City of Santa Barbara
Public Works Department

Memorandum

DATE: November 19, 2020

TO: Water Commission

VIA: Joshua Haggmark, Water Resources Manager

FROM: Dakota Corey, Water Supply Analyst

SUBJECT: Enhanced Urban Water Management Plan Work Session 2 of 2 – Future Portfolio Analysis

RECOMMENDATION

That Water Commission receive an update on the status of the Enhanced Urban Water Management planning effort and provide policy direction on the draft work products.

DISCUSSION

The Enhanced Urban Water Management Plan (EUWMP) project commenced in March 2020 and will be completed and submitted by the July 2021 State-mandated deadline. Information on the EUWMP was presented to the Water Commission in April 2020, July 2020, September 2020, and last week on November 12, 2020. In summary, the Water Commission has received information on the multifaceted stakeholder engagement process, water demand forecasting, current water supply portfolio analysis, and the first half of the future water supply portfolio analysis. Initial results demonstrate that the City's current water supply portfolio is adequate under current supply and demand conditions. However, it also indicates that as demands are projected to increase over time, or if supplies diminish, the City will need additional supplies to meet water demands, particularly during periods of drought.

Staff will be facilitating the second of two work sessions to review and discuss the materials that have been developed as part of the EUWMP project. Staff will review in depth the second half of the future portfolio analysis, including the Triple Bottom Line analysis, which considers social, environmental, and financial criteria for each portfolio, along with sensitivity and resiliency analyses for the future portfolios. As with the past four Water Commission meetings on the EUWMP, staff are seeking policy direction and comments on the draft work products.

Staff will present work completed to date on the EUWMP to City Council on November 17, 2020, and December 8, 2020. The November meeting will include a presentation on the demand forecasting, which was presented to Water Commission in September 2020 and Planning Commission in October 2020. At the December City Council meeting, staff

will be seeking additional policy direction on the draft work product that the Water Commission reviews in November. The Council agenda report will be a higher-level hybrid of the two November Water Commission work sessions, and will also include information presented at the July 2020 Water Commission meeting. The Water Commission's comments will be important to the final product and to the City Council discussion in December.

The EUWMP project team, which includes City staff and the firm Water Systems Consulting, Inc. (WSC), has made significant progress in developing and analyzing a collection of potential themed water supply portfolios that can meet the future water supply gaps identified in the existing portfolio analysis. The future portfolio analysis is the "heart" of the analytical work for the EUWMP. The analysis is complex and provides many options for consideration.

Future Portfolio Analysis

The future portfolio analysis evaluates a collection of themed portfolios through a multi-faceted, iterative approach. The Water Vision Santa Barbara (WVSB) Future Portfolio Analysis Technical Memorandum (TM) describes the analysis in detail. Several additional supporting TMs, listed below, have also been developed to describe the analyses performed on specific water supply options and planning considerations.

- WVSB Communications and Engagement Summary TM
- WVSB Demand Projections TM
- WVSB Water Supply and Climate Change Analysis for Lake Cachuma and Gibraltar Reservoir TM
- WVSB Groundwater Management Recommendations TM
- WVSB State Water Project Exchange and Storage Options TM
- WVSB Cost Basis TM

This collection of TMs is available for review on the City's Water Vision Santa Barbara webpage: www.SantaBarbaraCA.gov/WaterVision. Please reference the Future Portfolio Analysis TM Part 1 and the staff memo presented at the November 12, 2020 Water Commission meeting for a detailed discussion of the development and simulation of the future water supply portfolios. The analyses described in this memo are detailed in Part 2 of the Future Portfolio Analysis TM, also available on the project website.

Triple Bottom Line Analysis

A triple bottom line analysis (TBL) was used to evaluate the future portfolios against social, environmental, and financial criteria. Results of the earlier future portfolio simulation determined that Portfolio 1 (Baseline Supplies) and Portfolio 2 (Baseline Supplies Prioritized) did not meet the level of service goal to provide at least 85% of total supply in all years. As a result, these two portfolios were not included in the TBL analysis. The TBL criteria were scored for each portfolio by applying the scoring guide described below in Table 1. Several criteria are based on metrics summarized for each portfolio in Table 2.

Table 1: TBL Criteria Scoring Guide

Criteria	Criteria Scoring Guide
Economic	
Cost Above Baseline Portfolio	Lower cost is better. Total comparative cost from 2020 to 2050 for each portfolio. The cost above the Baseline Portfolio is used for comparison.
Potential for External Funding	This criterion captures the potential to reduce portfolio costs. Desalination and potable reuse each have relatively higher amounts of funding available compared with conservation. High: Both potable reuse and desalination expansion Medium: Potable reuse or desalination expansion individually Low: Conservation
Speed of Implementation	High: Desalination expansion since most infrastructure is existing Medium: Conservation since it is dependent on customer uptake Low: Potable reuse since regulations do not exist but they are expected to be rigorous and significant new treatment and conveyance infrastructure is needed
Social	
Reliability during design drought	High: No extraordinary conservation Medium: Up to three years (1 in 10 years over 30 years) of extraordinary conservation Low: Over three years of extraordinary conservation
Resilience to catastrophic event	High: Above average performance across resilience scenarios Medium: Average performance across resilience scenarios Low: Below average performance across resilience scenarios
Local Control	Higher local control is better. The amount of average available supplies from Gibraltar Reservoir, Mission Tunnel, groundwater, desalination, and recycled water is considered. See Table 2 for values. High: > 12,000 AFY; Medium: 10,000 to 12,000 AFY; Low: < 10,000 AFY
Environmental	
Protects/enhances habitats and wildlife	Lower use of Cachuma and State Water Project (SWP) is better. Measured with average use of 30-year projection period. See Table 2 for values. High: > 6,000 AFY; Medium: 4,000 AFY to 6,000 AFY; Low: < 4,000 AFY
Protects/enhances ocean water quality	Lower use of desalination is better. Measured with average use of 30-year projection period. See Table 2 for values. High: > 3,000 AFY; Medium: 1,500 AFY to 3,000 AFY; Low: < 1,500 AFY
Permitting or regulatory simplicity	Potable reuse has the most complex permitting requirements. Desalination expansion is covered by existing permits, but may be subject to changing State policies. High: Portfolio includes higher conservation scenario only Medium: Portfolio includes desalination expansion only Low: Portfolio includes potable reuse
Energy Efficiency	Lower energy consumption is better. Measured as average energy consumption per AF over 30-year projection period. See Table 2 for values. High: < 1,500 kWh/AF; Medium: 1,500 AFY to 3,000 kWh/AF; Low: > 3,000 kWh/AF

Table 2: TBL Metrics, Average Use (2020-2050)

Portfolios:	**3**	**4**	**5**	**6**	**7**	**8**	**9**
	Reliability	**Min Costs**	**Min Env. Impacts**	**Max Local Control**	**Max Reuse**	**Max and Desal**	**Expand + Prioritize Desal**
Number of Years in Each Water Storage Stage (2020-2050)							
Stage 1 (≥85%)	1	5	--	--	1	1	1
Stage 2 (≥75%)	--	--	--	--	--	--	--
Stage 3 (≥50%)	--	--	--	--	--	--	--
Extraordinary Conservation, Total Shortfall (2020-2050)							
AF	1,360	6,480	--	--	1,360	1,170	1,170
Comparative Cost Estimates, Cost (2020-2050)							
Cost Above Baseline ($M)	$87 M	$27 M	$186 M	$156 M	$78 M	$39 M	$48 M
Unit Cost ($/AF)	$1,780	$1,710	$2,070	$2,000	$1,760	$1,670	$1,690
TBL Metrics							
Local Control (AFY)[(1)]	11,290	8,907	13,532	13,141	11,290	10,782	10,782
Cachuma & SWP Use (AFY)	4,666	5,528	4,178	2,468	6,388	5,210	4,514
Desalination (AFY)	3,125	2,881	654	4,748	1,403	3,928	4,625
Energy Use (kWh/AF)	2,306	1,788	1,730	2,605	1,747	2,004	2,236

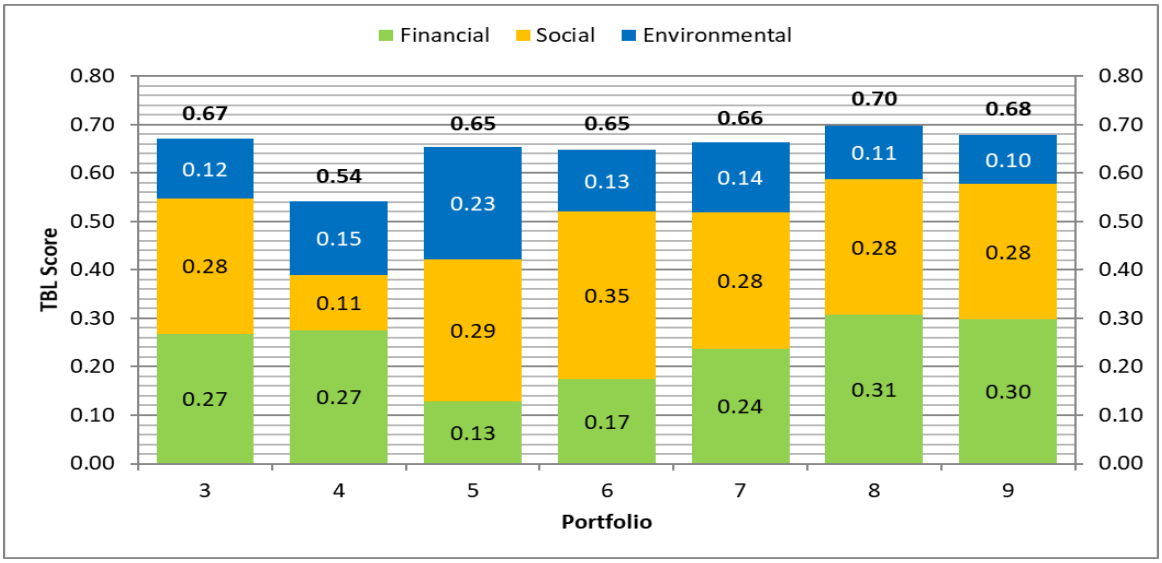
Note: Local Control includes use of Gibraltar, Mission Tunnel, groundwater, desalination, and recycled water.

The individual scoring for each portfolio is shown in Table 3, and the total score is presented in Figure 1. Higher scores indicate portfolios that performed better than others.

Table 3. Triple Bottom Line, Portfolio Scoring Matrix

Portfolios:	**3**	**4**	**5**	**6**	**7**	**8**	**9**
Criteria	**Max Reliability**	**Min Costs**	**Min Env. Impacts**	**Max Local Control**	**Potable Reuse**	**Expand Desal**	**Expand & Prioritize Desal**
Financial							
Cost Above Baseline Portfolio ($/M)	$87	$27	$183	$156	$75	$39	$48
Potential for External Funding	High	Medium	High	High	Medium	Medium	Medium
Speed of Implementation	Low	Medium	Low	Medium	Low	High	High
Social							
Reliability during design drought	High	Low	High	High	High	High	High
Resilience to catastrophic event	Medium	Low	Medium	High	Medium	Medium	Medium
Local Control	Medium	Low	High	High	Medium	Medium	Medium
Environmental							
Protects / enhances habitats and wildlife	Medium	Low	Medium	High	Low	Low	Medium
Protects / enhances ocean water quality	Medium	Medium	High	Low	High	Low	Low
Permitting or Regulatory Simplicity	Low	High	Low	Low	Low	Medium	Medium
Energy Consumption	Low	High	High	Low	High	Medium	Low

Figure 1. Triple Bottom Line, Portfolio Scoring, Baseline Weighting



Results of the TBL analysis indicate that all portfolios except for Portfolio 4 (Minimize Cost) are all within 0.05 points of each other. However, each portfolio has different strengths and weaknesses:

- **Portfolio 3 (Maximize Reliability):** Investment in potable reuse and prioritization of desalination provide higher reliability at a moderate cost. This portfolio scored in the middle in each set of criteria (financial, social, and environmental).
- **Portfolio 4 (Minimize Cost):** The new supply investment is limited to higher conservation, which results in a low unit comparative cost that is offset by low reliability and resilience.
- **Portfolio 5 (Minimize Environmental Impacts):** High investments in potable reuse and higher conservation resulted in high unit comparative cost, and high reliability and resiliency combined with low environmental impacts.
- **Portfolio 6 (Maximize Local Control):** Investments in potable reuse and desalination expansion resulted in the highest unit comparative cost, and highest reliability and resiliency.
- **Portfolio 7 (Potable Reuse):** Investment in potable reuse provided higher reliability at a moderate cost.
- **Portfolio 8 (Desalination Expansion):** Investment in desalination expansion provided high reliability at the lowest unit comparative cost.
- **Portfolio 9 (Desalination Expansion and Prioritization):** Compared with Portfolio 8, prioritizing desalination increases costs slightly and shifts the environmental impacts by increasing energy consumption and desalination production, and reducing use of Cachuma and SWP.

Sensitivity Analysis

The scoring in Figure 1 was based on the baseline criteria weighting developed by City staff and stakeholders. To account for different perspectives and priorities, three additional weightings were developed to perform a sensitivity analysis on the criteria weighting. These new weightings each emphasize a different aspect of the TBL analysis - affordability, social benefit, and environmental benefit. Details of the sensitivity analysis are provided in Sections 3.2.1 and 7.2 of the Future Portfolio Analysis TM.

Results of the sensitivity analysis demonstrate Portfolio 8 (Expand Desalination) consistently ranks first, regardless of the weighting scenario, except for the environmental benefit weighting, which ranks Portfolio 4 (Minimize Costs) first. Portfolio 7 (Potable Reuse) consistently ranks as the second highest in most weighting scenarios.

Portfolio 8 (Expand Desalination) has several benefits over Portfolio 7 (Potable Reuse):

- Lowest cost (the analysis should be revisited once potable reuse regulations are finalized).
- Higher speed of implementation, since Desal Plant has been reactivated.
- Lower permitting complexity, since the Desal Plant is permitted for 10,000 AFY.

On the other hand, Portfolio 7 has less energy consumption and ocean desalination than Portfolio 8.

Resiliency Analysis

Several resilience scenarios were developed to evaluate the future portfolio performance under different risks and uncertainties, described in Section 3.3 and 7.3 of the Future Portfolio Analysis TM. Six scenarios considered the temporary loss of one or more supplies, and one scenario addressed a Mega-drought. The temporary loss of one or more supplies scenarios include potential risks where the City is without one or more supplies for a short period (from power outage) or extended period (from major infrastructure failure). The portfolios were evaluated based on the amount of water that could be produced from the remaining supplies unaffected by the risk during drought conditions, since this is when the City's supplies are already most stressed. Results of the resiliency analysis show that Portfolio 6 (Max Local Control) provides the highest resiliency with the highest amount of local supplies; and, Portfolio 4 (Min Costs) has the lowest resiliency, since no new supplies are included. Portfolio 8 (Expand Desalination) does well or very well in each scenario.

Recommended Portfolio

The EUWMP future portfolio analysis evaluated nine different themed water supply portfolios to meet the range of expected future demands. The analysis showed that Portfolio 8 (Expand Desalination) best meets the City's expected future water supply needs. Timing of the needed expansion from 3,125 acre-feet per year (AFY) to 5,000 AFY will depend on the pace of demand growth, and the ongoing availability and reliability of existing supplies. Additionally, new regulations and/or advancements in treatment technology may increase the favorability of Portfolio 7 (Potable Reuse), which also scored highly in this analysis.

Policy Recommendation

The primary policy recommendation supported by results of both the existing portfolio analysis and the future portfolio analysis is to change desalination operations from an emergency/drought supply to a regular supply in the City's water supply portfolio. This does not mean the City will automatically operate the desal plant each year. The desal plant would be put into standby mode in the event that the proposed minimum water reserve thresholds are met:

- There are currently sufficient supplies to meet demands
- There are currently sufficient amounts of stored groundwater
- Cachuma storage volumes are 180,000 AF or greater

If these thresholds are met, City staff can make the decision to place the desal plant in standby mode, and will still be in a strong position to meet demands, even in a dry year. If dry conditions continue for multiple years and minimum thresholds are not met, the City could reactivate the desal plant to prepare for drought conditions. The decision to operate the desal plant in the new water year (October 1, 2021) would need to be made at the end of the prior rainy season, in April 2021. This means that if storage in Cachuma is at 180,000 AF or less in April, it would be at approximately 140,000 AF or less in October when the plant is reactivated after downstream releases and Member Unit use during the summer.

Adaptive Implementation Plan

The EUWMP includes an Adaptive Implementation Plan which outlines phases and corresponding next-steps to assist the City with adapting to future changes in water supplies and demands, and with making timely investments. The phases, described below, are graphically shown in Figure 2.

- **Phase 1 (Existing Conditions)**: Monitor demand and supply conditions, particularly the potential post-drought demand rebound. Implement recommendations for Gibraltar (Warren Act Pass-Through Agreement), groundwater (updated yield estimates), SWP (water management strategies), recycled water (update non-potable water market assessment; track potable reuse regulations). Operate desal plant until minimum reserve thresholds are met, demonstrating sufficient supply reserves are in place.
- **Phase 2:** Begin planning for a new supply for implementation in Phase 3. Update desalination operational costs and expansion considerations. Re-evaluate potable reuse based on any new potable reuse regulations. Determine if pursuing higher conservation rates is a realistic and economically feasible path for managing demands to avoid new supply investments.
- **Phase 3:** If demands are a driving factor in entering Phase 3, implement a new supply (desalination expansion or potable reuse) because an additional reliable supply is required during drought conditions. If supply reductions are the driving factor for entering Phase 3, plan to operate desalination continuously because the supply is needed during non-drought conditions to meet demands.
- **Phase 4**: Implement both a new supply (desal expansion or potable reuse) and plan to operate desalination continuously. Begin to identify additional new supply opportunities for Phase 5.
- **Phase 5**: Implement new supplies beyond those identified in this plan, such as additional desalination expansion, potable reuse, or higher conservation.

Figure 2. Adaptive Implementation Plan Phases

QUESTIONS FOR WATER COMMISSION

Staff is looking for feedback from Water Commission on the recommended portfolio (Portfolio 8, Expanded Desal). Staff is also welcoming feedback on the policy recommendation to make desalination at its current production capacity a regular part of the City's water supply portfolio, rather than specifically a drought supply. Any additional feedback on any other aspect of the project, including the triple bottom line analysis and the adaptive implementation plan, is also appreciated.

NEXT STEPS

Council will receive presentations related to the EUWMP in November and December. The November 17, 2020, presentation will focus on the demand analysis and the Water Conservation Strategic Plan. The December 8, 2020 presentation will provide a high-level review of the existing portfolio analysis, future portfolio analysis, recommendations and Active Implementation Plan. The Water Vision Stakeholder Group will hold its final workshop on December 10, 2020, allowing stakeholders to provide feedback on the selected portfolio, recommendations, and Adaptive Implementation Plan. Staff will return to the Water Commission in January 2021 to receive any additional input after the Water Commissioners have had an opportunity to review and digest the technical memorandums. Staff will then return to Council in February 2021 to request approvals and policy direction. These approvals will form the basis for the public draft Enhanced Urban Water Management Plan, which will be brought to Council in May 2021 for review, and again in June for adoption to meet the July 1, 2021 due date set by the California Department of Water Resources.