Los Angeles County Public Works
Seawater Barriers

Dominguez Gap Barrier Project
Unit 8 Replacement Wells

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1.0 Executive Summary

Bureau of Reclamation
WaterSMART Drought Response Program
Drought Resiliency Projects for Fiscal Year 2025
Funding Opportunity No. R25AS00013

Date: 10/7/2024

Applicant: Los Angeles County Flood Control District

Project Location: Facilities located along the Dominguez Channel within the Cities of Carson and Los Angeles, in the County of Los Angeles, California

Category A Applicant: Flood Control District

Task A: Increasing the Reliability of Water Supplies through Infrastructure Improvements

Funding Group II: Up to $3,000,000 per agreement for a project that can be completed within three years.

Summary: Public Works proposes to construct four new injection wells and two observation wells to replace and supplement existing Dominguez Gap Barrier Project facilities located in the Cities of Carson and Los Angeles. The four injection wells will be constructed to replace three existing injection wells, which are beyond their useful life and require immediate replacement. The existing injection wells will be destroyed to prevent the possibility of groundwater cross contamination between aquifers. Once the new injection wells are brought online, they will help create a freshwater pressure ridge to prevent seawater intrusion into the underlying aquifers of the West Coast Basin located in the County of Los Angeles, which is a critical source of potable water supply for the region. The additional observation well facilities will provide Public Works with additional groundwater elevation and chloride concentration data and improve the operational efficiency of the Dominguez Gap Barrier Project. It is anticipated that work will start in March 2027 and be completed in March 2028. The project is located entirely within the Los Angeles County Flood Control District right of way.

Public Works operates three seawater intrusion barriers, which continuously inject freshwater into the aquifer system to create a protective pressure ridge and prevent seawater from contaminating the groundwater supply. The three seawater barriers include the Alamitos Barrier Project, the Dominguez Gap Barrier Project, and the West Coast Basin Barrier Project. The seawater intrusion barriers were installed beginning in the early 1950’s as an experimental project in response to the overdraft caused by excessive groundwater pumping for a rapidly growing population. The design, construction, and operation of the barriers have been a significant accomplishment in mitigating seawater intrusion into critical coastal aquifers, which serve as an invaluable water source for Southern California residents. The seawater barriers protect a 32,000,000 acre-foot groundwater reservoir from contamination by seawater intrusion. Over five million residents of the Southern California Coastal Plain depend on this groundwater that provides approximately 35% of their potable water supply. Besides being the lowest cost water available, this groundwater reservoir serves as a strategic reserve in the vent imported water supplies are interrupted due to drought or delivery system failure.

The Dominguez Gap Barrier Project is located within the cities of Los Angeles, Carson, and Long Beach and consists of 9 miles of water pipeline, 94 injection wells, and a network of over 250 observation wells. The wells were constructed in phases between 1971 and 2004, and are in city streets, private properties, and along flood control channel levees.

Several local water agencies work together to support the seawater barrier injection and monitoring operations. By agreement, the water used for injection at the DGBP is purchased by the Water Replenishment District of Southern California, formerly known as the Central and West Basin Water Replenishment District. The DGBP originally only received imported water for injection, but in 2005, the Terminal Island Water Reclamation Plant and Advanced Water Purification Facility began providing advanced treated recycled water to the DGBP for injection. The City of Los Angeles Department of Water and Power is the owner and purveyor of the recycled water to the DGBP, whereas the City of Los Angeles Department of Public Works Bureau of Sanitation owns and operates the water recycling plant. The potable water supplied to the DGBP injection wells is provided by Metropolitan Water District. The 10-year average annual water supply to the DGBP from 2014 to 2023 is 7,316 acre-feet per year. **Table 1** below includes recycled and imported water supply data to the DGBP.

Table 1: 10-year average annual water supply

YEAR	IMPORTED WATER INJECTED (acre-feet)	RECYCLED WATER INJECTED (acre-feet)	TOTAL (acre-feet)
2014	4,070	4,171	8,241
2015	2,840	4,107	6,946
2016	2,657	2,267	4,923
2017	4,767	1,702	6,470
2018	4,307	2,205	6,512
2019	5,209	2,529	7,738
2020	5,016	3,888	8,904
2021	4,207	4,915	9,122
2022	2,833	4,524	7,357
2023	1,869	5,076	6,946
Total Average Annual Water Supply for 2014-2023 in AFY			**7,316**

2.0 Project Location

The DGBP Unit 8 Replacement Wells project area is located within Los Angeles County in the State of California. The proposed project area encompasses parts of the City of Carson and the Wilmington Community in the City of Los Angeles. In the City of Carson, the project area is along the western side of the Dominguez Channel between Sepulveda Boulevard and southerly of the Pacific Coast Highway. In the City of Los Angeles, the project area is along East Grant Street east of Goodrich Avenue. The project coordinates are between latitude 33.80618°N and longitude 118.22834°W to latitude 33.78510°N to longitude 118.23823°W.

Attachment A provides an overview location map of all the DGBP injection wells and observation wells. **Attachment B** shows a zoomed in view of the DGBP Unit 8 Replacement Wells project area and includes the following: 4 new injection wells; 3 existing injection wells to be destroyed; and 2 new observation wells.

3.0 Project Description

The work to be performed as part of the DGBP Unit 8 Replacement Wells (DGBP Unit 8) involves the construction of four (4) injection wells, one (1) double nested groundwater observation well, and one (1) quadruple nested groundwater observation well. These wells are replacement and supplemental facilities for the DGBP, which is used to form a freshwater barrier in the underlying aquifers to halt saltwater intrusion to the inland water producing areas. In general, the work will consist of drilling, casing, filter packing, grouting, and developing single casing injection wells and multiple casing observation wells.

Additional work on the DGBP Unit 8 will involve the following: destruction of three (3) existing injection well casings; installation of vaults for the wells and appurtenances to the wells; connection of the wells to the existing water laterals and telemetry conduits; installation of wiring, sensors, and instrumentation; programming and integration of the data signals with Public Works existing telemetry system; and expansion of the existing turnout areas along the westerly Dominguez Channel levee access road for additional space for vehicular parking.

Public Works anticipates the following sequence for completion of the injection and observation wells (not including well vault and wellhead completion).

1. The contractor shall mobilize at the project site and destroy the existing injection wells.

2. The contractor shall mobilize a dual tube flooded reverse rotary drill rig and related equipment to the project site.

3. The contractor shall drill and accommodate a 1-foot sampling interval for each pilot or test hole for all observation and injection well locations. The optimate pilot hole size shall be 8 inches in diameter. The maximum allowable pilot hole is 10.25-inch diameter.

4. Samples of the sieve analysis will be collected by Public Works during pilot hole drilling operations. Public Works will run geophysical logs in each pilot hole at the injection and observation well locations immediately following the conclusion of drilling the pilot hole.

5. Public Works will finalize the design of all wells and furnish designs to the contractor within 48 hours of pilot borehole completion.

6. The contractor shall drill, construct, and develop all injection and observation well per the plans and per any modifications provided by Public Works.

The contractor shall store and dispose of all well cuttings produced, and store and/or discharge water pumped during the drilling and development of the wells. In addition, the contractor shall do the following: provide testing and determine the type of disposal for all well cuttings, drilling water, and development water; provide all equipment required to transport all well cuttings and pumped water to the approved disposal/discharge sites; store well cuttings, drilling water, and development water in temporary holding bins and tanks that they provide at each well site; and install temporary piping for its use to dispose of water pumped during the development of the wells.

Injection Well Destructions

The existing injection wells to be destroyed are dual zone wells with 12-inch diameter casings made of asbestos cement. The contractor shall be responsible to assess the current condition of the existing injection wells and may submit alternative methods of destruction for review. Acceptable impervious sealing materials that shall be employed in the well destruction include neat cement or sand-cement grout. Gravel material may be used to backfill portion/s of the borehole that are within the aquifer. The contractor will be required to obtain a well destruction permit for all wells from the Los Angeles County Department of Public Health.

The general procedure for destroying the injection wells is detailed herein. The contractor is required to remove the existing injection well head assembly. They may backfill the perforated portion of the casing with gravel utilizing a 2-inch tremie pipe and then top with transition sand. The contractor shall use a well casing perforating tool to puncture holes within the blank portion of the casing from 5 feet above the top of the upper perforated portion of the casing to 5 feet below ground surface. The perforating tool shall puncture three holes, spaced equally around the circumference of the casing for every vertical foot of blank casing. Once the perforations are completed, the contractor shall pressure grout the well casing from the top of the transition sand to the ground surface via a 2-inch tremie pipe at a minimum pressure 10 pounds per square inch (psi). The tremie pipe/s shall also be backfilled and sealed with transition sand and grout. The existing injection well vaults shall have the top slab of the vault removed and disposed of. The bottom of the vault shall be broken up and then backfilled, with the surface restored in kind with the surrounding grade.

Drilling Wells

The reverse circulation hydraulic rotary drilling method shall include a mud tank system equipped with a shaker table and a desander/desilter system. The system shall be designed to facilitate the retrieval of representative samples from the discharge with a minimum of recirculated material. Drilling with a mixture of water and unprocessed mud, clay, or other material that tends to build a mudcake on the borehole wall that cannot be removed during well development will not be permitted. The contractor will bell responsible for retaining a Drilling Fluids Engineer and ensuring the drilling fluid does not exceed the characteristics identified in the specifications, such as viscosity, weight, sand content, water loss, and wall cake thickness. The consistency of the drilling fluid shall be controlled to properly keep mud off the walls of the hole to prevent caving of the wall as the drilling progresses.

The contractor shall first install a protective steel surface casing and then grout the annular space between the drilled hole and the protective casing with grout. This will seal the hole and protect against infiltration of surface water. cross contamination between potential surface water to the underlying aquifers.

A pilot hole will be drilled using a reverse circulation rotary drilling rig in the presence of a Public Works geologist at a rate no greater than 1 foot per minute. The geologist will analyze the contractor’s drilling progress and keep a lithologic log and record for each of the wells showing all materials penetrated and descriptive notes of conditions met during drilling. After the full depth of the hole is logged, Public Works will obtain a geophysical log of the pilot hole including a caliper log, and a plumbness and alignment test. Public Works will analyze the soil samples, sieve analysis, and geophysical log to specify the filter pack material, casing slot size, screened interval, and proper depth. Once Public Works finalizes the well design, the contractor may procure the appropriate well casing materials. After the well casing material is in hand, the contractor will borehole ream the hole to the proper diameter and then begin installation of the casing, filter pack, tremie pipes, and annular seal.

Developing Wells

The injection and observation wells will be developed following well construction. Well development of each well shall consist of cleaning and opening the casing perforations and the outside material adjacent to the perforations to allow free movement of water between the well and the aquifer. Development activities shall remove all drilling fluids and solids remaining inside the well casing and filter pack adjacent to the well screen. Well development activities generally consist of chemical treatment, simultaneous airlifting and swabbing, and pump development, and will following the following sequence:

1. Airlift pump to remove “heavy” drilling fluids and sediments from the well after allowing time for annular seals to set (injection and observation wells).

2. Chemically treat the well with a liquid polymer dispersant, let stand, and remove (injection wells only).

3. Swab and/or air lift development (injection and observation wells).

4. Install submersible pump to perform pumping development (injection wells only); perform open end airlift pumping (observation wells only).

After well construction is completed, the contractor will commence initial development no later than 48 hours. The contractor shall open-end airlift pump at the bottom of the well to remove the “heavy” drilling fluids and sediments. The contractor shall continue airlift pumping for the bottom 20 feet of perforations. Then the contractor shall swab a concentrated liquid polymer dispersant into the screen interval of the injection wells to help breakdown the bentonite drillings fluids in the well and borehole. A swabbing tool will be utilized to add the dispersant and to surge water through the aquifer formation, filter pack, and well screen. The swabbing tool will consist of two rubber discs at each end of a 10-foot-long perforated section of 4-inch steel pipe, with a 1-inch airline inserted through the hollow center. Following chemical treatment, the well will be swabbed and airlifted simultaneously starting from the top of the screen section and working down in 10-foot intervals until relatively sediment-free water is discharged from the well. Afterwards, the swab tool is removed, and pump development will be performed utilizing a submersible pump. The pumping rates are gradually increased in steps, until the discharge water is relatively sediment-free, and the well’s specific capacity no longer changes.

Well Completion

At the completion of well development, the wells are video surveyed, disinfected, and then capped with a steel plate. The contractor must file a well completion report with the California Department of Water Resources and the Los Angeles County Department of Public Health.

The injection and observation well vaults are then installed along with the wellhead assembly, furnishings, piping, valves, and appurtenances. The contractor shall furnish all labor equipment, and materials and perform all work required to construct the pipeline connections for the water supply lateral lines to the injection wells. The contractor then installs all wiring, sensors, and instrumentation at the well sites and integrates the new data signals with Public Works existing telemetry system. The contractor shall conduct programming and configuration of Public Works existing programmable logic controllers to ensure operational data from the new injection and observation well facilities can be monitored by Public Works. Public Works will then be able to monitor critical operational data such as injection flow rates, well casing pressures, and water level elevations at the new well facilities.

4.0 Applicant Category and Eligibility of Applicant

Public Works, acting on behalf of the Los Angeles Flood Control District, proposes to apply for a Drought Resiliency Project Task A (Increasing the Reliability of Water Supplies Through Infrastructure Improvements) as a **Category A applicant**.

Public Works is a local authority government in the County of Los Angeles, in the state of California. Public Works was formed in January 1985, consolidating the former County Road Department, the County Engineer Department, and the County Flood Control District. Public Works is responsible for the construction and operation of Los Angeles County's roads, building safety, sewerage, watershed management, drinking water systems in certain communities, flood control, and water conservation services. Public Works qualifies as a "Category A" applicant and is eligible to apply for the WaterSMART Drought Response Program – Funding Opportunity No. R25AS00013.

Public Works' workforce takes pride in being public servants providing essential and critical services for all residents and businesses in Los Angeles County. Public Works' diverse operations are defined within five core service areas: Water Resources, Transportation, Environmental Services, Construction Management, and Municipal Services. Its annual budget of approximately 4.1 billion is funded by restricted revenues, such as gas excise and sales tax, benefit assessment, water and sewer sales, user fees, and contract cities revenues.

Public Works is strategically focused on supporting economic development through business-friendly contracting opportunities that will better serve the County's small businesses and local worker hiring objectives. In Fiscal Year 2022-23, Pubic Works awarded approximately $1.5 billion worth of contracts within Los Angeles County, which helped create 18,368 jobs.

Public Works' workforce is comprised of approximately 3,640 employees in nearly 500 job classifications, including professional, technical, clerical, and skilled crafts. Headquartered at 900 South Fremont Avenue in Alhambra, Public Works has 70 field facilities throughout Los Angeles County.

5.0 Evaluation Criteria

5.1 Evaluation Criterion A: Severity of Drought or Water Scarcity and Impacts

The DGBP Unit 8 Replacement Well project area is in Los Angeles County, in Southern California. The history of drought in Southern California is widely known and comes in waves of dry and wet periods. A drought can occur when drier-than-normal conditions result in water related problems. For example, when the annual rainfall is less than normal for a year or consecutive years, this can result in lower snowpack amount, a decline in flow in rivers and streams, reduction of water levels at lakes and reservoirs, and a rapid decline of groundwater drinking supplies due to an increased reliance on groundwater pumping.

Southern California has suffered from multiple droughts throughout recent recorded history. A 3-year drought between 2007 and 2009 resulted in the statewide emergency proclamation and resulted in reduced usage of potable drinking water use throughout the state. During this drought, the average annual rainfall in Los Angeles County was 7 inches, which is less than half of the annual average rainfall of 14.25 inches, per the Los Angeles Almanac. One of the most severe and longest droughts in Southern California occurred in a five year stretch between 2012 and 2016. During this period the average rainfall amount in Los Angeles County was 7.16 inches. The result of this drought coerced the region to enforce stricter water conservation policies to reduce water consumption by residents, industries, and water agencies. The most recent drought in Southern California was a two year stretch from 2020 to 2022. During this drought Los Angeles County had an average annual rainfall of just 7.66 inches.

Attachment C showcases drought maps from the U.S. Drought Monitor (droughtmonitor.unl.edu) during these drought events.

The severity and duration of droughts in Southern California resulting from changes to water supply availability and climate change will continue to be a key challenge for the region to undertake. Los Angeles County is subject to extreme weather which includes extended periods of drought with few, intense rain events. Climate change is expected to reduce the reliability of imported water delivered to Los Angeles County. This will require an increased emphasis on development of local sources of water to increase the sustainability of our water supply.

To understand the impact of climate change on Los Angeles County flood control facilities and the County's flood control design standards, the Flood Control District approached the University of California, Los Angeles (UCLA) in May 2020 to cooperatively prepare and fund a study evaluating the impacts of climate change on extreme precipitation events in Los Angeles County. The study showed the rise of temperature due to climate change would increase the intensity of storm events. The Flood Control District will further evaluate the findings of the study prior to modifying the Flood Control Districts' design hydrology and design storm events. The UCLA climate scientists, in consultation with the Flood Control District, completed a report in June 2023 which summarized the results of this study in a comprehensive technical report to support specific regional planning efforts. UCLA is preparing to publish an article on the study in the Water Resources Journal in 2024. Overall, climate change is expected to bring irrevocable shifts in weather-related patterns across Los Angeles County. The region may experience higher temperatures with prolonged dry periods, leading to severe droughts, heat wave, and intense fire seasons.

Groundwater plays an important role in providing drinking water to the residents of Los Angeles County. It is a valuable local resource because of its high quality and low production cost. In addition, groundwater acts as a strategic reserve in the event the water supplies brought in from outside the region are interrupted due to drought or delivery system failure. A majority of the 10 million residents of Los Angeles County depend on groundwater, which provides 35 percent of the drinking water supply.

The DGBP Replacement Well project will play a vital role in protecting the groundwater drinking water supply from saltwater intrusion in the West Coast Groundwater Basin in Los Angeles County. If no action is taken, the groundwater reservoir may become contaminated with saltwater, causing the water to be too brackish for drinking water purposes. Furthermore, the loss of the local groundwater resources will make Los Angeles County less sustainable to withstand future periods of drought in the region, and more dependent on imported potable water from other sources.

5.2 Evaluation Criterion B: Project Benefits

Background

The DGBP Unit 8 Project will construct 4 new injection wells and 2 new observation wells to replace and supplement existing DGBP facilities located within the Cities of Carson and Los Angeles. The DGBP was constructed to prevent saltwater from intruding into the underling aquifers of the West Coast Groundwater Basin (WC Basin) located in the County of Los Angeles. The primary means of preventing saltwater intrusion is by utilizing wells to continuously inject freshwater into the aquifers to elevate localized groundwater levels along the DGBP alignment. The new injection wells will help prevent saltwater intrusion by creating a freshwater pressure ridge in the underly aquifers of the WC Basin. Four new injection wells will be constructed to replace three existing injection wells that are beyond their useful operating life. One of the existing injection wells will be replaced with two single aquifer zone injection wells to allow for more control of injection operations. The two new observation wells will provide Public Works with additional groundwater elevation and chloride concentration data and improve the operational efficiency of the DGBP.

Public Works operates three seawater intrusion barriers. The three seawater barriers include the Alamitos Barrier Project, the DGBP, and the West Coast Basin Barrier Project. The seawater intrusion barriers were installed beginning in the early 1950’s as an experimental project in response to the overdraft caused by excessive groundwater pumping for a rapidly growing population. Prior to the installation of the first production wells in the region to supply groundwater to the community, the natural gradients of flow in the basin aquifers were essentially seaward. Groundwater served as the primary water supply for the Los Angeles Area until the completion of the Owens Valley Aqueduct in 1914. The aqueduct provides for most of the City of Los Angeles’ water needs. However, all the beach cities continued to pump water from the WC Basin and continue to do so to this day. The persistent pumping lowered the water levels within the groundwater basin which caused the ocean saltwater to move inland. Saltwater intrusion (noted by increased chloride concentrations) was first detected in a well in Redondo Beach in 1912. By the 1940s, saltwater intrusion was moving landward at rates of up to 400 feet per year. Initially, groundwater recharge was attempted using surface basins, but confining subsurface layers prevented the surface recharges to reach the lower aquifers that were used for water production. In 1951, an injection test was performed using an abandoned water well in the City of Manhattan Beach. This test successfully established a freshwater mound. A line of these injection wells was critical in preventing further saltwater intrusion in the WC Basin and had the added benefit of providing basin recharge. A map of the Los Angeles County Groundwater Basins can be found in **Attachment D**.

Barrier construction commenced shortly thereafter when the California State Legislature appropriated funds to the State Water Resources Control Board in 1951. With that funding, the State of California contracted with the Los Angeles County Flood Control District on a pilot project to protect coastal groundwater basins from saltwater intrusion. A series of 9 injection wells and 36 observation wells were constructed in 1953. This project was later expanded to become the West Coast Basin Barrier Project.

Subsequent investigations of groundwater resources in Los Angeles County indicated the need for further seawater intrusion barriers. An area of concern was the Dominguez Gap in southern Los Angeles, where a deep channel cut by the ancestral Los Angeles River at a time of low sea level was later filled with stream deposits. Construction of the DGBP began in 1969 and was intended to halt saltwater intrusion into the WC Basin through the Dominguez Gap of the Los Angeles River. The gap is about two miles wide at its narrowest point and lies between the Palos Verdes Hills on the west and Signal Hill on the east. The DGBP is located within the cities of Los Angeles, Carson, and Long Beach and consists of 9 miles of water pipeline, 94 injection wells, and a network of over 250 observation wells. The wells were constructed in phases between 1969 and 2004, and are in city streets, private properties, and along flood control channel levees.

The DGBP primarily injects water into the Gaspur, 200-Foot Sand, and the 400-Foot Gravel aquifers. The aquifers of the WC Basin are generally confined. The WC Basin receives limited natural replenishment from the adjacent Santa Monia and Central Groundwater Basins. Both the Newport-Inglewood and Ballona Escarpment partially obstruct the flow of groundwater. The WC Basin is artificially recharged through both the Dominguez Gap Barrier Project and the West Coast Basin Barrier Project. Essentially, all water injected into the barriers falls back into the basin aquifers once the initial “pressure wall” with the saltwater is established as the gradient slopes steeply landward toward the Newport-Inglewood Fault. **Table 2** shows the added recharge benefit of the DGBP over the past ten years.

Table 2: Artificial Recharge to West Coast Basin by Dominguez Gap Barrier Project

YEAR	IMPORTED WATER INJECTED (acre-feet)	RECYCLED WATER INJECTED (acre-feet)	TOTAL (acre-feet)
2014	4,070	4,171	8,241
2015	2,840	4,107	6,946
2016	2,657	2,267	4,923
2017	4,767	1,702	6,470
2018	4,307	2,205	6,512
2019	5,209	2,529	7,738
2020	5,016	3,888	8,904
2021	4,207	4,915	9,122
2022	2,833	4,524	7,357
2023	1,869	5,076	6,946
Total Average Annual Water Supply for 2014-2023 in AFY =			**7,316**

The water levels in the aquifers of the WC Basin remain below sea level due to a history of over-pumping casing saltwater intrusion into the WC Basin. This intrusion necessitated placement of the seawater barriers, the adjudication of the basin, and led to the formation of the Water Replenishment District of Southern California (WRD).

The WC Basin was adjudicated in 1961. The total adjudication allowed for the extraction of 64,468.25 acre-feet of water a year (AFY), which is based on historical use rather than the safe yield for the basin. Natural replenishment (underflow from the Central Basin) is estimated at 20,000 to 30,000 AFY. The adjudication is a physical solution that includes replenishment through the DGBP and West Coast Basin Barrier Project, allowing production more than the natural safe yield which creates an annual overdraft.

WRD was formed in 1959 under the Water Replenishment District Act of 1955. WRD manages a 420 square mile service area (The entire WC Basin and the great majority of the Central Basin) that covers over 40 cities in Los Angeles County. WRD manages the two basins and its management solutions for the basins include operation of the seawater barriers by Public Works, managed aquifer recharge, controlled extractions through the adjudications, and having an in-lieu program to pay pumpers not to pump groundwater. The WRD purchase the water that is injected through the seawater barriers operated by Public Works. Public Works provides yearly estimates to the WRD regarding how much water will be injected into the barriers and conducts semi-annual meetings with the WRD and other pertinent local water entities summarizing the operation and performance of the barriers.

Issues

The DGBP Unit 8 Project will replace three existing injection wells that are beyond their useful life and require immediate replacement. The three existing injection wells are wells 26T, 27F, and 28C. The performance issues with each of these wells are described below:

Injection well 26T

This well was constructed in 1969 and is located along East Grant Street, east of Goodrich Avenue, in the City of Los Angeles. It is made of a 12-inch diameter asbestos cement casing that is 403 feet deep. It is a dual zone casing, meaning it is a single casing that injects into two aquifer zones using a pneumatic packer. A pneumatic packer is an inflatable device used to separate different zones inside an injection well casing to control injection rates into each zone. Well 26T injects into the 200 Foot Sand and 400 Foot Gravel aquifers.

Well 26T is a poor performing injection well that is difficult to control injection into the two aquifer zones. The pneumatic packers require substantial maintenance and upkeep to sufficiently separate the aquifer zones. There may be an issue with the pneumatic packer where it is no longer providing a sufficient seal between the 200 Foot Sand and 400 Foot Gravel aquifers. Another reason could be voids in the annular space outside of the well casing which allow the aquifer zones to communicate with each other. Nonetheless, the poor injection capacity at well 26T prevents Public Works from directing the injection water to the aquifer zones that need the most protection from saltwater intrusion.

The 200 Foot Sand aquifer near injection well 26T has naturally high groundwater elevations and is relatively freshwater (groundwater with chloride concentrations less than 250 milligrams per liter). Contrarily, the 400 Foot Gravel aquifer near injection well 26T has historical records of low groundwater levels and high levels of salinity. Over the last 10 years (since 2015), the average injection flow rate at 26T was 0.03 cubic feet per second (cfs) in the 200 Foot Sand aquifer and 0.05 cfs in the 400 Foot Gravel aquifer. It is important to note that the well was inoperable for half of that time due to maintenance issues with high groundwater and/or the pneumatic packer.

Based off historical performance at well 26T, Public Works recommends a single zone replacement well that focuses injection solely into the 400 Foot Gravel aquifer where the demand for additional recharge is warranted due to high chloride concentrations. There is little evidence to support the need to continue injection into the 200 Foot Sand aquifer at this site.

Injection well 27F

This well was constructed in 1969 and is located along the western side of the Dominguez Channel southerly of the Pacific Coast Highway, in the City of Carson. It is made of a 12-inch diameter asbestos cement casing that is 393 feet deep. It is a dual zone casing that injects into the Gaspur and 400 Foot Gravel aquifers.

Well 27F is an inactive injection well that was unfortunately partially grouted during an attempt to improve the integrity of the aquitard separating the Gaspur and 400 Foot Gravel aquifers. The Gaspur aquifer in this reach of the DGBP is prone to surface leakage due to a weak confining clay layer that is discontinuous. As a result, injected water has the potential to migrate upward and laterally through the discontinuous confining clay layers until it reaches the surface. Due to the reoccurrences of surface leakage, injection into the Gaspur aquifer at well 27F ceased in 1997. Injection into the 400 Foot Gravel aquifer continued until 2006, when surface leakage issues reemerged. A plan was put in place to improve the integrity of the aquitard separating the Gaspur and 400 Foot Gravel aquifers by drilling around the well vault to the depth of the aquitard and pressure grouting the area. The intention was for the grout to seal any voids in the clay layer, which would improve the integrity of the aquitard and allow injection into the 400 Foot Gravel aquifer to continue. However, during the project, the grout made its way into the well screen in the 400 Foot Gravel aquifer and left the well unusable.

The Gaspur aquifer near injection well 27F has historical records of high groundwater levels and high chloride concentrations. The 400 Foot Gravel aquifer near injection well 27F has historical records of low groundwater levels and high levels of salinity.

Based off historical performance at well 27F, Public Works recommends a single zone replacement well that focuses injection solely into the 400 Foot Gravel aquifer where the demand for additional recharge is warranted due to high chloride concentrations. A replacement well for the Gaspur aquifer is not recommended due to the weak confining clay layer along this reach of the DGBP.

Injection well 28C

This well was constructed in 1969 and is located along the western side of the Dominguez Channel southerly of Sepulveda Boulevard, in the City of Carson. It is made of a 12-inch diameter asbestos cement casing that is 284 feet deep. It is a dual zone casing that injects into the Gaspur and 400 Foot Gravel aquifers.

Well 28C is an active well that is poor performing and only operable in the 400 Foot Gravel aquifer. In 1998, casing damage was discovered in the upper portion of the casing in the Gaspur aquifer. Efforts to make a repair were thwarted because the pneumatic packer was buried with sediment and could not be deflated nor removed from the well. Since the downhole piping was still intact, injection operations in the 400 Foot Gravel aquifer resumed in 2013. However, the well cannot be disassembled for routine well redevelopment in its current state, and therefore has lost injection capacity over the years.

The Gaspur aquifer near injection well 28C has historical records of high groundwater levels and high chloride concentrations. The 400 Foot Gravel aquifer near injection well

28C has historical records of low groundwater levels and high levels of chloride concentrations.

Based off historical performance at well 28C, Public Works recommends installing two separate single zone replacement wells as a clustered well. A clustered well consists of separate casings within proximity of one another but each in its own individual borehole. One of the replacement wells would inject into the Gaspur aquifer, and the other would inject into the 400 Foot Sand aquifer. It's important to note that the Gaspur aquifer in this reach of the DGBP is more defined and less susceptible to surface leakage issues.

Benefits

The WC Basin is one of the most heavily utilized groundwater basins in Southern California. Figure X illustrates the groundwater basins in southern Los Angeles County. WC is bounded on the north by the Santa Monica Basin, to the East by the Central Basin, to the south by the San Pedro Bay and Palos Verdes Hills, and to the west by the Pacific Ocean. The boundary with the Santa Monica Basin is formed by the Ballona Escarpment which is approximately 1 mile south of Ballona Creek. The boundary with the Central Basin is formed by the Newport-Inglewood fault which runs through the Baldwin, Dominguez, and Signal Hills.

The primary goal for the DGBP Unit 8 project is to prevent saltwater intrusion into the Gaspur, 200 Foot Sand, and 400 Foot Gravel aquifers of the southern flank of the WC Basin. The installation of 4 replacement injection wells, 2 groundwater observation wells, and the integration of the new well facilities into Public Works' existing telemetry system will help Public Works address the issue of saltwater intrusion within the project vicinity. The destruction of the 3 existing injection wells that are beyond their useful life will prevent the possibility of subsidence and/or groundwater cross contamination.

The DGBP is one of three seawater barriers that Public Works operates, which protect a 32,000,000 acre-foot groundwater reservoir from contamination by saltwater intrusion. Over five million residents of the Southern California Coastal Plain depend on this groundwater that provides approximately 35 percent of their potable water supply. Besides being the lowest cost water available, this groundwater reservoir serves as a strategic reserve in the vent imported water supplies are interrupted due to drought or delivery system failure. The WC Basin underlies 160 square miles in the southwestern part of Los Angeles County. The WC Basin provides groundwater to approximately 11 cities and unincorporated areas of Los Angeles County.

Beneficial uses of water from the WC Basin include water for utility purchase (water company production that is provided for municipal and industrial purposes), irrigation for nurseries, cemeteries, parks, use by oil and refining industry, and various other commercial uses. There are a total of 35 production wells in the WC Basin per the Water Replenishment District.

Water quality within the WC Basin is generally good. However, near the coast, there are regions with elevated Total Dissolved Solids (TDS) and chlorides that are present from historical saltwater intrusion.

A secondary benefit of the DGBP Unit 8 project is to increase the injection of recharge waters to the WC Basin. The construction and successful operation of the project will result in the injection of an estimated 579 AFY of water into the WC Basin. This represents an increase of approximately 398 AFY of additional recharge above the baseline conditions that existed prior to project construction. Baseline injection well operating conditions and flow rates in cubic feet per second (cfs) are shown in **Table 3**. The estimated injection well operating conditions following construction of the project are shown in **Table 4**.

Table 3: Baseline Injection Well Operating Conditions

INJECTION WELL PROJECT NO.	FLOOD CONTROL DISTRICT NO.	AQUIFER	AVERAGE FLOW RATE (cfs)[B]
26T[A]	361AC	200 FOOT SAND	*0.03*
26T[A]	361AG	400 FOOT GRAVEL	*0.05*
27F[A]	360R	GASPUR	*0.00*
27F[A]	360U	400 FOOT GRAVEL	*0.00*
28C[A]	879AD	GASPUR	*0.00*
28C[A]	879AE	400 FOOT GRAVEL	*0.17*

TOTAL AVERAGE FLOW (cfs)	**0.25**
TOTAL RECHARGE (AFY)	**181**

NOTES

[A]Dual zoned well, single casing that injects into separate aquifers

[B]Average flow rate taken between 2015 - 2024

Table 4: Estimated Injection Well Operating Conditions

INJECTION WELL PROJECT NO.	FLOOD CONTROL DISTRICT NO.	AQUIFER	AVERAGE FLOW RATE (cfs)
26T1	TBD	400 FOOT GRAVEL	0.25
27F1	TBD	400 FOOT GRAVEL	0.25
28C1	TBD	GASPUR	0.05
28C1	TBD	400 FOOT GRAVEL	0.25

TOTAL AVERAGE FLOW (cfs)	**0.80**
TOTAL RECHARGE (AFY)	**579**
ADDITIONAL RECHARGE (AFY)	**398**

The DGBP Unit 8 project will yield an estimated 579 AFY per Table X. As shown in Table X, the average annual water supply is 7,316 AFY. As a result, the project represents an 8 percent yield of the total water supply (See **Table 5** below).

Table 5: Baseline Injection Well Operating Conditions

Total Project Water Yield in AFY	**579**
Average Annual Water Supply in AFY	**7,316**
Percentage Yield	**8%**

The DGBP Unit 8 project will help build long-term resilience to drought issues by preserving the groundwater reservoir by preventing saltwater intrusion. Many of the original DGBP injection wells are either no longer operational or are poor performing wells due to aging infrastructure. The replacement injection wells will reinforce areas of the DGBP that are vulnerable to saltwater intrusion and will allow for more efficient operation of the barrier.

The DGBP Unit 8 project will replace injection wells where a high concentration of chlorides exists along the barrier alignment. The recommended maximum contaminant level for chloride is 250 milligram per liter (mg/L) as per the National Secondary Drinking Water Regulations. Thus, a benchmark chloride concentration of 250 mg/L along the DGBP alignment has been established to determine whether saltwater is impacting groundwater quality. **Attachment E** shows a cross section of the DGBP alignment with the project area highlighted. The new replacement wells will be installed along sections of the barrier that have a history of high chloride concentrations between 500 to over 5,000 mg/L. **Attachment F** shows chloride contour maps which illustrates the issue of saltwater intrusion in the region and identifies areas where chlorides may be slipping past the DGBP.

The DGBP Unit 8 project replacement injection wells elevate groundwater levels to create a freshwater mound along the DGBP alignment. The elevation to which the groundwater must be raised to prevent saltwater intrusion is called the "protective elevation". Protective elevations are based upon the Ghyben-Herzberg Equation, which is a function of the difference in density between saltwater and freshwater, and the depth of the freshwater aquifer. It is important to note that protective elevations are theoretical values that are only calculated for observation wells between injection wells along the DGBP alignment. The ideal operations of the DGBP are to only inject the amount of water necessary to elevate groundwater levels to meet protective elevations along the entire DGBP alignment and thereby prevent saltwater intrusion.

In addition to preventing saltwater intrusion, the DGBP Unit 8 will also have the additional benefit of replenishing the groundwater supplies. This will allow the region to be more sustainable and less dependent on imported water sources like the Colorado River and the California State Water Project from northern California. Source water used for injection on the DGBP is an average of 70 percent recycled water and is permitted for up to 100 percent recycled water. The DGBP receives advanced purified recycled water from the City of Los Angeles Terminal Island Water Reclamation Plant and Advanced Water Purification Facility. In 2023, the DGBP injected over 5,000 acre feet of recycled water into the WC Basin. The DGBP Unit 8 project will increase the demand of recycled water to the barrier.

The DGBP Unit 8 project injection wells are estimated to provide benefits for up to 100 years. In 2012, Public Works worked with a consultant to perform a detailed condition assessment of the injection wells on the DGBP, Alamitos Barrier Project, and West Coast Basin Barrier Project. The consultant measured the rate of degradation of the existing wells and found that stainless steel wells have the best useful life of up to 100 years. The DGBP Unit 8 project replacement injection wells will be constructed of stainless steel material.

Additional Benefits

Reduce Demands on Potable Water

The increase in groundwater supplies through injection with recycled water can decrease dependence on imported water provided by the Metropolitan Water District of Southern California (MWD). MWD provides imported water to the DGBP, whereas the City of Los Angeles Department of Water and Power provides recycled water to the DGBP via the Terminal Island Water Reclamation Plant and Advanced Water Purification Facility. About 55 percent of MWD's potable water is imported from the California State Water Project and the Colorado River, whereas 45 percent is from local water supplies. The DGBP Unit 8 project could provide an estimated 579 AFY of recycled water that can be utilized to prevent saltwater intrusion and replenish the groundwater supplies. The DGBP Unit 8 project will increase the current demand for recycled water and result in less dependence on potable water from the MWD.

Reduce Energy Usage

The offset of imported water with advanced treated recycled water could result in a reduction of energy usage. Approximately 3,000 kilowatt-hours (kWh) per acre feet (AF) is required for convenance and pumping of imported water from the California State Water Project to Southern California, and 2,000 kWh/AF for Colorado River water. Collectively, an estimated 2,500 kWh/AF of energy is used to provide imported supplies to the seawater barriers. The estimated energy required to advance treat recycled water and pump that water for use is approximately 2,000 kWh/AF. Therefore, there is a potential energy savings of 500 kWh/AF with the DGBP Unit 8 project. Since the DGBP Unit 8 project will offset up to 579 AFY of blended imported water, about 289,500 kWh/year will be conserved. Over a 100-year lifespan of the project, this total could amount to over 28,000,000 kWh of reduced energy usage.

Reduce Greenhouse Gas Emissions

The offset of imported water with advanced treated recycled water could result in a reduction of greenhouse gas emissions. Based on the California Action Registry, General Reporting Protocol, the total tons of CO2 equivalent can be calculated by applying a factor of 0.724 pounds of CO2 equivalent per kWh. By offsetting 579 AFY of imported water demand and creating an average energy savings 500 kWh/AF, the DGBP Unit 8 Project will avoid greenhouse gas emissions of approximately 210 metric tons of CO2 equivalents per year. Over a 100-year lifespan of the project, this total could amount to 21,000 metric tons of avoided carbon emissions.

5.3 Evaluation Criterion C: Planning and Preparedness

Plan Description and Objective:

The DGBP Unit 8 Project will follow a Monitoring and Reporting Plan (MRP) like the Alamitos Barrier Project Unit 15 Replacement Wells Monitoring and Reporting Plan (See **Appendix A**). A similar MRP will be tailored specifically for the DGBP Unit 8 Project. The MRP will be developed after construction of the project and will be updated semi-annually.

The purpose and objective of the MRP is to evaluate the performance of the new injection wells and to assess the effectiveness of the DGBP in preventing saltwater intrusion and impacts to drinking water supply wells within the project area. The plan identifies the project goals and the monitoring and field procedures required to evaluate the project.

The primary goal for this project is to prevent saltwater intrusion into the WC Basin. The secondary goal for this project is to increase injection of recharge water into the Gaspur, 200 Foot Sand, and 400 Foot Gravel aquifers.

The operational goal of the DGBP is to prevent saltwater from intruding into the WC Basin. To verify the DGBP is achieving its goal, depth-specific groundwater samples are collected semi-annually and analyzed for chloride concentrations. The recommended maximum contaminant level for chloride is 250 milligram per liter (mg/L) as per the National Secondary Drinking Water Regulations. Thus, a benchmark chloride concentration of 250 mg/L along the DGBP alignment has been established to determine whether saltwater is impacting groundwater quality. In some cases, chloride concentrations along the DGBP alignment are above the 250 mg/L threshold. This could be a result of an existing saline plume or a sign of saltwater intrusion.

The current chloride levels will be compared against the maximum chloride levels established for each observation well. The maximum chloride concentration for each observation well was calculated by taking the highest chloride concentration measured at that well over the last 10 years, or by using a benchmark concentration of 250 mg/L, whichever is greater. The desired outcome of the project goal is for all observation wells along the DGBP alignment to have recent chloride concentrations less than or equal to their respective maximum chloride concentration values.

The construction and successful operation of the project will result in the injection of an estimated 579 acre-feet per year (AFY) of water into the WC Basin. This represents an increase of approximately 398 AFY of additional recharge water above the baseline conditions that existed prior to project construction.

The injection wells elevate groundwater levels to create a freshwater mound along the DGBP alignment. The elevation to which the groundwater must be raised to prevent saltwater intrusion is called the "protective elevation". Protective elevations are based upon the Ghyben-Herzberg Equation, which is a function of the difference in density between saltwater and freshwater, and the depth of the freshwater aquifer. It is important to note that protective elevations are theoretical values that are only calculated for observation wells between injection wells along the DGBP alignment. The ideal operations of the DGBP are only to inject the amount of water necessary to elevate groundwater levels to meet protective elevations along the entire DGBP alignment and thereby prevent saltwater intrusion.

Public Works has a current monitoring and sampling plan in place. The DGBP Unit 8 project will follow a similar plan as depicted in Section 3: Sampling Plan of the MRP (See Page 5 of the MRP in **Appendix A**).

In general, Public Works' barrier engineers will make recommendations for injection well flow rate changes based primarily on the groundwater elevations at observation wells along the DGBP alignment. It is important to note that there are other actors that influence injection well flow rates, such as chloride levels, well casing pressure, and geological constraints. The amount of water injected is dependent on the amount of water required to raise the water levels to the protective elevation along the DGBP alignment. The recommendations for flow rate changes are made monthly and are reviewed by the supervising barrier engineer. Once the recommendations are approved, the injection well flow rates are adjusted accordingly.

Groundwater elevations at observation wells are measured monthly. Corresponding groundwater elevation charts are prepared which can display up to three sets of monthly data from each observation well to help illustrated the monthly changes. In addition, the charts display a trend line of the protective elevation for each observation well for easy comparison with the groundwater elevations.

Observation wells are sampled semi-annual and analyzed for chloride content. Depth-specific groundwater samples are taken and compared with their respective maximum chloride concentrations. The chloride concentration results are utilized to generate a cross-section diagram to show the chloride concentrations along the DGBP alignment. The cross-section diagrams are prepared semi-annually.

It is also helpful to know chloride levels both seaward and landward of the DGBP to generate contour maps that show the spatial distribution of chloride levels in the groundwater basins. Observation wells located seaward and landward of the DGBP serve more as a reference of the chloride content distributed throughout the groundwater basins near the coastline.

The results from the chloride analysis are tabulated and input into modeling software to prepare chloride contour maps semi-annually. The results from the semi-annual chloride sampling events help determine whether any necessary operational changes at the injection wells need to be implemented to achieve the project goals. Recommended injection well flow rate changes are prepared monthly by the barrier engineer and are primary based on the analysis of the monthly groundwater measurement events. The chloride results serve as a supplemental criterion as to whether injection well flow rate changes should be implemented.

Further details on the field procedures can be found in Section 4: Field Procedures of the MRP (See Page 9 of the MRP in **Appendix A**).

Plan Development and Plan Support

The MRP (in **Appendix A**) was developed through a collaborative process during the planning and construction of the Alamitos Barrier Project Unit 15 Replacement Wells Project. The stakeholders involved in the preparation of the MRP included Public Works, Water Replenishment District of Southern California, Regional Water Quality Control Board, and the California State Water Board. A technical committee was formed with contributing members from these agencies and meetings were held quarterly to discuss project updates. One of the required submittals was the development of a MRP that was specific to the Alamitos Barrier Project Unit 15 Replacement Wells Project. Overall, the seawater barriers are operated following the same monitoring and reporting guidelines as depicted in the MRP in **Appendix A**. Similar guidelines from the MRP in Appendix A will be followed to support the DGBP Unit 8 project and ensure the project achieves its goal to prevent saltwater intrusion in the groundwater basins.

5.4 Evaluation Criterion D: Readiness to Proceed and Project Implementation

Task 1: Project Management

Project management is anticipated to begin immediately following the submittal of the grant application. Public Works will collaborate internally to review the project scope, schedule, and budget. Public Works groups to contribute the project will include personnel from the seawater barriers, construction management, design, geotechnical group, environmental compliance group, and maintenance. Project management is expected to start in October 2024 and finish by June 2028.

Task 2: Environmental Compliance

This project is determined to be categorically exempt; therefore, a Notice of Exemption (NOE) will be filed. The DGBP Unit 8 Replacement Wells Project's environmental determination will be adopted by the Los Angeles County Board of Supervisor's prior to the contract award for construction. After adoption, the NOE paperwork will be filled out. It will then be reviewed and once approved internally, will be filed with the County Recorder. In the schedule, this task starts at the start of the design phase and concludes following the board date, which is anticipated for October 2026.

Task 3: Permitting

Public Works will be required to acquire an excavation permit from the City of Los Angeles and the City of Carson, and to revise the existing National Pollutant Discharge Elimination System Permit for the DGBP. These permits will be acquired after the 60 percent design plans are completed. Permits are anticipated to be finalized and approved by May 2026. The contractor will be required to obtain well permits from the Los Angeles County Department of Public Health after the contract is awarded, which is expected to be December 2026.

No land purchases are required for this project to proceed.

Task 4: 60% Final Design

The first phase of the design is the preparation of the deliverable 60 percent project design plans. The design of the 60 percent plans is expected to start in November 2024 will take approximately seven months with completion expected in May 2025. Subsequently, a six-week review period will be provided for Public Works, the City of Los Angeles, and the City of Carson. The review period is expected to be completed by July 2025.

Task 5: 90% Final Design

The second phase of the design is the preparation of the deliverable 90 percent project design plans. The 90 percent plans will begin at the conclusion of the previous phase and include work on the traffic control plans. The 90 percent plans are expected to take 3 months and completion is expected by October 2025. The 90 percent plans will then be sent back to the Cities of Carson and Los Angles for review to ensure their comments have been addressed. The 90 percent plan review is scheduled for six weeks and ends November 2025.

Task 6: 100% Final Design

The third phase of the design is the preparation of the 100 percent design plans, specifications, and estimate. The traffic control plans will also be finalized during this phase and submitted with the 100 percent plans. Work on these items is expected to begin November 2025. Finalizing the plans, specifications, and estimate is anticipated to be completed by May 2026.

Task 7: Construction Contracting

The finalized plans, specifications, and estimate will be transferred to Public Works project management division to begin contract administration. The project will be presented to the Los Angeles County Board of Supervisors in October 2026. Upon approval, the project will be advertised for 4 weeks. Bid opening and analysis is anticipated for November 2026. Subsequently, a contract award is estimated for December 2026. Upon review of all submittals, Public Works will issue the contractor a notice to proceed to start construction.

Task 8: Project Construction

This task will begin at the conclusion of Task 7: Construction Contracting, and is scheduled to last 1 year. Project construction is estimated to start March 2027 and complete by March 2028.

Task 9: Construction Administration and Inspection

This task is scheduled to start with Task 8: Project Construction in March 2027 and will conclude approximately three months after construction concludes to complete any documentation (as-builts, contract closing documents, etc.). This task is expected to be completed in June 2028. The deliverables for this task are inspection reports, notice of project completion, engineer's certification of completion, and the as-built drawings.

A project schedule can be found in **Attachment G**.

5.5 Evaluation Criterion E: Presidential and Department of the Interior Priorities

Attachment H shows a map of disadvantaged communities that will benefit from the DGBP Unit 8 Replacement Well Project as mapped by the White House Council on Environmental Quality's Climate and Economic Justice Screening Tool. The map depicts numerous areas within the West Coast Groundwater Basin boundary (including areas within the Cities of Los Angeles, Carson, Lawndale, Gardena, Inglewood, and Long Beach) noted as disadvantaged communities. There is also a great portion of the groundwater basin boundary that has less than 85 percent of the State's median household income. All these areas utilize groundwater from the West Coast Groundwater Basin as a source of drinking water for their residents.

The DGBP Unit 8 Replacement Wells project will address critical water supply needs of the disadvantaged communities that receive drinking water from the West Coast Groundwater Basin. The project will preserve drinking water quality for all communities that utilize drawn water from the West Coast Groundwater Basin, including disadvantaged communities, by preventing saltwater intrusion and the potential contamination of this local groundwater supply. In addition, the Project will recharge aquifers pumped by the Golden State Water Company, California Water Service, and City of Inglewood, which provide water utility service to the disadvantaged communities in the following areas: Athens, Carson, Gardena, Hawthorne, Inglewood, and Lawndale).

5.6 Evaluation Criterion F: Nexus to Reclamation

The DGBP Unit 8 Replacement Wells project does not have a connection to a Reclamation project or Reclamation activity.

5.7 Evaluation Criterion G: Stakeholder Support for Proposed Project

Please refer to Appendix for letters of support from stakeholders and partners.

6.0 Environmental and Cultural Resources Compliance

The proposed project will have minor impact on the surrounding environment. All earth-disturbing work will be on developed land and no animal habitat will be impacted. The project will comply with all applicable regulations, is not located in a sensitive environment and there are no cumulative impacts, or indications that it may cause a substantial adverse change in the environment. The Dominguez Channel is a surface water that is adjacent to the project boundary. An existing National Pollutant Discharge Elimination System Permit will be amended to reflect new construction from the proposed project and any discharge to the surface water will comply with said permit. The Dominguez Gap Barrier Project water delivery system was constructed in phases dating back to 1971. The proposed project will not result in any modification to irrigation systems; no structures in the project area are listed as National Register of Historic Places; no archeological sites are in the project area; no adverse effect on communities with environmental justice concerns; no impact to tribal lands; and will not contribute to the spread of non-native species in the area.

7.0 Required Permits or Approvals

Excavation permits will be required to perform the work. Public Works will work with the Cities of Carson and Los Angeles to obtain acceptance for the project and then the contractor will be tasked with acquiring necessary excavation permits. Public Works will update an existing National Pollutant Discharge Elimination System permit to reflect the new construction from the DGBP Unit 8 Replacement Wells project. The contractor will also be required to obtain well permits from the County of Los Angeles Department of Public Health.

8.0 Overlap or Duplication of Effort Statement

The District does not have any overlap between this proposed Project and any other active or anticipated proposals or projects.

9.0 Conflict of Interest Disclosure Statement

The District does not have any actual or potential conflicts of interest resulting from this project.

10.0 Uniform Audit Reporting Statement

Los Angeles County submits a Single Audit, which is inclusive of the District. The County's EIN for the FY 2021-2022 Single Audit Report is 956000927.

11.0 Disclosure of Lobbying Activities

The SF-LLL Disclosure of Lobbying Activities form has been uploaded separately along with all other required SF forms.

12.0 Official Resolution

If selected, the District will provide an official resolution prior to award. The District's processes include an Official Resolution to be obtained after design completion and before construction.

13.0 Letters of Funding Commitment

The District will fund the remaining non-federal cost share for the project using Los Angeles County Flood Control District Funds.

Applicant Name: Los Angeles County Flood Control District

Project Title: Dominguez Gap Barrier Project Unit 8 Replacement Wells

BUDGET NARRATIVE

Budget Justification

The following section provides a description to support each budget category and an explanation of how the costs were determined.

The total cost for the project is $6,000,002. As shown in the Budget Summary Table, the requested grant is 50 percent of the total budget, and the local match is 50 percent. The Budget Details Table breaks down the estimated total combined effort of 12,514 hours by the disciplines listed below.

- Senior Civil Engineer (SCE)
- Civil Engineer (CE)
- Associate Civil Engineer (ACE)
- Principal Civil Engineering Assistant (PCEA)
- Senior Civil Engineering Assistant (SCEA)
- Civil Engineering Assistant (CEA)
- Principal Civil Engineering Technician
- Senior Civil Engineering Technician
- Civil Engineering Technician
- Engineering Aid III
- Electrical Engineer
- Associate Electrical Engineer
- Principal Electrical Engineering Assistant
- Mechanical Engineer
- Associate Mechanical Engineer
- Principal Mechanical Engineering Assistant
- Senior Mechanical Engineering Assistant
- Mechanical Engineering Assistant
- Supervising Engineering Geologist 2
- Supervising Engineering Geologist 3
- Engineering Geologist
- Principal Engineering Geology Assistant
- Senior Engineering Geology Assistant

- Engineering Geology Assistant
- Field Engineer
- Survey Supervisor 1, Flood Control
- Supervising Cadastral Engineer 1
- Supervising Cadastral Engineer 2
- Survey Party Chief 1
- Survey Party Chief 2
- Principal Survey-Mapping Technician
- Survey Mapping Technician
- Survey Technician 1
- Survey Technician 2
- Survey Aid
- Senior Structural Engineer
- Supervisor, Contract Construction
- Head Construction Inspector
- Senior Construction Inspector
- Construction Inspector
- Supervising Title Examiner
- Program Manager 1
- Contract Program Monitor
- Flood Control Construction Supervisor
- Public Works Crew Leader
- Public Works Maintenance Worker

The hourly wages for each discipline are shown in the Budget Details Table. The hourly wages presented do not include overhead or indirect costs. Average hourly wages were determined using the County of Los Angeles' currently approved monthly salaries (See Attachment 1). The hourly rates were increased by 12 percent to account for an average 3 percent annual increase in compensation for all employees over a four-year span. Final hourly rates were rounded to the nearest whole dollar for simplicity. Additionally, a fringe benefit rate of 35 percent of the employee's compensation was added in the Budget Details Table.

During the duration of the project, Los Angeles County Public Works will only invoice for the current hourly wage, but no more than the calculated hourly wage as listed in the Budget Details Table.

The budget is considered reasonable based on current available information and the Los Angeles County Public Works' experience with previous similar projects. The justification for each task's budget is provided below.

1.) Direct Project Administration Costs

Task 1: Progress Reports and Invoices

The $72,738 budget for this task was calculated based on an estimated 720 hours by a SCE, CE, ACE, PCEA, SCEA, and CEA. The estimate was based on actual reporting costs incurred on a similar project, the Alamitos Barrier Project Unit 15 Replacement Wells, and assumed a proposed project duration of 4 years.

Task 2: Final Project Reporting & Evaluation

The $36,612 budget for this task was calculated based on an estimated combined effort of 360 hours would be required from a SCE, CE, ACE, PCEA, SCEA, and CEA, to complete the draft and Final Project Reports, and perform the final evaluation of the project.

Task 3: Project Meetings

The $20,790 budget for this task was calculated based on a total of 220 hours for a SCE, CE, ACE, PCEA, SCEA, and CEA. This time will be used to prepare for meetings with the Cities of Carson and Los Angeles, internal staff, other follow-up meetings, and answering constituent questions regarding the project and/or project construction.

2.) Planning/Design/Engineering/Environmental

Task 4: Assessment

The budgeted cost of $12,690 was calculated based on estimated combined effort of 130 hours would be required by a SCE, CE, ACE, PCEA, SCEA, and CEA, to complete the project design concept for this project which is currently prepared in a draft form.

Task 5: Design

The total budget for this task is $412,614. The budget for the labor component of this task totals $698,450. The budget for this task was calculated based on an estimated combined effort of 4,140 hours by all job classifications listed at the beginning of this Budget Narrative except for the Program Manager 1, Contract Program Monitor, and Construction Inspector. The estimate for this task was based on actual reporting costs incurred on a similar project, the Alamitos Barrier Project Unit 15 Replacement Wells, and assumed a proposed project duration of 4 years.

Task 6: Environmental Documentation

The budget cost for this task is $12,690. It is based on a combined 130 hours by a SCE, CE, ACE, PCEA, SCEA, and CEA, to review a County of Los Angeles Board Letter package, to monitor when the Board of Supervisors approves the project, fill out the Notice of Exemption, send it through the internal review process for approval, and have it recorded at the County Recorder's office.

Task 7: Permitting

The $28,215 budget for this task is based on an estimated 290 hours by a SCE, CE, ACE, PCEA, SCEA, and CEA, to acquire excavation permits, obtain plan acceptance from the Cities of Carson and Los Angeles, update the existing National Pollutant Discharge Elimination System permit for the Dominguez Gap Barrier Project, and to ensure the contractor's compliance in obtaining well permits from the Department of Public Health and any other necessary permits required to perform the work activities.

3.) Construction/Implementation

Task 8: Construction Contracting

The $108,108 budget for this task was based on a combined effort of 1080 hours by a SCE, CE, ACE, PCEA, SCEA, and CEA, Program Manager 1, Contract Program Monitor, Supervising Engineering Geologist 2, Supervising Engineering Geologist 3, Engineering Geologist, Head Construction Inspector, and Senior Construction Inspector to secure a contractor and award a contract. These values were based on experience with Public Works' recent

Proposition 84 Drought Grant project. Public Works had to advertise this project three times and modify the specifications to get bids based on the current high demand for drillers.

Task 9: Construction Administration & Inspection

The total budget for this task is $484,515. The budget for this task was calculated based on an estimated combined effort of 5,360 hours by all job classifications listed at the beginning of this Budget Narrative. The estimate for this task was based on actual reporting costs incurred on a similar project, the Alamitos Barrier Project Unit 15 Replacement Wells, and assumed a proposed project duration of 4 years.

Task 10: Project Construction

The budget for this task is $4,805,880. This value was based on an estimated construction cost of $1,000,000 for each injection well, $250,000 for each observation well, and $50,000 for each well destruction. The budget for this task also includes a $155,880 consultant contract for site inspection purposes. This is based on actual reporting costs incurred on a similar project, the Alamitos Barrier Project Unit 15 Replacement Wells, which has an average monthly cost of approximately $13,000 and assumed a proposed project duration of 4 years.

4.) Monitoring/Performance

Task 11: Project Monitoring Plan

The $5,152 budget for this task was calculated based on an estimated effort of 50 hours by a SCE, CE, ACE, PCEA, SCEA, and CEA, for the development of a project monitoring plan, which will set procedures to evaluate the effectiveness of the project once the wells are brought online.

Budget Categories

The hourly wages for each discipline are shown in the Budget Details Table. The hourly wages presented do not include overhead or indirect costs. Average hourly wages were determined using the County of Los Angeles' currently approved monthly salaries (See **Attachment 1**). The hourly rates were increased by 12 percent to account for an average 3 percent annual increase in compensation for all employees over a four-year span. Final hourly rates were rounded to the nearest whole dollar for simplicity. Additionally, a fringe benefit rate of 35 percent of the employee's compensation was added and is reflected under Fringe Benefits.

During the duration of the project, Los Angeles County Public Works will only invoice for the current hourly wage, but no more than the calculated hourly wage as listed in the Budget Details Table.

Personnel

Eric Batman, P.E.,
Senior Civil Engineer
Mr. Batman will serve as the Senior Civil Engineer on this project and will be oversee all aspects of the project including planning, design, contract administration, and construction inspection.

Tasks	Hours	Rate	Total
1-9,11	655	$94.00	$61,570

Adam Lee, P.E.
Civil Engineer, Project Manager
Mr. Lee will serve as the Civil Engineer and Project Manager on this project and will be oversee all aspects of the project including planning, design, contract administration, and construction inspection.

Tasks	Hours	Rate	Total
1-9,11	1880	$85.00	$159,800

Paul Boice, P.E.
Associate Civil Engineer
Mr. Boice will serve as the Associate Civil Engineer on this project and will assist the project manager with review and preparation of project documents including planning, design, contract administration, and construction inspection.

Tasks	Hours	Rate	Total
1-9,11	1290	$76.00	$98,040

Principal Civil Engineering Assistant

The Principal Civil Engineering Assistant will assist with review and preparation of project documents including planning, design, contract administration, and construction inspection.

Tasks	Hours	Rate	Total
1-9,11	765	$64.00	$48,960

Senior Civil Engineering Assistant

The Senior Civil Engineering Assistant will assist with review and preparation of project documents including planning, design, contract administration, and construction inspection.

Tasks	Hours	Rate	Total
1-9,11	685	$58.00	$39,730

Civil Engineering Assistant

The Civil Engineering Assistant will assist with review and preparation of project documents including planning, design, contract administration, and construction inspection.

Tasks	Hours	Rate	Total
1-9,11	565	$55.00	$31,075

Principal Civil Engineering Technician

The Principal Civil Engineering Technician will assist with project design and construction inspection.

Tasks	Hours	Rate	Total
5,9	60	$59.00	$3,540

Senior Civil Engineering Technician

The Principal Civil Engineering Technician will assist with project design and construction inspection.

Tasks	Hours	Rate	Total
5,9	60	$53.00	$3,180

Civil Engineering Technician

The Civil Engineering Technician will assist with project design and construction inspection.

Tasks	Hours	Rate	Total
5,9	60	$50.00	$3,000

Engineering Aid III

The Engineering Aid III will assist with project design and construction inspection.

Electrical Engineer

The Electrical Engineer will assist with project design and construction inspection.

Associate Electrical Engineer

The Associate Electrical Engineer will assist the Electrical Engineer with project design and construction inspection.

Principal Electrical Engineering Assistant

The Principal Electrical Engineering Assistant will assist the Electrical Engineer with project design and construction inspection.

Mechanical Engineer

The Mechanical Engineer will assist with project design and construction inspection.

Associate Mechanical Engineer

The Associate Mechanical Engineer will assist the Mechanical Engineer with project design and construction inspection.

Principal Mechanical Engineering Assistant

The Principal Mechanical Engineering Assistant will assist the Mechanical Engineer with project design and construction inspection.

Tasks	Hours	Rate	Total
5,9	120	$64.00	$7,680

Senior Mechanical Engineering Assistant

The Senior Mechanical Engineering Assistant will assist the Mechanical Engineer with project design and construction inspection.

Tasks	Hours	Rate	Total
5,9	80	$58.00	$4,640

Mechanical Engineering Assistant

The Mechanical Engineering Assistant will assist the Mechanical Engineer with project design and construction inspection.

Tasks	Hours	Rate	Total
5,9	40	$55.00	$2,200

Supervising Engineering Geologist 3

The Supervising Engineering Geologist 3 Engineering Assistant will assist with design, construction contracting, and construction administration and inspection.

Tasks	Hours	Rate	Total
5,8,9	180	$94.00	$16,920

Supervising Engineering Geologist 2

The Supervising Engineering Geologist 2 Engineering Assistant will assist with design, construction contracting, and construction administration and inspection.

Tasks	Hours	Rate	Total
5,8,9	220	$85.00	$18,700

Engineering Geologist

The Engineering Geologist will assist with design, construction contracting, and construction administration and inspection.

Tasks	Hours	Rate	Total
5,8,9	520	$76.00	$39,520

Principal Engineering Geology Assistant

The Principal Engineering Geology Assistant will assist with design and construction inspection.

Tasks	Hours	Rate	Total
5,9	120	$68.00	$8,160

Senior Engineering Geology Assistant

The Senior Engineering Geology Assistant will assist with design and construction inspection.

Tasks	Hours	Rate	Total
5,9	240	$61.00	$14,640

Engineering Geology Assistant

The Engineering Geology Assistant will assist with design and construction inspection.

Tasks	Hours	Rate	Total
5,9	320	$58.00	$18,560

Field Engineer

The Field Engineer will assist with design and construction inspection.

Tasks	Hours	Rate	Total
5,9	340	$92.00	$31,280

Survey Supervisor 1, Flood Control

The Survey Supervisor 1, Flood Control, will assist with design and construction inspection.

Tasks	Hours	Rate	Total
5,9	140	$81.00	$11,340

Supervising Cadastral Engineer 1

The Supervising Cadastral Engineer 1 will assist with design and construction inspection.

Tasks	Hours	Rate	Total
5,9	20	$66.00	$1,320

Supervising Cadastral Engineer 2

The Supervising Cadastral Engineer 2 will assist with design and construction inspection.

Tasks	Hours	Rate	Total
5,9	20	$73.00	$1,460

Survey Party Chief 1

The Survey Party Chief 1 will assist with design and construction inspection.

Tasks	Hours	Rate	Total
5,9	40	$72.00	$2,880

Survey Party Chief 2

The Survey Party Chief 2 will assist with design and construction inspection.

Tasks	Hours	Rate	Total
5,9	40	$76.00	$3,040

Principal Survey-Mapping Technician

The Principal Survey-Mapping Technician will assist with design and construction inspection.

Tasks	Hours	Rate	Total
5,9	100	$59.00	$5,900

Survey Mapping Technician

The Survey Mapping Technician will assist with design and construction inspection.

Tasks	Hours	Rate	Total
5,9	100	$50.00	$5,000

Survey Technician 1

The Survey Technician 1 will assist with design and construction inspection.

Tasks	Hours	Rate	Total
5,9	80	$63.00	$5,040

Survey Technician 2

The Survey Technician 1 will assist with design and construction inspection.

Tasks	Hours	Rate	Total
5,9	80	$66.00	$5,280

Survey Aid

The Survey Aid will assist with design and construction inspection.

Tasks	Hours	Rate	Total
5,9	20	$46.00	$920

Senior Structural Engineer

The Senior Structural Engineer will assist with design.

Tasks	Hours	Rate	Total
5	20	$100.00	$2,000

Supervisor, Contract Construction

The Contract Construction Supervisor will assist with design and construction inspection.

Tasks	Hours	Rate	Total
5,9	260	$76.00	$19,760

Head Construction Inspector

The Head Construction Inspector will assist with design, construction contracting, and construction inspection.

Tasks	Hours	Rate	Total
5,8,9	280	$69.00	$19,320

Senior Construction Inspector

The Senior Construction Inspector will assist with design, construction contracting, and construction inspection.

Tasks	Hours	Rate	Total
5,8,9	920	$62.00	$57,040

Construction Inspector

The Construction Inspector will assist with construction inspection.

Tasks	Hours	Rate	Total
9	800	$56.00	$44,800

Supervising Title Examiner

The Supervising Title Examiner will assist with design.

Tasks	Hours	Rate	Total
5	20	$58.00	$1,160

Program Manager 1

The Program Manager 1 will assist with construction contracting and inspection.

Tasks	Hours	Rate	Total
8,9	60	$55.00	$3,300

Contract Program Monitor

The Contract Program Monitor will assist with construction contracting and inspection.

Tasks	Hours	Rate	Total
8,9	60	$57.00	$3,420

Flood Control Construction Supervisor

The Flood Control Construction Supervisor will assist with construction inspection.

Tasks	Hours	Rate	Total
9	80	$60.00	$4,800

Public Works Crew Leader

The Public Works Crew Leader will assist with construction inspection.

Tasks	Hours	Rate	Total
9	80	$41.00	$3,280

Public Works Maintenance Worker

The Public Works Maintenance Worker will assist with construction inspection.

Tasks	Hours	Rate	Total
9	120	$33.00	$3,960

Fringe Benefits

A fringe benefit rate of 35 percent of the employee's compensation was added in the table below.

Job Position	Labor Cost	Fringe Benefit 35%
Associate Electrical Engineer	$12,160	$4,256
Associate Mechanical Engineer	$27,360	$9,576
Civil Engineer	$159,800	$55,930
Civil Engineering Assistant	$31,075	$10,877
Civil Engineering Technician	$3,000	$1,050
Construction Inspector	$44,800	$15,680
Contract Program Monitor	$3,420	$1,197
Electrical Engineer	$6,800	$2,380
Engineering Aid III	$2,400	$840
Engineering Geologist	$39,520	$13,832
Engineering Geologist Assistant	$18,560	$6,496
Field Engineer	$31,280	$10,948
Flood Control Construction Supervisor	$4,800	$1,680
Head Construction Inspector	$19,320	$6,762
Mechanical Engineer	$6,800	$2,380
Mechanical Engineering Assistant	$2,200	$770
Principal Civil Engineering Assistant	$48,960	$17,136
Principal Civil Engineering Technician	$3,540	$1,239
Principal Electrical Engineering Assistant	$12,800	$4,480
Principal Engineering Geology Assistant	$8,160	$2,856
Principal Mechanical Engineering Assistant	$7,680	$2,688
Principal Survey-Mapping Technician	$5,900	$2,065
Program Manager 1	$3,300	$1,155
Public Work Maintenance Worker	$3,960	$1,386
Public Works Crew Leader	$3,280	$1,148
Senior Civil Engineer	$61,570	$21,550
Senior Civil Engineering Assistant	$39,730	$13,906
Senior Civil Engineering Technician	$3,180	$1,113
Senior Construction Inspector	$57,040	$19,964
Senior Engineering Geologist Assistant	$14,640	$5,124
Senior Mechanical Engineering Assistant	$4,640	$1,624
Senior Structural Engineer	$2,000	$700
Supervising Cadastral Engineer 1	$1,320	$462
Supervising Cadastral Engineer 2	$1,460	$511
Supervising Engineering Geologist 2	$18,700	$6,545
Supervising Engineering Geologist 3	$16,920	$5,922
Supervising Title Examiner 1	$1,160	$406
Supervisor, Contract Construction	$19,760	$6,916

Survey Aid	$920	$322
Survey Mapping Technician	$5, 000	$1,750
Survey Party Chief 1	$2,880	$1,008
Survey Party Chief 2	$3,040	$1,064
Survey Supervisor 1, Flood Control	$11,340	$3,969
Survey Technician 1	$5,040	$1,764
Survey Technician 2	$5,280	$1,848

Travel

Travel costs are estimated to be negligible and will not be considered for reimbursement.

Equipment

Equipment costs are estimated to be negligible and will not be considered for reimbursement.

Supplies

Supply costs are estimated to be negligible and will not be considered for reimbursement.

Contractual

A Construction Inspection Services Contract will be utilized to provide additional inspectors to assist Public Works with site inspection during the project construction. We estimate the average hourly rate will be $108.25, with 120 hours of labor per month for 12 months. This estimate based on actual reporting costs incurred on a similar project, the Alamitos Barrier Project Unit 15 Replacement Wells.

Inspection Services Contract

Tasks	Hours	Rate	Monthly Total	12 Month Total
10	120	$108.25	$12,990	$155,880

Construction

Construction costs are estimated to be $4,650,000. This value was based on an estimated construction cost of $1,000,000 for each injection well, $250,000 for each observation well, and $50,000 for each well destruction. This estimate is based on actual reporting costs incurred on a similar project, the Alamitos Barrier Project Unit 15 Replacement Wells, which was completed in 2023. The contract will be awarded using competitive bid procedures and the award will be made to the lowest qualified bidder.

Tasks	Description	Unit Cost	Quantity	Total Cost
10	Injection Well Construction	$1,000,000.00	4	$4,000,000
10	Observation Well Construction	$250,000.00	2	$500,000
10	Injection Well Construction	$50,000.00	3	$150,000

Other

Other costs are estimated to be negligible and will not be considered for reimbursement.

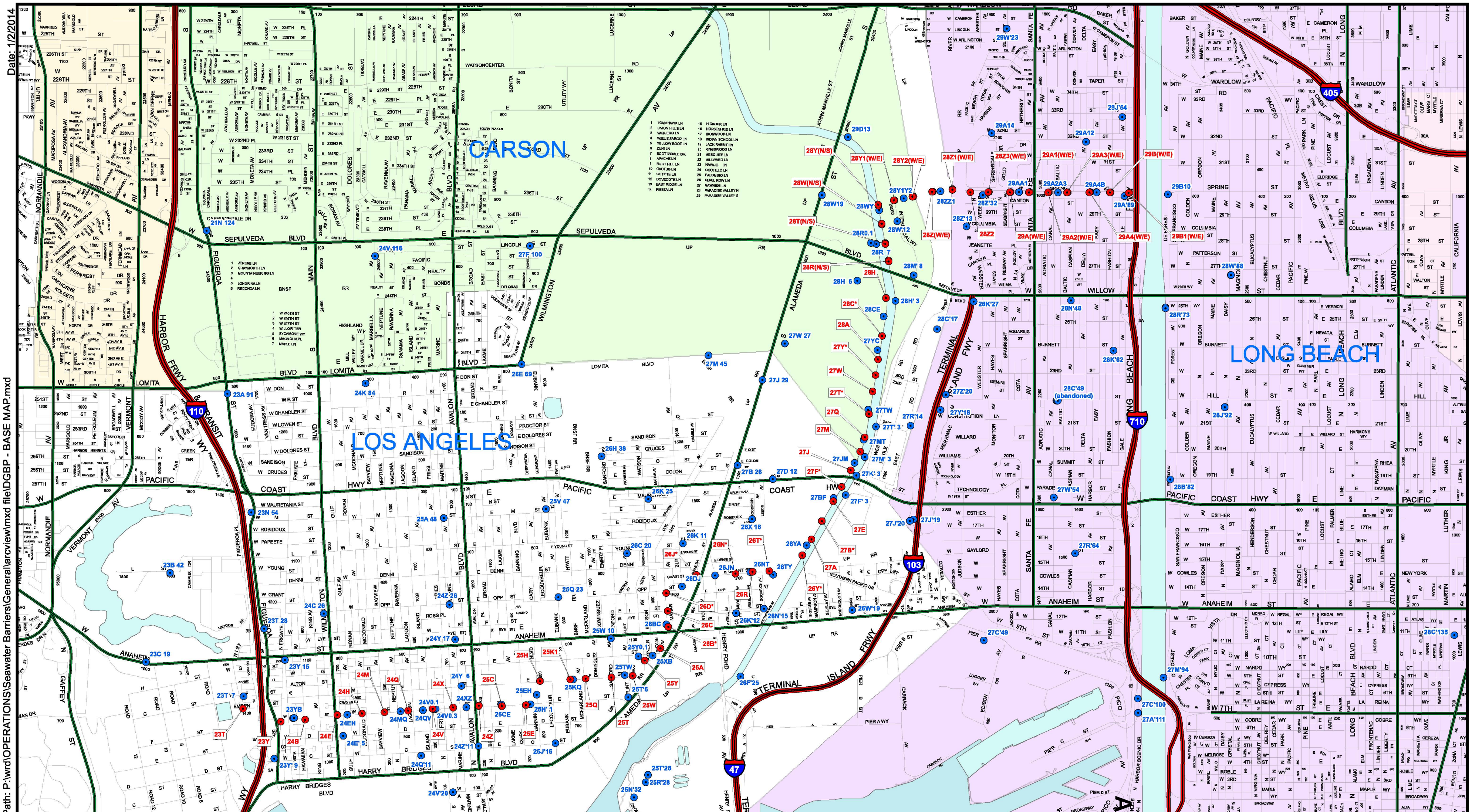
Indirect Costs

Indirect costs are estimated to be negligible and will not be considered for reimbursement.

Dominguez Gap Barrier Project
Overview Map

Date: 1/2/2014

Path: P:\wrd\OPERATIONS\Seawater Barriers\General\arcview\mxd file\DGBP - BASE MAP.mxd



0.25 0.125 0 0.25 0.5 0.75 1 Miles

Legend

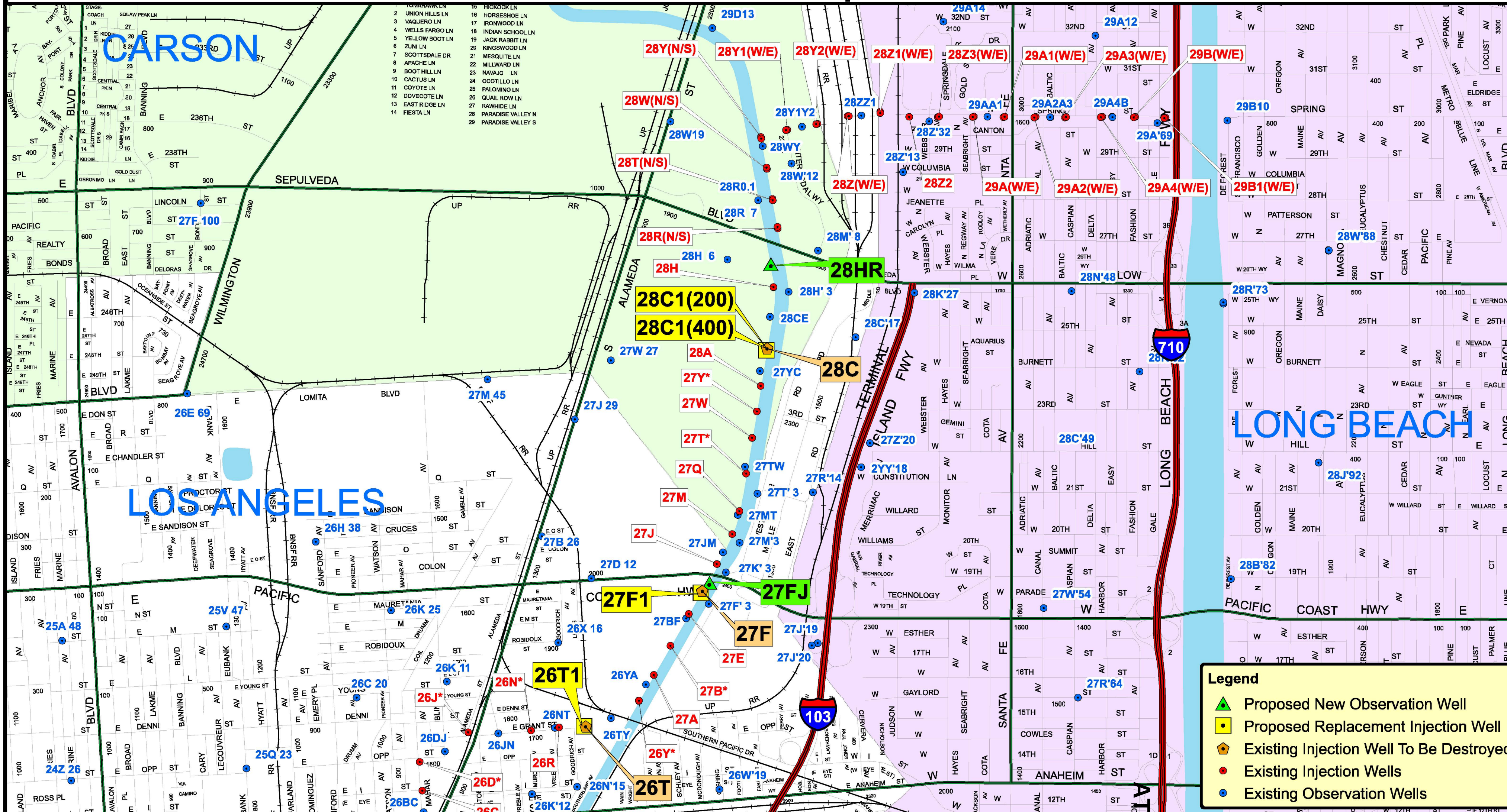
Injection Wells

Observation Wells

ATTACHMENT A

Public Works
LOS ANGELES COUNTY

Dominguez Gap Barrier Project Unit 8 Replacement Wells
Overview Map



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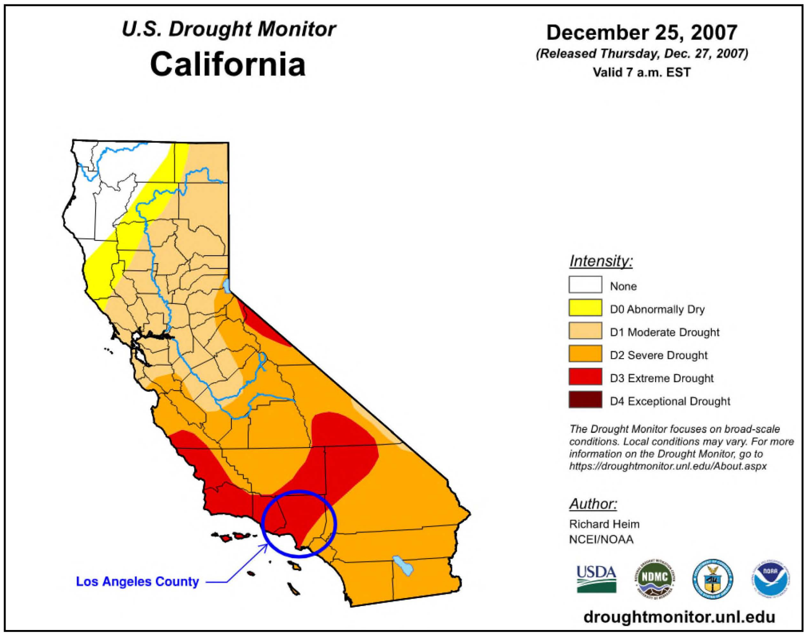
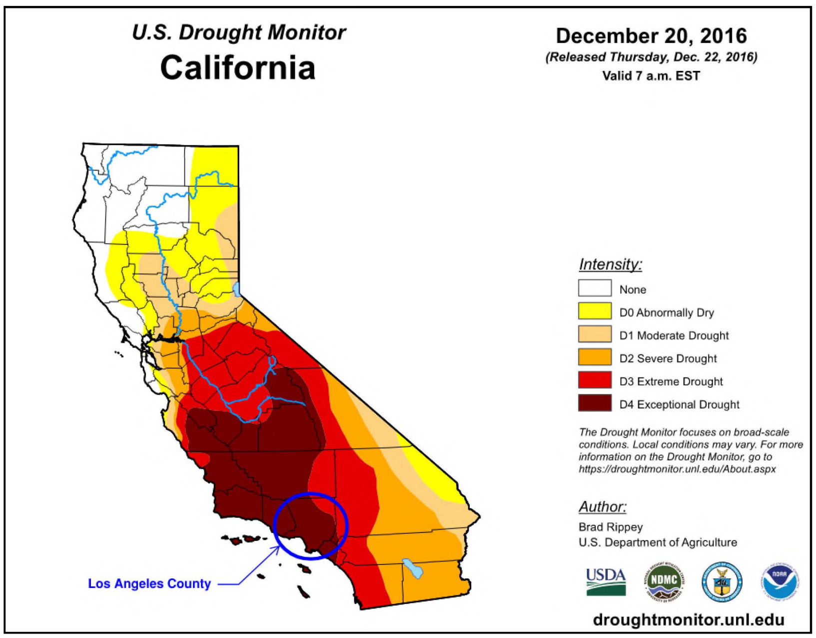
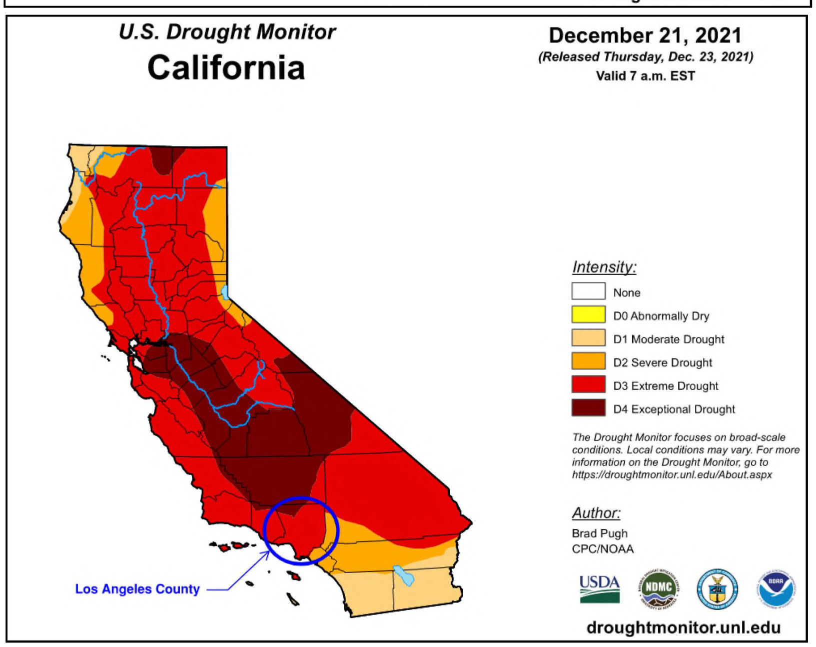
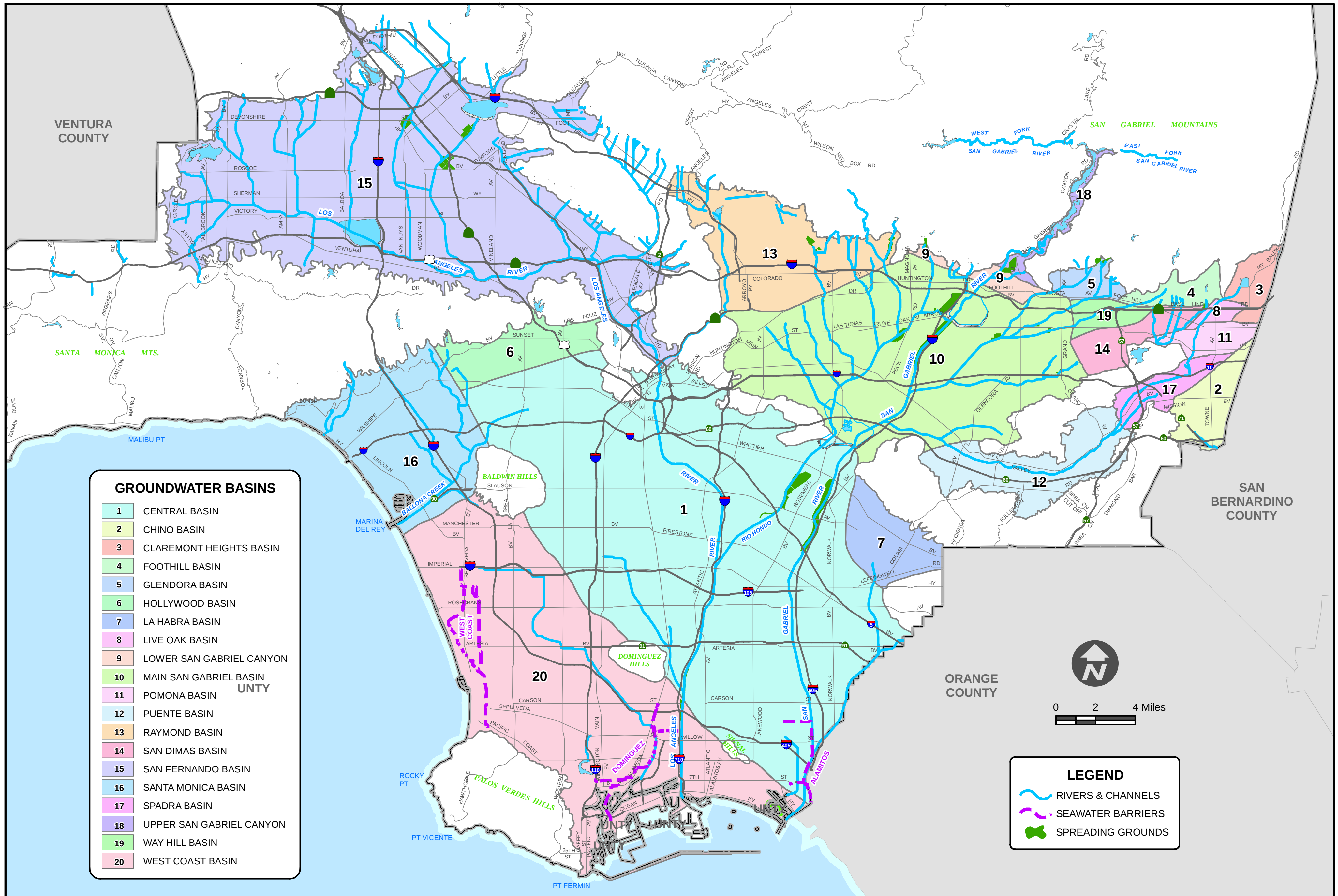
ATTACHMENT B

ATTACHMENT C









LOS ANGELES COUNTY FLOOD CONTROL DISTRICT

Dominguez Gap Barrier Project Unit 8 Replacement Wells

WaterSMART Drought Response Program	Groundwater Basins & Recharge Facilities	**ATTACHMENT D**

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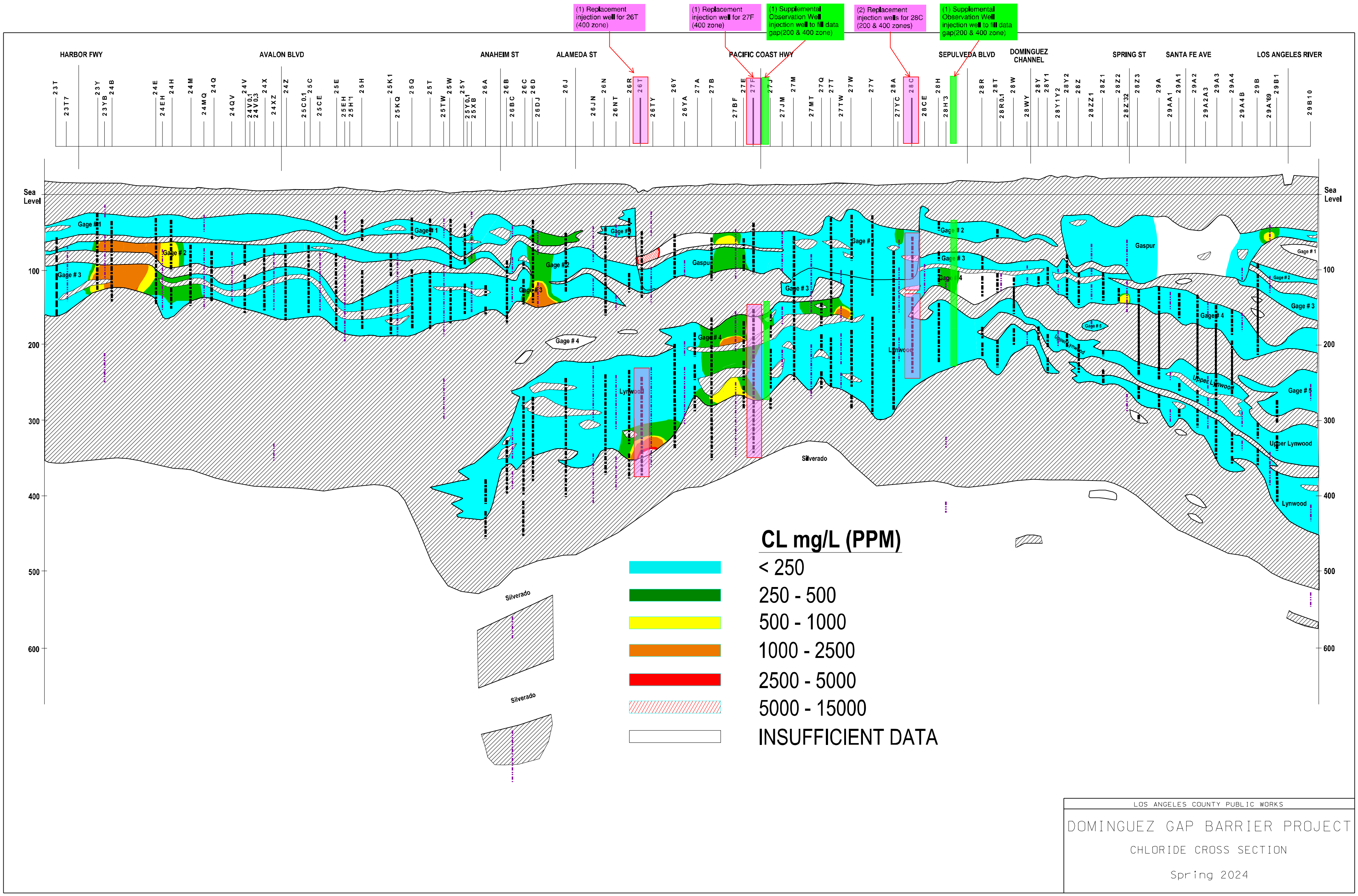
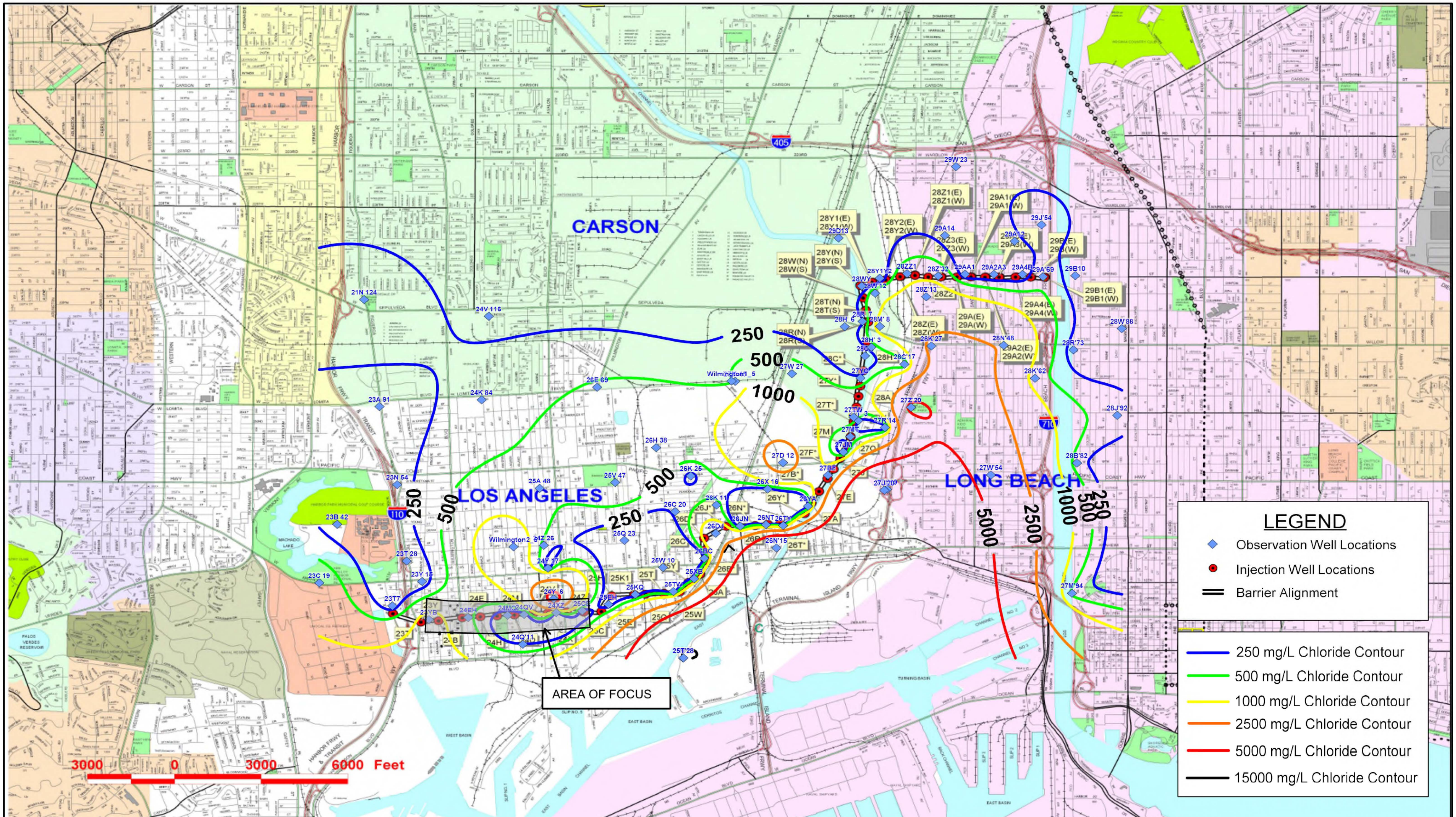
ATTACHMENT E

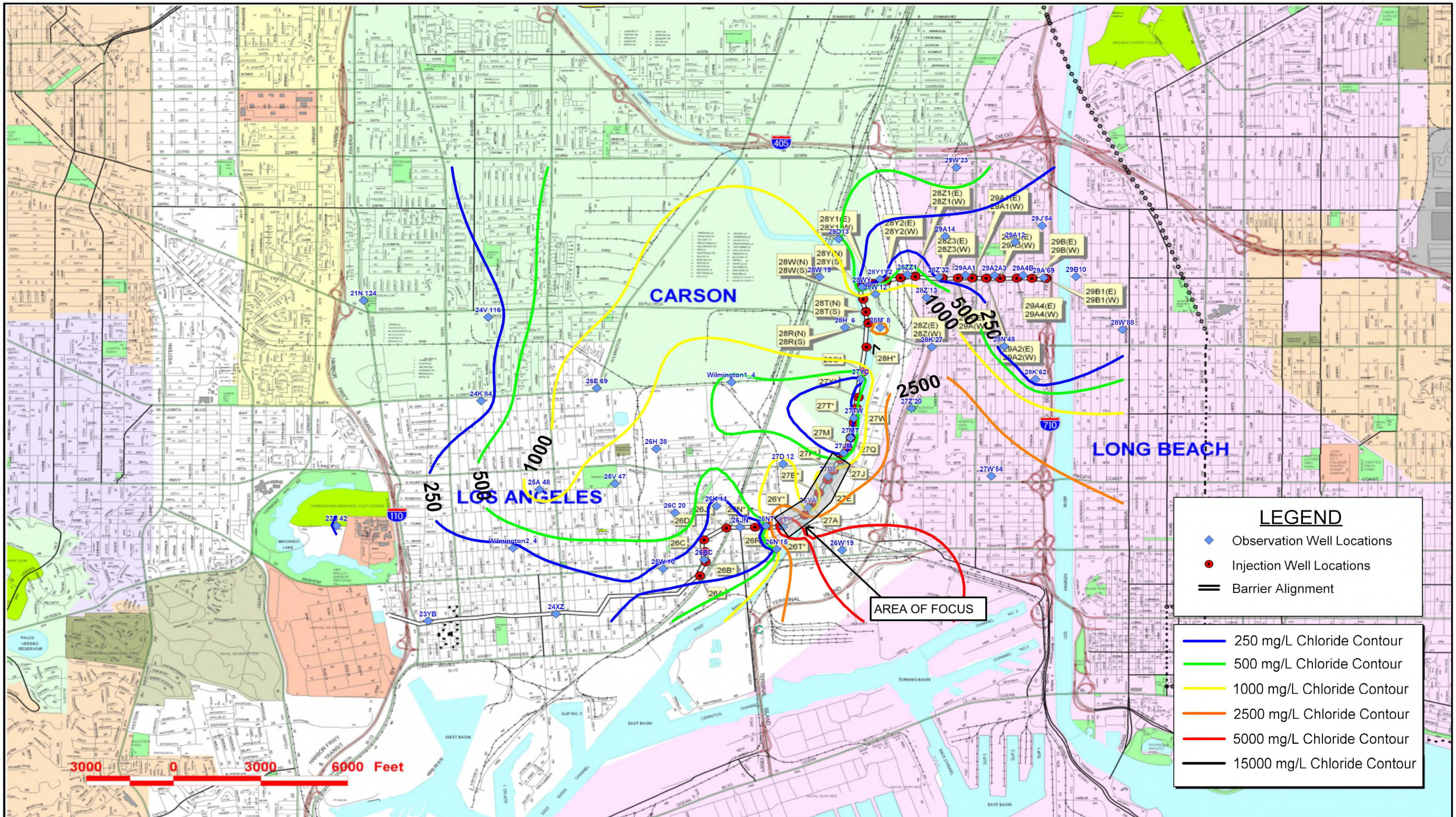




Public Works
LOS ANGELES COUNTY

Dominguez Gap Barrier Project
200 Foot Chloride Contours - Spring 2024

ATTACHMENT F



Public Works
LOS ANGELES COUNTY

Dominguez Gap Barrier Project
400 Foot Chloride Contours - Spring 2024

ATTACHMENT F

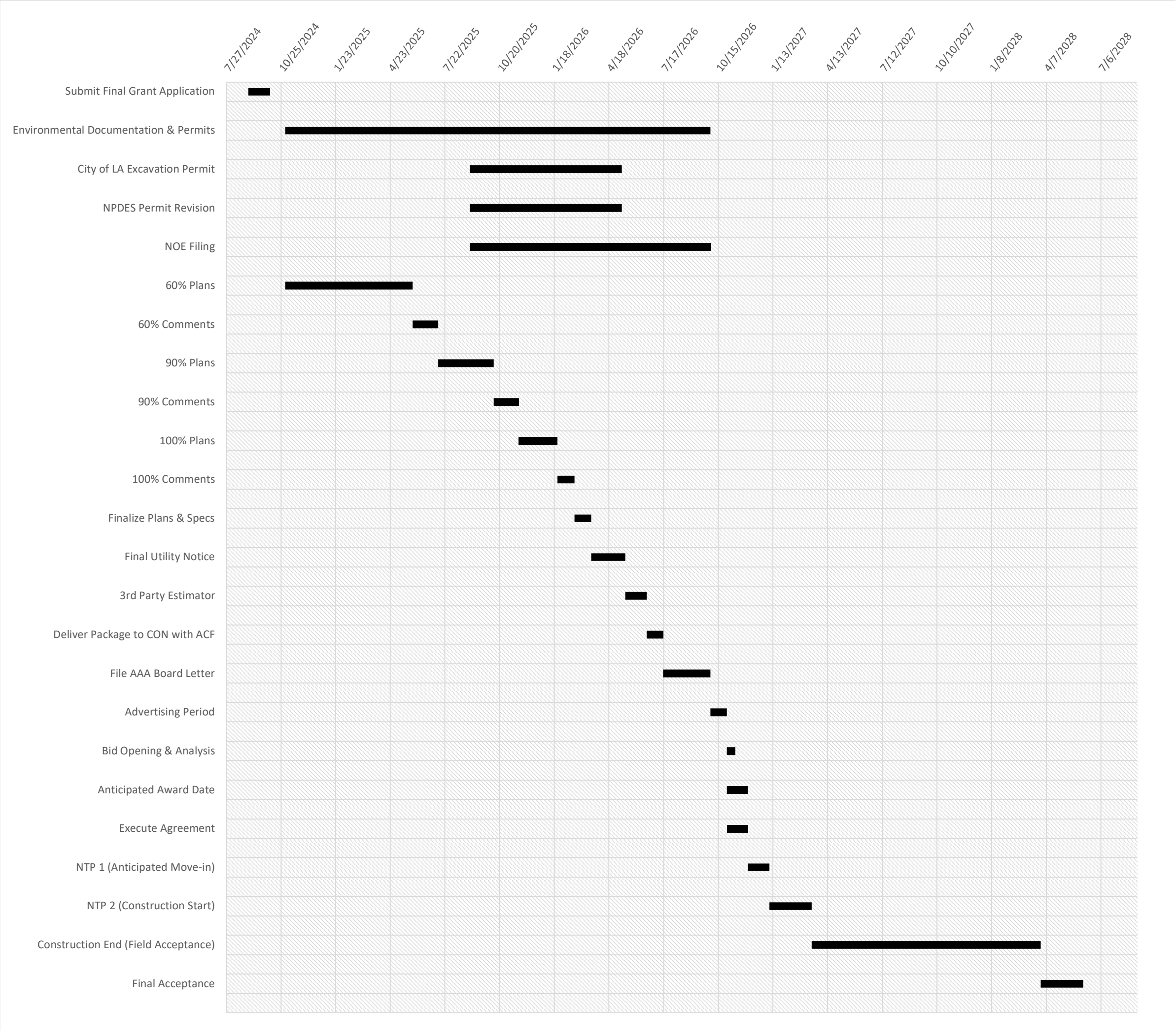
ATTACHMENT G
Project Schedule

9/29/2024

Dominguez Gap Barrier Project Unit 8 Replacement Wells

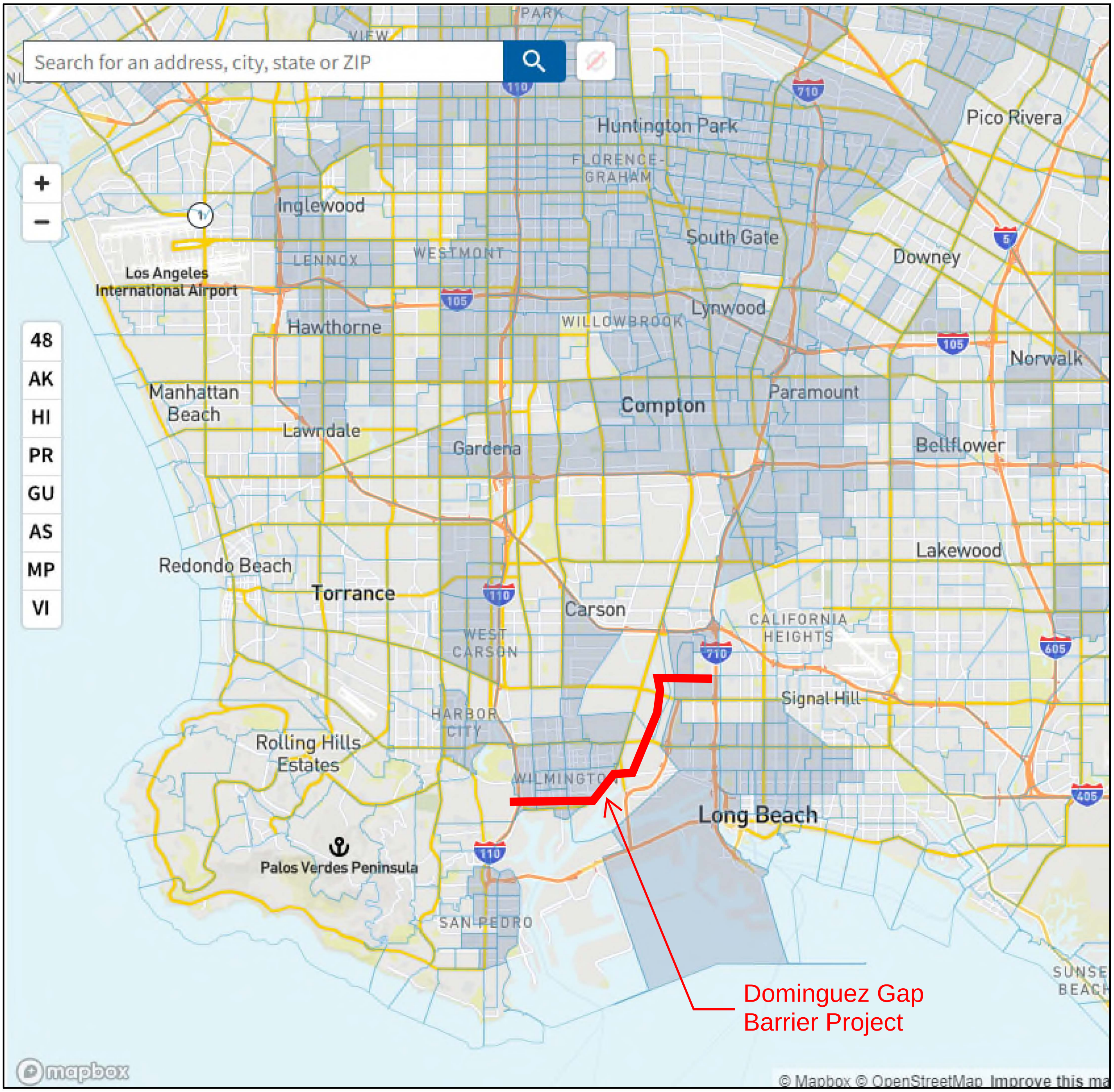
red = actual dates

TASK	START	DAYS	WEEKS	END
Submit Final Grant Application	9/1/2024	36	5.1	10/7/2024
Environmental Documentation & Permits	11/1/2024	700	100.0	10/2/2026
City of LA Excavation Permit	9/1/2025	250	35.7	5/9/2026
NPDES Permit Revision	9/1/2025	250	35.7	5/9/2026
NOE Filing	9/1/2025	397	56.7	10/3/2026
60% Plans	11/1/2024	210	30.0	5/30/2025
60% Comments	5/30/2025	42	6.0	7/11/2025
90% Plans	7/11/2025	91	13.0	10/10/2025
90% Comments	10/10/2025	42	6.0	11/21/2025
100% Plans	11/21/2025	63	9.0	1/23/2026
100% Comments	1/23/2026	28	4.0	2/20/2026
Finalize Plans & Specs	2/20/2026	28	4.0	3/20/2026
Final Utility Notice	3/20/2026	56	8.0	5/15/2026
3rd Party Estimator	5/15/2026	35	5.0	6/19/2026
Deliver Package to CON with ACF	6/19/2026	27	3.9	7/16/2026
File AAA Board Letter	7/16/2026	78	11.1	10/2/2026
Advertising Period	10/2/2026	27	3.9	10/29/2026
Bid Opening & Analysis	10/29/2026	14	2.0	11/12/2026
Anticipated Award Date	10/29/2026	35	5.0	12/3/2026
Execute Agreement	10/29/2026	35	5.0	12/3/2026
NTP 1 (Anticipated Move-in)	12/3/2026	35	5.0	1/7/2027
NTP 2 (Construction Start)	1/7/2027	70	10.0	3/18/2027
Construction End (Field Acceptance)	3/18/2027	377	53.9	3/29/2028
Final Acceptance	3/29/2028	70	10.0	6/7/2028



ATTACHMENT H

Disadvantaged Communities per White House Council on Environmental Quality's Climate & Economic Justice Screening Tool



MONITORING and REPORTING PLAN

Alamitos Barrier Project Unit 15 Replacement Wells
Los Angeles County Flood Control District
Proposition 1 Groundwater Grant Program
Grant Agreement No. D1912531

SECTION 1: PURPOSE

The Los Angeles County Flood Control District (LACFCD) will construct 5 new injection wells and 2 new observation wells to replace and supplement existing Alamitos Barrier Project (ABP) facilities located within the Cities of Long Beach and Seal Beach. The ABP was constructed to prevent seawater from intruding into the underlying aquifers of the Central and Orange County Basins. The primary means of preventing seawater intrusion is by utilizing wells to continuously inject freshwater into the aquifers to elevate localized groundwater levels along the ABP alignment. The new injection wells will help prevent seawater intrusion by creating a freshwater pressure ridge in the underlying aquifers of the Central and Orange County Basins. Five new injection wells will be constructed to replace existing injection wells that are beyond their useful operating life. In addition, two new observation well will provide LACFCD with new groundwater elevation and chloride concentration data in the project reach to enable more efficient operation of the ABP.

The purpose of the Monitoring and Reporting Plan (MRP) is to evaluate the performance of the 5 new injection wells and to assess the effectiveness of the ABP in preventing seawater intrusion and impacts to drinking water supply wells within the Project area. The information developed in the MRP will be evaluated and used to recommend operational adjustments to achieve the Project purpose and objectives described in the Project Assessment and Evaluation Plan (PAEP).

Project Goals

The primary goal for this project is to prevent seawater intrusion into the C, B, A, and I Zone aquifers. The R-Zone aquifer is an additional aquifer in the vicinity of the project and has high salinity content but the ABP does not inject into this zone. The secondary goal for this project is increase injection of recharge water into the C, B, A, and I Zone aquifers

1.1 Prevent Seawater Intrusion into the Basins

The operational goal of the ABP is to prevent seawater from intruding into the Central and Orange County Basins. In order to verify the ABP is achieving its goal, depth-specific groundwater samples are collected semi-annually and analyzed for chloride concentrations. The recommended maximum contaminant level for chloride is 250 milligram per liter (mg/L) as per the National Secondary Drinking Water Regulations. Thus, a benchmark chloride concentration of 250 mg/L along the ABP alignment has been established to determine whether seawater is impacting groundwater quality. In some cases, chloride concentrations along the ABP alignment are above the 250 mg/L threshold. This could be the result of an existing saline plume, a sign of seawater intrusion, or movement of chlorides from the R-Zone into the underlying C, B, A, and I Zone aquifers.

The current chloride levels will be compared against the maximum chloride levels established for each observation well. The maximum chloride concentration for each observation well was calculated by taking the highest chloride concentration measured at that well over the last 10 years, or by using a benchmark concentration of 250 mg/L, whichever is greater. The desired outcome of the Project goal is for all observation wells along the ABP alignment to have recent chloride concentrations less than or equal to their respective maximum chloride concentration values.

1.2 Increase Injection of Recharge Water to the Basins

The construction and successful operation of the project will result in the injection of an estimated 543 acre-feet per year (AFY) of water into the Basins. This represents an increase of approximately 36 AFY of additional recharge water above the baseline conditions that existed prior to project construction. Baseline injection well operating conditions and flow rates in cubic feet per second (cfs) are shown in Table 1. The estimated injection well operating conditions following construction of the project are shown in Table 2.

Table 1 – Baseline Injection Well Operating Conditions

INJECTION WELL PROJECT NO.	FLOOD CONTROL DISTRICT NO.	AQUIFER	AVERAGE FLOW RATE (cfs)
33W	492AW	C,B,A,I	*0.15*
34F	502BY	A	*0.40*
34H	502CA	A	*0.00*
34H	502CB	I	*0.15*

TOTAL AVERAGE FLOW (cfs)	**0.70**
TOTAL RECHARGE (AFY)	**507**

Table 2 – Estimated Injection Well Operating Conditions

INJECTION WELL PROJECT NO.	FLOOD CONTROL DISTRICT NO.	AQUIFER	AVERAGE FLOW RATE (cfs)
33W2	492CW	C,B	0.15
33W2	492CX	A,I	0.15
34F2	502CK	A	0.15
34H2	502CL	A	0.15
34H2	502CP	I	0.15

TOTAL AVERAGE FLOW (cfs)	**0.75**
TOTAL RECHARGE (AFY)	**543**
ADDITIONAL RECHARGE (AFY)	**36**

The injection wells elevate groundwater levels to create a freshwater mound along the ABP alignment. The elevation to which the groundwater must be raised to prevent seawater intrusion is a called the “protective elevation”. Protective elevations are based upon the Ghyben-Herzberg Equation, which is a function of the difference in density between saltwater and freshwater, and the depth of the freshwater aquifer. It is important to note that protective elevations are theoretical values that are only calculated for observation wells between injection wells along the ABP alignment. The ideal operations of the ABP are to only inject the amount of water necessary to elevate groundwater levels to meet protective elevations along the entire ABP alignment and thereby prevent seawater intrusion.

1.3 Other Monitoring Activities

The LACFCD already has a barrier monitoring and sampling plan in place. The new project wells will follow the same monitoring and sampling plan, as outlined in this MRP.

SECTION 2: PROJECT AREA

Exhibit A shows a location map of the well facilities in the vicinity of the project including the following: 5 new injection wells, 4 injection wells to be destroyed, 2 new observation wells, and 4 existing observation wells along the ABP alignment that will be utilized to assess the performance of the project. Exhibit A also shows observation wells located landward and seaward of the ABP to provide an overview of the chloride content in the Central and Orange County Basins.

The Project area is located at two separate locations along the ABP alignment. The first location is adjacent to State Route 22 and just east of North Studebaker Road in the City of Long Beach. The second location is within the City of Los Angeles Haynes Generating Station in the City of Seal Beach. Exhibit B shows where seawater intrusion prevention will occur within the project area.

SECTION 3: SAMPLING PLAN

3.1 Injection Well Monitoring Procedure

The LACFCD has a current monitoring and sampling plan in place. The project wells will follow the same monitoring and sampling plan, as described herein.

Construction of the 5 new injection wells includes installation of magnetic flow meters (magmeter) at each well location to monitor and record injection rates at 15-minute intervals. The average of these readings is multiplied by the total time elapsed to get the total water injected. This calculation is performed for each well. The totals from each of the 5 new wells are summed to get the total water injected from the project wells. The injection volume monitoring table, Exhibit C, shows an example of the calculation worksheet that is utilized to verify whether or not the project's numeric target of 543 AFY of water injected is met. All data on this worksheet is kept up to date throughout the year by an engineer overseeing the operation of the ABP (barrier engineer). Data that is input into Exhibit C is highlighted blue and is described in the following bullets:

- <u>Date, Time, & Event</u> – These columns record types of ABP or well activities and incidents that either affect the injection quantities or affect staff's ability to monitor injection quantities. The Date and Time columns record the timing of the event and the Event column documents the type of event. The Duration gets calculated from the Date and Time columns. Duration is the number of seconds between two events. There are generally four categories that can affect the flow rates at the ABP as a whole or at individual wells.

    1. <u>Barrier Activities</u> – These are activities that are carried out over the ABP as a whole. The first of these activities are ABP shutdowns and restarts. These occur generally for large scale line maintenance/repairs, work at the pressure regulating valve station, or ABP wide inspections. This work is performed by LACFCD or its contractors.

       Barrier flow rate changes and verifications are additional routine ABP activities performed by LACFCD field staff. The barrier engineer evaluates groundwater conditions on a monthly basis and identifies wells where flow rates need to be increased or decreased to prevent seawater intrusion.

    2. <u>Well Activities</u> – Well activities include maintenance and repair tasks that are performed at any of the new injection wells. The only foreseeable maintenance activity that would require a well to be shutdown is well redevelopment. Injection well redevelopment will be scheduled approximately once every two years. However, if the pressure inside an injection well increases and it becomes difficult to maintain injection flows, additional well redevelopment activities may be performed to restore injection capacity.

       Well repair tasks include repairing leaks in the piping and appurtenant devices, video inspections of wells, and possible repair of the well casings. These repairs are performed by LACFCD field staff or a contractor under the direction of LACFCD staff.

3. Recycled Flow Reductions and Shutdowns – The recycled water supply for the ABP comes from Water Replenishment District's (WRD) Leo J. Vander Lans Advanced Treatment Water Recycling Facility (LVL ATWF). There is a potential for recycled water from the plant to be reduced or temporarily suspended due to maintenance at the plant, power outages, or other unforeseen circumstances. When the recycled water supply is reduced or shut off, the ABP continues to inject water and utilizes imported water to make up for the reduction in the availability of recycled water.

4. Imported Flow Reductions and Shutdowns – The imported water supply for the ABP comes from the Metropolitan Water District (MWD) Long Beach 7A feeder located in the City of Long Beach. There is a potential for imported water to be temporarily suspended due to maintenance at the feeder or other unforeseen circumstances. Currently, when the imported water supply is shut off, the ABP also shuts off. However, there is the potential in future operations to continue to inject water into the ABP utilizing recycled water when imported water is unavailable.

- Imported / Recycled Water Injection – These two columns record the total amount of each type of water that is supplied to the ABP. Flowmeters are located at both the imported and recycled water connections to the ABP. Exhibit D is a readout screen from the supervisory control and data acquisition (SCADA) system. The SCADA consistently monitors the flow at the meters and archives the readings every fifteen minutes. The MWD Total Imported Flow LB-07A meter measures imported flow to ABP. The LVL product water pump station flow meter (i.e., LVL PWPS flow meter) registers recycled water flow from the LVL ATWF to the ABP.

  The values for Imported and Recycled Water Injection that are to be placed in the table will come from taking the average of the archived readings from the flow meters stated above (that occur every fifteen minutes) throughout the Duration between the logged Events.

  The imported and recycled water flows are used to calculate Total Barrier Injection and Recycled Water Injection percentage. Total Barrier Injection is the sum of the imported and recycled water flows. Recycled Water Injection percentage is the Recycled Water Flow divided by the Total Barrier Injection, represented as a percentage. This percentage is applied to the injection rates of the project wells to calculate imported and recycled water contributions into those wells. This assumes that the water in the ABP is completely mixed throughout the system.

- Injection at Project Wells – These columns record the injection rates at each of the project wells. Each well is constructed with a magmeter that transmits real-time data to the SCADA system and archives readings every fifteen minutes. The average of these readings is utilized as the well measurement between Events.

- Calculated Imported / Recycled Water Injected - Finally, the total volume of imported and recycled water injected for the time period between events is calculated. This is achieved by multiplying the sum of the five new injection well flow rates for the respective type of water by the Duration and then dividing by 43,560 to convert cubic feet into acre-feet.

These individual water volumes are then summed, and the total volume of recycled and imported water injected will confirm whether the project goal is met.

The barrier engineer makes recommendations for injection well flow rate changes based primarily on the groundwater elevations at the observation wells along the ABP alignment. It is important to note that there are other factors that influence injection well flow rates, such as chloride levels, well casing pressure, and geological constraints. The amount of water injected is dependent on the amount of water required to raise the water levels to the protective elevation along the ABP alignment. The recommendations for flow rate changes are made semi-monthly and are reviewed by the supervising barrier engineer. Once the recommendations are approved the injection well flow rates are adjusted accordingly.

3.2 Observation Well Monitoring Procedures

The LACFCD has a current monitoring and sampling plan in place. The project wells will follow the same monitoring and sampling plan, as described herein.

Groundwater elevations at the proposed two observation wells and four existing nested observation wells along the ABP alignment are measured semi-monthly. This amounts to a total of 6 observation well locations and 13 groundwater elevation measurements. These observation wells were selected because they are located between injection wells along the ABP alignment and serve as the best indicator to how to operate the injection wells. A list of the observation wells along the ABP alignment within the Project area is shown in Exhibit E.

The groundwater elevations are categorized based on the aquifer zone that the respective well is screened in. The 6 observation wells were chosen to monitor the C, B, A, and I Zone aquifers along the barriers alignment primarily focusing on the project areas shown in Exhibit B.

Groundwater elevation charts are prepared for the C, B, A, and I Zone aquifers. The groundwater elevation charts display up to three sets of semi-monthly data from each observation well to help illustrate the semi-monthly changes. In addition, the chart displays a trend line of the protective elevation for each observation well for easy comparison with the groundwater elevations. It is important to note that well 33U’0.5 is omitted from the groundwater elevation charts since it is not directly along the barrier alignment and therefore has no protective elevation. Exhibit F shows an example of the monthly groundwater elevation charts and Exhibit G includes the corresponding groundwater data utilized to generate the charts.

The 6 observation wells listed in Exhibit E are also sampled semi-annually and analyzed for chloride content. A total of 28 depth-specific groundwater samples are collected from the 4 existing observation wells and the two new observation well locations. The samples are compared with their respective maximum chloride concentrations. Each observation well is assigned a project number that helps identify its location relative to the ABP alignment. A separate and unique Flood Control District (FCD) number is assigned to each observation well casing that monitors an aquifer zone. As a result, an observation well with nested casings will have a single project number and multiple FCD numbers.

The chloride concentration results are utilized to generate a cross-section diagram to show the chloride concentrations along the ABP alignment. The cross-section diagrams are prepared semi-annually. Exhibit H shows an example of a chloride cross section diagram with the project area boundary identified. Exhibit I includes the corresponding chloride data from each observation well.

It is also useful to know chloride levels both seaward and landward of the ABP in order to generate contour maps that show the spatial distribution of chloride levels in the Basins. A total of 8 observation wells (15 well casings) located seaward and landward of the ABP are sampled semi-annually or annually, depending on their proximity to the ABP alignment. Observation wells near the ABP are of utmost interest, thus, are typically sampled semi-annually. In addition, chloride levels in observation wells located farther from the ABP typically do not fluctuate as much as wells located closer to the ABP. It is important to note that chloride levels collected from the observation wells located along the ABP alignment are utilized to make operational adjustments at the injection wells. The observation wells located seaward and landward of the ABP serve more as a reference of the chloride content distributed throughout the Basins near the coastline. Exhibit J lists the observation wells located landward, seaward of the ABP alignment and their respective target sample elevations.

The results from the chloride analysis are tabulated and input into modeling software to prepare chloride contour maps semi-annually. These maps are helpful in identifying where chlorides may be slipping past the ABP. In addition, the contour maps can be used to monitor the movement of chloride pockets landward of the ABP. Since there are multiple depth-specific groundwater samples measured at each observation well, the highest chloride concentration sample is utilized to prepare the contour maps. Exhibit K shows an example of chloride contour maps for the C, B, A, and I Zone Aquifers and Exhibit L includes the corresponding chloride data from each observation well.

The results from the semi-annual chloride sampling events help determine whether any necessary operational changes at the injection wells need to be implemented in order to achieve the Project goals. Recommended injection well flow rate changes are prepared semi-monthly by the barrier engineer and are primarily based on the analysis of the semi-monthly groundwater measurement events. The chloride results serve as supplemental criteria as to whether injection well flow rate changes should be implemented.

SECTION 4: FIELD PROCEDURES

4.1 Field Procedures to Measure Prevention of Seawater Intrusion into the Basins

LACFCD employs a crew of four barrier technicians with a supervising technician that oversees the barrier monitoring and sampling program.

Many of the observation wells along the ABP alignment are also integrated into the SCADA allowing LACFCD barrier engineers to view a continuous record of groundwater level data. Manual groundwater measurements are taken at observation wells that are not connected to the SCADA, or on an as needed basis at observation wells that are connected to the SCADA, to verify the accuracy of the telemetry readings.

To collect manual groundwater level measurements, barrier technicians utilize a groundwater surface probe (probe) to measure the depth to groundwater in the observation well. A photo of a probe is included in Exhibit M. The probe is lowered on a cable into the well casing from the ground surface until a “beeping” sound is heard, indicating the probe has touched the groundwater surface. The cable itself is graduated, which allows the technician to measure the depth of the probe (and thereby the depth to groundwater) to the nearest tenth of a foot. The ground surface is the reference point used at each observation well. LACFCD has record of the reference point elevation at each observation well, relative to mean sea level. The water surface elevation can be calculated by subtracting the measured depth to the water surface from the reference point elevation.

The barrier technicians are also responsible for collecting the water quality samples for chloride analysis. Prior to collecting groundwater samples, the barrier technicians utilize a bottom sounder to verify that there is no excess sediment inside the well casing and that the well is not compromised (i.e., bent casing). The barrier technicians utilize a sampling truck with a boom arm to collect groundwater samples. A sampling tube is pressurized with nitrogen gas to prevent water from entering the tube as it is lowered to the desired depth. Depending on the length of the well screen, up to three samples are collected from each well casing. Typical desired depths include the following: five feet below the top of the well screen; the midpoint of the well screen; and five feet above the bottom of the well screen. Once the tube reaches the desired depth, the nitrogen gas is released, allowing the groundwater from the immediate area to enter the tube. After the nitrogen gas has been vented and the groundwater has entered the tube, it is re-pressurized to preserve the sample until it is retrieved from the well. The sampling tube is decontaminated by backflushing freshwater through the tube and rinsing the outside of the unit.

The groundwater samples are taken to a lab, with chain of custody documentation, and analyzed for chloride content via ion chromatography. The lab utilizes Environmental Protection Agency method 300.0 – Determination of Inorganic Anions by Ion Chromatography. A small volume of sample, typically 2-3 milliliters, is introduced into an ion chromatograph. The negatively charged chloride ions are separated by their attraction to the positively charged molecules loaded in the system. This allows the lab scientist to measure the chloride concentration in the sample.

4.2 Documentation

The barrier technicians measure and record the groundwater elevations on the ABP Semi-Monthly Groundwater Measurement sheet, as shown in Exhibit N.

It is important to note that measurements in the field reflect the depth to groundwater (i.e., the distance from the ground surface to the water surface). However, since the topography varies significantly from one observation well location to another, the depth measurements are converted to elevations so that groundwater information from one observation well can be compared with information from another observation well. A reference point elevation must be known in order to convert groundwater depths to groundwater elevations. Typically, the reference point elevation for each well is the elevation of the vault at the ground surface. Knowing this information, a depth to groundwater can be converted to a groundwater elevation by subtracting the recorded depth from the reference point elevation. This conversion is automatically calculated when the technician enters the data in the electronic spreadsheet for the measurement event.

For the water quality samples for chloride analysis, the barrier technicians handle the samples with personal protective gloves. The samples are placed in 500 milliliter volume bottles that are labeled with the observation well project number, the respective FCD number, and the depth that the sample was taken. A courier picks up the samples on a weekly basis from a LACFCD field yard and delivers the samples to the lab for analysis. Chain of Custody Records are prepared for all the samples collected. Exhibit M shows a photo of the sampling truck; Exhibit O includes an example of the Chain of Custody Records; and Exhibit P includes a sample lab report of chloride results.

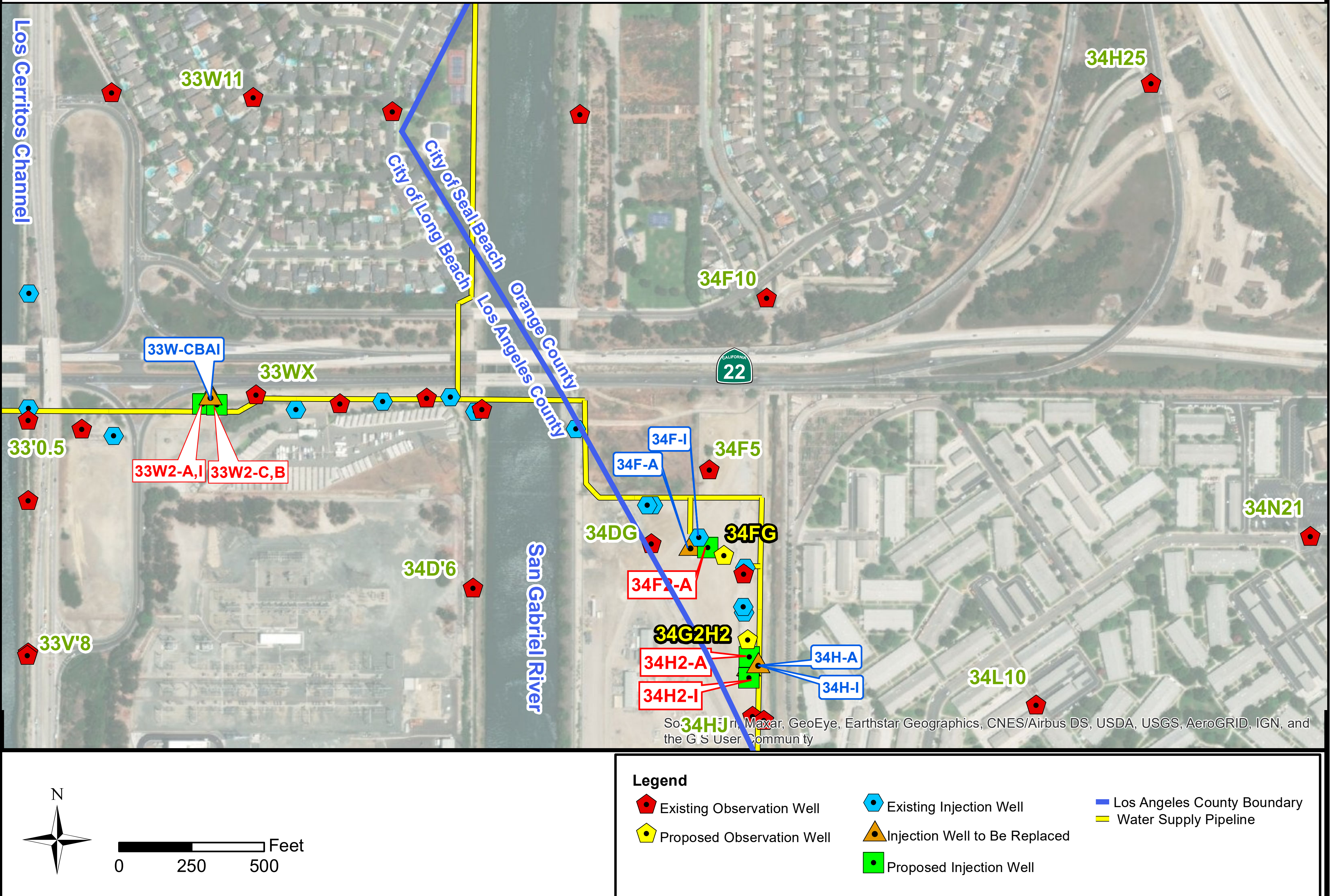
4.3 Field Procedures to Measure Increased Injection of Recharge Waters to the Basins

Injection well flow rates are obtained remotely via the SCADA system or manually at the well site. The SCADA provides real-time operational data from injection wells and observation wells associated with the ABP. Manual flow rate measurements are taken at the well site by utilizing a portable ultrasonic flow meter. LACFCD has dedicated barrier maintenance technicians that maintain and operate the injection wells.

4.4 Documentation

The barrier maintenance technicians measure and record the injection well flow rates on Exhibit C – Injection Volume Monitoring. This information is relayed to the barrier engineer so they can prepare the next set of recommended flow rate changes based on groundwater levels.

Alamitos Barrier Project
Unit 15 - Replacement Wells



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Public Works
LOS ANGELES COUNTY

Alamitos Barrier Project
Unit 15 - Replacement Wells
Map of Seawater Intrusion Prevention Area

EXHIBIT B

TRUNCATED - EXCEEDS 100 PAGES FOR PROPOSAL PACKAGE

N

Feet
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Legend

Improved Intrusion Prevention Area

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