



PARADISE CREEK FLOOD MITIGATION

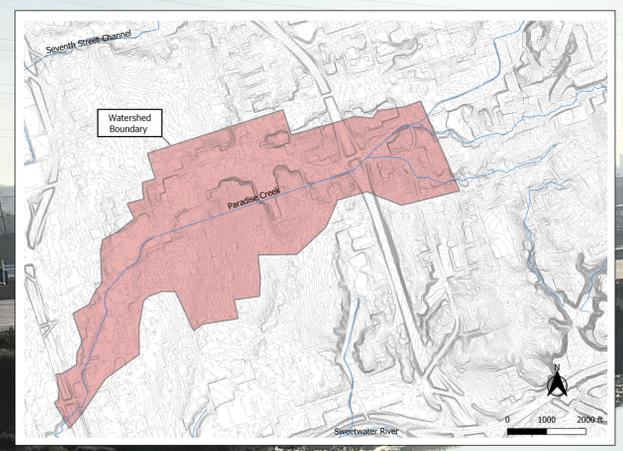


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HYDROLOGY



PROJECT SUMMARY

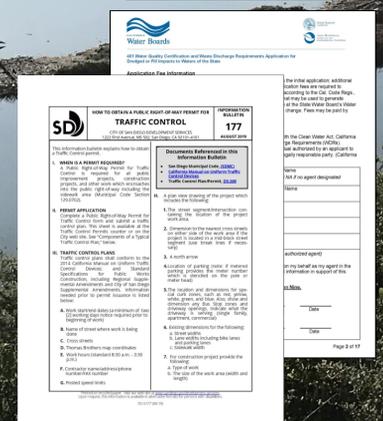
National City hired Seamless Engineering to explore, develop, and design flood mitigation strategies to reduce or eliminate flooding in Paradise Creek.

Paradise Creek is a tidally influenced creek that experiences flooding during high-tide events. The wet weather season in San Diego coincides with exceptionally high tidal events called "king tides" and causes flooding in the Creek and the surrounding community. Heavy rainfall along with the king tides can result in severe flooding in National City's streets, specifically on 18th Street and Roosevelt Avenue. This is a major concern for the businesses, residential areas, and recreational parks near the creek.



The peak discharge given a 25-year flood event was calculated using the rational method for the outlined watershed for Paradise Creek. The watershed boundary was chosen using a National City drainage map with designed drainage basins in place. The scope of our project focuses on the drainage area of Paradise Creek channel that drains directly into the Paradise Creek Wetland and further into the San Diego Bay. This area in total is roughly 1 square mile. Utilizing current land use maps provided by SanDAG, an estimated land use percentage was calculated in order to produce the most accurate runoff coefficient. Additionally, readings from the isopluvial maps provided by the San Diego County Hydrology Manual, an intensity duration amount was calculated. The peak discharge amount of 479.5 cubic feet per second is within range of the USGS StreamStats given range. Understanding the peak discharge amount allows for a more accurate flood mitigation design.

CONSTRUCTION & PERMITTING



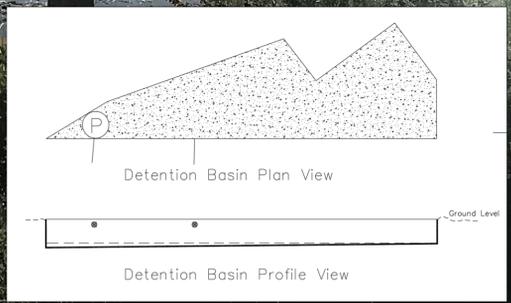
The permits used for construction and regulation include Clean Water Act Section 401, which discusses Water Board certification for any federal permit or license authorizing impacts to waters of the U.S., and Section 404, which regulates the discharge of dredging or fill material into waters of the U.S., including wetlands. Traffic control permitting for the traffic study is also needed, and National City local permits are required to include local jurisdictions.

The National City local permits include, but are not limited to:

- The Public Utility Construction Permit Application
- Private Storm Water Best Management Practices (BMPs) Maintenance Agreement
- Traffic Control Permit and Permit Extension
- Transportation Permit



DESIGN



The flood barrier is designed to block and contain tidal flows in the Paradise Creek Wetland. As the water level in the wetland rises, the flood barrier will automatically be lifted due to hydrostatic water pressure. It is designed to be minimally invasive and mostly self-sufficient.

The detention basin is designed to temporarily contain rainfall and runoff in Paradise Creek during rain events. It can hold up to 3.67 million cubic feet of water to account for a 100-year flood.

TRAFFIC STUDY

The purpose of this traffic study is to evaluate and determine potential traffic impacts for the proposed Paradise Creek Flood Mitigation project.

In order to conduct a proper traffic study for this project, we have completed a traffic impact analysis regarding the affected areas flooded. On the intersection of 18th Street and Roosevelt Avenue, the existing conditions were calculated to compare the wet and flooded conditions of the roadways. A Level of Service between the three conditions were then considered and the value with the lowest Directional Design-Hour Volume (DDHV) would be the best to choose for the quality of roadway performance.

18th Street & Roosevelt Avenue DDHV (vehicles per hour)			
Time	Dry Condition	Wet Condition	Flooded Condition
AM	12,040	15,652	21,070
PM	3,440	4,472	6,020

ENVIRONMENTAL IMPACTS

The proposed project will have a less than significant environmental impact with mitigation.

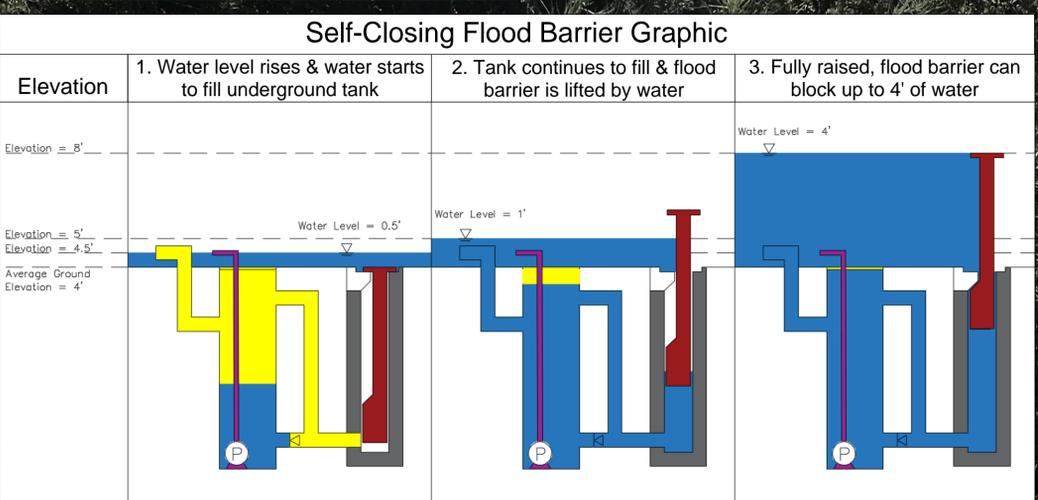
Aesthetics may be affected by the construction of the self-closing flood barrier and detention basin. In addition, construction activities will impact air quality and noise because of vehicle emissions and sediment disturbance. The most significant impacts will arise from interference with a protected wetland environment.

To mitigate these impacts, our project will incorporate minimal construction, designs requiring little operation and maintenance, and wetland restoration.

COST ESTIMATE

A Cost Analysis has been conducted for the three components of this project: the flood barrier, detention basin, and mitigation. After the designs were established, a list of materials was put together. Then, the quantity of each material was determined using the dimensions for each design. Multiple sources were used to ensure that the lowest cost for the best value was attained for each material. Although it is not a material, excavation is an essential part of the project, and excavation accounts for the highest individual cost.

Item of Work	Cost	Item of Work	Cost
Flood Barrier		Detention Basin	
Excavation	\$465	Excavation	\$540,915
PUR Foam	\$510	Concrete	\$1,241,010
Fiberglass	\$4,764	PE-HD Pipe	\$171.71
PE-HD Pipe	\$2,593	Pump	\$17,430
Concrete	\$2,610	Mitigation	
Pump	\$761.60	Excavation	\$10,419
Permits	\$5,000	Plants	\$500



SPRING 2020