4.8 HYDROLOGY and WATER QUALITY

This section analyzes the proposed ordinance revisions' potential to adversely affect hydrology and water quality. This analysis is partially based on a Conceptual Drainage and SUSMP (Water Quality) Report prepared by Hunsaker and Associates, LA Inc., dated May 6, 2011. The report is included as Appendix E of this EIR. The City's Public Works Department also conducted analysis of hydrology and water quality issues since the preparation of the 2011 study that is incorporated into this section.

4.8.1 Setting

a. Hydrology and Storm Drain System. The project area is located on the Palos Verdes Peninsula. Since the Rancho Palos Verdes Peninsula is a single hill formation, a central ridge disperses drainage in a number of small watershed systems. However, no major watershed systems are completely confined within the boundaries of Rancho Palos Verdes. All surface waters originate from precipitation that falls on the peninsula. The drainage pattern flows in several directions as a result of the central ridge. The majority of runoff flows directly south into the Pacific Ocean. The remaining runoff flows east through San Pedro, north through Rolling Hills and Rolling Hills Estates, or west through Palos Verdes Estates. All runoff, however, eventually flows into the Pacific Ocean.

The project area is part of an approximately 855-acre watershed that includes developed and undeveloped land. Off-site areas to the north of the project area include existing Tracts 27789, 31617 and 31714, as well as natural hillside and canyon open space areas. Altamira Canyon is the main natural drainage course that drains the project area and off-site tributary areas. Altamira Canyon has experienced and continues to experience erosion that is partially due to runoff from the existing development in and outside of the project area. Figure 4.8-1 shows the drainage pattern in the project area.

The ~~existing drainage system~~ Portuguese Bend Development, including the 31 undeveloped lots, was originally permitted by the County ~~designed in 1940 for the entire Portuguese Bend Development, including the 31 undeveloped lots~~. Since that time, the City adopted the Landslide Moratorium and there has been development above Altamira Canyon that drains into the project area, all of which contributes to overall runoff in the project area. Observations from area residents suggest that the existing system is inadequate to convey runoff from the developed lots.

The City Public Works Department conducted field observations in Zone 2 to assess the adequacy of the Council-adopted mitigation measures currently being implemented as part of Monks Lots residential development associated with Exception "P" of the Landslide Moratorium Ordinance. More specifically, the observation assessed whether water runoff from recently developed Zone 2 properties exceeded pre-development water runoff conditions. The field observations were conducted during rain events on February 2, 2019 and February 9, 2019. Runoff was observed during these storm events from properties with and without water runoff detention devices (holding tanks). The observed runoff appeared to be less on the properties with holding tanks.

In the vicinity of the project area, runoff is conveyed within existing drainage courses, storm drains, and culverts that traverse the area. The project area is divided roughly by Cinnamon Lane into two major drainage areas. The area east of Cinnamon Lane drains a total of approximately 637 acres, of which approximately 82 acres are located in the Zone 2 area. Drainage in the easterly watershed is conveyed by Altamira Canyon southwesterly to Narcissa Drive. The area west of Cinnamon Lane drains a total of 115 acres, of which approximately 42 acres are located in the Zone 2 area. Drainage in the westerly watershed is conveyed by a combination of an existing subsurface storm drain system and surface flow in a southeasterly direction along Figtree Road to the cul-de-sac at the end of Figtree Road. The storm drain continues southeasterly through private lots to a junction with Altamira Canyon (the easterly watershed) approximately 400 feet north of Narcissa Drive. From the junction, the storm drain drains southwesterly across Narcissa Drive and Palos Verdes Drive South and outlets into the lower reaches of Altamira Canyon. Altamira Canyon drains directly into the Pacific Ocean from Palos Verdes Drive South.

b. Flood Hazard Zones. The Flood Insurance Rate Map (FIRM) issued by the Federal Emergency Management Agency (FEMA) for Zone 2 and the surrounding area (Map ID 06037C2026F) indicates that the project area and surroundings are contained within Zone X and Zone D. Zone X designates an area with a minimal risk of flooding (not within the 100-year flood zone) and Zone D designates an area with areas in which flood hazards are undetermined, but possible. The flood hazard zones are shown in Figure 4.8-1. As shown on Figure 4.8-1, nine of the 31 lots that could be developed as a result of the project are partially or completely located within the Zone D designation.

c. Water Quality (Federal, State, and local regulations). Direct discharges of pollutants into waters of the United States are not allowed, except in accordance with the National Pollutant Discharge Elimination System (NPDES) program established in Section 402 of the Clean Water Act (CWA). The major purpose of the NPDES program is to protect human health and the environment by protecting the quality of water. California's primary statute governing water quality and water pollution is the Porter-Cologne Water Quality Control Act of 1970 (Porter-Cologne Act). The Porter-Cologne Act grants the State Water Resources Control Board (SWRCB) and the Regional Water Quality Control Board (RWQCB) broad powers to protect water quality and is the primary vehicle for implementation of California's responsibility under the federal CWA. The Porter-Cologne Act grants the SWRCB and RWQCBs the authority and responsibility to adopt plans and policies, to regulate discharges to surface and groundwater, to regulate waste disposal sites, and to require clean up of discharges of hazardous materials and other pollutants.

The protection of water quality in the watercourses in Rancho Palos Verdes is under the jurisdiction of the Los Angeles RWQCB (SWRCB District 4). The RWQCB establishes requirements prescribing discharge limits and establishes water quality objectives through the "Waste Discharge Requirements for Municipal Storm Water and Urban Runoff Discharges Within the County of Los Angeles, and the Incorporated Cities Therein, Except the City of Long Beach" for which the City of Rancho Palos Verdes is a co-permittee (Order No. 01-182), NPDES Permit No. CAS004001, dated December 13, 2001 and amended most recently in 2012 and 2015, issued by the California Regional Water Quality Control Board – Los Angeles Region, which also serves as a NPDES permit under the Federal Clean Water Act. As a co-permittee, the City is

required to implement procedures with respect to the entry of non-storm water discharges into the municipal storm water system. Chapter 13.10 of the Rancho Palos Verdes Municipal Code (RVPMC) addresses specific storm water pollution requirements for new developments in accordance with the NPDES Permit.

The NPDES permit specifies that all new development and redevelopment projects that fall under specific categories must implement Low Impact Development (LID) strategies. Single family homes equal to one acre or greater of disturbed area that add more than 10,000 square feet of impervious surface area are subject to the LID requirements. Unless exempted, the site for every new development project shall be designed to control pollutants, pollutant loads, and runoff volume to the maximum extent feasible by minimizing impervious surface area and controlling runoff from impervious surfaces through infiltration, evapotranspiration, bioretention and/or non-potable rainfall harvest and use in accordance with the requirements set forth in the MS4 permit. The project applicant shall prepare a storm water mitigation plan that implements LID standards and practices for stormwater pollution mitigation, provides documentation to demonstrate compliance with the MS4 permit on the plans and permit application submitted to the city, and complies with the following:

- *Retain stormwater runoff on-site for the Stormwater Quality Design Volume (SWQDv) defined as the runoff from*
    - *The 85th percentile 24-hour runoff event as determined from the Los Angeles County 85th percentile precipitation isohyetal map; or*
    - *The volume of runoff produced from a 0.75 inch, 24-hour rain event, whichever is greater.*
- *Minimize hydromodification impacts to natural drainage systems as defined in the NPDES permit.*

The construction of new single-family hillside homes that do not meet these criteria are exempt from the LID requirements, but shall include mitigation measures to conserve natural areas, protect slopes and channels, provide storm drain system stenciling and signage, divert roof runoff to vegetated areas before discharge unless the diversion would result in slope instability, and direct surface flow to vegetated areas before discharge, unless the diversion would result in slope instability.

Per Section 13.10.050 of the RPVMC, owners and occupants of property in the City must comply with the following requirement:

> *B. Use of Water. Runoff of water used for irrigation purposes shall be minimized to the maximum extent practicable. Runoff of water from the permitted washing down of paved areas shall be minimized to the maximum extent practicable and diverted so that flow is directed to landscaped areas for infiltration where possible.*

Section 15.20.050 of the RPVMC requires appropriate landslide abatement measures as conditions of issuance of any landslide moratorium exception permit. Specific conditions imposed by the City are listed in Section 4.5, *Geology*, on pages 4.5-14 and 4.5-15.

Chapter 15.34 of the RPVMC, Water Conservation Landscaping, includes water efficient landscape standards intended to promote water conservation while allowing the maximum possible flexibility in designing healthy, attractive, and cost effective water efficient landscapes. This chapter is at least as effective in conserving water as the model ordinance drafted by the California Department of Water Resources pursuant to Assembly Bill 1881.

The Rancho Palos Verdes General Plan Conservation and Open Space Element (2018) includes the following policies related to drainage and water quality:

6. *Prohibit activities that create excessive silt, pollutant runoff, increase canyon-wall erosion, or potential for landslide, within Resource Management Districts containing Hydrologic Factors (RM 6).*

10. *Stringently regulate irrigation, natural drainage, and other water-related considerations in new developments and existing uses affecting existing or potential slide areas.*

The Safety Element of the Rancho Palos Verdes General Plan (2018) includes the following policies related to drainage and flooding that are applicable to the project or project area:

23. *Avoid or minimize the risks of flooding to new development*

24. *Evaluate whether new development should be located in flood hazard zones, and identify construction methods or other methods to minimize damage if new development is located in flood hazard zones.*

d. Water Supply. The Rancho Dominguez District of the California Water Service Company (CWSC) is the local purveyor of domestic water. CWSC serves domestic customers in Rancho Palos Verdes, Palos Verdes Estates, Rolling Hills, Rolling Hills Estates, and a portion of Lomita. There is no local groundwater extraction for use by the CWSC on the Palos Verdes Peninsula. The Rancho Dominguez District's water supply for Palos Verdes is 100% reliant on imported water supply from the Metropolitan Water District (MWD) of Southern California, which is purchased through the West Basin Municipal Water District (WBMWD).

Based on the WBMWD's 2015 Urban Water Management Plan (UWMP), the WBMWD's 2020 water supply is 189,893 acre-feet per year (AFY) while 2020 demand is estimated at 167,999 AFY. By 2030, WBMWD supplies are forecast to increase to 201,529 AFY while demand is forecast to increase to 174,394 AFY (WBWD June 2016).

4.8.2 Impact Analysis

a. Methodology and Significance Thresholds. As discussed in the Initial Study prepared for the proposed project (Appendix A), the project area sits inland of steep coastal bluffs above the Pacific Ocean at an average elevation of approximately 350 feet above sea level. In addition, according to the Department of Conservation Tsunami Inundation Map for the Redondo Beach (South) Quadrangle, the project area is located outside a tsunami inundation area (DOC, March 2009). Therefore, as discussed in the Initial Study, impacts related to flooding as a result of the failure of a levee or dam and inundation by seiche, tsunami, or mudflow would be less than significant.

Impacts would be considered potentially significant if the proposed project would:

- *Violate any water quality standards or waste discharge requirements*
- *Substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering or the local groundwater table level*
- *Substantially alter the existing drainage pattern of the area such that substantial erosion or siltation occurs*
- *Substantially alter the existing drainage pattern or substantially increase the rate or amount of surface runoff in a manner which results in flooding*
- *Create or contribute runoff water which would exceed the capacity of existing or planned storm water drainage systems or provide substantial additional sources of polluted runoff*
- *Otherwise substantially degrade water quality*
- *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*
- *Place within a 100-year flood hazard area structures which would impede or redirect flood flows*
- *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*
- *Expose people or structures to a significant risk of loss, injury, or death as a result of inundation by seiche, tsunami, or mudflow*

The Initial Study determined that the proposed project could result in potentially significant impacts related to all of these impact categories except for the last two related to levee or dam failure or inundation by seiche, tsunami, or mudflow. These two topics are therefore not discussed further in this section.

Two hydrologic methods were used for the drainage analysis contained within the Hydrologic Study prepared by Hunsaker and Associates, 2011. The methods include the Rational Method and the Modified Rational Method, which are included in the 2006 Los Angeles County Hydrology Manual. A 24-hour storm analysis based upon the Los Angeles County Rational and Modified Rational Method of Hydrology was used for clear, burned, and burned and bulked conditions for the watershed. The amount of impervious surfaces in the project area was determined from the Land Use and Imperviousness Table provided in the Los Angeles County Hydrology Manual, 2006.

b. Project Impacts and Mitigation Measures.

Impact HWQ-1 During construction of the proposed project, the soil surface would be subject to erosion and the downstream watershed, including the Pacific Ocean, could be subject to temporary sedimentation and discharges of various pollutants. However, with implementation of Mitigation Measure HWQ-1, impacts relating to the potential for discharge of various pollutants, including sediment, would be Class II, *less than significant with mitigation incorporated*.

Adoption of the proposed ordinance revisions would result in the possible future development of up to 31 new residences on existing legal lots in Zone 2. Each of the 31 lots would be graded to accommodate single-family residential structures. As discussed in Section 2.0, *Project Description*, grading on each of the lots would be limited to less than 1,000 cubic yards (cut and fill combined including export), with no more than 50 cubic yards of imported fill per lot.

Excavation and grading could result in erosion of soils and sedimentation, which could cause temporary impacts to surface water quality and therefore violate water quality standards or contribute additional sources of polluted runoff. Project development would likely require temporary on-site storage of excavated soils (stockpiling). During grading and soil storage, soil migration off-site could occur via wind entrainment and/or water erosion. Eroded soils could lead to sedimentation of surface waters downstream of the project area, and could also discharge to the Pacific Ocean, potentially violating water quality standards. Therefore, impacts would be potentially significant.

Mitigation Measure. The following mitigation measure would be required to reduce impacts related to water quality during construction activities to a less than significant level.

HWQ-1 Construction pollution, sediment and erosion control. Prior to issuance of any Grading Permit or Building Permit, each applicant shall prepare a Low Impact Development (LID) plan for the review and approval of the Building Official. The applicant shall be responsible for continuous and effective implementation of the plan during construction of each residence. The LID plan shall include Best Management Practices that may include, but not be limited to, the following:

- *Erosion Control. Eroded sediments from areas disturbed by construction and from stockpiles of soil shall be retained on-site to minimize sediment transport from the site to streets, drainage facilities or adjacent properties via runoff, vehicle tracking or wind. Utilize erosion control techniques, such as soil stabilizers, covering soil during construction, wind blocking devices, cease grading during high winds, use of soil binders (watering graded soils should be avoided), filtration devices, and stabilizing ingress/egress points. Reduce fugitive dust to the maximum extent practicable.*
- *BMPs. Erosion from slopes and channels shall be controlled by*

implementing an effective combination of BMPs (as approved in Regional Board Resolution No. 99-03), such as the limiting of grading scheduled during the wet season; inspecting graded areas during rain events; planting and maintenance of vegetation on slopes; and covering erosion susceptible slopes.

- *Pollutant Detainment Methods. Protect downstream drainages from escaping pollutants by capturing materials carried in runoff and preventing transport from the site. Examples of detainment methods that retard movement of water and separate sediment and other contaminants are silt fences, hay bales, sand bags, berms, silt and debris basins.*
- *Construction Materials Control. Construction-related materials, wastes, spills or residues shall be retained on-site to minimize transport from the site to streets, drainage facilities or adjoining properties by wind or runoff. Runoff from equipment and vehicle washing shall be contained at construction sites unless treated to remove sediment and pollutants. Non-stormwater runoff from equipment and vehicle washing and any other activity shall be contained at the construction site.*
- *Recycling/Disposal. Maintain a clean site. This includes proper recycling of construction-related materials and equipment fluids.*
- *Construction Waste Disposal. Clean up and dispose of small construction wastes (i.e., dry concrete) in accordance with applicable regulations and requirements.*

Significance After Mitigation. Impacts related to the quality of runoff during construction, water quality standards, and degradation of water quality during construction would be less than significant with implementation of Mitigation Measure HWQ-1. This is because Mitigation Measure HWQ-1 would require BMPs to control erosions and sedimentation, reduce the transport of pollutants off-site, and achieve compliance with NPDES permit requirements.

Impact HWQ-2 Development facilitated by the proposed ordinance revisions would incrementally increase the amount of impermeable surfaces in the project area, and potential new development would also generate various urban pollutants such as oil, herbicides and pesticides, which could adversely affect surface water quality. With implementation of Mitigation Measure HWQ-2, impacts related to surface water quality would be Class II, *less than significant with mitigation incorporated*.

The proposed project would allow for development of up to 31 new single-family homes within Zone 2 of the Portuguese Bend area. This new development would increase the number of vehicles and the amount of pesticides used in the project area compared to existing conditions. Impermeable surfaces such as driveways would accumulate deposits of oil, grease, and other vehicle fluids and hydrocarbons. In addition, maintenance of new landscaping could introduce chemical inputs such as pesticides and herbicides. During storms, these deposits would be washed into and through the drainage systems and to the Pacific Ocean. The

addition of fertilizers, pesticides and other chemicals to new landscaping has the potential to include higher than natural concentrations of trace metals, biodegradable wastes (which affect dissolved oxygen levels), and excessive major nutrients such as nitrogen and phosphorus.

Urban runoff can have a variety of deleterious effects. Oil and grease contain a number of hydrocarbon compounds, some of which are toxic to aquatic organisms at low concentrations. Heavy metals such as lead, cadmium, and copper are the most common metals found in urban storm water runoff. These metals can be toxic to aquatic organisms, and have the potential to contaminate drinking water supplies. Nutrients from fertilizers, including nitrogen and phosphorous, can result in excessive or accelerated growth of vegetation or algae, resulting in oxygen depletion and additional impaired uses of water. Therefore, the increased impervious surface area, vehicular activity and use of pesticides for landscaping on-site, could increase the amount of pollutants in on-site runoff, which could adversely affect the water quality of receiving waters including the Pacific Ocean.

As discussed above, the project would involve revisions to a landslide moratorium ordinance, which would allow for potential development of 31 individual single-family residences in the project area. The 31 residences and associated hardscaping could potentially increase the impervious surface area on each of the individual lots by up to approximately 38%, based on the average amount of impervious surface area on existing developed lots in the watershed. The development that could potentially result from the project as well as the increase in impervious surfaces in the project area would incrementally increase the amount of pollutants that could be contained in runoff from the area. Therefore, impacts would be potentially significant.

Mitigation Measures. As discussed under *Setting*, in accordance with Rancho Palos Verdes Municipal Code Chapter 13.10.050, owners and occupants of property within the city are required to minimize the runoff of water used for irrigation purposes to the maximum extent practicable. Runoff of water from washing down paved areas is required to be minimized to the maximum extent practicable. Sweeping and collection of debris is encouraged for trash disposal. In addition, with implementation of Mitigation Measure HWQ-2 listed below which would require adherence to the Municipal Code requirements related to the NPDES permit, runoff from the individual residences that could be developed as a result of the project would not have a substantial effect on water quality.

HWQ-2 **NPDES Review.** Any development proposal located within, adjacent to or draining into a designated Environmentally Sensitive Area (ESA) and involving the creation of two thousand five hundred square feet or more (≥ 2,500 SF) of impervious surface shall require review and approval by the City's NPDES consultant for compliance with applicable NPDES requirements prior to any building or grading permit issuance. Construction must comply with any required NPDES General Construction Permit requirements.

Significance After Mitigation. Impacts related to the quality of runoff, water quality standards, and degradation of water quality after construction would be less than significant with implementation of Mitigation Measure HWQ-2. Impacts would be less than significant with implementation of this mitigation because it requires measures to control runoff and sedimentation in accordance with NPDES permit requirements.

Impact HWQ-3 **Potential buildout under the proposed ordinance revisions would incrementally increase the amount of on-site impermeable surface area, which could have the potential to increase storm water flows and create localized flooding. However, with implementation of Mitigation Measures GEO-3 (a and b) and HWQ-3 (a and b), buildout under the ordinance revisions would result in a flow rate generally similar to existing conditions. Therefore, impacts related to storm water runoff would be Class II, *less than significant with mitigation incorporated*.**

The proposed ordinance revisions would allow for the construction of single-family homes on 31 of the lots in the project area. The addition of single-family structures, hardscaping, and driveways/parking areas would incrementally increase the overall amount of impermeable surface area in the project area. An increase in impervious surfaces could increase the peak flow rate compared to existing conditions. This has the potential to create flooding and drainage problems, as the existing drainage system is inadequate to handle existing runoff rates.

The existing drainage system in the project area is a private system originally permitted by the County. Reference plans and design calculations were not available for confirmation of the capacity of the existing drains, but testimony and video provided by residents, as part of the NOP comment period, indicates that some culverts and roads do not adequately convey existing runoff. The increase in peak runoff rates as a result of buildout of the 31 lots for the design storm events (10, 25, 50-year, and Capital Storm) ranges from 0.5% to 1% for the entire watershed and 2.9% to 4.5% for the project area (Zone 2), which is represented as "Q (cfs)" in Table 4.8-1 and Table 4.8-2.

Table 4.8-1
Cumulative Watershed Drainage Runoff Summary

Year		Pre-development	Post-development	Delta	% change
LID [a]	Area (ac)	854.7	854.7	0.00	0.0%
	Q (cfs)	37.4	40.1	2.70	6.7%
	q (cfs/ac)	0.044	0.047	0.003	6.7%
	Vol (ac-ft)	12.0	12.9	0.90	7.0%
	vol (ac-ft/ac)	0.014	0.015	0.001	7.0%
2-year	Area (ac)	854.7	854.7	0.00	0.0%
	Q (cfs)	276.7	282.5	5.78	2.0%
	q (cfs/ac)	0.324	0.331	0.007	2.0%
	Vol (ac-ft)	53.4	55.4	2.00	3.6%
	vol (ac-ft/ac)	0.062	0.065	0.002	3.6%
2-year (Burn)	Area (ac)	854.7	854.7	0.00	0.0%
	Q (cfs)	312.0	317.3	5.3	1.7%
	q (cfs/ac)	0.365	0.371	0.006	1.7%

Table 4.8-1
Cumulative Watershed Drainage Runoff Summary

Year		Pre-development	Post-development	Delta	% change
	Vol (ac-ft)	65.2	68.2	3.0	4.4%
	vol (ac-ft/ac)	0.076	0.080	0.004	4.4%
5-year	Area (ac)	854.7	854.7	0.00	0.0%
	Q (cfs)	579.62	587.37	7.75	1.3%
	q (cfs/ac)	0.678	0.687	0.009	1.3%
	Vol (ac-ft)	91.44	96.56	5.12	5.3%
	vol (ac-ft/ac)	0.107	0.113	0.006	5.3%
10-year	Area (ac)	854.7	854.7	0.00	0.0%
	Q (cfs)	876.86	885.38	8.52	1.0%
	q (cfs/ac)	1.026	1.036	0.010	1.0%
	Vol (ac-ft)	121.6	126.68	5.08	4.0%
	vol (ac-ft/ac)	0.142	0.148	0.006	4.0%
25-year	Area (ac)	854.7	854.7	0.00	0.0%
	Q (cfs)	1,230.7	1,237.3	6.63	0.5%
	q (cfs/ac)	1.440	1.448	0.008	0.5%
	Vol (ac-ft)	164.78	170.7	5.92	3.5%
	vol (ac-ft/ac)	0.193	0.200	0.007	3.5%
50-year	Area (ac)	854.7	854.7	0.00	0.0%
	Q (cfs)	1,505.4	1,515.53	10.13	0.7%
	q (cfs/ac)	1.761	1.773	0.012	0.7%
	Vol (ac-ft)	197.98	204.58	6.60	3.2%
	vol (ac-ft/ac)	0.232	0.239	0.008	3.2%
Capital	Area (ac)	854.7	854.7	0.00	0.0%
	Q (cfs)	2,116.30	2,128.40	12.10	0.6%
	q (cfs/ac)	2.476	2.490	0.014	0.6%
	Flow Vol (ac-ft)	228.3	234.91	6.61	2.8%
	Debris Vol (ac-ft)	20.3	20.3	0.00	0.0%
	total Vol (ac-ft)	230.8	237.4	6.62	2.8%
	vol (ac-ft/ac)	0.270	0.278	0.008	2.8%

Source: Hunsaker and Associates, LA Inc., 2011.
Volume (Vol) Acre (ac)
Acre-feet (ac-ft) Cubic feet per second (cfs)
[a] *LID has replaced the SUSMP referenced in the Hunsaker report, but the 0.75 inch, 24-hour rain event standard has not changed.*

Table 4.8-2
Project Area (Zone 2) Drainage Runoff Summary

Year		Pre-development	Post-development	Delta	% change
LID	Area (ac)	145.8	145.8	0.00	0.0%
	Q (cfs)	9.7	12.0	2.30	19.2%
	q (cfs/ac)	0.067	0.082	0.016	19.2%
	Vol (ac-ft)	3.1	3.8	0.70	18.4%
	vol (ac-ft/ac)	0.021	0.026	0.005	18.4%
2-year	Area (ac)	145.8	145.8	0.00	0.0%
	Q (cfs)	62.4	70.8	8.40	11.9%
	q (cfs/ac)	0.428	0.486	0.058	11.9%
	Vol (ac-ft)	9.7	12.7	3.00	23.6%
	vol (ac-ft/ac)	0.067	0.087	0.02	23.6%
5-year	Area (ac)	145.8	145.8	0.00	0.0%
	Q (cfs)	129.3	138.9	9.60	6.9%
	q (cfs/ac)	0.887	0.953	0.066	6.9%
	Vol (ac-ft)	16.3	21.4	5.10	23.8%
	vol (ac-ft/ac)	0.112	0.147	0.03	23.8%
10-year	Area (ac)	145.8	145.8	0.00	0.0%
	Q (cfs)	187.9	196.7	8.80	4.5%
	q (cfs/ac)	1.289	1.349	0.060	4.5%
	Vol (ac-ft)	21.2	26.2	5.00	19.1%
	vol (ac-ft/ac)	0.145	0.180	0.03	19.1%
25-year	Area (ac)	145.8	145.8	0.00	0.0%
	Q (cfs)	263.2	271.1	7.87	2.9%
	q (cfs/ac)	1.805	1.859	0.054	2.9%
	Vol (ac-ft)	27.8	33.9	6.10	18.0%
	vol (ac-ft/ac)	0.191	0.233	0.04	18.0%
50-year	Area (ac)	145.8	145.8	0.00	0.0%
	Q (cfs)	314.3	324.45	10.15	3.1%
	q (cfs/ac)	2.156	2.225	0.070	3.1%
	Vol (ac-ft)	35.9	39.8	3.90	9.8%
	vol (ac-ft/ac)	0.246	0.273	0.03	9.8%

Source: Hunsaker and Associates, LA Inc., 2011.
Volume (Vol) Acre (ac)
Acre-feet (ac-ft) Cubic feet per second (cfs)
[a] *LID has replaced the SUSMP referenced in the Hunsaker report, but the 0.75 inch, 24-hour rain event standard has not changed.*

Localized flood effects may occur on an individual lot basis (Hunsaker and Associates, LA Inc., 2011). The hydrologic analysis conducted by Hunsaker and Associates determined that increases in runoff from an individual lot would range from approximately 9.8% to 15.1%, as shown in Table 4.8-3.

The hydrologic analysis conducted as part of the Drainage Report (Appendix E) determined that the post-development runoff rates would result in an increase in runoff from the existing lots into the existing culverts, roads, and natural watercourses. The Capital storm is determined by applying burned and bulked factors in 50-year storm. Vacant lots in Zone 2 area are adjacent to existing developed lots; therefore, those vacant lots do not experience the full burn effect as natural area and no capital storm is determined. For the proposed project, the LID 0.75 inch 24-hour storm event criteria were used to determine whether runoff volume or flow should be treated (Hunsaker and Associates, 2011).

The Modified Rational Method was used to determine the peak flow rate and the peak volume for the project compared to existing conditions, utilizing the Los Angeles County Time of Concentration calculator (based upon the Rational Method). Water quality treatment flow rates and volumes were calculated with the Los Angeles County Time of Concentration calculator developed for the LID analysis (using a rainfall of 0.75 inches). It was assumed that the amount of impervious surfacing on the 31 lots that could potentially be developed would increase by 38% compared to existing conditions on the vacant lots (Hunsaker and Associates, 2011). The increase in peak flow rate and volume would potentially increase storm water flows and create flooding.

The analysis performed for the project involved review of available data and a visual inspection of roads and areas immediately adjacent to roads to determine the overall hydrological impact of the proposed project. Each of the individual property owners would need to prepare a detailed hydrologic analysis to demonstrate compliance with the mitigation measures listed below. The mitigation measures address individual site development impacts due to flooding and erosion. Although resolving existing conditions is not part of the mitigation required for the proposed project's impacts, the City is actively investigating methods for addressing earth movement, erosion, and flooding issues in the project area. The Final Feasibility Study for the Portuguese Bend Landslide Complex (July 2018) prepared for the City by Daniel B. Stephens & Associates, Inc. addresses land movement and slope failure issues in the area, stating that land movement and slope failure continues throughout the Portuguese Bend area at varying rates. The study ~~and~~ identifies a number of technologies as options for the City to consider regarding storm water control and groundwater extraction to achieve manageable and sustainable land stability. The study and its recommendations were adopted by the City Council. The City's Public Works Department is working toward implementation of the recommendations. Specific recommendations include:

- *Conduct an engineering analysis and evaluation of the existing stormwater drainage system of this area to assist in the design and construction of an updated system to convey runoff to the ocean and eliminate ponding areas that have been created over the years due to land settlement.*
- *Make efforts for design and installation of groundwater extraction drains (horizontal drains or hydraugers). Hydrauger design and installation can be tested and modified based on*

results obtained. These horizontal drains could be installed, for example, into the coastal bluff and extend north under Palos Verdes Drive South, and directly drain into the ocean.

Table 4.8-3
Median Lot Drainage Runoff Summary

Year		Pre-development	Post-development	Delta	% change
LID	Area (ac)	0.74	0.74	0.00	0.0%
	Q (cfs)	0.02	0.06	0.04	64.8%
	q (cfs/ac)	0.03	0.08	0.053	64.8%
	Vol (ac-ft)	0.01	0.02	0.01	62.3%
	vol (ac-ft/ac)	0.01	0.03	0.016	62.3%
2-year	Area (ac)	0.74	0.74	0.00	0.0%
	Q (cfs)	0.22	0.36	0.14	40.1%
	q (cfs/ac)	0.29	0.49	0.195	40.1%
	Vol (ac-ft)	0.01	0.06	0.05	79.9%
	vol (ac-ft/ac)	0.02	0.09	0.07	79.9%
5-year	Area (ac)	0.74	0.74	0.00	0.0%
	Q (cfs)	0.54	0.70	0.16	23.4%
	q (cfs/ac)	0.73	0.95	0.223	23.4%
	Vol (ac-ft)	0.02	0.11	0.09	80.6%
	vol (ac-ft/ac)	0.03	0.15	0.12	80.6%
10-year	Area (ac)	0.74	0.74	0.00	0.0%
	Q (cfs)	0.85	1.00	0.15	15.1%
	q (cfs/ac)	1.14	1.35	0.204	15.1%
	Vol (ac-ft)	0.05	0.13	0.09	64.6%
	vol (ac-ft/ac)	0.06	0.18	0.12	64.6%
25-year	Area (ac)	0.74	0.74	0.00	0.0%
	Q (cfs)	1.24	1.38	0.14	9.8%
	q (cfs/ac)	1.68	1.86	0.183	9.8%
	Vol (ac-ft)	0.07	0.17	0.10	60.9%
	vol (ac-ft/ac)	0.09	0.23	0.14	60.9%
50-year	Area (ac)	0.74	0.74	0.00	0.0%
	Q (cfs)	1.47	1.65	0.17	10.6%
	q (cfs/ac)	1.99	2.23	0.235	10.6%
	Vol (ac-ft)	0.14	0.20	0.07	33.1%
	vol (ac-ft/ac)	0.18	0.27	0.09	33.1%

Source: Hunsaker and Associates, LA Inc., 2011
Note: Volume (Vol) Acre (ac)
Acre-feet (ac-ft) Cubic feet per second (cfs)

- *Perform an engineering analysis of the watershed, including the northern canyon areas (upper Portuguese, Ishibashi, and Paintbrush Canyons) to identify where, how and to what extent stormwater infiltrates into groundwater in the Portuguese Bend Landslide Complex (PBLC). Subsequently, efforts could be made for design and installation of an environmentally friendly flexible liner system in the watershed canyons where the stormwater significantly infiltrates to groundwater in the PBLC to minimize infiltration and allow stormwater to be discharged to the ocean in a controlled manner.*
- *Identify existing surface fractures throughout the PBLC area and install land surface fracture sealing with environmentally friendly material to minimize direct uncontrolled stormwater infiltration which currently percolates into groundwater. Check and maintain these sealed surface fractures in the PBLC annually prior to the rainy season.*
- *Consider working with Rolling Hills to construct a centralized sanitary sewer system and a storm water drainage system for the residential neighborhood at the top of the watershed above the Portuguese, Ishibashi, and Paintbrush Canyon areas, as well as within the City's Portuguese Bend neighborhood.*

As discussed in the *Setting*, Section 15.20.050 of the City of Rancho Palos Verdes Municipal Code establishes requirements for projects that are exceptions to the City's landslide moratorium regulations. The following requirements apply to the project area:

- *If lot drainage deficiencies are identified by the Director of Public Works, all such deficiencies shall be corrected by the applicant.*
- *Roof runoff from all buildings and structures on the site shall be contained and directed to the streets or an approved drainage course.*
- *If required by the city geotechnical staff, the applicant shall submit a soils report, and/or a geotechnical report, for the review and approval of the city geotechnical staff.*
- *All landscaping irrigation systems shall be part of a water management system approved by the director of public works. Irrigation for landscaping shall be permitted only as necessary to maintain the yard and garden.*

As discussed in the *Setting*, the City Public Works Department conducted field observations within Zone 2 to assess the adequacy of the Council-adopted mitigation measures currently being implemented as part of Monks Lots residential development associated with Exception "P" of the Landslide Moratorium Ordinance. As a result of the observations, it is City staff's opinion that holding tanks that have been installed on recently developed Zone 2 properties are operating to control runoff as designed and runoff is not exceeding per-predevelopment conditions. Furthermore, City staff is of the opinion that, provided that best engineering practices are employed and holding tanks are maintained and operational during storm events, the incorporation of similar mitigation measures would ensure that the future development of 31 lots would not cause any significant increase in runoff during rain events in the project area. Nonetheless, impacts would be potentially significant because individual developments could result in localized changes in surface hydrology.

Mitigation Measures. As discussed in Section 4.5, *Geology*, Mitigation Measure GEO-3 (a and b) would be required. Mitigation Measures GEO-3 (a and b) would require design of storm drainage improvements that address drainage deficiencies and avoid increases in infiltration of

stormwater to the satisfaction of the Director of Public Works prior to issuance of any grading or building permits on individual lots. In addition, Mitigation Measures HWQ-3(a) and HWQ-3(b) would be required to reduce impacts related to changes in surface hydrology to a less than significant level.

HWQ-3(a) **Drainage Plan.** Prior to issuance of any grading or building permit, a Licensed Civil Engineer shall prepare a detailed hydrology study and drainage plan subject to approval by the Director of Public Works. The study/plan shall be paid for by the project applicant and shall be designed to accommodate for a minimum of a 100-year rain event, and address impacts to the proposed building site, as well as upstream and downstream properties. The analysis will follow the methodology outlined in the Los Angeles County Hydrology and Sedimentation Manual (latest edition), the Los Angeles County Low Impact Development Manual, and Los Angeles County Stormwater Best Management Practices Design and Maintenance Manual for preparation of the design calculations. Improvements will be based upon the policies and codes of the City. The drainage plan shall address impacts to the immediate vicinity as well as downstream facilities including culverts, roads, open drainage courses, and Altamira Canyon, and shall demonstrate that:

- *Post-construction lot infiltration and runoff rates and volume shall be made equal to pre-construction conditions through use of appropriate low impact development principles such as, but not limited to, detaining peak flows and use of cisterns, holding tanks, detention basins, bio-retention areas or swales, green roofs that detain water with delayed release onto the lot and permeable hardscape, and installation and maintenance of holding tanks.*
- *~~Illustrate that point (concentrated) f~~ Flow on each of the properties is either normalized, attenuated adequately, or will reach an acceptable conveyance such as a storm drain, channel, roadway or natural drainage course. All runoff shall be directed to an acceptable conveyance (one that is adequate to convey any increase in runoff without causing additional impacts such as flooding and erosion) and shall not be allowed to drain to localized sumps or catchment areas with no outlet.*
- *~~Avoid c~~ Changes to the character of the runoff at property lines have been avoided. Changes in character include obstructing or diverting existing runoff entering the site, changing the depth and frequency of flooding, concentration of flow outletting onto adjacent properties or streets, and increasing the frequency or duration of runoff outletting onto adjacent properties or streets.*
- *~~Minimize~~ "Dry Weather" infiltration that could add to the total infiltration from the project is minimized.*

- *Holding tanks will be installed ~~and~~, maintained and operated as designed. Annual third-party certification by a licensed engineer that the system is operational as designed is required.*
- *Maximum 25 percent net coverage for RS-1 and RS-2 zoned properties. Any increase in maximum lot coverage over 25 percent shall be subject to the approval of a Minor Exception Permit or Variance.*
- *Transpiration through landscaping is maximized.*
- *For developments on sloped sites, driveways shall incorporate a serpentine design to the extent possible to minimize the possibility of flooding onto adjacent properties.*

Runoff shall be infiltrated on-lot where feasible. However, because the area is subject to geotechnical hazards, any use of techniques involving infiltration will need review by a geotechnical engineer under contract to the applicant and approval by the City Public Works Department. Infiltration may be allowed on a lot by lot basis or consistent with existing conditions if no hazard is determined to exist. If runoff cannot be infiltrated, a combination of detention and infiltration of the change in runoff volume will mitigate some of the impacts due to hydromodification.

HWQ-3(b) Certification. The property owner shall submit, after the installation of the drainage improvements and at the property owner's expense, a hydrology study, prepared, stamped and signed by a Licensed Civil Engineer certifying that the site drainage is operating according to City approvals. Specifically, the report shall certify that the post-construction lot infiltration and runoff rates and volume are equal to pre-construction conditions. The study shall be approved by the Director of Public Works or his/her designee.

Significance After Mitigation. Mitigation Measures HWQ-3(a) and HWQ-3(b) requires post-construction and pre-construction runoff rates to be equalized so that there are no changes in the character of runoff at property lines. This would prevent substantial increases in the rate, volume, and duration of runoff leaving lots after they are developed, thereby reducing the potential for flooding or exceeding the capacity of storm water drainage systems. Impacts related to alteration of drainage patterns, the potential for the proposed project to result in flooding, and the capacity of storm water drainage systems would be less than significant with implementation of Mitigation Measures HWQ-3(a) and HWQ-3(b).

Impact HWQ-4 Potential development under the proposed ordinance revisions would incrementally increase the amount of impermeable surface in the project area, which could affect the location and amount of groundwater infiltration. However, with adherence to existing regulations related to drainage design and with implementation of mitigation measures GEO-3 (a and b) and HWQ-3(a and b), impacts

related to groundwater recharge would be Class II, *less than significant with mitigation incorporated*.

The proposed project would allow for the construction of single-family homes on up to 31 of the 111 lots in the Zone 2 area. The remaining 80 lots are either developed primarily with single-family residences and associated accessory structures and landscaping or have obtained planning entitlements for development via Exception "P". The addition of new single-family residences, hardscaping and parking areas would incrementally increase the overall amount of impermeable surface area on individual lots. Impermeable surface area could increase by up to approximately 38% on individual lots as they are built out (based on the average amount of impervious surface area on existing developed lots in the watershed). The resulting increase in runoff from individual lots if drainage is not properly controlled could potentially range between 9.8% and 15.1% over existing conditions (Hunsaker and Associates 2011). However, as described below, any new development would maintain, and would not exacerbate, the existing runoff and infiltration conditions.

As discussed in Section 4.5, *Geology*, infiltration is a concern in the project area because an increase in infiltration could affect the stability of existing landslides in the project area vicinity. Adding water to the landslide material adds weight, creates buoyancy, and further reduces clay strength on existing slopes, which could lead to slope failure. However, as discussed under Impact HWQ-4, runoff rates, runoff volumes, and infiltration would remain generally the same as under existing conditions with buildout of the 31 lots pursuant to the proposed ordinance revisions and adherence to Mitigation Measure HWQ-3(a and b) under Impact HWQ-3. This mitigation measure requires a drainage study prior to construction and limits the rate of runoff from a lot to the runoff rate from the lot that existed prior to development. Additionally, Mitigation Measures GEO-3(a) and GEO-3(b), as discussed in Section 4.5, Geology, would limit the rate of runoff from the lots to pre-development runoff rates. With implementation of these measures, there would be no net increase in stormwater runoff rates.

Mitigation Measures. Impacts would be less than significant; therefore, mitigation beyond measures GEO-3 (a and b) and HWQ-3(a and b) is not required. These mitigation measures require on-site infiltration and management of precipitation such that runoff rates do not increase above existing conditions following development of a lot.

Significance After Mitigation. Impacts would be less than significant with implementation of Mitigation Measures GEO-3 (a and b) and HWQ-3(a and b). These mitigation measures require on-site infiltration and management of precipitation such that runoff rates do not increase above existing conditions following development of a lot.

Impact HWQ-5 Adoption of the proposed ordinance revisions would allow for the construction of up to 31 single-family homes in the project area. Several of the single-family homes could be constructed in an area in which there is a potential for flood hazards. However, with implementation of Mitigation Measure HWQ-5, flooding impacts would be Class II, *less than significant with mitigation incorporated*.

The FIRM issued by FEMA for Zone 2 and the surrounding area (Map ID 06037C2026F) indicates that the project area and surroundings are contained in Zone X and Zone D. Zone X designates an area with a minimal risk of flooding (not within the 100-year flood zone) and Zone D designates an area in which flood hazards are undetermined, but possible. Nine of the 31 lots that could be developed as a result of the project are partially or completely located within the Zone D designation, as shown in Figure 4.8-1. Therefore, flooding could occur and new development could incrementally increase flooding on downstream properties, which could cause damage to structures and could be hazardous to humans during a storm event. Impacts would be potentially significant.

Mitigation Measures. Mitigation Measure HWQ-5 would be required to reduce impacts to a less than significant level.

HWQ-5 Standards of Construction in a Flood Zone D Area. Prior to issuance of any grading permit or building permit, the applicant for any construction project located in an area designated as Zone D by FEMA shall comply with the following, pursuant to Section 15.42.120 of the RPVMC. Plans shall be reviewed and approved accordingly by the City Building Official prior to issuance of any grading or building permit:

- *All new construction shall be designed to be adequately anchored to prevent flotation, collapse or lateral movement of the structure resulting from hydrodynamic and hydrostatic loads, including the effects of buoyancy*
- *All new construction shall be constructed with materials and utility equipment resistant to flood damage*
- *All new construction shall be constructed using methods and practices that minimize flood damage*
- *All new construction shall be constructed with electrical, heating, ventilation, plumbing and air conditioning equipment and other service facilities that are designed and/or located so as to prevent water from entering or accumulating within the components during conditions of flooding*

Significance After Mitigation. Impacts would be less than significant with implementation of Mitigation Measure HWQ-5.

Impact HWQ-6 Development under the proposed ordinance revisions would incrementally increase water demand in the project area, but the increase in demand could be met with existing and forecast water supplies. This impact would be Class III, *less than significant*.

The 31 single family residences accommodated by the proposed ordinance revisions would generate demand for an estimated 3.29 million gallons (10.1 acre-feet) of water per year (see CalEEMod worksheets in Appendix B). As noted in the *Setting*, the WBMWD's 2020 water supply is 189,893 acre-feet per year (AFY) while 2020 demand is estimated at 167,999 AFY. By 2030, WBMWD supplies are forecast to increase to 201,529 AFY while demand is forecast to

increase to 174,394 AFY (WBWD June 2016). Thus, 10.1 AFY demand generated by the proposed project would be well within the WBMWD's current and projected available water supply (21,894 AFY in 2020 and 27,135 AFY in 2030) and the impact to water supply would be less than significant. Project area development would be subject to applicable state and local water conservation requirements.

Mitigation Measures. Mitigation beyond compliance with standard requirements is not needed.

c. Cumulative Impacts. Cumulative development in the City and surrounding areas would include approximately 2,232 residential dwelling units and 219,646 square feet of non-residential uses, as shown in Table 3-1 in Section 3.0, *Environmental Setting*. Planned and pending development in the general vicinity could increase impermeable surface area, thereby potentially increasing peak flood flows and overall runoff volumes. However, with implementation of mitigation measures similar to those required for the proposed project, the post development peak discharges would not substantially increase peak flood flows or increase flooding. Consequently, the project would not contribute materially to any potential cumulative increases in peak runoff or associated flooding impacts.

With respect to surface water quality, construction activity associated with cumulative development would temporarily increase sedimentation due to grading and construction activities. In addition, new development would increase the generation of urban pollutants that may adversely affect water quality in the long term. However, all future development would be subject to implementation of appropriate Best Management Practices (BMPs) in accordance with City, State and Federal requirements. Furthermore, all qualifying projects are subject to the requirements of the NPDES Permit as required by Mitigation Measure HWQ-2, which is specifically designed to develop, achieve, and implement a timely, comprehensive, and cost-effective storm water pollution control program. Thus, implementation of applicable requirements on development in the area would reduce cumulative impacts to a less than significant level. As discussed above, with implementation of mitigation measures, the project's contribution to increased pollutant loads in area surface water would be reduced to a less than significant level and thus would not be cumulatively considerable.

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