Appendix H

Water Resources Technical Report

PSOMAS

Imperial Avalon Mixed Use
Water Resources Technical Report

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1.0 Introduction

1.1 Project Description

The Imperial Avalon Mixed-Use project, herein known as the Project, involves the development of multiple residential buildings with a café, restaurant space, and open space park areas to serve as amenity spaces for the community on a 27.3-acre site. The Project site currently consists of a mobile home park. The development site is located at 21207Avalon Boulevard and is bounded by Grace Ave to the west, Dominguez Channel and I-405 freeway to the north, Avalon Blvd to the east, and single-family residences and a shopping center to the south.

1.2 Scope of Work

This report provides a description of the existing surface water hydrology, and water quality at the Project Site and an analysis of the Project's potential impacts related to surface water hydrology and water quality.

2.0 Regulatory Framework

2.1 Surface Water Hydrology

County of Los Angeles Hydrology Manual

The Los Angeles County Department of Public Works (LACDPW) presently owns and maintains three regional flood control facilities in and around the City of Carson. Therefore, the Los Angeles County (County) Department of Public Works Hydrology Manual is basis of design for storm drainage facilities. The Hydrology Manual requires that a storm drain conveyance system be designed for a 25-year storm event and that the combined capacity of a storm drain, and street flow system accommodate flow from a 50-year storm event. Areas with sump conditions are required to have a storm drain conveyance system capable of conveying flow front a 50-year storm event. The County also limits the allowable discharge into existing storm drain facilities based on the MS4 Permit which is enforced on all new developments that discharge directly into the County's storm drain system. Any proposed drainage improvements of County owned storm drain facilities such as catch basins and storm drain lines requires the approval/review from the County Flood Control District department.

2.2 Surface Water Quality

Clean Water Act

The Clean Water Act was first introduced in 1948 as the Water Pollution Control Act. The Clean Water Act authorizes Federal, state, and local entities to cooperatively create comprehensive programs for eliminating or reducing the pollution of state waters and tributaries. The primary goals of the Clean Water Act are to restore and maintain the chemical, physical, and biological integrity of the nation's waters and to make all surface waters fishable and swimmable. As such, the Clean Water Act forms the basic national framework for the management of water quality and the control of pollutant discharges. The Clean Water Act also sets orth a number of objectives in order to achieve the above-mentioned goals. These objectives include regulating pollutant and toxic pollutant discharges; providing for water quality that protects and fosters the propagation of fish, shellfish and wildlife; developing waste treatment management plans; and developing and implementing programs for the control of non-point sources of pollution.

Since its introduction, major amendments to the Clean Water Act have been enacted (e.g., 1961, 1966, 1970, 1972, 1977, and 1987). Amendments enacted in 1970 created the U.S. Environmental Protection Agency (USEPA), while amendments enacted in 1972 deemed the discharge of pollutants into waters of

the United States from any point source unlawful unless authorized by a USEPA National Pollutant Discharge Elimination System (NPDES) permit. Amendments enacted in 1977 mandated development of a "Best Management Practices" Program at the state level and provided the Water Pollution Control Act with the common name of "Clean Water Act," which is universally used today. Amendments enacted in 1987 required the USEPA to create specific requirements for discharges.

In response to the 1987 amendments to the Clean Water Act and as part of Phase I of its NPDES permit program, the USEPA began requiring NPDES permits for: (1) municipal separate storm sewer systems (MS4) generally serving, or located in, incorporated cities with 100,000 or more people (referred to as municipal permits); (2) 11 specific categories of industrial activity (including landfills); and (3) construction activity that disturbs five acres or more of land. Phase II of the USEPA's NPDES permit program, which went into effect in early 2003, extended the requirements for NPDES permits to: (1) numerous small municipal separate storm sewer systems, (2) construction sites of one to five acres, and (3) industrial facilities owned or operated by small municipal separate storm sewer systems. The NPDES permit program is typically administered by individual authorized states.

In 2008, the USEPA published draft Effluent Limitation Guidelines (ELGs) for the construction and development industry. On December 1, 2009 the EPA finalized its 2008 Effluent Guidelines Program Plan.

In California, the NPDES stormwater permitting program is administered by the State Water Resources Control Board (SWRCB). The SWRCB was created by the Legislature in 1967. The joint authority of water distribution and water quality protection allows the Board to provide protection for the State's waters, through its nine Regional Water Quality Control Boards (RWQCBs). The RWQCBs develop and enforce water quality objectives and implement plans that will best protect California's waters, acknowledging areas of different climate, topography, geology, and Hydrology. The RWQCBs develop "basin plans" for their hydrologic areas, issue waste discharge requirements, enforce action against stormwater discharge violators, and monitor water quality.

Federal Anti-Degradation Policy

The Federal Antidegradation Policy (40 Code of Federal Regulations 131.12) requires states to develop statewide antidegradation policies and identify methods for implementing them. Pursuant to the Code of Federal Regulations (CFR), state antidegradation policies and implementation methods shall, at a minimum, protect and maintain (1) existing in-stream water uses; (2) existing water quality, where the quality of the waters exceeds levels necessary to support existing beneficial uses, unless the state finds that allowing lower water quality is necessary to accommodate economic and social development in the area; and (3) water quality in waters considered an outstanding national resource.

California Porter-Cologne Act

The Porter-Cologne Water Quality Control Act established the legal and regulatory framework for California's water quality control. The California Water Code authorizes the SWRCB to implement the provisions of the CWA, including the authority to regulate waste disposal and require cleanup of discharges of hazardous materials and other pollutants.

As discussed above, under the California Water Code (CWC), the State of California is divided into nine RWQCBs, governing the implementation and enforcement of the CWC and CWA. The Project Site is located within Region 4, also known as the Los Angeles Region. Each RWQCB is required to formulate and adopt a Basin Plan for its region. This Plan must adhere to the policies set forth in the CWC and established by the SWRCB. The RWQCB is also given authority to include within its regional plan water discharge prohibitions applicable to particular conditions, areas, or types of waste.

California Anti-Degradation Policy

The California Antidegradation Policy, otherwise known as the *Statement of Policy with Respect to Maintaining High Quality Water in California* was adopted by the SWRCB (State Board Resolution No. 68-16) in 1968. Unlike the Federal Antidegradation Policy, the California Antidegradation Policy applies to all waters of the State, not just surface waters. The policy states that whenever the existing quality of a water body is better than the quality established in individual Basin Plans, such high quality shall be maintained and discharges to that water body shall not unreasonably affect present or anticipated beneficial use of such water resource.

California Toxic Rule

In 2000, the EPA promulgated the California Toxic Rule, which establishes water quality criteria for certain toxic substances to be applied to waters in the State. The EPA promulgated this rule based on the EPA's determination that the numeric criteria are necessary in the State to protect human health and the environment. The California Toxic Rule establishes acute (i.e., short-term) and chronic (i.e., long-term) standards for bodies of water such as inland surface waters and enclosed bays and estuaries that are designated by the LARWQCB as having beneficial uses protective of aquatic life or human health.

Board Basin Plan for the Coastal Watersheds of Los Angeles and Ventura Counties

As required by the California Water Code, the LARWQCB has adopted a plan entitled “Water Quality Control Plan, Los Angeles Region: Basin Plan for the Coastal Watersheds of Los Angeles and Ventura Counties” (Basin Plan). Specifically, the Basin Plan designates beneficial uses for surface and groundwaters, sets narrative and numerical objectives that must be attained or maintained to protect the designated beneficial uses and conform to the State's antidegradation policy, and describes implementation programs to protect all waters in the Los Angeles Region. In addition, the Basin Plan incorporates (by reference) all applicable State and Regional Board plans and policies and other pertinent water quality policies and regulations. Those of other agencies are referenced in appropriate sections throughout the Basin Plan.

The Basin Plan is a resource for the RWQCB and others who use water and/or discharge wastewater in the Los Angeles Region. Other agencies and organizations involved in environmental permitting and resource management activities also use the Basin Plan. Finally, the Basin Plan provides valuable information to the public about local water quality issues.

NPDES Permit Program

The NPDES permit program was first established under authority of the CWA to control the discharge of pollutants from any point source into the waters of the United States. As indicated above, in California, the NPDES stormwater permitting program is administered by the SWRCB through its nine RWQCBs.

The General Permit

SWRCB Order No. 2009-0009-DWQ known as “The General Permit” was adopted on September 2, 2009. This NPDES permit establishes a risk-based approach to stormwater control requirements for construction projects by identifying three project risk levels. The main objectives of the General Permit are to:

1. Reduce erosion

2. Minimize or eliminate sediment in stormwater discharges
3. Prevent materials used at a construction site from contacting stormwater
4. Implement a sampling and analysis program
5. Eliminate unauthorized non-stormwater- discharges from construction sites
6. Implement appropriate measures to reduce potential impacts on waterways both during and after construction of projects
7. Establish maintenance commitments on post-construction pollution control measures

California mandates requirements for all construction activities disturbing more than one acre of land to develop and implement Stormwater Pollution Prevention Plans (SWPPP). The SWPPP documents the selection and implementation of Best Management Practices for a specific construction project, charging Owners with stormwater quality management responsibilities. A construction site subject to the General Permit must prepare and implement a SWPPP that meets the requirements of the General Permit.

Los Angeles County Municipal Separate Storm Sewer System (MS4) Permit

As described above, USEPA regulations require that MS4 permittees implement a program to monitor and control pollutants being discharged to the municipal system from both industrial and commercial projects that contribute a substantial pollutant load to the MS4.

On December 13, 2001, the LARWQCB adopted Order No. 01-182 under the CWA and the Porter-Cologne Act. This Order is the NPDES Permit or MS4 permit for municipal stormwater and urban runoff discharges within Los Angeles County. The requirements of this Order (the "Permit") cover 84 cities and most of the unincorporated areas of Los Angeles County. Under the Permit, the Los Angeles County Flood Control District (LACFCD) is designated as the Principal Permittee. The Permittees are the 84 Los Angeles County cities (including the City of Carson) and Los Angeles County. Collectively, these are the "Co-Permittees". The Principal Permittee helps to facilitate activities necessary to comply with the requirements outlined in the Permit but is not responsible for ensuring compliance of any of the Permittees.

Stormwater Quality Management Program (SQMP)

In compliance with the Los Angeles County MS4 Permit, the Co-Permittees are required to implement a stormwater quality management program (SQMP) with the goal of accomplishing the requirements of the Permit and reducing the amount of pollutants in stormwater runoff. The SQMP requires the County of Los Angeles and the 84 incorporated cities to:

- Implement a public information and participation program to conduct outreach on storm water pollution;
- Control discharges at commercial/industrial facilities through tracking, inspecting, and ensuring compliance at facilities that are critical sources of pollutants;
- Implement a development planning program for specified development projects;
- Implement a program to control construction runoff from construction activity at all construction sites within the relevant jurisdictions;
- Implement a public agency activities program to minimize storm water pollution impacts from public agency activities; and

- Implement a program to document, track, and report illicit connections and discharges to the storm drain system.

The MS4 Permit contains the following provisions for implementation of the SQMP by the Co-Permittees:

1. General Requirements:

   - Each permittee is required to implement the SQMP in order to comply with applicable stormwater program requirements.
   - The SQMP shall be implemented and each permittee shall implement additional controls so that discharge of pollutants is reduced.

2. Best Management Practice Implementation:

   - Permittees are required to implement the most effective combination of BMPs for stormwater/urban runoff pollution control. This should result in the reduction of storm water runoff.

3. Revision of the SQMP:

   - Permittees are required to revise the SQMP in order to comply with requirements of the RWQCB while complying with regional watershed requirements and/or waste load allocations for implementation of TMDLs for impaired waterbodies.

4. Designation and Responsibilities of the Principal Permittee:

   The Los Angeles County Flood Control District is designated as the Principal Permittee who is responsible for:

   - Coordinating activities that comply with requirements outlined in the NPDES Permit;
   - Coordinating activities among Permittees;
   - Providing personnel and fiscal resources for necessary updates to the SQMP;
   - Providing technical support for committees required to implement the SQMP; and
   - Implementing the Countywide Monitoring Program required under this Order and assessing the results of the monitoring program,

5. Responsibilities of Co-Permittees:

   Each co-permittee is required to comply with the requirements of the SQMP as applicable to the discharges within its geographical boundaries. These requirements include:

   - Coordinating among internal departments to facilitate the implementation of the SQMP requirements in an efficient way;
   - Participating in coordination with other internal agencies as necessary to successfully implement the requirements of the SQMP; and
   - Preparing an annual Budget Summary of expenditures for the storm water management program by providing an estimated breakdown of expenditures for different areas of concern, including budget projections foil the following year.

6. Watershed Management Committees (WMCs):

- Each WMC shall be comprised of a voting representative from each Permittee in the Watershed Management Area (WMA).
- Each WMCs is required to facilitate exchange of information between co-Permittees, establish goals and deadlines for WMAs, prioritize pollution control measures, develop and update adequate information, and recommend appropriate revisions to the SQMP.

7. Legal Authority:

- Co-permittees are granted the legal authority to prohibit non-storm water discharges to the storm drain system including discharge to the MS4 from various development types.

Standard Urban Stormwater Mitigation Plan (SUSMP)

Under the Los Angeles County Municipal NPDES Permit, permittees are required to implement a development planning program to address storm water pollution. These programs require project applicants for certain types of projects to implement Standard Urban Stormwater Mitigation Plans (SUSMP) throughout the operational life of their projects. The purpose of SUSMP is to reduce the discharge of pollutants in storm water by outlining BMPs which must be incorporated into the design plans of new development and redevelopment. A project is subject to SUSMP if it falls under one of the categories listed below:

1. Single-family hillside homes
2. Ten or more unit homes (including single family homes, multifamily homes, condominiums, and apartments).
3. Automotive service facilities
4. Restaurants
5. 100,000 or more square-feet of impervious surface in industrial/commercial development.
6. Retail gasoline outlet
7. Parking lots with 5,000 square feet or more of surface area or with 25 or more parking spaces
8. Redevelopment projects in subject categories that meet redevelopment thresholds
9. Location within or directly adjacent to or discharging directly to an environmentally sensitive area if the discharge is likely to impact a sensitive biological species or habitat and the development creates 2,500 square feet or more of impervious surface.

Permittees are required to adopt the requirements set herein in their own SUSMP. Additional BMPs may be required by ordinance or code adopted by the Permittee and applied in a general way to all projects or on a case by case basis.

Low Impact Development (LID)

The County of Los Angeles (County) has prepared the 2014 Low Impact Development Standards Manual (LID Standards Manual) to comply with the requirements of the National Pollutant Discharge Elimination System (NPDES) Municipal Separate Storm Sewer System (MS4) Permit for stormwater and non-stormwater discharges from the MS4 within the coastal watersheds of Los Angeles County (CAS004001, Order No. R4- 2012-0175), henceforth referred to in this document as the 2012 MS4 Permit. The LID

Standards Manual provides guidance for the implementation of stormwater quality control measures in new development and redevelopment projects in unincorporated areas of the County with the intention of improving water quality and mitigating potential water quality impacts from stormwater and non-stormwater discharges.

The LID Standards Manual addresses the following objectives and goals:

- Lessen the adverse impacts of stormwater runoff from development and urban runoff on natural drainage systems, receiving waters, and other water bodies;
- Minimize pollutant loadings from impervious surfaces by requiring development projects to incorporate properly-designed, technically-appropriate Best Management Practices (BMPs) and other Low Impact Development (LID) strategies; and
- Minimize erosion and other hydrologic impacts on natural drainage systems by requiring development projects to incorporate properly-designed, technically appropriate hydromodification control development principles and technologies

2.3. Groundwater

Board Basin Plan for the Coastal Watersheds of Los Angeles anal Ventura Counties

As required by the California Water Code, the LARWQCB has adopted a plan entitled “Water Quality Control Plan, Los Angeles Region: Basin Plan for the Coastal Watersheds of Los Angeles and Ventura Counties” (Basin Plan). Specifically, the Basin Plan designates beneficial uses for surface and groundwaters, sets narrative and numerical objectives that must be attained or maintained to protect the designated beneficial uses and conform to the State's antidegradation policy, and describes implementation programs to protect all waters in the Los Angeles Region. In addition, the Basin Plan incorporates (by reference) all applicable State and Regional Board plans and policies and other pertinent water quality policies and regulations. Those of other agencies are referenced in appropriate sections throughout the Basin Plan.

The Basin Plan is a resource for the Regional Board and others who use water and/or discharge wastewater in the Los Angeles Region. Other agencies and organizations involved in environmental permitting and resource management activities also use the Basin Plan. Finally, the Basin Plan provides valuable information to the public about local water quality issues.

Safe Drinking Water Act (SDWA)

The Federal Safe Drinking Act, established in 1974, sets drinking water standards throughout the country and is administered by the USEPA. The drinking water standards established in the SDWA, as set forth in the Code of Federal Regulations (CFR), are referred to as the National Primary Drinking Water Regulations (Primary Standards, Title 40, CFR Part 141) and the National Secondary Drinking Water Regulations (Second Standards, 40 CFR Part 143). California passed its own Safe Drinking Water Act in 1986 that authorizes the State’s Department of Health Services (DHS) to protect the public from contaminants in drinking water by establishing maximum contaminants levels (MCLs), as set forth in the CCR, Title 22, Division 4, Chapter 15, that are at least as stringent as those developed by the USEPA, as required by the federal Safe Drinking Water Act.

California Water Plan

The California Water Plan (The Plan) provides a framework for water managers, legislators, and the public to consider options and make decisions regarding California’s water future. The Plan, which is updated every five years, presents basic data and information on California’s water resources including water supply evaluations and assessments of agricultural, urban, and environmental water uses to quantify the gap between water supplies and uses. The Plan also identifies and evaluates existing and proposed statewide

demand management and water supply augmentation programs and projects to address the State's water needs.

The goal for the California Water Plan Update is to meet Water Code requirements, receive broad support among those participating in California's water planning, and be a useful document for the public, water planners throughout the state, legislators and other decision-makers.

3.0 Surface Water Hydrology

3.1 General Approach

The Project site is located within Los Angeles County Flood Control District (LACFD) jurisdiction therefore, the City of Carson has adopted the County Department of Public Works (LACDPW) Hydrology Manual as its basis of design for storm drainage facilities. The LACDPW Hydrology Manual requires projects to have drainage facilities that meet the Urban Flood level of protection. The Urban Flood is runoff from a 25-year frequency design storm falling on a saturated watershed. A 25-year frequency design storm has a probability of 1/25 of being equaled or exceeded in any year. The County's CEQA Threshold Guide, however, establishes the 50-year frequency design storm event as the threshold to analyze potential impacts on surface water hydrology as a result of development. To provide a more conservative analysis, this report analyzed the larger storm event threshold, the 50-year frequency design storm event.

The Modified Rational Method was used to calculate storm water runoff. The "peak" (maximum value) runoff for a drainage area is calculated using the formula, **Q=CIA**

Where,

Q = Volumetric flow rate (cfs)

C = Runoff coefficient (dimensionless)

I = Rainfall Intensity at a given point in time (in/hr)
A = Basin area (acres)

The Modified Rational Method assumes that a steady, uniform rainfall rate will produce maximum runoff when all parts of the basin area are contributing to outflow. This occurs when the storm event lasts longer than the time of concentration. The time of concentration (Tc) is the time it takes for rain in the most hydrologically remote part of the basin area to reach the outlet.

The method assumes that the runoff coefficient (C) remains constant during a storm. The runoff coefficient is a function of both the soil characteristics and the percentage of impervious surfaces in the drainage area.

LACDPW developed a time of concentration calculator, Tc Calculator (TC_calc_depth.xls, July 2006), to automate time of concentration calculations as well as the peak runoff rates and volumes using the Modified Rational Method design criteria as outlined in the Hydrology Manual. The data input requirements include: sub-area size, soil type, land use, flow path length, flow path slope and rainfall isohyet. The LACDPW has produced Isohyetal maps that provide the Project Site's soil type and the rainfall isohyet value based on the location of the project. Once all values were known, the Tc Calculator was used to calculate the storm water peak runoff flow rate for the Existing and Proposed Project conditions by evaluating an individual sub-area independent of all adjacent subareas. See Table 1 for the Tc Calculator Peak Runoff Flow results. Results for the 5-, 10-, 25-, 50-, and 100-year events were all included for information.

3.2 Data Sources

The primary sources of data are the *LACDPW Hydrology / Sedimentation Manual and Appendices* (LACDPW 2006), and the Los Angeles County *Standard Urban Stormwater Mitigation Plan* (September 2002).

Rainfall and soil characteristics for the Project Site are given in Isohyetal Map Figure LACDPW 1-HI.18 (Section 4). A copy of the map is provided in Section 7.0. The 50-year (24-hour) rainfall isohyet nearest the Project area is approximately 6.10-inches. The isohyets for all of the storm events, based on factors from the LA County Hydrology Manual in Table 5.3.1, are as listed:

- 5-Year 24-Hour: 3.56-inches
- 10-Year 24-Hour: 4.36-inches
- 25-Year 24-Hour: 5.36-inches
- 50-Year 24-Hour: 6.10-inches
- 100-Year 24-Hour: 6.84-inches

As shown on the Isohyetal Map, the soil classification of the Project Site falls predominantly into Soil Type 003. The Project Site area to be disturbed in connection with construction of the Project is approximately 27.3 acres.

3.3 Existing Site Conditions

The existing Project Site is currently improved with a mobile home park. The Project Site totals approximately 27.3 acres with an average imperviousness of 99%.

Stormwater runoff currently flows into v-gutters throughout the Project Site and is collected by various catch basins that drain to an LA County Flood Control District storm drain line that runs through the middle of the Project Site. The County storm drain line is a 75" reinforced concrete pipe that drains into the nearby Dominguez Channel. Stormwater runoff in areas directly adjacent to Grace Ave and Avalon Blvd flows to the street curb and gutter system and does not directly discharge into the County storm drain. Additionally, an area at the southwest corner of the site flows into private property. For the purpose of this study to compare equal areas in the existing and proposed condition, these specific areas will be considered as one single drainage area of 27.3 acres.

The Project Site is not located within a FEMA FIRM area with reduced flood risk due to levee, also known as Zone "X".

3.4 Proposed Project Site Conditions

The proposed Project will consist of multiple residential buildings with a café, restaurant space, and open space park areas to serve as amenity spaces for the community on a 27.3-acre site. The assumed average imperviousness of the Project Site will decrease to approximately 75.6% once all Project improvements, landscaping, and amenities are installed.

The proposed stormwater flows will continue to drain into the 75" storm drain line that runs through the middle of the Project Site and will not change the existing drainage pattern. However, as described below, the Project's compliance with existing Low Impact Development (LID) requirements will create reductions in the stormwater flows to the County's stormwater system. As stated in Section 3.3 Existing Site Conditions, areas which drain to either Grace Ave or Avalon Blvd, or to the private property to the south will be collected and directed to the existing 75" County storm drain.

3.5 Hydrology Results

Table 1 below summarizes the hydrology results demonstrating the peak stormwater runoff flows for the 5-, 10-, 25-, 50- and 100-year storm events under existing conditions and following construction of the Project:

Table 1. Existing and Proposed Peak Runoff Flows

	Existing	Proposed*	
Storm Event	**Q_{Total} [cfs]**	**Q_{Total} [cfs]**	**% Reduction**
5-Yr	26.99	22.95	-15.0%
10-Yr	35.65	31.61	-11.3%
25-Yr	46.54	42.50	-8.7%
50-Yr	54.78	50.74	-7.4%
100-Yr	63.68	59.64	-6.3%

* Includes reduction from LID implementation (subtracting the 85th Percentile storm flow of 4.04 cfs)

The Project Site was reviewed as one hydrology area since all runoff flows towards the middle of the site. This review demonstrates that the Project will not exceed the existing stormwater flows. It takes into account the Project's required Low Impact Development (LID) reductions which are needed to manage post construction stormwater runoff. The Project will include the installation of private catch basins, planter drains, and roof downspouts throughout the Project Site to collect roof and site runoff, and direct stormwater to the LID system through a series of underground storm drain pipes. This onsite stormwater conveyance system would serve to prevent onsite flooding and nuisance water build-up on the Project Site. The Project will likely implement a stormwater capture and use system (i.e. harvesting system for on-site irrigation use), the volume of water leaving the Project Site will be reduced from the existing flows.

4.0 Surface Water Quality

4.1 General Approach

Construction Best Management Practices (BMP's) will be designed and maintained as part of the implementation of the SWPPP in compliance with the General Permit. The SWPPP shall begin when construction commences, before any site clearing and grubbing of demolition activity. During construction, the SWPPP will be referred to regulatory standards, and amended as changes occur throughout the construction process. The Notice of Intent (NOI), Amendments to the SWPPP, Annual Reports, Rain Event Action Plans (REAPs),

and Non-Compliance Reporting will be posted to the State's SMARTS website in compliance with the requirements of the General Permit.

The Project falls under the jurisdiction of the Los Angeles County Department of Public Works, which follows the 2009 Low Impact Development (LID) Manual design guidelines. The purpose of this surface water quality report is:

- To document that the Los Angeles County LID requirements will be met;
- To determine the proposed development's impact on existing hydrologic conditions;
- To identify the pollutants of concern and provide BMPs that will mitigate those pollutants of concern; and
- To provide sufficient detailed information to support detailed hydraulic design of stormwater treatment systems.

The LID requirements, approved by the Regional Water Quality Control Board, call for the treatment of the peak mitigation flow rate or volume of runoff produced either by a 0.75" 24-hr rainfall event or the 85th percentile rainfall event, whichever is greater. Under section 3.1.2 of the LID Manual, this post-

construction stormwater runoff from the new development shall be infiltrated, evapotranspirated, captured and used, and/or treated through high efficiency BMP's onsite. The rainfall intensity of the 85th percentile rainfall for the Project Site's location is 0.85 inches; therefore, the 85th percentile rainfall event governs.

4.2 Site Characterization for Water Quality Review

Current Property Use: A mobile home park with asphalt roads and an amenity and office building. There are no known existing BMPs serving the Project Site.

Proposed Property Use: The proposed Project will consist of multiple residential buildings with a café, restaurant space, and open space park areas to serve as amenity spaces for the community.

Soils: The soil of this Project Site is classified as predominantly Type 003, and Type 013 in the northwestern corner as shown in the Hydrology Map from the Los Angeles County Department of Public Works (LACDPW) website as well as the LACDPW Isohyet Map 1-H1.17 (see section 7.0 for maps).

Receiving Waters: The Project Site is tributary to the Dominguez Channel.

The Dominguez Channel is listed on the 2012 CWA Section 303(d) list (approved by SWRCB June 30, 2015) as impaired due to the prevalence of the pollutants shown in Table 2, which is excerpted from the State Water Resources Control Board, "Quality Limited Segments" article dated June 9, 2016. Currently, this waterway's existing beneficial uses include ground water recharge, warm freshwater habitat, water contact recreation, and non-contact water recreation; potential uses include municipal and domestic supply, industrial service supply, and wildlife habitat.

Table 2: Receiving Waters for Urban Runoff from Site[1]

Receiving Waters	303(d) List Impairments[2]	Designated Beneficial Uses	Proximity to RARE Uses
Dominguez Channel	Fecal Indicator Bacteria, Metals/Metalloids, Toxicity, Pesticides, Other Organics	Existing/Intermittent: WILD Potential: MUN, WARM	No

4.3 Pollutants of Concern

Table 3 lists the pollutants anticipated to be generated by the Project's proposed land uses. According to the City of Carson of City Planning's Zoning Code, the Project falls under the category residential and commercial development. Therefore, the following pollutants could potentially be generated: sediment/turbidity, nutrients, trash and debris, oxygen demanding substances, bacteria and viruses, oil and grease and pesticides.

[1] State Water Resources Control Board, Los Angeles Region. *Water Quality Control Plan Los Angeles Region*. June 13, 1994.

[2] Los Angeles Regional Water Quality Control Board. 2010 CWA Section 303(d*) List of Water Quality Limited Segments*. October 11, 2011.

Table 3: Potential Pollutants Generated by Land Use Type[3]

Type of Development (Land Use)	Sediment /Turbidity	Nutrients	Organic Compounds	Trash & Debris	Oxygen Demanding Substances	Bacteria & Viruses	Oil & Grease	Pesticides	Metals
Commercial Development	P(1)	P(1)	P(4)	P	P(4)	P(3)	P	P(1)	N
Residential	P	P	N	P	P(1)	P	P(2)	P	N

Abbreviations: P=Potential N=Not expected

Notes:

(1) A potential pollutant if landscaping or open area exists on the Project site
(2) A potential pollutant if land use involves animal waste
(3) Specifically, petroleum hydrocarbons
(4) Bacterial indicators are routinely detected in pavement runoff.

A comparison of the pollutants existing in the Dominguez Channel based on the State 303(d) list and pollutants associated with the planned land use activities on the Project Site show an overlap of **organic compounds, pesticides, and bacteria & viruses** as pollutants. These common pollutants are considered the pollutants of concern. Stormwater best management practices (BMP) implemented for the Project in conformance with applicable regulatory requirements will be designed to address these pollutants of concern. Table 4 summarizes the efficiency of general categories of BMPs in treating different types of pollutants.

The Los Angeles County Department of Public Works requires LID compliance for all new development projects. As noted above, the LID concept for this Project is likely a stormwater capture and use system. Rainwater harvesting collects rainwater from a surface that allows for the rainwater to be stored and used later. In a typical rainwater harvesting situation, rainwater is collected from an impervious surface such as the roof of a building and then stored inside of a tank or cistern. Rainwater can be collected from other surfaces as well such as parking lots, roadways, driveways, and even land surfaces. The runoff within the cistern will be pumped up for irrigation of the landscape around the Project Site. High flow outlets for the rainwater harvesting cistern will be routed to discharge into the County's storm drain system as per proposed conditions, as described in section 2.4, above.

Table 4 summarizes treatment control levels for each Low Impact Development strategy selected. Items highlighted with grey coloring indicate the previously mentioned pollutants of concern for the Los Angeles River. This indicates that stormwater harvesting provides high to medium levels of efficiency to remove sediments and turbidity, an unknown level of treatment for trash, and high to medium levels of efficiency for bacteria and viruses. Because stormwater harvesting provides a low level of treatment for trash removal, an additional level of stormwater management will be required for this project in the application of upstream water quality inlets. As per Table 4, water quality inlets provide a medium level of efficiency for trash removal.

[3] Riverside County Flood Control and Conservation District, Riverside County Water Quality Management Plan for Urban Runoff, July 24, 2006. Note: This source is utilized because the Los Angeles County Flood Control District has not established a table that outlines pollutants of concern; however, the Riverside County plan accurately represents pollutant types typically occurring in Los Angeles County.

Table 4: Treatment Control BMP Selection Matrix[4]

Dominguez Channel Pollutant of Concern (Yes/No)	Treatment Control BMP Categories							
	Veg. Swale /Veg. Filter Strips	Detention Basins	**Planter Box / Harvesting /Infiltration Basins & Trenches**	Wet Ponds or Wetlands	Sand Filter or Filtration	**Water Quality Inlets**	Hydro-dynamic Separator Systems	Manufactured / Proprietary Devices
Sediment/Turbidity	H/M	M	H/M	H/M	H/M	L	H/M (L for turbidity)	U
No			✓			✓		
Nutrients	L	M	H/M	H/M	L/M	L	L	U
No								
Organic Compounds	U	U	U	U	H/M	L	L	U
Yes			✓			✓		
Trash & Debris	L	M	U	U	H/M	M	H/M	U
No			✓			✓		
Oxygen Demanding Substances	L	M	H/M	H/M	H/M	L	L	U
No								
Bacteria & Viruses	U	U	H/M	U	H/M	L	L	U
Yes			✓			✓		
Oils & Grease	H/M	M	U	U	H/M	M	L/M	U
No								
Pesticides (non-soil bound)	U	U	U	U	U	L	L	U
Yes			✓			✓		
Metals	H/M	M	H	H	H	L	L	U
Yes			✓			✓		

Abbreviations:
L: Low removal efficiency H/M: High or medium removal efficiency U: Unknown removal efficiency

4.4 Best Management Practices

Source and Treatment Control Best Management Practices (BMPs) are required for this Project under the LA County Standard Urban Stormwater Mitigation Plan (SUSMP) and Los Angeles County Department of Public Works Low Impact Development (LID) Standards Manual.

4.4.1 Site Design BMPs

4.4.1.1 Minimize Stormwater Pollutants of Concern

The Project will minimize pollutants of concern from impacting surface water quality by maximizing the reduction of pollutant loadings to the Maximum Extent Practicable. Based on

[4] Riverside County Flood Control and Conservation District, Riverside County Water Quality Management Plan for Urban Runoff, July 24, 2006. Note: This table is utilized because the Los Angeles County Flood Control District has not established a table that summarizes each BMP's efficiency for treating pollutants of concern.

soils engineering recommendations suggesting that ground infiltration is not possible, it has been determined that a stormwater harvesting system will be used to meet the project's LID requirements. This storm water harvesting tank will be installed to a volume equivalent to a size listed in Table 6 in this report. The pollutants of concern – namely, sediment, trash, and bacteria & viruses– will be addressed through a pre-treatment settlement device connected to the harvesting tank within the Project Site. Pretreatment Settling devices rely primarily on sedimentation, in which coarse sediments and debris sink or fall out of the collected stormwater. Some settling devices also provide secondary screening to improve the capture of floatables and sediment. Building roof run-off will be collected via roof drains and routed internally through the buildings and directed into the harvesting tank. Capture and use, commonly referred to as rainwater harvesting, collects and stores stormwater for later use, thereby offsetting potable water demand and reducing pollutant loading to the storm drain system.

The County of Los Angeles Health Department reviews all storm water harvesting systems for any potential health implications due to long term storage of rainwater. It has been determined by LA County Health Department that storage in excess of 6 months is allowed, so if the stored stormwater does not come in direct contact humans or any other potable water sources. To protect the public from these such occurrences, any potable water lines feeding into the harvesting water system are protected by the installation of a backwater valve.

If the harvesting water tank requires emptying due to maintenance, then all held water must be diverted to the sanitary sewer system per the LA County Health Department guidelines. However, as new guidelines and guidance becomes available; the potential for other uses of collected stormwater will be considered. Capture and use BMPs that are designed with the intent to use captured stormwater for indoor or consumptive purposes will be reviewed on a case-by-case basis to ensure that all treatment, plumbing, and Building and Safety codes are met. Prior to connection to the harvesting tank, downspout filters will be installed to remove any debris that enters the harvesting tank from the on-site piping system. Any storm water flows in excess of the 85th percentile storm will overflow to the street gutter system.

4.4.1.2 Conserve Natural Areas

The existing Project Site consists of mobile home park. There is minimal existing landscape within the Project Site. Following development of the Project, the Project Site will include additional landscaped open areas, and as discussed above, will provide water quality treatment to meet the LID requirements of the Los Angeles County Department of Public Works.

4.4.2 Source Control BMPs

4.4.2.1 Protect Slopes and Channels

There are no unprotected slopes or unlined channels onsite. The entire area to be developed will be either vegetated or hardscaped.

4.4.2.2 Provide Storm Drain System Stenciling and Signage

Stenciling will be provided for public storm drains near the vicinity of the Project.

4.4.3 Treatment Control BMPs

4.4.3.1 Mitigation Design (Volumetric or Flow based)

The LID calculation methodology was used to calculate the required treatment volumes for each of the discharge points from the Project Site. Volume-based criteria are used in the

sizing of the cistern. LID calculations are provided in section 7.0. The results are summarized in the tables below.

Table 5. Proposed Condition SUSMP Results

Project Site Area [ac]	BMP Type	85th percentile *V_M [ft^3]
27.3	Stormwater Capture and Use	49,507

*The total volume (Vm) of stormwater runoff to be mitigated was calculated by analyzing the Project area as one area. Using this Vm and the appropriate BMP calculation from the County of LA LID manual, Table 6 shows the requirements for the area.

Table 6. Summary SUSMP / LID Mitigation BMPs

Area	Area [ac]	Impervious Area [ac]	Required Storage Volume SWQDv [ft^3]	BMP Type	Provided Treatment SWQDv [ft^3]	% Treated	Impervious Area Untreated [ac]
1	27.3	20.2	49,507	Stormwater Capture and Use	59,201	100	0
Total Percent Treatment						**100%**	

The proposed BMP will provide full treatment of the 85th percentile storm event. The selected BMP for the Project Site has a larger volume capacity to treat more than the required baseline volume of 49,507 ft^3. The total provided treatment volume is 49,507 ft^3 or 370,400 gallons.

5.0 Significance Thresholds

5.1 Surface Water Hydrology

With respect to surface water hydrology, the State 2019 CEQA Guidelines (Appendix G) inquire whether the Project would:

- Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river or through the addition of impervious surfaces, in a manner which would:
    - Substantially decrease groundwater supplies or interfere substantially with groundwater recharge such that the project may impede sustainable groundwater management of the basin?
    - Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river or through the addition of impervious surfaces, in a manner which would:
        - Result in substantial erosion or siltation on- or off-site;
        - Substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site;
        - Create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff; or
        - Impede or redirect flood flows?

- In flood hazard, tsunami, or seiche zones, risk release of pollutants due to project inundation?

5.2 Surface Water Quality

With respect to surface water quality, the State 2019 CEQA Guidelines (Appendix G) inquire whether the Project would:

- In flood hazard, tsunami, or seiche zones, risk release of pollutants due to project inundation?
- Conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan?

The Appendix G of the CEQA Guidelines can be used to determine the significance of a project's impact on surface water quality. These are defined in Section 13050 of the California Water Code (CWC). Pollution, contamination, or nuisance may occur if regulatory standards are violated, as defined in the applicable NPDES stormwater permit or Water Quality Control Plan for the receiving water body. The CWC include the following definitions:

"Pollution" means an alteration of the quality of waters of the state to a degree which unreasonably affects either the following: 1) the waters for beneficial uses or 2) facilities which serve these beneficial uses. "Pollution" may include "Contamination".

"Contamination" means an impairment of the quality of the waters of the state by waste to a degree, which creates a hazard to the public health through poisoning or through the spread of disease. "Contamination" includes any equivalent effect resulting from the disposal of waste, whether or not waters of the state are affected.

"Nuisance" means anything which meets all of the following requirements: 1) is injurious to health, or is indecent or offensive to the senses, or an obstruction to the free use of property, so as to interfere with the comfortable enjoyment of life or property; 2) affects at the same time an entire community or neighborhood, or any considerable number of persons, although the extend of the annoyance or damage inflicted upon individuals may be unequal; and 3) occurs during, or as a result of the treatment or disposal of wastes.

6.0 Project Impact Analysis

6.1 Surface Water Hydrology

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
Would the project:				
a. Substantially decrease groundwater supplies or interfere substantially with groundwater recharge such that the project may impede sustainable groundwater management of the basin?	☐	☐	☒	☐
b. Substantially alter the existing drainage pattern of the site or area including through the alteration of the course of a stream or river, in a manner which would:				
i. Result in substantial erosion or siltation on or off-site;	☐	☐	☒	☐
ii. Substantially increase the rate or amount of surface runoff in a manner which would result in flooding on or off-site;	☐	☐	☒	☐
iii. Create or combine runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted; or	☐	☐	☒	☐
iv. Impede or redirect flood flows?	☐	☐	☒	☐
c. In flood hazard, tsunami, or seiche zones, risk release of pollutants due to project inundation?	☐	☐	☒	☐
d. Conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan?	☐	☐	☒	☐

a. Would the project substantially decrease groundwater supplies or interfere substantially with groundwater recharge such that the project may impede sustainable groundwater management of the basin?

Less Than Significant Impact. As discussed above, construction activities for the project involves the development of multiple residential buildings with a café, restaurant space, and open space park areas to serve as amenity spaces for the community on a 27.3-acre site. There are no proposed underground levels for this Project. Information of groundwater data collected from the State Water Resources Control Board's GEOTRACKER website indicates that in 2010, groundwater was reported at a depth of 40 feet below grade, located approximately 3,000 and 3,300 feet north of the Project site, respectively. Although the excavation is not below the current groundwater level, it is still possible that groundwater could be encountered during excavation. If groundwater is encountered during construction, temporary pumps and filtration would be utilized in compliance with all applicable regulations and requirements, including all relevant NPDES requirements related to construction and discharges from dewatering operations. NPDES requires dischargers must demonstrate that discharges do not violate any water quality objective/criteria for the receiving waters, demonstrate that discharge shall not exceed effluent limitations, perform an analysis using a sample of groundwater or wastewater to be discharged, show discharge shall not cause acute nor chronic toxicity in receiving waters, that discharge shall pass through a treatment system if necessary, and must comply with the provisions of the NPDES permit. Therefore, through compliance with regulatory requirements, potential impacts would be less than significant.

Regarding groundwater recharge, the Project Site is currently mostly impervious with approximately 100-percent impervious surfaces. Therefore, there is currently low groundwater recharge potential. While operation of the Project would not change the amount of impervious surface, the underground footprint of the Project's improvements and landscaping would span property line to property line, and therefore the groundwater recharge potential would remain minimal. As stated above, the volume greater than the first flush of stormwater, which bypasses the BMP systems, would discharge to an approved discharge point in the public right-of-way and would not result in infiltration of a large amount of rainfall that would affect groundwater hydrology, including the direction of groundwater flow. As such, the Project would not interfere substantially with groundwater recharge such that the Project may impede sustainable groundwater management of the West Coast Groundwater Basin.

Therefore, the Project's potential impact on groundwater supplies and groundwater recharge would be less than significant, and no mitigation measures are required.

b. Would the project substantially alter the existing drainage pattern of the site or area including through the alteration of the course of a stream or river, in a manner which would:

i. result in substantial erosion or siltation on or off-site;

Less Than Significant Impact. Construction activities have the potential to temporarily alter existing drainage patterns and flows on the Project Site by exposing the underlying soils, modifying flow direction, and making the Project Site temporarily more permeable. Also, exposed and stockpiled soils could be subject to erosion and conveyance into nearby storm drains during storm events. In addition, on-site watering activities to reduce airborne dust could contribute to pollutant loading in runoff. However, as discussed above, Project construction activities would occur in accordance with City grading permit regulations (Chapter IX, Division 70 of the LAMC), such as the preparation of an erosion control plan, to permit regulations, construction activities for the Project would not substantially alter the Project Site drainage patterns in a manner that would result in substantial erosion or siltation on- or off-site. As such, construction-related impacts to hydrology would be less than significant, and no mitigation measures are required.

The Project Site is comprised of approximately 100-percent impervious surfaces under existing conditions. With implementation of the Project, the amount of impervious area would not increase. As such, there would be a limited potential for erosion or siltation to occur from exposed soils or large expenses of pervious areas. Therefore, the Project would not substantially alter the existing drainage pattern of the

Project Site or surrounding area such that substantial erosion or siltation on-site or off-site would occur. Operational impacts to hydrology would be less than significant, and no mitigation measures are required. Impacts are not likely to occur, because as the Regional Water Quality Control Board (RWQCB) dictates, the Project must provide a Low Impact Development (LID) system which will capture and use all the rainwater from the 85th percentile storm. As Table 1 demonstrates, a decrease in runoff is expected due to the development even when the impervious area increases. Therefore, no impact is expected.

ii. substantially increase the rate or amount of surface runoff in a manner which would result in flooding on or off-site

Less Than Significant Impact. The Dominguez Channel is within the vicinity of the Project Site. Construction activities for the Project would involve removal of the existing structures and associated hardscape as well as the excavation and removal of soil. These activities have the potential to temporarily alter existing drainage patterns on the Project Site by exposing the underlying soils, modifying flow direction, and making the Project Site temporarily more permeable. Project Construction activities would occur in accordance with City grading permit regulations (Chapter IX, Division 70 of the LAMC), such as the preparation of an erosion control plan, to reduce the effects of sedimentation and erosion. Thus, through compliance with applicable City grading permit regulations, construction activities for the Project would not substantially alter the Project Site drainage patterns in a manner that would result in flooding on- or off-site. As such, construction-related impacts to hydrology would be less than significant, and no mitigation measures are required.

As previously discussed, under the County's LID Ordinance, post-construction stormwater runoff from new projects must be infiltrated, evapotranspirated, captured and used, and/or treated through high efficiency BMPs on-site for the volume of water produced by the greater of the 85th percentile storm event or the 0.75-inch storm event (i.e., "first flush"). Consistent with LID requirements to reduce the quantity and improve the quality of rainfall runoff that leaves the Project Site, the Project would include the installation BMP systems would be designed with an internal bypass overflow system to prevent upstream flooding during major storm events. Therefore, while the Project would not increase impervious surfaces compared to existing conditions, with implementation of BMPs the Project would not increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site. Operational impacts to hydrology would be less than significant, and no mitigation measures are required.

iii. create or combine runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted;

Less Than Significant Impact. The Project Site currently consists of a mobile home park, and no landscaped areas. The Project Site is 100-percent impervious and is not crossed by any water courses or rivers. Stormwater runoff currently flows into v-gutters throughout the Project Site and is collected by various catch basins that drain to an LA County Flood Control District storm drain line that runs through the middle of the Project Site. The County storm drain line is a 75" reinforced concrete pipe that drains into the nearby Dominguez Channel. Stormwater runoff in areas directly adjacent to Grace Ave and Avalon Blvd flows to the street curb and gutter system and does not directly discharge into the County storm drain

As previously discussed, operation of the Project would keep the impervious surface area within the Project Site at 95-percent. The Project would include the installation of building roof drain downspouts, area drain, and planter drains to collect roof and site runoff. The Project would also direct stormwater away from buildings through a series of storm drain pipes. Furthermore, based on the volumetric flow rate analysis, a comparison of the pre- and post-Project peak flow rate indicated that there would be a decrease in stormwater runoff. In addition, the implementation of BMPs required by the County's LID Ordinance would target runoff pollutants that could potentially be carried in stormwater runoff due to the collection of water to meet the regional LID guidelines. Therefore, the Project would not create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff. Impacts would be less than significant, and no mitigation measures are required.

iv. impede or redirect flood flows?

Less Than Significant Impact. The Project Site is located inside the 500 Yr. Flood Zone, otherwise known as Zone X, in the Flood Insurance Rate Maps from the Federal Emergency Management Agency (FEMA). The 500 Yr. Flood Zone refers to an area with a 0.2% (or 1 in 500 chance) annual chance of flooding. This zone is also used to designate base floodplains of lesser hazards, such as areas protected by levees from 100-year flood, or shallow flooding areas with average depths of less than one foot or drainage areas less than 1 square mile. In addition to the low risk of flooding, the Project would implement a capture and use and/or biofiltration system BMPs and a stormwater conveyance system. Thus, the Project would not alter the existing drainage pattern of the Project Site in a manner that would impede or redirect flood flows. As such, no impacts would occur.

c. In flood hazard, tsunami, or seiche zones, would the project risk release of pollutants due to project inundation?

Less Than Significant Impact. Earthquake-induced flooding occurs when nearby water retaining structures, such as dams or storage tanks, are breached or damaged during an earthquake. The Los Angeles County Safety Element (1990) identified the Project Site to be within a "dam or debris basin flood area". The Hansen Dam Reservoir has been identified by the Los Angeles County Safety Element (1990) as a potential source being located approximately 17 miles to the northwest of the Project Site. However, there appears to be minimal risk of earthquake-induced flooding at the Project site due to the following:

- In general, there are engineering controls in place that are established by state and local agencies to monitor the dam safety in accordance with the National Dam Safety Act (Public Law 92-367) to ensure that these structures are designed and constructed properly as well as receive regular inspections, maintenance and design retrofits, to reduce the potential for earthquake-induced failures.
- In addition to the site distance, there are also numerous drainage channels and spreading grounds between the source and the Project site, including the Los Angeles River and Dominguez Channel, that would intercept and divert flood waters that would result from a breach of the Hansen Dam or similar water-storage structures upstream.

Moreover, the Project would not exacerbate potential dam failure or the possibility of flooding as a result of dam failure.

The Project is located too far away from the ocean and is at too high of an elevation for it to be affected by a tsunami. Seiches, which is a temporary disturbance in the water levels of lakes or partially enclosed bodies of water, will not affect the Project as it is not close enough to a large body of water to be affected.

As previously described, the Project Site is located inside Zone X in the Flood Insurance Rate Maps from the Federal Emergency Management Agency (FEMA). In addition to the low risk of flooding, the Project includes capture and use and/or biofiltration system BMP and a stormwater conveyance system, which would be improved upon the existing site devoid of treatment and on-site detention. Therefore, the Project would not risk release of pollutant due to inundation by flood hazards.

For the reasons addressed above, the Project Site would have a less than significant impact on the potential release of pollutants due to a potential dam failure. And the Project Site would not have a risk of release of pollutants as a result of tsunami or seiche.

d. Conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan?

Less Than Significant Impact. Under Section 303(d) of the Clean Water Act, states are required to identify water bodies that do not meet their water quality standards. Biennially, the Los Angeles Regional

Water Quality Control Board (LARWQCB) prepares a list of impaired waterbodies in the region, referred to as the 3030(d) list. The 303(d) list are subject to the development of a Total Maximum Daily Load (TMDL). As discussed in this report, the Project Site is located within the Los Angeles River Watershed. Constituents of concern listed for the Los Angeles River under California's Clean Water Act Section 303(d) List include Ammonia, Copper, Indicator Bacteria, Lead, Nutrients (Algae), Oil, and Trash. No Total Maximum Daily Load (TMDL) data have been recorded by EPA for this waterbody.

As described above, based on observation of existing conditions, stormwater currently discharges from the Project Site without treatment or on-site detention. Thus, the Project's implementation of capture and use and/or biofiltration system BMPs would minimize the release of anticipated and potential pollutants generated by the Project (e.g., sediment, nutrients, pesticides, metals, pathogens, and oil and grease). As the project would not increase the amount of impervious area, implementation of the LID BMP measures on the Project Site would result in an improvement in surface water quality runoff when compared to existing conditions. In addition, during construction operations the project site is required by the State Water Resources Control Board (SWRCB) to implement stormwater management Best Management Practices (BMPs) as required in the project's Stormwater Pollution Prevention Program (SWPPP) following the latest guidelines of the California Stormwater Quality Association (CASQA) handbook. These BMPs will ensure that stormwater runoff quality during construction is maintained in a manner which reduces sediment transmission, lowers stormwater turbidity, as well as maintains the overall pH of the stormwater.

As such, the Project would not conflict with or obstruct any water quality control plans. With compliance with existing regulatory requirements and implementation of LID BMP's, the Project would no conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan. Impacts would be less than significant.

Surface Water Hydrology During Construction

During construction of the project, a SWPPP written by a Qualified SWPPP Developer will be prepared to implement temporary control measures throughout the construction phase. The SWPPP is designed to comply with California's General Permit for Stormwater Discharges Associated with Construction and Land Disturbance Activities (General Permit) Order No. 2009-0009-DWQ as amended in 2010 and 2012 (NPDES No. CAS000002) issued by the State Water Resources Control Board (State Water Board). In accordance with the General Permit, Section XIV, the SWPPP is designed to address the following:

- Sources of sediment associated with construction, construction site erosion and other activities associated with construction activity are controlled;
- Where not otherwise required to be under a Regional Water Quality Control Board (Regional Water Board) permit, all non-stormwater discharges are identified and either eliminated, controlled, or treated;

Surface Water Hydrology During Operation

Per Los Angeles Municipal Code (LAMC) Guidelines, required Permit Registration Documents (PRDs) shall be submitted to the State Water Board via the Stormwater Multi Application and Report Tracking System (SMARTS) by the Legally Responsible Person (LRP), or authorized personnel (i.e., Approved Signatory) under the direction of the LRP. The project-specific PRDs include:

1. Notice of Intent (NOI);
2. Risk Assessment (Construction Site Sediment and Receiving Water Risk Determination);
3. Site Map;
4. Annual Fee;
5. Signed Certification Statement (LRP Certification is provided electronically with SMARTS PRD submittal); and
6. SWPPP.
    a. Post-construction water balance calculation;

b. Active Treatment System (ATS) plan; and
c. Dischargers proposing an alternate soil erodibility factor must submit justification (documentation of methods used [e.g. soil particle size analysis].

With compliance with the above regulatory requirements, the Project will have less than significant impact on the surface water hydrology. Specifically, based on the above, the Project would not result in an incremental impact for flooding on either on-site or off-site areas during a 50-year storm event, it would not substantially increase the amount of surface water in a water body, and it will not result in a permanent adverse change to the movement of surface water that would result in an incremental effect on the capacity of the existing storm drain system. As demonstrated in Section 3.5, the Project would also not require significant new stormwater infrastructure since there will be a reduction in stormwater flows due to the Project's required LID reductions. Therefore, the development of the Project would result in less than significant impact on surface water hydrology.

Cumulative Impact Analysis

The geographic context for the cumulative impact analysis on surface water hydrology is the Los Angeles River Watershed. The Project in conjunction with forecasted growth in the Los Angeles River Watershed could cumulatively increase stormwater runoff flows. However, as noted above, the Project would have no net impact on stormwater flows. Also, in accordance with County requirements, related projects and other future development projects would be required to implement BMPs to manage stormwater in accordance with LID guidelines. Furthermore, the County of Los Angeles Department of Public Works would review each future development project on a case-by-case basis to ensure enough local and regional infrastructure is available to accommodate stormwater runoff. Therefore, potential cumulative impacts associated with the Project on surface water hydrology would be less than significant.

6.2 Surface Water Quality

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
Would the project:				
a. Violate any water quality standards or waste discharge requirements?	☐	☐	☒	☐
b. Otherwise substantially degrade water quality?	☐	☐	☒	☐

a. violate any water quality standards or waste discharge requirements?

Less Than Significant Impact. As discussed in the following analysis, the Project would not violate any water quality standards or waste discharge requirements or otherwise substantially degrade surface of groundwater quality.

Surface Water Quality During Construction

During Project construction, particularly during the grading phase, stormwater runoff from precipitation events could cause exposed and stockpiled soils to be subject to erosion and convey sediments into municipal storm drain systems. In addition, on-site watering activities to reduce airborne

dust could contribute to pollutant loading in runoff. Pollutant discharges relating to the storage, handling, use and disposal of chemicals, adhesives, coatings, lubricants, and fuel could also occur. As Project construction would disturb less than one acre of soil, the Project would not be required to obtain coverage under the National Pollutant Discharge Elimination System (NPDES) Construction General Permit. However, the Project would be required to implement Best Management Practices (BMP's) as part of the City's grading permit requirements. BMP's would include, but would not necessarily be limited to, erosion control, sediment control, non-stormwater management, and materials management BMP's (e.g., sandbags, storm drain inlets protection, stabilized construction entrance/exit, wind erosion control, and stockpile management) to minimize the discharge of pollutants in stormwater runoff during construction. In addition, Project construction activities would occur in accordance with City grading permit regulations (LAMC Chapter IX, Division 70), such as the preparation of an Erosion Control Plan, to reduce the effects of sediment and erosion.

As discussed above, construction activities for the project involves the development of multiple residential buildings with a café, restaurant space, and open space park areas to serve as amenity spaces for the community on a 27.3-acre site. There are no proposed underground levels for this Project. Information of groundwater data collected from the State Water Resources Control Board's GEOTRACKER website indicates that in 2010, groundwater was reported at a depth of 40 feet below grade, located approximately 3,000 and 3,300 feet north of the Project site, respectively. Although the excavation is not below the current groundwater level, it is still possible that groundwater could be encountered during excavation. If groundwater is encountered during construction, temporary pumps and filtration would be utilized in compliance with all applicable regulations and requirements, including all relevant NPDES requirements related to construction and discharges from dewatering operations. NPDES requires dischargers must demonstrate that discharges do not violate any water quality objective/criteria for the receiving waters, demonstrate that discharge shall not exceed effluent limitations, perform an analysis using a sample of groundwater or wastewater to be discharged, show discharge shall not cause acute nor chronic toxicity in receiving waters, that discharge shall pass through a treatment system if necessary, and must comply with the provisions of the NPDES permit. Therefore, through compliance with regulatory requirements, potential impacts would be less than significant.

Dewatering operations are practices that discharge non-stormwater, such as groundwater, that must be removed from a work location and discharged into the storm drain system to proceed with construction. Discharges from dewatering operations can contain high levels of fine sediments, which, if not properly treated, could lead to exceedance of the NPDES requirements. If groundwater is encountered during construction, temporary pumps and filtration would be utilized in compliance with all relevant NPDES requirements related to construction and discharges from dewatering operations. Furthermore, if dewatering is required, the treatment and disposal of the dewatered water would occur in accordance with the Los Angeles Regional Water Quality Control Board (LARWQCB) Waste Discharge Requirements for Discharges of Groundwater from Construction and Project Dewatering to Surface Waters in Coastal Watersheds of Los Angeles and Ventura Counties.

With the implementation of site-specific BMP's included as part of the Erosion Control Plan required to comply with the City grading permit regulations, the Project would significantly reduce or eliminate the discharge of potential pollutants from the stormwater runoff. Therefore, with compliance with NPDES requirements and City grading regulations, construction of the Project would not violate any water quality standard or waste discharge requirements or otherwise substantially degrade surface water quality. Furthermore, construction of the Project would not result in discharges that would cause regulatory standards to be violated. Thus, temporary construction-related impacts on surface water quality would be less than significant, and no mitigation measures are required.

Surface Water Quality During Operation

Under the County's Low Impact Development (LID) Ordinance, post-construction stormwater runoff from new projects must be infiltrated, evapotranspirated, captured and used, and/or treated through high efficiency BMP's on-site for the volume of water produced by the greater of the 85th percentile storm event or the 0.75-inch storm event (i.e., "first flush"). Consistent with LID requirements to reduce the quantity and

improve the quality of rainfall runoff that leaves the Project Site, the Project would include the installation of capture and use and/or biofiltration system BMP's as established by the LID Manual. The installed BMP systems would be designed with an internal bypass overflow system to prevent upstream flooding during major storm events. As most potential contaminants are anticipated to be contained within the "first flush" storm event, major storms are not anticipated to cause an exceedance of regulatory standards.

Due to the nature of the proposed development to change the land use from an existing warehouse to a residential/commercial development, the Project will result in a reduction of potential types of pollutants. As detailed in Section 4.0, a comparison of the pollutants existing in the Dominguez Channel based on the State 303(d) list and pollutants associated with the planned land use activities on the Project Site show an overlap of **organic compounds, pesticides, and bacteria & viruses** as pollutants**.** These three pollutants of concern will be addressed through the proposed stormwater BMPs in order to comply with Los Angeles County's Standard Urban Stormwater Mitigation Plan (SUSMP). BMPs include, but are not limited to, rainwater harvesting and an increase of landscape area. For example, rainwater harvesting collects rainwater from a surface that allows for the rainwater to be stored and used later. In a typical rainwater harvesting situation, rainwater is collected from an impervious surface such as the roof of a building and then stored inside of a tank or cistern. Rainwater can be collected from other surfaces as well such as parking lots, roadways, driveways, and even land surfaces. Based on the analysis contained in this report, there are no significant impacts for surface water quality as a result of the Project.

With compliance under the SWPPP, SUSMP, and the County's LID Ordinance, construction and operational water quality impacts would be less than significant.

Groundwater Quality During Construction

As discussed above, construction activities for the project involves the development of multiple residential buildings with a café, restaurant space, and open space park areas to serve as amenity spaces for the community on a 27.3-acre site. There are no proposed underground levels for this Project. Information of groundwater data collected from the State Water Resources Control Board's GEOTRACKER website indicates that in 2010, groundwater was reported at a depth of 40 feet below grade, located approximately 3,000 and 3,300 feet north of the Project site, respectively. Although the excavation is not below the current groundwater level, it is still possible that groundwater could be encountered during excavation. If groundwater is encountered during construction, temporary pumps and filtration would be utilized in compliance with all applicable regulations and requirements, including all relevant NPDES requirements related to construction and discharges from dewatering operations. NPDES requires dischargers must demonstrate that discharges do not violate any water quality objective/criteria for the receiving waters, demonstrate that discharge shall not exceed effluent limitations, perform an analysis using a sample of groundwater or wastewater to be discharged, show discharge shall not cause acute nor chronic toxicity in receiving waters, that discharge shall pass through a treatment system if necessary, and must comply with the provisions of the NPDES permit. Therefore, through compliance with regulatory requirements, potential impacts would be less than significant.

If dewatering is required, the treatment and disposal of the dewatered water would occur in accordance with the Los Angeles Regional Water Quality Control Board (LARWQCB) Waste Discharge Requirements for Discharges of Groundwater from Construction and Project Dewatering to Surface Waters in Coastal Watersheds of Los Angeles and Ventura Counties. Therefore, Project construction could potentially improve the existing condition by removing impacted groundwater. In addition, the proposed construction activities would be typical of a residential project and would not involve activities that could further impact the underlying groundwater quality.

Other potential effects to groundwater quality could result from the presence of an underground storage tank (UST) or during the removal of an UST. As previously described, however, no existing UST's are anticipated to be found beneath the Project Site. Therefore, the removal of UST's would not pose a significant hazard on groundwater.

Based on the above, construction of the Project would not result in discharges that would violate any groundwater quality standard or waste discharge requirements. Therefore, construction-related impacts on groundwater quality would be less than significant, and no mitigation measures are required.

Groundwater Quality During Operation

Operational activities which could affect groundwater quality include spills of hazardous materials and leaking UST's. Surface spills from the handling of hazardous materials most often involve small quantities and are cleaned up in a timely manner, thereby resulting in little threat to groundwater. Other types of risks such as leaking underground storage have a greater potential to affect groundwater. However, as discussed above, the Project would not include any new UST's that would have the potential to expose groundwater to contaminants. In addition, while the Project would introduce more density and an additional land use (residential) to the project site which would slightly increase the use of potentially hazardous materials as described above, the Project would comply with all applicable existing regulations that would prevent the Project from affecting or expanding any potential areas of contamination, increasing the level of contamination, or causing regulatory water quality standards at an existing production well to be violated, as defined in the California Code of Regulations, Title 22, Division 4, Chapter 15 and the Safe Drinking Water Act. The Project also does not include the installation or operation of water wells, or any extraction or recharge system near the coast, an area of known groundwater contamination or seawater intrusion, a municipal supply well, or a spreading ground facility.

In addition, the Project includes the installation of a capture and use and/or biofiltration system as a means of treatment and disposal of the volume of water produced by the greater of the 85th percentile storm or the 0.750-inch storm event, which would allow for treatment of the on-site stormwater. Therefore, the Project would not violate any water quality standards or waste discharge requirements or otherwise substantially degrade ground water quality. The Project's potential impact on groundwater quality during operation would be less than significant, and no mitigation measures are required.

b. Otherwise substantially degrade water quality?

Less Than Significant Impact. As discussed in response to question 6.2.a, the project would not otherwise substantially degrade water quality, following the reasons provided in that answer.

7.0 Calculations and Site Plan

EXISTING AND PROPOSED PEAK RUNOFF FLOWS

Storm Event	Modeled Rainfall depth (in)	Existing Q total (cfs)	Proposed Q total (cfs)	%Reduction
5-yr	3.56	26.99	22.95	15.0%
10-yr	4.36	35.65	31.61	11.3%
25-yr	5.36	46.54	42.50	8.7%
50-yr	6.1	54.78	50.74	7.4%
100-yr	6.84	63.68	59.64	6.3%

LEGEND:

- STORMWATER FLOW DIRECTION ARROW
- AREA OF OFF-SITE RUNOFF TO PRIVATE PROPERTY
- AREA OF OFF-SITE RUNOFF TO STREET
- CATCH BASIN
- HYDROLOGY AREA

EXISTING DISCHARGE LOCATION FOR COUNTY DRAIN

1
27.3 AC

EXISTING 75" LOS ANGELES COUNTY FLOOD CONTROL DISTRICT DRAIN

GRAPHIC SCALE: 1"=50'

SEAL

DATE 11/2/2020
SCALE 1"=50'
PROJECT NUMBER 11MP020100

IMPERIAL AVALON MIXED USE PROJECT

EXISTING CONDITIONS HYDROLOGY AND DRAINAGE

PSOMAS
555 South Flower Street, Suite 4400
Los Angeles, CA 90071
(213) 223-1400 (213) 223-1444 fax
www.psomas.com

REV	DATE	DESCRIPTION	BY	APP'D

DESIGNED
DRAFTED
CHECKED

SHEET C1
OF

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LID BMP TREATMENT SUMMARY

SUB-AREA	TOTAL AREA (ACRES)	IMPERVIOUS AREA (ACRES)	IMPERVIOUS AREA DESCRIPTION	PERVIOUS AREA (ACRES)	BMP TYPE	BMP DESIGN VOLUME Vw (FT^3)	
						REQUIRED	DESIGNED
1	27.2	20.6	COURTYARD HARDSCAPE, SIDEWALK, STREETS, AND BUILDING ROOF	6.6	INFILTRATION	59,201	59,201

EXISTING AND PROPOSED PEAK RUNOFF FLOWS

	Modeled Rainfall	Existing	Proposed	
Storm Event	depth (in)	Q total (cfs)	Q total (cfs)	%Reduction
5-yr	3.56	26.99	22.95	15.0%
10-yr	4.36	35.65	31.61	11.3%
25-yr	5.36	46.54	42.50	8.7%
50-yr	6.1	54.78	50.74	7.4%
100-yr	6.84	63.68	59.64	6.3%

LEGEND:

- PERVIOUS AREA
- CL – CENTER LINE
- FFE – FINISHED FLOOR ELEVATION
- FG – FINISHED GRADE
- FS – FINISHED SURFACE
- TG – TOP OF GRATE
- LP – LOW POINT
- HP – HIGH POINT
- CATCH BASIN
- 1 / X.XX AC – HYDROLOGY AREA

PROPERTY LINE
25.50 FS/HP
EXISTING DISCHARGE LOCATION FOR COUNTY DRAIN
PROPERTY LINE
ALL STORM DRAIN PIPING TO CONNECT TO LAFCD DRAIN
21.50 FS
20.66 FS/LP
21' SLOPE BASEMENT
26' FIRE LANE
GRACE AVE
BLDG A
FFE=23.5
23.45 FS
23.80 FS
23.50 FS
PROPERTY LINE
22.24 TG/LP
27.2 AC
BLDG B
FFE=23.5
(21.40) FS
PROPERTY LINE
AVALON BLVD
23.20 FS
EXISTING 75' LOS ANGELES COUNTY FLOOD CONTROL DISTRICT DRAIN
24.05 FS
23.40 FS
BLDG D
FFE=23.5
BLDG C
FFE=23.0
32' FIRE LANE
10' SETBACK LINE
ALL STORM DRAIN PIPING TO CONNECT TO LAFCD DRAIN
19.10 FS/LP
28' FIRE LANE
(20.93) FS
20.30 FS
PROPERTY LINE
22.30 FS
21.60 FG/LP
22.90 FS
GRAPHIC SCALE: 1"=50'

IMPERIAL AVALON MIXED USE PROJECT

PROPOSED HYDROLOGY AREA AND GRADING

DATE 11/2/2020
SCALE 1"=50'
PROJECT NUMBER 11MP020100

PSOMAS
555 South Flower Street, Suite 4400
Los Angeles, CA 90071
(213) 223-1400 (213) 223-1444 fax
www.psomas.com

DESIGNED DRAWN CHECKED

SHEET C2 OF

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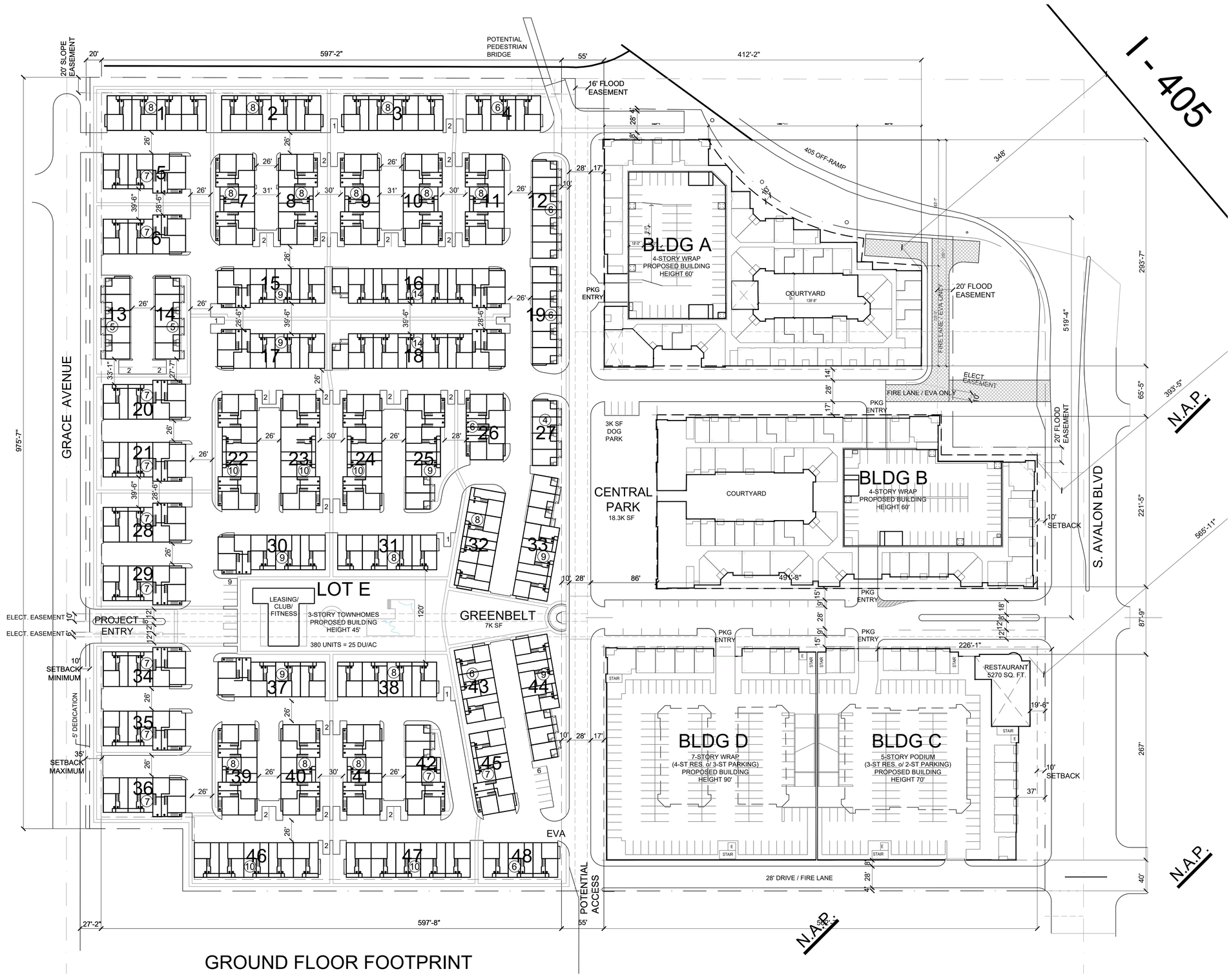
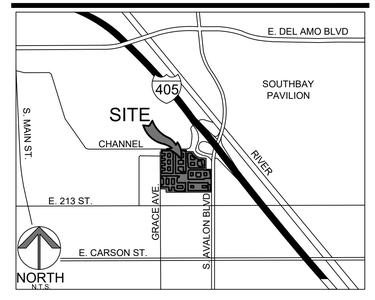


GROUND FLOOR FOOTPRINT

VICINITY MAP



NORTH

1"=60'-0" 0 30' 60' 120' 180'

IMPERIAL AVALON MIXED USE

CARSON, CA 90745

RESIDENTIAL BUILDINGS
Site Plan

Architecture. Design. Relationships.

A1.1

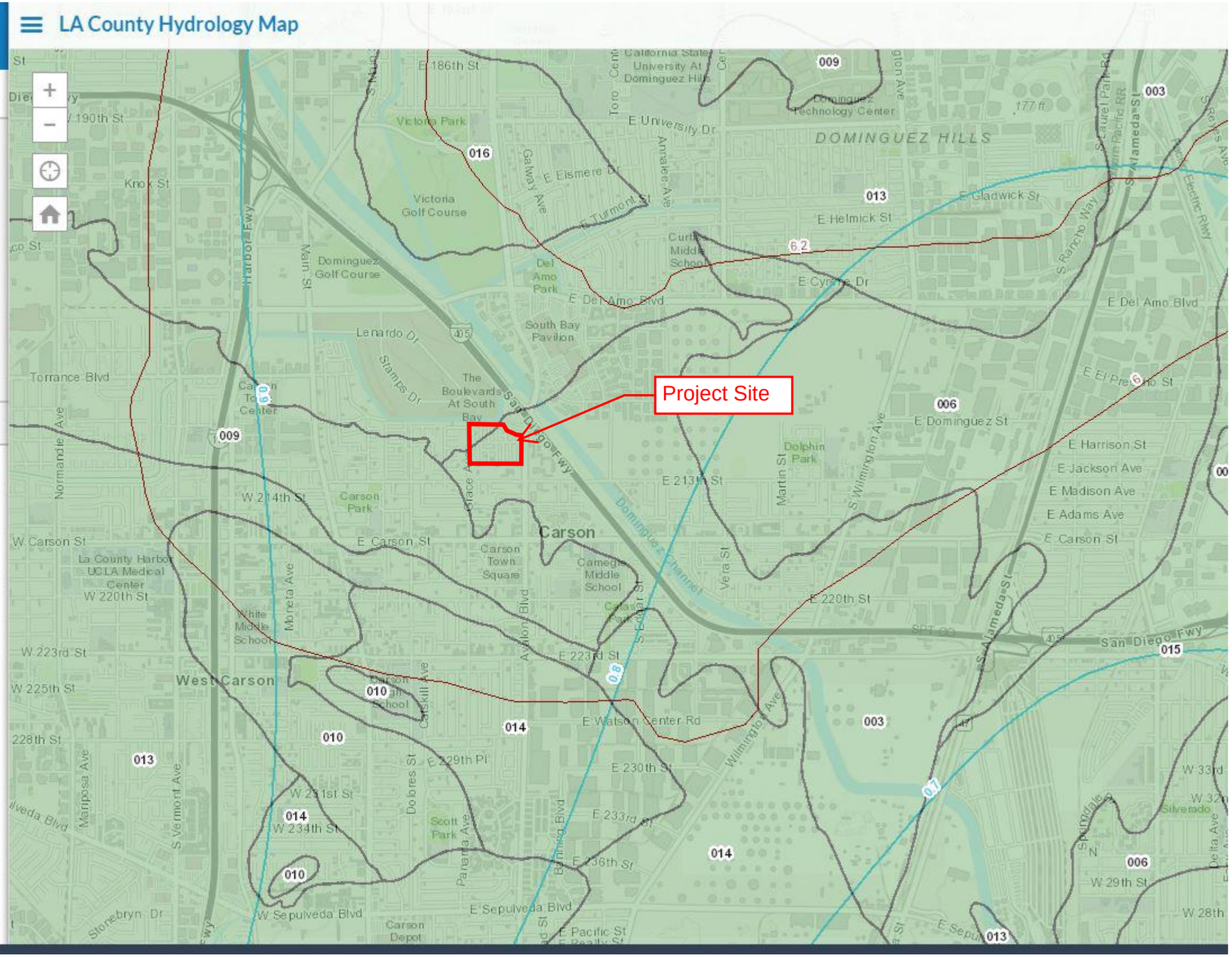
Scale 1" = 60'
Job No. 2019-298
Date 09-30-2020

Wednesday, September 30, 2020 4:57:20 PM
R:\2019\2019-298 FARING CAPITAL IMPERIAL AVALON CARSON\03 DESIGN\02 SCHEMATIC\02 AUTOCAD\19-298_A1.1-1.2 SITE PLAN.DWG

About | Legend | Layers

Layers

- [x] Hydrology GIS
  - [x] 50yr Two Tenths (Rainfall)
  - [ ] DPA Zones
  - [x] Soils 2004
  - [x] Final 85th Percentile, 24-hr Rainfall
  - [ ] 1-year, 1-hour Rainfall Intensity
  - [ ] Final 95th Percentile, 24-hr Rainfall
- [x] LA County Parcels



Peak Flow Hydrologic Analysis

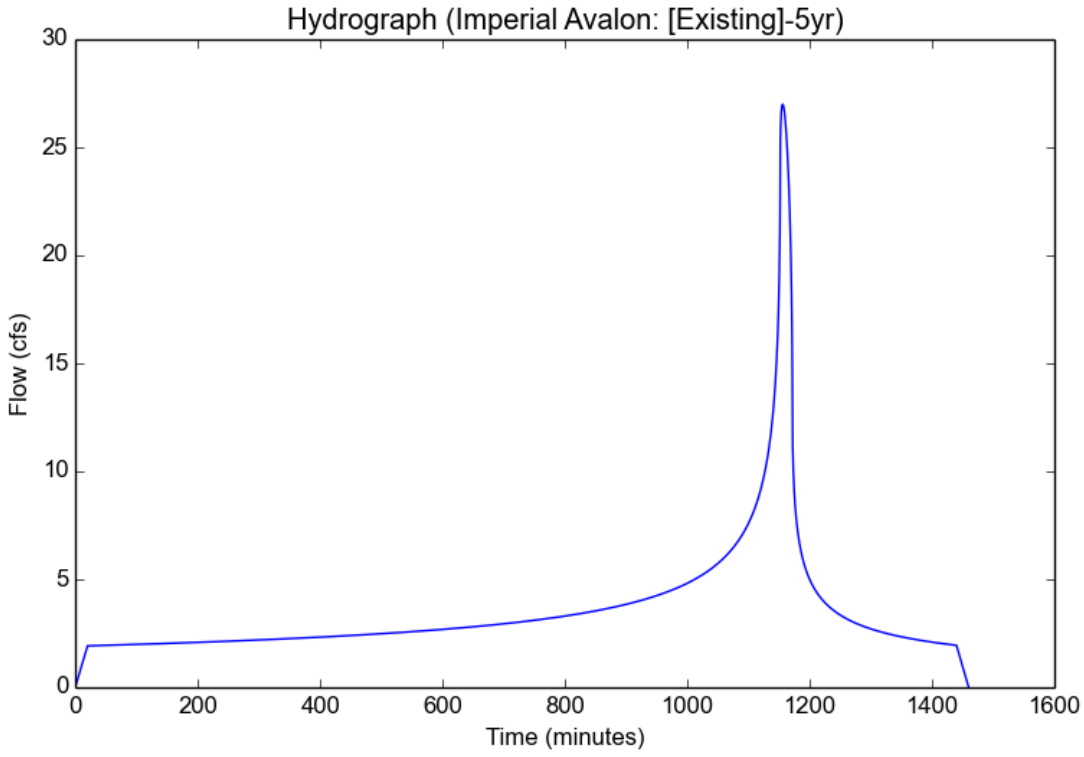
File location: W:/1IMP020100/ENGR/DOCS/Water Resources Report/Attachments/5 - HydroCalcs/Imperial Avalon - [Existing]-5yr.pdf
Version: HydroCalc 0.3.0-beta

Input Parameters

Project Name	Imperial Avalon
Subarea ID	[Existing]-5yr
Area (ac)	27.3
Flow Path Length (ft)	1530.0
Flow Path Slope (vft/hft)	0.01
50-yr Rainfall Depth (in)	6.1
Percent Impervious	0.99
Soil Type	3
Design Storm Frequency	5-yr
Fire Factor	0
LID	False

Output Results

Modeled (5-yr) Rainfall Depth (in)	3.5624
Peak Intensity (in/hr)	1.1078
Undeveloped Runoff Coefficient (Cu)	0.1555
Developed Runoff Coefficient (Cd)	0.8926
Time of Concentration (min)	20.0
Clear Peak Flow Rate (cfs)	26.9945
Burned Peak Flow Rate (cfs)	26.9945
24-Hr Clear Runoff Volume (ac-ft)	7.1697
24-Hr Clear Runoff Volume (cu-ft)	312313.9614



Peak Flow Hydrologic Analysis

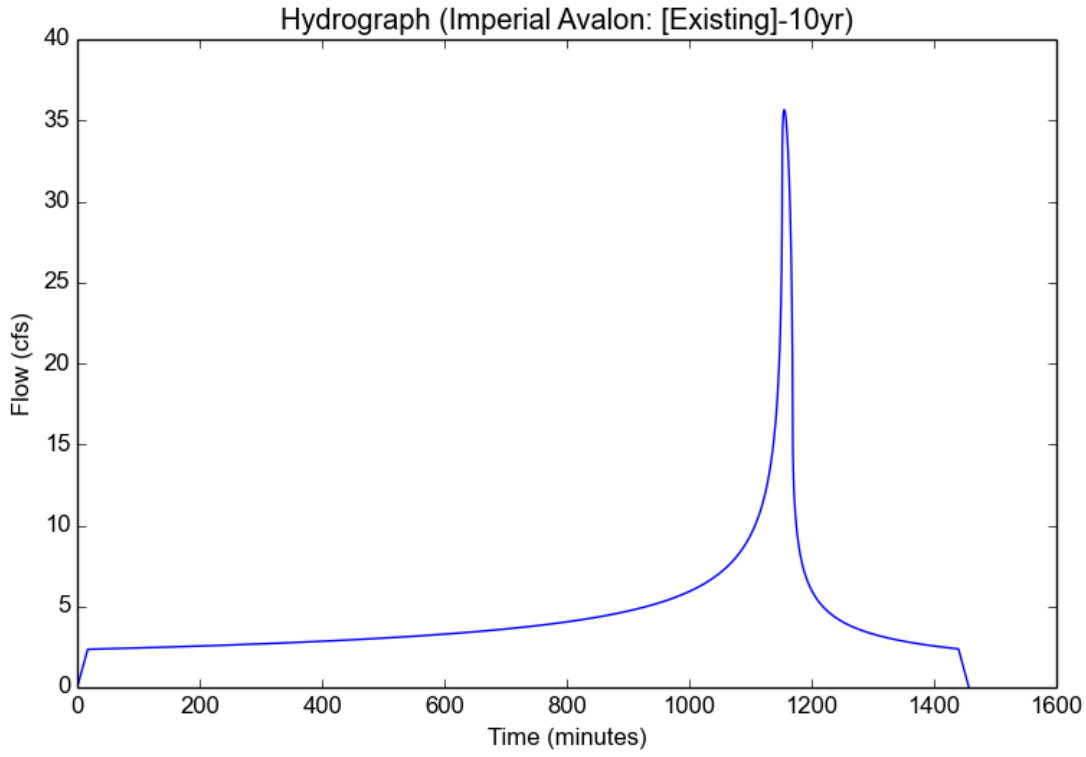
File location: W:/1IMP020100/ENGR/DOCS/Water Resources Report/Attachments/5 - HydroCalcs/Imperial Avalon - [Existing]-10yr.pdf
Version: HydroCalc 0.3.0-beta

Input Parameters

Project Name	Imperial Avalon
Subarea ID	[Existing]-10yr
Area (ac)	27.3
Flow Path Length (ft)	1530.0
Flow Path Slope (vft/hft)	0.01
50-yr Rainfall Depth (in)	6.1
Percent Impervious	0.99
Soil Type	3
Design Storm Frequency	10-yr
Fire Factor	0
LID	False

Output Results

Modeled (10-yr) Rainfall Depth (in)	4.3554
Peak Intensity (in/hr)	1.462
Undeveloped Runoff Coefficient (Cu)	0.2301
Developed Runoff Coefficient (Cd)	0.8933
Time of Concentration (min)	17.0
Clear Peak Flow Rate (cfs)	35.653
Burned Peak Flow Rate (cfs)	35.653
24-Hr Clear Runoff Volume (ac-ft)	8.7663
24-Hr Clear Runoff Volume (cu-ft)	381860.6785



Peak Flow Hydrologic Analysis

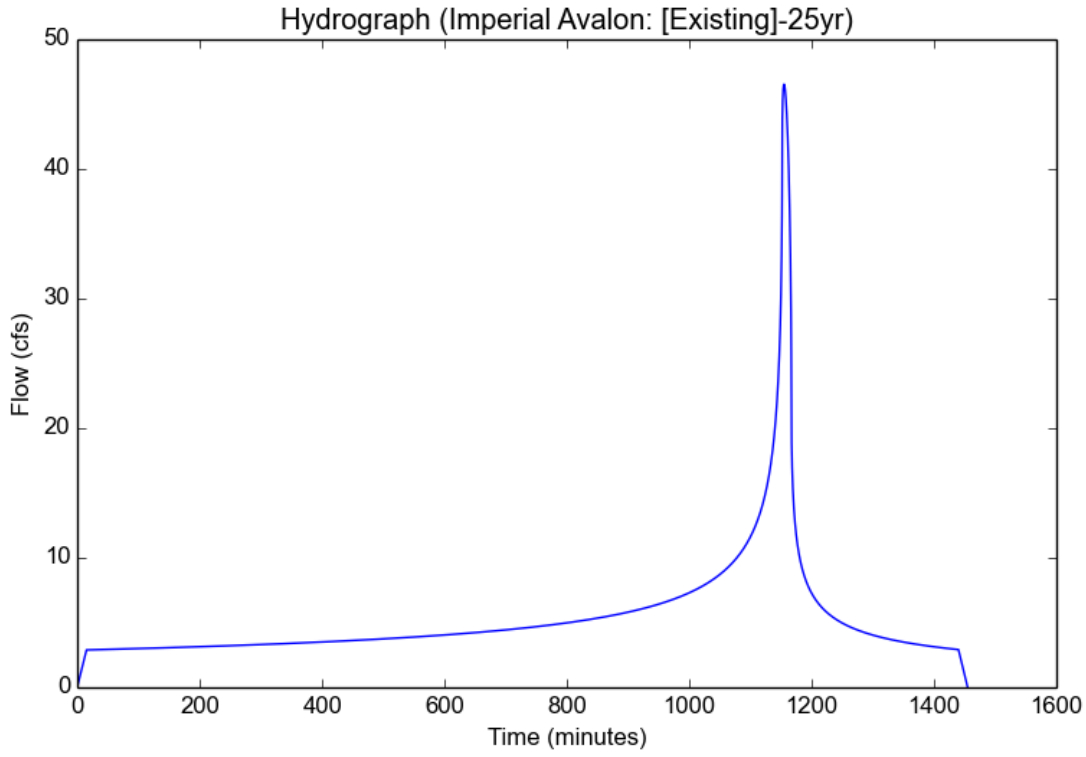
File location: W:/1IMP020100/ENGR/DOCS/Water Resources Report/Attachments/5 - HydroCalcs/Imperial Avalon - [Existing]-25yr.pdf
Version: HydroCalc 0.3.0-beta

Input Parameters

Project Name	Imperial Avalon
Subarea ID	[Existing]-25yr
Area (ac)	27.3
Flow Path Length (ft)	1530.0
Flow Path Slope (vft/hft)	0.01
50-yr Rainfall Depth (in)	6.1
Percent Impervious	0.99
Soil Type	3
Design Storm Frequency	25-yr
Fire Factor	0
LID	False

Output Results

Modeled (25-yr) Rainfall Depth (in)	5.3558
Peak Intensity (in/hr)	1.9067
Undeveloped Runoff Coefficient (Cu)	0.3077
Developed Runoff Coefficient (Cd)	0.8941
Time of Concentration (min)	15.0
Clear Peak Flow Rate (cfs)	46.5391
Burned Peak Flow Rate (cfs)	46.5391
24-Hr Clear Runoff Volume (ac-ft)	10.7807
24-Hr Clear Runoff Volume (cu-ft)	469606.8653



Peak Flow Hydrologic Analysis

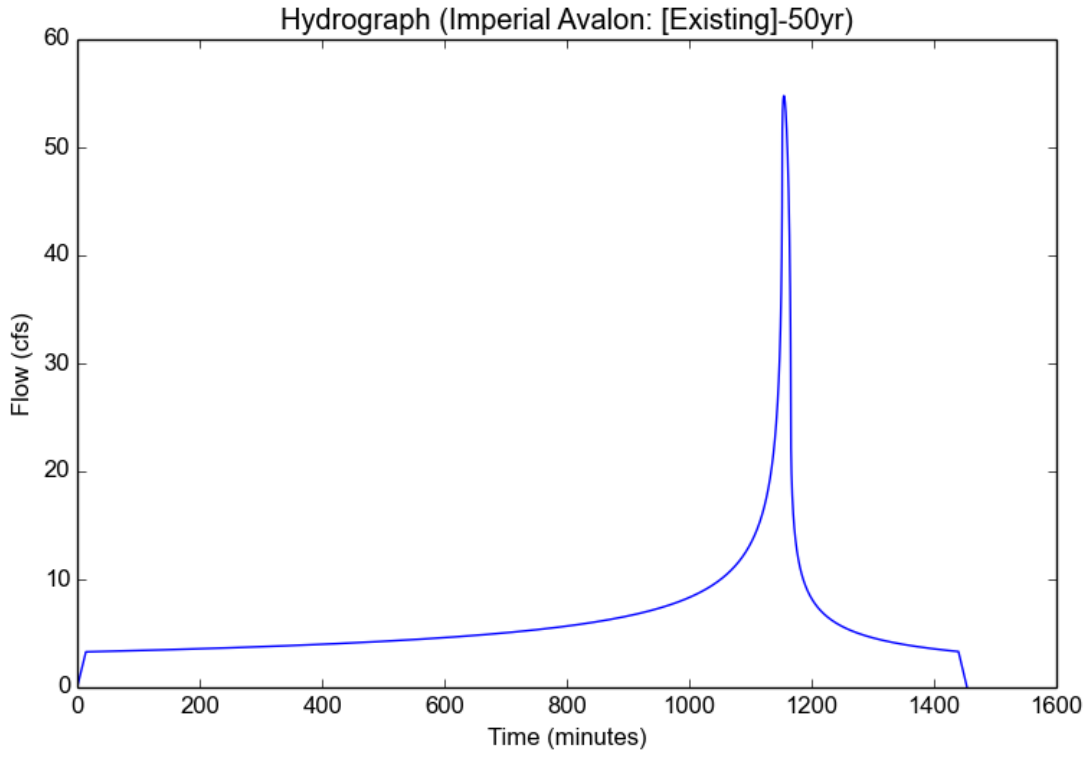
File location: W:/1IMP020100/ENGR/DOCS/Water Resources Report/Attachments/5 - HydroCalcs/Imperial Avalon - [Existing]-50yr.pdf
Version: HydroCalc 0.3.0-beta

Input Parameters

Project Name	Imperial Avalon
Subarea ID	[Existing]-50yr
Area (ac)	27.3
Flow Path Length (ft)	1530.0
Flow Path Slope (vft/hft)	0.01
50-yr Rainfall Depth (in)	6.1
Percent Impervious	0.99
Soil Type	3
Design Storm Frequency	50-yr
Fire Factor	0
LID	False

Output Results

Modeled (50-yr) Rainfall Depth (in)	6.1
Peak Intensity (in/hr)	2.2432
Undeveloped Runoff Coefficient (Cu)	0.3587
Developed Runoff Coefficient (Cd)	0.8946
Time of Concentration (min)	14.0
Clear Peak Flow Rate (cfs)	54.784
Burned Peak Flow Rate (cfs)	54.784
24-Hr Clear Runoff Volume (ac-ft)	12.2793
24-Hr Clear Runoff Volume (cu-ft)	534888.4141



Peak Flow Hydrologic Analysis

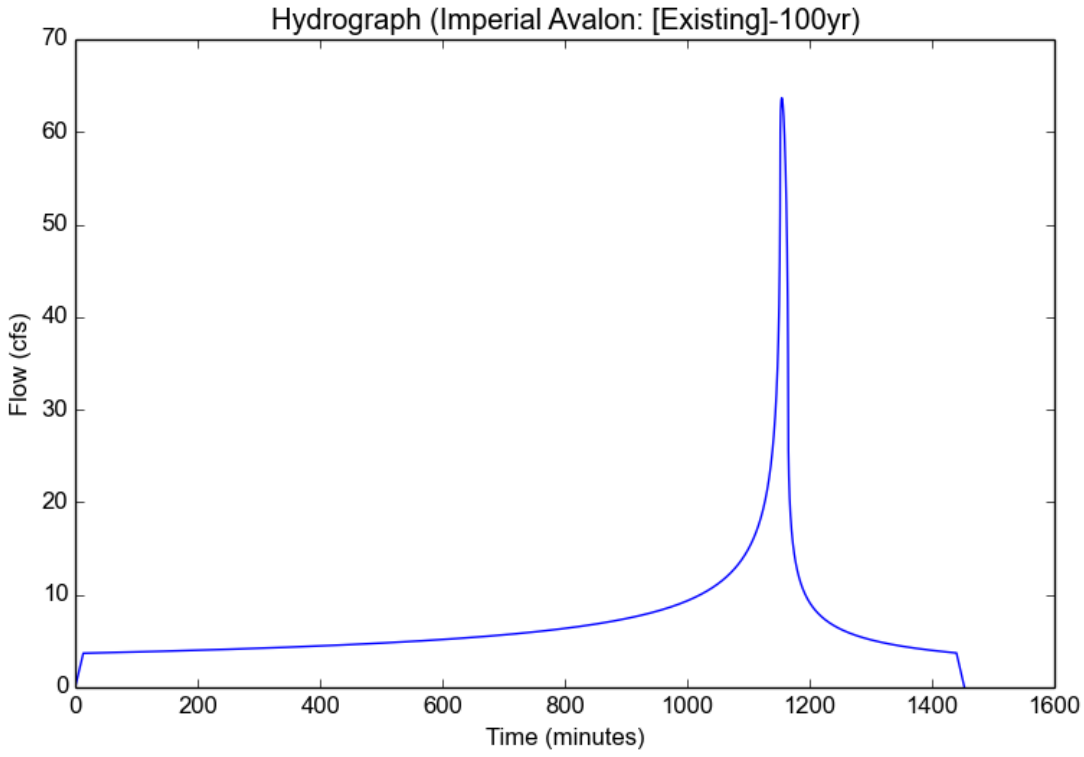
File location: W:/1IMP020100/ENGR/DOCS/Water Resources Report/Attachments/5 - HydroCalcs/Imperial Avalon - [Existing]-100yr.pdf
Version: HydroCalc 0.3.0-beta

Input Parameters

Project Name	Imperial Avalon
Subarea ID	[Existing]-100yr
Area (ac)	27.3
Flow Path Length (ft)	1530.0
Flow Path Slope (vft/hft)	0.01
50-yr Rainfall Depth (in)	6.1
Percent Impervious	0.99
Soil Type	3
Design Storm Frequency	100-yr
Fire Factor	0
LID	False

Output Results

Modeled (100-yr) Rainfall Depth (in)	6.8442
Peak Intensity (in/hr)	2.6061
Undeveloped Runoff Coefficient (Cu)	0.4087
Developed Runoff Coefficient (Cd)	0.8951
Time of Concentration (min)	13.0
Clear Peak Flow Rate (cfs)	63.682
Burned Peak Flow Rate (cfs)	63.682
24-Hr Clear Runoff Volume (ac-ft)	13.7782
24-Hr Clear Runoff Volume (cu-ft)	600178.4164



Peak Flow Hydrologic Analysis

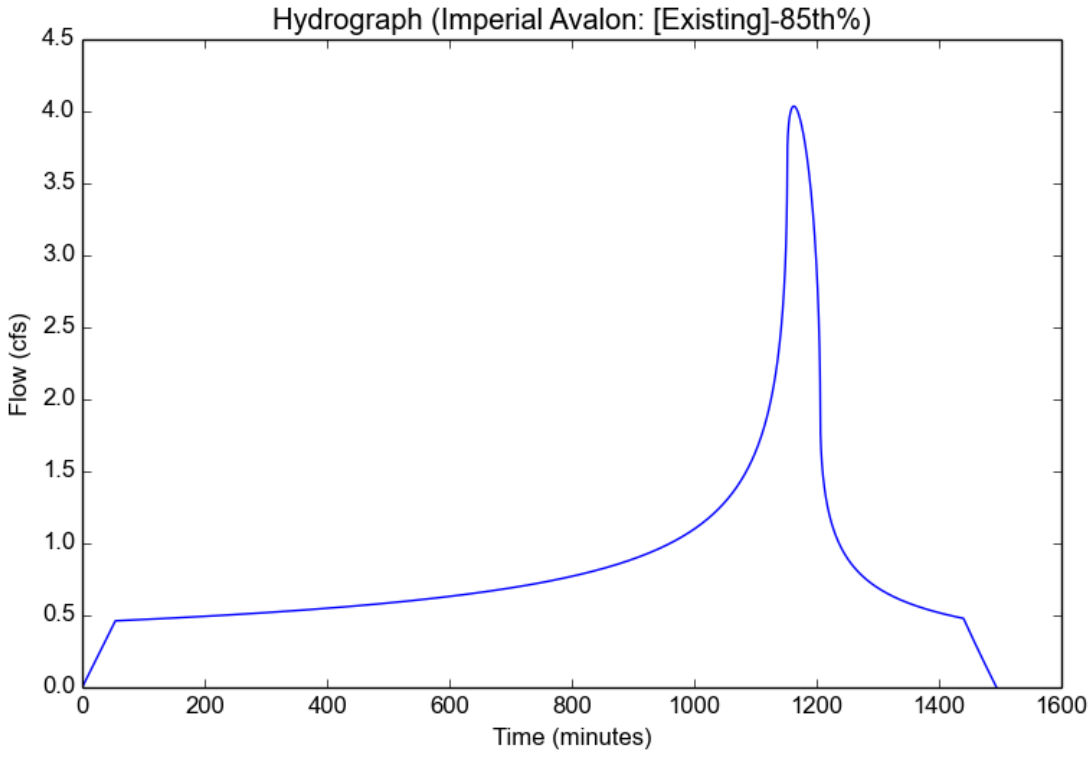
File location: W:/1IMP020100/ENGR/DOCS/Water Resources Report/Attachments/5 - HydroCalcs/Imperial Avalon - [Existing]-85th%.pdf
Version: HydroCalc 0.3.0-beta

Input Parameters

Project Name	Imperial Avalon
Subarea ID	[Existing]-85th%
Area (ac)	27.3
Flow Path Length (ft)	1530.0
Flow Path Slope (vft/hft)	0.01
85th Percentile Rainfall Depth (in)	0.85
Percent Impervious	0.99
Soil Type	3
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.85
Peak Intensity (in/hr)	0.1657
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.892
Time of Concentration (min)	54.0
Clear Peak Flow Rate (cfs)	4.0359
Burned Peak Flow Rate (cfs)	4.0359
24-Hr Clear Runoff Volume (ac-ft)	1.7107
24-Hr Clear Runoff Volume (cu-ft)	74518.712



Imperial Avalon Volume Calculations:

Givens:

Areas =

Breakdown	sqft	acre	acre	Inputs
Area Total	1,189,739	27.3	100%	
Impervious, Ai	879,059	20.181	74%	
Pervious, Ap	310,680	7.133	26%	
Undeveloped Area, Au	0	0	0%	
Exempt Area	0	0	0%	
TOTAL	**1,189,739**	**27.313**	100%	
Site Features				
Landscaped Area Ground Level	310,680	7.133		
TOTAL Pervious	**310,680**	**7.133**		
Landscaped Areas Counted Towards ETWU**				
Additional Landscaped Area	0	0		
Exempt Area				
Pool	0	0		
TOTAL Exempt	**0**	**0.00**		

****Note these are additional landscaped areas NOT EXPOSED to the sky.**

Soil media infiltration rate:	5	in/hr	(Table 4.3)
T_{Fill} =	3	hrs	(Table 4.5)
Drawdown time, T (hr) =	48	hrs	(Table 4.5)
$K_{Sat,Design}$ Factor of Safety, FS =	2		
$V_{design\ Planter}$ Factor of Safety =	1.5		
Design Storm =	85th Percentile		(Per City of LA requirement)
Design Storm Intensity =	0.85	in	(Per LA County Hydrology GIS)
Planting Factor =	0.4		(Per Landscape Architect)
7 Month Evapotranspiration, ET_7	21.7		(Per City of LA Irrigation Guidelines, App C)

i. Determine the Mitigation Volume (V_M):

V_M (ft^3) = 85th Percentile Intensity (in) * Catchment Area (acres) * (3085.5 cuft/1ac-in)

where Catchment Area (acres) = (Impervious Area * 0.9) + [(Pervious area + Undeveloped area) * 0.1]

V_M (ft^3) = 0.85*[(20.181*0.9)+[(7.133+0)*0.1]] * 3085.5 ft^3

V_M (ft^3) = 49,507 ft^3 or 370,339 Gallons **(If Design is Capture and Use i.e. Rainwater Harvesting)**

V_M (ft^3) =	49507	ft^3	or	370,339	Gallons

ii. Determine planting area (ft^2):

Planting Area (ft^2) = 310680.2 + 0 ft^2

Planting Area (ft^2) = 310,680 ft^2

iii. Determine Planter Factor, PF, (ft^2)

Planter Factor (ft^2) = Planting Factor x Planting Area

Planter Factor (ft^2) = 0.4 x 310680.2 ft2

Planter Factor (ft^2) =	124272.08	ft^2

iv. Determine the 7-month (Oct 1-April 30) Estimated Total Water Use (ETWU):

$ETWU_{(7\text{-month})}$ = ET_7 x 0.62 x PF

$ETWU_{(7\text{-month})}$ = 21.7 x 0.62 x 124272.08

$ETWU_{(7\text{-month})}$ =	1671957	gal

v. Verify $ETWU_{(7\text{-month})}$ is greater than or equal to V_{WQDV}:

$ETWU_{(7\text{-month})}$	≥	*$V_{(Design)}$ (gal)*
1,671,957	≥	*370,339*

CAPTURE AND USE IS FEASIBLE