Appendix N

Water Resources Report

2nd & PCH Development

Hydrology and Water Quality Technical Report

October 4, 2013

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1.0 INTRODUCTION

The proposed 2nd and PCH Development Project (Project) encompasses approximately 10.9 acres in the City of Long Beach, County of Los Angeles, California. The Project is generally located at the southwest corner of Pacific Coast Highway (PCH) and Second Street, along Marina Drive. The Project includes the redevelopment of the existing site into a mixed use development consisting of 216,000 square feet of retail, 29,000 square feet of restaurant space, and associated landscaping and open space. In addition, a new roadway would be constructed in the southern portion of the site. Parking would be provided both in parking structures and at the ground level of the site. Additional infrastructure and landscaping improvements are also proposed.

This report was prepared by Incledon Consulting Group to provide a surface hydrology and water quality analysis to evaluate Project impacts based on California Environmental Quality Act (CEQA) significance thresholds. The analysis presented in this report is based on a previously completed Hydrology and Water Quality Technical Report prepared by Fuscoe Engineering, Inc. in October 2010, and information provided by various public agencies, including the Federal Emergency Management Agency (FEMA), California Department of Water Resources (DWR), Los Angeles Regional Water Quality Control Board (RWQCB), California Geological Survey (CGS), County of Los Angeles (County), and City of Long Beach (City).

1.1 Scope of Work

This report provides an analysis and summary of the hydrology at the Project Site. The hydrology study included in this report is for the 50-year, 24-hour storm event.

1.2 Project Site Description

The 10.9-acre project site is located in the City of Long Beach and the County of Los Angeles and is bounded on the north by East 2nd Street, on the west by Pacific Coast Highway (PCH), on the south by Studebaker Road, and on the east by Marina Drive, as shown in Figure 1, Site Map. The project vicinity is characterized by flat and gently rolling topography, which generally slopes toward the south to Alamitos Bay. The site is predominantly urbanized with hotel and supporting commercial uses, with impervious surfaces constituting much of the site. Existing impervious surfaces include buildings, internal streets, and parking areas. Pervious surfaces consist of landscaped areas primarily located around the hotel structures and the perimeter of the site. Under existing conditions, the project site is 82% impervious. There are no water bodies located on the project site. The area surrounding the project site contains a mix of commercial uses within the Marina Pacifica, Market Place, and Marina Shores shopping centers, including restaurant, retail, and office uses, and recreational uses within the Alamitos Bay Marina, which consist largely of impervious paved surfaces. Open space associated with the Los Cerritos Wetlands and landscaped medians and greenbelts along local roadways and are the only contiguous areas of predominantly pervious surfaces in the project vicinity.

2.0 ENVIRONMENTAL SETTING

2.1 Regional Conditions

the project site is located within the Los Angeles-San Gabriel Hydrologic Unit, as determined by the RWQCB for planning purposes. This hydrologic unit covers most of Los Angeles County and drains a 1,608-square mile area. The Los Angeles River, San Gabriel River, and Ballona Creek are the major drainage systems in this area. The San Gabriel River is located just to the southeast of the project site, and the Los Angeles River is located approximately six miles west from the project site. Both rivers run in a north-south direction and drain into the Pacific Ocean. There are no surface water bodies or wetlands located on the project site. The primary surface water bodies in the vicinity are Alamitos Bay, the San Gabriel River, the Los Cerritos Channel, Los Cerritos Wetlands, and the Pacific Ocean. Although several of these surface water bodies have been engineered and dredged substantially, portions of them are included in the U.S. Department of the Interior Fish and Wildlife Service (DOI-FWS) National Wetlands Inventory.

2.2 On-site Conditions

2.2.1 Hydrology and Drainage

Most of the surface runoff from the project site is generated on-site, with almost no surface flow entering the site from other areas. Runoff from the east and northeastern portions of the site generally flows in an easterly direction, where it is collected by existing City-owned storm drains along Pacific Coast Highway (PCH), designated as Conveyance ID #220010 and #220010 in the City of Long Beach Stormwater Master Plan. These storm drains converge to a 36-inch reinforced concrete pipe (Conveyance ID #220005) that bisects the project site and ultimately discharges to the Alamitos Bay Marina southwest of the project. Runoff from the western portions of the site along Marina Drive is generally conveyed west via sheet flow towards Marina Drive, where it is intercepted by existing catch basins and storm drains that connect to an existing 18-inch City-owned storm drain that discharges to Alamitos Bay at a separate outlet than the 36-inch drain. The location of the storm drainage facilities serving the project area are illustrated in Figure 2, Existing Hydrology Map.

Under existing conditions, all on-site runoff ultimately discharges to the existing 36-inch storm drain (Conveyance ID 220005) southwest of the site. As summarized in Table IV.G-2 above, the existing 36-inch storm drain has sufficient capacity to convey runoff from the 50-year event from the project and upstream areas. The 24-inch line upstream of the 36-inch line along PCH (Conveyance ID #220015) is undersized by 0.9 cubic feet per second (cfs) for the 50-year event under existing conditions. However, the pipe size does comply with the 25-year capacity requirements of the Los Angeles County Department of Public Works (LACDWP) Hydrology and Hydraulic Design.

2.2.2 FEMA

According to the Flood Insurance Rate Map (FIRM) for the project site (FIRM Map No. 06037C1988F, revised September 26, 2008) issued by FEMA, the project site is located within Zone X, as illustrated in Figure 3, Flood Insurance Rate Map. Zone X refers to areas located within a 500-year floodplain (i.e., areas with a 0.2-percent chance of flooding in any given year), areas located within a 100-year floodplain (i.e., areas with a one-percent chance of flooding in any given year) with average depths of less than one foot or less than one square mile in area,

and areas located within a 100-year floodplain that are protected from flooding by levees. The project site, as indicated on the FIRM, is within a 100-year floodplain that is protected by "Provisionally Accredited" levees, as determined by the U.S. Army Corps of Engineers (ACOE), which is the agency responsible for operation and maintenance of the levees along the Los Angeles River. A Provisionally Accredited Levee (PAL) is a levee that FEMA has previously accredited with providing one-percent annual chance protection on an effective FIRM and for which FEMA is awaiting data and/or documentation that will demonstrate the levee's compliance with 44 CFR Section 65.10, Mapping of Areas Protected by Levee Systems, of the NFIP regulations.

2.2.3 Water Quality

Surface water quality can be affected by a number of variables, which include land use, hydrology, meteorology, geology, and soils. Land uses may affect surface water quality based on the associated activities. Geology and soils may affect surface water quality in that they determine infiltration and runoff velocity. The more infiltration of runoff into the soil, and slower the runoff velocity, the less ability the runoff has to carry sediments and pollutants. The project site is located within the San Gabriel River Watershed. Since the watershed is highly urbanized, urban runoff and illegal dumping are major contributors to impaired water quality in the San Gabriel River and tributaries. Primary sources of storm water pollution in urban areas typically include automobiles and activities associated with automobile use, housekeeping and landscaping practices, industrial activities, construction, non-storm water connections to the drainage system, and accidental spills. Common Sources of Pollutants in Urban Runoff Pollutant concentrations in urban runoff are extremely variable, and are dependent on source strength, storm intensity, runoff volume, and elapsed time since the previous storm event.

As part of the City Water Management Plan (SWMP), receiving water monitoring is conducted at key discharge points throughout the watershed. The monitoring program includes 1) mass emission monitoring during storm events, 2) monitoring of dry weather discharges, 3) receiving water monitoring, and 4) special studies. As part of the initial receiving water sampling efforts, the City monitored Alamitos Bay for the first two years of the program to document the effects of a dry weather diversion previously installed upstream in the watershed. In addition, monitoring of the first major storm event of each season was continued to assess water quality and toxicity at locations in the Alamitos Bay and to determine the extent of impact of storm water discharges to the Bay. Since the initial pilot program in 2002, five storm water plume-tracking studies have been conducted in Alamitos Bay. The results of these studies on plume characteristics found that the Los Cerritos Channel (located northwest of the project site) was the major source of storm water entering Alamitos Bay. The proposed project drains directly into Alamitos Bay and does not drain into the Los Cerritos Channel. In addition, the results found that for the most part, total metal concentrations increased with decreasing salinity (or increasing storm water influence),and with the exception of cadmium, dissolved metals also showed similar patterns of storm water influence. Tests of sea urchin fertilization found no evidence of a toxic response. At the end of the 2007/08 monitoring period, it was recommended that the monitoring of the storm water plume in Alamitos Bay be discontinued.

3.0 METHODOLOGY

3.1 Description of Method

This study evaluates the change in surface water runoff patterns and quantity for the Project Site associated with the proposed Project and the impact of these changes on the existing downstream storm water system.

Hydrologic calculations to evaluate surface water runoff associated with the 50-year storm frequencies were performed for on-site and off-site drainage areas, utilizing the hydrology program, *XPSWMM (v2013)*, in accordance with the Los Angeles County 2006 Hydrology Manual. Results of the existing condition hydrologic analysis are summarized in Table, Summary of Existing Hydrology Conditions, below. Detailed calculations are provided in Appendix A.

Table 1: Existing Condition Hydrology Summary 50-Year, 24-Hour Storm Event

Subarea	Area (acres)	Flow rate (cfs)
1	0.78	1.51
2	2.24	3.59
3	2.79	4.69
4	2.00	2.49
5	1.10	2.00
6	1.98	2.17
Onsite Total	**10.88**	**16.45**
20	1.12	1.87
21	0.46	0.90
22	0.46	0.88
23	0.30	0.52
24	4.05	5.99
25	4.40	5.78
26	1.34	1.42
27	0.70	1.06
Offsite Total	**12.83**	**18.42**
Total	**23.71**	**34.87**

3.2 Hydrology Calculations

Input data used in the hydrology calculations were determined from the County Hydrology Manual. The Project Site is located on Hydrologic Map 1-H1.5 in Appendix B of the County's Hydrology Manual, included in Appendix A to this report. Based on Hydrologic Map 1-H1.5, the project is located on Tujunga Fine Sandy Loam (015). Isohyets represent the depth of rainfall for a standard design frequency over a specified period of time. The 50-year, 24-hour rainfall isohyet for the Project Site is 4.8 inches.

4.0 PROJECT DESIGN FEATURES

The Project involves the redevelopment of the existing site into a mixed use development consisting of 216,000 square feet of retail, 29,000 square feet of restaurant space, and associated landscaping and open space. In addition, a new roadway would be constructed in the southern portion of the site. Parking would be provided both in parking structures and at the ground level of the site. Additional infrastructure and landscaping improvements are also proposed. The following identifies project features that are proposed as part of the project. Current stormwater regulations require development projects to obtain permits for both construction and operation of proposed uses. The conditions associated with these permits include various requirements for controlling the amount or rate of stormwater discharged from the project site, as well as the generation and release of pollutants into stormwater flows. These requirements for stormwater management, which will be employed as part of the proposed project, are discussed in detail below.

4.1 Stormwater Management Features for Construction Activities

As part of the conditions of approval and prior to the issuance of grading permits, the project developer must provide evidence that the project will comply with the most current Construction General Permit (CGP) and associated local National Pollutant Discharge Elimination System (NPDES) regulations to ensure that the potential for soil erosion is minimized on a project-by-project basis. In accordance with the updated GCP (Order No. 2009-0009-DWQ), the following Permit Registration Documents (PRDs) are required to be submitted to the SWRCB Stormwater Multi-Application Reporting and Tracking System (SMARTS) website, and certified by the Legally Responsible Person (LRP).

a. Notice of Intent
b. Risk Assessment
c. Storm Water Pollution Prevention Plan (SWPPP) developed by a Qualified SWPPP Developer (QSD)
d. Post-Construction Water Balance Calculator (Not Required, this project is included in the Long Beach Municipal Separate Storm Sewer System (MS4) permit Order No. R9-2009-0030).
e. Annual Fee and Certification by

Throughout construction, the project site is required to be inspected by a Qualified SWPPP Inspector (QSP) and an annual report must be submitted to the SWRCB and certified on the SMARTS website.

4.2 Stormwater Management Features for Post-Construction Activities

Based on the requirements of the City of Long Beach Stormwater Management Plan (SWMP), the proposed project is designated as a "Priority Project" since the proposed redevelopment project includes the redevelopment of more than 5,000 square feet, development of 10 or more residential units, and more than 100,000 square feet of commercial development. As a result, the project is required to incorporate and implement, where applicable, source control and treatment control BMPs that address post-construction management of storm water runoff quality. Selection of treatment control BMPs is based on the pollutants of concern for the project site and the BMP's ability to treat those pollutants, in consideration of site conditions and constraints. In

addition, the treatment control BMPs must be designed to treat potential pollutants and runoff produced from a 0.75-inch storm event, prior to its discharge into a storm water conveyance system.

In accordance with the Standard Urban Storm Water Mitigation Plan (SUSMP) requirements the proposed project will include the following site design and source control BMPs:

- All drainage improvements, such as catch basins, roof drains, and surface parking drains will be designed in accordance with standard engineering practices.
- Common area landscape management that includes use of drought-tolerant, native landscaping, minimizing fertilizer and pesticide application, use of slow-release fertilizers, maintenance activities, providing education to homeowners/tenants (via project owner, HOA and/or POA), and providing education and training for employees on management of landscape materials and storm water management.
- Installing and maintaining efficient irrigation systems designed to minimize water by eliminating overspray to hardscape areas, and setting irrigation timing and cycle lengths in accordance with water demands, given time of year, weather, and day and night temperatures.
- The phrase "No Dumping-Only Rain In Drain" or equally effective phrase will be stenciled on catch basins and/or area drains to alert the public as to the destination of pollutants discharged into the storm water.
- The project will comply with SUSMP design requirements for outdoor trash and storage areas, loading docks, and storm drain stenciling.

In addition to site design and source control BMPs, the project will include the following treatment control BMPs:

4.2.1 Media Filtration

In accordance with SUSMP requirements, media filtration units will be implemented to treat on-site flows and a portion of the off-site flows prior to discharging into the existing 36-inch storm drain line. Media roof drain filter BMPs will also be implemented (e.g., Filterra Roof Drain) to provide treatment of flows from the rooftops for the proposed buildings. The remainder of off-site flows originating from the property east of the project (approximately 8.5 acres) will be routed around the property without treatment and all on-site flows will be treated before co-mingling with these off-site flows.

Media filter inserts typically come as contained pre-cast vault or manhole structures that use passive, siphon-activated media-filled cartridges or chambers that trap and adsorb particulates and pollutants. These units are noted to have high to medium removal efficiencies for sediments including soil-bound pesticides, metals, organics, trash/debris, oxygen demanding substances, bacteria, and oil & grease. They are moderately efficient at removing nutrients. Removal efficiencies for these constituents vary depending on the filter media selected, (such as perlite, zeolites, fabric, sand, etc) and for the type of unit installed. Media filtration system include both proprietary and design-build systems. There are several design variations for sand filters, including Austin Sand Filters, Delaware Sand Filters, and underground filters. In general, sand filters feature a pre-treatment basin or chamber to allow large particulates to settle out, and a filtration chamber where storm water runoff is filtered through a layer of sand (typically 18

inches deep at a minimum). Other variations include utilizing a mixture of organic compost or peat within the sand layer (Organic filter) and combining the sand filter layer within the pre-treatment basin (Pocket Sand Filter). Examples of proprietary media filter units include the StormFilter® (Contech Construction Products, Inc.), Up-FloTM Filter (Kristar Enterprises, Inc), Smart Sponge® media filtration vaults (Abtech Industries), and JellyfishTM filter systems (Imbrium Systems, Inc).

In accordance with the City's SUSMP requirements, the media filtration units will be sized to treat the first 0.75-inch of storm water runoff from a storm event for its contributing drainage area. Since off-site runoff will not comingle with on-site runoff, treatment of off-site flows is not required. Accordingly, the media filtration devices including the roof drain filters will be sized to treat, at a minimum, 1.81 cfs or 23,958 cubic feet of combined on-site runoff. Further details on sizing, design, and maintenance responsibilities for the media filtration unit will be documented in the project-specific SUSMP, prepared during later phases of the project.

4.3 Storm Drain Infrastructure

Post-construction drainage patterns will be similar to the existing condition. Therefore, storm water runoff will be conveyed in a similar manner as in the existing condition. Runoff will continue to flow generally west and southwest, discharging primarily to the existing 36-inch-diameter City storm drain line located on the Project site. The portion of the 36-inch-diameter located within the Project will be removed and replaced with an on-site storm drain system to accommodate new buildings as shown in Figure 4, Proposed Hydrology Map.

5.0 ANALYSIS OF PROJECT IMPACTS

A project may have a significant impact on hydrology and water quality if it would exceed the significance thresholds included in Section IX, Hydrology and Water Quality, and Section XVII, Utilities and Service Systems, in Appendix G of the CEQA Guidelines.

The hydrologic analysis estimated the existing and proposed condition peak flow runoff for a 50-year, 24-hour storm event to evaluate the hydrologic impacts on the Project watershed. A separate 0.75-inch hydrologic analysis estimated the water quality design volume and flow rate to evaluate the impacts to water quality resulting from Project development. The following impact assessments are based on these analyses and the significance criteria outlined below.

Would the Project violate any water quality standards or waste discharge requirements? Or 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 result in substantial erosion or siltation on- or off-site? Or otherwise substantially degrade water quality?

With the implementation of site design, source control, and treatment control BMPs, the Project will treat onsite runoff prior to discharging into the proposed storm drain system. As a result of runoff controls, water quality exceedances are not anticipated, and pollutants are not anticipated in project runoff that would adversely affect beneficial uses in downstream receiving waters. In addition, the Project will comply with the CGP requirements during construction activities. Overall, runoff contaminants generated by the operation of the proposed project are not anticipated to violate any water quality standards or waste discharge requirements, impair the quality of receiving surface waters, impair the beneficial uses of the receiving waters, or otherwise substantially degrade water quality. Thus impacts to surface water quality associated with the Project are would be less than significant.

Would the Project substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level (e.g., the production rate of pre-existing nearby wells would drop to a level which would not support existing land uses or planned uses for which permits have been granted);

Within the project site, groundwater is relatively close to the groundsurface (within l0 feet bgs) and subject to rainfall and tidal influence due to the proximity of the site to the Alamitos Bay and the Pacific Ocean. The project site is not located in an aquifer recharge area, and there are no groundwater wells or pumping activities proposed for the project site. Temporary dewatering is expected during the construction of the sub-surface structures and a permanent dewatering system is expected to maintain the structural integrity of the subterranean parking structure for long-term operations. All dewatering required for construction activities and post-construction operation will be performed in accordance with Los Angeles RWQCB and SWRCB General Construction Permit requirements. Therefore, impacts to groundwater recharge and groundwater supplies from the Project are considered less than significant.

Additionally, as discussed in Section IV.F, Hazards and Hazardous Materials, of this EIR, a groundwater remediation program is currently being implemented on the project site under the

oversight of the RWQCB to address existing contamination associated with historic gas station operations both on- and off-site. Upon completion of remedial activities, to the satisfaction of the RWQCB, such contamination will no longer be considered a threat to groundwater quality and no further impacts to local groundwater resources would occur. As such, operation of the proposed project will not degrade the groundwater quality to levels below standards considered acceptable by the Los Angeles RWQCB or other regulatory agencies or impair the quality of receiving surface waters or groundwater. Impacts would be less than significant in this regard and no mitigation measures are required.

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, or substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site? Or 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 require or result in the construction of new storm water drainage facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?

Under post-development conditions, storm water runoff will be conveyed similar to existing conditions, continuing to flow generally west and southwest, discharging to the existing 36-inch City storm drain line southwest of the site. Proposed roof drains and area drains will collect roof runoff from the new buildings and connect to a new on-site storm drain system. Within the project site between Marina Drive and PCH, the existing 36-inch line will be removed and relocated to the north to accommodate the new buildings.

Additional new storm drain lines will collect flows throughout the site, and will converge with the relocated 36-inch line. Along PCH, the existing storm drains will remain and connect to the relocated line, and the storm drain line at Marina Drive will remain as under existing conditions. Figure 4, Proposed Hydrology Map, identifies the proposed storm drain facilities.

Due to the proposed land use conversion from existing hotel uses to commercial uses, it is anticipated the project will increase impervious surfaces by approximately 7 percent compared to existing conditions. Proposed grading will comply with City and County standards that require a minimum slope of half a percent for most pedestrian areas. Because the project site is flat, proposed condition hydrology calculations assume the flow paths to be half a percent onsite. In combination with the proposed storm drain system and increased imperviousness, it is expected that peak flow runoff rates will increase accordingly. Runoff from the proposed project will drain similar to existing conditions, and will continue to discharge all on-site runoff into the proposed 36-inch line that traverses the site. All other off-site drainage areas would remain as under existing conditions. Table 2, Summary of Proposed Hydrology Conditions, below, summarizes the proposed on-site hydrology conditions based on the estimated increases in imperviousness on-site.

Table 2: Proposed Condition Hydrology Summary 50-Year, 24-Hour Storm Event

Subarea	Area (acres)	Flow rate (cfs)
1	1.31	2.53
2	1.43	3.01
3	1.84	3.31
4	2.23	4.21
5	1.51	3.63
6	2.56	4.89
Onsite Total	**10.88**	**21.58**
20	1.12	1.91
21	0.46	0.82
22	0.46	0.81
23	0.30	0.50
24	4.05	5.99
25	4.40	5.78
26	1.34	1.62
27	0.70	1.17
Offsite Total	**12.83**	**18.60**
Total	**23.71**	**40.18**

Approximate proposed storm drain sizes are shown on Figure 4, Proposed Hydrology Map. The increase in onsite 50-year runoff rate is 5.13 cfs, or approximately 15 percent. Based on the capacity of the existing 36-inch-diameter (42.2 cfs), the proposed runoff (38.14 cfs) does not exceed full flow capacity. Site-specific hydrology and hydraulic conditions will be evaluated during the conceptual grading and engineering phases of the project to determine appropriate storm drain sizes and slopes. Potential impacts to the planned storm water drainage systems are considered less than significant.

In order to reduce the peak flows discharging to the undersized 24-inch storm drain in PCH (10 Conveyance #220015) and reduce the required sizes of storm drains crossing the site within the parking structure, a new on-site 24-inch storm drain line will collect offsite flows and direct the runoff south along the eastern boundary of the proposed site. The off-site flows will then tie into the new on-site system proposed for Marina Drive before discharging into the existing 36-inch-diameter storm drain. The increase in runoff due to the increase in impervious surfaces is considered less than significant based on the available capacity within the existing 36-inch line. In addition, increases in discharges to tidal waters such as the marina are not subject to hydromodification (generally defined as the alteration of natural flow characteristics of a site) impacts and therefore, potential impacts to increased erosion or downstream habitats are less than significant.

Overall, based on the above discussion, the proposed project would not substantially alter the existing drainage pattern of the site or area, create or contribute runoff water that would exceed the capacity of existing or planned stormwater drainage systems, require or result in the construction of new stormwater drainage facilities or expansion of existing facilities. As such, impacts related to surface hydrology and drainage would be less than significant.

Would the project place housing within a 100-year flood hazard area as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map? Or place within a 100-year flood hazard area structures which would impede or redirect flood flows? Or expose people or structures to a significant risk of loss, injury or death involving flooding, including flooding as a result of the failure of a levee or dam?

As previously discussed, the FIRM prepared by FEMA currently indicates that the entire project site is located within areas defined as being within the 0.2-percent chance flood area (500-year floodplain). This includes areas located within a 100-year floodplain that are protected by levees, as in the case of the project site, which is protected by "Provisionally Accredited" levees (i.e., San Gabriel River channel), as determined by the ACOE in accordance with National Flood Insurance Act regulations. Given the ongoing inspection and maintenance of the San Gabriel River levees by the ACOE, the potential for failure of the levees is considered minimal. Therefore, no significant impacts associated with the placement of housing or structures within a 100-year flood hazard or flooding as a result of the failure of a levee or dam will occur. No mitigation measures are required.

6.0 MITIGATION MEASURES

With the implementation of the above Project Design Features, the proposed Project is not anticipated to result in any potentially significant hydrologic or water quality impact. Therefore, mitigation measures are not required for the proposed Project.

7.0 SIGNIFICANT UNAVOIDABLE ADVERSE IMPACTS

No significant unavoidable adverse impacts are expected following the construction of the new storm drains and detention facilities.

8.0 REFERENCES

Fuscoe Engineering, *Water Quality and Hydrology Technical Report*, October 12, 2010.

Los Angeles County Department of Public Works, *Hydrology Manual*, January 2006.

PCR Services Corporation, *Second and PCH Development Draft Environmental Impact Report, Section IV.G Hydrology and Water Quality*, March 2011.

APPENDIX A
EXHIBITS

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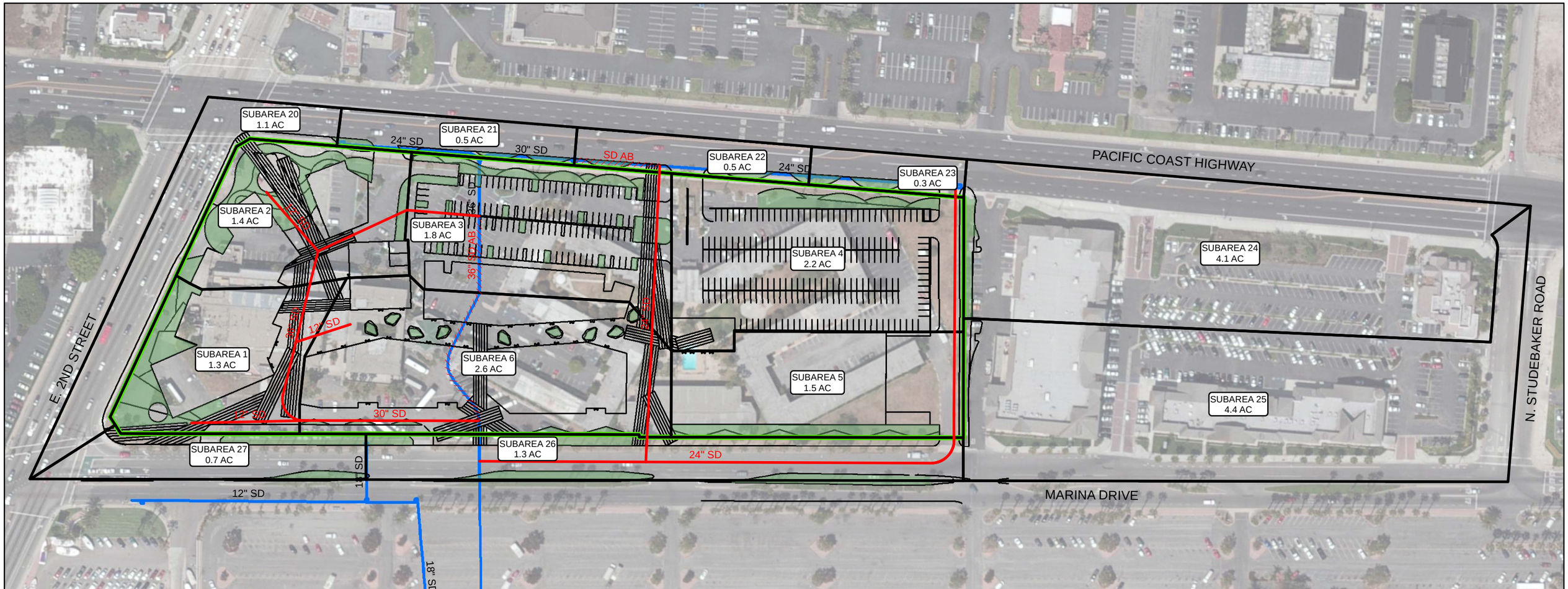
FIGURE 1 SITE MAP
2ND AND PCH DEVELOPMENT

Path: I:\285.007 SP Marina\GIS\MXD\SITEMAP.mxd



50-YEAR, 24-HOUR PROPOSED CONDITION TC CALCULATOR RESULTS															
Project	Subarea	Area (acres)	%imp	Frequency	Soil Type	Length (ft)	Slope (ft/ft)	Isohyet (in.)	Tc-calculated (min.)	Intensity (in./hr)	Cu	Cd	Flow rate (cfs)	Tc Equation	Volume (acre-ft)
Proposed-50YR	1	1.31	0.80	50	15	286	0.005	4.8	7	2.44	0.3	0.79	2.53	Tc=(10)^-0.507*(Cd*I)^-0.519*(L)^0.483*(S)^-0.135	0.39
Proposed-50YR	2	1.43	0.81	50	15	254	0.005	4.8	6	2.63	0.4	0.8	3.01	Tc=(10)^-0.507*(Cd*I)^-0.519*(L)^0.483*(S)^-0.135	0.43
Proposed-50YR	3	1.84	0.89	50	15	439	0.005	4.8	9	2.17	0.3	0.83	3.31	Tc=(10)^-0.507*(Cd*I)^-0.519*(L)^0.483*(S)^-0.135	0.59
Proposed-50YR	4	2.23	0.95	50	15	443	0.005	4.8	9	2.17	0.3	0.87	4.21	Tc=(10)^-0.507*(Cd*I)^-0.519*(L)^0.483*(S)^-0.135	0.76
Proposed-50YR	5	1.51	0.88	50	15	148	0.005	4.8	5	2.86	0.4	0.84	3.63	Tc=(10)^-0.507*(Cd*I)^-0.519*(L)^0.483*(S)^-0.135	0.48
Proposed-50YR	6	2.56	0.97	50	15	465	0.005	4.8	9	2.17	0.3	0.88	4.89	Tc=(10)^-0.507*(Cd*I)^-0.519*(L)^0.483*(S)^-0.135	0.89
ONSITE TOTAL		10.88											21.58		3.54
Proposed-50YR	20	1.12	1.00	50	15	768	0.0039	4.8	12	1.9	0.3	0.9	1.91	Tc=(10)^-0.507*(Cd*I)^-0.519*(L)^0.483*(S)^-0.135	0.4
Proposed-50YR	21	0.46	0.93	50	15	367	0.0014	4.8	10	2.07	0.3	0.86	0.82	Tc=(10)^-0.507*(Cd*I)^-0.519*(L)^0.483*(S)^-0.135	0.15
Proposed-50YR	22	0.46	0.92	50	15	359	0.0014	4.8	10	2.07	0.3	0.85	0.81	Tc=(10)^-0.507*(Cd*I)^-0.519*(L)^0.483*(S)^-0.135	0.15
Proposed-50YR	23	0.30	0.88	50	15	248	0.0002	4.8	11	1.98	0.3	0.83	0.50	Tc=(10)^-0.507*(Cd*I)^-0.519*(L)^0.483*(S)^-0.135	0.1
Proposed-50YR	24	4.05	0.99	50	15	924	0.0016	4.8	16	1.66	0.2	0.89	5.99	Tc=(10)^-0.507*(Cd*I)^-0.519*(L)^0.483*(S)^-0.135	1.43
Proposed-50YR	25	4.40	1.00	50	15	1141	0.0009	4.8	21	1.46	0.2	0.9	5.78	Tc=(10)^-0.507*(Cd*I)^-0.519*(L)^0.483*(S)^-0.135	1.57
Proposed-50YR	26	1.34	0.84	50	15	905	0.0011	4.8	19	1.53	0.2	0.79	1.62	Tc=(10)^-0.507*(Cd*I)^-0.519*(L)^0.483*(S)^-0.135	0.41
Proposed-50YR	27	0.70	0.85	50	15	507	0.0039	4.8	10	2.07	0.3	0.81	1.17	Tc=(10)^-0.507*(Cd*I)^-0.519*(L)^0.483*(S)^-0.135	0.22
OFFSITE TOTAL		12.83											18.60		4.43
TOTAL		23.71											40.18		7.97

OPEN SPACE SUMMARY TABLE	
EXISTING PERVIOUS SPACE	4.2 AC
EXISTING IMPERVIOUS SPACE	19.6 AC
PROPOSED PERVIOUS SPACE	2.7 AC
PROPOSED IMPERVIOUS SPACE	21.1 AC
TOTAL AREA	23.8 AC

LEGEND

- PROPOSED HYDROLOGY BOUNDARY
- PROJECT BOUNDARY
- PROPOSED STORM DRAIN
- PROPOSED ABANDONED STORM DRAIN
- EXISTING STORM DRAIN
- PROPOSED OPEN SPACE

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0 70 140 280 Feet

N

FIGURE 4 PROPOSED CONDITION HYDROLOGY MAP
2ND AND PCH DEVELOPMENT

Path: I:\285.007 SP Marina\GIS\MXD\235007 PROPOSED HYDROLOGY MAP.mxd

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0 500 1,000 2,000 Feet

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FIGURE 3 FEMA MAP
2ND AND PCH DEVELOPMENT

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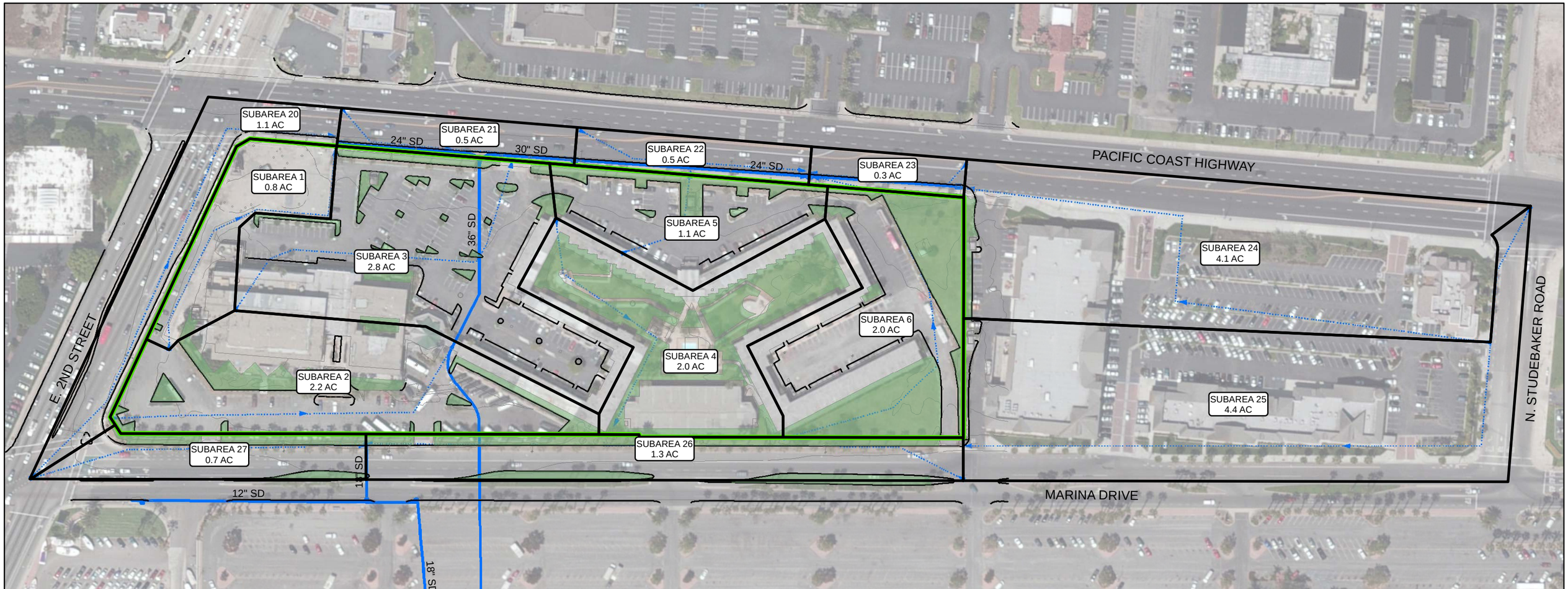

50-YEAR, 24-HOUR EXISTING CONDITION TC CALCULATOR RESULTS															
Project	Subarea	Area (acres)	%imp	Frequency	Soil Type	Length (ft)	Slope (ft/ft)	Isohyet (in.)	Tc-calculated (min.)	Intensity (in./hr)	Cu	Cd	Flow rate (cfs)	Tc Equation	Volume (acre-ft)
Existing-50YR	1	0.78	0.98	50	15	473	0.0042	4.8	9	2.17	0.3	0.89	1.51	Tc=(10)^-0.507*(Cd*I)^-0.519*(L)^0.483*(S)^-0.135	0.28
Existing-50YR	2	2.24	0.86	50	15	572	0.0035	4.8	11	1.98	0.3	0.81	3.59	Tc=(10)^-0.507*(Cd*I)^-0.519*(L)^0.483*(S)^-0.135	0.7
Existing-50YR	3	2.79	0.93	50	15	565	0.0027	4.8	11	1.98	0.3	0.85	4.69	Tc=(10)^-0.507*(Cd*I)^-0.519*(L)^0.483*(S)^-0.135	0.93
Existing-50YR	4	2.00	0.56	50	15	397	0.0025	4.8	11	1.98	0.3	0.63	2.49	Tc=(10)^-0.507*(Cd*I)^-0.519*(L)^0.483*(S)^-0.135	0.44
Existing-50YR	5	1.10	0.81	50	15	363	0.0041	4.8	8	2.3	0.3	0.79	2.00	Tc=(10)^-0.507*(Cd*I)^-0.519*(L)^0.483*(S)^-0.135	0.33
Existing-50YR	6	1.98	0.60	50	15	642	0.0031	4.8	15	1.71	0.3	0.64	2.17	Tc=(10)^-0.507*(Cd*I)^-0.519*(L)^0.483*(S)^-0.135	0.46
ONSITE TOTAL		10.88											16.45		3.14
Existing-50YR	20	1.12	0.97	50	15	768	0.0039	4.8	12	1.9	0.3	0.88	1.87	Tc=(10)^-0.507*(Cd*I)^-0.519*(L)^0.483*(S)^-0.135	0.39
Existing-50YR	21	0.46	1.00	50	15	367	0.0014	4.8	9	2.17	0.3	0.9	0.90	Tc=(10)^-0.507*(Cd*I)^-0.519*(L)^0.483*(S)^-0.135	0.16
Existing-50YR	22	0.46	0.99	50	15	359	0.0014	4.8	9	2.17	0.3	0.89	0.88	Tc=(10)^-0.507*(Cd*I)^-0.519*(L)^0.483*(S)^-0.135	0.16
Existing-50YR	23	0.30	0.93	50	15	248	0.0002	4.8	11	1.98	0.3	0.86	0.52	Tc=(10)^-0.507*(Cd*I)^-0.519*(L)^0.483*(S)^-0.135	0.1
Existing-50YR	24	4.05	0.99	50	15	924	0.0016	4.8	16	1.66	0.2	0.89	5.99	Tc=(10)^-0.507*(Cd*I)^-0.519*(L)^0.483*(S)^-0.135	1.43
Existing-50YR	25	4.40	1.00	50	15	1141	0.0009	4.8	21	1.46	0.2	0.9	5.78	Tc=(10)^-0.507*(Cd*I)^-0.519*(L)^0.483*(S)^-0.135	1.57
Existing-50YR	26	1.34	0.71	50	15	905	0.0011	4.8	20	1.49	0.2	0.71	1.42	Tc=(10)^-0.507*(Cd*I)^-0.519*(L)^0.483*(S)^-0.135	0.36
Existing-50YR	27	0.70	0.78	50	15	507	0.0039	4.8	11	1.98	0.3	0.77	1.06	Tc=(10)^-0.507*(Cd*I)^-0.519*(L)^0.483*(S)^-0.135	0.2
OFFSITE TOTAL		12.83											18.42		4.37
TOTAL		23.71											34.87		7.51

OPEN SPACE SUMMARY TABLE	
EXISTING PERVIOUS SPACE	4.2 AC
EXISTING IMPERVIOUS SPACE	19.6 AC
PROPOSED PERVIOUS SPACE	2.7 AC
PROPOSED IMPERVIOUS SPACE	21.1 AC
TOTAL AREA	23.8 AC

LEGEND

- EXISTING HYDROLOGY BOUNDARY
- PROJECT BOUNDARY
- EXISTING STORM DRAIN
- FLOW PATH
- EXISTING OPEN SPACE

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FIGURE 2 EXISTING CONDITOIN HYDROLOGY MAP
2ND AND PCH DEVELOPMENT

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APPENDIX B
TC CALCULATOR RESULTS

50-YEAR, 24-HOUR EXISTING CONDITION TC CALCULATOR RESULTS

Project	Subarea	Area (acres)	%imp	Frequency	Soil Type	Length (ft)	Slope (ft/ft)	Isohyet (in.)	Tc-calculated (min.)	Intensity (in./hr)	Cu	Cd	Flow rate (cfs)	Tc Equation	Volume (acre-ft)
Existing-50YR	1	0.78	0.98	50	15	473	0.0042	4.8	9	2.17	0.3	0.89	1.51	Tc=(10)^-0.507*(Cd*I)^-0.519*(L)^0.483*(S)^-0.135	0.28
Existing-50YR	2	2.24	0.86	50	15	572	0.0035	4.8	11	1.98	0.3	0.81	3.59	Tc=(10)^-0.507*(Cd*I)^-0.519*(L)^0.483*(S)^-0.135	0.7
Existing-50YR	3	2.79	0.93	50	15	565	0.0027	4.8	11	1.98	0.3	0.85	4.69	Tc=(10)^-0.507*(Cd*I)^-0.519*(L)^0.483*(S)^-0.135	0.93
Existing-50YR	4	2.00	0.56	50	15	397	0.0025	4.8	11	1.98	0.3	0.63	2.49	Tc=(10)^-0.507*(Cd*I)^-0.519*(L)^0.483*(S)^-0.135	0.44
Existing-50YR	5	1.10	0.81	50	15	363	0.0041	4.8	8	2.3	0.3	0.79	2.00	Tc=(10)^-0.507*(Cd*I)^-0.519*(L)^0.483*(S)^-0.135	0.33
Existing-50YR	6	1.98	0.60	50	15	642	0.0031	4.8	15	1.71	0.3	0.64	2.17	Tc=(10)^-0.507*(Cd*I)^-0.519*(L)^0.483*(S)^-0.135	0.46
ONSITE TOTAL		10.88											16.45		3.14
Existing-50YR	20	1.12	0.97	50	15	768	0.0039	4.8	12	1.9	0.3	0.88	1.87	Tc=(10)^-0.507*(Cd*I)^-0.519*(L)^0.483*(S)^-0.135	0.39
Existing-50YR	21	0.46	1.00	50	15	367	0.0014	4.8	9	2.17	0.3	0.9	0.90	Tc=(10)^-0.507*(Cd*I)^-0.519*(L)^0.483*(S)^-0.135	0.16
Existing-50YR	22	0.46	0.99	50	15	359	0.0014	4.8	9	2.17	0.3	0.89	0.88	Tc=(10)^-0.507*(Cd*I)^-0.519*(L)^0.483*(S)^-0.135	0.16
Existing-50YR	23	0.30	0.93	50	15	248	0.0002	4.8	11	1.98	0.3	0.86	0.52	Tc=(10)^-0.507*(Cd*I)^-0.519*(L)^0.483*(S)^-0.135	0.1
Existing-50YR	24	4.05	0.99	50	15	924	0.0016	4.8	16	1.66	0.2	0.89	5.99	Tc=(10)^-0.507*(Cd*I)^-0.519*(L)^0.483*(S)^-0.135	1.43
Existing-50YR	25	4.40	1.00	50	15	1141	0.0009	4.8	21	1.46	0.2	0.9	5.78	Tc=(10)^-0.507*(Cd*I)^-0.519*(L)^0.483*(S)^-0.135	1.57
Existing-50YR	26	1.34	0.71	50	15	905	0.0011	4.8	20	1.49	0.2	0.71	1.42	Tc=(10)^-0.507*(Cd*I)^-0.519*(L)^0.483*(S)^-0.135	0.36
Existing-50YR	27	0.70	0.78	50	15	507	0.0039	4.8	11	1.98	0.3	0.77	1.06	Tc=(10)^-0.507*(Cd*I)^-0.519*(L)^0.483*(S)^-0.135	0.2
OFFSITE TOTAL		12.83											18.42		4.37
TOTAL		23.71											34.87		7.51

50-YEAR, 24-HOUR PROPOSED CONDITION TC CALCULATOR RESULTS

Project	Subarea	Area (acres)	%imp	Frequency	Soil Type	Length (ft)	Slope (ft/ft)	Isohyet (in.)	Tc-calculated (min.)	Intensity (in./hr)	Cu	Cd	Flow rate (cfs)	Tc Equation	Volume (acre-ft)
Proposed-50YR	1	1.31	0.80	50	15	286	0.005	4.8	7	2.44	0.3	0.79	2.53	Tc=(10)^-0.507*(Cd*I)^-0.519*(L)^0.483*(S)^-0.135	0.39
Proposed-50YR	2	1.43	0.81	50	15	254	0.005	4.8	6	2.63	0.4	0.8	3.01	Tc=(10)^-0.507*(Cd*I)^-0.519*(L)^0.483*(S)^-0.135	0.43
Proposed-50YR	3	1.84	0.89	50	15	439	0.005	4.8	9	2.17	0.3	0.83	3.31	Tc=(10)^-0.507*(Cd*I)^-0.519*(L)^0.483*(S)^-0.135	0.59
Proposed-50YR	4	2.23	0.95	50	15	443	0.005	4.8	9	2.17	0.3	0.87	4.21	Tc=(10)^-0.507*(Cd*I)^-0.519*(L)^0.483*(S)^-0.135	0.76
Proposed-50YR	5	1.51	0.88	50	15	148	0.005	4.8	5	2.86	0.4	0.84	3.63	Tc=(10)^-0.507*(Cd*I)^-0.519*(L)^0.483*(S)^-0.135	0.48
Proposed-50YR	6	2.56	0.97	50	15	465	0.005	4.8	9	2.17	0.3	0.88	4.89	Tc=(10)^-0.507*(Cd*I)^-0.519*(L)^0.483*(S)^-0.135	0.89
ONSITE TOTAL		10.88											21.58		3.54
Proposed-50YR	20	1.12	1.00	50	15	768	0.0039	4.8	12	1.9	0.3	0.9	1.91	Tc=(10)^-0.507*(Cd*I)^-0.519*(L)^0.483*(S)^-0.135	0.4
Proposed-50YR	21	0.46	0.93	50	15	367	0.0014	4.8	10	2.07	0.3	0.86	0.82	Tc=(10)^-0.507*(Cd*I)^-0.519*(L)^0.483*(S)^-0.135	0.15
Proposed-50YR	22	0.46	0.92	50	15	359	0.0014	4.8	10	2.07	0.3	0.85	0.81	Tc=(10)^-0.507*(Cd*I)^-0.519*(L)^0.483*(S)^-0.135	0.15
Proposed-50YR	23	0.30	0.88	50	15	248	0.0002	4.8	11	1.98	0.3	0.83	0.50	Tc=(10)^-0.507*(Cd*I)^-0.519*(L)^0.483*(S)^-0.135	0.1
Proposed-50YR	24	4.05	0.99	50	15	924	0.0016	4.8	16	1.66	0.2	0.89	5.99	Tc=(10)^-0.507*(Cd*I)^-0.519*(L)^0.483*(S)^-0.135	1.43
Proposed-50YR	25	4.40	1.00	50	15	1141	0.0009	4.8	21	1.46	0.2	0.9	5.78	Tc=(10)^-0.507*(Cd*I)^-0.519*(L)^0.483*(S)^-0.135	1.57
Proposed-50YR	26	1.34	0.84	50	15	905	0.0011	4.8	19	1.53	0.2	0.79	1.62	Tc=(10)^-0.507*(Cd*I)^-0.519*(L)^0.483*(S)^-0.135	0.41
Proposed-50YR	27	0.70	0.85	50	15	507	0.0039	4.8	10	2.07	0.3	0.81	1.17	Tc=(10)^-0.507*(Cd*I)^-0.519*(L)^0.483*(S)^-0.135	0.22
OFFSITE TOTAL		12.83											18.60		4.43
TOTAL		23.71											40.18		7.97