CITY OF SANTA BARBARA

SUBSURFACE DESALINATION INTAKE AND POTABLE REUSE FEASIBILITY STUDIES

WORK PLAN
SUBSURFACE DESALINATION INTAKE

FINAL REVISED
March 2016

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REVISIONS

1. **March 2016**: All references to 103 S. Calle Cesar Chavez as a site alternative have been removed. It has been determined that this property does not belong to the City.

City of Santa Barbara

Subsurface Desalination Intake and Potable Reuse Feasibility Studies

WORK PLAN
Subsurface Desalination Intake

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1.0 INTRODUCTION

The purpose of this document is to present a Work Plan that will be followed to evaluate the feasibility of using a subsurface intake to supply seawater to the City of Santa Barbara's (City) Charles Meyer Desalination Plant (Desal Plant), in order to replace the use of a screened open ocean intake.

1.1 Background

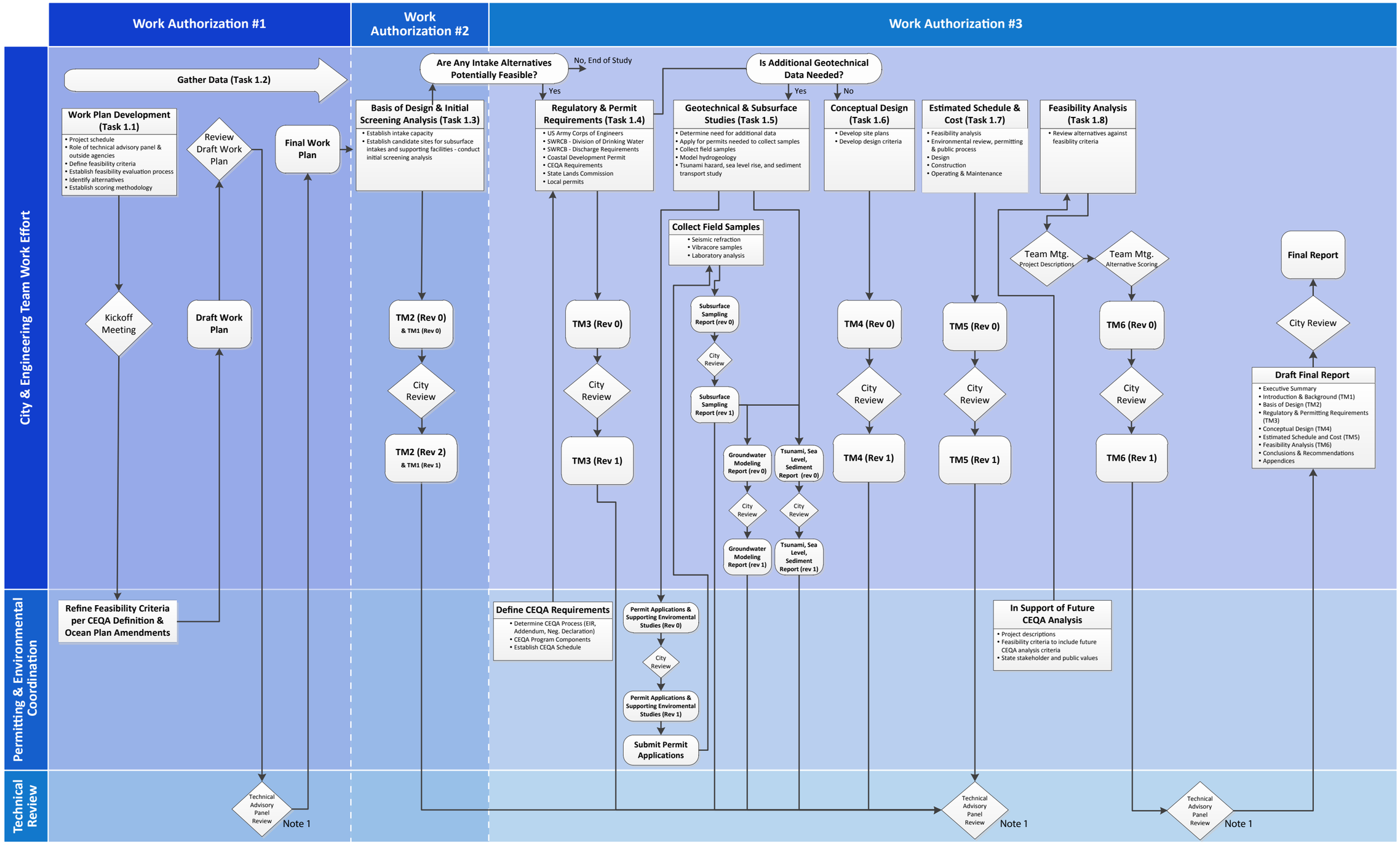
On September 23, 2014 the City of Santa Barbara City Council directed Public Works Department staff to report back with a plan to evaluate the feasibility of subsurface desalination intakes (subsurface intake) and potable reuse, including indirect and direct potable reuse options. The direction given by City Council was to report back with a plan for this evaluation following award of the desalination plant contract in April 2015. Furthermore, on January 30, 2015, the Central Coast Regional Water Quality Control Board (RWQCB) adopted an amendment to the City's El Estero Wastewater Treatment Plant (WWTP) Waste Discharge Requirements (WDR) that included a condition that the City should report back to the RWQCB by August of 2015 with a Work Plan that will result in completed feasibility studies by June 2017.

The City subsequently retained the services of Carollo Engineers, Inc. (Carollo) to complete these studies. Carollo will deliver the work for these feasibility studies under three work authorizations:

- **Work Authorization 1:** The Work Plans for both the subsurface intake and potable reuse studies. (**Note:** *The subsurface intake Work Plan is the subject of this document*)
- **Work Authorization 2:** Subsurface intake initial screening analysis and potable reuse feasibility study.
- **Work Authorization 3:** Subsurface intake feasibility study.

Each subsequent work authorization would be performed at the direction of City Council in accordance with the RWQCB's requirement.

A programmatic workflow diagram for all three authorizations for the subsurface intake study is presented in Figure 1. A copy of the fully executed scope of work for Work Authorization 1 is presented in Appendix A.



Notes:

1. It is envisioned that the technical advisory process includes a public meeting where stakeholders will be given a chance to state their interests in the City's study effort and comment upon the direction of the City's work product.

Figure 1 - Subsurface Desalination Intake Feasibility Study Programmatic Work Plan

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1.2 Objectives

The City is required to submit a Work Plan for evaluating subsurface intakes to the RWQCB by August 2015. The overall objective of this Work Plan is to present the methodology and procedures that will be used to perform the subsurface intake feasibility study. Objectives of this Work Plan include:

2. Establish the project schedule.
3. Establish the methods by which the design basis will be established. Design basis includes intake capacity and site alternative evaluation.
4. Establish the types of subsurface intakes that will be studied.
5. Establish procedure to identify sites for subsurface intakes and raw water conveyance piping
6. Establish a procedure to determine subsurface properties
7. Establish procedure to model subsurface intake's influence on the sustainability of the City's drinking water aquifer (capacity and water quality).
8. Establish procedure to estimate subsurface intake water quality and any additional treatment needs.
9. Establish the scope of cost estimates and cost estimating procedures.
10. Establish and define feasibility screening criteria.
11. Establish and define initial screening criteria that may limit further consideration of project alternatives.
12. Establish technical advisory panel role, procedures, and objectives.
13. Establish the role of outside agencies (e.g., RWQCB, California Coastal Commission, etc.) and City residents.

1.3 Scope

The City Council meeting minutes from September 23, 2014, Agenda Item 16: *Authorize Actions and Adopt a Resolution for Reactivating the Charles E. Meyer Desalination Facility*, state that there was an additional motion "to direct staff to return to the City Council after the [Desalination Plant Reactivation] contract decision is made in April [2015] to begin exploring a range of alternatives, including subsurface intake and potable reuse options." Relative to determine City Council's intent as to the scope of this study, the verbal transcript of the meeting was examined. In review of this transcript, the verbal intent was to "direct staff…[to evaluate the] feasibility, cost, and timeline associated with both converting the offshore facility to a subsurface intake and look at the options about potable reuse".[1]

[1] Mayor Schneider, as documented on September 23, 2014 City Council Meeting video recording (available on the City's website): http://media-07.granicus.com:443/OnDemand/santabarbara/santabarbara_d2343df5-8a20-499d-b1fb-5dda1f9e0414.mp4 at 2 hours and 33 minutes.

This motion was further adopted by the Central Coast RWQCB, who on January 30, 2015 amended the City's NPDES Permit (AMENDED ORDER NO. R3-2010-0011, NPDES NO. CA0048143) and in Section VI Paragraph C.6.c.iii (Special Provisions, Desalination Facility) adopted a provision to require the City to "Analyze the feasibility of a range of alternatives, including subsurface intake and potable reuse options."

Therefore, the direction given by both the City Council and RWQCB, relative to the scope of this study was to evaluate:

1. A replacement of the City's open ocean intake using a subsurface intake.
2. Potable reuse alternatives, also in the context of a replacement of desalination plant's open ocean intake use.

1.4 Work Plan Organization and Sequence of Work

This Work Plan focuses only on the City's subsurface intake feasibility study and is organized into the following sections:

- Introduction
- Basis of Design
- Feasibility and Initial Screening Criteria
- Implementation Schedule Development
- Cost Estimating Methodology
- Feasibility Analysis
- Technical Advisory Process

The City's potable reuse feasibility study is addressed as separate Work Plan.

The programmatic workflow diagram presented in Figure 1 shows the chronology that project work product will be developed and reviewed for each of the three work authorizations. As noted in Figure 1, only potentially feasible alternatives will be evaluated in Work Authorization 3. Initial screening will be performed in Work Authorization 2 and if enough data is available to determine that the alternative does not pass initial screening, no further feasibility analysis will be performed for that intake alternative.

A complete project schedule including the anticipated dates of all project milestones and deliverables is presented in Figure 2.

Subsurface Desalination Intake & Potable Reuse Feasibility Studies

ID	Task Name	Duration	Start	Finish
1	**Notice to Proceed (Work Authorization 1)**	1 day	Fri 5/1/15	Fri 5/1/15
2	Notice to Proceed (Work Authorization 2)	1 day	Tue 9/22/15	Tue 9/22/15
3	Notice to Proceed (Work Authorization 3)	1 day	Mon 11/23/15	Mon 11/23/15
4	**TASK 1 - SUBSURFACE DESALINATION INTAKE FEASIBILITY STUDY**	**526 days**	**Fri 5/1/15**	**Fri 5/5/17**
5	**1.1 Work Plan Development**	**114 days**	**Fri 5/1/15**	**Wed 10/7/15**
6	Kickoff Meeting	1 day	Wed 5/20/15	Wed 5/20/15
7	Draft Work Plan	36 days	Fri 5/1/15	Fri 6/19/15
8	City Review	5 days	Mon 6/22/15	Fri 6/26/15
9	Submit Draft Work Plan to RWQCB	1 day	Mon 6/29/15	Mon 6/29/15
10	RWQCB Approval/Comments	1 day	Tue 7/21/15	Tue 7/21/15
11	Final Work Plan	10 days	Thu 8/13/15	Wed 8/26/15
12	TM1 (Revision 0): Intro, Background & Project Alternatives	15 days	Thu 8/27/15	Wed 9/16/15
13	City Review	5 days	Thu 9/17/15	Wed 9/23/15
14	TM1 (Revision 1): Intro, Background & Project Alternatives	10 days	Thu 9/24/15	Wed 10/7/15
15	**1.2 Literature Review**	**106 days**	**Fri 5/1/15**	**Fri 9/25/15**
16	Collect Literature	99 days	Fri 5/1/15	Wed 9/16/15
17	Data Collection List Updates	**105 days**	**Mon 5/4/15**	**Fri 9/25/15**
18	Weekly Data Collection Updates	16 days	Mon 5/4/15	Mon 5/25/15
23	Monthly Data Collection Updates	66 days	Fri 6/26/15	Fri 9/25/15
28	**1.3 Basis of Design & Initial Screening Analysis**	**55 days**	**Wed 9/23/15**	**Tue 12/8/15**
29	**1.3.1 Prelim. Geophysical Studies (Tsunami, Sea Level Rise & Sediment Transport)**	**35 days**	**Wed 9/23/15**	**Tue 11/10/15**
33	**1.3.2 Basis of Design and Initial Screening**	**35 days**	**Wed 10/21/15**	**Tue 12/8/15**
37	**1.4 Regulatory Requirements**	**30 days**	**Wed 9/23/15**	**Tue 11/3/15**
41	**1.5 - Geotechnical & Subsurface Studies**	**220 days**	**Tue 11/24/15**	**Mon 9/26/16**
42	**1.5.1 Permitting for Subsurface Data Collection/Sampling**	**35 days**	**Tue 11/24/15**	**Mon 1/11/16**
52	**1.5.2 Field Activities for Geotechnical and Subsurface Data Collection/Sampling**	**125 days**	**Tue 3/8/16**	**Mon 8/29/16**
57	**1.5.3 Groundwater Modeling**	**35 days**	**Tue 8/9/16**	**Mon 9/26/16**
61	**1.6 Conceptual Design**	**45 days**	**Tue 9/6/16**	**Mon 11/7/16**
65	**1.7 Estimated Schedule and Cost**	**25 days**	**Tue 10/4/16**	**Mon 11/7/16**
69	**1.8 Feasibility Analysis**	**113 days**	**Tue 11/8/16**	**Thu 4/13/17**
79	**1.9 Subsurface Desalination Intake Feasibility Report**	**35 days**	**Fri 4/14/17**	**Thu 6/1/17**
83	**TASK 2 - NOT USED**	**333 days**	**Tue 11/24/15**	**Thu 3/2/17**
108	**TASK 3 - POTABLE REUSE FEASIBILITY STUDY**	**248 days**	**Fri 5/1/15**	**Tue 4/12/16**
109	**3.1 Work Plan Development**	**109 days**	**Fri 5/1/15**	**Wed 9/30/15**
110	Kickoff Meeting	1 day	Wed 5/20/15	Wed 5/20/15
111	Draft Work Plan	36 days	Fri 5/1/15	Fri 6/19/15
112	City Review	5 days	Mon 6/22/15	Fri 6/26/15
113	Submit Draft Work Plan to RWQCB	1 day	Mon 6/29/15	Mon 6/29/15
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117	City Review	5 days	Thu 9/17/15	Wed 9/23/15
118	TM1 (Revision 1): Intro, Background & Project Alternatives	5 days	Thu 9/24/15	Wed 9/30/15
119	**3.2 Literature Review**	**106 days**	**Fri 5/1/15**	**Fri 9/25/15**
120	Collect Literature	99 days	Fri 5/1/15	Wed 9/16/15
121	Data Collection List Updates	105 days	Mon 5/4/15	Fri 9/25/15
122	Weekly Data Collection Updates	16 days	Mon 5/4/15	Mon 5/25/15
127	Monthly Data Collection Updates	66 days	Fri 6/26/15	Fri 9/25/15
132	**3.3 Regualtory and Permit Requirements**	**30 days**	**Thu 8/27/15**	**Wed 10/7/15**
136	**3.4 Conceptual Design**	**45 days**	**Thu 8/27/15**	**Wed 10/28/15**
140	**3.5 Estimated Schedule and Cost**	**25 days**	**Thu 9/24/15**	**Wed 10/28/15**
144	**3.6 Feasibility Analysis**	**70 days**	**Thu 12/31/15**	**Wed 4/6/16**
154	**3.7 Potable Reuse Feasibility Report**	**7 days**	**Mon 4/4/16**	**Tue 4/12/16**
158	**TASK 4 - TECHNICAL ADVISORY PROCESS**	**453 days**	**Wed 8/12/15**	**Fri 5/5/17**
159	Workshop 1: Work Plan	1 day	Wed 8/12/15	Wed 8/12/15
160	Workshop 2: Initial Screening	1 day	Wed 12/30/15	Wed 12/30/15
161	Workshop 3: Feasibility Analysis (Potable Reuse Study)	1 day	Fri 5/5/17	Fri 5/5/17
162	Workshop 4: Feasibility Analysis (Subsurface Study)	1 day	Fri 4/1/16	Fri 4/1/16
163	**RWQCB FINAL REPORT DEADLINE**	1 day	Fri 6/2/17	Fri 6/2/17

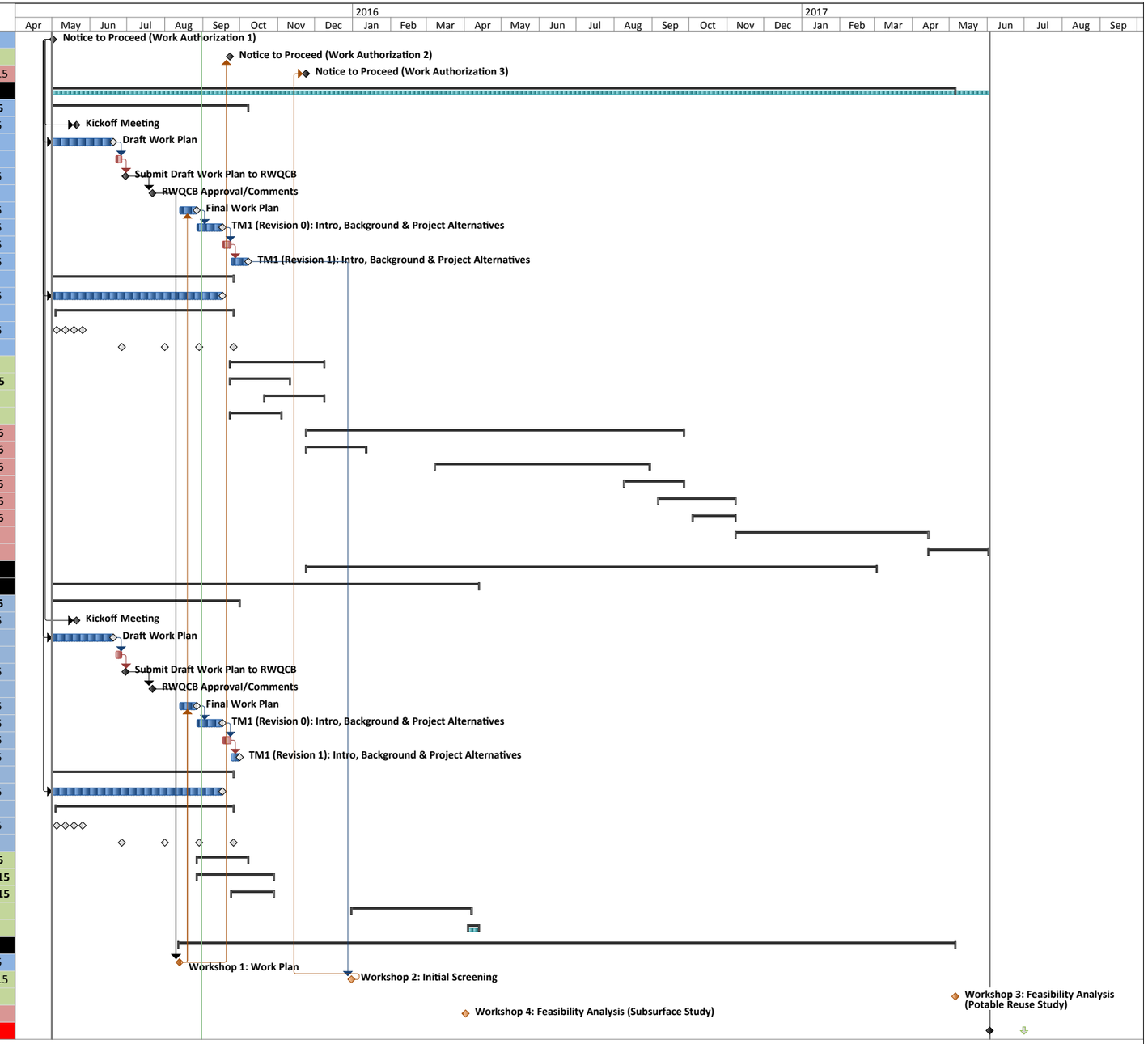

Figure 2 - Project Schedule

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1.5 Goal of Study

The goal of this study is to meet the requirements set forth by City Council and the RWQCB that were described in Section 1.3. However, this study may also inform future studies including future updates to the City's Long Term Water Supply Plan. The City's primary water source is Cachuma Reservoir, which provides over 50 percent of the City's water supply during a normal (non-drought) year. The City's water supply allocation from Cachuma could be reduced in the future due to pending federal environmental decisions on a revised Biological Opinion for the Cachuma Project, reduced operational yield due to siltation in the reservoir, and reduced drought yield as a result of the current historic drought. The City's supply planning will need to be updated to address shortages caused by such reductions to the City's existing Cachuma supply. Options for replacing a reduced Cachuma supply may include desalination and potable reuse.

Because the amount of the reduction from the City's Cachuma supply is unknown at this time, it is premature for the City to evaluate exact desalination and potable reuse capacity options that may or may not meet the City's needs. The timing for this analysis would be more appropriate following the final federal environmental decisions and operational yield analyses that determine the future Cachuma allocations. Therefore, the direction given by City Council and the RWQCB (as presented in Section 1.3) is appropriate at this time because it will determine the maximum capacity that is technically feasible from subsurface intakes and potable reuse without requiring the City to invest in developing many project concepts that may or may not meet the City's future needs pending forthcoming environmental and operational yield decisions.

Thus, the goal of this study is to understand the maximum yield that is technically feasible for subsurface intake alternatives (subject of this Work Plan) and potable reuse alternatives (subject of a separate Work Plan). The maximum yield will provide information on whether the alternatives could replace the open ocean intake independently, and potentially combined. How the City will use of these technically feasible maximum yields needs to be informed by the City's need, which will follow at a later date. Therefore, the information developed in this study will inform future studies, such as an update to the City's Long Term Water Supply Plan.

Feasibility and initial screening criteria are presented in Section 3 of this Work Plan. Alternatives are first subjected to initial screening criteria, which are based on technical feasibility criteria and capacities defined under current project objectives. It is anticipated that alternatives may end up in the following three general categories, defined further as follows:

1. **Infeasible** – The alternative does not pass the initial screening criteria and is not feasible due to technical criteria.

   Action: The alternative shall not be considered further in this study and is not recommended for inclusion in future studies.

2. **Potentially feasible, does not meet current Study goals** – The alternative meets technical screening criteria and is potentially feasible. However, the alternative's capacity does not meet the current Study goals.

   Action: The alternative shall not be considered further in this study but is potentially feasible and may be considered in future studies. Information collected during the screening process is useful to inform future studies.

3. **Potentially feasible** – The alternative passes through the initial screening stage and is considered potentially feasible.

   Action: The alternative shall be considered further in this study under current objectives and is subject to the work sequence laid out in the Work Plan.

2.0 BASIS OF DESIGN

To focus the efforts of this study on only those options that are at least potentially feasible, it is important to establish a clear definition of the basis of design for the subsurface intake alternatives. Raw water production capacity, project site alternatives, intake technology alternatives, subsurface properties, and water quality and treatment needs determine the basis of design for the various subsurface intake alternatives.

As noted previously in the programmatic work flow diagram presented in Figure 1, the basis of design will be established in Work Authorization 2. Once the design basis is established, initial screening criteria can be assessed based upon available information. Where sufficient information is not available, an alternative will be determined "potentially feasible" and the study will recommend the collection of additional data. By screening alternatives in this manner, only potentially feasible alternatives are considered for the feasibility analysis. Therefore, the definitions for basis of design criteria presented in the subsequent subsections of this Work Plan are intended to guide the project's work effort and the initial screening analysis that will be conducted in Work Authorization 2.

2.1 Capacity

As described earlier, the goal of this Study is to understand the maximum yield that is technically feasible for subsurface desalination intake alternatives and potable reuse alternatives, and to evaluate the feasibility of alternatives to replace the City's existing screened open ocean intake. All alternatives will go through technical evaluation to determine the maximum yield achievable. The target yield for each alternative will be based on the City's permitted capacity for screened open ocean intake, which is 10,000 acre-feet per year (AFY) of finished desalinated water supply. Each subsurface intake shall therefore be designed to produce 15,898 gallons per minute (gpm) of seawater to meet such needs. This intake flow rate accounts for a 45 percent RO recovery and the volume of raw water required for backwashing any pretreatment filters when the City's desalination plant is operated to produce 10,000 AFY. Because it is unknown if a subsurface intake can produce the quality of water required to completely eliminate pretreatment, and the City's desalination plant is existing and uses pretreatment filters that require backwash, the volume of intake water required for backwash is included in the intake capacity required. Consistent with the existing facility operation, backwash water is not recycled to reduce intake flow required.

2.2 Project Site Alternatives

Project site alternatives for a subsurface intake shall include the following areas due to their proximity to the City's desalination plant, the proximity to the existing intake line and its existing easement for a railroad crossing, and the availability of prior geotechnical data. [2,3,4,5,6]

1. East Beach
2. West Beach
3. Leadbetter Beach
4. 401 E. Yanonali Street (i.e., City Corporation Yard, APN #017-540-006), and

These locations are identified in Figure 3.

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[2] Outfall pipeline easement granted by Southern Pacific Railroad Company: Recording Instrument, Book 902, pages 111 through 120, dated November 28, 1949.
[3] CH2M Hill. 1989. Draft Technical Memorandum No. 3: Report on Preliminary Hydrogeologic Testing on East Beach, Santa Barbara. Prepared for City of Santa Barbara, California.
[4] CH2M Hill. 1990. Desalination Feasibility Study Summary Report. Prepared for City of Santa Barbara and Goleta Water District, California.
[5] CH2M Hill. 1990. Draft Technical Memorandum: Report on Hydrogeologic Testing of Beach Sand Lens, Santa Barbara. Prepared for City of Santa Barbara.
[6] Martin, P., Berenbrock, C., 1986. Ground-Water Monitoring at Santa Barbara, California: Phase 3 – Development of a Three-Dimensional Digital Ground-Water Flow Model for Storage Unit I of the Santa Barbara Ground-Water Basin, U.S. Geological Survey Water-Resources Investigations Report 86-4103.

0.4 0 0.20 0.4 Miles

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Figure 3 - Subsurface Intake Project Site Alternatives

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At these locations, this study will focus on the areas onshore and offshore, depending upon the intake technology that is being considered. For offshore areas, only the submerged tideland areas that fall within the sovereign lands legislatively granted to the City, pursuant to Chapter 78, Statutes of 1925, as amended (Grant) will be considered. The seaward limit of this Grant is the U.S. pierhead line, established by the Secretary of the Navy and located one-half (1/2) mile offshore.[7] Consideration of only this offshore area simplifies property acquisition requirements (i.e., lease from the California State Lands Commission (CSLC)) for any lands required by subsurface intake facilities.

2.2.1 Site Access and Security

As part of the evaluation of project site alternatives, consideration will be given to the site access for maintenance procedures (such as pump replacement and well rehabilitation). Industry standards and precedent projects for each alternative will be uses as the basis for estimation of the frequency of these efforts. Furthermore, additional security features of the sites will be addressed as part of the basis of design.

2.3 Intake Technology Alternatives

Based upon the state of intake technology and recent studies conducted by others, the following intake technology alternatives will be considered for this study.[8,9,10,11,12]

1. Vertical wells
2. Lateral beach wells (onshore infiltration galleries)
3. Horizontal collector wells (i.e., Ranney wells)
4. Slant wells
5. Subsurface infiltration galleries (SIG) – offshore
6. Horizontal directionally drilled (HDD) wells (i.e., Neodren)

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[7] CSLC. 2014. Correspondence between California State Lands Commission (CLSC) and Joe Monaco (Dudek), Subject: Request for Consistency Determination for the Reactivation of a Desalination Plant with Lease No. PRC 4942.9, a General Permit - Public Agency Use to the City of Santa Barbara Channel, City of Santa Barbara, Santa Barbara County. August 20, 2014.
[8] Mackey. E.D., et al. 2011. Assessing Seawater Intake Systems for Desalination Plants. Water Research Foundation. Denver, CO.
[9] Kennedy/Jenks Consultants. 2011. scwd^2 Seawater Desalination Intake Technical Feasibility Study. Prepared for scwd^2 Desalination Program. September 2011.
[10] SWRCB. 2012. Mitigation and Fees for the Intake of Seawater by Desalination and Power Plants, Final Report. March 12, 2012.
[11] Missmer. 2013. Subsurface Intakes for Seawater Reverse Osmosis Facilities: Capacity Limitation, Water Quality Improvement, and Economics. Desalination. Elsevier. 322 (2013) 37-51.
[12] ISTAP. 2014. Final Report: Technical Feasibility of Subsurface Intake Designs for the Proposed Poseidon Water Desalination Facility at Huntington Beach, California. Published under the Auspices of the California Coastal Commission and Poseidon Resources (Surfside) LLC. October 9, 2014.

For each alternative, this study will develop a project description to assist in the comparison of potentially feasible alternatives. Project descriptions will contain the following:

- Physical description of the intake system and required infrastructure/facilities.
- Potential yield and water quality produced.
- History of use (i.e., California, U.S. and global) for both seawater and freshwater intake applications. History will include capacity as well as information regarding site, design, and performance.
- Regulatory requirements affecting design, construction and operation.
- Required construction equipment, resources, and procedures to assist in the subsequent evaluation of constructability and construction impacts.
- Reliability
- Maintenance requirements.

2.4 Subsurface Properties

This section presents Work Plan elements associated with reviewing available literature and publications that describe subsurface properties and characteristics in the vicinity of the shoreline at each project site alternative. This information will be used to identify potential areas for focused evaluation and analyze subsurface intake feasibility, capacity, and potential impacts. Also presented is a discussion of data gaps and collection of new data to address data gaps that will then be used to further evaluate feasibility and capacity of subsurface intake alternatives that are not eliminated from consideration due to failure to pass initial screening.

2.4.1 Literature Review

Available literature describing geologic and hydrogeologic properties of the beach and near shore areas will be reviewed. Sources of information include:

- Published geologic/hydrogeologic studies in the area, including:
  - USGS reports
  - Prior hydrologic and geotechnical studies conducted by the City.
- The City's 1989 and 1990 subsurface intake studies conducted on East, West, and Leadbetter Beaches.
- Geotechnical data associated with the design and installation of piles supporting Stearns Wharf.
- Any data related to sand movement (i.e., erosion and deposition) in the areas of East, West and Leadbetter Beaches that may be associated with harbor dredging and mooring (data provided by the City Waterfront Department).

- Hydrologic data and studies on existing wells and the groundwater aquifer used for drinking water production, including various USGS hydrogeologic and modeling studies.
- Studies relating to tsunami hazard, sediment transport, and projected sea level changes in the Santa Barbara area: California State Waters Map Series—Offshore of Santa Barbara, California. http://pubs.usgs.gov/sim/3281/
- Barnard, P.L., Revell, D.L., Hoover, D., Warrick, J., Brocatus, J., Draut, A.E., Dartnell, P., Elias, E., Mustain, N., Hart, P.E., and Ryan, H.F. 2009. Coastal Processes Study of Santa Barbara and Ventura Counties, California: U.S. Geological Survey Open-File Report 2009-1029, 904 p.
- Bechtel Corporation. 1990. Alternative Water Supplies. Submitted to the City of Santa Barbara. April 1990.
- City of Santa Barbara Public Works Department. Groundwater Data Collection files provided by Kelley Dyer on June 8, 2015.
- State Water Resources Control Board Geotracker contamination inventory tool. http://geotracker.waterboards.ca.gov/
- ISTAP. 2014. Final Report: Technical Feasibility of Subsurface Intake Designs for the Proposed Poseidon Water Desalination Facility at Huntington Beach, California. Published under the Auspices of the California Coastal Commission and Poseidon Resources (Surfside) LLC. October 9, 2014
- Johnson, S.Y., Dartnell, P., Cochrane, G.R., Golden, N.E., Phillips, E.L., Ritchie, A.C., Greene, H.G., Krigsman, L.M., Kvitek, R.G., Dieter, B.E., Endris, C.A., Seitz, G.G., Sliter, R.W., Erdey, M.D., Gutierrez, C.I., Wong, F.L., Yoklavich, M.M., Draut, A.E., Hart, P.E., and Conrad, J.E. (S.Y. Johnson and S.A. Cochran, eds.), 2013. California State Waters Map Series—Offshore of Santa Barbara, California: U.S. Geological Survey Scientific Investigations Map 3281, pamphlet 45 p., 11 sheets, scale 1:24,000.
- National Water Research Institute (NWRI), 2015. West Basin Municipal Water District's Ocean Water Desalination Subsurface Intake Study – Guidance Manual Review, Bureau of Reclamation Project No. R14AP00173.
- Nishikawa, T., 1997. A Simulation-Optimization Model for Water Resources Management, Santa Barbara, California, U.S. Geological Survey Water-Resources Investigations Report 97-4246.
- Nishikawa, T., 1998. Water-Resources Optimization Model for Santa Barbara, California. J. Water Resource Planning Management, 124(5), 252–263.
- Martin, P., 1984. Ground-Water Monitoring at Santa Barbara, California: Phase 2 – Effects of Pumping on Water Levels and on Water Quality in the Santa Barbara Ground-Water Basin, U.S. Geological Survey Water Supply Paper 2197.
- Martin, P., Berenbrock, C., 1986. Ground-Water Monitoring at Santa Barbara, California: Phase 3 – Development of a Three-Dimensional Digital Ground-Water

Flow Model for Storage Unit I of the Santa Barbara Ground-Water Basin, U.S. Geological Survey Water-Resources Investigations Report 86-4103.

- Mustain, N. 2007. Grain Size Distribution of Beach and Nearshore Sediments of the Santa Barbara Littoral Cell: Implications for Beach Nourishment. MS Thesis in Earth Sciences, University of California, Santa Cruz, 107 pp.
- SWRCB. 2015. Proposed Desalination Amendment: Creating a Consistent Permitting Process. State Water Resources Control Board. April 24, 2015.
- SWRCB. Draft Final Amendment to the Water Quality Control Plan for Ocean Waters of California Addressing Desalination Facility Intakes, Brine Discharges, and Incorporating other Non-substantive Changes. State Water Resources Control Board. May 5, 2015.
- Swarzenski, P.W., Izbicki, J.A. 2009. Coastal Groundwater Dynamics off Santa Barbara, California: Combining geochemical tracers, electromagnetic seepmeters, and electrical resistivity. Estuarine, Coastal and Shelf Science, 83, 77-89.
- Todd, D. K. 1978. Groundwater Basin Data: Status and Needs. A Report to the City of Santa Barbara, California.
- U.S. Department of the Interior, 1969. Geology, Petroleum Development, and Seismicity of the Santa Barbara Channel Region, California. Geological Survey Professional Paper 679.
- U.S. Geological Survey. Groundwater Watch, Santa Barbara County. http://groundwaterwatch.usgs.gov/countymap.asp?sa=CA&cc=083
- Wong, F.L., Phillips, E.L., Johnson, S.Y., Sliter, R.W., 2012. Modeling of Depth to Base of Last Glacial Maximum and Seafloor Sediment Thickness for the California State Waters Map Series, Eastern Santa Barbara Channel, California, U.S. Geological Survey Open-File Report 2012-1161, 16p.

Additional relevant geological reports and studies prepared for other subsurface intake projects in California will also be reviewed to obtain information about the applicability of comparable near shore conditions that may be relevant to this study.

Information that will be collected and reviewed in this task will be used to develop an understanding of the stratigraphy of the beach and near shore environment, locations and depths that could be targeted for potential development of subsurface intake facilities, hydraulic properties of the various geologic units, location of confining layers and faults that would limit the yield of subsurface intake facilities, groundwater quality considerations (including the location of known sources of contamination), and location of water supply wells and sensitive habitats that could be impacted by subsurface intake development.

2.4.2 Additional Data Collection

It is anticipated that there will be a number of uncertainties regarding subsurface conditions. Therefore, identification of associated data gaps that will developed during this feasibility study. In some cases, it may be appropriate to make assumptions or translate subsurface information from other similar locations when conducting the feasibility analysis. Safety factors will be applied to these assumptions based upon the quality of information available – and where necessary, written justification will be made to substantiate these assumptions. In other cases, it may not be possible to make assumptions and, in such cases, a range of focused field data collection activities may be suggested to improve the understanding of site conditions and subsurface intake feasibility for any given subsurface intake alternative at a given location. This information may also be helpful in identifying locations along the beach where subsurface conditions are better than other locations (e.g., locations where there is coarse material associated with ancestral stream channels). Because the nature and significance of the data gaps is not yet known, it is not possible to develop a specific Work Plan for data collection at this time. For this reason, this Work Plan outlines several potential data collection activities that may be performed, depending on the type of subsurface intake facility being evaluated. These activities fall into the following general categories that may include (least invasive and costly listed first):

1. Geophysical survey conducted along the beach and into near shore area to aid in defining stratigraphy, target zones, and depth to bedrock.
2. Drilling of coreholes and installation of piezometers to refine subsurface stratigraphy, target zones, and groundwater levels at the shoreline in specific areas.
3. Installation of one or more test wells and observation wells and performance of aquifer tests to measure aquifer productivity, hydraulic conductivity, and water quality.
4. Offshore drilling and coreholes to collect ocean bottom samples for determination of permeability and seawater infiltration gallery feasibility, SIG basis of design, and depth to low permeability materials associated with an offshore fault.

Based upon these data collection alternatives, if desired, at the direction of City Council, it is anticipated that a more specific data collection program (i.e., Phase 3 of the City's work program presented in Figure 1) would be developed for specific locations and specific subsurface intake alternatives, once the initial feasibility study work is completed. This data collection Work Plan will be prepared for review prior to implementation of the program.

2.4.3 Field Program Permitting

There are a number of permits/approvals that will be needed prior to conducting data collection field work. Permits/approvals may include:

- Coastal Development Permit
- Army Corps of Engineers, General Permit 7

- Regional Water Quality Control Board, Section 404 determination
- CEQA/NEPA
- City of Santa Barbara Parks Department

Activity descriptions associated with permit applications may include:

- Description of sampling technique and what the data will be used for.
- Description of equipment used and access that is required.
- Number of people required to collect the samples.
- Duration of sampling event.
- Description of any restoration that may be required following sampling.

It is anticipated that a more specific and detailed description of permits that would be required would be prepared as part of the field program discussed in the feasibility study.

2.5 Tsunami (Coastal) Hazards and Sediment Transport

Tsunami (coastal) hazards and sediment transport (i.e., erosion or deposition) will be evaluated to assess a subsurface intake alternative's susceptibility to oceanographic and geophysical hazards. This information will help to determine any applicable protective features, site alternatives, or required maintenance that should be considered when establishing a basis of design for each subsurface intake alternative. The following subsections present the technical approach for performing these evaluations.

2.5.1 Tsunami (Coastal) Hazard Analysis

The coastal hazard analysis consists of two phases of input analyses (i.e., water and land), delineation of elevations and assets on the landside of the shoreline, and delineation of water level extremes:

- *Landside Analysis* involves compilation of stationary databases, including drawings of the structural components of the Desal Plant that are part of the shoreline facilities (e.g., beach weir box), beach profiles and elevations of neighboring structures that might interact with local wave shoaling dynamics.

- *Waterside Analysis* includes a determination of extreme water levels, inundation, and recurrence probabilities using an assimilation of non-stationary databases. Because of the nature of the Santa Barbara shoreline, the coastal hazard analysis of the project structures and supporting facilities must be coupled to a sea level rise, tides, and storm wave hazard analysis of the harbor breakwater system. To perform these complex wave analyses, numerical refraction-diffraction computer codes called OCEANRDS will be utilized.

The fundamental inputs to the coastal hazards analysis are:

- Extreme wave height.
- Local water depth.
- Depth and slope of sediment cover over bedrock at the toe of the project structures.

The basis of design must consider a domain that extends far beyond the project boundaries to account for wave climate variability, wave propagation, shelf bathymetry, etc. The coastal hazard analysis will utilize a research tool recently developed at the Scripps Institution of Oceanography, referred to as the Coastal Evolution Model (CEM). The Coastal Evolution Model employs algorithms consistent with the U.S. Army Corps of Engineers Coastal Engineering Manual, but employs the latest generation equilibrium beach profile algorithms that provide 3-dimensional predictive and mapping capability of the wave run-up field, beach erosion, and shoreline recession under the effects of wave climate variability, climate cycles, and sea level rise. Once the model has been calibrated, the design tsunami associated with the project will be incorporated.

The information developed as a result of this coastal hazard analysis will help to determine the design basis for locating subsurface intake facilities to avoid loss as a result of sea level rise or tsunami inundation and if any control features can be provided to protect the facilities.

2.5.2 Sediment Transport Analysis

The sediment transport and sediment budget analysis will support hazard assessment of the subsurface intake alternatives for the project. The characteristic of an optimal subsurface intake site is one that is neither erosional nor depositional, and one that is within a feasible hydraulic pathway to the desalination facility. Evaluating long term erosional or depositional tendencies and predicting shoreline evolution requires analyzing the sediment budget of the littoral cell in which the subsurface intake candidate sites reside. A littoral cell is a coastal compartment that contains the complete cycle of sedimentation, including sources, transport paths, and sinks. The Santa Barbara Littoral Cell (containing the sites to be evaluated) was one of the sites used during CEM validation, which required assembly and formatting of a full range of databases for the CEM – all of which will be available for use during this project.

The data developed as a result of the sediment transport analysis will help to determine the design basis for locating subsurface intake facilities to avoid plugging or erosion, if any control features can be provided to protect the facilities from erosion or deposition, and what maintenance may be expected.

2.6 Water Quality and Treatment Needs

Subsurface intake systems may reduce the concentration of the following parameters found in seawater:

- Suspended particulate matter (i.e., total suspended solids (TSS) and turbidity) and remove virtually all of the algae,
- Up to 98 percent of bacteria,
- Up to 50 percent of the natural organic carbon with a higher percentage of organic polymers removed, and
- A significant concentration of transparent exopolymer particles (TEP).[13]

Reduction of these constituents in seawater intake water may have the following advantages:

- *Suspended solids* - reduced concentrations of suspended solids may reduce or in some cases eliminate the need for additional pretreatment (i.e., filtration) to meet RO feed water silt density index (SDI) specifications. Where filtration is still required, a reduction in solids generation from backwash waste treatment is realized.
- *Biopolymer and TEP* - reduced concentrations of biopolymers and TEP may decrease the risk of membrane biofouling and may increase the time between required membrane cleanings - possibly allowing longer operating life for the membranes.[14]

Therefore, in some cases, a subsurface intake may eliminate or significantly reduce the need for a pretreatment system that would be needed to produce an equivalent RO feed water quality if a surface intake were used.

Although most existing literature provides the expectation that a subsurface intake will eliminate the need for pretreatment, some California projects have demonstrated otherwise[15]:

- **Long Beach, California:** A demonstration facility operating at the Hayes Generating Station in Long Beach showed that a subsurface infiltration gallery intake did not eliminate the need for pretreatment. The pilot study showed cartridge filters required weekly (or more frequent) replacement.[16]

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[13]ISTAP. 2014. Final Report: Technical Feasibility of Subsurface Intake Designs for the Proposed Poseidon Water Desalination Facility at Huntington Beach, California. Published under the Auspices of the California Coastal Commission and Poseidon Resources (Surfside) LLC. October 9, 2014.
[14] Dehwah. A.H.A., Li, S., Al-Mashharawi, S., Winters, H., Missimer, T.M. 2014. Influence of beach well and deep ocean intakes on TEP and organic carbon reduction in SWRO systems.
[15] SWRCB. 2012. Mitigation and Fees for the Intake of Seawater by Desalination and Power Plants, Final Report. March 12, 2012.
[16] Allen, J., Cheng, R., Tseng, T.J., Wattier, K., 2009. Update for the Pilot and Demonstration-Scale Research Evaluation of Under-Ocean Floor Seawater Intake and Discharge. 2009 AWWA Annual Conference & Exposition. June 16, 2009.

- **Morro Bay, California:** Dissolved iron concentrations from vertical beach wells were found to range from 1 to 10 mg/L necessitating pretreatment using sulfuric acid and filtration.[17]
- **Doheny Beach, California:** Significant concentrations of iron and manganese (Fe: 10 mg/L; Mn: 5 mg/L) were found in source water from a slant well intake. It is believed that these concentrations will decrease over time to non-detect levels, however, the rate at which this will occur cannot be reliably predicted. Additional treatment is recommended for implementing the desalination process and to treat brine before discharge to the South Orange County Water Authority's ocean outfall.[18]

As a result, careful study of subsurface geochemistry must be completed to demonstrate the possible production of suspended solids, iron, and manganese. The available data will be used to compare against other installations to determine a basis of design water quality that can be expected. However, because the City's desalination plant is already equipped with filtration, it is assumed that filtration technology will continue to be used to remove suspended solids. The need for additional pretreatment to address dissolved iron and manganese will be estimated through this study.

Additionally, raw water characterization will consider capture of high concentrations of carbon dioxide (i.e., greater than that seen in seawater) that may require additional mitigation to offset greenhouse gas (GHG) to meet the City's GHG limits.[19]

2.7 Analysis of Subsurface Intake Systems

This section presents the methodology that will be used to evaluate each subsurface intake alternative in terms of various hydrogeologic feasibility screening criteria. The following hydrogeologic feasibility screening criteria are included in the analysis:

- Individual facility yield, spacing for multiple locations of given subsurface intake type, and length of beach required to produce 15,898 gpm and 10,000 AFY
- Percentage of ocean water captured by the subsurface intake
- Impacts to local groundwater supplies and sensitive habitats
- Potential to capture or mobilize known groundwater contamination

Methodologies for conducting the technical analyses are described below.

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[17] Kartinen.E., et al. 2003. Solving Morro Bay's Seawater Reverse Osmosis Plant's Iron Problem. AWWA Membrane Technology Conference. Atlanta, GA. March 2003.
[18] MWDOC. 2014. Final Summary Report - Doheny Ocean Desalination Project Phase 3 Investigation. Prepared by the Municipal Water District of Orange County. January 2014.
[19] City of Santa Barbara. 2012. Climate Action Plan. September 2012.

2.7.1 Methodology for Evaluating Yield, Intake Facility Spacing, and Length of Beach Required

The number of facilities required to meet the target flow of up to 15,898 gpm (10,000 AFY) and the length of beach required to accommodate these facilities is an important feasibility consideration. The infrastructure (i.e., facilities) required to accommodate each type of subsurface intake (presented in Section 2.3) will have a different configuration and expected flow rate. When multiple facilities are required to achieve the target yield, the facilities must be spaced far enough apart from one another to prevent significant interference with each other, thus reducing yield and potentially impacting local groundwater supplies, other groundwater users and/or sensitive habitats. There are three potential project site alternatives under consideration for subsurface intakes: East, West, and Leadbetter Beach (refer to Figure 3). Following are approximate lengths of each beach, measured using the City of Santa Barbara Map System at the approximate high tide mark[20]:

- Leadbetter Beach: 3,230 feet; 0.61 miles.
- West Beach: 1,395 feet; 0.26 miles.
- East Beach: 8,130 feet; 1.54 miles.

These are total lengths; the actual length available to a project would likely be less because of site access issues, presence of creek and estuary discharges, setback requirements from environmentally sensitive areas, locations of existing facilities (pier, recreational areas, dredge system piping, etc.), and utilities.

To determine the overall beach area required for a subsurface intake alternative, the first step is to estimate the rate of flow that each type of subsurface intake facility would be expected to produce. Standard analytical equations and numerical methods will be used to estimate flow. The type of analytical approach will depend upon the type of subsurface intake (e.g., well versus subsurface infiltration gallery) and the aquifer unit penetrated by the subsurface intake. Table 2.1 presents the methods that will be used to calculate yield.

Assumed aquifer water levels (high and low), groundwater gradient (high and low), and a range of transmissivity values for the target aquifer zone(s) will be estimated using available data obtained in Section 2.4.1. A maximum amount of allowable water level drawdown at the subsurface intake (e.g., inside the well) will be established so that the water level does not fall below the top of a confining layer or assumed screen depth. The calculations will be iterated until the production rate does not result in drawdown exceeding the allowable maximum.

[20] City of Santa Barbara. Map Analysis and Printing System. http://gismaps.santabarbaraca.gov/SilverlightViewer/Viewer.html?Viewer=CityOfSantaBarbaraPublic

Table 2.1 Methods Used to Compute SSI Yield		
Type of SSI	**Method to Estimate Flow**	**Reference**
Vertical Wells	Theis Method (confined) Neuman and Witherspoon (unconfined, leaky)	Theis, C.V. 1935. The relation between the lowering of the piezometric surface and the rate and duration of discharge of a well using groundwater storage, Am. Geophys. Union Trans., vol. 16, pp. 519-524. Neuman, S.P. and P.A. Witherspoon. 1972. Field determination of the hydraulic properties of leaky multiple aquifer systems, Water Resources Research, vol. 8, no. 5, pp. 1284-1298.
Lateral beach wells (onshore infiltration galleries)	Yield is assumed and is a function of the length of intake screen required to achieve the yield and permeability of surrounding media	Driscoll, 1986. Groundwater and Wells, Second Edition, pg. 765. On-land infiltration galleries.
Collector wells (i.e. Ranney wells)	Hantush and Papadopulos, 1962	Hantush, M.S., Papadopulos, I.S., 1962. Flow of ground water to collector wells. J. Hydraulics Div., Proc. Am. Soc. Civil Engrs HY 5, 221–244.
Slant wells	Universal Drawdown Equation or Numerical Model	Williams, D. E., 2013. Drawdown distribution in the vicinity of nonvertical wells. Groundwater, vol. 51, no. 5, pp. 745-751 MODFLOW 2000
Subsurface infiltration galleries (SIG) – offshore	Yield is assumed and is a function of the length of intake screen, permeability of the bed material, and area required to achieve the yield	Driscoll, 1986. Groundwater and Wells, Second Edition, pg. 763. Flow into bed-mounted infiltration galleries.
Horizontal directionally drilled (HDD) wells (i.e., Neodren)	Universal Drawdown Equation or Numerical Model	Williams, D. E., 2013. Drawdown distribution in the vicinity of nonvertical wells. Groundwater, vol. 51, no. 5, pp. 745-751 MODFLOW-2000

Once the yield from a single subsurface intake facility is estimated, the number of subsurface intake facilities required to achieve the target yield can be computed. The next

step is to calculate the distance needed between subsurface intake facilities in order to minimize interference and reduction in yield caused by water level drawdown from the neighboring intake. This step will not be needed for the subsurface infiltration gallery type intakes because this type of intake does not rely on horizontal flow through an aquifer.

For subsurface intakes that require multiple facilities to achieve the target yield, the applicable analytical equations presented in Table 2.1 will be used with the calculated flow rate to estimate the amount of drawdown that would be expected at various distances from the subsurface intake. It is assumed that drawdown caused by interference from the neighboring subsurface intakes (combined total from all neighboring subsurface intakes) is unacceptable if it exceeds 20 percent of the available drawdown in the affected well. On the basis of this analysis, the acceptable spacing between subsurface intake facilities can be estimated. Lastly, the length of beach required to achieve the target yield with the estimated number of subsurface intake facilities can be estimated and compared to the length of beach that is available.

2.7.2 Methodology for Evaluating Percentage of Ocean Water Inflow into Subsurface Intake Systems

Subsurface intake's that draw a significant percentage of total flow from groundwater rather than seawater may have greater impact on the local groundwater basin, City wells, and sensitive habitats. The percentage of seawater relative to groundwater brought into the subsurface intake will depend on the alternative being considered, location relative to ocean, and the aquifer that is penetrated by the intake. For example, vertical wells would be expected to produce a mixture of native groundwater and seawater because they are typically located some distance back from the beach, while subsurface infiltration galleries produce primarily seawater because they are constructed on the ocean floor. In addition, if the aquifer material penetrated by a well is separated from the ocean bottom by a confining layer or the ocean bottom lacks permeability, or the presence of the known offshore fault limits the flow of seawater, wells would be expected to produce proportionately more groundwater than seawater and hence, would have a greater potential impact on the groundwater basin.

As discussed in Section 2.4, the City will estimate subsurface properties based upon existing literature, or supplemental information will be collected as determined necessary and if authorized by City Council. This information will include an assessment of the production capacity of intake facilities subsurface properties and also the connectivity of subsurface formations to the local groundwater supplies and sensitive habitats. Based upon an initial review of the data, there appears to be an unconfined shallow zone (upper 100-200 feet) and deeper, underlying zones referred to as the upper and lower producing zones. Percent ocean water yield from the shallow unconfined and upper production zone will be estimated using applicable analytical methods such as WINFLOW (2-D), a simplified numerical flow model with particle tracking, or the USGS groundwater flow model currently under development for the Santa Barbara basin (refer to Section 2.6.3). Preference will be

given to using the USGS groundwater flow model if it can be readily adapted to evaluate this issue. Aquifer water levels, groundwater gradient, and transmissivity values for the target aquifer zone will be estimated using available data obtained in Section 2.4.1. Percent ocean water yield from the lower production zone will not be estimated.

2.7.3 Methodology for Evaluating Impacts to Local Groundwater Supplies and Sensitive Habitats

As shown in Figure 4, most City wells are completed in Storage Unit 1 that underlies much of the City center and several are completed in the Foothill Basin on the north and west side of the City (Storage Unit 2). Wells are screened in the upper, middle, and/or lower producing zones at various depths. In general, groundwater in Storage Unit 1 flows from north to south toward the ocean where it discharges. During periods of heavy pumping (e.g., drought periods), there is evidence that seawater intrusion occurs. Subsurface intakes that produce a significant amount of local groundwater may impact the amount of groundwater in storage and affect water levels and production at City wells, particularly during drought. Water level drawdown caused by a subsurface intake may also lower water levels and increase the potential for salt water intrusion. There are also several sensitive habitats in the vicinity of the beach areas that are the subject of this study. These include, but may not be limited to:

- Sycamore Creek and tidal pool that seasonally discharges to the East Beach area
- Clark bird refuge and pond that discharges to East Beach
- Mission Creek and tidal pool that discharges to East Beach

A numerical model will be used to determine potential impacts to the Storage Unit 1, the Foothills Basin and local sensitive habitats. For many years, the City has been working with the USGS on developing a numerical groundwater flow model for the Santa Barbara Basin as part of its Long Term Water Supply Program, adopted in 1994. The model is based on MODFLOW-2000, with the addition of SEAWAT-2000 to model salt water intrusion. USGS staff working on the model have indicated that the model is appropriate for evaluating reductions in available groundwater storage in the basin and impacts to City production wells resulting from subsurface intakes, including salt water intrusion. The model can also be used to simulate water level drawdown near sensitive habitats that are hydraulically-connected to the shallow groundwater system. Some modifications to the model may be needed to simulate water levels in the shallow zone. The updated model report is undergoing technical review at the USGS and will not be published until early 2016. However, USGS staff have indicated that the model is completed and calibrated and they are willing to use the model and to generate preliminary results on an informal basis until the model update is published.

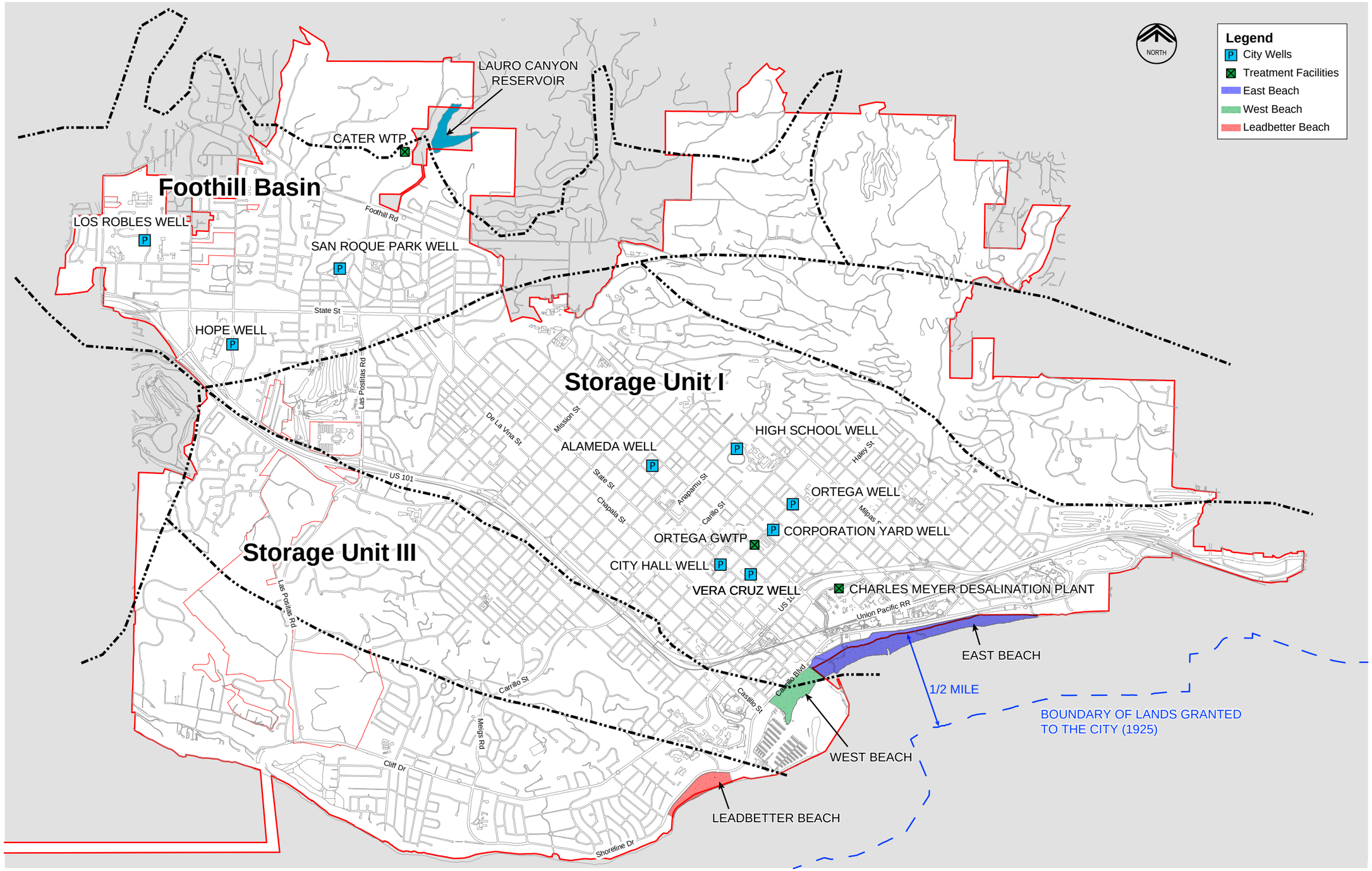

Figure 4 - City Water Wells and Groundwater Basins

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The model can simulate pumping from subsurface intake vertical wells along the coast. Collector wells can be simulated as large diameter production wells. Onshore infiltration galleries can be simulated with the model using a drain package. Slant wells and HDD wells cannot be directly simulated and so some adjustments to the model or simplifying assumptions will be necessary because these intakes are completed at an angle and do not align with the model grid arrangement. The subsurface infiltration gallery alternative will likely not be modeled using the groundwater flow model because it is assumed that all of the flow into this intake is derived from seawater and so there is no anticipated impact on the groundwater basin or sensitive terrestrial habitats.

2.7.4 Methodology for Evaluating Potential Capture of Known Groundwater Contamination

The uppermost portions of shallow zone that underlie the City are 100 - 200 feet thick and extend toward and beneath the shoreline. Groundwater quality in this shallow zone has been impacted by a number of sources of contamination, which are regulated by the Regional Water Quality Control Board. Subsurface intakes that are open to this zone may capture or mobilize this contamination. It is also possible, depending on degree of confinement, that subsurface intake pumping from deeper water producing zones could draw contamination into deeper units and impact subsurface intake water quality. Steps that will be taken to evaluate the potential for this to occur include the following:

- Prepare a contaminant source inventory for the area within 2 miles of the beach areas.
- Identify known and documented sources of groundwater contamination that have the potential, due to proximity and mobility characteristics, to impact subsurface intake water quality in the shallow zone or deeper producing zones.
- Utilize the results from the numerical modeling assessment performed in Section 2.7.3 to assess whether water level drawdown from subsurface intake operations is likely to cause movement of known sources of contamination toward the subsurface intake. Some modifications to the model may be needed to simulate water levels in the shallow zone.

Based upon this information, the project team will summarize the relative risk (high, medium, or low) of capturing known sources of contamination into subsurface intake alternatives completed in the shallow zone and deeper producing zones.

2.8 Project Life

A 20 year project life will be assumed for a subsurface intake system. This is also the time that is assumed to be required for repayment of any loan used to finance a subsurface intake project.

2.9 Reliability Features

Reliability of maintaining the required intake capacity and water quality will also be addressed in the design basis. Based upon the intake type, hydrogeology, geochemistry, and other factors, using the literature data, a safety factor will be substantiated and established as a basis of design requirement used to determine the redundancy required to address downtime for maintenance and repairs, as well as a possible decrease in production capacity due to plugging.

3.0 FEASIBILITY CRITERIA AND INITIAL SCREENING

As presented in Figure 1 and in Section 2 of this Work Plan, as the design basis is developed, initial screening criteria (i.e., based upon technical criteria) are considered. However, before the initial screening analysis can proceed, it is necessary to first identify feasibility criteria that can be used to analyze the subsurface intake alternatives.

For this project, "feasibility" will be defined by industry standard procedures for projects in California, as documented in the 2012 California Environmental Quality Act (CEQA) Statute and Guidelines. The act provides the following definition:

> *"Feasible" means capable of being accomplished in a successful manner within a reasonable period of time, taking into account economic, environmental, social, and technological factors."*

Consistent with this definition, the Ocean Plan Amendments that were adopted by the State Water Resources Control Board on May 6, 2015 identifies 13 factors that should be used to determine feasibility for subsurface intakes:

1. Geotechnical data
2. Hydrogeology
3. Benthic topography
4. Oceanographic conditions
5. Presence of sensitive habitats
6. Presence of sensitive species
7. Energy use
8. Impact on freshwater aquifers, local water supply and existing water users
9. Desalinated water conveyance
10. Existing infrastructure
11. Design constraints (engineering constructability)
12. Project life cycle costs
13. Other site and facility-specific factors

For the purposes of this study, these factors can be identified by the four main components of the CEQA definition of "feasible" as presented in Table 3.1: i.e., economic, environmental, social, and technological factors. As indicated in Table 3.1, some of the Ocean Plan criteria affect one or more of the CEQA factors of feasibility. Expanded definitions for each of the subsurface intake feasibility screening criteria presented in Table 3.1 are presented in following subsections.

Table 3.1 Feasibility Criteria

Feasibility Criteria	CEQA Feasibility Criteria			
	Technological Factors	Social Factors	Environmental Factors	Economic Factors
Geotechnical factors				
1 Geochemistry				
a. Risk of adverse geochemical interactions due to fluid mixing	x			
b. Risk of well clogging	x			
c. Risk of changes to inorganic water chemistry	x			
2 Seismic hazards				
a. Project facilities would cross a known fault line, or be exposed to a seismic hazard that could otherwise not be protected from loss by design	x			
Hydrogeology factors				
3 Impact on freshwater aquifers, local water supplies and existing water users	x	x	x	
4 Impact to sensitive habitats such as marshlands, drainage areas, etc.	x	x	x	
5 Potential yield per installation	x			
6 Proximity to sources of underground water contamination (i.e., will mobilize or capture contamination)	x		x	
Benthic Topography				
7 Suitability of bottom conditions (e.g., rocky bottom, presence of sensitive environments such as kelp beds, etc.)	x			
Oceanographic Factors				
8 Sensitivity to sea level rise (i.e., bathymetry)	x			x
9 Sensitivity to erosion or sedimentation (e.g., able to protect against erosion or sedimentation, able to maintain permeability of ocean bottom without entrainment of fine sediment (i.e., armoring), etc.)	x			x
10 Sensitivity to tsunami inundation	x			x
Presence of Sensitive Habitats				
11 Proximity to marine protected areas	x		x	
12 Proximity to on-shore habitats such as marshlands, or environmental sensitive habitat areas (ESHAs)	x		x	
Energy Use				
13 Project requires more or less energy than other alternatives, accounting for any possible reduction in treatment requirements.	x		x	x
14 Project energy use exceeds City's Greenhouse Gas Emission Threshold as identified in the City's 2012 Climate Action Plan				
Design and Construction Constraints				
15 Proximity to existing infrastructure (e.g., existing intake line, railroad crossing, desalination facility)	x			x
16 Number of units required for design capacity	x			x
17 Linear feet of beachfront required	x			x
18 Onshore footprint for facilities	x			x

Table 3.1 Feasibility Criteria

Feasibility Criteria	CEQA Feasibility Criteria			
	Technological Factors	Social Factors	Environmental Factors	Economic Factors
19 Onshore footprint required for construction activities	x			x
20 Complexity of off-shore construction (e.g., uneven topography, wave energy, depth to seabed, environmental monitoring requirements, etc.)	x		x	x
21 Scope and complexity of property, easement, or right of way acquisitions (e.g., State Lands lease, property condemnation, rail road crossing, etc.)	x	x		x
22 Reliability and performance				
a. Precedent (i.e., demonstration of intake technology in similar seawater or freshwater applications at a similar scale)	x			
b. Performance risk (i.e., stable yield and quality over project life)	x			
c. Maintainability (i.e., can yield or quality be restored by standard means that won't significantly impact the facility operation or availability)	x			
d. Material of construction performance	x			x
23 Sustainability (e.g., labor, chemicals, mechanical equipment use to sustain performance)				
a. Frequency of maintenance	x	x	x	x
b. Complexity of maintenance	x	x	x	x
Other Site-Specific Factors				
24 Impact to recreational uses of land or ocean		x		x
25 Impact to commercial uses of land or ocean		x		x
26 Certainty of implementation schedule and costs (i.e., as affected by affected by permitting, demonstration or pilot testing, environmental requirements, monitoring, etc.)		x		x
Economic Factors				
27 Cost impacts to water rate payers		x		x
28 Impact of project construction schedule on recreational and commercial use as it relates to the local economy		x		x

Geotechnical Factors

1. Geochemistry
    a. Risk of adverse geochemical interactions due to fluid mixing: The risks of adverse fluid mixing are greatest where waters from different directions within an aquifer (landwards vs. seawards), aquifers, or aquifer depths enter an intake (or enter different intakes and later mixing within piping system). Systems with the lowest risk of adverse fluid mixing are constructed subsea and produce water largely by vertical infiltration.
    b. Risk of well clogging: Loss of intake capacity by clogging (or plugging) can be cause by a variety of chemical, biological, and physical processes. The greatest risk of clogging occurs where there is mixing of dissimilar water or a change in water chemistry (e.g., introduction of dissolved oxygen). Clogging is of greatest concern where rehabilitation is complex and expensive.
    c. Risk of changes to inorganic water chemistry: Long-term changes in water chemistry caused, for example, by different fractions of landward derived freshwater could interfere with the reliable performance of the reverse osmosis process. The risk is lowest where intakes produce water predominantly by vertical infiltration of seawater (e.g., subsea galleries).
2. Seismic Hazards
    a. Project facilities located near a fault line: Project facilities that would cross a known fault line, or be exposed to a seismic hazard that could otherwise not be protected from loss by design are considered. Active faults pose a risk of liquefaction and settlement at the facility.

Hydrogeology Factors

1. Impact on freshwater aquifers, local water supplies, and existing water users: Groundwater pumping of saline water may result in abstraction of freshwater from a groundwater basin, adversely impacting the basin's water budget and causing additional drawdown that causes groundwater to flow seaward.
2. Impact to sensitive habitats: This criterion considers impacts from water drawdown or changes in hydrology due to the location of a subsurface intake relative to sensitive habitats such as marshlands, wetlands, and drainage areas.
3. Potential yield per installation: Potential yield per installation are best estimates of unit yield per well, acre of gallery subsurface area, and per foot of HDD well or water tunnel. In the absence of site-specific data, these values were estimated based on local hydrogeology and the performance of similar systems constructed elsewhere.
4. Proximity to sources of underground water contamination: The potential to uncover or release potential underground water contaminants is addressed in this criterion

including the potential of the contaminants to mobilize and spread to other areas or to feasibly capture and abate contamination.

Benthic Topography

1. Suitability of bottom conditions: Suitability of bottom environmental conditions is applicable to only seabed and surf zone infiltration galleries. Unsuitable conditions would be a rocky bottom or the presence of sensitive environments such as kelp beds.

Oceanographic Factors

1. Sensitivity to sea level rise (bathymetry): Sensitivity to sea level rise relates to the effects of changes in water depth and landwards beach migration on constructed intakes. The location of intake structures needs to consider the projected rise of seawater and beach migration over their operational lives. This includes design considerations of locating different subsurface intake technologies further inland or offshore to avoid the impacts of future sea level rise that would place them in a sub-optimal setting. Sensitivity to sea level rise based on local bathymetry including both current and potential post-sea level rise future conditions.
2. Sensitivity to erosion or sedimentation: Sensitivity to erosion or sedimentation – e.g., able to protect against erosion or sedimentation, able to maintain permeability of ocean bottom without entrainment of fine sediment (i.e., armoring). Sedimentation rate, whether natural or anthropogenically influenced, may impact subsurface intakes by either burying or exhuming them. The sensitivity of an intake design alternative is evaluated based on local sedimentation rates and likely intake locations and designs. This criterion also includes beach maintenance through artificial replenishment or deposition of dredge material.
3. Sensitivity to tsunami inundation: This criterion considers the location of facilities associated with each subsurface intake technology that may result in disruptions to operation or increased maintenance due to potential tsunami inundation. The ability to protect intake facilities through feasible design and construction is also considered as part of this criterion.

Presence of Sensitive Habitats

1. Proximity to California Marine Protected Areas (MPAs), California State Water Quality Protection Areas of Special Biological Significance (SWQPAs), and other offshore sensitive habitats. Pursuant to the Marine Life Protection Act it is unlawful to injure, damage, take, or possess any living or non-living, geological, or cultural marine resource within MPAs that would compromise protection of species, natural communities, habitats, or geologic features. The intent behind this Act was to protect sensitive marine resources within these MPAs and consistency with this intent will be evaluated in respect to all actions associated with construction, operation, and

maintenance of a subsurface intake. The SWQPAs are ocean areas monitored and maintained for water quality by the California State Regional Water Quality Control Board with the intent of protecting water quality within these potentially sensitive areas and the impacts from a subsurface intake to the protection of these areas is considered in this criterion. Impacts caused by construction, operation or maintenance of subsurface intakes to other offshore habitats including kelp beds, seagrass and eelgrass beds, and soft-bottom benthic habitat are also considered.

2. Proximity to onshore sensitive habitats: Sensitive onshore habitats such as estuaries, marshlands, wetlands, or environmental sensitive habitat areas (ESHAs) may experience direct and indirect impacts from construction, operations, and maintenance of a subsurface intake and associated facilities based on the location of these facilities.

Energy Use

1. Project energy requirements: This criterion addresses if the project's operational energy requirements would be more or less impactful than current site conditions, accounting for any possible reduction in treatment or pumping requirements.
2. Project greenhouse gas emissions (GHG): The project's increase or decrease in GHG emissions from operational energy use above the current site conditions and City's approved GHG policy is considered in this criterion.

Design and Construction Constraints

1. Proximity to existing infrastructure: Proximity to existing infrastructure to decrease the amount of construction associated with connecting the subsurface intake to an existing intake pipeline and the desalination facility. This can also include proximity to important infrastructure, such as a railroad crossing, that could increase or decrease the project implementation schedule and complexity of construction.
2. Number of units: Number of units (e.g., number of wells, gallery acres, and feet of well pipelines) required for design capacity, which can correlate to amount and complexity of construction and maintenance as well as the onshore and offshore space foregone.
3. Linear feet of beachfront required for facilities associated with a subsurface intake: The linear beachfront requirement gives an indication of how spread out a system will be and is an important cost and logistical factor. This is calculated by multiplying the number of units by anticipated minimum spacing for each subsurface intake technology.
4. Onshore footprint for facilities: The onshore footprint is the area permanently required for the facilities associated with the subsurface intake and do not include temporary construction easements.

5. Onshore footprint required for construction activities: The offshore footprint of a seafloor or surf zone infiltration gallery is determined by the size and number of filter units required for production capacity and reliability purposes.
6. Construction complexity: Complexity of construction refers to the potential for difficulties to occur during construction including:
    a. The local availability of contractors who are qualified to perform the work and that have the specialty equipment and experience with this specific type of work.
    b. Construction challenges and risks due to uneven topography, the depth to the seabed, and unfavorable wave energy conditions
    c. Consideration of factors that may impede or delay construction including uncertainties and extended duration for obtaining or complying with construction permits, seasonal restrictions on beach construction due to public use, seasonal restrictions of offshore operations due to sea conditions, as well as environmental review impacts from construction.
7. Scope and complexity of property, easement, or right of way acquisitions required to connect the subsurface intake to the desalination plant: This includes (but may not be limited to) obtaining California State Lands Commission lease, property condemnation, and railroad crossing.
8. Reliability and performance
    a. Precedent of technology implementation: Precedent of technology implementation of the subsurface intake technology in similar seawater or freshwater applications at a similar scale to the project. Confidence in the feasibility of a subsurface intake technology is greatest where there is a track record of successful implementation of that technology at other sites with geological conditions similar the project area.
    b. Performance risk: Performance risk is the potential for the subsurface intake system to not meet project performance expectations in terms of water yield and quality over the project life. A large amount of uncertainty with regard to the likelihood of successful implementation of a subsurface intake technology is considered a high performance risk. Performance risk also relates to the opportunities to pilot test an intake option or accurately estimate system performance using other means or data, including the operational history of comparable systems constructed in similar geologies.
    c. Maintainability: Maintainability of the subsurface intake system to restore yield or quality of product water by standard means that won't significantly impact the facility operation or availability of product water. This can include replacement of pumps, pipelines, and other intake facilities and also chemically or mechanically cleaning the subsurface intake to restore capacity.

d. Materials of construction performance: Material constraints address construction materials requirements for intake types. In general, seawater intakes should be constructed of corrosion resistant materials.

9. Sustainability (e.g., labor, chemicals, mechanical equipment use to sustain performance)
   a. Frequency of maintenance: Frequency of maintenance is the relative frequency at which an intake option is expected to require maintenance activities to either address breakdowns (e.g., pump failure) or restore system performance (e.g., well rehabilitation).
   b. Complexity of maintenance: Complexity of maintenance addresses both technical difficulties associated with potential maintenance activities and logistical issues that may make maintenance more complex. For example, offshore maintenance is considered more complex than onshore maintenance activities.

Other Site-Specific Factors

1. Impact to recreational uses of land or ocean: Impact to recreational uses of land or ocean including temporarily restricting recreational activities to beach users, surfers, and recreational boating during construction and/or maintenance activities, or permanent restrictions during the facility operation.
2. Impact to commercial uses of land or ocean: Impact to commercial uses of land or ocean including temporarily or permanently restricting fishing, aquaculture activity, commercial port and harbor activities, and ocean tourism.
3. Certainty of implementation: Certainty of implementation schedule and costs that accounts for effects from permitting, demonstration or pilot testing, environmental requirements, and monitoring.

Economic Factors

1. Cost to water rate payers: Cost impacts to water rate payers from estimated product water price accounting for construction, operational, and maintenance costs.
2. Impact of construction schedule on recreational and commercial uses: Impact of project construction schedule on recreational and commercial use as it related to the local economy. This factor primarily focusses on the restriction of recreational and commercial uses both onshore and offshore due to construction, operation, and maintenance of a subsurface intake.

3.1 Initial Screening Criteria

The technical factors identified in Table 3.1 will be a starting point to determine if each option should be further considered for evaluation - e.g., before economic, environmental and social factors are considered. Intake alternatives that are judged to have technical feasibility criteria in conflict with the project objectives will be determined to fail initial screening, and will not be considered further in this study. For alternatives that pass initial screening, each subsurface intake alternative will also be evaluated for feasibility based upon the economic, environmental, social, and technological factors identified in Table 3.1.

For the purposes of this study, "Initial Screening Criteria" will be defined as follows:

> *Initial Screening Criteria: Those technical factors that would not allow a full-scale system to be successfully constructed or operated, would result in a high risk of failure or unacceptable performance, or would not produce water supply required to replace the use of the desalination plant's screened open ocean intake per Study goals.*

Table 3.2 presents initial screening criteria that will be used in this study. Initial screening criteria will be analyzed concurrent to the design basis development presented in Section 2 to avoid carrying forward alternatives for further study that are not technically feasible.

Table 3.2 Initial Screening Criteria

Screening Criteria	Failure to meet criteria
Geotechnical Hazards	
Seismic hazard	Project facilities would cross a known fault line, or be exposed to a seismic hazard that could otherwise not be protected from loss by design
Hydrogeologic Factors	
Operation of subsurface intake adversely impacts existing fresh water aquifers, local water supplies, or existing water users.	• Volume of groundwater in storage is reduced due to subsurface intake pumping, impacting drought supply and requiring additional desalination to make up for loss of groundwater. • Operation of subsurface intake causes salt water intrusion into groundwater aquifers.
Operation of subsurface intake adversely impacts sensitive habitats such as marshlands, drainage areas, etc.	Operation of subsurface intake drains surface water from sensitive habitat areas or adversely changes water quality.

Table 3.2 Initial Screening Criteria	
Screening Criteria	**Failure to meet criteria**
Insufficient length of beach available for replacing full yield derived from the existing open ocean intake.	Small individual facility yield, large number of facilities required, and minimum spacing between facilities requires more shoreline than is available.
Benthic Topography	
Land type makes intake construction infeasible	Depth to bedrock too shallow (i.e., less than 40-feet deep); rocky coastline; cliffs
Oceanographic Factors	
Erosion, sediment deposition, sea level rise or tsunami hazards	Oceanographic hazards make aspects of the project infrastructure vulnerable in a way that cannot be protected and/or would prevent the City from being able to receive funding or insurance for this concept
Presence of Sensitive Habitats	
Proximity to marine protected areas	Location would require construction within a marine protected area
Design and Construction Constraints	
Adequate capacity	Subsurface material lacks adequate transmissivity to meet target yield of at least 15,898 gpm (i.e., build-out intake capacity necessary to produce 10,000 AFY).
Lack of adequate linear beach front for technical feasibility	Length of beachfront available is not sufficient for construction of the required number of wells of all or portion of intake to meet target yield
Lack of adequate land for required on-shore facilities	• Surface area needed for on-shore footprint of an intake unit is greater than the available onshore area • Requires condemnation of property for new on-shore intake pumping facilities
Lacking adequate land for on-shore construction staging	The amount of land available to stage construction does not meet need
Precedent for subsurface intake technology	Intake technology has not been used before in a similar seawater or fresh water application at a similar scale)

After the initial screening, projects will be further categorized as 1) Infeasible, 2) Potentially feasible, but does not meet Study goals, or 3) Potentially feasible. The next steps or actions for each of these categories is described in Section 1.

4.0 IMPLEMENTATION SCHEDULE DEVELOPMENT

In conjunction with the cost estimate, an implementation schedule for each of the project alternatives will be developed. Major components that will be included in the implementation schedule are summarized below:

- Planning Phase (Feasibility Studies)
  - Work Plan Development: A Work Plan outlining the feasibility study is developed
  - Initial Screening Analysis: Technical feasibility criteria are used to determine if a subsurface intake alternative passes initial screening.
  - Regulatory and Permit Requirements: Alternatives passing initial screening are subjected to an analysis of regulatory and permit requirements.
  - Conceptual Design: Site plans and design criteria are established for each surviving alternative.
  - Feasibility Analysis: Surviving alternatives are screened against all feasibility criteria outlined in Table 3.1.
- Test Well Demonstration
  - Design: A full set of bid set construction documents are created for the test well.
  - Permitting: Test well is put through a permitting process in which all required permits are obtained for test well – Coastal Development Permit, Army Corps Permit, City Building Permit, etc.
  - Environmental: CEQA and/or NEPA for test well
  - Bid Phase: Contractors are solicited for bids for construction of the test well.
  - Construction: Test well is constructed by selected contractor.
  - Test Well Demonstration: Test well is operated while data is collected and analyzed.
  - Report/Recommendation: All findings resulting from the test well demonstration are summarized and reported in the final report.

** *Assumes property or easement acquisition is not necessary for the Test Phase.*

- Implementation
  - Property and easement acquisition: Any property or easements that are needed will be attained.
  - Design: A full set of bid set construction documents are created for the full scale subsurface intake.
  - Permitting: Subsurface intake is put through a permitting process in which all required permits are obtained – Coastal Development Permit, Army Corps Permit, City Building Permit, etc.
  - Environmental: CEQA and/or NEPA for full scale subsurface intake.

- Bid Phase: Contractors are solicited for bids for construction of the full scale subsurface intake.
- Construction: Full scale subsurface intake is constructed by selected contractor.
- Operation: Full scale subsurface intake is operated and serves as a source or raw water to be treated at the Desal Plant.

5.0 COST ESTIMATING METHODOLOGY

As demonstrated in the programmatic work flow diagram presented in Figure 1, intake alternatives surviving initial screening shall proceed to various additional study phases, which provide the basis for a cost estimate. Alternatives lacking sufficient data for analysis may be recommended for additional data collection, resulting in the potential for samples and other studies. The following studies shall be performed on subsurface intake alternatives surviving initial screening analysis:

- Regulatory and Permit Requirements
- Geotechnical and Subsurface Studies (for alternatives requiring additional data collection)
- Conceptual Design

Aforementioned studies will be used as basis to perform a Class 4 feasibility cost estimate, as defined by the American Association of Cost Engineers (AACE), on each surviving subsurface intake alternative. Typical estimating methodologies for this level of cost estimate include parametric models, specific analogy, expert opinion, and trend analysis. A review of similar projects will be used as the basis for the cost estimate. As defined by the AACE, the expected accuracy range of a Class 4 cost estimate is as follows:

- Low: -15% to -30%
- High: +20% to +50%

The cost estimate will represent the total cost for implementation of the subsurface intake alternative. The estimated cost shall include the following:

- Feasibility analysis
- Environmental review, permitting, and public process
- Property and easement acquisition
- Design fees
- Construction costs
- Operation and maintenance

Results from the cost estimate will be used during the feasibility analysis of surviving alternatives. The feasibility analysis process is described in the following section.

6.0 FEASIBILITY ANALYSIS

As presented in Figure 1, each alternative that survives the initial screening analysis shall be subjected to a feasibility analysis after the estimated schedules and costs are complete. Whereas the initial screening analysis only considered certain technological factors presented in Table 3.2, the feasibility analysis will consider all technological, social, environmental, and economic factors presented in Table 3.1. For each alternative, advantages and disadvantages with respect to each of the 28 feasibility criteria will be ascribed. Table 6.1 below provides an example summary that will be used to present the feasibility criteria analysis for each intake alternative**.**

Once the feasibility analysis has been completed, it will be reviewed by the technical advisory panel. The final report deliverable will consist of all technical memoranda associated with this work.

7.0 TECHNICAL ADVISORY PROCESS

The technical advisory process described in this Work Plan provides an independent, third party review of the project work product at key intervals throughout the project duration, as the work product is developed. The technical advisory process shall achieve the following objectives:

1. Provide timely review of project work product by experts in the required subject matter to advise and guide the City's feasibility study.
2. Facilitate input from project stakeholders that can be used to inform the City's comparison of potentially feasible alternatives.
3. Create a record of the review and stakeholder process to be included as an appendix to the feasibility study report.

Table 6.1 Sample Feasibility Analysis Summary Table

Feasibility Criteria	Advantages	Disadvantages
Geotechnical factors		
1 Geochemistry a. Risk of adverse geochemical interactions due to fluid mixing b. Risk of well clogging c. Risk of changes to inorganic water chemistry **2 Seismic hazards** a. Project facilities would cross a known fault line, or be exposed to a seismic hazard that could otherwise not be protected from loss by design	**[Insert advantages for alternative here]**	**[Insert disadvantages for alternative here]**
Hydrogeology factors		
3 Impact on freshwater aquifers, local water supplies and existing water users		
4 Impact to sensitive habitats such as marshlands, drainage areas, etc.		
5 Potential yield per installation		
6 Proximity to sources of underground water contamination (i.e., will mobilize or capture contamination)		
Benthic Topography		
7 Suitability of bottom conditions (e.g., rocky bottom, presence of sensitive environments such as kelp beds, etc.)		
Oceanographic Factors		
8 Sensitivity to sea level rise (bathymetry)		
9 Sensitivity to erosion or sedimentation (e.g., able to protect against erosion or sedimentation, able to maintain permeability of ocean bottom without entrainment of fine sediment (i.e., armoring), etc.)		
10 Sensitivity to tsunami inundation		
Presence of Sensitive Habitats		
11 Proximity to marine protected areas		
12 Proximity to on-shore habitats such as marshlands, or environmental sensitive habitat areas (ESHAs)		
Energy Use		
13 Project requires more or less energy than other alternatives, accounting for any possible reduction in treatment requirements.		
14 Project energy use exceeds City's Greenhouse Gas Emission Threshold as identified in the City's 2012 Climate Action Plan		
Design and Construction Constraints		
15 Proximity to existing infrastructure (e.g., existing intake line, railroad crossing, desalination facility)		
16 Number of units required for design capacity		

Table 6.1 Sample Feasibility Analysis Summary Table

Feasibility Criteria	Advantages	Disadvantages
17 Linear feet of beachfront required		
18 Onshore footprint for facilities		
19 Onshore footprint required for construction activities		
20 Complexity of off-shore construction (e.g., uneven topography, wave energy, depth to seabed, environmental monitoring requirements, etc.)		
21 Scope and complexity of property, easement, or right of way acquisitions (e.g., State Lands lease, property condemnation, rail road crossing, etc.)		
22 Reliability and performance		
a. Precedent (i.e., demonstration of intake technology in similar seawater or freshwater applications at a similar scale)		
b. Performance risk (i.e., stable yield and quality over project life)		
c. Maintainability (i.e., can yield or quality be restored by standard means that won't significantly impact the facility operation or availability)		
d. Material of construction performance		
23 Sustainability (e.g., labor, chemicals, mechanical equipment use to sustain performance)		
a. Frequency of maintenance		
b. Complexity of maintenance		
Other Site-Specific Factors		
24 Impact to recreational uses of land or ocean		
25 Impact to commercial uses of land or ocean		
26 Certainty of implementation schedule and costs (i.e., as affected by affected by permitting, demonstration or pilot testing, environmental requirements, monitoring, etc.)		
Economic Factors		
27 Cost impacts to water rate payers		
28 Impact of project construction schedule on recreational and commercial use as it relates to the local economy		

To assist the Central Coast Regional Water Quality Control Board administer the technical advisory process, the City will retain the services of the National Water Research Institute (NWRI). NWRI is a California non-profit organization whose activities include ensuring safe, reliable sources of water now and for future generations through a variety of research, education, and public out-reach activities. NWRI has facilitated similar technical advisory programs on subsurface intake and potable reuse feasibility projects in California, including programs for both municipal and state regulatory agencies. NWRI will retain the services of the experts that will review the work, facilitate the project meetings (i.e., that will include an opportunity for stakeholder comments) and complete the documentation of the technical review and stakeholder process.

Participants in the technical advisory process shall consist of:

- A moderator: Jeff Mosher, National Water Research Institute,
- Technical Advisory Panel (TAP): Consultants retained by NWRI; The composition of the TAP shall consist of up to four individuals whose qualifications may include:
  - Hydrogeologists, geotechnical, civil engineers, and/or contractors experienced in the design, construction, and costs of subsurface desalination plant intakes.
  - CEQA consultant experienced in coastal development.
  - Public agency representative experienced with the implementation of seawater desalination.
  - Former regulators with experience in permitting.
- Project stakeholders (e.g., regulators and city residents),
- The City's public works staff, and
- The City's consultant team: Carollo Engineers.

This section of the Work Plan provides the guidelines for how the technical advisory process will be conducted. The qualifications and role of the technical advisors, the format for the technical advisory meetings, stakeholder process, and documentation will be explained.

7.1 Technical Advisory Panel

NWRI shall select and retain approximately four technical advisors to review the work product developed by the City’s consultant team. It is anticipated that the technical advisory panel may consist of the following types of experts:

- Hydrogeologists, technical, civil engineers, and/or contractors experienced in the design, construction, and costs of subsurface desalination plant intakes.

7.2 Technical Advisory Panel Meetings

The following technical advisory workshops will be held at the intervals described in the programmatic Work Plan diagram and project schedule - i.e., Figures 1 and 2:

1. TAP Workshop No. 1: Work Plan
2. TAP Workshop No. 2: Initial Screening Analysis
3. TAP Workshop No. 4: Subsurface Desalination Intake Feasibility Study

Note: *TAP Workshop No. 3 is associated with the Potable Reuse study.*

The City will provide NWRI with the necessary work product for review at least 15 working days prior to a technical advisory workshop. NWRI will be responsible for distributing the work product to the technical advisory panel, and posting the material to the project website (also managed by NWRI). The project website will be open to the public and NWRI shall post the work product no less than 5 days prior to a technical advisory workshop.

NWRI will create and distribute an agenda for each technical advisory workshop, however, each technical advisory workshop will consist of two parts and follow the format described in Table 7.1.

Table 7.1 TAP Workshop Format

Part 1	
1. Moderated by NWRI 2. Presentation by City highlighting key material from the work product that is the subject of the workshop 3. TAP questions and answers on presentation material and work product that is the subject of the workshop 4. Stakeholder comment period 5. Meeting minutes, including TAP questions, City responses, and stakeholder comments will be recorded by NWRI staff.	Participants include: • City and City's consultant team • NWRI moderator and staff • TAP members • Project Stakeholders
Part 2	
1. Moderated by NWRI 2. City and City consultant team will be provided an opportunity to ask the TAP questions regarding the comments received. 3. TAP will be allowed to ask additional questions. 4. Meeting minutes will be prepared by NWRI staff consisting of the final TAP comments on the work product developed by the City's team.	Participants include: • City and City's consultant team • NWRI moderator and staff • TAP members

7.2.1 Stakeholder Process

As indicated in Table 7.1, a portion of Part 1 of each TAP Workshop will consist of a stakeholder comment period where:

1. Stakeholders (e.g., regulatory agencies, City residents) will be provided the opportunity to fill out comment cards related to issues, feedback, or comments regarding the work product.
2. Comment cards must be submitted to NWRI staff 10 minutes before the stakeholder comment period begins.
3. Each stakeholder shall have 120 seconds to deliver their comments.
4. Stakeholders that have successfully completed their comment cards are able to yield their time to another individual to speak on their behalf.

NWRI's moderator will administer the stakeholder process in accordance with this procedure.

The entire workshop shall be recorded for reference and made available on the NWRI managed project website. It is the responsibility of NWRI to produce meeting minutes from the workshop, which will be reviewed by the consultant team and posted on NWRI's project website. The comment cards will require stakeholders to fill out the following information:

Name

Affiliation (e.g., regulatory agency, City resident, other)

City Resident? ☐ Yes or ☐ No

Comment

Stakeholders are not required to attend a technical advisory workshop to submit comments for the record. Comments may be submitted to NWRI within 5 working days of the technical advisory workshop. NWRI is responsible for recording comments and comment cards as part of the Workshop meeting record (i.e., meeting minutes).

7.3 Project Stakeholders

Anticipated stakeholders associated with this project are presented in Table 7.2. This list of stakeholders was adapted from the noticing list included in the City's 2014 Coastal Development Application for Repair and Maintenance Activities at the Charles Meyer Desalination Facility Offshore Intake Structure. This list includes those residents and businesses that are in close proximity to the areas affected by the work on the City's intake, and parties that have expressed interest in the City's desalination plant reactivation project. For the purposes of this study, this list should not be considered exhaustive and will require periodic updates as project alternatives are clearly defined and updated.

Table 7.2 Project Stakeholders	
Name	**Location**
Environmental Defense Center	Santa Barbara, CA
Santa Barbara Arts and Crafts Show	Santa Barbara, CA
California Department of Fish and Game,	San Diego, CA
Central Coast Regional Water Quality Control Board	San Luis Obispo, CA
Army Corps of Engineers Regulatory Division	Ventura, CA
Santa Barbara County Flood Control District	Santa Barbara, CA
City of Santa Barbara Waterfront Department	Santa Barbara, CA
City of Santa Barbara Creeks Division, Attention	Santa Barbara, CA
City of Santa Barbara Parks Division	Santa Barbara, CA
Santa Barbara Trolley Company	Santa Barbara, CA
Wheel Fun Rentals of Santa Barbara	Santa Barbara, CA
Land and Sea Tours	Santa Barbara, CA
Mtd Santa Barbara	Santa Barbara, CA
Rusty's Pizza	Santa Barbara, CA
Santa Barbara Visitor Center	Santa Barbara, CA
Santa Barbara Fish House	Santa Barbara, CA
City of Santa Barbara Recreation Division	Santa Barbara, CA
El Torito	Santa Barbara, CA
Segway of Santa Barbara	Santa Barbara, CA
Surf N Wear	Santa Barbara, CA
Mountain Air Sports	Santa Barbara, CA
Harbor View Inn, Eladio's Restaurant, State Street Coffee	Santa Barbara, CA
Montecito Assn	Santa Barbara, CA
Montecito Planning Commission	Santa Barbara, CA
Santa Barbara Waterfront Division	Santa Barbara, CA
City of Goleta	Goleta, CA
Santa Barbara Parks	Santa Barbara, CA
Central Coast Water Authority	Buellton, CA
Environmental Defense Center	Santa Barbara, CA
Janet Martorana	Santa Barbara, CA
Metropolitan Transit District	Santa Barbara, CA

Table 7.2 Project Stakeholders	
Name	**Location**
S.B. Co Air Poll Cont Dist	Santa Barbara, CA
S.B. Unified School Districts	Santa Barbara, CA
SBCAG	Santa Barbara, CA
Surfrider Foundation	Santa Barbara, CA
Caltrans District 5	San Luis Obispo, CA
Central Coast Regional	San Luis Obispo, CA
David Matson, Deputy Director	Santa Barbara, CA
Goleta Water District	Goleta, CA
Carpinteria Valley Water District	Carpinteria, CA
Montecito Water District	Santa Barbara, CA
Union Pacific Railroad	Omaha, NE
US Fish and Wildlife Service	Ventura, CA
Union Pacific Railroad	Roseville, CA
Santa Barbara Channelkeeper	Santa Barbara, CA
Heal the Ocean	Santa Barbara, CA
Sweetwater Collaborative	Santa Barbara, CA
Phil Walker	Santa Barbara, CA
Robert H Sulnick	Santa Barbara, CA

7.3.1 Regulators

Regulators that have been identified as project stakeholders are presented in Table 7.3. This list is not final, and may be expanded as the project develops.

7.4 Documentation Requirements

A list of the documents that will be developed as part of the technical advisory process is presented in Table 7.4. These documents will be made available via NWRI's project website at times indicated.

Table 7.3 Key Regulators

Agency	Name	Office	Phone	Email
Division of Drinking Water	Jeff Densmore	Carpinteria	(805) 566-1326	jeff.densmore@waterboards.ca.gov
Division of Drinking Water	Kurt Souza	Carpinteria	(805) 566-4745	kurt.souza@waterboards.ca.gov
Central Coast RWQCB	Peter von Langen	San Luis Obispo	(805) 549-3688	peter.vonlangen@waterboards.ca.gov
California Coastal Commission	Tom Luster	San Francisco	(415) 904-5400	tluster@coastal.ca.gov

Table 7.4 Technical Advisory Process Documents and Publication Procedures	
Document Title	**Publication Procedure**
Draft Work Plan	• Provided to NWRI 15 working days prior to TAP Workshop 1. • Posted to NWRI website at least 5 days prior to TAP Workshop 1.
TAP Workshop 1 Agenda	• Distributed to stakeholder list 15 days prior to TAP Workshop 1. • Posted to NWRI website at least 5 days prior to TAP Workshop 1.
TAP Workshop 1 Meeting Minutes	• Draft provided to project team and TAP panel for review 10 days following TAP Workshop 1. Will include all stakeholder comments received at the workshop or by correspondence to NWRI. • Posted to NWRI website within 30 days following TAP Workshop 1.
Tech Memo 2 (Basis of Design & Initial Screening Analysis) – Subsurface Tech Memo 3 (Permit & Regulatory Req.) – Subsurface Draft groundwater modeling report – Subsurface Draft tsunami hazard, sea level rise & sediment transport report	• Provided to NWRI 15 working days prior to TAP Workshop 2. • Posted to NWRI website at least 5 days prior to TAP Workshop 2.
TAP Workshop 2 Agenda	• Distributed to stakeholder list 15 days prior to TAP Workshop 2. • Posted to NWRI website at least 5 days prior to TAP Workshop 2.
TAP Workshop 2 Meeting Minutes	• Draft provided to project team and TAP panel for review 10 days following TAP Workshop 2. Will include all stakeholder comments received at the workshop or by correspondence to NWRI. • Posted to NWRI website within 30 days following TAP Workshop 2.
Draft subsurface sampling report Tech Memo 4 (Conceptual Design) Tech Memo 5 (Estimated Schedule & Cost) Tech Memo 6 (Feasibility Analysis)	• Provided to NWRI 15 working days prior to TAP Workshop 4. • Posted to NWRI website at least 5 days prior to TAP Workshop 4.

Table 7.4 Technical Advisory Process Documents and Publication Procedures	
Document Title	**Publication Procedure**
TAP Workshop 4 Agenda	• Distributed to stakeholder list 15 days prior to TAP Workshop 4. • Posted to NWRI website at least 5 days prior to TAP Workshop 4.
TAP Workshop 4 Meeting Minutes	• Draft provided to project team and TAP panel for review 10 days following TAP Workshop 4. Will include all stakeholder comments received at the workshop or by correspondence to NWRI. • Posted to NWRI website within 30 days following TAP Workshop 4.

APPENDIX A – WORK AUTHORIZATION 1
SCOPE OF SERVICES

APPENDIX A – WORK AUTHORIZATION 1
SCOPE OF SERVICES

SANTA BARBARA CITY AGREEMENT NO. 25,191

With

Carollo Engineers, Inc., for a Work Plan for Subsurface Desalination Intake and Potable Reuse Feasibility Studies

This Contract is entered into on May 5, 2015, by and between:

The City of Santa Barbara, a Municipal Corporation, referred to herein as the "City,"

and,

Carollo Engineers, Inc., a California Corporation, referred to herein as the "**Contractor,**"

WITNESSETH:

WHEREAS, Contractor has the special background, training and experience required by City, and in consideration of the mutual covenants, conditions, promises and agreements, herein, the City and Contractor **AGREE**:

1. SCOPE OF CONTRACTOR SERVICES

a. Contractor agrees to provide a Work Plan for Subsurface Desalination Intake and Potable Reuse Feasibility Studies as described in more detail in the attached scope of services (Exhibit A) dated April 20, 2015.

On January 30, 2015, the Regional Water Quality Control Board adopted an amendment to the City's El Estero Wastewater Treatment Plant water discharge requirements that included a special provision for the City to "analyze the feasibility of a range of alternatives, including subsurface intake and potable reuse options" and "submit a feasibility study work plan for the Regional Water Board, by August 31, 2015."

b. The City has been advised and enters into this Contract understanding that Tom Seacord has been designated the project manager for provide Subsurface Desalination Intake and Potable Reuse Feasibility Studies and that the Project Manager will have direct responsibility for interacting with City staff and delivering Contractor's services to the City under this Contract. Contractor shall not substitute nor otherwise allow any other person to serve in place of the Project Manager without the written consent of the Department Head, who shall have sole discretion as to whether the proposed substitution is acceptable. Should Contractor substitute or allow any unauthorized person to serve as project manager, Contractor shall have no right to any monies for services provided by that unauthorized person and City shall also have the right to immediately terminate this Contract.

2. COMPENSATION

a. The total compensation for all services provided pursuant to this Contract, including all extra services as defined in Section 3 hereof and reimbursable expenses,

shall not exceed the sum of **$343,925** without the express written approval of City Council of the City of Santa Barbara. The basic contract is for **$312,659** and the total that may be claimed for Extra Services under Section 3 of this Contract shall not exceed **$31,266.** This Contract provides the exclusive means of payment and reimbursement for costs to Contractor by the City.

b. Changes in personnel or in rates of compensation set forth in Exhibit A may be made only after written notice to and written approval by the Department Head, **Rebecca J. Bjork**, ("Department Head").

c. Where travel costs are included in Exhibit A, only the actual travel costs (at fare, rate per mile or lump sum approved), and/or actual expenses pursuant to the provisions of the Contract and within guidelines approved by the City Finance Director will be reimbursed.

d. Contractor may be reimbursed for such other necessary costs, including actual costs of copies, printing, postage, shipping and documents expense, and all costs of other materials, equipment, services and supplies, as approved and required to complete the work, according to the attached Exhibit A.

e. Compensation for Extra Services of Contractor authorized in accordance with Section 2 shall be paid to Contractor by City in accordance with the fee schedule set forth in Exhibit A. Contractor shall only be entitled to payment for Extra Services under this Contract if Contractor has obtained authorization required under Section 3 below.

f. Contractor shall submit itemized statements, which shall include a detailing of the number of hours spent on each task and copies of all subcontractors' invoices, to request payment in accordance with the standard billing format issued by the City Department. Contractor shall keep records concerning payment items on a generally recognized accounting basis and such records shall be maintained for a period of 3 years following the completion of the work assigned. Such records shall be made available for copying, inspection or audit by City employees or independent agents during reasonable business hours.

3. EXTRA SERVICES OF CONTRACTOR

Prior to performing any services other than those described in Exhibit A ("Extra Services"), Contractor shall submit a written request for Extra Services and obtain the written approval of the Department Head or his/her designee. The request for Extra Services shall at minimum include a description of the services to be performed, the reason why the Extra Services are needed or required, a schedule for completion of the proposed Extra Services, and a not-to-exceed amount for performance of the proposed Extra Services. Each approved Extra Services request shall be billed separately.

4. TIME OF BEGINNING AND COMPLETION

Services shall begin upon full execution of this Contract by the City, and delivery of a fully executed copy of the Contract to the Contractor. Contractor shall adhere to schedules and deadlines agreed to by City and Contractor shown in Exhibit A. The Contractor shall submit to the City a feasibility study work plan to "analyze the feasibility of a range of alternatives, including subsurface intake and potable reuse options" for review by the Regional Water Quality Control Board (RWB), by August 31, 2015. Contractor's failure to complete the above services within the time specified, due to avoidable delays, may at the City's discretion be considered a material breach of this Contract. Contractor shall review the remaining work and schedule of performance at least monthly and shall confirm that completion may be expected within the schedule

approved, or in the alternative, give immediate notice when it shall first appear that the approved schedule will not be sufficient, together with an explanation for any projected insufficiency of delays in the schedule. No extension of time to complete any portion of the services called for in the Contract shall be allowed except upon the express, written approval of the Department Head. Contractor shall request, in writing, a time extension for approval by City, promptly upon the occurrence of any action causing delay in Contractor's prosecution of the services. The nature of the delay, the corrective actions taken and the impacts on the project schedule shall be described in each request for a time extension.

5. OWNERSHIP OF DOCUMENTS

All documents, computer programs, plans, renderings, charts, designs, drafts, surveys and other intellectual property which is originally developed by Contractor pursuant to this Contract shall become the property of City upon full and complete compensation to Contractor for services performed herein. Contractor will take such steps as are necessary to perfect or to protect the ownership interest of the City in such property. Contractor may retain copies of said documents for Contractor's file.

6. ASSIGNMENT OF CONTRACT

Contractor shall not assign, sublet or transfer any right, privilege or interest in this Contract, or any part thereof, without prior written consent of City. Contractor shall not substitute personnel designated in the proposal of Contractor without the written consent of City.

7. OFFICIAL NOTICES

Notices to either party shall be provided by personal delivery or by depositing them in the United States mail, first class postage prepaid, and addressed as identified at the signature page of this Contract. A party may change mailing address for all purposes under this Contract, by written notice.

8. DEFENSE, INDEMNITY AND HOLD HARMLESS

a. Contractor shall, to the extent permitted by law, investigate, defend, indemnify and hold harmless the City, its officers, employees and agents from and against any and all loss, damage, liability, claims, demands, detriments, costs, charges and expenses (including reasonable attorney fees) and causes of action of whatsoever character which the City may incur, sustain or be subjected to on account of loss or damage to property or loss of use thereof, or for bodily injury to or death of any persons (including but not limited to property, employees, subcontractors, agents and invitees of each party hereto) arising out of or in any way connected with the work to be performed under this Agreement other than as such work relates to Professional Liability Insurance.

b. With respect to Professional Liability Insurance, Contractor shall investigate, defend, indemnify and hold harmless the City, its officers, agents and employees from and against any and all loss, damage, liability, claims, demands, detriments, costs, charges and expenses (including reasonable attorney's fees) and causes of action of whatsoever character which City may incur, sustain or be subjected to

on account of loss or damage to property or loss of use thereof, or for bodily injury to or death of any persons (including but not limited to property, employees, subcontractors, agents and invitees of each party hereto) arising out of or due to the acts, errors or omissions of Contractor.

9. INSURANCE REQUIREMENTS

As part of the consideration of this Agreement, Consultant agrees to purchase and maintain at its sole cost and expense during the life of this agreement insurance coverage against claims for injuries to persons or damages to property which may arise from or in connection with the performance of the work hereunder by the Consultant, its agents, representatives, or employees.

MINIMUM SCOPE AND LIMIT OF INSURANCE

Coverage shall be at least as broad as:

A. **Commercial General Liability (CGL): Insurance Services Office Form CG 00 01 covering CGL on an "occurrence" basis, including products and completed operations with limits of no less than Two Million Dollars ($2,000,000) per occurrence for bodily injury, personal injury and property damage. If a general aggregate limit applies, either the aggregate limit shall apply separately to this project or the general aggregate limit shall be twice the required occurrence limit.**

B. **Automobile Liability: Insurance Services Office Form Number CA 0001 covering Code 1 (any auto), or if Consultant has no owned autos, Code 8 (hired) and Code 9 (non-owned), with limits of no less than One Million Dollars ($1,000,000) per accident for bodily injury and property damage.**

C. **Workers' Compensation: In accordance with the provisions of the California Labor Code, Consultant is required to be insured against liability for Workers' Compensation or to undertake self-insurance. Statutory Workers' Compensation and Employers' Liability of at least $1,000,000 shall cover all Consultant's staff while performing any work incidental to the performance or this agreement.**

D. **Professional Liability: Professional Liability (Errors and Omission) Insurance appropriate to the Consultant's profession, with limit no less than One Million Dollars ($1,000,000) per occurrence or claim and Two Million Dollars ($2,000,000) aggregate to cover all services rendered by the Consultant pursuant to this Agreement.**

If the Consultant maintains higher coverage limits than the amounts shown above, then the City requires and shall be entitled to coverage for the higher coverage limits maintained by the Consultant. Any available insurance proceeds in excess of the specified minimum limits of insurance and coverage shall be available to the City.

OTHER INSURANCE PROVISIONS

Each insurance policy shall contain, or be endorsed to contain, the following five (5) provisions:

1) Additional Insured Status

The City of Santa Barbara, its officers, employees, and agents, shall be covered as additional insureds on the Commercial General Liability and the Automobile Liability policy with respect to liability arising out of work or operations performed by or on behalf of the Consultant including materials, parts, or equipment furnished in connection with such work or operations and automobiles owned, leased, hired, or borrowed by or on behalf of the Consultant. Additional Insured coverage shall be provided in the form of an endorsement to the Consultant's insurance (at least as broad as Insurance Services Office Form CG 20 10 11 85). A copy of the endorsement evidencing that the City of Santa Barbara has been added as an additional insured on the policy, must be attached to the certificate of insurance.

2) Subcontractors

Consultant shall require and verify that all subcontractors maintain insurance meeting all the requirements stated herein, and Consultant shall ensure that the City is an additional insured on insurance required from subcontractors. For Commercial General Liability coverage subcontractors shall provide coverage with a format at least as broad as Insurance Services Office form CG 20 38 04 13.

3) Notice of Cancellation

A provision that coverage will not be cancelled or subject to reduction without written notice given to the City Clerk, addressed to P.O. Box 1990, Santa Barbara, California 93102-1990.

4) Primary Coverage

For any claims related to this contract, the Consultant's insurance coverage shall be primary insurance as respects the City, its officers, officials, employees, and volunteers. Any insurance or self-insurance maintained by the City shall be excess of the Consultant's insurance and shall not contribute with it.

5) Waiver of Subrogation

Consultant hereby agrees to waive rights of subrogation which any insurer of Consultant may acquire from Consultant by virtue of the payment of any loss. Consultant agrees to obtain any endorsement that may be necessary to affect this waiver of subrogation. Consultant agrees to obtain any endorsement that may be necessary to affect this waiver of subrogation, but this provision applies regardless of whether or not the City has received a waiver of subrogation endorsement from the insurer.

The Workers' Compensation policy shall be endorsed with a waiver of subrogation in favor of the City for all work performed by the Consultant, its employees, agents and subcontractors.

ACCEPTABILITY OF INSURERS

All insurance coverage shall be placed with insurers that have a current rating from AM Best of no less than A: VII; and are admitted insurance companies in the State of California. All other insurers require prior approval of the City.

CLAIMS MADE POLICIES

If the required Professional Liability (Errors and Omissions) policy provides coverage on a claims-made basis:

1. **The Retroactive Date must be shown and must be before the date of the contract or the beginning of contract work.**
2. **Insurance must be maintained and evidence of insurance must be provided for at least five (5) years after completion of the contract of work.**
3. **If coverage is canceled or non-renewed, and not replaced with another claims-made policy form with a Retroactive Date prior to the contract effective date, the Consultant must purchase "extended reporting" coverage for a minimum of five (5) years after completion of contract work.**

COVERAGE LIMITS SPECIFICATIONS

Approval of the insurance by City or acceptance of the certificate of insurance by City shall not relieve or decrease the extent to which the Consultant may be held responsible for payment of damages resulting from Consultant's services or operation pursuant to this Agreement, nor shall it be deemed a waiver of City's rights to insurance coverage hereunder.

If, for any reason, Consultant fails to maintain insurance coverage which is required pursuant to this Agreement, the same shall be deemed a material breach of contract. City, at its sole option, may terminate this Agreement and obtain damages from the Consultant resulting from said breach. Alternately, City may purchase such required insurance coverage, and without further notice to Consultant, City may deduct from sums due to Consultant any premium costs advanced by City for such insurance.

DEDUCTIBLES AND SELF-INSURED RETENTIONS

Any deductibles or self-insured retentions must be declared to and approved by the City. At the option of the City, either: the Consultant shall cause the insurer to reduce or eliminate such deductibles or self-insured retentions as respects the City, its officers, officials, employees, and volunteers; or the Consultant shall provide a financial guarantee satisfactory to the City guaranteeing payment of losses and related investigations, claim administration, and defense expenses.

EVIDENCE OF COVERAGE

Consultant must provide evidence that it has secured the required insurance coverage before execution of this agreement. A Certificate of Insurance supplied by the City or the appropriate ACORD and Insurance Services Office forms evidencing the above shall be completed by Consultant's insurer or its agent and submitted to the City prior to execution of this Agreement by the City.

Consultant shall furnish the City with original certificates and amendatory endorsements or copies of the applicable policy language effecting coverage required by this clause. All certificates and endorsements are to be received and approved by the City before work commences. However, failure to obtain the required documents prior to the work beginning shall not waive the Consultant's obligation to provide them. The City reserves the right to require complete, certified copies of all required insurance policies, including endorsements required by these specifications, at any time.

10. TERMINATION

This Contract may be terminated with or without cause by either party at any time by giving the other no less than thirty (30) days notice in writing. In the event of such termination, Contractor shall deliver all programs, drawings, surveys, drafts, plans, work in progress and other documents related to the project to the City within five (5) days of the notice of termination. In the event of such termination, Contractor shall be compensated for such services as are performed and work product delivered to the City up to the point of termination.

11. RIGHT TO PERFORM SIMILAR SERVICES

Nothing in this Contract shall restrict the City from providing the same or similar services through City employees, other contractors, other resources, or by arrangements with other agencies. Contractor may engage in similar activities to the extent that such work does not conflict with the proper performance of services under this Contract.

12. CONFLICT OF INTERESTS

Contractor warrants by execution of this Contract that no person or selling agent has been employed or retained to solicit or secure this Contract upon an agreement or understanding for commission, percentage, brokerage or contingent fee, and that Contractor maintains no agreement, employment, or position which would be in conflict with the duties to be performed for City under this Contract. Contractor further agrees that during the term of this Contract, Contractor will not obtain, engage in, or undertake any interests, obligations or duty that would be in conflict with, or interfere with, the services or duties to be performed under the provisions of this Contract.

13. ADMINISTRATION OF EMPLOYMENT

Contractor shall obtain and administer the employment of personnel having the background, training, experience, licenses and registration necessary for the work assigned, including all coordination, the withholding of proper taxes and benefits, the

payment of wages, employer's contributions for FICA, and Federal and State unemployment payments, and the review and maintenance of any necessary licenses, certificates, memberships and other qualifications necessary for the services to be provided. Contractor is an independent contractor and shall not be considered an agent or employee of the City for any purpose. Contractor and its employees and agents are not entitled to any of the benefits or privileges that the City provides its employees.

14. BUSINESS TAX CERTIFICATE

Prior to the execution of the Contract, Contractor shall obtain a business tax certificate from the City at Contractor's expense. Contractor shall maintain a business tax certificate as required by the City Finance Director during the term of this Contract.

15. NO WAIVER OF PROVISIONS

No waiver of a breach of any provision of this Contract shall be construed to be a continuing waiver of that provision, nor a waiver of any breach of another provision of this Contract.

16. APPLICABLE LAWS, PARTIAL INVALIDITY

This Contract shall be subject to the Santa Barbara City Charter, and the laws, rules, regulations and ordinances in effect within the City of Santa Barbara, County of Santa Barbara, California, and any interpretation of the law that may be necessary shall be pursuant to the laws applicable within that jurisdiction. If any provision of this Contract is determined to be invalid, illegal or unenforceable for any reason, that provision shall be deleted from this Contract and such deletion shall in no way affect, impair, or invalidate any other provision of this Contract, unless it was material to the consideration for the performance required. If a provision is deleted which is not material to such consideration, the remaining provisions shall be given the force and effect originally intended.

17. NON-DISCRIMINATION ORDINANCE

Contractor shall perform all work pursuant to this Contract in compliance with Section 9.126.020 of the Santa Barbara Municipal Code (a copy of which is attached as Exhibit B), prohibiting unlawful discrimination in employment practices, and shall be bound by the terms of such ordinance.

18. CITY SERVICE CONTRACTOR MANDATORY MINIMUM WAGE

a. Chapter 9.128 of the Santa Barbara Municipal Code establishes a mandatory minimum wage for employees of contractors providing services to the City. In the performance of this Agreement, Contractor and any subcontractor, agent, or assignee of Contractor under this Agreement shall comply with the provisions of Chapter 9.128 of the Municipal Code as such Chapter existed upon the adoption of this Agreement or the last date this Agreement was amended.

b. Current Living Wage Certificates on forms supplied by the City shall be completed by Contractor, submitted to City prior to execution of this Contract by City, and attached as Exhibit C. Contractor shall require any and all subcontractors and all tiers of

such subcontractors to provide Living Wage Certificates as required by Santa Barbara Municipal Code Chapter 9.128.

19. NONAPPROPRIATIONS OF FUNDS

Notwithstanding any other provision of this Agreement, in the event that no funds or insufficient funds are appropriated or budgeted by the City, or funds are not otherwise available for payments in the fiscal year(s) covered by the term of this Agreement, then City will notify Contractor of such occurrence and City may terminate or suspend this Agreement in whole or in part, with or without a prior notice period. Subsequent to termination of this Agreement under this provision, City shall have no obligation to make payments with regard to the remainder of the term.

IN WITNESS WHEREOF, the parties have executed this contract as of the date and year first written above.

CITY OF SANTA BARBARA
A Municipal Corporation

Rebecca Bjork
Public Works Director

ATTEST:

Gwen Peirce, CMC
City Clerk Services Manager

APPROVED AS TO CONTENT:

Joshua Haggmark
Water Resources Manager

APPROVED AS TO FORM:
Ariel Pierre Calonne
City Attorney

By

Business Tax Compliance:
Certificate No. 32030

By

Approved as to Insurance:

Mark Howard
Risk Manager

CONTRACTOR:
Carollo Engineers, Inc.

Signature

Jim Meyerhofer
Type or Print Name

Sr. Vice President
Title

5075 Shoreham Pl. Suite 120
Address

San Diego	CA	92122
City	State	Zip

858-505-1020
Telephone Number

EXHIBIT A

Scope of Services

SCOPE OF SERVICES

PRELIMINARY DESIGN SERVICES FOR
RECOMMISSIONING THE CITY'S DESALINATION PLANT
(Subsurface Desalination Intake and Potable Reuse Feasibility Studies).
(Project)

AUTHORIZATION #1: WORK PLAN DEVELOPMENT

BACKGROUND

On September 23, 2014 the City of Santa Barbara City Council directed Public Works Department staff to report back on a plan to evaluate the feasibility of subsurface desalination intake and potable reuse, including indirect and direct potable reuse options. The direction given by CITY Council was to report back on a plan for this evaluation following award of the desalination plant contract in April 2015. Furthermore, on January 30, 2015, the Central Coast Regional Water Quality Control Board (RWQCB) adopted an amendment to the CITY's El Estero Wastewater Treatment Plant (WWTP) Waste Discharge Requirements (WDR) that included a condition that the CITY should report back to the RWQCB by August of 2015 with a Work Plan for these studies that will have the work completed by June 2017. This scope of services was therefore developed to satisfy the direction of City Council and the RWQCB by preparing a feasibility analysis for subsurface desalination intakes and potable reuse alternatives. This information can be used as part of future planning efforts designed to help the CITY plan for future drought emergencies.

PURPOSE

The purpose of this scope of services is to present the initial tasks required for evaluating the feasibility of subsurface desalination plant intakes and potable reuse alternatives. The feasibility study work product will be developed in a manner so as to accomplish the following objectives:

- Satisfy the requirements of the CITY's amended Waste Discharge Requirements for the El Estero WWTP.
- Support a future updates to the CITY's Long Term Water Supply Plan.

This scope of services is the first of three authorizations required to complete this study effort. The three separate authorizations include:

- Authorization #1: Work plan development and literature review.
- Authorization #2: Subsurface desalination intake basis of design and fatal flaw analysis; Potable Reuse Feasibility Study.
- Authorization #3: Subsurface desalination intake feasibility study.

The steps involved in this study are described graphically in the programmatic work flow diagrams presented in Figures 1 and 2.

CAROLLO'S SERVICES

TASK 1 – SUBSURFACE DESALINATION INTAKE FEASIBILITY STUDY
The tasks required to perform the services associated with ***TASK 1 – Subsurface Desalination Intake Feasibility Study*** are presented below and summarized graphically in the attached Programmatic Work Plan.

1.1 – Work Plan Development
The CITY of Santa Barbara is required to submit a Work Plan for evaluating subsurface desalination intakes to the Central Coast Regional Water Quality Control Board (RWQCB) by August 2015. As part of CAROLLO's services included in this Scope of Work, CAROLLO will conduct a kickoff meeting with the CITY to develop a Work Plan that has the following objectives:

- Establish the project schedule.
- Establish technical advisory panel role, procedures and objectives.
  - It is anticipated that the technical advisory process will be facilitated by the National Water Research Institute (NWRI). The technical advisors will include a panel of approximately four (4) experts (chosen and retained by NWRI).
  - It is anticipated that up to three (3) technical advisory workshops will be included in the Work Plan. These workshops will occur throughout the project at points that coincide with project work product development and completion. The points at which these technical advisory workshops occur will be established in the Work Plan.
  - It is anticipated that the panel will review and advise on technical studies and conclusions of CAROLLO and CITY.
  - It is anticipated that public comments will be facilitated by NWRI as part of the Technical Advisory Panel meetings. Applicable public comments/sentiment (i.e., consistent with regulatory framework) will be incorporated thereafter into the feasibility screening analysis.
- Establish the role of outside agencies (e.g., RWQCB, California Coastal Commission, etc.) and City residents.
- Establish the methods by which the design basis will be established. Design basis includes:
  - Intake capacity
  - Candidate sites for study
- Establish the types of subsurface intakes that will be studied (e.g., vertical wells, lateral beach wells, horizontal collector wells (i.e., Ranney wells), slant wells, subsurface infiltration galleries (SIG), and horizontally directionally drilled (HDD) wells (i.e., Neodren))
- Establish and define fatal flaws that may limit further consideration of project sites, which may include: available land, known geologic hazards/conditions (e.g., proximity of faults, depth to bedrock, transmissivity of soils, etc.), proximity to marshes that may be affected by intake use, anticipated loss of facilities due to erosion, etc.
- Establish and define feasibility screening criteria (e.g., constructability, permitability, impact to the CITY's drinking water aquifers, estimated environmental impacts during construction, impact to rate payers, etc.).
- Establish sequencing of analyses and application of feasibility screening criteria.
- Establish procedure to identify sites for subsurface intakes and raw water conveyance piping
- Procedure to determine subsurface properties (if applicable). Examples include:

  - Review literature data to establish sites to focus study.
  - Collect new data:
    - Identify permits required and establish application procedure
    - Sequence of subsurface data collection.
- Establish procedure to model subsurface intake's influence on the sustainability of the CITY's drinking water aquifer.
- Establish procedure to estimate subsurface intake water quality and additional treatment needs.
- Establish and define metrics to compare subsurface intake alternatives to the CITY's current open ocean intake. These metrics may include:
  - Reliability of intake water supply
  - Benefit to treatment process costs
  - Impact to CITY's groundwater supply
  - Construction phase environmental impact (monetized)
  - Operation phase treatment impacts (monetized)
  - Impact to rate payers
- Establish scoring methodology to use.

To maximize the Work Plan development / kickoff meeting's potential, CAROLLO will distribute kickoff meeting agenda, which will include some assignments for CITY staff to consider before the meeting date (e.g., possible feasibility screening criteria and their definitions, site alternatives for facilities and conveyance of raw water, etc.). Following the kickoff meeting, CAROLLO will:

- Prepare meeting minutes to identify action items and data needs.
- Develop a draft Work Plan that will be submitted to the Central Coast RWQCB staff for review.
  - Upon receipt of the RWQCB's comments, CAROLLO will prepare a final Work Plan.

Following acceptance of the Work Plan by the RWQCB, in concert with the data collected as part of Task 1.2 (Literature Review), CAROLLO will prepare a draft Technical Memorandum (TM) that will be used as part of the technical advisory process (TM 1 (Revision 0)) and summarizes the pertinent background information, definitions for feasibility screening criteria that were established, and the subsurface desalination intake alternatives that will be evaluated. The CITY will review this TM and provide comments back to CAROLLO within 1 week following submission of the draft TM. CAROLLO will incorporate any comments into a revised TM (TM 1 (Revision 1)) that will be used as supporting material for the technical advisory process discussed in Task 4.1 (Technical Advisory Process). After the technical advisory process is complete, the final TM contents will be used as chapters in the Desalination Subsurface Intake Feasibility Report.

Task 1.1 Deliverables by CAROLLO

1. Kickoff Meeting Agenda and Assignments
2. Kickoff Meeting Minutes
3. Draft Work Plan
4. Final Work Plan
5. TM 1 (Revision 0): Introduction, Background and Project Alternatives
6. TM 1 (Revision 1): Introduction, Background and Project Alternatives

1.2 – Literature Review

CAROLLO will collect, review and prepare data to evaluate the subsurface intake alternatives identified. CAROLLO will prepare a formal list of data needs that are either independently collected or requested from the CITY. CAROLLO will provide weekly data gathering list updates during the first month of the project and monthly updates thereafter. It is anticipated that the list will include items such as, but not limited to:

- Published geologic/hydrogeologic studies in the area, including:
  - USGS reports
  - Prior hydrologic and geotechnical studies conducted by the CITY.
- The CITY's 1989 and 1990 subsurface intake studies conducted on East, West and Ledbetter Beaches.
- Geotechnical data associated with the design and installation of piles supporting Stearns Warf.
- Any data related to tsunami hazards, sea level rise and sediment transport (i.e., erosion and deposition) in the areas of East, West and Ledbetter Beaches that may be associated with harbor dredging and mooring. The CITY Waterfront Department may be consulted for this information.
- Basis of design reports for the CITY's desalination plant (after reactivation and associated improvements).
- Water, sewer, (existing) recycled water and stormwater atlas data in GIS format
- Current or anticipated flood plain maps
- Hydrologic data and studies on existing wells and the groundwater aquifer used for drinking water production, including various USGS hydrogeological and modelling studies..
- Data related to baseline environmental conditions that could be affected by one or more of the intake options.
- California State Waters Map Series—Offshore of Santa Barbara, California http://pubs.usgs.gov/sim/3281/

CAROLLO will use the CITY's Map Analysis and Printing System (http://gismaps.santabarbaraca.gov/) to facilitate development of scaled site plans and graphics.

Task 1.2 Deliverables by CAROLLO

1. Data collection lists and updates

Summary of TASK 1 Project Meetings

Task No.	Meeting Name	Purpose
1.1	Kickoff Meeting	CAROLLO and CITY will meet to: • Discuss CAROLLO's proposal for Work Plan content • Identify candidate project sites for initial feasibility screening ***(This meeting will be held at the same time as the kickoff meeting in Task 3.1)***
	Draft Work Plan Meeting	CAROLLO and CITY will meet to review draft work plan before it is submitted to the RWQCB and Technical Advisory Panel. ***(This meeting will be held at the same time as the Draft Work Plan Meeting in Task 3.1)***

TASK 3 – POTABLE REUSE FEASIBILITY STUDY

The tasks required to perform the services associated with ***TASK 3 – Potable Reuse Feasibility Study*** are presented below and summarized graphically in the attached Programmatic Work Plan.

3.1 – Work Plan Development

The CITY of Santa Barbara is required to submit a Work Plan for evaluating potable reuse alternatives to the Central Coast Regional Water Quality Control Board (RWQCB) by August 2015. As part of CAROLLO's services included in this Scope of Work, CAROLLO will conduct a kickoff meeting with the CITY to develop a Work Plan that has the following objectives:

- Establish the project schedule.
- Establish technical advisory panel role, procedures and objectives.
  - It is anticipated that the technical advisory process will be facilitated by the National Water Research Institute (NWRI). The technical advisory panel will include a panel of approximately four (4) experts (chosen and retained by NWRI) as well as representatives from various regulatory agencies as determined appropriate.
  - It is anticipated that up to three (3) technical advisory panel workshops will be included in the Work Plan. These workshops will occur throughout the project at points that coincide with project work product development and completion. The points at which these technical advisory panel workshops occur will be established in the Work Plan.
  - It is anticipated that the panel will review and advise on technical studies and conclusions of CAROLLO and CITY.
  - It is anticipated that public comments will be facilitated by NWRI as part of the Technical Advisory Panel meetings. Public comments/sentiment will be incorporated thereafter into the feasibility screening analysis.
- Establish the role of outside agencies (e.g., RWQCB, California Coastal Commission, etc.) and City residents.
- Establish and define fatal flaws that may limit further consideration of project sites, which may include: poor aquifer tranmissivity, known geologic hazards, small site, etc.
- Establish and define feasibility screening criteria (e.g., estimated environmental impacts, permitability, improves the reliability of the CITY's water supply, impact to rate payers, potable water quality benefits, etc.).
- Establish sequencing of analyses and application of feasibility screening criteria.
- Procedure to identify the capacity of potable reuse supply that is available.
- Identify possible sites for treatment, storage and distribution facilities to evaluate when considering both Direct Potable Reuse (DPR) and Indirect Potable Reuse (IPR) alternatives.
  - It is anticipated that up to twenty (20) site/process/routing/size alternatives may be considered for further analysis against the feasibility screening criteria identified. Possible treatment facility location options may include (but may not be limited to):
    - 401 E. Yanonali Street (i.e., City Corporation Yard, APN #017-540-006), and
    - 103 S. Calle Cesar Chavez (APN #017-113-020)
    - Repurposing the Charles Meyer Desalination Plant located at 525 E. Yanonali Street

    Possible indirect potable recharge locations may include (but may not be limited to):
    - Recharge wells in the foothills basin (near Route 154 and Highway 101)
    - Recharge wells in groundwater basin referred to as "Unit 1" (north of Highway 101)

    - Infiltration of water (i.e., like a spreading basin) in Mission Creek before Oak Park.

    Possible potable reuse options may include (but may not be limited to):
    - Discharge of advanced treated wastewater into Lauro Canyon Reservoir (a.k.a., raw water production).
    - Dilution and off-setting the intake volume of seawater flowing to the Charles Meyer Desalination Plant
- Establish and define metrics to compare potable reuse alternatives to the CITY's current drought plan (i.e., desalination).
- Establish scoring methodology to use

To maximize the Work Plan development / kickoff meeting's potential, CAROLLO will distribute kickoff meeting agenda, which will include some assignments for CITY staff to consider before the meeting date (e.g., possible feasibility screening criteria and their definitions, site alternatives for facilities and distribution of treated water, etc.). Following the kickoff meeting, CAROLLO will:

- Prepare meeting minutes to identify action items and data needs.
- Develop a draft Work Plan that will be submitted to the Central Coast RWQCB staff for review.
    - Upon receipt of the RWQCB's comments, CAROLLO will prepare a final Work Plan.

Following acceptance of the Work Plan by the RWQCB, in concert with the data collected as part of Task 3.2 (Data Gathering), CAROLLO will prepare a draft Technical Memorandum (TM) that will be used as part of the technical advisory process (TM 1 (Revision 0)) and summarizes the pertinent background information, definitions for feasibility screening criteria that were established, and the IPR/DPR alternatives that will be evaluated. The CITY will review this TM and provide comments back to CAROLLO within 1 week following submission of the draft TM. CAROLLO will incorporate any comments into a revised TM (TM 1 (Revision 1)) that will be used as supporting material for the technical advisory process discussed in Task 4.1 (Technical Advisory Process). After the technical advisory process is complete, the final TM contents will be used as chapters in the Potable Reuse Feasibility Report.

Task 3.1 Deliverables by CAROLLO

1. Kickoff Meeting Agenda and Assignments
2. Kickoff Meeting Minutes
3. Draft Work Plan
4. Final Work Plan
5. TM 1 (Revision 0): Introduction, Background and Project Alternatives
6. TM 1 (Revision 1): Introduction, Background and Project Alternatives

3.2 – Data Gathering

CAROLLO will collect, review and prepare data to evaluate the study alternatives identified. CAROLLO will prepare a formal list of data requested and provide weekly data gathering list updates during the first month of the project and monthly updates thereafter. It is anticipated that the list will include items such as, but not limited to:

- Basis of design reports for the CITY's recycled water treatment system, which should include:
    - Historical effluent flow data (hourly flows over previous 10 years, including drought periods)

  - Existing and projected recycled water demands
  - Recycled water quality, including regulated primary and secondary drinking water standards, non-regulated treatment goals, and irrigation water standards (e.g., boron and sodium adsorption ratio).
- Water, sewer, (existing) recycled water and stormwater atlas data in GIS format
- Current or anticipated flood plain maps
- Hydrologic data, aquifer characteristics (thickness, orientation, extent, degree of confinement), estimates of aquifer properties (e.g., T, S), confining layer extent and properties, production well pumping rates, water quality, well logs, and studies on existing wells and the groundwater aquifer used for drinking water production.
- Location and nature of all existing wells in the study area including well logs, geophysical logs, water quality data, water level data, and yield data.
- Soil infiltration rates (for use in estimating infiltration basin capacities)
- Hydrologic data and studies on existing wells and the groundwater aquifer used for drinking water production (e.g., USGS Report).
- Regional (County-wide) reports on potable reuse opportunities that describe:
  - Regional groundwater balance that addresses sustainable yield of groundwater aquifers that are shared by more than one agency.
  - Aquifer adjudication between the City and neighboring agencies.
  - How excess groundwater use by one agency may be balanced by IPR.

CAROLLO will use the CITY's Map Analysis and Printing System (http://gismaps.santabarbaraca.gov/) to facilitate development of scaled site plans and graphics.

Task 3.2 Deliverables by CAROLLO

1. Data collection lists and updates

Summary of TASK 3 Project Meetings

Task No.	Meeting Name	Purpose
3.1	Kickoff Meeting	CAROLLO and CITY will meet to: • Discuss CAROLLO's proposals for Work Plan content • Identify candidate project sites for initial feasibility screening ***(This meeting will be held at the same time as the kickoff meeting in Task 1.1)***
	Draft Work Plan Meeting	CAROLLO and CITY will meet to review draft work plan before it is submitted to the RWQCB and Technical Advisory Panel. ***(This meeting will be held at the same time as the Draft Work Plan Meeting in Task 1.1)***

TASK 4 – PROJECT REVIEW

4.1 – Technical Advisory Process

CAROLLO will retain the services of NWRI to facilitate a technical advisory process that will be defined in the Work Plan developed in Task 1.1 and Task 3.1. It is anticipated the technical advisory process will consist of:

- Approximately four (4) technical advisors (selected and retained by NWRI) with the following qualifications in the areas of both potable reuse and subsurface desalination intakes:
    - Hydrogeologist
    - Engineer or contractor
    - Regulatory/permitting (e.g., CEQA consultant)
    - Water Quality
- Up to four (4) technical advisory panel workshops consisting of the following topics:
    - Workshop 1: Work Plan Review (Task 1 and Task 3) – ***Included in this Scope of Services (Authorization #1)***
    - Workshop 2: Fatal Flaw Analysis (Task 1 and Task 3) – ***Included in a separate Scope of Services (Authorization #2)***
    - Workshop 3: Feasibility Analysis (Potable Reuse) – ***Included in a separate Scope of Services (Authorization #2)***
    - Workshop 4: Feasibility Analysis (Subsurface Desalination Intake) – ***Included in a separate Scope of Services (Authorization #3)***

  CAROLLO will prepare technical materials and make presentations to the technical advisory panel.
- NWRI will facilitate technical advisory workshops and public comment.

The Technical Advisory Process will be formally adopted in the Work Plan developed in Task 3.1.

CAROLLO will be responsible for:

- Coordination of workshop dates with workshop participants.
- Preparing and distributing workshop materials to the technical advisors and workshop participants a minimum of 2 weeks prior to the workshop meetings.

CAROLLO's subconsultant (NWRI) will be responsible for:

- Facilitating the technical advisory panel workshops and public comment.
- Preparing draft and final meeting minutes.

Task 4.1 Deliverables

1. Meeting Agendas and Workshop Materials
2. Draft meeting minutes
3. Final meeting minutes

4.2 –CITY Council Workshops/Meetings

CAROLLO will attend up to three (3) CITY Council workshops or meetings to assist CITY staff in presenting the progress and findings of the studies completed in Tasks 1, 2 and 3.

Task 4.2 Deliverables by CAROLLO

1. Powerpoint presentation for City Council workshop or meeting

Summary of TASK 4 Project Meetings (Authorization #1)

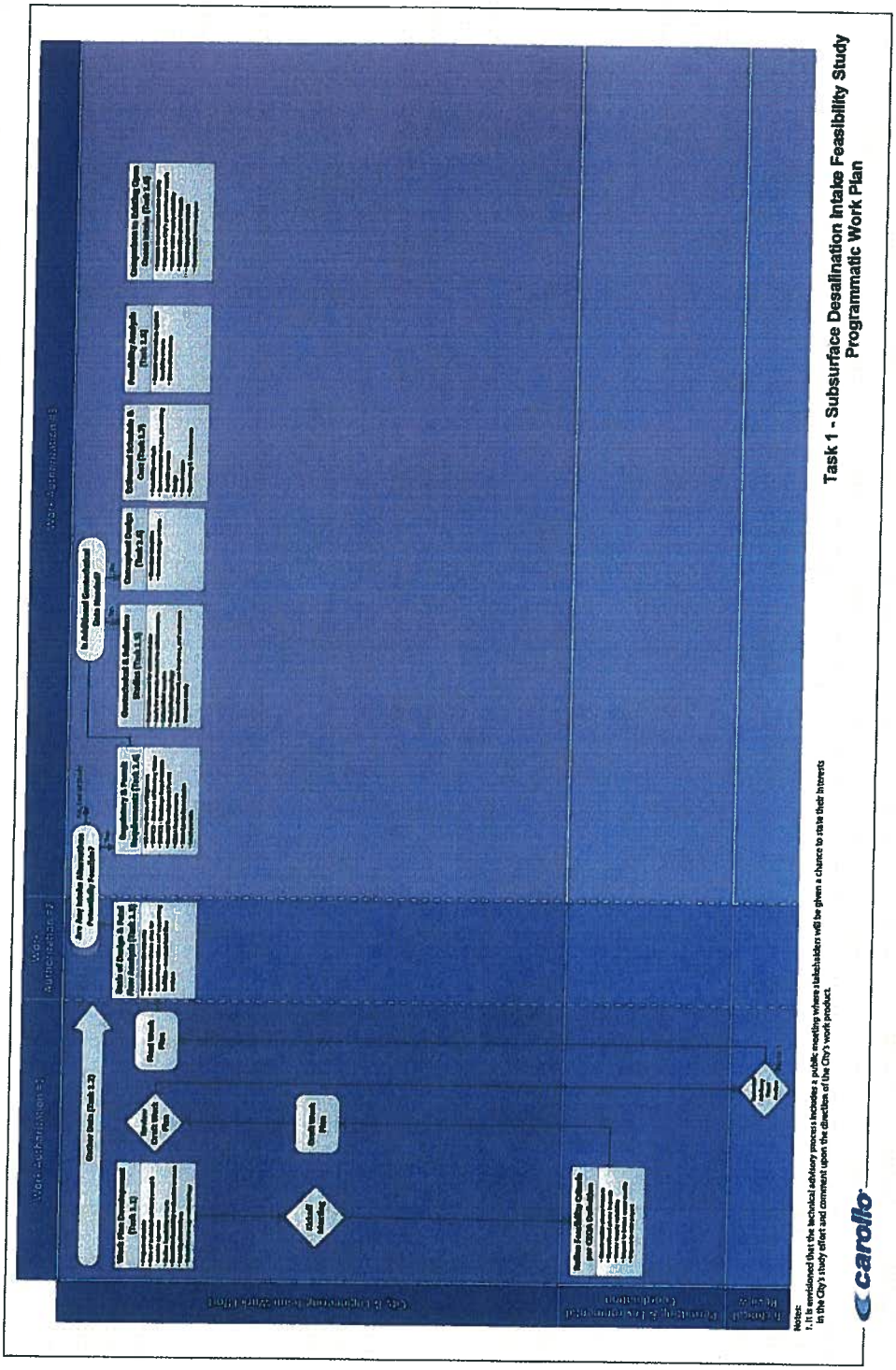
Task No.	Meeting Name	Purpose
4.1	Technical Advisory Panel Workshop #1 (Task 1.1 and 3.1)	This meeting will be facilitated by NWRI and have the following objectives: • Following meeting with CITY staff to review Draft Work Plans submitted under Tasks 1.1 and 3.1, CAROLLO and CITY will meet with Technical Advisory Panel to review Draft Work Plans. CAROLLO will present Draft Work Plan to technical advisory panel and interested parties. • NWRI will facilitate and receive comments from the audience on work plan approach.

TIME OF PERFORMANCE

The project schedule will be further refined during the work plan development, however the CITY is required to submit a draft work plan to the RWQCB by August 2015 and a final Feasibility Study Report by June 2017. It is anticipated that CAROLLO will provide services based upon the schedule presented in Attachment A.

PAYMENT

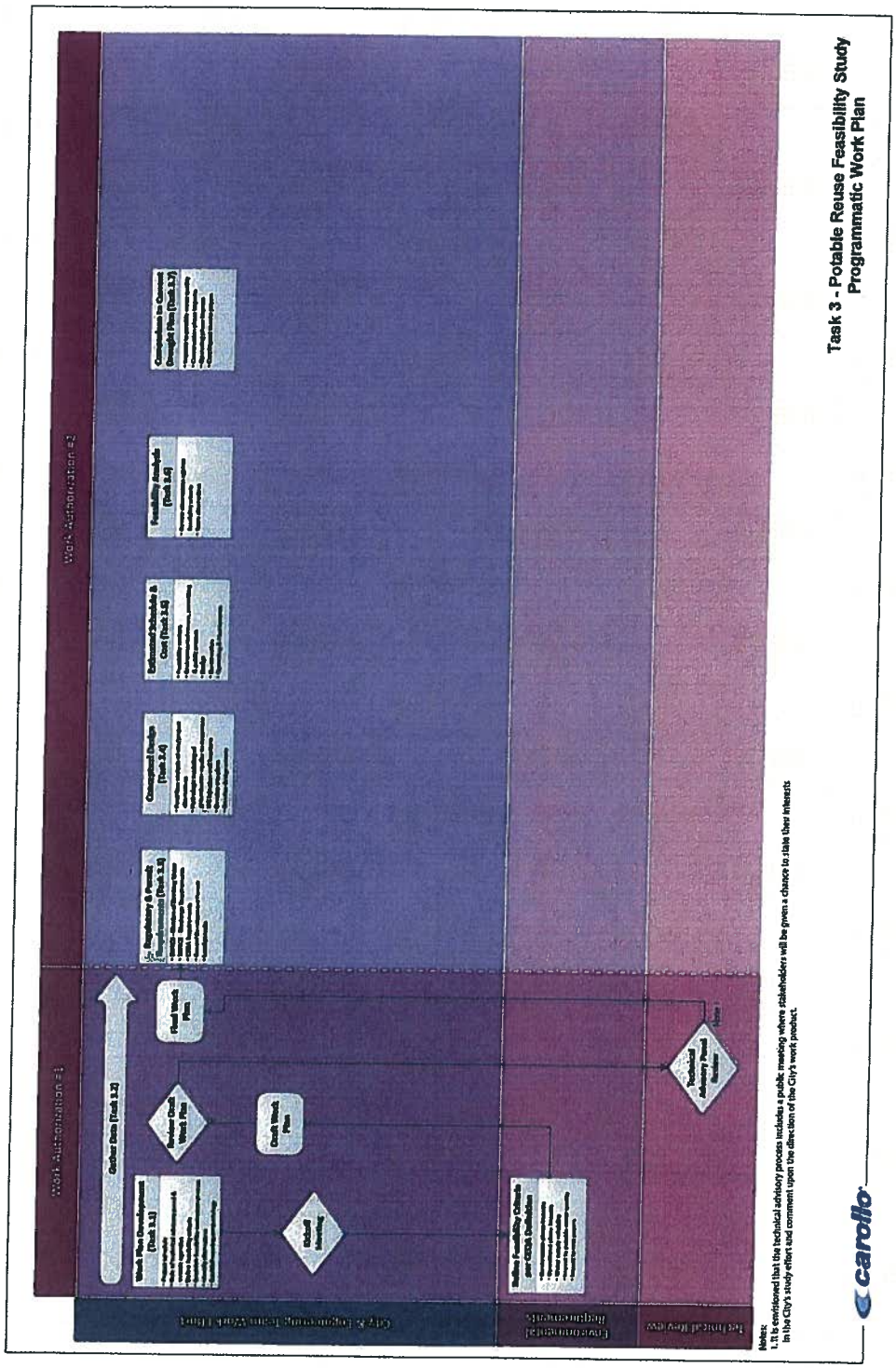
Payment will be based upon the terms stated in the contract Agreement between CAROLLO and the CITY. Invoices will be submitted by CAROLLO to the CITY on a monthly basis and will include CAROLLO's labor hours and direct costs, along with supporting invoices and the CITY's invoice cover sheet. Refer to the attached table for a schedule of fees involved with this Scope of Services.



Notes:
1. It is envisioned that the technical advisory process includes a public meeting where stakeholders will be given a chance to state their interests in the City's study effort and comment upon the direction of the City's work product.

carollo

Task 1 - Subsurface Desalination Intake Feasibility Study
Programmatic Work Plan



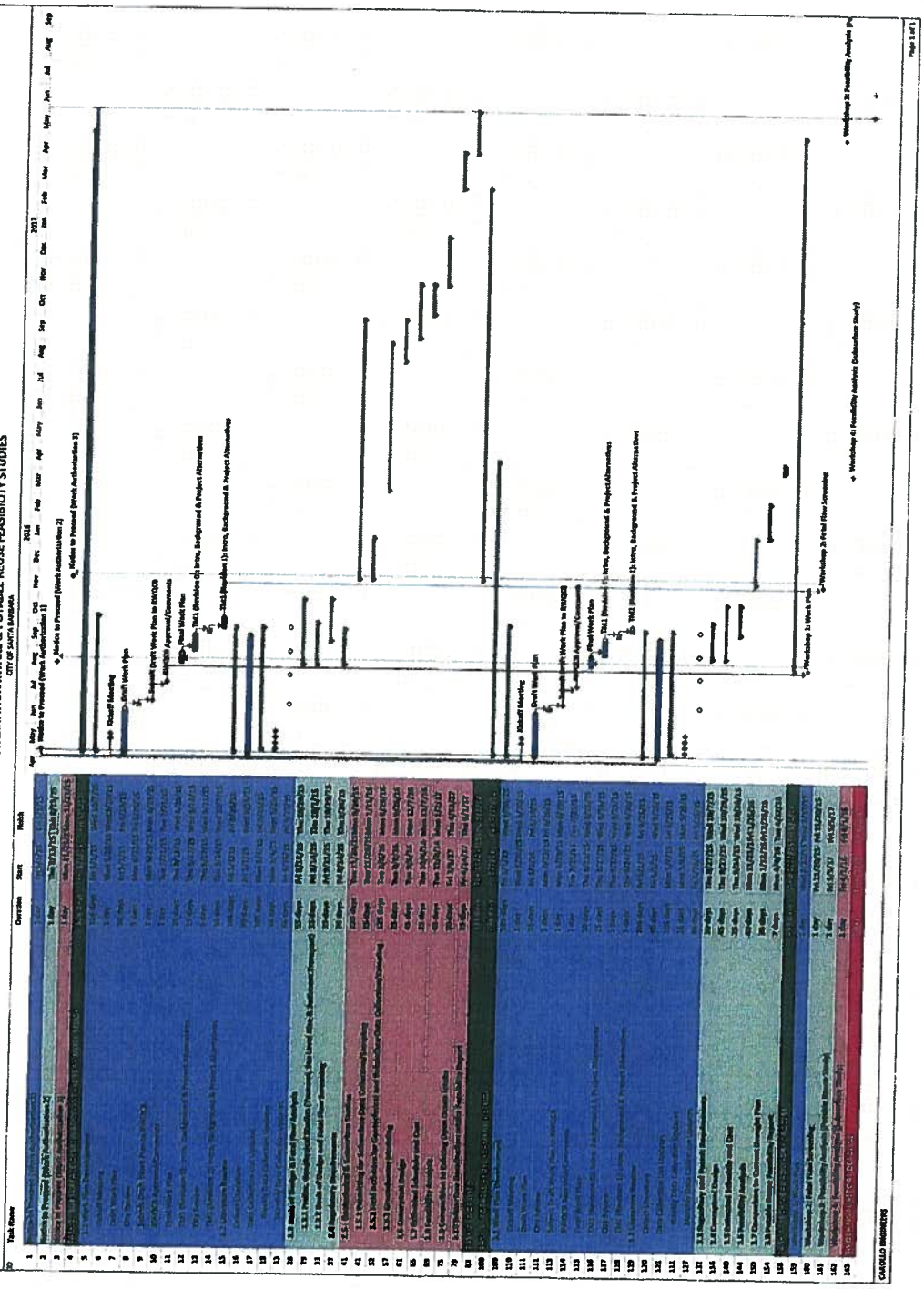
Task 3 - Potable Reuse Feasibility Study
Programmatic Work Plan

carollo

ATTACHMENT A

SUBSURFACE DESALINATION INTAKE & POTABLE REUSE FEASIBILITY STUDIES

CITY OF SANTA BARBARA



CAROLLO ENGINEERS

PRELIMINARY DESIGN SERVICES FOR RECOMMISSIONING THE CITY'S DESALINATION PLANT
(Subsurface Intake and Potable Reuse Studies)

AUTHORIZATION #1: WORK PLAN DEVELOPMENT

		[illegible] Meyerhofer Principal-in-Charge	[illegible] Seacord Project Manager/Project Engineer	[illegible] Assistant Project Engineer	[illegible] Technical Engineer	[illegible] Salveson Potable Reuse - Technical Advisor	[illegible] Financial Analyst (Cost Estimates)	[illegible] Quality Manager	Technician	Word Processor	[illegible]	OTHER DIRECT COSTS (ODCs) Subconsultants Dudek	[illegible] Consultants	Water Globe Consulting	Tenera Environmental	Michael Baker International	National Water Research Institute (NWRI) Technical Advisory Panel	Subconsultant Mark-up (10%) (Notes 1, 2)	Printing	Travel	Subtotal Labor	Subtotal ODCs	Total
[illegible]																							
1.1	Work Plan Development	2	40	80				1	8	[illegible]	$ 1,553	$ [illegible]	$ 20,000	$ [illegible]				$ [illegible]	$ 125	$ [illegible]	$ [illegible]	$ [illegible]	$ [illegible]
1.2	Literature Review		4	24							$ 320		$ 20,000					$ 2,000	$ -	$ -	$ 4,834	$ 22,320	$ [illegible]
[illegible]																							
2.1	Work Plan Development	1	40	80				1	8	[illegible]	$ [illegible]	$ [illegible]	$ [illegible]					$ [illegible]	$ 125	$ [illegible]	$ [illegible]	$ [illegible]	$ [illegible]
2.2	Data Gathering		4	24							$ 320		$ 20,000					$ 2,000	$ -	$ -	$ 4,834	$ 22,320	$ [illegible]
[illegible]																							
3.1	Technical Advisory Process		[illegible]	20					6	[illegible]	$ [illegible]	$ [illegible]	$ 4,500				$ [illegible]	$ [illegible]	$ -	$ [illegible]	$ [illegible]	$ [illegible]	$ [illegible]
3.2	City Council Meetings/Workshops		[illegible]						4		$ 320							$ -	$ -	$ [illegible]	$ [illegible]	$ [illegible]	$ [illegible]
[illegible]																							

Notes:

1. Tenera Environmental is a subconsultant to Dudek who will manage their contract and will apply a 10% mark-up to Tenera's fee. Carollo has not applied a second mark-up to the Tenera Environmental fee.
2. 10% mark-up applies to subconsultant fees only. No mark-up has been applied to ODCs (Printing, Travel).

EXHIBIT B

Contractor's Nondiscriminatory Employment Certificate

CONTRACTOR'S NONDISCRIMINATORY EMPLOYMENT CERTIFICATE
Santa Barbara Municipal Code § 9.126.020

A. Certificate Generally

Consistent with a policy of nondiscrimination in employment on contracts of the City of Santa Barbara and in furtherance of the provisions of Section 1735 and 1777.6 of the California Labor Code a "contractor's obligation for nondiscriminatory employment certificate" as hereinafter set forth shall be attached and incorporated by reference as an indispensable and integral term of all bid specifications and contracts of the City for purchases, services, and the construction, repair, or improvement of public works.

B. Contents of Certificate

The Contractor's obligation for nondiscriminatory employment is as follows:

1. The Contractor will not discriminate against any employee or applicant for employment because of race, creed, color, national origin, ancestry, sexual orientation, political affiliation or beliefs, sex, age, physical handicap, medical condition, marital status or pregnancy (as those terms are defined by the California Fair Employment and Housing Act -- Government Code Section 12900-12996), except where such discrimination is based on a bona fide occupational qualification. The Contractor will take positive action or ensure that applicants are employed, and that employees are treated during employment, without regard to their race, creed, color, national origin, ancestry, sexual orientation, political affiliation or beliefs, sex, age, physical handicap, medical condition, marital status or pregnancy (as those terms are defined by the California Fair Employment and Housing Act -- Government Code Section 12900-12996), except where such discrimination is based on a bona fide occupational qualification. Such action shall include but not be limited to the following: Employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. The Contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices to be provided by the City setting forth the provisions of this nondiscrimination clause.

2. The Contractor will, in all solicitations or advertisements for employees placed by or on behalf of the Contractor, state that all qualified applicants will receive consideration for employment without regard to race, color, national origin, ancestry, sexual orientation, political affiliation or beliefs, sex, age, physical handicap, medical condition, marital status or pregnancy (as those terms are defined by the California Fair Employment and Housing Act -- Government Code Section 12900-12996), except where such discrimination is based on a bona fide occupational qualification.

3. The Contractor will send to each labor union or representative of workers, with which he has a collective bargaining agreement or other contract or understanding, a notice to be provided by the City advising the said labor union or workers' representative of the Contractor's commitments under this provision, and shall post copies of the notice in conspicuous places available to employees and applicants for employment.

4. The Contractor will permit access to his records of employment, employment advertisements, application forms, and other pertinent data and records by the City, the Fair Employment Practices Commission, or any other appropriate agency of the State designated by the City for the purposes of investigation to ascertain compliance with the Contractor's Obligation for Nondiscriminatory Employment provisions of this contract, or Fair Employment Practices statute.

5. A finding of willful violation of the nondiscriminatory employment practices article of this contract or of the Fair Employment Practices Act shall be regarded by the City as a basis for determining that as to future contracts for which the Contractor may submit bids, the Contractor is a "disqualified bidder" for being "nonresponsible".

   The City shall deem a finding of willful violation of the Fair Employment Practices Act to have occurred upon receipt of written notice from the Fair Employment Practices Commission that it has investigated and determined that the Contractor has violated the Fair Employment Practices Act and has issued an order under Labor Code Section 1426 or obtained an injunction under Labor Code Section 1429.

   Upon receipt of any such written notice, the City shall notify the Contractor that unless he demonstrates to the satisfaction of the City within a stated period that the violation has been corrected, he shall be declared a "disqualified bidder" until such time as the Contractor can demonstrate that he has implemented remedial measures, satisfactory to the City, to eliminate the discriminatory employment practices which constituted the violation found by the Fair Employment Practices Commission.

6. Upon receipt from any person of a complaint of alleged discrimination under any City contract, the City Administrator shall ascertain whether probable cause for such complaint exists. If probable cause for the complaint is found, the City Administrator shall request the City Council to hold a public hearing to determine the existence of a discriminatory practice in violation of this contract.

   In addition to any other remedy or action provided by law or the terms of this contract, the Contractor agrees that, should the City Council determine after a public hearing duly noticed to the Contractor that the Contractor has not complied with the nondiscriminatory employment practices provisions of this contract or has willfully violated such provisions, the City may, without liability of any kind, terminate, cancel, or suspend this contract, in whole or in part. In addition, upon such determination the Contractor shall, as a penalty to the City, forfeit a penalty of $25.00 for each calendar day, or portion thereof, for each person who was denied employment as a result of such noncompliance. Such moneys shall be recovered from the Contractor. The City may deduct any such penalties from any moneys due the Contractor from the City.

7. The Contractor certifies to the City that he has met or will meet the following standards for positive compliance, which shall be evaluated in each case by the City:

   a. The Contractor shall notify all supervisors, foremen and other personnel officers in writing of the content of the nondiscrimination provision and their responsibilities under it.
   b. The Contractor shall notify all sources of employee referrals (including unions, employment agencies, advertisements, Department of Employment) of the content of the nondiscrimination provision.
   c. The Contractor shall file a basic compliance report as required by the City. Willfully false statements made in such reports shall be punishable as provided by law. The compliance report shall also specify the sources of the work force and who has the responsibility for determining whom to hire, or whether or not to hire.
   d. The Contractor shall notify the City of opposition to the nondiscrimination provision by individuals, firms or organizations during the period of this contract.

8. Nothing contained in this Contractor's Obligation for Nondiscriminatory Employment Certificate shall be construed in any manner to prevent the City from pursuing any other remedies that may be available at law.

9. The Contractor certifies to the City that he will comply with the following requirements with regard to all subcontractors and suppliers:

   a. In the performance of the work under this contract, the Contractor will include the provisions of the foregoing paragraphs (1) through (8) in all subcontracts and in any supply contract to be performed within the State of California, so that such provisions will be equally binding upon each subcontractor and each supplier.
   b. Contractor will take such action with respect to any subcontract or purchase order as the City may direct as a means of enforcing such provisions including sanctions for noncompliance: Provided, however, that in the event the Contractor becomes involved in, or is threatened with, litigation with a subcontractor or supplier as a result of such direction by the City, the Contractor may request the City to enter into such litigation to protect the interests of the City.

EXHIBIT C

Contractor's Living Wage Certificate

LIVING WAGE CERTIFICATION

Official notification to: _____.

_____.

_____.

The service contract that is pending between your company and the City of Santa Barbara is subject to the City of Santa Barbara Living Wage Ordinance, SBMC Chapter 9.128 (hereinafter referred to as "the Ordinance"). Pursuant to this ordinance, you are hereby notified that your company is required to demonstrate compliance by completing and returning the attached compliance statement. This statement must be completed and returned before contract commencement. **You may fax the compliance statement to: either the requesting department or to the City of Santa Barbara Finance Department (Purchasing) at (805) 897-1977.**

Please Note: Current living wage rates will apply to all subsequent contracts and amendments during the remainder of the current fiscal year ending June 30, 2015.

The City of Santa Barbara Living Wage Ordinance was adopted on April 4, 2006 (Ordinance number 5384). All capitalized terms used herein are used as defined in the Ordinance. The Ordinance requires that persons directly working on City of Santa Barbara contracts, for services specified in the ordinance, are to be paid a living wage while working on the City of Santa Barbara contract. The Ordinance only applies to those persons directly providing services to the City and does not apply to administrative or support staff employees of a Service Contract, such as administrators, payroll, personnel, or similar employees. The Ordinance also does not apply to employees who are Handicapped, Apprentices, Learners, or Student Interns, who are otherwise part of an employer's training program as those terms are defined in the Ordinance. The Ordinance also states that employees have the right to expressly negotiate and agree to wage and benefit levels different than those required by the Ordinance.

The Ordinance requires that employees working for your firm on this contract be notified that the City of Santa Barbara Living Wage Ordinance applies to them. As part of compliance for this contract, you are required to notify affected employees.

Effective from July 1, 2014, through June 30, 2015, the current rate for minimum compensation to employees is:

1. If benefits are not provided to an Employee, a wage of no less than $16.70 per hour.

2. If Basic Medical Insurance and Compensated Holidays are provided to the Employee, a wage of no less than $14.32 per hour.

3. If Supplemental Employee Benefits are provided to the Employee, a wage of no less than $13.12 per hour.

(All capitalized terms used herein are used as defined in the Ordinance, SBMC Chapter 9.128)

Also be advised that the City may request any or all certified payrolls associated with this contract, however, any such request will be made to your firm in writing and provide fourteen calendar days to respond. The City may also conduct on-site audits to verify compliance. These audits may include, but are not limited to, employee interviews.

Direct questions regarding this Ordinance to General Services Manager, City of Santa Barbara Finance Department, P.O. Box 1990, Santa Barbara, CA 93102.

1. * Select A, B C or D below.

☐ A. **The Living Wage Ordinance does not apply to this contract because:**

☐ **Exemption for Handicapped Individuals and Apprentices**. For the purposes of this form, an employee shall not include a "handicapped employee" employed pursuant to a special license issued under Sections 1191 and 1191.5 of the state Labor Code or an "apprentice" or "learner" employed pursuant to a special license issued under Section 1192 of the state Labor Code.

☐ **Exemption for Student Interns**. For the purposes of this form, an employee shall also not include a student intern which shall be defined as a person receiving educational or school credit at a duly licensed and accredited school or educational institution as part of or in connection with his or her employment or service with the City Service Contractor.

☐ **Public Entity.**

☐ **Non-profit exemption**.

☐ **Workers are part of a bona fide collective bargaining agreement.**

☐ **Persons employed are defined as executive or professional as used in the federal Fair Labors Standards Act of 1938 (29 USC Section 201 et. seq.).**

☐ Services are incidental. Explain: _____

_____

Complete the certification portion on page 3.

☒ B. Employees working on City of Santa Barbara contracts receive a pay rate that meets or exceeds the City of Santa Barbara Living Wage requirement of $16.70 per hour without benefits.

** Complete items #2, #3, #4, #5 and the certification portion on page 3.*

☐ C. Employees working on City of Santa Barbara contracts receive a pay rate that meets the City of Santa Barbara Living Wage requirement of $14.32 per hour with the following benefits:

1. A combined twelve days compensated leave time annually for full-time employees, and prorated leave for employees working less than full time
2. Basic Medical Insurance Coverage for the Employee.

** Complete items #2, #3, #4, #5, #6 and the certification portion on page 3.*

☐ D. Employees working on City of Santa Barbara contracts receive a pay rate that meets the City of Santa Barbara Living Wage requirement of $13.12 per hour with all of the following benefits:

1. A combined twelve days compensated leave time annually for full-time employees, and prorated leave for employees working less than full time
2. Basic Medical Insurance Coverage for the Employee.

3. Basic Medical Insurance Coverage for the Employee's spouse, domestic partner or family.

4. One additional Supplemental Benefit as defined in the Ordinance.

   ☐ Pension or deferred compensation retirement plan.

   ☐ Childcare or dependent care.

   ☐ Equivalent of ten (10) eight hour days of compensated leave over and above the compensated leave in item 1.

   ☐ Other: _____

** Complete items #2, #3, #4, #5, #6 and the certification portion on page 3.*

2. Will any subcontractors perform work on this contract? ☒ Yes ☐ No
   If yes, please indicate company(s) on an additional page.

3. Will you post employee notification form in an area accessible to employees working on City of Santa Barbara contracts? ☒ Yes ☐ No

4. You may be required to provide certified payroll records, time cards, and other records any time during the contract period to demonstrate compliance. These payroll records must include the following information for each employee working on this contract: employee name, job classification, employer benefit contribution, and hourly pay under this contract.

   Do you agree to provide this information within 14 calendar days when requested? ☒ Yes ☐ No

   The City may also perform on site payroll audits that may include, but are not limited to, employee interviews.

5. a) Please provide the total affect that the Living Wage requirements had on your bid price (i.e., no cost affect, increase bid price by $..., etc.)?

   No Affect

   b) How many employees benefited from the living wage requirement? None

   c) How much did the above employees benefit in aggregate during the contract:
   $0.00

6. The City has several insurance plans. To qualify for a lower wage tier, you must offer insurance at no cost to your employees and match one of the following plans in terms of co-pays/out-of-pocket expenses.

   ☐ **Aetna HMO:** No deductible, $100 co-pay for emergency room visits, no charge for preventative care, $25 co-pay for office visits to Primary Care Physicians/$35 co-pay to Specialists; Prescriptions: $20 co-pay for generics; $30 co-pay for brand, & $45 co-pay for non-formulary.

   ☐ **Kaiser HMO:** No deductible, $35 co-pay for emergency room visits, no charge for preventative care, $10 co-pay for office visits; Prescriptions: $5 co-pay for generics; $15 co-pay for brand & non-formulary is not covered.

☐ **Aetna Open Access Managed Care PPO:** Deductibles: $500/individual $1,000/family, $100 co-pay + 20% coinsurance for emergency room visits, no charge for preventative care, $25 co-pay for office visits; Prescriptions: $20 co-pay for generics; $30 co-pay for brand, & $45 for non-formulary.

☐ **Aetna Health Reimbursement PPO:** Deductibles: $2,000/individual $4,000/family, 20% coinsurance for emergency room visits, no charge for preventative care, 20% coinsurance for office visits; Prescriptions: $10 co-pay for generics; $20 co-pay for brand, & $35 for non-formulary.

☐ **Aetna Health Savings Account PPO:** Deductibles: $2,500/employee only coverage, $5,000/family, 20% coinsurance for emergency room visits, no charge for preventative care, 20% coinsurance for office visits; Prescriptions: $15 co-pay for generics; $25 co-pay for brand, & $40 for non-formulary.

The signatory below hereby certifies, under penalty of perjury, that the forgoing information is correct:

CAROLLO ENGINEERS, INC.
Company Name

5075 SHOREHAM PL., SUITE 120, SAN DIEGO, CA 92122
Company Address **City, State, Zip**

THOMAS F. SEACORD 858-505-1020 858-505-1015
Contact Name **Phone number** **Fax number**

THOMAS F. SEACORD, VICE PRESIDENT
Name and Title (Please print)

Signature

APRIL 17, 2015
Date

You may fax the compliance statement to: City of Santa Barbara Finance Department (Purchasing) at (805) 897-1977.

List of Subcontractors/Subconsultants

DUDEK
605 Third Street
Encinitas, CA 92024
Phone: (760) 479-4296
Contact: Joe Monaco

FUGRO WEST, INC.
660 Clarion Court, Suite A
San Luis Obispo, CA 93401
Phone: (805) 542-0797
Contact: Paul Sorensen

GSI WATER SOLUTIONS, INC.
418 Chapala St. Suite F
Santa Barbara, CA 93101
Phone: (805) 895-3956
Contact: Jeff Barry

MICHAEL BAKER INTERNATIONAL
9755 Claremont Mesa Blvd
San Diego, CA 92124
Phone: (858) 614-5000
Contact: Scott Jenkins

NATIONAL WATER RESEARCH INSTITUTE
18770 Ward St
Fountain Valley, CA 92708-0896
Phone: (714) 378-3278
Contact: Jeff Moshier

TENERA
971 Dewing Ave, Suite 101
Lafayette, CA 94549
Phone: (915) 962-9769
Contact: David Mayer

WATER GLOBE CONSULTING
824 Contravest Lane
Winter Springs, FL 32708
Phone: (203) 253-1312
Contact: Nikolay Voutchkov