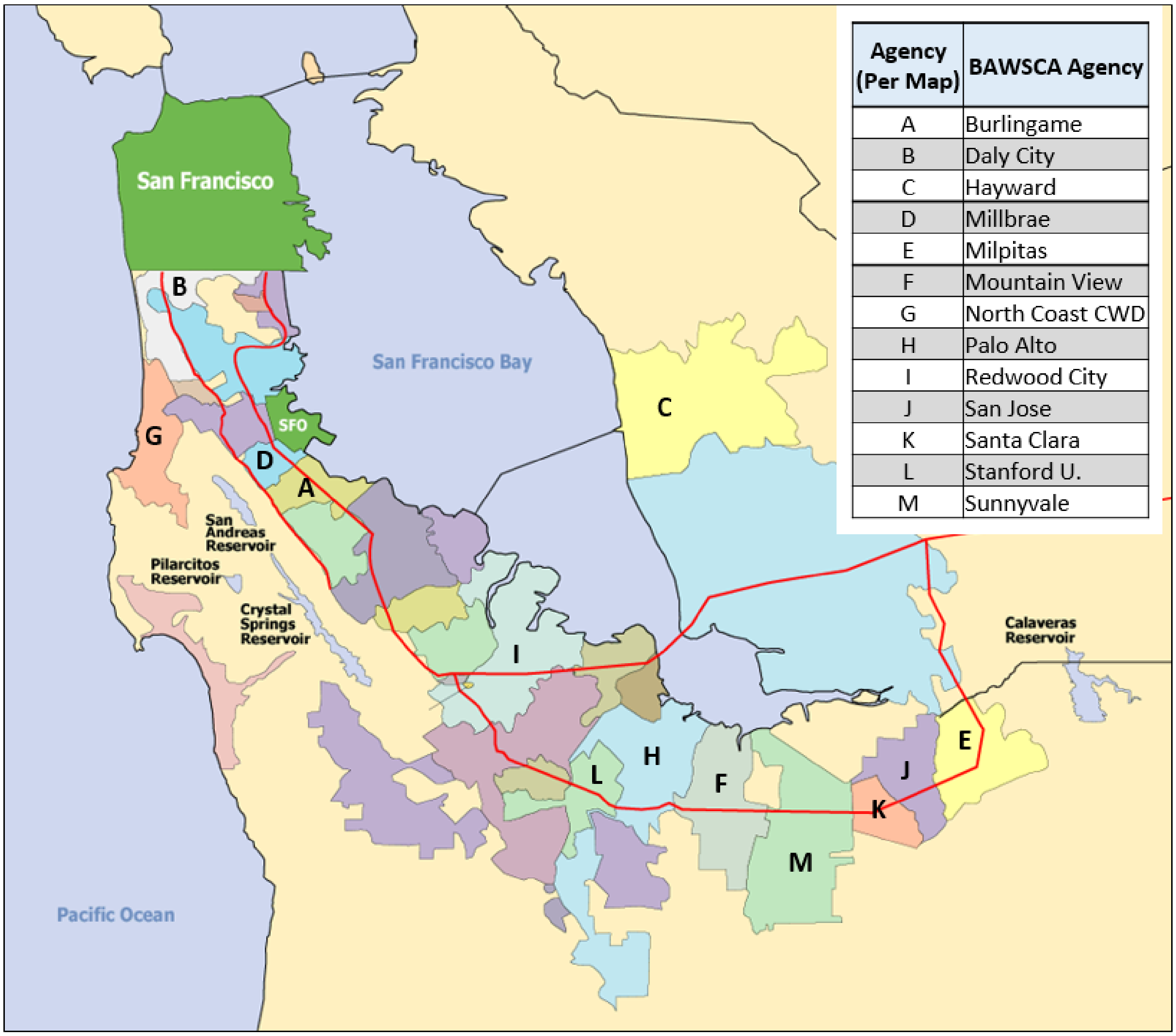
4 *Stanford University has an active recycled water program (details provided later in this section).*

5 *The sum of these values differs from the numbers shown in BAWSCA's FY 2015-16 Annual Survey due to the inclusion of information provided by Stanford University and the inclusion of City of Hayward's recycled water production quantity, both of which are not reported in BAWSCA's Annual Survey.*

As listed in Table 4, 13 of BAWSCA's 26 member agencies have recycled water as part of their water supply portfolio. Additional agencies may be considering future recycled water projects a to meet a portion of their nonpotable water supply needs. Some agencies can more readily incorporate recycled water into their supply portfolio if they are part of an organization that also has wastewater services and treatment. Agencies that include both water suppliers and wastewater treatment services may have greater opportunity to produce recycled water directly versus having to enter into agreements with separate wastewater agencies.

Specific details regarding the recycled water operations of the above member agencies can be found in their respective 2015 Urban Water Management Plans. UWMPs can be found on each member agencies website. The following discussion summarizes recycled water program information that is detailed in those UWMPs.

Figure 8 - BAWSCA Agencies with Active Recycled Water Programs



Agency (Per Map)	BAWSCA Agency
A	Burlingame
B	Daly City
C	Hayward
D	Millbrae
E	Milpitas
F	Mountain View
G	North Coast CWD
H	Palo Alto
I	Redwood City
J	San Jose
K	Santa Clara
L	Stanford U.
M	Sunnyvale

a. Burlingame

The City of Burlingame uses approximately 300,000 gallons per day (gpd) of recycled water for internal use within their wastewater treatment plant. Burlingame has not historically used recycled water outside of their wastewater treatment plant and does not currently have the treatment capabilities to meet the Title 22, Article 3 criteria for reuse of the recycled water for nonpotable uses such as irrigation.

b. Daly City

In 2004, Daly City completed a $7.5 million tertiary treatment project at the North San Mateo County Sanitation District's (NSMCD) wastewater treatment plant. The upgrades provided Daly City with an unrestricted tertiary recycled water capacity of approximately 3,100 AFY (2.77 MGD). Daly City currently uses approximately 1,200 AFY of its unrestricted tertiary recycled water. The recycled water program pumps recycled water for irrigation of four golf courses (Olympic Club—two courses, San Francisco, and Lake Merced), two city parks (Westlake and Marchbank) and median strips along John Daly Boulevard, Junipero Serra Boulevard and the Westlake off ramp. Additionally, the delivery of recycled water to Harding Park began in October 2012.

Daly City and SFPUC are pursuing the feasibility of an "Expanded Tertiary Recycled Water Facilities Project," a facility that would be separate from the one detailed above, and produce approximately 3 mgd. The proposed project would provide recycled water to customers in the Town of Colma, including cemeteries, city parks, schools, and a golf course. The expanded recycled water capacity could also potentially contribute to groundwater recharge.

c. Hayward

Hayward's current recycled water system provides secondary treated wastewater to the Russell City Energy Center (RCEC), owned by Calpine Corporation. The RCEC, located adjacent to Hayward's water pollution control facility (WPCF), is a 600-megawatt natural gas-fired combined cycle energy generation facility. The RCEC initiated operations in August 2013. The RCEC's permit to operate, issued by the California Energy Commission, requires the facility to use recycled water for cooling. Hayward and RCEC entered an agreement whereby Hayward delivers secondary treated wastewater, which is further treated by the RCEC to tertiary level, in accordance with Title 22 requirements. RCEC's recycled water use is a directly beneficial use as defined in the California Code of Regulations.

In 2015, Hayward delivered 569 MG to the RCEC, an average of 1.5 mgd. During the peak summer months (June through September), deliveries averaged about 2.1 mgd. Hayward anticipates that future quantities will increase, however, they note that future deliveries are difficult to determine with certainty, because the RCEC operates on demand, and demand can be impacted by factors such as weather conditions and how many other plants are operating at the time. Hayward has assumed for planning purposes that average deliveries to RCEC could reach 2.5 mgd in future years.

In addition to recycled water use at RCEC, Hayward plans to implement a recycled water project to deliver tertiary treated wastewater to other customers within an approximately 2-mile radius of their WPCF. A project at that facility could deliver an estimated 90 million gallons of recycled water per year, an annualized average of about 250,000 gpd, to 22 customers. Most customers would use the recycled water for irrigation, with some industrial uses for cooling towers and boilers. All the current and planned uses of recycled water by Hayward are direct beneficial uses in accordance with California Water Code §13050(f).

d. Millbrae

The City of Millbrae's current recycled water use is limited to applications onsite at the water pollution control plant. The recycled water is used to wash down and clean equipment, including the bar screens and clarifiers, and for dust control at the facility. The total monthly volume of recycled water used onsite is 9 million gallons. Recycled water for this purpose is planned to continue indefinitely.

e. Milpitas

The City of Milpitas does not treat wastewater, but instead pumps its wastewater, consisting primarily of industrial and sanitary discharge, through two force mains to the San Jose/Santa Clara Water Pollution Control Plant (WPCP), also known as the San Jose/Santa Clara Regional Wastewater Facility (RWF).

Wastewater treatment is provided by agreement with the cities of San Jose and Santa Clara (as joint owners of WPCP). Under terms of the agreement, Milpitas pays a capital share (in proportion to the City's 14.25 mgd capacity rights and the total plant capacity) and pays an operating cost share based on discharge volumes to WPCP. WPCP is one of the largest advanced wastewater treatment facilities in California, treating an average of 110 million gallons of wastewater per day from over 1.4 million residents and 17,000 main business connections, encompassing the cities of San Jose, Santa Clara, Milpitas, Campbell, Cupertino, Los Gatos, Saratoga, and Monte Sereno. Most of the final treated water is discharged into the South San Francisco Bay. Approximately 13% is supplied to South Bay Water Recycling (SBWR) for distribution to customers.

As a tributary agency to the WPCP, the City of Milpitas has rights to the recycled water purveyed by SBWR. Milpitas purchases recycled water from SBWR through a contract with the City of San Jose. Milpitas operates and maintains the recycled water distribution facilities within City boundaries through a contract with the City of San Jose, whereby Milpitas provides day-to-day operational services and helps to comply with recycled water permit requirements within the city.

The City of San Jose in coordination with SCVWD recently completed the SBWR Strategic and Master Plan, which describes and quantifies potential uses of recycled water throughout the SBWR service area and addresses technical and economic feasibility of the potential uses, including nonpotable and potable alternatives.

There are two golf courses within Milpitas – Spring Valley Golf Course and Summitpointe Golf Club – which currently rely on raw water deliveries of South Bay Aqueduct water from SCVWD for their irrigation. Due to the drought, SCVWD curtailed its deliveries to these two entities, and Milpitas, SCVWD, the Santa Clara County Parks Department (which owns the land operated by Spring Valley Golf Course), Spring Valley Golf Course and Summitpointe Golf Club are collaborating on plans to extend recycled water infrastructure to these golf courses. The recycled water extensions to the golf courses would be coordinated with the Milpitas Recycled Water Pipeline Extension Project, which will extend the existing recycled water infrastructure to the eastern side of Milpitas allowing existing potable water irrigators to convert to recycled water.

Even though recycled water is not subject to drought restrictions, Milpitas, like other recycled water retailers, has seen a decrease in recycled water use during the most recent drought.

f. Mountain View

Mountain View uses tertiary treated recycled water from the Palo Alto Regional Water Quality Control Plant (RWQCP) for irrigation in the North Bayshore Area.

In addition to Mountain View's flows, the RWQCP also treats wastewater generated by the communities of Palo Alto, East Palo Alto, Los Altos, Los Altos Hills, Stanford University, and Moffett Field (the latter conveyed through Mountain View's system). The RWQCP is designed for an average dry-weather wastewater flow capacity of 39 mgd with full tertiary treatment. Average flow in 2015 was 18.4 mgd. The RWQCP uses a multi-step process to filter, clean, and disinfect wastewater so that it can safely be discharged to the Bay or used for irrigation and other approved nonpotable uses.

Current wastewater generation for Mountain View is 6.4 mgd (7,129 AF). The RWQCP operates under the terms of a 1968 agreement (Partner's Agreement) in which the cities of Mountain View and Los Altos agreed to retire their treatment plants and partner with the City of Palo Alto to construct a regional treatment plant. The RWQCP provides recycled water through a 2007 agreement that delineates the cost sharing of the original system construction and allocates 3.0 mgd of recycled water to Mountain View at no cost through 2035, concurrent with the expiration of the Partner's Agreement. In October 2015, Mountain View's City Council authorized staff to negotiate an amended contract to:

- Implement and fund facilities rehabilitation and construction
- Increase system backup and reliability
- Establish a cost allocation method for generating recycled water
- Continue salinity reduction efforts
- Extend the life of the agreement to 2060

Mountain View's recycled water distribution system includes 5.5 miles of recycled water mains, serving areas north of U.S. Route 101 and west of California Route 237. There are currently 50 customer connections to the Mountain View's recycled water distribution system.

In 2014, Mountain View completed a study to determine the feasibility of expanding the existing recycled water system to increase recycled water use and improve system reliability. The study identified five possible alternatives for expansion based on current and expected recycled water demand throughout the entire city. The recommended expansion alternative alignment extends from Mountain View's existing recycled water mains on Charleston Road and Crittenden Lane, through NASA Ames and Moffett Field, under U.S. Route 101 and into the Middlefield-Ellis-Whisman area of Mountain View. Recycled water uses considered in the 2014 study included irrigation, toilet flushing, and cooling towers both inside and outside of Mountain View's water service area where recycled water may be feasible in the future.

g. North Coast County Water District

The City of Pacifica owns and operates the Calera Creek Water Recycling Plant (Calera Creek Plant) which produces tertiary recycled water from Pacifica's wastewater collection system. North Coast CWD receives a portion of the total amount of tertiary recycled water produced annually from the Calera Creek Plant, under an Agreement with Pacifica. North Coast CWD began receiving recycled water from the plant, and began delivering the tertiary recycled water to customers for irrigation use in August 2013.

North Coast CWD's recycled water customers in Pacifica include the SFPUC (Sharp Park Golf Course), Fairway Park, Oceana High School, and the Ingrid B. Lacy Middle School. In 2015, North Coast CWD also began offering recycled water, for irrigation use, to residential customers. It established a recycled water filling station at its main office, where residents of Pacifica can obtain recycled water for irrigation use, subject to special permitting and training requirements regarding the use of recycled water.

North Coast CWD delivered approximately 10.6 million gallons of recycled water to customers in 2015.

h. Palo Alto

The City of Palo Alto operates the Regional Water Quality Control Plant (RWQCP), a wastewater treatment plant, for the East Palo Alto Sanitary District, Los Altos, Los Altos Hills, Mountain View, Palo Alto, and Stanford University. Wastewater from these communities is treated by the RWQCP prior to discharge to the Bay. Approximately 220,000 people live in the RWQCP service area. Of the wastewater flow to the RWQCP, about 60 percent is estimated to come from residences, 10 percent from industries, and 30 percent from commercial businesses and institutions. The RWQCP uses physical, biological, and chemical treatment to remove about 99 percent of the solids and organic materials from influent wastewater.

In 1992, the City and the other RWQCP partners completed a Water Reclamation Master Plan (Master Plan). This Master Plan identified a five-year, three-stage implementation for recycled water development in the service area of the RWQCP.

The recycled water produced by the RWQCP in FY 2015 was used for the following:

- Trucked water mostly for irrigation with some construction dust control (25 AF)
- Irrigation water for Palo Alto Parks (28 AF)
- Irrigation water for the Palo Alto Municipal Golf Course (166 AF)
- Water for the Duck Pond (29 AF)
- Irrigation water for CalTrans freeway landscape medians (11 AF)
- The pipeline serving Shoreline Park and other customers in Mountain View (410 AF)
- Water for irrigation in and around the RWQCP and in processes at the plant itself. The amount of recycled water that replaces potable water for this use (560 AF). That usage is about 112 AF/Y for landscape irrigation and about 448 AF/Y for industrial use

Total industrial water use for the plant is about 1,960 AF/Y. Because the water is recirculated through the plant, it was assumed approximately 20% of the total water use is newly recycled water, the amount of fresh water that would need to be continuously added if recycled water was not available. Due to the drought, actual recycled water use in Palo Alto in 2015 was slightly lower than the projection in the 2010 UWMP (818 AF versus 850 AF).

On September 28, 2015 the Palo Alto City Council adopted a resolution certifying the Environmental Impact Report (EIR) for an expansion of the existing recycled water distribution system. The primary objectives of extending the recycled water pipeline would be:

- To allow Palo Alto to maximize recycled water as a supplemental water source, thereby improving potable water supply reliability by conserving drinking water
- To provide a dependable, drought-proof locally controlled nonpotable water source
- To increase recycled water use from the RWQCP and reduce discharge to San Francisco Bay
- To reduce reliance on imported water

In 2016, the City of Palo Alto in collaboration with the Santa Clara Valley Water District embarked on a recycled water strategic planning process. The scope of work includes an updated evaluation of expanding the recycled water distribution system to the Stanford Research Park considering current and projected irrigation demands, construction costs, and funding opportunities. An IPR feasibility study for Northwest Santa Clara County will be done by performing a groundwater use assessment and determining the impact on the aquifer of increased pumping and potential recharge operations. The Recycled Water Strategic Plan is scheduled for completion in early 2019.

i. Redwood City

In 2000, Redwood City used approximately 1,000 AFY more water than its Individual Supply Guarantee (ISG), which is the quantity of supply as made available under a contract with the SFPUC. To accommodate future housing, employment, and population growth within Redwood City, the city initiated a water recycling program and an aggressive water conservation program to reduce water demands and to meet both current and future water needs.

A pilot recycled water program began in 2000 and successfully provided approximately 0.25 mgd of recycled water to customers in the eastern end of Redwood Shores. In 2002, a Feasibility Study was prepared for Redwood City's recycled water program that included an assessment of the city-wide recycled water market and project alternatives. In August 2003, the Redwood City Council approved the recycled water project. Design and construction of the recycled water project was initiated in 2004.

The Redwood City recycled water project has a design capacity of up to 3,238 AFY of average annual demand, and includes the option to export recycled water to neighboring communities. The recycled water project has been implemented in two phases. Phase I of the project included the design and construction of facilities to serve customers east of Highway 101 in Redwood Shores and the Greater Bayfront Area. Phase II of the project will expand the recycled water service area west of Highway 101 to downtown Redwood City. The Stanford in Redwood City Project, a development project located at 425 Broadway, will also annex to the Phase II area of the project. Redwood City has completed construction of Phase I and Phase II buildout is expected by the year 2030. The facilities installed to date were constructed to supply the initial phases of the project, up to 2,000 AFY, while providing the flexibility to deliver up to 3,238 AFY in the future.

Approximately 712 AFY of recycled water was used by Redwood City in 2015. Most of the recycled water use (675 AFY) was for landscape irrigation purposes. The remaining 37 AFY was used by industrial customers for construction. Approximately 45 AFY was used on Silicon Valley Clean Water's property for landscape impoundment and on-site dust control. That use was not considered as an offset to potable water demands since the impoundment was not previously supplied by potable water. As of January 2016, the recycled water system served 156 irrigation sites and eight non-irrigation sites within the existing recycled water system.

Recycled water use in Redwood City also includes Recycled water distributed by the city's Recycled Water Fill Station Program. In the drought year of 2015, the program distributed 1.4 AFY to 107 residential participants and distributed 21 AFY to 21 commercial properties.

j. San Jose

The City of San Jose began implementing a major water recycling program, known as the South Bay Water Recycling (SBWR) Program, under the auspices of the San Jose / Santa Clara Regional Water Facility's (RWF) National Pollutant Discharge Elimination System Permit. The program was developed to protect the salt marsh habitat of two federally protected endangered species, the salt marsh harvest mouse and the California clapper rail, by reducing effluent flows from the Plant into the wetlands of the South Bay. A further benefit of this program was the development of a drought-proof supply of water, which augments local and imported water supplies.

The SBWR system and distributes recycled water generated by RWF. Some of this water is being supplied to the Santa Clara Valley Water District's (SCVWD) adjacent Silicon Valley Advanced Water Purification Center (formerly known as the Advanced Recycled Water Treatment Facility), which in turn purifies the water with advanced technologies and blends it with tertiary treated water to create high quality recycled water that can be used by a wider variety of customers. Since March 2014, the purification center has been demonstrating the effectiveness of the advanced treatment technologies (microfiltration, reverse osmosis, and advanced oxidation) and setting the stage for the SCVWD to begin a potable reuse program. Potable reuse involves using purified water to augment groundwater or surface water supplies. The SBWR Strategic and Master Plan (Strategic Plan), which discusses nonpotable and potable reuse opportunities, is available from SCVWD. The SBWR program delivers disinfected tertiary treated wastewater from the RWF through an extensive recycled water distribution system consisting of over 105 miles of pipeline. The recycled water is used for nonpotable purposes such as agriculture; industrial cooling and processing; and irrigation of golf courses, parks, and schools. During the peak summer season, SBWR diverts between 15 and 20 MGD of recycled water for irrigation and industrial uses to over 700 customers throughout San Jose, Santa Clara, and Milpitas.

In 2010 SCVWD projected that by 2015 their nonpotable recycled water use would be 18,680 AF and that it would increase to 29,180 AF by 2030. Actual 2015 nonpotable recycled water use was over 20,000 AF and the current projection for 2030 is 27,600 AFY.

In 2010 the City of San Jose projected that they would use 5,148 AF of recycled water. However, the actual recycled water use in 2015 was 3,607 AF, about 43 percent lower than projected. The actual total potable and recycled water use in 2015 was about 66 percent lower than water demands as projected in 2010, largely attributed to short term water restrictions and drought response.

Currently, the cities of San Jose, Santa Clara and Milpitas promote recycled water usage through a variety of mechanisms, including:

- Lower cost of recycled water than potable water
- SBWR obtains regulatory approval for recycled water usage
- The cities of San Jose, Santa Clara, and Milpitas have ordinances requiring the use of recycled water for irrigation where available
- San Jose prohibits the use of potable water for uses appropriate to recycled water
- Support developers' expansion of system to areas where recycled water is unavailable

SCVWD is evaluating the potential potable reuse of recycled water. Within the San Jose Municipal Water System (SJMWS) service area, use of recycled water will continue to expand as additional distribution facilities are constructed by developers as needed to supply recycled water to fulfill their water needs. SJMWS anticipates increased recycled water usage within the service area as identified in the SBWR Strategic and Master Plan. Infrastructure enhancements, including potable reuse options will be evaluated to determine the most optimal use of available wastewater. The South Bay Water Recycling Program's Strategic and Master Plan, which discusses nonpotable and potable reuse opportunities, is available by contacting SCVWD.

k. Santa Clara

Recycled water within the City of Santa Clara is supplied from the jointly owned San Jose-Santa Clara Regional Wastewater Facility (RWF). The South Bay Water Recycling Program was initiated to reduce the discharge of treated water flowing from the RWF into the San Francisco Bay. A past Plant discharge permit placed a discharge limit of 120 mgd during the summer ("dry-weather flow") to help maintain the salt marsh habitat of the south bay. Thus, the RWF formed South Bay Water Recycling (SBWR), which purchased the City of Santa Clara's recycled water system and now is the regional recycled water wholesaler within the RWF service area. SBWR provides oversight, promotes recycled water, operates the recycled water distribution system, and provides technical guidance to recycled water customers.

Recycled water is currently used within Santa Clara for irrigation at golf courses, parks, landscape street medians and schools. Several industries use recycled water in industrial processes, cooling towers and for toilet flushing in dual plumbed buildings. The largest users of recycled water are California Paperboard, the Santa Clara Golf and Tennis Club, the Don Von Raesfeld Power Generation Facility and Air Products, combining for 1,462 acre-feet (476.4 MG) in 2015. Although recycled water has been used in some industrial processes, the predominant use for recycled water remains irrigation.

The existing recycled water distribution system was laid out to maximize service to large potential recycled water customers. Recycled water sales have grown dramatically since the inception of the system. The recent economic recession resulted in a softening of recycled water sales in Santa Clara, however, the expansion of the recycled water distribution system is projected to result in continued growth of recycled water use. With an increased demand for recycled water for cooling towers in data centers, a projected uptake in usage is highly likely.

The City and SBWR are working with potential customers along the pipeline extensions to encourage, and in some instances, require recycled water use for irrigation and/or cooling towers. Some additional customers may be provided with recycled water once additional recycled water distribution mainline extensions are completed. Many of these potential customers represent a very small percentage of the potential recycled water sales. Due to the high cost of distribution system extensions and retrofit costs, Santa Clara has found it was typically not cost effective to convert smaller potential users to recycled water use.

All new developments that occur within a reasonable distance of the existing or proposed recycled water distribution system will be required to provide a landscape irrigation system and/or cooling towers constructed for the use of recycled water. Several infill projects may be developed along the recycled water distribution system that is currently in place. Future recycled water use in the City of Santa Clara is expected to grow to nearly 6,900 AFY in 2040.

l. Stanford University

Stanford University (Stanford) planned domestic water demand reduction measures in the Stanford Water Conservation, Reuse and Recycling Master Plan (published in 2003). One of the most involved conservation measures in the 2001 Master Plan was the re-use of cooling tower blow-down water from the on-campus Cogeneration Facility. This project was initiated in 2009, ultimately supplying an average of 13,000 gpd for flushing high efficiency toilets and urinals in nearby newer academic buildings, including Environment and Energy Building (Y2E2), Li Ka Shing Center for Learning (LKSC), Lokey Stem

Cell Research Building (SIM1), Huang Engineering Center (HEC), Spilker Engineer and Applied Sciences, Shriram Center for Bioengineering and Chemical-engineering, and Knight Management Center – Graduate School of Business. These buildings are dual-plumbed to use reclaimed water for toilets and urinals. In 2015, the Cogeneration Facility was decommissioned and replaced with the Stanford Energy System Innovations (SESI) Central Energy Facility. The installation of the facility greatly reduced potable water use on campus but also eliminated the available supply for recycled water. While the source of recycled water was lost in 2015, the dual plumbing infrastructure remains intact; as new sources of recycled water emerge, these buildings will be among the first to implement its use.

Stanford Water Resources and Civil Infrastructure group (and Land, Buildings, and Real Estate department) has partnered with the department of Civil and Environmental Engineering (CEE) in the construction and operation of the Codiga Resource Recovery Center (CR2C), which will enable CEE to expand its research of wastewater treatment processes. The facility opened in the early part of 2017 and is undergoing testing. Stanford will utilize findings to inform a policy regarding recycled water future potential use on campus.

m. Sunnyvale

The City of Sunnyvale has developed a recycled water program that serves parks, golf courses and the landscaping needs of diverse industries within their service area. A wastewater reclamation program was developed in 1991 when Sunnyvale first identified short-term goals of recycling wastewater of 20% to 30% of high-quality effluent from the Sunnyvale Water Pollution Control Plant (Plant). The long-term goal of the city as stated in their 2000 Recycled Water Master Plan is to reuse 100% of all wastewater (15 MGD) generated from the Plant to reduce all flows to the bay. In 2013, Sunnyvale performed a feasibility study to evaluate expansion of the recycled water program. The study looked at various alignments to expand the system within the city as well as neighboring cities, improve distribution system reliability, and improve recycled water production capabilities to meet increased demand.

Sunnyvale's current recycled water system consist of the Water Pollution Control Plant (WPCP) pump station, the San Lucar tank and pump station, the Sunnyvale Golf Course pump station and approximately 18 miles of recycled water pipelines ranging in diameter from 6- to 36-inches. The system now supplies 124 connections within the city limits as well as Moffett Field. Major customers include Baylands Park, Twin Creek Sports Complex, Lockheed/Martin Area, and the Sunnyvale Municipal Golf Course.

The use of recycled water provides for the following benefits to Sunnyvale:

- Potable water users benefit as this decreases reliance on imported supply
- All Sunnyvale residents benefit from securing a long-term adequate water supply to sustain economic growth and ensure public health
- Recycled water users benefit by avoiding strict conservation requirements and water use restrictions during times of drought and by paying less than the cost of potable water
- All water users benefit from bringing in another water source to augment supplies
- Area wetlands benefit from reduced fresh water discharges into the saline wetlands

The 2013 feasibility study as referenced above identified recycled water system pipeline alignments based on existing customers with dedicated landscape meters, location of other major customers and demand clusters, and proximity of potential customers to the existing recycled water pipeline. Four alignment/connection types were developed and include:

- **Wolfe Road Main:** This pipeline is intended to extend the recycled water system to the south to capture potential users along the Sunnyvale-Cupertino boundary, including the Apple Campus 2 that could ultimately use more than 500 AFY
- **Main Loop:** This alignment is intended to loop the existing recycled water system to provide reliability, connect to future storage tank site(s), and provide opportunity for further expansion and recycled water use along the alignment
- **Potential Recycled Water Alignments:** These alignments are intended to capture outlying potential high demand users that are not located along the mainline or Wolfe Road alignments. These alignments generally extend to a specific high demand user or cluster of users and attempts to pick up as many viable users along the way
- **Infill Connections:** Customers that have been identified along the existing recycled water pipelines and do not require pipeline extensions, but rather only retrofits of the sites to receive recycled water

Sunnyvale plans to build the alignments in four Phases as part of their Capital Improvement Program. Estimates of recycled water demand for sites within the city have been based on actual or projected irrigation use, as determined by the review of city water billing records. For sites outside Sunnyvale, estimates are based on the facility area or by comparison to other similar sites within the city. Pipeline alignments were selected to minimize overall piping requirements, and to accommodate a phased approach to construction.

Sunnyvale has a phased approach to build alignments to reach customers. The potential demand for full build out is 2,061 AFY with an estimated cost of $432.2 million. Additional capital investment is needed for treatment, pumping, and storage facility improvements to support the expansion of the recycled water system. Therefore, the capital costs associated with treatment, pumping, and storage range from $99.5M to $114.1M.

Dividing the overall recycled water system expansion project into multiple phases and assigning project prioritization serves to create a Capital Improvement Plan (CIP) that is more fiscally manageable by implementing improvements over time and as they are necessary to further develop the recycled water system.

Non-irrigation uses such as stream flow augmentation and groundwater recharge represent long-term options and solutions that could potentially accommodate large amounts of recycled water flow. Such potable reuse activities are being evaluated by SCVWD, in its capacity as the groundwater management agency for Santa Clara County.

11.0 BAWSCA Strategy Moving Forward for Recycled Water

In FY 2017-18, BAWSCA is implementing the following three Strategy actions related to water reuse, including nonpotable recycled water as well as IPR and DPR:

- **Element 1** - Continue to work with regional partners (SFPUC, SCVWD, and other agencies including BAWSCA member agencies) on furthering studies aimed at identifying and evaluating opportunities for the use of purified water (i.e., IPR and DPR)
- **Element 2** - Track legislative efforts and regulations related to IPR and DPR in California (through participation in technical organizations such as WateReUse) to stay current on requirements
- **Element 3** – Stay engaged with BAWSCA member agencies to remain current regarding their plans and efforts as associated with the continued development of recycled water opportunities.

Regular updates to the BAWSCA Water Management Representatives and the Board will continue to be provided on key developments in the Strategy actions described above.

ATTACHMENT A

Glossary

Glossary

a. General Terms

The terms “reused” and “recycled” are often used interchangeably. Reclaimed water is not considered reused or recycled until it is put to some purpose. It can be reclaimed and be usable for a purpose, but not recycled until somebody uses it.

- **Recycled Water** - treated domestic wastewater that is used more than once before it passes back into the water cycle. recycled water is not meant for human consumption
- **Water Reuse** – this term is used interchangeably with the term ‘Water Recycling’. An adjective is often applied to the sub-term ‘reuse’ to indicate that advanced treatment is being applied, hence the terms ‘indirect potable reuse’ and ‘direct potable reuse’ (see the discussion below for further details)

b. Uses and Delivery Methods

- **Augmentation** is the process of adding reclaimed water into an existing raw water supply (such as a reservoir, lake, river, wetland, and/or groundwater basin)
- **Beneficial Reuse** is the use of reclaimed water for purposes that contribute to the water needs of the economy and/or environment of a community
- **Groundwater Recharge** occurs naturally as part of the water cycle and/or is enhanced by using constructed facilities to add water into a groundwater basin
- **Irrigation** is the physical application of water to land to assist in the production of crops or landscape
- **Potable Water** is drinking water that meets or exceeds state and federal drinking water standards
- **Retrofit** is the process of constructing and separating potable and recycled water pipelines that allows reclaimed water to be used for nondrinking purposes. This also includes the process of preparing customer use sites for recycled water use

c. Water Reuse Options

These are various technical words or terms, often interchangeably used, to explain the different options for water reuse that a community could choose from.

- **De-facto, Unacknowledged or Unplanned Potable Reuse** occurs when water intakes draw raw water supplies downstream from discharges of clean water from wastewater treatment plants, water reclamation facilities, or resource recovery facilities
- **Direct Potable Reuse (DPR)** water is distributed directly into a potable water supply distribution system downstream of a water treatment plant or into the source water supply immediately upstream of the water treatment plant
- **Indirect Potable Reuse (IPR)** water is blended with other environmental systems such as a river, reservoir, or groundwater basin, before the water is reused
- **Nonpotable Reuse** refers to reclaimed water that is not used for drinking, but is safe to use for irrigation, industrial uses, or other non-drinking water purposes

- **Planned Potable Reuse** is publicly acknowledged as an intentional project to reclaim water for drinking water. It is sometimes further defined as either direct or indirect potable reuse (see definitions below)
- **Potable Reuse** refers to recycled water you can drink. The reclaimed water is purified sufficiently to meet or exceed federal and state drinking water standards and is safe for human consumption

d. Water Types and Quality

Terms used to define the types of water or different qualities of water are given below:

- **Advanced Purified Water or Purified Water** has passed through proven treatment processes and has been verified through monitoring to be safe for augmenting drinking water supplies. The source water for advanced treatment is often clean water from a wastewater treatment or resource recovery plant. Purification processes can involve a multistage process such as microfiltration, reverse osmosis and advanced oxidation, as well as Soil Aquifer Treatment. Any of these options are capable of producing water quality that has been verified through monitoring to be safe for augmenting drinking water supplies
- **Greywater** is the term used to describe water segregated from a domestic wastewater collection system and reused on site. This water can come from a variety of sources such as showers, bathtubs, washing machines, and bathroom sinks. It contains some soap and detergent, but is clean enough for nonpotable uses. Many buildings or individual dwellings have systems that capture, treat and distribute greywater for irrigation or other nonpotable uses
- **Raw Water** is surface or groundwater that has not gone through an approved water treatment process
- **Reclaimed Water** is used water that has been treated to be fit-for-purpose for reusing or recycling
- **Reused Water** is water used more than once and has been treated to a level that allows for its reuse for a beneficial purpose
- **Sewage** is the used water of household and commercial businesses that contains human waste. Distinguished from industrial wastewater. Sewage can be used interchangeably with wastewater
- **Wastewater** is the used water of a community or industry that contains dissolved and suspended matter. There are different types of wastewater: domestic, commercial, and industrial
- **Domestic Wastewater/Sewage** is used water from washing food, dishes, clothes and bodies, and for toilet flushing. The used water that goes down the drain or is flushed down the toilet is called sewage. Because a considerable amount of water is used to carry away only a quite small quantity of waste, domestic sewage is mostly water. It is referred to as “wastewater” in most places
- **Industrial Wastewater and Commercial Wastewater/Sewage** is the liquid waste generated by industries, small businesses and commercial enterprises and can be discharged to a sewer upon approval of a regulating authority. Some industrial wastewater may require pretreatment before it can be discharged into the sewer system, while other industrial and commercial wastewaters are explicitly excluded. Controlling the release of harmful chemicals into the wastewater collection system is known as Source Control

e. Treatment Technology

There are words used to describe the different types of Water Purification Treatment Technology that can be used to create reclaimed water:

- **Advanced Oxidation** is one of the processes that can be used as a safety barrier in the water purification process. Hydrogen peroxide, ultraviolet (UV) light and other processes are used in combination to form a powerful oxidant that provides further disinfection of the water and breaks down the remaining chemicals and microorganisms and provides further disinfection of the water
- **Dual Media Filtration** is a filtration method that uses two different types of filter media, usually sand and finely granulated anthracite
- **Granular Activated Carbon** is used to remove chemicals that are dissolved in the used water
- **Multi-barrier Processes** are purification processes that consist of several barriers to ensure sufficient reduction and/or elimination of the various substances that need to be controlled. As in all processes, monitoring is important to check that the processes are working properly and efficiently. Membrane filtration, reverse osmosis, advanced oxidation, riverbank filtration, Soil Aquifer Treatment, and constructed wetlands all may be parts of a multi-barrier purification process. Not all of these processes are needed in all situations
- **Ozonation** is the process of applying ozone (03) for the disinfection of water. Ozone (O3) is a strong oxidant
- **Reverse Osmosis** is a method of removing dissolved salts and other constituents from water. Pressure is used to force the water through a semi-permeable membrane that transmits the water but stops most dissolved materials from passing through the membrane. This treatment method is commonly used in desalination, a process that takes salt out of seawater
- **Soil Aquifer Treatment** occurs when water, including recycled water, soaks into the ground and is purified by the physical, chemical, and biological processes; that naturally occur in soil

f. Treatment Processes and Products

There are words used to describe the wastewater treatment processes and the products created as part of wastewater treatment. Often the facilities are referred to as Wastewater Treatment Plants, Water Reclamation Facilities, or Resource Recovery Facilities, usually depending on the types of treatment technology used at the facility.

- **Biosolids** is the nutrient-rich organic material (by-product) made from the stabilized sewage sludge of a wastewater treatment or resource recovery facility. Biosolids can be recycled as a soil amendment for crops, and may also be used as final or alternative daily cover at landfills. Increasingly, Biosolids may also be used as an alternative energy source. Biosolids are generally used in one of four forms: as a nutrient-rich, liquid, moist solid, dried pellet, or compost
- **Discharge** is the release of effluent, which meets regulatory standards, and designated by a regulatory permit to be safely discharged into the environment without causing harm
- **Disinfected Secondary-2.2 Recycled Water** means recycled water that has been oxidized and disinfected so that the median concentration of total coliform bacteria in the effluent does not exceed a most probable number (MPN) of 2.2 per 100 milliliters as per the results of the last seven days for which water quality analyses have been completed and does not exceed 23 per 100 milliliters as per the results in more than one sample collected in any 30-day period

- **Disinfected Secondary-23 Recycled Water** means recycled water that has been oxidized and disinfected so that the median concentration of total coliform bacteria in the effluent does not exceed a MPN of 23 per 100 milliliters as per the results of the last seven days for which water quality testing has been completed and does not exceed 240 per 100 milliliters as per the results in more than one sample collected in any 30-day period
- **Effluent** is the liquid that flows out of something, particularly from a wastewater treatment plant. Depending on the amount of treatment it has had, its quality can vary and can even meet or exceed drinking water standards
- **Full Advanced Treatment (FAT)** is terminology used interchangeably with Advanced Water Treatment, and denote waters that the water used in an IPR scheme has been beyond the secondary treatment level to further purify it. Advanced treatment implies that reverse osmosis and advanced oxidation (or other known and proven treatment technologies) have been applied
- **MGD** is the abbreviation for million gallons per day. This term is often used to describe the volumes of water treated and discharged from a treatment plant
- **Primary Treatment** is a process where solid matter is removed. The remaining liquid may be discharged or subjected to further treatment
- **Secondary Treatment** is a process where dissolved and suspended biological matter is removed to a nonpotable level so that the water may be disinfected and discharged into a stream or river, or used for irrigation at controlled locations
- **Sewage Sludge** refers to the residual, semi-solid material that is produced as part of primary and secondary treatment. Sewage sludge is further treated by aerobic or anaerobic digestion and dewatered at a wastewater treatment plant or resource recovery facility to produce Biosolids and other byproducts such as methane gas and struvite recovery
- **Tertiary Treatment or Advanced Water Treatment** refers to processes that purify water for uses such as irrigation or for water blended with other environmental systems such as a river, reservoir, or groundwater basin prior to reuse. It can also include treatment processes to remove nitrogen and phosphorus to allow discharge into a highly sensitive or fragile ecosystem (estuaries, low-flow rivers, coral reefs, etc.)

g. State Regulations

California regulations promulgated regarding the treatment of wastewater is often referred to in text discussions (specifically, Title 22). Additional detail is provided below.

- **Title 22 Standards** are the requirements established by the State Water Resources Control Board Division of Drinking Water (formerly the California Department of Public Health) for the production and use of recycled water. Title 22, Chapter 3, Division 4 of the California Code of Regulations, outlines the level of treatment required for allowable uses for recycled water. The most typical uses include irrigation, firefighting, residential landscape watering, industrial uses, food crop production, construction activities, commercial laundries, toilet flushing, road cleaning, recreational purposes, lakes, ponds and decorative fountains. Section 13550 of the California Water Code is a declaration by the State Legislature that the use of potable water is a waste if recycled water is available
  - **Article 3 of Title 22** discusses uses of recycled water for irrigation, impoundment, cooling and other purposes

- **Article 5 of Title 22** discusses Indirect Potable Reuse (IPR) for groundwater replenishment
- **Future Articles of Title 22** will discuss IPR for surface water replenishment and also will discuss direct potable reuse (DPR)

ATTACHMENT B

MOU Excerpts for IPR Partnerships

MOU Excerpt: Scope of Work for BAWSCA-SCVWD-SFPUC IPR Partnership

5. WORK TO BE PERFORMED

The Feasibility Study will be conducted cooperatively by the Parties and Consultant(s) in two phases. The focus of the first phase ("Phase 1") will be to identify the key project objectives for the Parties and define viable alternative(s) that can meet those objectives. Based on the results of Phase 1, viable project alternative(s) can be further analyzed in detail in Phase 2, providing sufficient technical and institutional information to evaluate a Project(s) that can mutually benefit the Parties. Subsequent tasks and work products may be added through addendum(s) to this MOU as agreed by the Parties.

At the conclusion of Phase 1, each Party reserves the right to not move forward with Phase 2 or subsequent activities envisioned under this MOU. However, any Party may use the analysis developed herein for any future planning or development.

The SCVWD is seeking to develop a drought-proof water supply through purifying treated wastewater through advanced water treatment technologies. This Program is expected meet or exceed drinking water standards and may be utilized to replenish the Santa Clara County groundwater basin; to supplement the raw water treated at the SCVWD's water treatment plants; or to enable storage of the water through its participation in various banking programs and/or exchanges with other water agencies.

The following tasks have been identified for assessing the Phase 1 feasibility of SFPUC/BAWSCA's participation in the Program:

1. *Define objectives for the SCVWD and SFPUC/BAWSCA and their principles of participation*
    a. Purpose: Identify the specific objectives that each Party has with respect to its participation in the Feasibility Study. These objectives will include conveyance, timing, quantity, quality and reliability of water supply and any other impacts or constraints of concern.

    b. Elements:
        i. The Parties will develop specific objectives and may solicit feedback from the following stakeholders, as appropriate:
            1. City of San Jose
            2. City of Santa Clara
        ii. Synthesize preliminary findings
        iii. Hold a meeting between the Parties summarizing key areas of overlap, differences, and identifying issues that will require further analysis.
        iv. Draft specific objectives, principles of participation, issues to be resolved in the near term, and those that require further study.

    c. Deliverables:
        i. Meeting agendas and summaries.

        ii. Specific objectives, principles of participation, and list of issues to be resolved in Phase 1 (short-term) and Phase 2 (requiring further analysis).

2. *Conduct constraints analysis*
    a. Purpose: Identify potential constraints/boundaries that would impact the Parties from entering into a Participation Agreement, and identify the particular terms and conditions of a Participation Agreement.
    b. Elements:
        i. Review and analyze the following areas of importance from each Party's perspective:
            1. Legal requirements and constraints
            2. SCVWD imported water contracts
            3. SCVWD treated water contracts
            4. Institutional/governance requirements
            5. Regulatory
            6. Environmental
            7. Financial
            8. Infrastructure
            9. Operational
            10. Water supply project commitments/availability of water
            11. Others as identified in Task 1
        ii. Prepare draft findings and circulate among Parties for review and comment.
        iii. Hold a joint meeting between the Parties to discuss draft findings and assess the need for further analysis (if necessary)
        iv. Finalize findings
    c. Deliverables: Memorandum (draft and final) summarizing findings.

3. *Identify conceptual alternatives*

    a. Purpose: Identify conceptual alternatives that may be analyzed in further detail.
    b. Elements:
        i. Identify alternatives that meet the objectives identified in Task 1 and are not immediately omitted from further consideration under the constraints identified in Task 2.
            1. Groundwater extraction (SCVWD Campbell Well Field)
            2. New or leased wells.
            3. Treated surface water deliveries to SFPUC/BAWSCA at Intertie in Milpitas.
            4. Treated surface water deliveries to SFPUC/BAWSCA at a new Westside Intertie, to be developed.
            5. Treated water deliveries directly to San Jose and/or Santa Clara.

6. Transfers/exchanges, either direct or indirect to SFPUC/BAWSCA, using Los Vaqueros, Semitropic, State Water Project, or other.
7. Direct transfer of purified water to the San Francisco Regional Water System.

ii. Select up to four (4) viable project alternatives from Task 3.b.i
1. Develop Project schematic
2. Identify infrastructure requirements for each alternative
3. Identify preliminary (concept-level) capital and operations and maintenance costs

c. Deliverable: Technical Memorandum describing selected viable Project alternatives.

4. *Develop Work Plan for Phase 2*
   a. Purpose: Identify hydraulic modeling and other needs for further analysis of each alternative.
   b. Develop cost estimate for proposed scope of work for Phase 2.
   c. Deliverable: Work plan description and cost estimate for Phase 2.

MOU Excerpt: Scope of Work for SVCW Potable Reuse Exploratory Plan (PREP)

5. WORK TO BE PERFORMED

The PREP (Potable Reuse Exploratory Plan) will be developed with the cooperative input from the Parties and a hired consultant. Subsequent work products will be added through addendum to this Agreement as agreed by the Parties, as necessary.

The purpose of the initial screening phase of the PREP is to provide sufficient information for the Parties to determine whether to proceed with continued exploration of, and investment in, potable reuse through this plan. As Indirect Potable Reuse Regulations for GRR have been adopted in 2014 and SWA regulations are anticipated to be adopted in December of this year, for the purpose of this effort, two types of Indirect Potable Reuse projects will be explored (1) Groundwater Replenishment Reuse (GRR) and (2) Surface Water Augmentation (SWA). As regulations for Direct Potable Reuse are anticipated in subsequent years, Direct Potable Reuse will not be evaluated as part of this PREP. The following tasks should be performed during this phase:

TASK DESCRIPTION

1) **Develop Advanced Treatment Options** – The objective of this task is to define one typical treatment process train to provide Advanced Water Treatment (AWT) for the anticipated potable reuse options. The AWT requirements will be developed for two source water baseline conditions.

- **Baseline Condition #1** assumes the source water for AWT will be Undisinfected Secondary Effluent.
- **Baseline Condition #2** assumes the source water for AWT will be Disinfected Tertiary recycled water (Calfironia Title 22).

This task will describe the potential difference in infrastructure, Operations and Maintenance (O&M) requirements associated with the use of Undisinfected Secondary and Disinfected Tertiary effluent for the various options shown in Table 1.

Table 1: Summary of Potable Reuse Options

Potable Reuse Option	Source Water Baseline
Groundwater Replenishment & Reuse (GRR)	Undisinfected Secondary
	Disinfected Tertiary
Surface Water Augmentation (SWA)	Undisinfected Secondary
	Disinfected Tertiary

ASSUMPTION: Work under this task will be based on a typical AWT process train consisting of microfiltration (MF), reverse osmosis (RO) and an advanced oxidation process (AOP), that includes ultraviolet (UV) oxidation and disinfection. It is assumed that this AWT process train would be suitable for the two potable reuse options and the two source waters, although the disinfection and O&M requirements may vary. Evaluation of process alternatives that do not include Reverse Osmosis is not included as it is assumed brine waste from the AWT can be discharged to the Bay. The AWT facility is assumed to be located on available land at SVCW or at a site near the airport. SVCW shall provide information on available flows, water quality and siting as requested.

OUTCOME: Up to two concept-level AWT process trains will be developed for the various potable reuse options, as shown in Table 1. AWT options will be summarized using schematics to illustrate each major process component and a matrix to describe each process and the anticipated removal credit required to meet anticipated regulatory requirements. A table of advantages/disadvantages of treating of Undisinfected Secondary and Disinfected Tertiary Effluent will be provided based on the AWT RO treatment train defined above (i.e. operational, regulatory, water quality, land, environmental, capital and operating costs, etc.).

2) **Summary of Regulatory Requirements and Issues** – The objective of this task is to provide an overview of the significant and potential issues associated with the incorporation of potable reuse supplies into a groundwater basin (San Mateo Plain Basin) and existing surface water storage reservoirs (e.g., Crystal Springs, Bear Gulch). Major regulatory requirements for the potable reuse method (e.g., dilution rates, retention times, incorporation locations) will be summarized and approaches for meeting such requirements (e.g., engineered buffer, dilution vs. redundant treatment, modeling, and monitoring), and potential institutional issues to be considered under future phases of study will be discussed at a high-level.

ASSUMPTION: Assessment of GRR will be based on current regulations and SWA will be based on available information related to the status of the SWA criteria currently under development.

OUTCOME: Summary table of regulations, requirements and issues for implementing a potable reuse project via GRR via injection wells and SWA.

3) **Facilities Assessment** – The objective of this task is to identify candidate potable reuse project alternatives at a concept-level to provide a preliminary understanding of the viability and cost of specific project types. Work under this task will be focused on three alternative concepts:

Alternative 1: GRR in the San Mateo Plain Basin
Alternative 2: SWA in Crystal Springs Reservoir
Alternative 3: SWA in Bear Gulch Reservoir

As approved by the PREP participants, up to four facility assessment concept project maps and analyses will be developed to show concept facilities sites and pipeline alignments where possible, indicate potential new faciliteis or adaptation of any existing facilities, and identify points of integration with the existing water storage and transmission/distribution systems including potential new facilities to recapture the potable supply and introduce it into the potable system (raw water intake). Additional variations or sub-alternatives may be noted but not analyzed. As approved by the PREP particpants, the most conservative project for each alternative will be carried forward for development of preliminary costs in Task 4.

ASSUMPTION: PREP participants will provide facilities and operational information as required to complete work under this task. Consultant will provide specific information requests for PREP participants to respond to during this task.

- The conceptual level mapping work performed under this task will be shown over Google Earth images or GIS mapping provided by PREP participants.
- Conceptual siting analysis will identify approximate locations of facilities in order to establish initial cost estimates for alternatives (in Task 4). Detailed siting analysis or analysis of site options is not included.
- Preliminary pipeline alignments for up to four alternative projects will be depicted on aerial photography using Google Earth and/or Powerpoint.
- Maps will be presented via desktop sharing during the team conference calls under Task 6 to confirm preferred sites and alignments for each alternative.
- Hydraulic pumping requirements will be based on starting and ending elevations and assumptions for pumping/motor efficiency and friction factors. Hydraulic modeling is not included.
- Operational storage models or simulations will not be developed. Storage needs to serve as an engineered storage buffer for a potable reuse project will be based on a conservative estimate of response time.
- Potential locations for GRR will be based on information from existing hydrogeological studies and potential locations provided by BAWSCA. The GRR projects will be summarized at a concept level; no new groundwater modeling will be performed. The following GRR sub-alternatives may be considered:

✓ Alt 1a: One injection point near SVCW with three (3) extraction points at northern end of basin and 3 extraction points at southern ends of basin.

✓ Alt 1b: One alternate injection point and three (3) extraction points at northern end of basin; one injection and three (3) extraction points at southern end of basin. Evaluation of the alternate injection point will be based on designation by the PREP parties.

- The evaluation of SWA at Crystal Springs will assume the most conservative locations for pipeline alignments and discharge location, as agreed upon by the PREP partners. Additional alignments or discharge locations may be noted but not analyzed.
- The evaluation of SWA at Bear Gulch Reservoir will initially be assessed at a high-level to identify potential fatal flaws based on the dilution and retention capacity at the reservoir. If a fatal flaw is identified then preliminary costs will not be developed.

OUTCOME: Up to four concept level facilities assessment alternative projects will be evaluated, as approved by the PREP parties.

4) **Develop Preliminary Costs** – The Consultant shall develop conceptual costs for each of the alternative projects identified under Task 3, which will be expressed as total capital costs in 2016 dollars, as well as on a cost/per-acre foot basis. Operation and Maintenance (O&M) costs shall be characterized and separately identified in the preliminary cost analysis.

ASSUMPTION: Costs will be developed at a conceptual screening level (ACCE Class V based on 0% to 2% level of project description with an expected range of accuracy between -50% and +100%).

- Unit costs will be based on available existing potable reuse programs, local data, technical guidance documents and professional experience.
- Other soft costs for additional studies, permitting, mitigation, etc. will be included as a line item in the cost tables with noted assumptions.
- PREP partners will provide typical unit costs from recently bid projects as appropriate.
- Annualized capital costs will be based on an agreed upon project life and interest rate. O&M costs will be a similar Class V level, based only on typical treatment costs, standard energy rates for conveyance pumping, and all other O&M activities based on a % of capital costs only.

OUTCOME: Summary tables will be developed to list capital costs, annualized capital costs, annual O&M costs and unit annualized costs for the four project alternatives. Cost tables will be presented via desktop sharing during the team conference calls under Task 6 to confirm assumptions. Backup tables listing cost components, sources and assumptions will be provided for the four alternative projects.

5) **Develop Project Summary Report** – A project summary report will be developed to summarize the outcomes of Tasks 1 through 4. The Consultant shall identify key outstanding questions and project needs for a subsequent feasibility analysis phase of PREP. The report will include a list of potential areas of study to support engineering evaluations, environmental impact analyses, grant funding, and other technical and institutional issues that require further study and strategic development.

ASSUMPTION: A work plan for the next phase of work will not be developed as part of this effort. The report will be presented via desktop sharing during one of the team conference calls under Task 6.

DELIVERABLES: Draft and Final Project Summary Report (digital copy only – pdf, word and excel for back-up tables) summarizing the outcomes of Tasks 1 through 4.

6) **Project Management and QA/QC** - Project management includes submittal of monthly project status reports, monthly conference calls, internal coordination to manage project on schedule and budget, development of a project schedule and QA/QC program to be applied throughout the duration of the project.

ASSUMPTION: Based on a 6 month contract duration; this task will include 6 invoice/status reports and 6, one-hour conference calls.

OUTCOME: Submit 6 invoices/status reports.

7) **<u>Meetings</u>** – One face-to-face meeting to present outcomes from Tasks 3 through 5 is proposed to present updates on the work and solicit input from PREP partners. This workshop will be hosted in the BAWSCA office.

ASSUMPTION: SVCW will provide logistics coordination (identification of an agreeable time, development of the agenda and distribution of materials). PREP partners will commit to reviewing materials in advance of the meeting and responding to action items within 2 weeks of meeting. Consultant will develop technical materials to distribute in advance of the meeting and take meeting minutes. This task includes time to prepare meeting materials, attendance at meeting and development of meeting minutes after each meeting. No kickoff meeting is included, as this work has been performed during final scoping of this work phase.

OUTCOME: A digital copy (pdf/word) will be submitted for all meeting materials.

As provided in Section 7 of this Agreement, the Parties will designate a Party to be the Contracting Entity to enter into an agreement with a consultant for preparation of the PREP. Work to be performed by PREP Party staff is described in Section 7 of this Agreement. The Parties acknowledge that work performed on individual projects or concepts that could be evaluated as part of the PREP may be independently pursued by any of the Parties under separate efforts and would therefore not be subject to the terms of this Agreement.

Table 2: Summary of Project Fee by Task

Tasks	Total Est Hours	Total KJ Labor	Total Expenses	Total Labor + Subs + Expenses
Task 1 – Develop Treatment Options	23	$4,326	$86	$4,412
Task 2 – Incorporation of Potable Reuse Supplies	16	$3,016	$60	$3,076
Task 3 – Facilities Assessment	80	$13,682	$274	$13,956
Task 4 – Develop Preliminary Costs	48	$8,382	$168	$8,550
Task 5 – Develop Project Summary Report	72	$12,147	$243	$12,390
Task 6 – Project Management and QA/QC	42	$8,083	$162	$8,245
Task 7 – Meetings	22	$4,584	$787	$5,371
Task 1-7 Total	**303**	**$54,220**	**$1,780**	**$56,000**