There are also two existing storm drains at the south end of the park at its lowest point and a third near the parking lot belonging to Torrey Pines High School. There is an existing irrigation system to water the park's grasses and landscape supplied by the city's water. The park is located atop a ridge surrounded by natural, undeveloped canyons to the east and west. To the south, is a parking lot and baseball field designed to emphasize sustainable development and economic efficiency.

The objective of this project is to design an efficient, sustainable, and cost-effective stormwater capture and reuse system for Torrey Highlands Park. By designing a durable/long-lasting system, reusing stormwater that would be wasted otherwise, and helping the park conserve water, this project will decrease the amount of stormwater draining into the ocean. Stormwater capture and reuse offers a sustainable and practical way to augment San Diego's local freshwater supply, while protecting our oceans from polluted runoff. One key beneficial use of recycled stormwater is for the purpose of irrigation. Specifically, the irrigation of local parks, which are a vital aspect of the community that provide a place for physical activity, connecting with nature, and community gatherings.

### INTRODUCTION

The park's stormwater has been treated as more of a nuisance than a valuable resource. However, due to San Diego's reliance on imported water and the need for viable, local water source options to counter drought conditions, stormwater harvesting systems and reuse projects have become a popular consideration. Such projects not only decrease the required demand of imported water, but also conserve water and protect the environment by decreasing the amount of stormwater draining into the ocean. Stormwater capture and reuse offers a sustainable and practical way to augment San Diego's local freshwater supply, while protecting our oceans from polluted runoff. One key beneficial use of recycled stormwater is for the purpose of irrigation. Specifically, the irrigation of local parks, which are a vital aspect of the community that provide a place for physical activity, connecting with nature, and community gatherings.

### PURPOSE

The purpose of this project is to design an efficient, sustainable, and cost-effective stormwater capture and reuse system for Torrey Highlands Park. With each step, cost, sustainability, practicality, and environmental impacts will be at the forefront of Aztec Builders' considerations. Aztec Builders anticipates minimizing costs and footprint by tapping into existing storm drains and utilizing gravity-fed systems based on site topography.

### BACKGROUND

Torrey Highlands park is a 12 acre lot containing a 2.2 acre grass field, a small dirt dog park, and a playground surrounded by native shrubbery and trees. The park is located atop a ridge surrounded by natural, undeveloped canyons to the east and west. To the south, is a parking lot and baseball field belonging to Torrey Pines High School. There is an existing irrigation system to water the park's grasses and landscape supplied by the city's water. There are also two existing storm drains at the south end of the park at its lowest point and a third near the parking lot.

### HYDROLOGY

By adhering to the guidelines within the County of San Diego Hydrology Manual, the peak hourly flow rates associated with 10 and 100 year storm events were calculated for the region. The study revealed a peak hourly rate of 2,904 cubic feet per second for a 10 year storm and 4,199 cubic feet per second for a 100 year storm for the entire park vicinity. In addition, the quantity of collectible rainfall for the area was 2,253 acre feet per year.

### GEOTECHNICAL/ECOLOGIC

A geotechnical evaluation revealed that the site contains a sandy soil known as Capistrano Sandy Loam. Based on the soil type and other site characteristics, it was determined that the site can be safely excavated to a maximum depth of 13.6 feet to avoid soil loading. An ecologic evaluation of the region on the site also revealed the park's water demands. It was determined that approximately 5 acres of the park will require irrigation and by utilizing EPA's water budgeting calculator, it was calculated that 190,600 gallons of water per month will be needed to meet the park's irrigation demands.

### WATER TREATMENT

Aztec Builders recommends a system offered from Fabco Industries called the "Stormsafe Cartridge Vault," which could handle the peak hourly flow rate for the region without backing up or bypassing flow. The system has customizable cartridges that allow treatment to be tailored based on the quality of influent and the desired quality of effluent. Because California is likely to update their treatment requirements for stormwater harvesting, the system offers a cost-effective way to alter or update the treatment process accordingly. For now, however, Aztec Builders recommends purchasing the sediment, standard, and coliform bacteria cartridges based on the anticipated pollutants of concern for the Torrey Highlands site.

### CAPTURE SYSTEM

A capture system feasibility study considered two options; the design of additional stormwater capture infrastructure on site such as drainage ditches or perforated pipes, or retrofitting the existing storm drains to collect stormwater. The study revealed that 97% of the park's collectible rainfall could be captured through the storm drains alone. Due to the fact that adding additional stormwater capture infrastructure to Torrey Highlands park would only be targeting the 13% of collectible rainfall that the site's storm drains currently misses, Aztec Builders recommends simply retrofitting the existing drains.

### STORAGE

By analyzing the monthly consumptive volume of the system, it was determined that a peak volume of approximately 390,000 gallons would be reached. If the system were sized for this volume, the total volume of water saved would be about 640,000 gallons. The system was also analyzed based on 65,000 gallons of storage and 15,000 gallons of storage. For the smaller two-storage volumes, the total water saved would be about 480,000 and 150,000 gallons respectively.

### IRRIGATION

Aztec Builders recommends replacing parts of the existing spray irrigation system with a drip irrigation system. The use of a Rain-Bird control panel will allow for easy adjustment for random storms or percolation issues, or retrofitting the existing storm drains to collect stormwater. Specifically, the irrigation of local parks, which are a vital aspect of the community that provide a place for physical activity, connecting with nature, and community gatherings.

### TEAM #14 AZTEC BUILDERS

TORREY HIGHLANDS STORMWATER CAPTURE AND REUSE PROJECT

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**Figure 1: Breakdown of Collectible Stormwater**

**Figure 2: Irrigation Demand vs Collectible Runoff**

**Figure 3: Excavation Pressure Diagram**

**Figure 4: Irrigation Manifold**