APPENDIX F

HYDROLOGY REPORT AND PRELIMINARY WATER QUALITY MANAGEMENT PLAN

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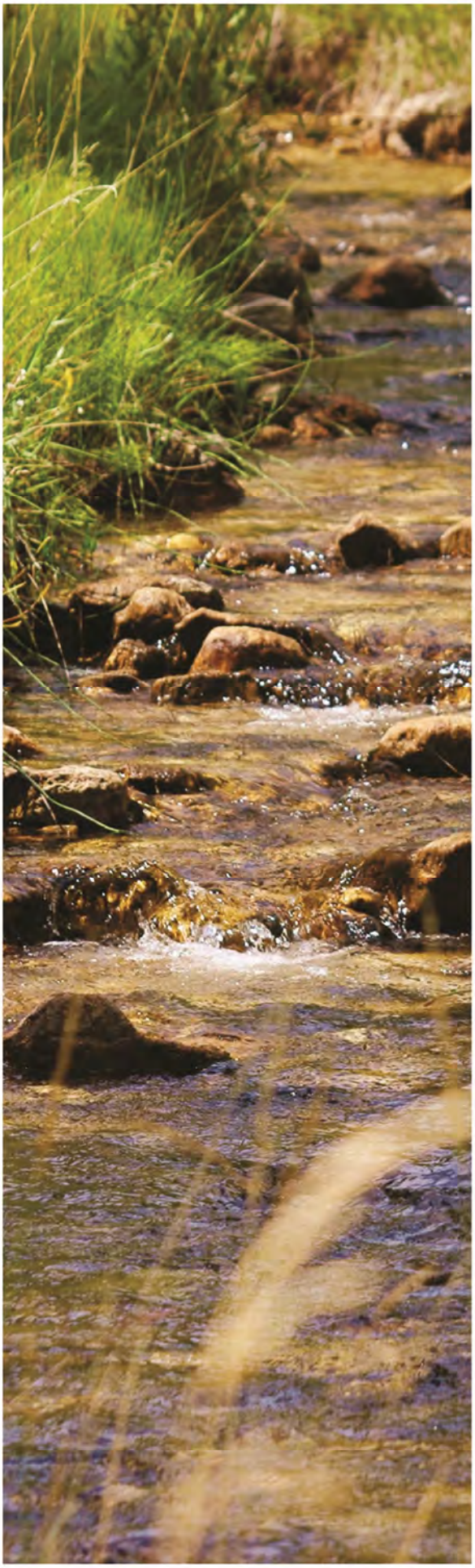

Paseo Tirador
TTM 18148
San Juan Capistrano, CA

PRELIMINARY HYDROLOGY REPORT

Prepared for:

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I. INTRODUCTION

a. PROJECT SITE DESCRIPTION

The subject site consists of approximately 16.55 gross acres located near the center of the City of San Juan Capistrano, CA. The subject site is made up of six parcels with APNs 666-131-07, 666-131-09, 666-131-13, 666-131-14, 666-131-15, and 666-131-16. The south and east portions of the site are bounded by San Juan Creek, the west by the San Diego Freeway, and the north by Calle Arroyo a currently-under-construction 24 Hour Fitness building and site improvements. A scour wall is located along the southeast edge of the subject site which provides protection from San Juan Creek.

Based on available imagery obtained through previous reports, the subject site has been vacant since at most 1994. No available documentation suggest the subject site has been previously developed. The project site is vacant with Paseo Tirador extending along the east side of the property. Paseo Tirador is a two-lane paved road and was approved by the City of San Juan Capistrano in 1980 but was recently vacated. The San Juan Creek trail connects to Paseo Tirador and runs along the southeast portion of the site. The trail exits the south side of the developable area and continues under the San Diego Freeway. The subject site's existing condition consists of slopes averaging 2%-5% draining toward the San Juan Creek, which runs along the southeast edge of the site.

The land developer is proposing a residential community consisting of 136 dwelling units along with open space on 10.55 developed acres, dedicating the remaining portion of the site to the City of San Juan Capistrano. The residential community with provide for detached and attached residential products and onsite amenities. A portion of the property which encompasses San Juan Creek will remain undisturbed and dedicated for conservation purposes.

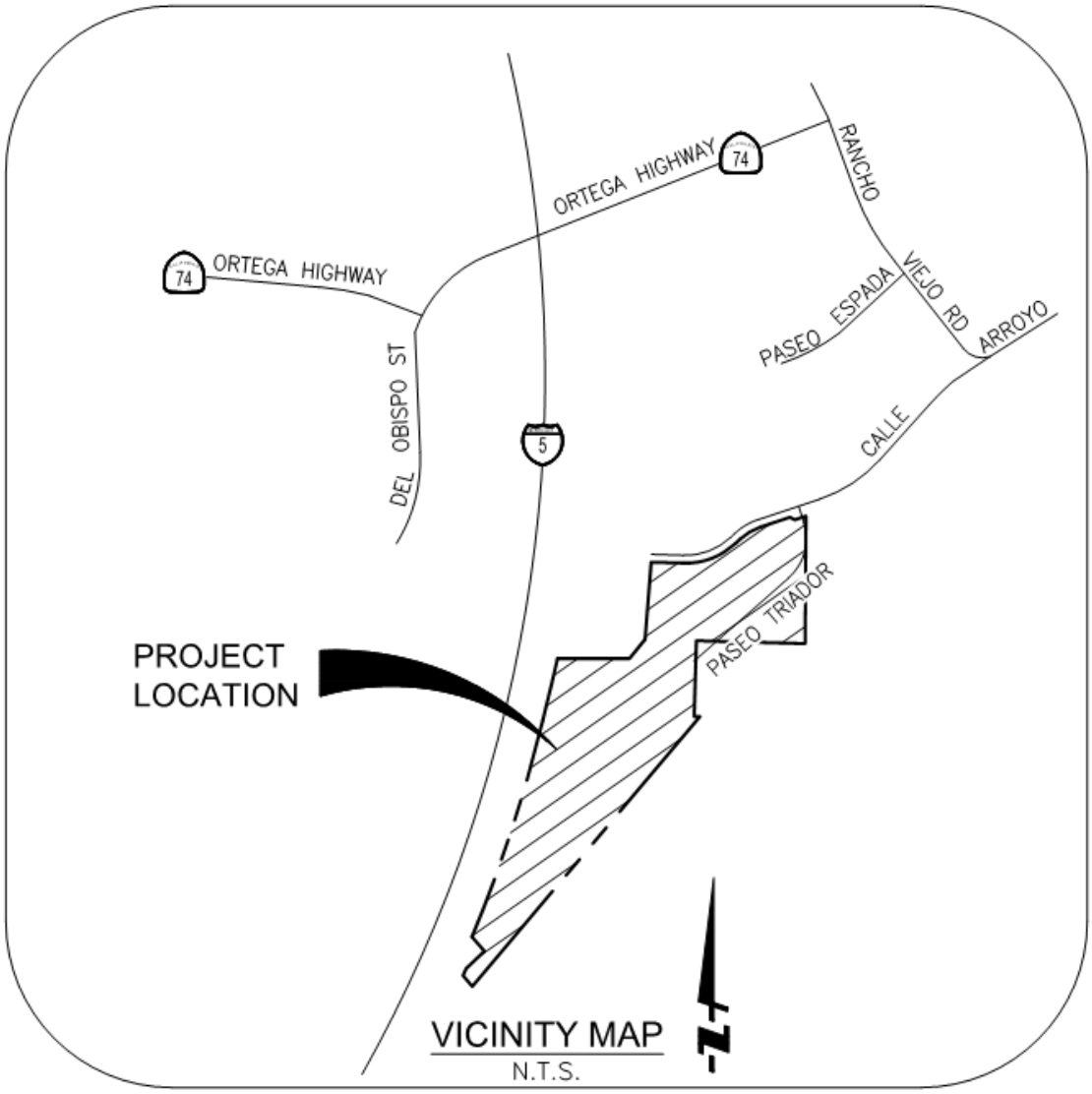
b. PURPOSE AND SCOPE

The purpose of this preliminary study is to analyze the pre-and post-development drainage conditions in order to provide adequate drainage facilities for the proposed development project.

This preliminary drainage study will analyze and compare the 25 and 100 -year storm events for the existing and proposed conditions. Outcomes from this analysis will facilitate the conceptual layout of a drainage system to adequately convey storm runoff through the site without adversely impacting surrounding areas, neighboring properties, and/or existing storm drain facilities.

This report also includes a discussion of MS4 stormwater requirements for South Orange County and integration of these requirements into the proposed drainage facilities.

c. PROJECT LOCATION MAP



II. EXISTING TOPOGRAPHIC AND HYDROLOGIC CONDITIONS

a. EXISTING TOPOGRAPHY

The subject site has recently been modified due to the construction of a 24 Hour Fitness center to the northwest. Artificial fill from the 24 Hour Fitness site has been pushed onto the subject site, which results in minor modifications to existing topography. Generally the project site experiences moderate slopes with existing grades averaging 2%-5% sloping down towards the top of the San Juan Creek bank on the southeast edge of the site. The creek banks have an average height of 20'. Existing elevations range from 90' to 104' above MSL across the developable portion of the subject site. The site has been undeveloped since 1994. Paseo Tirador, an existing two lane paved road, enters the site off Calle Arroyo and ends with a cul-de-sac towards the middle of the property. The San Juan Creek Trail connects to Paseo Tirador on the subject site and runs along the southeast portion of the site. The trail leaves the property at the southern portion of the site and continues under the San Diego Freeway.

b. EXISTING DRAINAGE PATTERN

Despite the recent construction of the adjacent fitness center, which has resulted in minor modification to the existing drainage patterns, the subject site currently conveys all onsite storm flows towards San Juan Creek. See Exhibit A: Existing Condition Rational Method Hydrology Map in Appendix B for the four existing drainage areas (A, B, C, and D). Currently, the project site accepts storm runoff from the entire 2.71-acre 24 Hour Fitness site. Once construction of the 24-hour Fitness center is completed, storm runoff from its site will be intercepted within its property and conveyed via a storm drain pipe in Calle Arroyo to the Horno Creek Channel, a City-owned and maintained regional drainage facility. With the exception of the 24 Hour Fitness center site, no other onsite storm runoff enters the project site via overland flow. For the purposes of this analysis, the 24 Hour Fitness parcel is assumed to be developed to its ultimate buildout condition.

Based upon the Flood Insurance Rate Maps (FIRMs) shown in Appendix C, posted by the Flood Emergency Map Agency (FEMA) dated 2009, portions of the project site are located within the delineated 100 year flood area zone AE with base flood elevations provided. A floodway is also delineated by FEMA which is generally located along Horno Creek Channel and San Juan Creek. A Floodway is defined below.

"A 'Regulatory Floodway' means the channel of a river or other watercourse and the adjacent land areas that must be reserved in order to discharge the base flood without cumulatively increasing the water surface elevation more than a designated height. Communities must regulate development in these floodways to ensure that there are no increases in upstream flood elevations."

Any fill proposed for this project must be outside of the Floodway for the purposes of processing a Conditional Letter of Map Revision-Fill (CLOMR-F).

c. EXISTING STORM DRAIN FACILITIES

Storm drain facilities that capture onsite storm flows exist within the project limits. A large city-owned and –maintained regional facility, Horno Creek Channel, bisects the project. Catch basins within Paseo Tirador in existing Area A convey onsite storm flows to Horno Creek Channel. All the aforementioned facilities convey flows to San Juan Creek.

Just outside the property limits, an existing earthen swale, located parallel to the western edge of the subject site, running along the 5 Freeway conveys storm flows from onsite Areas C and D and a number of offsite areas to an existing 27" RCP, which leads to San Juan Creek. The proposed project may take advantage of this existing storm drain pipe that currently conveys onsite storm flow to San Juan Creek.

Two catch basins, located at low points within Calle Arroyo just north of the site, collect any potential run-on from the north, and join to the existing Horno Creek Channel. Horno Creek Channel is a 16'-wide by 8.5'-tall reinforced concrete box which bisects the project in the north/south direction and conveys stormwater into the San Juan Creek. See existing plans in Appendix E.

A scour protection wall within the project limits was constructed along San Juan Creek in 2009, which will provide flood protection and soil stability for the overall project. Just downstream of the project San Juan Creek is improved as a concrete lined earthen channel with a soft bottom, however the portion adjacent to the project is an unimproved natural watercourse.

III. Hydrologic Analysis

a. STORM FREQUENCY

This report will analyze the 25- and 100-year storm events for the existing and proposed project conditions.

b. METHODOLOGY

The area of the study site is within the jurisdiction of the City of Juan Capistrano, which is within southern Orange County. The City of San Juan Capistrano accepts methodologies and practices as described in both the Orange County Hydrology Manual dated October, 1986 and the Orange County Hydrology Manual Addendum No. 1, dated 1996.

The computer program used to perform hydrologic calculations in this report is CivilCadd/Civil Design Engineering Software, Version 9.0 program packaged in 2014 by Bondiman and Associates, Inc. Civil Design's Rational Method Program was used to determine all runoff in this report. This software has been identified as acceptable software within Orange County.

c. EXISTING CONDITION

As described in section II.b, three onsite drainage areas, A, B, C & D are identified within the existing condition study, all of which are tributary to San Juan Creek and shown on the Exhibit A in Appendix B. Storm runoff from Areas C and D join with offsite flows along the westerly property line emanating from the 5 freeway and landscaped areas north of the project, prior to discharging into San Juan Creek. The below analysis include runoff from Areas C and D for only the project's onsite areas. This analysis will provide for a more accurate comparison of pre and post project conditions.

Table III.1 Discharge to San Juan Creek – refer to Exhibit A in Appendix B

	Existing Condition Summary Runoff from Site			
	Q_{25} (cfs)	Q_{100} (cfs)	Area (AC)	CivilD file name
A	11.2	14.6	5.05	SJCRMex25A.out, SJCRMex100A.out
B	7.8	10.1	3.71	SJCRMex25B.out, SJCRMex100B.out
C	3.4	4.4	1.30	SJCRMex25C.out, SJCRMex100C.out
D	1.1	1.5	0.39	SJCRMex25D.out, SJCRMex100D.out
∑	**23.5**	**30.6**	***10.45**	**N/A**

**Note: The remaining +/- 5.5 acres of property is located within San Juan Creek and not being developed.*

Prior to its confluence with Horno Creek Channel, San Juan Creek flows southwesterly towards the Pacific Ocean carrying a 100 year peak flow rate of approximately 30,000 cfs with a tributary area of 108.5 square miles. Upon its confluence with Horno Creek Channel, the 100 year peak flow rate increases to approximately 32,000 cfs with a tributary area of 116.8 square miles.

d. PROPOSED CONDITION

In the proposed condition, overall site drainage patterns generally remain the same as existing patterns. Storm flows will continue to reach San Juan Creek through similar means, including the existing 27" RCP in the southwest property corner and Horno Creek Channel. Proposed drainage facilities and hydrologic analyses are summarized in section IV of this report.

The westerly side of the project (Area C), consisting of 5.55 acres will be conveyed to a subsurface dual-purpose water quality and detention system, located just adjacent to the 5 freeway within an open space area. Both the required water quality volume along with the peak flow storm runoff will be conveyed to this system. Peak storm volume will be detained above the water quality volume for flow attenuation and released at below existing condition flow rates into the existing earthen swale running south westerly along the 5 freeway, where it reaches an existing 27" RCP inlet and conveyed into San Juan Creek.

The easterly side of the project (Area A), consisting of 4.9 acres falls within areas of the project that will be conveyed to flow-through water quality treatment BMPs prior to joining into the Horno

Creek Channel. Storm flow increases Area A will be mitigated by overcompensating the flow reduction for Area C.

IV. PROPOSED DRAINAGE FACILITIES

a. UNMITIGATED PEAK STORM FLOWS

Tables IV.1 and IV.2 below summarize proposed unmitigated storm flows from the project tributary to San Juan Creek, based upon the rational method analysis. The rational method analysis was also used to size onsite storm drain facilities. Refer to Appendix D for detailed calculations.

Because the unmitigated proposed discharge to San Juan Creek exceeds the existing discharge, provided in the below Table IV.2, peak storm mitigation is required for the overall development, which will be discussed in section IV.b.

Table IV.1 Storm Discharge to San Juan Creek (Unmitigated) – refer to Exhibit B in Appendix B

San Juan Creek	Proposed Condition Runoff From Site			
	Q_{25} (cfs)	Q_{100} (cfs)	Area (AC)	CivilD file name
A	16.8	21.7	5.55	SJCRMprop25A.out, SJCRMprop100A.out
C	15.1	19.5	4.90	SJCRMprop25C.out, SJCRMprop100C.out
∑	**31.9**	**41.2**	**10.45**	**N/A**

Table IV.2 Existing vs. Proposed Unmitigated Condition Summary

San Juan Creek	Discharge Summary		
	Q_{25} (cfs)	Q_{100} (cfs)	Area (AC)
Existing Condition	23.5	30.6	10.45
Proposed Condition	31.9	41.2	10.45
Delta	**8.4**	**10.6**	**0.0**

b. MITIGATED PEAK STORM FLOWS

Based upon increased impervious ratios and decreased times of concentration, unmitigated peak storm flows have increased from the existing to proposed conditions as shown in the above table IV.1. The proposed drainage facility, located on the western edge of the site, will provide multiple functions, providing for water quality treatment and peak flow attenuation. This proposed underground basin is designed to infiltrate water quality flows into the ground, whereas the peak storm volume will be stored within additional volume of the basin. As the water level rises in the basin a controlled outlet will meter the discharge leaving the basin into the existing earthen channel along the westerly property line, which reaches San Juan Creek via an existing 27" RCP as

previously described. A summary of discharge to the existing 27" RCP is described in table IV.3 below.

The City of San Juan Capistrano requires onsite facilities to be sized for runoff from the 25-year storm, therefore the analysis of the 100-year storm event shown below is not required for design. See Exhibit C: Proposed Condition Unit Hydrograph Method Hydrology Map in Appendix B. By routing the 25-year, 24-hour peak storm for proposed Area C through the proposed basin, the total peak discharge flow rate for the proposed development has been reduced below pre-project levels for the overall project. The 24-hour storm duration was selected for routing due to its large runoff volume as compared to shorter duration storms. See summary in the below tables for peak storm attenuation. Basin routing calculations are provided in Appendix D.

Table IV.3 Discharge to 27" RCP

27" RCP	Discharge Summary			
	Q_{25} (cfs)	Q_{100} (cfs)	Area (AC)	CivilD file name
Existing Condition	4.5	5.9	1.69	See table III.1
Proposed Mitigated Condition	3.1	3.6	4.9	SJCUHprop25yr24hrC.out, SJCRTEprop25yr24hrC.out, SJCUHprop100yr24hrC.out, SJCRTEprop100yr24hrC.out
Delta	**-1.4**	**-2.3**	**0.0**	**N/A**

In the existing condition, Area A discharges directly into Horno Creek Channel. Existing condition area B sheet flows across the southern property line directly into San Juan Creek. Runoff from the proposed condition Area A, which correlates to a similar watershed as existing condition Areas A and B, will discharge directly into Horno Creek Channel. Proposed discharge is shown in table IV.4 below. No detention system is provided to mitigate proposed condition area A. The 35' length of Horno Creek Channel RCB from the project connection point to its outlet in San Juan Creek should have capacity to accommodate this small increase in runoff due to the small time of concentration of project discharge as compared to the longer time of concentration for the approximately 4.3-square-mile Horno Creek watershed.

Table IV.4 Discharge to Horno Creek Channel

Horno Creek Channel	Discharge Summary			
	Q_{25} (cfs)	Q_{100} (cfs)	Area (AC)	CivilD file name
Existing Condition	11.2	14.6	5.05	See table III.1
Proposed Condition (No mitigation provided)	16.8	21.7	5.55	See table IV.1
Delta	**5.6**	**7.1**	**0.50**	**N/A**

A storm runoff summary for the overall project is provided in table IV.5. For both the 25-year and 100-year storms, discharge to San Juan Creek in the proposed condition is less than in the existing condition.

Table IV.5 Overall Project Discharge to San Juan Creek (Mitigated)

San Juan Creek	Discharge Summary			
	Q_{25} (cfs)	Q_{100} (cfs)	Area (AC)	CivilD file name
Existing Condition	23.5	30.6	10.45	See table III.1
Proposed Mitigated Condition	19.9	25.3	10.45	See tables IV.3 and IV.4
Delta	**-3.6**	**-5.3**	**0.0**	**N/A**

A separate project-specific Preliminary Water Quality Management Plan (PWQMP) has been prepared for the overall project, which contains the required water quality calculations, assessment of hydrologic conditions of concern, and corresponding hydromodification mitigation calculations, as applicable.

V. SUMMARY

Based upon analyses provided in this report, the proposed development will not adversely impact the existing drainage conditions. As described previously, existing drainage patterns will be generally be preserved. Peak flow attenuation is provided through one onsite proposed detention facility. The proposed storm drain facilities will adequately convey 25-year storm flows through the project site while maintaining 100-year storm protection throughout the development. A further detailed hydrology analysis will be provided in the final engineering phase of the project.

VI. REFERENCES

1. Orange County Hydrology Manual (October, 1986)
2. Orange County Hydrology Manual Addendum No. 1 (1996)
3. City of San Juan Capistrano Municipal Code
4. Orange County Local Drainage Manual (January, 1996)