CWEA
PROTECTING CALIFORNIA'S MOST CRITICAL RESOURCE

LOS ANGELES BASIN SECTION

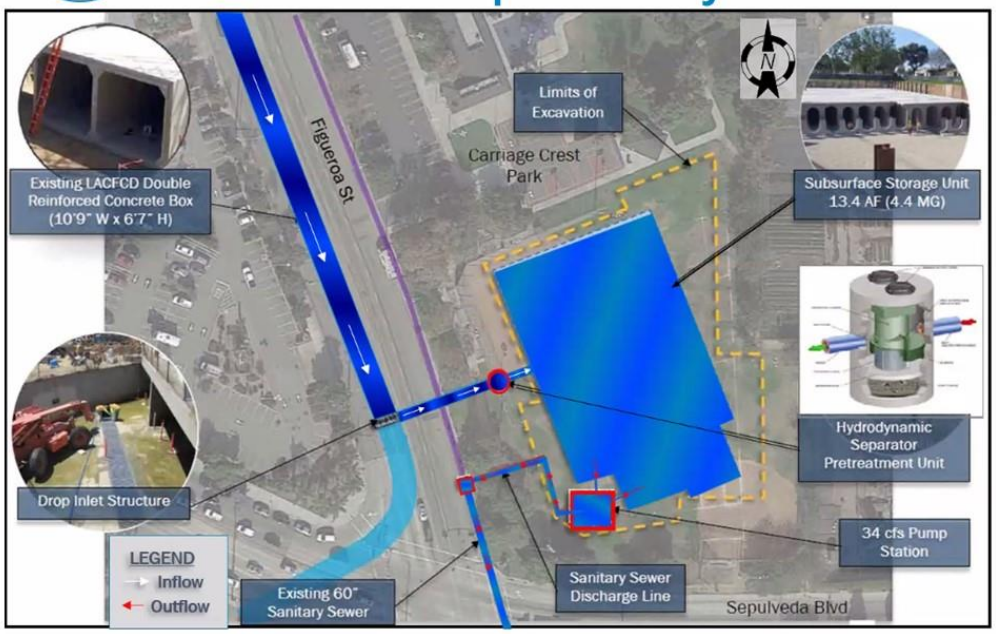
Carriage Crest Park
Stormwater Capture Project

Serves 1,146 acre Watershed

Multi-Benefit Project

Cost $18 Million

Grant Funding $13 Million



Engineering Achievement Award

CARSON california FUTURE UNLIMITED

Carson All-America City

Project Narrative

Carriage Crest Stormwater Diversion Project
An Innovative and Cost Effective Approach to Stormwater Capture & Treatment

LOS ANGELES COUNTY SANITATION DISTRICTS
Converting Waste Into Resources

BACKGROUND

Water that flows in storm drains, especially during dry weather, is a significant source of pollutants to rivers and coastal waters. The cities and unincorporated areas of Los Angeles County are responsible for managing water in storm drains ("stormwater"), whether raining or not, under a MS4 (Municipal Separate Storm Sewer System) permit issued by the Regional Water Quality Control Board. The MS4 permit requires the reduction of pollutants in stormwater to improve water quality. The permit also encourages cities and the County to develop collaborative solutions. Under Senate Bill 485, which became effective January 1, 2016, the Los Angeles County Sanitation Districts (Sanitation Districts) have authority to help manage and treat stormwater (including dry weather flows) in Los Angeles County. The Sanitation Districts' first project under this new authority is the Carriage Crest Stormwater Capture Project.

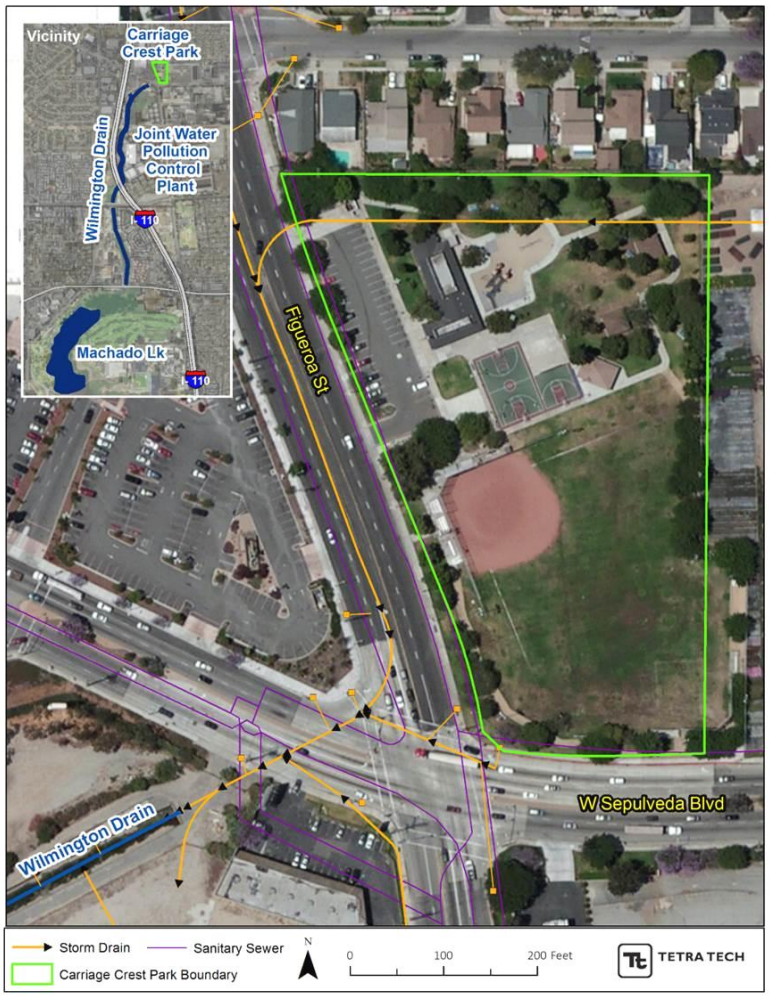


Figure 1. Carriage Crest Park located in the City of Carson.

A COLLABORATIVE PROJECT

The Carriage Crest Stormwater Capture Project in the City of Carson utilizes an innovative stormwater capture and diversion facility that was funded through a $13 million Cooperative Implementation Agreement between the City of Carson and CalTrans (California Department of Transportation) as well as additional funding from LA County Public Works. The City of Carson retained the Sanitation Districts to assist with the planning, permitting, design and construction of the facility. The facility was designed by Tetra Tech and constructed by OHL USA. Due to funding

deadlines, the City pre-purchased storage units from StormTrap and furnished these units to OHL for installation. The project is expected to begin operation in Spring 2022.

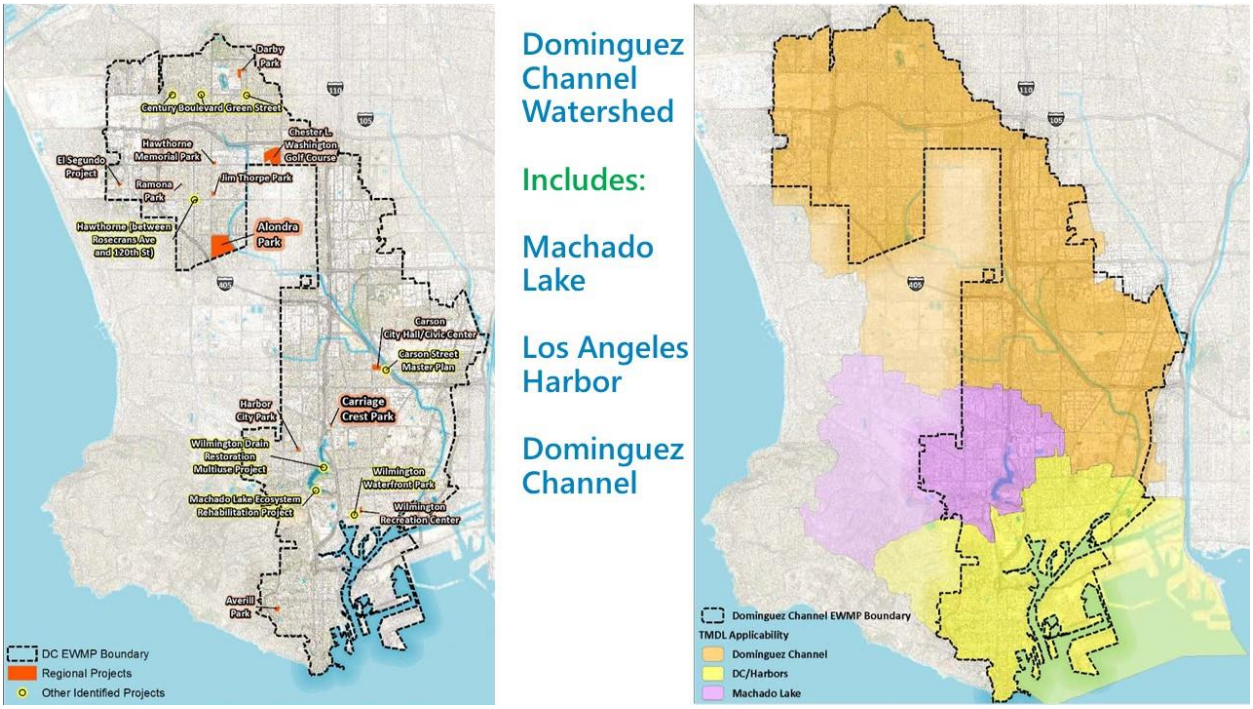
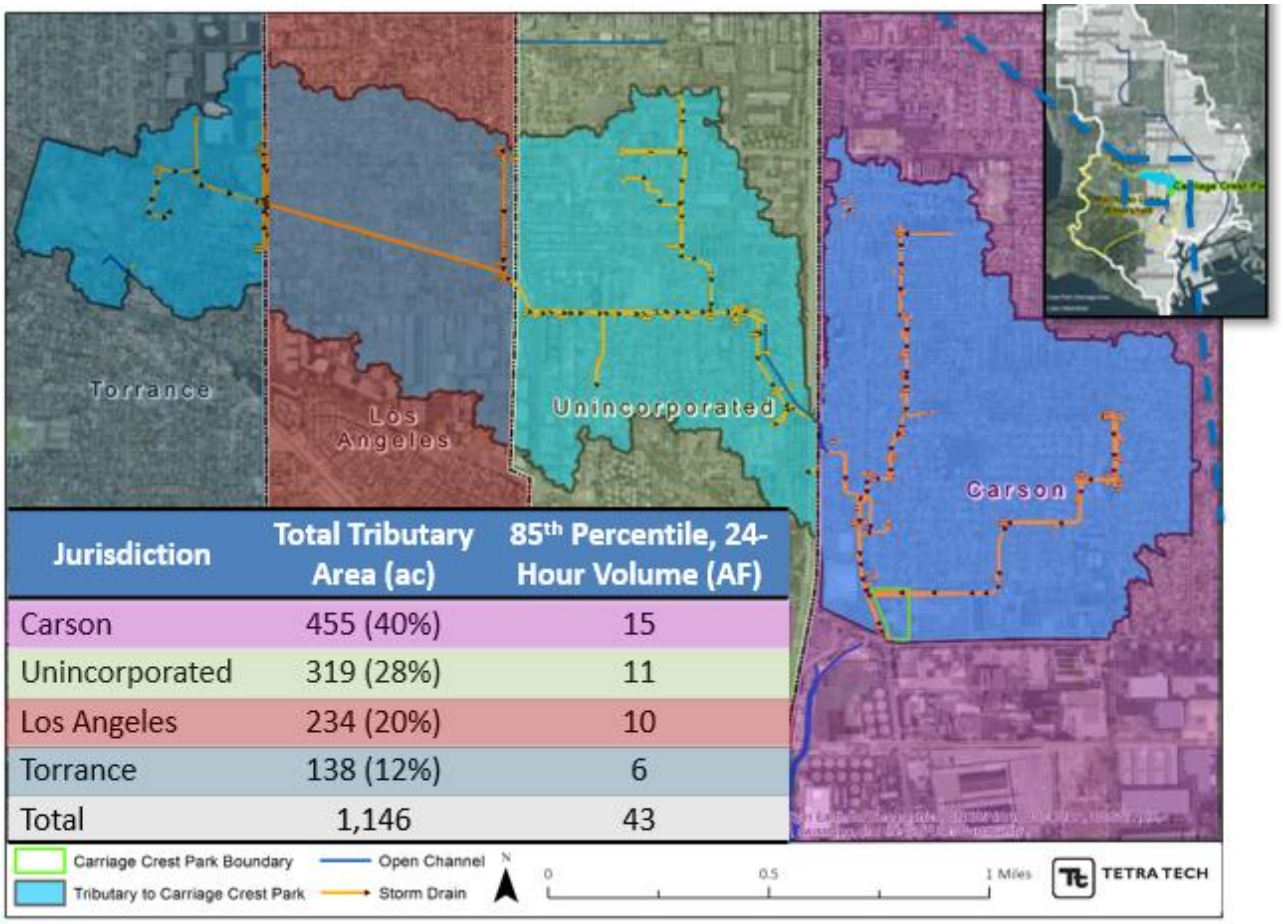


Figure 2. Carriage Crest Park has a central location in the Dominquez Channel Watershed.

PROJECT DESCRIPTION

The project will divert an average of 120 million gallons of stormwater per year from a storm drain that collects water from a 1,146 acre watershed that includes portions of the cities of Torrance, Los Angeles and Carson as well as unincorporated Los Angeles County. This regional solution will divert stormwater to a new underground storage facility located under Carriage Crest Park in the City of Carson. Captured stormwater will then be pumped to an existing Sanitation Districts sanitary (wastewater) sewer, which flows to the Sanitation Districts' Joint Water Pollution Control Plant (JWPCP). The project diverts all dry-weather flow and the design storm generated by the City of Carson and the unincorporated Los Angeles County area in the watershed. The project's control system and proximity to the JWPCP will make it possible to send large volumes of stormwater to the sanitary sewer during storms without appreciably increasing the risk of a sewer overflow. During larger storms, when sewer capacity isn't available, the project diverts the stormwater to storage until sewer capacity is available again. By diverting these flows and treating them at the JWPCP, the project will improve water quality at Machado Lake and the Los Angeles Harbor because less bacteria, nutrients and other pollutants will reach those water bodies. The project will also increase flows at the JWPCP and thereby make more water available to recycle in the future.

The project contains a number of features to maximize water quality benefits, minimize overall cost and minimize risk of sewer system overflow.



Jurisdiction	Total Tributary Area (ac)	85th Percentile, 24-Hour Volume (AF)
Carson	455 (40%)	15
Unincorporated	319 (28%)	11
Los Angeles	234 (20%)	10
Torrance	138 (12%)	6
Total	1,146	43

Figure 3. Carriage Crest Stormwater Diversion Project drainage area.

PROJECT FEATURES

Diversion from the Storm Sewer

Diversion from the storm sewer - Stormwater will be diverted by gravity flow from the storm drain under Figueroa Street through automated control valves to the new facility. Diverted stormwater will receive pretreatment to remove trash, debris and sediment before flowing into a new underground concrete storage tank with a capacity of 13.5 acre-feet. During dry weather, all stormwater flow will be diverted into the facility. During wet weather when the storage is full, the control valves will reduce and potentially stop diversion from the storm drains to protect the sanitary sewer and storage system from overflowing overfilling.

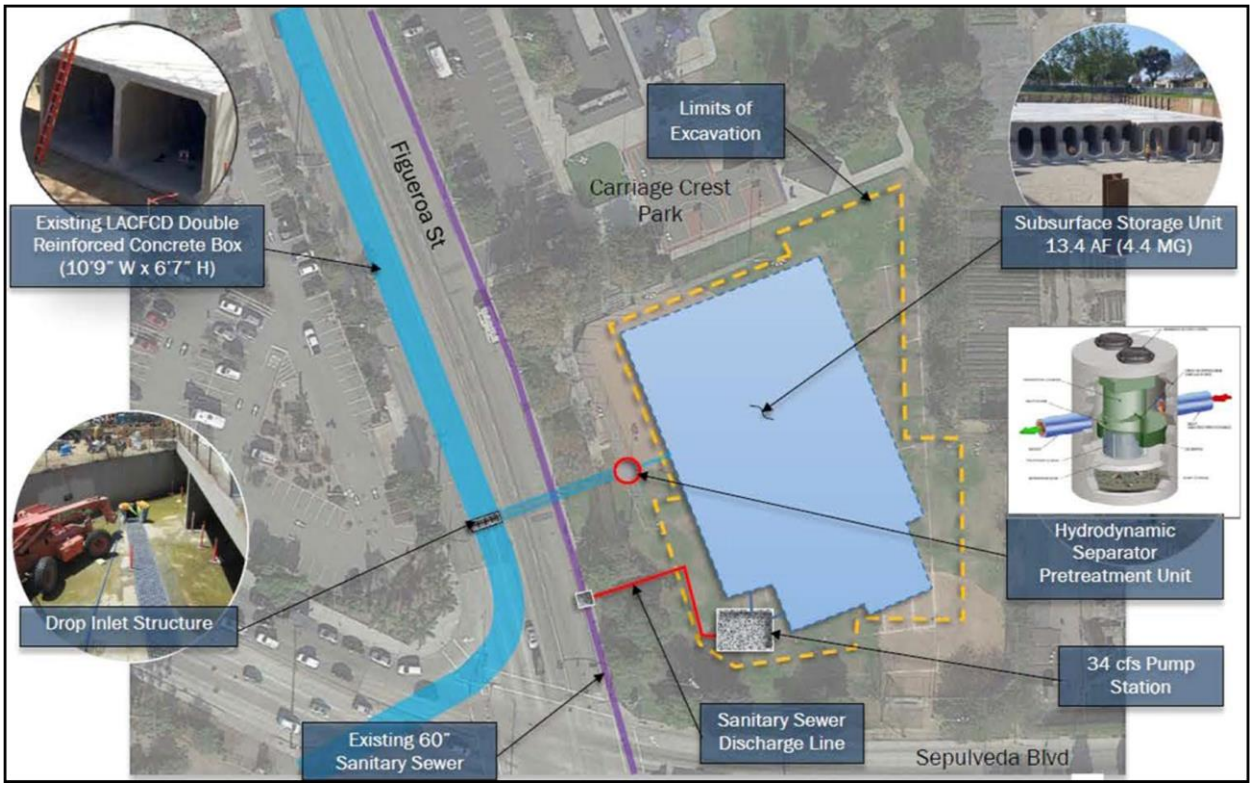


Figure 4. Innovative project elements capture and treat stormwater. For example, the hydrodynamic separator pretreatment unit is used to remove trash, debris, and sediment before flowing into a new underground concrete storage tank.

Discharge from Storage to Sanitary Sewer

Discharge from storage to sanitary sewer - The facility includes a pump station to discharge stored pretreated stormwater to the nearby Sanitation Districts sanitary sewer for treatment at the JWPCP. To maximize the volume of stormwater diverted while preventing the sewer from overflowing, sewer level sensors will allow the pumps to operate until shut down these pumps when the sewer flow reaches a high level. At that time, the pumps are shut down until the flow in the sewer returns to a safe level for diversion.

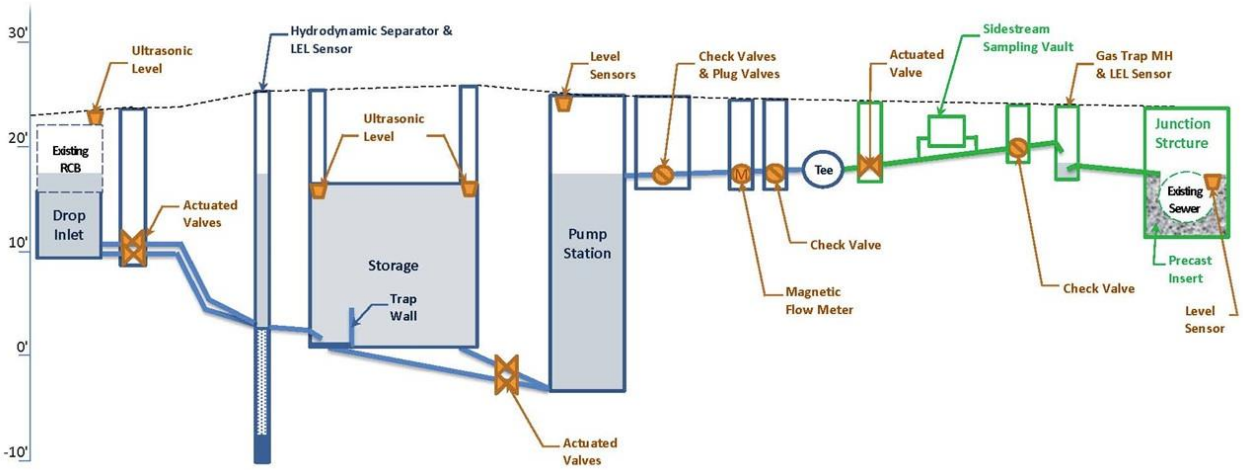


Figure 5. Flow Schematic.

Minimizing Sewer Treatment Costs

Minimizing sewer treatment costs - Diversions to storage are expected to occur full time except potentially during wet weather when the storage is full. However, to make the project as cost-effective as possible, pumping from storage to the sanitary sewer will only occur at night when sewer flows are lowest, which will avoid a peak-flow fee charges.

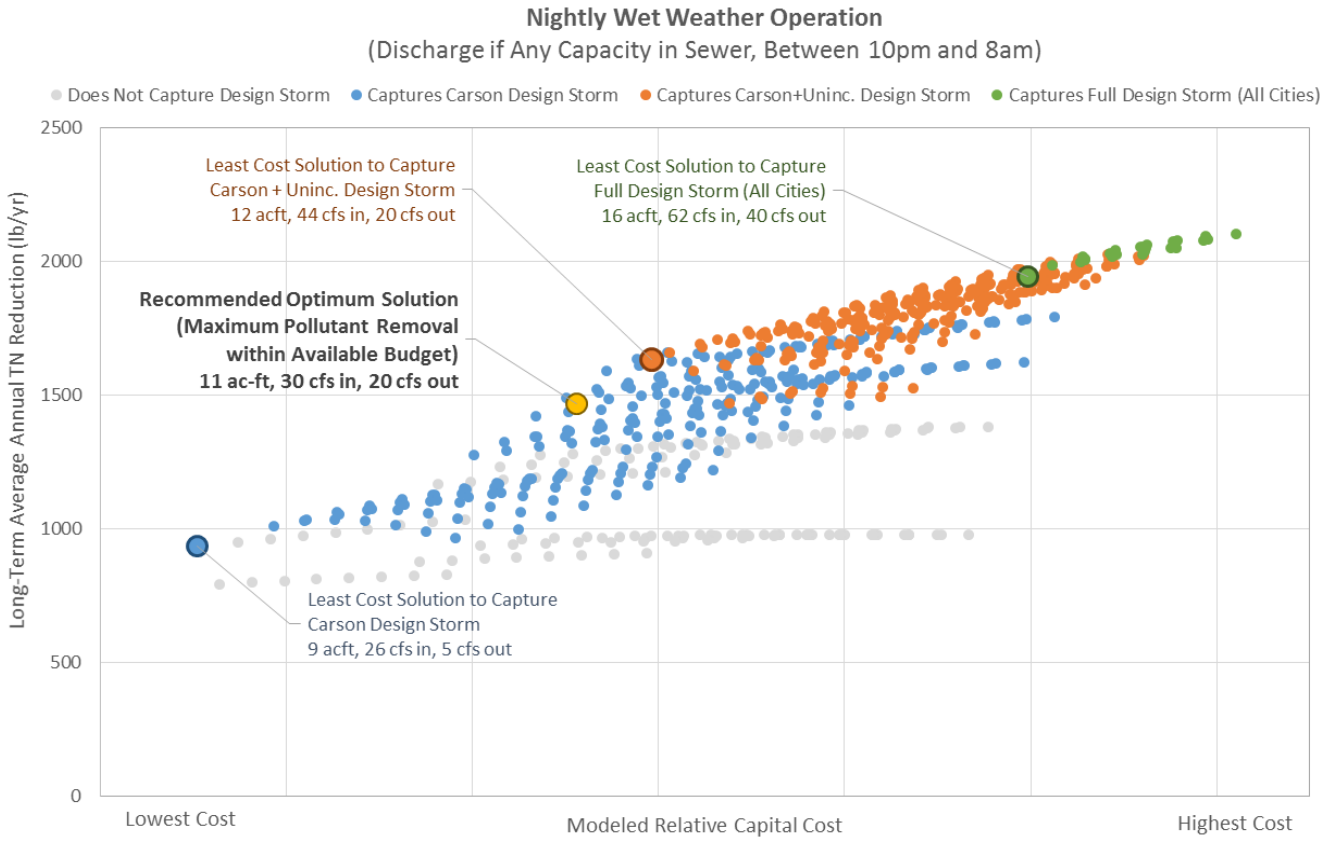


Figure 6. Flow Modeling.

Minimizing Capital Costs

Minimizing capital costs - The major costs for most stormwater diversion projects are related to storage volume and land. In this project, the use of real-time flow monitoring and a sophisticated control system allowed the storage to be sized at half the volume of a traditional system, which saved over $13 million in construction costs. Further, by placing the storage tank beneath an existing park, there was no need to purchase new land while full use of the park will still be supported.

Figure 7. Storage tanks are placed beneath an existing park, so there was no need to purchase additional property to support the full use of Carriage Crest Park.

Other Protective Features

Other protective features - The facility has influent and effluent LEL (lower explosive limit) sensors and automated control valves that automatically close if potentially explosive substances are detected. The control valves have battery backups to close the valves during a power outage so that the facility will be isolated from the storm drain and sanitary sewer during an outage. This feature provides another protection from overflow of the sanitary sewer or storage tank. The facility also includes redundant backflow preventors and a gas trap manhole to ensure that any odors in the storm drain and sanitary sewer will not migrate into the storage tank or storm drain.

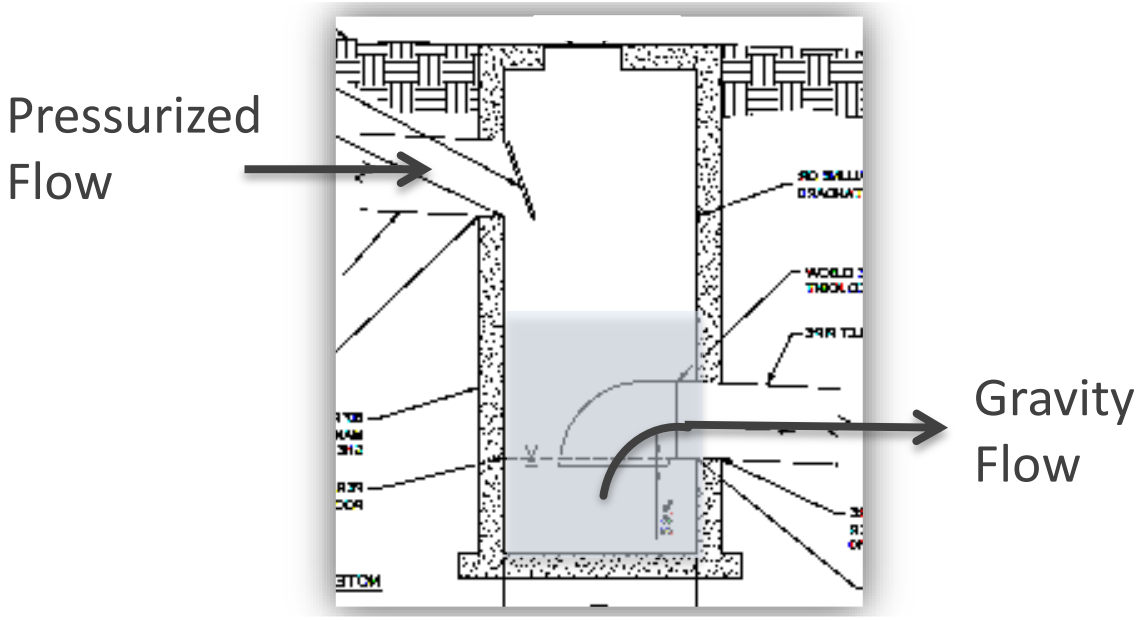


Figure 8. Gas Trap Manhole Detail.

System Monitoring and Control

System monitoring and control - The myriad of controls for what is diverted from the storm sewer and what is pumped to the sanitary sewer will normally be automatically handled by an onsite programmable logic controller. However, a telemetry system was installed to allow operators to monitor the system from the Sanitation Districts' Long Beach Main Pumping Plant Control Room, which is staffed 24/7. From that control room, system alarms can be received and responded to and the facility can be shut down the system or operated manually if needed to alleviate an emergency condition in the sewer or the treatment plant.

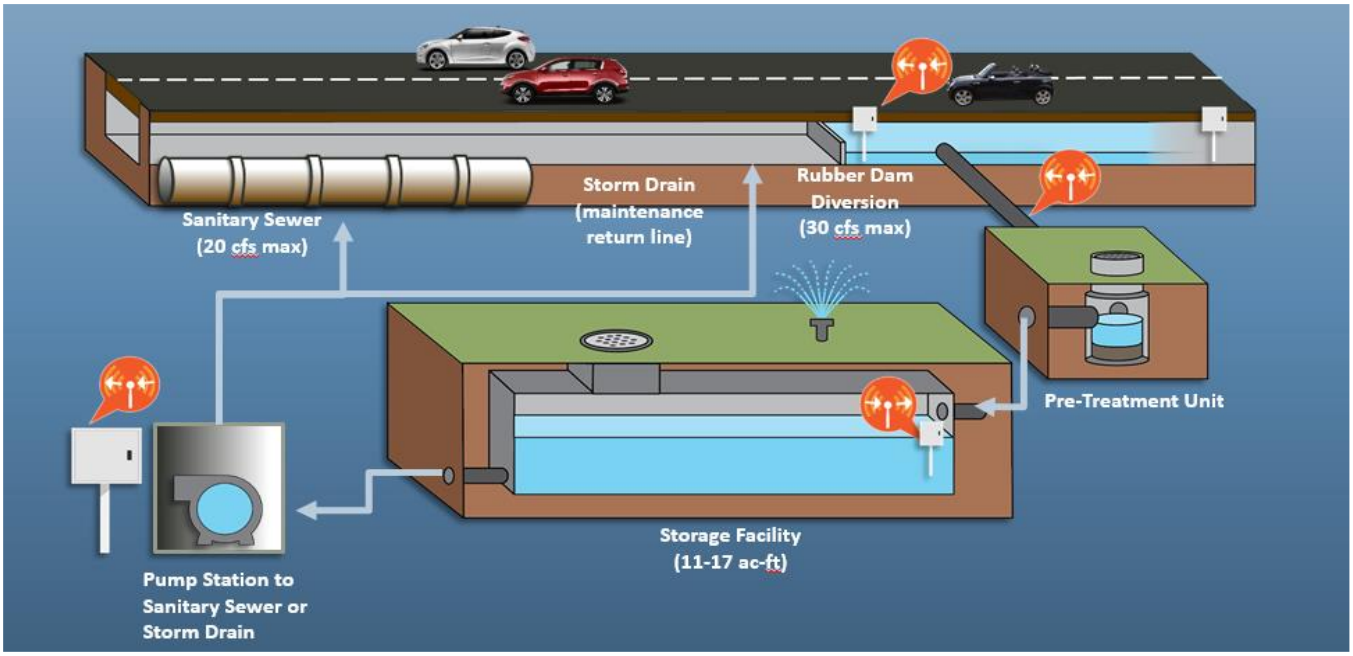


Figure 9. A telemetry system was installed to allow monitoring 24/7.

PROJECT BENEFITS AND CONCLUSIONS

The project innovatively integrates stormwater and wastewater systems, taking advantage of off-peak capacity in existing wastewater infrastructure. A sophisticated control system will maximize the diversion of water while minimizing risk of a sanitary sewer overflow. This control system allowed the facility's storage tank to be significantly reduced, which saved over $13 million in construction costs. Another project benefit is that the captured stormwater will provide more water to the JWPCP that can be recycled and used to augment our local water supply in the future.

Our hope is that this multi-benefit project will serve as a roadmap to other jurisdictions seeking cost-effective ways to comply with MS4 permits and improve water quality by managing stormwater.

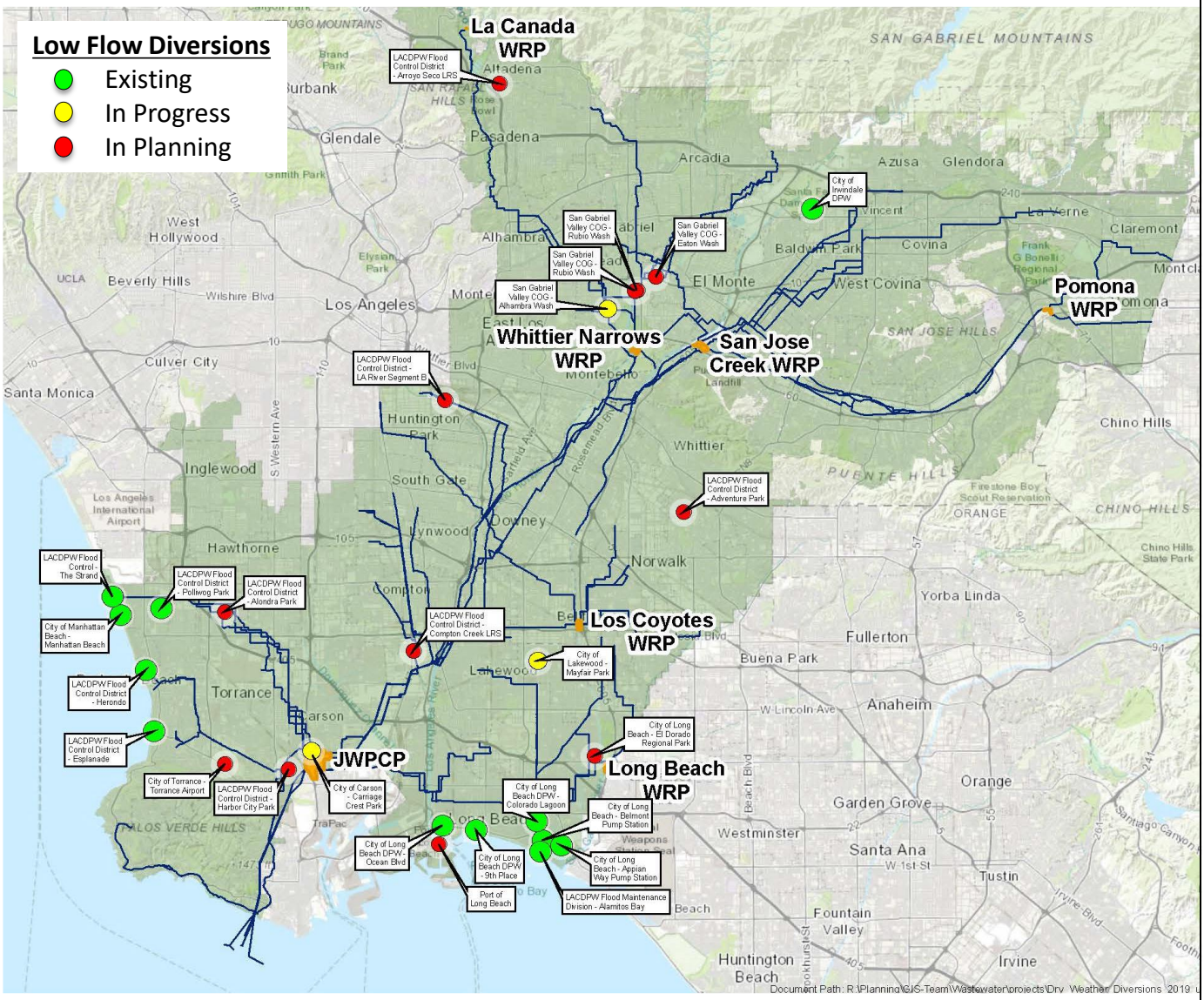


Figure 10. The Sanitation Districts has a number of diversion projects on the horizon with collaborators in multiple jurisdictions across our region.