5.9 HYDROLOGY AND WATER QUALITY

This section of the Draft Environmental Impact Report (DEIR) evaluates the potential impacts to hydrology and water quality conditions from implementation of the Proposed Project. Hydrology deals with the distribution and circulation of water, both on land and underground. Water quality deals with the quality of surface and groundwater. Surface water is on the surface of the land and includes lakes, rivers, streams, and creeks. Groundwater is below the surface of the earth.

- *Hydrology Analysis for TTM 18104 (Nohl Condos, City of Anaheim, Count of Orange*, Hunsaker & Associates Irvine, Inc., April 15, 2019. (Appendix J to the DEIR.)
- *Preliminary Water Quality Management Plan, Nohl Ranch Condominiums, Vesting Tentative Tract Map No. 18104*, Hunsaker & Associates Irvine, Inc, October 1, 2018. (Appendix K to the DEIR.)

Complete copies of these studies are included in the Appendices to this Draft EIR.

5.9.1 Environmental Setting

5.9.1.1 REGULATORY BACKGROUND

Clean Water Act

The federal Water Pollution Control Act (or Clean Water Act [CWA]) is the principal statute governing water quality. It establishes the basic structure for regulating discharges of pollutants into the waters of the United States and gives the US Environmental Protection Agency (EPA) authority to implement pollution control programs, such as setting wastewater standards for industry. The statute's goal is to completely end all discharges and to restore, maintain, and preserve the integrity of the nation's waters. The CWA regulates direct and indirect discharge of pollutants; sets water quality standards for all contaminants in surface waters; and makes it unlawful for any person to discharge any pollutant from a point source into navigable waters unless a permit is obtained under its provisions. The CWA mandates permits for wastewater and stormwater discharges; requires states to establish site-specific water quality standards for navigable bodies of water; and regulates other activities that affect water quality, such as dredging and the filling of wetlands. The CWA funds the construction of sewage treatment plants and recognizes the need for planning to address nonpoint sources of pollution. Section 402 of the CWA requires a permit for all point source (a discernible, confined, and discrete conveyance, such as a pipe, ditch, or channel) discharges of any pollutant (except dredge or fill material) into waters of the United States.

Safe Drinking Water Act

The federal Safe Drinking Water Act (SDWA) regulates drinking water quality nationwide and gives the EPA the authority to set drinking water standards, such as the National Primary Drinking Water regulations (NPDWRs or primary standards). The NPDWRs protect drinking water by limiting the levels of specific contaminants that can adversely affect public health. All public water systems that provide service to 25 or more individuals must meet these standards. Water purveyors must monitor for contaminants on fixed

schedules and report to the EPA when a maximum contaminant level (MCL) is exceeded. MCL is the maximum permissible level of a contaminant in water that is delivered to any user of a public water system. Contaminants include organic and inorganic chemicals (e.g., minerals), substances that are known to cause cancer, radionuclides (e.g., uranium and radon), and microbial contaminants (e.g., coliform and E. coli). The MCL list typically changes every three years as the EPA adds new contaminants or revises MCLs. The California Department of Public Health's Division of Drinking Water and Environmental Management is responsible for implementation of the SDWA in California.

Porter-Cologne Water Quality Act

The Porter-Cologne Water Quality Act (Water Code sections 13000 et seq.) is the basic water quality control law for California. Under this Act, the State Water Resources Control Board (SWRCB) has ultimate control over state water rights and water quality policy. In California, the EPA has delegated authority to issue NPDES permits to the SWRCB. The state is divided into nine regions related to water quality and quantity characteristics. The SWRCB, through its nine Regional Water Quality Control Boards (RWQCBs) carries out the regulation, protection, and administration of water quality in each region. Each regional board is required to adopt a Water Quality Control Plan or Basin Plan that recognizes and reflects the regional differences in existing water quality, the beneficial uses of the region's ground and surface water, and local water quality conditions and problems. The City of Anaheim is in the Santa Ana River Basin, Region 8. This Basin Plan gives direction on the beneficial uses of the state waters within Region 8, describes the water quality that must be maintained to support such uses, and provides programs, projects, and other actions necessary to achieve the standards established in the Basin Plan.

5.9.1.2 APPLICABLE PLANS AND PROGRAMS

National Pollutant Discharge Elimination System

The National Pollutant Discharge Elimination System (NPDES) permit program was established by the CWA to regulate municipal and industrial discharges to surface waters of the US from their municipal separate storm sewer systems (MS4s). Under the NPDES program, all facilities which discharge pollutants into waters of the US are required to obtain an NPDES permit. Requirements for storm water discharges are also regulated under this program.

The term "pollutant" broadly applies to any type of industrial, municipal, and agricultural waste discharged into water. Point sources can be publicly owned treatment works (POTWs), industrial facilities, and urban runoff. (The NPDES program addresses certain agricultural activities, but the majority are considered nonpoint sources and are exempt from NPDES regulation.) Under the national program, NPDES permits are issued only for direct, point-source discharges. Direct sources discharge directly to receiving waters, and indirect sources discharge to POTWs, which in turn discharge to receiving waters.

NPDES issues two basic permit types: individual and general. Also, the EPA has recently focused on integrating the NPDES program further into watershed planning and permitting (USEPA 2012).

The NPDES has a variety of measures designed to minimize and reduce pollutant discharges. All counties with storm drain systems that serve a population of 50,000 or more, as well construction sites one acre or more in size, must file for and obtain an NPDES permit. Another measure for minimizing and reducing pollutant discharges to a publicly owned conveyance or system of conveyances (including roadways, catch basins, curbs, gutters, ditches, man-made channels and storm drains, designed or used for collecting and conveying stormwater) is the EPA's Storm Water Phase II Final Rule. The Phase II Final Rule requires an operator (such as a City) of a regulated small MS4 to develop, implement, and enforce a program (e.g., best management practices [BMPs], ordinances, or other regulatory mechanisms) to reduce pollutants in post-construction runoff to the City's storm drain system from new development and redevelopment projects that result in the land disturbance of greater than or equal to one acre. Anaheim Public Works Department is the local enforcing agency of the MS4 NPDES permit.

Municipal Stormwater (MS4) Permit

The Project Site lies within the jurisdiction of Santa Ana RWQCB (Region 8) and is subject to the waste discharge requirements of the North Orange County MS4 Permit (Order No. R8-2009-0030) and NPDES Permit No. CAS618030, as amended by Order No. R8-2010-0062. The County of Orange, incorporated cities of Orange County, and the Orange County Flood Control District are co-permittees under the MS4 Permit. Pursuant to the MS4 Permit, the co-permittees were required to develop and implement a drainage area management plan (DAMP) as well as local implementation plans (LIPs), which describe urban runoff management programs for the local jurisdictions. The City of Anaheim, as a permittee under the General MS4 permit, has legal authority for enforcing the terms of the permit in its jurisdiction.

The General MS4 Permit requires that new development or significant redevelopment projects use BMPs, including site design planning, source control, and treatment techniques, to ensure that the water quality of receiving waters is protected. These requirements are detailed in the Orange County Model Water Quality Management Plan (WQMP) and supplemental Technical Guidance Document, updated December 2013, which the City of Anaheim has incorporated into its project approval processes. In the City, any new development project or significant redevelopment project (i.e., adding 5,000 or more square feet of impervious surface) is required to prepare a WQMP that specifies the BMPs and low-impact development (LID) measures that would be implemented to minimize the effects of the project on regional hydrology, runoff flow rates and/or velocities, and pollutant loads. LID is a stormwater management strategy that emphasizes conservation and use of existing site features integrated with stormwater controls that are designed to mimic natural hydrologic patterns, and minimizes runoff by reducing the elements of development that produce it. An Operations and Maintenance Plan must also be included as part of the WQMP and must designate terms, conditions, and requirements for maintaining the BMPs in perpetuity.

County of Orange

The County of Orange also regulates storm runoff and water quality as the principal permittee under the General MS4 Permit and the DAMP. The City of Anaheim is a co-permittee under the General MS4 Permit and has legal authority for enforcing the terms of the permit in its jurisdiction.

The DAMP includes a New Development and Significant Redevelopment program. This program incorporates watershed protection and stormwater quality management principles into the general-plan process, environmental review process, and development permit approval process. The New Development and Significant Redevelopment program includes a model WQMP that defines requirements for project-specific planning, selection, and incorporation of BMPs into new development or redevelopment projects.

City of Anaheim

The City of Anaheim has adopted a LIP based upon the County's DAMP, which includes the model WQMP. Using the local LIP as a guide, the City approves project-specific WQMPs as part of the development plan and approval process prior to the issuance of permits. All applicants for new development or significant redevelopment projects in Anaheim are required to prepare a WQMP and submit it to the Department of Public Works. The WQMP must address:

- Regional or watershed programs
- Source control BMPs
- Site design BMPs
- Low impact development BMPs
- Treatment control BMPs
- Mechanism by which long-term operation and maintenance of all structural BMPs would be maintained

Storm Water Pollution Prevention Plans

Pursuant to the CWA, in 2001 the SWRCB issued a statewide general NPDES Permit for stormwater discharges from construction sites (NPDES No. CAS000002). The current Statewide Construction General Permit is SWRCB Order No. 2009-0009-DWQ, issued in 2009. Under this Statewide Construction General Activity permit, discharges of stormwater from construction sites with a disturbed area of one or more acres are required to either obtain individual NPDES permits for stormwater discharges or to be covered by the General Permit. Coverage by the General Permit is accomplished by completing and filing Permit registration documents with the SWRCB, which include a Notice of Intent (NOI), risk assessment, site map, Storm Water Pollution Prevention Plan (SWPPP), annual fee, and signed certification statement. The permit registration documents are submitted electronically to the SWRCB via the Storm Water Multiple Application and Report Tracking System website. Each applicant under the Construction General Permit must ensure that the SWPPP is prepared prior to grading and is implemented during construction. The SWPPP must list BMPs implemented on the construction site to protect stormwater runoff and must contain a visual monitoring program; a chemical monitoring program for "non-visible" pollutants to be implemented based on the risk level of the site; and inspection, reporting, training, and recordkeeping requirements. In the Santa Ana Region, the SWRCB is the permitting agency, and the Santa Ana RWQCB provides local oversight and enforcement.

National Flood Insurance Program

The National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973 mandate the Federal Emergency Management Agency (FEMA) to evaluate flood hazards. FEMA provides Flood Insurance Rate Maps (FIRMs) for local and regional planners to promote sound land use and floodplain development, identifying potential flood areas based on the current conditions. To delineate a FIRM, FEMA conducts engineering studies referred to as Flood Insurance Studies. The most recent FIRMs for the Project area (FIRM No. 06059C0128J) were revised on December 3, 2009. Using information gathered in these studies, FEMA engineers and cartographers delineate Special Flood Hazard Areas on FIRMs.

The Flood Disaster Protection Act requires owners of all structures in identified Special Flood Hazard Areas to purchase and maintain flood insurance as a condition of receiving federal or federally related financial assistance, such as mortgage loans from federally insured lending institutions. Community members in designated areas are able to participate in the National Flood Insurance Program (NFIP) afforded by FEMA. The NFIP is required to offer federally subsidized flood insurance to property owners in communities that adopt and enforce floodplain management ordinances that meet minimum criteria established by FEMA. The National Flood Insurance Reform Act of 1994 further strengthened the NFIP by providing a grant program for state and community flood mitigation projects. The act also established the Community Rating System, a system for crediting communities that implement measures to protect the natural and beneficial functions of their floodplains, as well as managing erosion hazards.

The design standard for flood protection established by FEMA is the 100-year flood event, also described as a flood that has a 1-in-100 chance of occurring in any given year. Additionally, FEMA has developed requirements and procedures for evaluating earthen levee systems and mapping the areas affected by those systems. Levee systems are evaluated for their ability to provide protection from 100-year flood events, and the results of this evaluation are documented in the FEMA Levee Inventory System. Levee systems must meet minimum freeboard standards and must be maintained according to an officially adopted maintenance plan. Other FEMA levee system evaluation criteria include structural design and interior drainage.

5.9.1.3 EXISTING CONDITIONS

Regional Drainage

The Project Site is in the Santa Ana River Watershed and tributary to Santa Ana River Reaches 1 and 2, and Santiago Creek Channel Reach 1. Currently, there is no approved Watershed Infiltration and Hydromodification Management Plan for the watershed. Although Reach 1 of the Santa Ana River is considered impaired under Section 303(d) of the Clean Water Act (pathogens), there are currently no "total maximum daily loads" established for any of the Project Site's receiving waters.

Project Site Drainage

The Project Site currently consists of a commercial development, with runoff divided into two drainage areas "A" and "B", a western drainage and an eastern drainage (see Figure 5.9-1, *Existing Drainage Conditions*). The western drainage consists of the southwestern portion of the site, with runoff conveyed southerly as sheet

flow to existing gutters, which flow to Nohl Ranch Road. Runoff is conveyed southerly as gutter flow to Serrano Avenue, then westerly approximately 110 feet to an existing catch basin just west of the intersection of Nohl Ranch Road and Serrano Avenue. Runoff is conveyed approximately 1.4 miles westerly in the Serrano Avenue storm drain system before discharging to Santiago Creek to the south, which is tributary to Reach 2 of the Santa Ana River.

The eastern drainage is from the northwestern and eastern portions of the site. Runoff is conveyed as sheet flow to gutters on the site that flow to the southeastern portion and discharge to Serrano Avenue. Runoff is then conveyed as gutter flow easterly to South Calle Venado, then northerly approximately 0.15 mile into an existing catch basin and discharged northeasterly to Oak Canyon.

Flows from Oak Canyon are conveyed north to Anaheim Hills Golf Course, then westerly prior to discharging the existing storm drain system in Anaheim Hills Road (Orange County Flood Control District Facility No. E01S09), which conveys them north to Reach 2 of the Santa Ana River. All flows are then conveyed southerly to Reach 1 of the Santa Ana River and ultimately to the Pacific Ocean.

Groundwater

The Project Site lies in the Orange County Groundwater Basin (OC Basin), which underlies the northern half of Orange County, covering approximately 350 square miles (OCWD 2015). The OC Basin is bordered by the Coyote and Chino Hills to the north, the Santa Ana Mountains to the northeast, and the Pacific Ocean to the southwest. It terminates near the Orange County boundary to the northwest, where it connects to the Central Basin of the Los Angeles Groundwater Basin. The hydrogeology of the OC Basin is characterized by a deep structural alluvial basin containing a thick accumulation of interbedded sand, silt, and clay. The California Department of Water Resources has divided the Basin into two zones, the Forebay and the Pressure areas. The Project Site is in the Pressure area, where large quantities of surface water and near-surface groundwater is impeded from percolating into the major producible aquifers by clay and silt layers at shallow depths (upper 50 feet) (OCWD 2015).

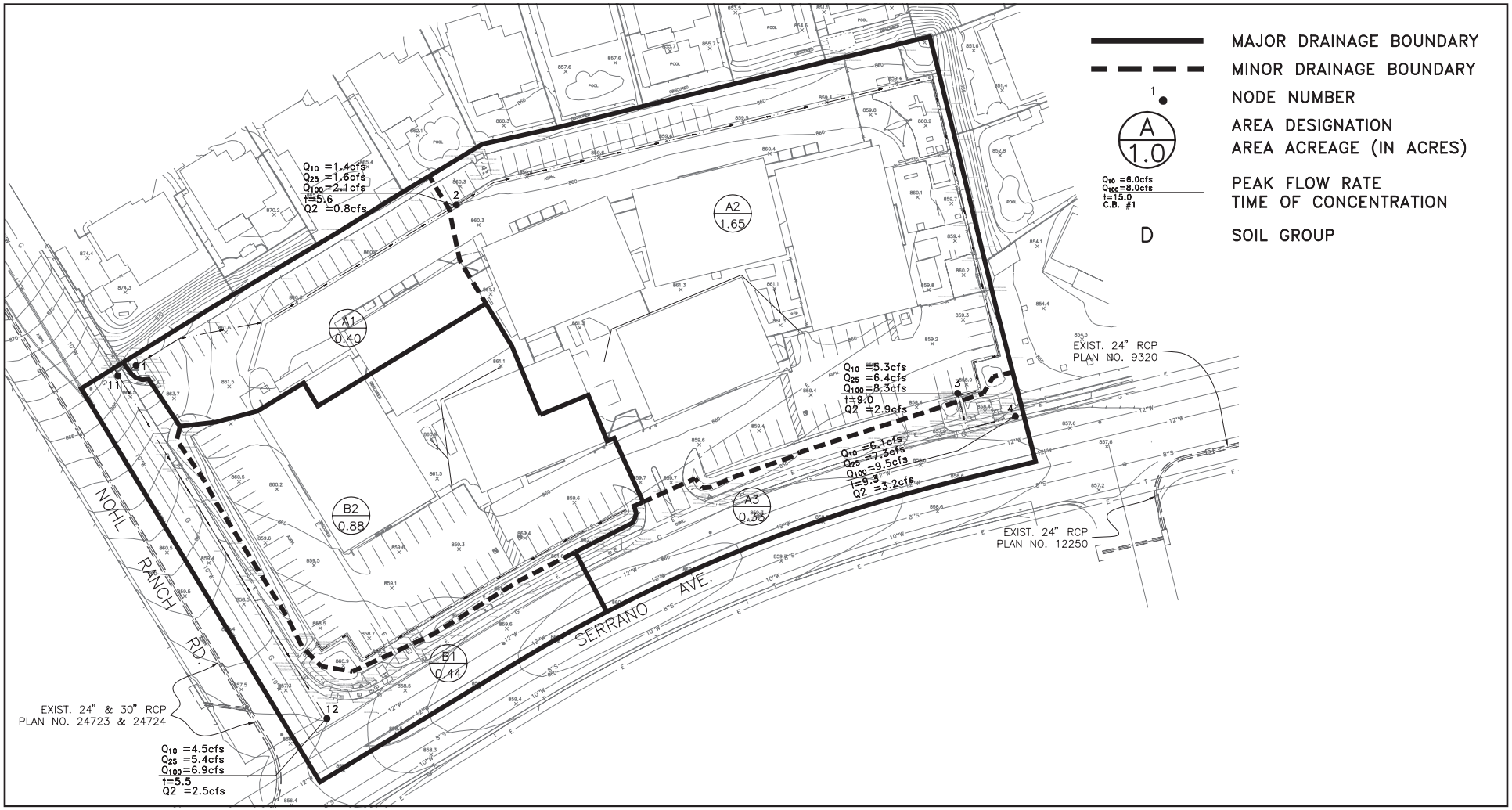
Groundwater in the OC Basin is managed by Orange County Water District. Groundwater is extracted from more than 500 production wells in the basin. The water supply system also includes 800 monitoring wells, more than 1,000 acres of recharge ponds, two seawater intrusion barriers, three desalters, the Groundwater Replenishment System, the Prado wetlands, and Prado Dam (OCWD 2015).

Subsurface Conditions

Subsurface soils consist primary of hydrologic soils group Type C and D soils, and these soils consist primarily of clays and silts and are characterized as having high swell potential with a low to very low rate of transmission when thoroughly wet. The Project Site is not in a shallow groundwater zone or plume protection zone.

Figure 5.9-1 - Existing Drainage Conditions

5. Environmental Analysis



Source: Hunsaker & Associates, 2018

5. Environmental Analysis
HYDROLOGY AND WATER QUALITY

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Flood Hazards

Designated Flood Zones

FEMA determines floodplain zones in an effort to assist cities in mitigating flooding hazards through land use planning. FEMA also outlines specific regulations for any construction in a 100-year floodplain. The 100-year floodplain is defined as an area that has a 1 percent chance of being inundated during a 12-month period. This has been established as the base flood for purposes of floodplain management measures. FEMA also prepares maps for 500-year floods, which mean that in any given year, the risk of flooding in the designated area is 0.2 percent. The FIRM for the Project Site, No. 06059C0159J, was prepared in 2009. The Project Site is identified as Zone X, an area of minimal flood hazard, and no flooding impact due to designated flood zones is anticipated.

5.9.2 Thresholds of Significance

According to Appendix G of the CEQA Guidelines, a project would normally have a significant effect on the environment if the project would:

HYD-1 Violate any water quality standards or waste discharge requirements or otherwise substantially degrade surface or ground water quality.

HYD-2 Substantially decrease groundwater supplies or interfere substantially with groundwater recharge such that the project may impede sustainable groundwater management of the basin.

HYD-3 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:

i) Result in a 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 offsite.

iii) 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

iv) Impede or redirect flood flows.

HYD-4 In flood hazard, tsunami, or seiche zones, risk release of pollutants due to project inundation.

HYD-5 Conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan.

The Initial Study, included as Appendix A, substantiates that impacts associated with the following thresholds would be less than significant:

- Threshold HYD-2

- Threshold HYD-3.ii
- Threshold HYD-3.iv
- Threshold HYD-4

These impacts will not be addressed in the following analysis.

5.9.3 Plans, Programs, and Policies

Regulatory Requirements

RR HYD-1 The Proposed Project is required to be developed in compliance with the following state, regional, and local regulations concerning grading, storm water and water quality control:

State

- NPDES General Construction Permit. NOI and SWPPP Requirements
- SWRCB General Industrial Activities Storm Water Permit

Regional

- Santa Ana RWCB Waste Discharge Permits (WDRs) and Water Quality Certifications
- Orange County MS4 Permit
- Orange County Model Water Quality Management Plan (WQMP) and Technical Guidance Document
- Orange County Drainage Area Management Plan (DAMP). New Development/Significant Redevelopment Program
- Orange County Hydrology Manual and 1996 Addendum
- Orange County Water District (OCWD) Groundwater Replenishment Program
- Orange County and City of Anaheim Local Implementation Plan (LIP)

City of Anaheim

- City of Anaheim General Plan, Public Services and Facilities Element
- City of Anaheim General Plan, Green Element
- City of Anaheim General Plan, Safety Element
- City of Anaheim Municipal Code, Chapter 10.09, NPDES Program
- City of Anaheim Municipal Code, Chapter 10.20, Construction and Destruction of Wells
- City of Anaheim Municipal Code, Chapter 17.04, Grading Permits
- City of Anaheim Municipal Code, Chapter 17.28, Flood Hazard Reduction

5.9.4 Environmental Impacts

5.9.4.1 IMPACT ANALYSIS

The following impact analysis addresses thresholds of significance for which the Initial Study disclosed potentially significant impacts. The applicable thresholds are identified in brackets after the impact statement.

Impact 5.9-1: Violate any water quality standards or waste discharge requirements or otherwise substantially degrade surface or groundwater quality. [Threshold HYD-1]

Construction

The Project Site is 3.03 acres, and the proposed construction would disturb one or more acres of land. Therefore, a NPDES permit from the SWRCB is required, including submittal of an NOI and preparation of a SWPPP. The SWPPP includes BMPs to reduce water quality impacts, including various measures to control on-site erosion; to reduce sediment flows into stormwater; to control wind erosion; to reduce tracking of soil and debris into adjacent roadways and off-site areas; and to manage wastes, materials, wastewater, liquids, hazardous materials, stockpiles, equipment, and other site conditions to prevent pollutants from entering the storm drain system. Inspections, reporting, and stormwater sampling and analysis are also required to ensure that visible and nonvisible pollutants are not discharged off-site. Since the Project Site is in proximity to the City of Orange boundaries, the City would also provide an opportunity for the City of Orange to review the storm drain plans, if requested.

Implementation of the provisions of the NPDES permit and compliance with City grading requirements would minimize construction impacts through the implementation of BMPs that reduce construction-related pollutants. This would ensure that any impacts to downstream waters resulting from construction activities would be less than significant.

Operation

A Preliminary Water Quality Management Plan (PWQMP) was prepared for the Proposed Project to comply with the requirements of the NPDES Stormwater Program during long-term operation of the Proposed Project (included as Appendix K to the DEIR). It should be noted that the City's review of the PWQMP focused on the pretreatment and LID component, and detailed sizing review will be conducted as part of the Final WQMP. Specifically, the PQWMP indicated that the Proposed Project could have offsite impacts to the driveway approach areas in the right-of-way, which would require implementation of right-of-way BMP to treat the commensurate flow from the footprint not captured onsite. Activities typical of residential developments are anticipated for the Proposed Project. These include day-to-day activities such as recreation, lounging, commuting, exercising, and other residential related activities. And typical household wastes from residential uses are anticipated to be generated daily from the Proposed Project. These include food wastes, paper products, and recyclable materials. These materials would be disposed to on-site trash enclosures and removed for disposal on a weekly basis by the local private waste management company.

Considering these typical residential activities, potential pollutants that could be generated by maximum buildout of the Proposed Project would include bacteria/viruses, heavy metals, nutrients, pesticides, organic compounds, sediment, trash and debris, oxygen-demanding substances, and oil and grease. According to the PWQMP, the potential pollutants of concern anticipated by the Proposed Project are summarized in Table 5.9-1:

Table 5.9-1 Pollutants of Concern

Pollutants	Additional Information
Suspended Solid/ Sediment	Potential sources of sediment include existing landscaping areas and disturbed earth surfaces.
Nutrients	Potential sources of nutrients include fertilizers, sediment and trash/debris.
Heavy Metals	Potential sources include vehicles and automotive fluids.
Pathogens (Bacteria/Virus)	Potential sources of pathogens include landscaping areas and food wastes.
Pesticides	Potential sources of pesticides include landscaping areas.
Oil and Grease	Potential source includes automobiles.
Toxic Organic Compounds	Potential source includes automobiles.
Trash and Debris	Potential sources include common litter and trash from residents

As part of the PWQMP, hydrologic conditions of concern (HCOC) were identified. A HCOC is a combination of upland hydrologic conditions and stream biological and physical conditions that presents a condition of concern for physical and/or biological degradation of streams. In the North Orange County permit area, HCOCs are considered to exist if any streams downstream from the project are determined to be potentially susceptible to hydromodification impacts and either of the following conditions exists:

- Post-development runoff volume for the 2-yr, 24-hr storm exceeds the pre-development runoff volume for the 2-yr, 24-hr storm by more than 5 percent.

or

- Time of concentration (Tc) of post-development runoff for the 2-yr, 24-hr storm event is less than the time of concentration of the pre-development condition for the 2-yr, 24-hr storm event by more than 5 percent.

Based on County's current hydromodification susceptibility GIS data, the Proposed Project was determined to be potentially susceptible to hydromodification because the Project Site discharges to Oaks Canyon, Anaheim Hills Golf Course, and Santiago Creek, which have natural or unimproved downstream drainage reaches and are susceptible to hydromodification impacts. Therefore, a hydrology study was prepared (Appendix J to the DEIR) that determined that the Proposed Project would not exceed the specific criteria for 2-year post-development runoff. The HCOC analysis summary is provided in Table 5.9-2, and details of analysis and supporting documents are included as Appendix D to the PWQMP, included as Appendix K to the DEIR.

Table 5.9-2 Hydromodification Analysis Summary

Drainage Area[1]	Acres	Existing Q_2	Proposed Q_2	Existing T_C	Proposed T_C
A	2.05 acres	2.9 cfs	0.4cfs	9.0 min	9.3 min
B	0.88 acres	1.68 cfs		5.5 min	

[1] In developed condition, drainage areas A and B are combined into a single drainage.

As with the existing conditions, runoff from the Project Site would flow easterly and then southerly prior to discharging to the existing storm drain in Serrano Avenue. And the Proposed Project was designed to meet the following LID performance standard:

- Provide onsite biotreatment to treat additional runoff, as feasible, up to 80 percent average annual capture efficiency.

And the following site design BMPs were incorporated into the Proposed Project.

- **Minimize Impervious Area:** The Proposed Project will minimize impervious area by incorporating the use of multilevel structures and providing landscaping in open space areas and common areas adjacent to walkways and residential units to minimize the project's impervious footprint, thereby reducing runoff generated during rain events.

- **Maximize Natural Infiltration Capacity:** Due to the Project Site's proximity to the Geologic Hazard Abatement District Benefit Area as part of the Santiago Landslide Area, infiltration is not recommended.

- **Preserve Existing Drainage Patterns and Time of Concentration:** The proposed drainage pattern is consistent with existing drainage patterns, with drainage from the developed site conveyed southeasterly and southwesterly to the existing offsite drainage system.

- **Disconnect Impervious Areas:** Landscaping will be provided adjacent to walkways and building units to break up the Project's impervious areas.

- **Protect Existing Vegetation and Sensitive Areas, and Revegetate Disturbed Areas:** The site currently consists of a commercial plaza, with limited landscaping areas. There are no natural areas or critical landscaping areas to preserve. All disturbed areas will either be paved or landscaped.

- **Xeriscape Landscaping:** Native and/or drought-tolerant landscaping will be incorporated into the site design, consistent with City guidelines.

Incorporating these site design BMPs and the LID performance criterion and complying with regulatory requirements would reduce stormwater pollutants that could affect water quality in the Santa Ana River and/or the Pacific Ocean, thus reducing impacts related to stormwater pollution and water quality to less than significant levels.

Level of Significance before Mitigation: Less than significant.

Impact 5.9-2: 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 a substantial erosion or siltation on- or off-site. [Threshold HYD-3.i]

Buildout of the Proposed Project could result in changes to stormwater runoff and water quality during construction activities. Stormwater runoff could contain pollutants—such as soil and sediments that are released during grading and excavation activities, and petroleum-related pollutants due to spills or leaks from heavy equipment and machinery. Other common pollutants that can result from construction activities include solid or liquid chemical spills; concrete and related cutting or curing residues; wastes from paints, stains, sealants, solvents, detergents, flues, acids, lime, plaster, and cleaning agents; and heavy metals from equipment. The western stormwater runoff flows into the existing storm drain inlets and eventually discharges into Santiago Creek to the south; the eastern drainage would discharge to Oak Canyon, then to the drainage system in Anaheim Hills Road. All drainages would discharge to Reach 2 of the Santa Ana River, then flow southerly to Reach 1 of the Santa Ana River, and ultimately to the Pacific Ocean.

The Project Site is 3.03 acres, and construction would disturb one or more acres of land. Therefore, a NPDES permit from the SWRCB, including submittal of an NOI and preparation of a SWPPP, is required. The SWPPP includes BMPs to reduce water quality impacts, including various measures to control on-site erosion; to reduce sediment flows into stormwater; to control wind erosion; to reduce tracking of soil and debris into adjacent roadways and off-site areas; and to manage wastes, materials, wastewater, liquids, hazardous materials, stockpiles, equipment, and other site conditions to prevent pollutants from entering the storm drain system. Inspections, reporting, and stormwater sampling and analysis are also required to ensure that visible and nonvisible pollutants are not discharged off-site.

Implementation of the provisions of the NPDES permit and compliance with City grading requirements would minimize construction impacts through the implementation of BMPs that reduce construction-related pollutants. This would ensure that any impacts to downstream waters resulting from construction activities would be less than significant. In addition to the requirements of the NPDES permit, grading and building permit requirements include the reduction of erosion and sedimentation impacts during construction. Full compliance with applicable local, state, and federal regulations would reduce water quality impacts associated with construction to a less than significant level.

Level of Significance before Mitigation: Less than significant.

Impact 5.9-3: 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 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. [Threshold HYD-3.iii]

The Proposed Project would include bioretention with underdrains and proprietary vegetated biotreatment systems (Modular Wetland Systems or approved equivalent). The proposed biotreatment BMPs are treat-and-release facilities and were selected based on their proven pollutant removal efficiencies as well as on site

constraints (shallow storm drain system, utility crossings). The stormwater runoff from the Project Site's six drainage management areas (DMAs) would be conveyed to these biotreatment BMPs via diversion troughs located within each of the Project's catch basins. The proposed six DMAs are shown in Figure 5.9-2, *Proposed Drainage Condition*.

In general, post-development drainage area and flow direction would be consistent with pre-project conditions. Runoff from the Project Site is conveyed as surface flow to project gutters and discharged to a catch basin and the Project's storm drain system. To satisfy the Project requirements for LID and stormwater treatment, non-storm water flows and the design capture volume from each of the Proposed Project's DMAs would be conveyed to a biotreatment BMP prior to discharging off-site.

As shown in Table 5.9-3, under existing conditions, the Project Site is 92 percent (3.45 acres) impervious and 8 percent (0.3 acres) pervious. It should be noted that the analysis assumed 3.75 total gross acreage, which includes adjacent right-of-way (0.72 acres) that serves the Project Site (3.03 acres). The Proposed Project would result in increased total pervious area from 0.30 acre to 0.61 acre, and decreased total impervious area from 3.45 acres to 3.14 acres. Therefore, the Proposed Project would result in a net increase of about 8 percent of pervious areas, improving the drainage conditions by reducing the stormwater runoff and peak discharge to drainage channels.

Table 5.9-3 Net Increase in Pervious Area, acres

Project Site	Pervious Area (acres)	Percentage	Impervious Area (acres)	Percentage	Total Acreage
Pre-Project Conditions	0.30	8%	3.45	92%	3.75
Post-Project Conditions	0.61	16%	3.14	84%	3.75
Change	-0.31	-8%	0.31	**8%**	**--**

Source: Hunsaker 2018.

Although the overall impervious surface area and the stormwater within the Project Site would decrease, the flow rates to two drainage systems (i.e., Area A and Area B) would change so that the easterly drainage Area A would receive increased flow rates and the westerly drainage Area B would receive decreased flow rates as summarized in Table 5.9-4.

Table 5.9-4 Drainage Areas and Flow Rate Summary

	Area A			Area B		
	Existing	Proposed	Change	Existing	Proposed	Change
Area	2.38 ac	3.29 ac	0.91 ac	1.32 ac	0.41 ac	(-0.91 ac)
Q_2 (cfs)	3.2	4.2	1.0	2.5	0.8	(-1.7)
Q_{10} (cfs)	6.1	7.9	1.8	4.5	1.4	(-3.1)
Q_{25} (cfs)	7.3	9.6	2.3	5.4	1.7	(-3.7)
Q_{100} (cfs)	9.5	12.4	2.9	6.9	2.2	(-4.7)

Source: Hunsaker 2019.

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The designed storm event flow rate for the Proposed Project is 25-year, and as shown in Table 5.9-4, the total runoff generated from Area A is 9.6 cfs, an increase of 2.3 cfs from the existing 7.3 cfs. The flow from Area A would convey to storm drain node 6, a 24-inch RCP in Serrano Avenue. As part of the Proposed Project this drain node would have connector pipe full capture screens and automated retractable screens on the curb surface that meet the Full Capture Requirements of the State Trash Provision. Prior to reaching node 6 at Serrano Avenue, a flow-by detention basin would be provided at node 4.1, with a required volume of 436 cubic feet to retain the excess flow of 2.3 cfs generated by the Proposed Project in the 25-year storm event. Therefore, the Proposed Project would not increase the storm water flow rate at any of the existing drainage system, and the Proposed 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.

Level of Significance Before Mitigation: Less than significant.

Impact 5.9-4: Conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan. [Threshold HYD-5]

The PWQMP divided the Project Site into six DMAs and calculated design capture volumes (DCV) and design flow rates for each of the DMA. This was used to identify appropriate treatment BMPs for the DMA. Table 5.9-5 and Figure 5.9-3, *Proposed Biotreatment BMPs*, show BMPs selected for each of the DMA. As described, the Proposed Project would implement proprietary biofiltration (Modular Wetland Systems or approved equivalent) and bioretention with underdrains to treat captured stormwater. These are considered treat-and-release facilities and include treatment mechanisms that employ soil microbes and plants. These units have been selected based on their proven pollutant removal efficiencies as well as on site constraints (shallow storm drain system, utility crossings). The water quality design flow from each of the Project's DMAs will be conveyed to proposed biotreatment BMPs via diversion troughs in each of the Project's catch basins. The PWQMP also calculated appropriate design flow rate sizes for these LID BMPs for each of the DMAs.

Table 5.9-5 Design Capture Volume and Low Impact Development Best Management Practices

DMA	Tributary Drainage Area	C-Value	D_{85} (in)	Simple Method DCV (ft^3)	T_C (min)	Design Intensity (in/hr)	Q_{BMP} (cfs)	LID BMP
1	0.22 ac	0.75	0.85	509	5	0.26	0.043	Proprietary Biofiltration
2	0.51 ac	0.75	0.85	1,180	7.3	0.24	0.092	Proprietary Biofiltration
3	0.14 ac	0.75	0.85	324	5	0.26	0.027	Bioretention w/ Underdrains
4	1.08 ac	0.75	0.85	2,499	7.8	0.24	0.194	Bioretention w/ Underdrains
5	0.87 ac	0.75	0.85	2,013	7.3	0.24	0.157	Proprietary Biofiltration
6	0.14 ac	0.75	0.85	324	5	0.26	0.027	Bioretention w/ Underdrains

Source: Hunsaker 2018.
in = inches; ft^3 = cubic foot; cfs = cubic foot per second
C-Value = Runoff coefficient value
D_{85} = Remainder of the design capture storm depth in inches
DCV = design capture volume
Tc (min) = time of concentration in minute
Design intensity (in/hr) = Design intensity at which the estimated time of concentration (T_c) achieves 80% capture efficiency.
Q_{BMP} (cfs) = Design flow rate in cubic feet per second

Figure 5.9-2 - Proposed Drainage Condition

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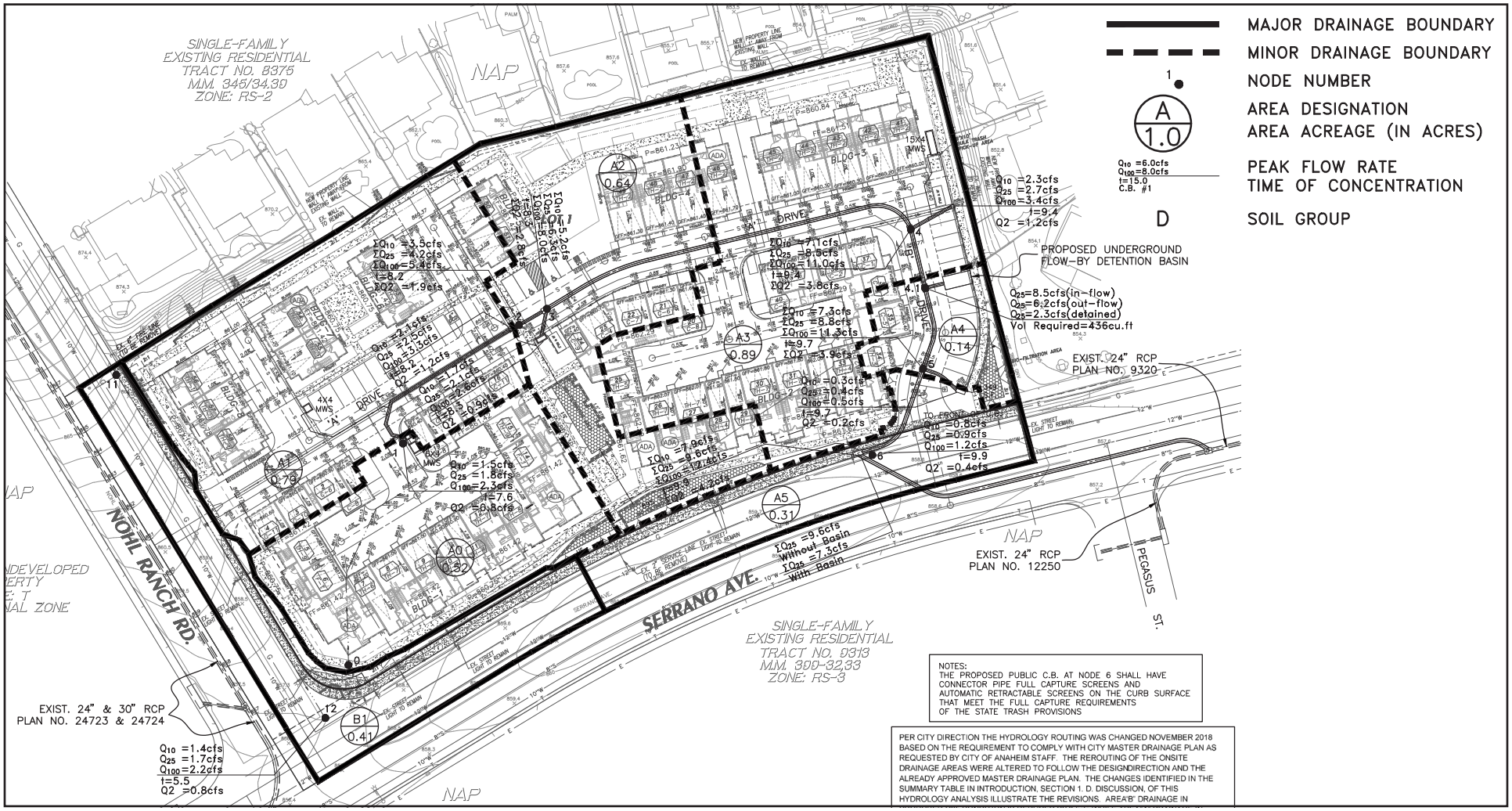

Source: Hunsaker & Associates, 2019

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Figure 5.9-3 - Proposed Biotreatment BMPs

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BMP SUMMARY

DMA	TRIBUTARY DRAINAGE AREA	IMP.	C-VALUE	D_{85} (in)	DCV_{SIMPLE} (cu-ft)	Tc (MIN)	INTENSITY	Q_{BMP}	LID BMP
1	0.22	0.8	0.75	0.85	509	5	0.26	0.043	BIO-7 PROPRIETARY BIOFILTRATION
2	0.51	0.8	0.75	0.85	1,180	7.3	0.24	0.092	BIO-7 PROPRIETARY BIOFILTRATION
3	0.14	0.8	0.75	0.85	324	5	0.26	0.027	BIO-1 BIORETENTION W/ UNDERDRAINS
4	1.08	0.8	0.75	0.85	2,499	7.8	0.24	0.194	BIO-1 BIORETENTION W/ UNDERDRAINS
5	0.87	0.8	0.75	0.85	2,013	7.3	0.24	0.157	BIO-7 PROPRIETARY BIOFILTRATION
6	0.14	0.8	0.75	0.85	324	5	0.26	0.027	BIO-1 BIORETENTION W/ UNDERDRAINS

TRACT BOUNDARY

NAP — NOT A PART

DRAINAGE MANAGEMENT AREA (DMA) LIMITS

DMA / ACRE — DMA DESIGNATION AND ACREAGE

SURFACE FLOW (ONSITE)

SURFACE FLOW (OFFSITE)

PROPOSED STORM DRAIN SYSTEM (PRIVATE)

PROPOSED BIORETENTION DRAINAGE SYSTEM (PRIVATE)

EXISTING STORM DRAIN SYSTEM (PUBLIC)

PROPOSED CATCH BASIN/INLET (PRIVATE) WITH BMP
PRE-1 CONNECTOR PIPE SCREEN
S1 STORM DRAIN SYSTEM STENCILING/SIGNAGE
N14 COMMON AREA CATCH BASIN INSPECTION

EXISTING CATCH BASIN (PUBLIC)

PROPOSED LANDSCAPING AREA WITH BMPS
N3 COMMON AREA LANDSCAPE MANAGEMENT
S4 EFFICIENT IRRIGATION SYSTEM AND LANDSCAPING DESIGN
HSC-2 IMPERVIOUS AREA DISPERSION
HSC-3 STREET TREES

S3 DESIGNATED TRASH ENCLOSURE

BIO-1 BIORETENTION WITH UNDERDRAIN

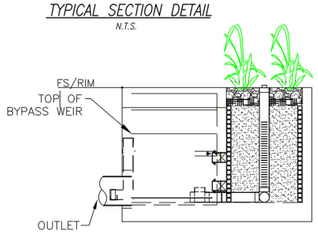
PAVEMENT/ WALKWAY

BIO-7 PROPRIETARY BIOTREATMENT
MODULAR WETLAND SYSTEM (OR APPROVED EQUIVALENT)

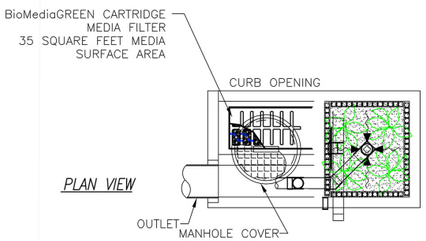
DISCHARGE POINT/ POINT OF COMPLIANCE

SW — N15 STREET SWEEPING

BIO-7 PROPRIETARY BIOTREATMENT (MWS)
TYPICAL SECTION DETAIL
N.T.S.



ELEVATION VIEW



PLAN VIEW

BIO-1 BIORETENTION (WITH UNDERDRAIN)
TYPICAL SECTION DETAIL

BIO-1 BIORETENTION WITH UNDERDRAIN
TYPICAL SECTION DETAIL
N.T.S.

0 — 70
Scale (Feet)

Source: Hunsaker & Associates, 2018

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Additionally, the Proposed Project is anticipated to incorporate the nonstructural and structural source control BMPs identified by the PQWMP and listed in Table 5.9-6.

Table 5.9-6 Nonstructural and Structural Source Control BMPs

Nonstructural Source Control BMPs	
Education for Property Owners, Tenants and Occupants	Educational materials will be provided to homeowners at close of escrow by the owner and periodically thereafter by the HOA to inform them of their potential impacts to downstream water quality. Materials include those described in Section VII of this WQMP and provided in the Final WQMP.
Activity Restrictions	Activity restrictions to minimize potential impacts to water quality and with the purpose of protecting water quality will be prescribed by the Project's Covenant, Conditions and Restrictions (CC&Rs), or other equally effective measure.
Common Area Landscape Management	Maintenance activities for landscape areas shall be consistent with City, County and manufacturer guidelines for fertilizer and pesticide use (OC DAMP Section 5.5). Maintenance includes trimming, weeding and debris removal and vegetation planting and replacement. Stockpiled materials during maintenance activities shall be placed away from drain inlets and runoff conveyance devices. Wastes shall be properly disposed of or recycled.
BMP Maintenance	Responsibility for implementation, inspection and maintenance of all BMPs (structural and non-structural) shall be consistent with the BMP Inspection and Maintenance Responsibilities Matrix provided in Section V of this WQMP, with documented records of inspections and maintenance activities completed.
Common Area Litter Control	Litter control onsite will include the use of HOA litter patrols, violation reporting and clean up during landscaping maintenance activities and as needed to ensure good housekeeping of the Project's common areas.
Employee Training	All employees, contractors and subcontractors of the HOA shall be trained on the proper use and staging of landscaping and other materials with the potential to impact runoff and proper clean-up of spills and materials.
Common Area Catch Basin Inspection	As required by the Technical Guidance Document, at least 80% of the Project's drainage facilities shall be inspected, cleaned/maintained annually, with 100% of facilities inspected and maintained within a two-year period. Cleaning should take place in the late summer/early fall, prior to the start of the wet season. Records shall be kept to document annual compliance.
Street Sweeping	The Project's private streets shall be swept, at minimum, on a weekly basis
Structural Source Control BMPs	
Provide storm drain system stenciling and signage	Storm drain stencils or signage prohibiting dumping and discharge of materials ("No Dumping – Drains to Ocean") shall be provided adjacent to each of the Project's proposed inlets. The stencils shall be inspected and restenciled as needed to maintain legibility.
Design and construct trash and waste storage areas to reduce pollution introduction	Designated trash enclosure areas shall be covered and designed to preclude trash and pad area from run-on, run-off and wind. Any drains within area shall be connected to the sanitary sewer system, with proper approval from the sewer company. Site shall be inspected with use to ensure all materials are disposed of properly.
Use efficient irrigation systems & landscape design, water conservation, smart controllers, and source control	In conjunction with routine landscaping maintenance activities, inspect irrigation for signs of leaks, overspray and repair or adjust accordingly. Adjust system cycle to accommodate seasonal fluctuations in water demand and temperatures. Ensure use of native or drought tolerant/non-invasive plant species to minimize water consumption.

Source: Hunsaker 2018.

The Project Site is already fully developed with urban uses, and the Proposed Project was designed to incorporate the proprietary biofiltration and bioretention with underdrains to treat captured stormwater as recommended by the PWQMP. Therefore, the Proposed Project would not adversely affect the downstream water quality or groundwater quality. Implementation of the Proposed Project would not conflict with or obstruct implementation of any water quality control plan. Impacts would be less than significant.

Level of Significance before Mitigation: Less than significant.

5.9.5 Cumulative Impacts

Drainage

The Project Site is in the Santa Ana River Watershed, and development of various projects within this Watershed would increase the amount of impervious area, potentially increasing runoff, drainage volumes, and contributing to flood hazards. However, the Project Site is already fully developed, and the Proposed Project would decrease the area of impervious surfaces within the Project Site. Therefore, the Proposed Project would not contribute to increasing the amount of impervious area within the Watershed, and would not contribute to increased overall runoff volumes and flood hazards. Additionally, as with the Proposed Project, other projects would also be required to implement site design, LID, and treatment control BMPs pursuant to MS4 permits of the RWQCB. Cumulative impacts to drainage would be less than significant, and project impacts would not be cumulatively considerable.

Groundwater

The cumulative study area respecting groundwater is the OC Basin. Other projects in the OC Basin would increase the amount of impervious area and thus could reduce groundwater recharge. However, the Proposed Project would reduce the amount of impervious area, and would not contribute to the downstream water quality or groundwater quality. The Project Site is not a groundwater recharge area, and would not result in decreased groundwater supplies or interfere substantially with groundwater recharge. Therefore, combined with other projects in the area, the Proposed Project would not adversely impact groundwater recharge or quality in the OC Basin. Additionally, payment of the replenishment assessment to the OCWD by the City and other agencies that extract groundwater from the Basin would allow the OCWD to continue its program to protect groundwater resources and to recharge the local aquifers in order to prevent overdraft. The Proposed Project and other projects in the City are required to pay applicable fees to the City, and the City would ensure that no significant cumulative impacts to groundwater water occurs within the City. No significant cumulative impacts are anticipated.

Water Quality

The cumulative study area for water quality is the part of Orange County in the jurisdiction of the Santa Ana RWQCB. Other projects could result in a cumulatively considerable impact to water quality due to construction activities and increases in post-development runoff. All construction projects that involve the disturbance of one or more acres of land are subject to the NPDES Construction Permit requirements for implementation of individual SWPPPs, which outline erosion control, sediment control, wind erosion control, tracking control, non-storm water management and waste management, and materials pollution control BMPs. Additionally, new development and significant redevelopment projects are required to prepare and implement WQMPs for long-term implementation and maintenance of source-control, site design, and treatment-control BMPs to ensure compliance with water quality goals and with the City's NPDES ordinance. The Proposed Project has incorporated biofiltration and bioretention with underdrains to ensure that runoff from the Project Site is properly treated. Thus, pollutants generated in the Project Site and cumulative development projects in the

Basin would be mitigated during construction activities and project operation. Compliance with the Santa Ana RWQCB's requirements for waste discharge and/or water quality certifications would also prevent long-term stormwater quality impacts. No significant cumulative impact would occur.

Level of Significance before Mitigation: Less than significant.

5.9.6 Level of Significance Before Mitigation

Upon implementation of regulatory requirements and standard conditions of approval, the following impacts would be less than significant: 5.9-1, 5.9-2, and 5.9-3.

5.9.7 Mitigation Measures

No mitigation measures are required.

5.9.8 Level of Significance After Mitigation

No significant impacts related to hydrology and water quality have been identified. No significant and unavoidable impacts are anticipated.

5.9.9 References

Hunsaker & Associates Irvine, Inc. 2019, April 15. Hydrology Analysis for TTM 18104 (Nohl Condos, City of Anaheim, Count of Orange.

_____. 2018, October 1. Preliminary Water Quality Management Plan, Nohl Ranch Condominiums, Vesting Tentative Tract Map No. 18104.

US Environmental Protection Agency (USEPA). 2012, September 26. Water Permitting 101. http://www.epa.gov/npdes/pubs/101pape.pdf.