Appendix E
Preliminary WQMP

Water Quality Management Plan (WQMP)

Project Name:

Avalon Bay Commons

Northwest Corner of Enterprise and Aliso Creek Road

Aliso Viejo, CA 92656

Prepared for:

AvalonBay Communities

11111 Santa Monica Blvd, Suite 1700

Los Angeles, CA 90025

949-955-6225

Prepared by:

Tait & Associates, Inc.

Engineer: Ryan Haskin

Registration No. 84850

701 N. Parkcenter Drive

Santa Ana, CA 92705

714-560-8200

Engineer's Seal

Prepared on: **June 22, 2024**

Project Owner's Certification			
Permit/Application No.		Grading Permit No.	
Tract/Parcel Map No.		Building Permit No.	
CUP, SUP, and/or APN (Specify Lot Numbers if Portions of Tract)			

This Water Quality Management Plan (WQMP) has been prepared for AvalonBay Communities by Tait & Associates, Inc. The WQMP is intended to comply with the requirements of the local NPDES Stormwater Program requiring the preparation of the plan.

The undersigned, while it owns the subject property, is responsible for the implementation of the provisions of this plan and will ensure that this plan is amended as appropriate to reflect up-to-date conditions on the site consistent with the current Orange County Drainage Area Management Plan (DAMP) and the intent of the non-point source NPDES Permit for Waste Discharge Requirements for the County of Orange, Orange County Flood Control District and the incorporated Cities of Orange County within the San Diego Region (South Orange County). Once the undersigned transfers its interest in the property, its successors-in-interest shall bear the aforementioned responsibility to implement and amend the WQMP. An appropriate number of approved and signed copies of this document shall be available on the subject site in perpetuity.

Owner:			
Title	Avalon Bay Commons		
Company	AvalonBay Communities		
Address	11111 Santa Monica Blvd., Suite 1700, Los Angeles, CA 90025		
Email	Chris Hench		
Telephone #			
Signature		Date	

Contents

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Section 1 Discretionary Permit(s) and Water Quality Conditions

Project Infomation			
Permit/Application No.	TBD	Site Address or Tract/Parcel Map No.	Southwest corner of Enterprise and Aliso Creek Road.
Additional Information/ Comments:	N/A		
Water Quality Conditions			
Water Quality Conditions from prior approvals or applicable watershed-based plans	N/A		

Section 2 Project Description

The project site consists of the redevelopment of an existing 4.06-acre area of a commercial/business center currently composed of a parking field for the anchor business in the center and is located at the southwest corner of Enterprise and Aliso Creek Road The project APN is 629-101-16. The proposed project will consist of constructing a six-level apartment complex totaling approximately 360 units. The project also includes the construction of a parking structure, leasing office, fitness club, community pool, and retail space.

2.1 General Description

Description of Proposed Project				
Site Location	The project site consists of the redevelopment of an existing 4.06-acre area of a commercial/business center currently composed of a parking field for the anchor business in the center and is located at the southwest corner of Enterprise and Aliso Creek Road. The project APN is 629-101-16.			
Project Area (ft^2): 176,844	Number of Dwelling Units: 360		SIC Code: _____	
Narrative Project Description:	The project site consists of the redevelopment of an existing 4.06-acre area of a commercial/business center currently composed of a parking field for the anchor business in the center and is located at the southwest corner of Enterprise and Aliso Creek Road. The proposed project will consist of constructing a six-level apartment complex totaling approximately 360 units. The project also includes the construction of a parking structure, leasing office, fitness club, community pool, and retail space.			
Project Area	Pervious		Impervious	
	Area (acres or sq ft)	Percentage	Area (acres or sq ft)	Percentage
Pre-Project Conditions	1.04 acres	26%	3.02 acres	74%
Post-Project Conditions	0.46 acres	11%	3.60 acres	89%

2.2 Post Development Drainage Characteristics

Proposed grading of the site will match existing grading in the parking field area. Portions of the proposed buildings extend into the existing slope adjacent to Enterprise and will require retaining walls to retain the existing grade up to Enterprise. Retaining wall heights are anticipated to range from 3 feet to 35 feet based on the current site plan.

The proposed improvements feature courtyards between the blocks of apartment buildings that face the roadside slope. The drainage conditions of these courtyards will have a high importance in establishing the grading concept for the site. Runoff within these courtyards will be designed to freely flow away from the structures toward the roadside slope and continue down and around the complex before it ultimately discharges to the center's existing storm drain system. This path of travel for runoff will be critical to ensure the flood protection of the structures in this area of the project.

The proposed project is initially anticipated to be an export site due to the large cuts into the roadside slope, water quality detention system, site utilities, pavement section, building and parking structure footings, and topsoil and planting requirements.

The small portion of the existing parking field southeast beyond the limits of the project improvements will share a storm drain inlet and will co-mingle with project runoff in DMA-C. This off-site run-on is captured and treated by the project BMPs, however it creates a discrepancy between the project improvement area (4.06 acres) used in the project description, and the Drainage Management Areas (4.17 acres) used for stormwater calculations.

2.3 Property Ownership/Management

The site is owned and managed by AvalonBay Communities.

Section 3 Site & Watershed Characterization

3.1 Site Conditions

3.1.1 Existing Site Conditions

The site features a large slope between Enterprise and the parking field. At the intersection of Enterprise and Town Center, the parking field is roughly 4 feet lower than the public roadway. As Enterprise travels north, the roadway has an upward slope of approximately 7%, resulting in a 50 foot difference in elevation from the roadway down to the parking field at the northerly end of the project. Existing grades within the parking field are relatively flat with 1-2 feet of relief from one side of the site to the other.

The existing drainage pattern consists of overland flow to several drop inlets scattered across the parking field. The drop inlets connect to an onsite storm drain system that flows south and exits the property to through a 36" RCP connection to a County owned 90" RCP within Enterprise near its intersection with Aliso Creek Road.

Existing Land Uses

Land Use Description	Total Area (acres)	Impervious Area (acres)	Pervious Area (acres)	Imperviousness (%)
Commercial	4.06	3.02	1.04	74
Total				

3.1.2 Infiltration-Related Characteristics

Storm water infiltration into the subsurface soils is not considered feasible due to the presence of clayey subgrade soils and diatomaceous siltstone bedrock.

3.1.2.1 Hydrogeologic Conditions

Groundwater was encountered in the form of seepage zones at approximate elevations of 320 to 328 feet above MSL (mean sea level), which is roughly 20 feet below the existing asphalt parking lot. Refer to the Geotechnical Report in the Appendix.

3.1.2.2 Soil and Geologic Infiltration Characteristics

Storm water infiltration into the subsurface soils is not considered feasible due to the presence of clayey subgrade soils and diatomaceous siltstone bedrock.

3.1.2.3 Geotechnical Conditions

Refer to the Geotechnical Report in the Appendix.

3.1.2.4 Summary of Infiltration Opportunities and Constraints of Existing Site

Storm water infiltration into the subsurface soils is not considered feasible due to the presence of clayey subgrade soils and diatomaceous siltstone bedrock.

3.2 Proposed Site Development Activities

3.2.1 Overview of Site Development Activities

Proposed grading of the site will match existing grading in the parking field area. Portions of the proposed buildings extend into the existing slope adjacent to Enterprise and will require retaining walls to retain the existing grade up to Enterprise. Retaining wall heights are anticipated to range from 3 feet to 35 feet based on the current site plan.

The proposed improvements feature courtyards between the blocks of apartment buildings that face the roadside slope. The drainage conditions of these courtyards will have a high importance in establishing the grading concept for the site. Runoff within these courtyards will be designed to freely flow away from the structures toward the roadside slope and continue down and around the complex before it ultimately discharges to the center's existing storm drain system. This path of travel for runoff will be critical to ensure the flood protection of the structures in this area of the project.

The proposed project is initially anticipated to be an export site due to the large cuts into the roadside slope, water quality detention system, site utilities, pavement section, building and parking structure footings, and topsoil and planting requirements.

3.2.2 Project Attributes Influencing Stormwater Management

As noted above in Section 3.2.1, the subject site discharges to the to the private onsite storm drain network withing the shopping center. The proposed storm drain system for the apartment complex will be designed to convey runoff, unimpeded, to the existing private storm drain network. The 85th percentile (water quality) storm events will be captured by the on-site, underground detention system (see water quality section below), while larger storm event peak flows will bypass the detention system and directly discharge to the downstream storm drain.

Proposed Land Uses

Land Use Description	Total Area (acres)	Impervious Area (acres)	Pervious Area (acres)	Imperviousness (%)
Commercial	4.06	3.60	0.46	89
Total	4.06	3.60	0.46	89

3.2.3 Effects on Infiltration and Harvest and Use Feasibility

Storm water infiltration into the subsurface soils is not considered feasible due to the presence of clayey subgrade soils and diatomaceous siltstone bedrock. Harvest and use is also not feasible due to the lack of necessary pervious area.

3.3 Receiving Waterbodies

The project site is within the Aliso Creek watershed. The site drains into an existing 15" which discharges into Aliso Creek which ultimately discharges into the Pacific Ocean.

3.4 Stormwater Pollutants or Conditions of Concern

Pollutants or Conditions of Concern				
Pollutant	Expected from Proposed Land Uses/ Activities (Yes or No)	Receiving Waterbody Impaired (Yes or No)	Priority Pollutant from WQIP or other Water Quality Condition? (Yes or No)	**Pollutant of Concern (Primary, Other, or No)**
Suspended-Solids				
Nutrients				
Heavy Metals				
Bacteria/Virus/Pathogens			Yes	Primary
Pesticides				
Oil and Grease				
Toxic Organic Compounds				
Trash and Debris				
Dry Weather Runoff			Yes	Primary

3.5 Hydrologic Conditions of Concern

Does a hydrologic condition of concern exist for this project? Yes, due to the drainage being received by Aliso Creek which is an earthen channel.

☐ No – An HCOC does not exist for this receiving water because:

- ☐ Project discharges directly to a protected conveyance (bed and bank are concrete lined the entire way from the point(s) of discharge to a receiving lake, reservoir, embayment, or the Ocean
- ☐ Project discharges directly to storm drains which discharge directly to a reservoir, lake, embayment, ocean or protected conveyance (as described above)
- ☐ The project discharges to an area identified in the WMAA as exempt from hydromodification concerns

☒ Yes – An HCOC does exist for this receiving water because none of the above are applicable.

Repeat this checklist for each different receiving water to which the project would discharge.

3.6 Critical Course Sediment Yield Areas

The potential for critical coarse sediment does not apply per map N.8 in the TGD. Sediment is not anticipated to be a contributing factor to discharge from the developed condition and storm drain network.

Section 4 Site Plan and Drainage Plan

4.1 Drainage Management Area Delineation

Proposed grading of the site will match existing grading in the parking field area. Portions of the proposed buildings extend into the existing slope adjacent to Enterprise and will require retaining walls to retain the existing grade up to Enterprise. Retaining wall heights are anticipated to range from 3 feet to 35 feet based on the current site plan.

The proposed improvements feature courtyards between the blocks of apartment buildings that face the roadside slope. The drainage conditions of these courtyards will have a high importance in establishing the grading concept for the site. Runoff within these courtyards will be designed to freely flow away from the structures toward the roadside slope and continue down and around the complex before it ultimately discharges to the center's existing storm drain system. This path of travel for runoff will be critical to ensure the flood protection of the structures in this area of the project.

The proposed project is initially anticipated to be an export site due to the large cuts into the roadside slope, water quality detention system, site utilities, pavement section, building and parking structure footings, and topsoil and planting requirements.

DMA-A: This area, which is 0.96 acres, will capture drainage in an underground storm drainage system and flow into an underground detention system. The underground detention system will discharge to a Modular Wetland System (or equivalent linear treatment device) with an internal high flow bypass for flows exceeding the required treatment rate, then discharge to the downstream storm drain system.

DMA-B: This area, which is 2.89 acres, will capture drainage in an underground storm drainage system and then it will flow into an underground detention system. A weir structure will divert low flows equivalent to the required treatment volume or treatment flow rate from the underground detention system into a Modular Wetland System (or equivalent linear treatment device) and then discharge to the downstream storm drain system. Large storm events exceeding the water quality treatment requirements will overtop the weir, bypass the treatment system, and discharge to the downstream storm drain system.

DMA-C: This drainage area, which is 0.32 acres, consist of an ashpault parking area. The existing stormwater inlet and low spot of this drainage area is located where the proposed building will be. Grades will be adjusted within the northern portion of DMA C to slope up and join the southeastern project frontage. The southern portion of DMA C will not be touched and will be considered off-site runon. A new catchbasin will be added to the new low spot of the parking field to maintain the existing drainage pattern of the parking field. DMA C will discharge to and be treated by the same undground detention system and Modular Wetland System (or equivalent linear treatment device) as DMA B.

4.2 Overall Site Design BMPs

The project site will capture drainage in an underground storm drainage system and then it will flow into an underground detention system. Low flows equivalent to the required treatment volume or treatment flow rate from the underground detention system will then be conveyed into a Modular Wetland System (or equivalent linear treatment device) which will drain down within 48 hours of the storm event and then exit into the existing storm drain system.

4.3 DMA Characteristics and Site Design BMPs

4.3.1 DMA A - This area, which is 0.96 acres, will capture drainage in an underground storm drainage system and flow into an underground detention system. The underground detention system will discharge to a Modular Wetland System (or equivalent linear treatment device) with an internal high flow bypass for flows exceeding the required treatment rate, then discharge to the downstream storm drain system.

4.3.2 DMA B – This area, which is 2.89 acres, will capture drainage in an underground storm drainage system and then it will flow into an underground detention system. A weir structure will divert low flows equivalent to the required treatment volume or treatment flow rate from the underground detention system into a Modular Wetland System (or equivalent linear treatment device) and then discharge to the downstream storm drain system. Large storm events exceeding the water quality treatment requirements will overtop the weir, bypass the treatment system, and discharge to the downstream storm drain system.

4.3.3 DMA C – This drainage area, which is 0.32 acres, consist of an ashpault parking area. The existing stormwater inlet and low spot of this drainage area is located where the proposed building will be. Grades will be adjusted within the northern portion of DMA C to slope up and join the southeastern project frontage. The southern portion of DMA C will not be touched and will be considered off-site runon. A new catchbasin will be added to the new low spot of the parking field to maintain the existing drainage pattern of the parking field. DMA C will discharge to and be treated by the same undground detention system and Modular Wetland System (or equivalent linear treatment device) as DMA B.

4.3.4 DMA Summary

Drainage Management Areas				
DMA (Number/Description)	Total Area (acres)	Imperviousness (%)	Infiltration Feasibility Category (Full, Partial, or No Infiltration)	Hydrologic Source Controls Used
DMA-A	0.96	80	No Infiltration	Underground Detention, Modular Wetland System
DMA-B	2.89	80	No Infiltration	Underground Detention, Modular Wetland System
DMA-C	0.21	95	No Infiltration	

4.4 Source Control BMPs

Non-Structural Source Control BMPs				
Identifier	**Name**	**Check One**		**Reason Source Control is Not Applicable**
		Included	**Not Applicable**	
N1	Education for Property Owners, Tenants and Occupants	☒	☐	
N2	Activity Restrictions	☒	☐	
N3	Common Area Landscape Management	☒	☐	
N4	BMP Maintenance	☒	☐	
N5	Title 22 CCR Compliance (How development will comply)	☒	☐	
N6	Local Industrial Permit Compliance	☐	☒	There are no fuel dispensing areas in the project site.
N7	Spill Contingency Plan	☒	☐	
N8	Underground Storage Tank Compliance	☒	☐	
N9	Hazardous Materials Disclosure Compliance	☒	☐	
N10	Uniform Fire Code Implementation	☒	☐	
N11	Common Area Litter Control	☒	☐	
N12	Employee Training	☒	☐	
N13	Housekeeping of Loading Docks	☐	☒	There are no loading docks proposed in the project site.
N14	Common Area Catch Basin Inspection	☒	☐	
N15	Street Sweeping Private Streets and Parking Lots	☒	☐	
N16	Retail Gasoline Outlets	☐	☒	There are no retail gasoline outlets proposed in the project site

Structural Source Control BMPs

Identifier	Name	Check One		Reason Source Control is Not Applicable
		Included	Not Applicable	
S1	Provide storm drain system stenciling and signage	☒	☐	
S2	Design and construct outdoor material storage areas to reduce pollution introduction	☒	☐	
S3	Design and construct trash and waste storage areas to reduce pollution introduction	☒	☐	
S4	Use efficient irrigation systems & landscape design, water conservation, smart controllers, and source control	☒	☐	
S5	Protect slopes and channels and provide energy dissipation	☒	☐	
	Incorporate requirements applicable to individual priority project categories (from SDRWQCB NPDES Permit)	☒	☐	
S6	Dock areas	☐	☒	There are no loading docks on the project site.
S7	Maintenance bays	☐	☒	There are no maintenance bays on the project site.
S8	Vehicle wash areas	☐	☒	There are no vehicle washing areas on the project site.
S9	Outdoor processing areas	☐	☒	There are no outdoor processing areas on the project site.
S10	Equipment wash areas	☐	☒	There are no equipment wash areas on the project site.
S11	Fueling areas	☐	☒	There are no fueling areas on the project site.
S12	Hillside landscaping	☒	☐	

S13	Wash water control for food preparation areas	☐	☒	There are no food processing areas on the project site.
S14	Community car wash racks	☐	☒	There is no community car wash on the project site.

Section 5 Low Impact Development BMPs

5.1 LID BMPs for DMA-A

DMA-A, which is 0.96 acres, will capture drainage in an underground storm drainage system and then it will flow into an underground detention system. Low flows equivalent to the required treatment volume or treatment flow rate from the underground detention system will discharge into a Modular Wetland System (or equivalent linear treatment device) and then exit into the existing storm drain system.

5.1.1 Hydrologic Source Controls for DMA-A

The full design capture volume is being treated by the LID BMP's, no hydrologic source controls are proposed.

5.1.2 Structural LID BMP for DMA-A

The BMP used in the proposed project is a Modular Wetland System which is a linear stormwater bioretention device that treats the flow horizontally. This allows for a smaller footprint, higher treatment capacity, and design versatility.

The Modular Wetland System BMP has been designed to treat the calculated DCV of 3,073 cf for area DMA-A.

5.2 LID BMPs for DMA-B + DMA-C

Runoff from DMA-B and DMA-C will be captured in an underground storm drainage system and then will flow into an underground detention system. Low flows equivalent to the required treatment volume or treatment flow rate from the underground detention system will then be conveyed into a Modular Wetland System (or equivalent linear treatment device) and then exit into the existing storm drain system.

5.2.1 Hydrologic Source Controls for DMA-B + DMA-C

The full design capture volume is being treated by the LID BMP's, no hydrologic source controls are proposed.

5.2.2 Structural LID BMP for DMA-B + DMA-C

The BMP used in the proposed project is a Modular Wetland System which is a linear stormwater bioretention device that treats the flow horizontally. This allows for a smaller footprint, higher treatment capacity, and design versatility.

The Modular Wetland System BMP has been designed to treat the calculated DCV of 10,382 cf for the combined area of DMA-B and DMA-C.

5.3 Summary of LID BMPs

In summary, the two Modular Wetland Systems will treat the calculated DCV for DMA-A and the combined area of DMA-B and DMA-C. The flow will then be discharged into the existing storm drain system and ultimately into the Pacific Ocean.

Section 6 Hydromodification BMPs

6.1 Points of Compliance

The point of compliance is the existing storm drain system within the existing shopping center. The project connects two existing storm drains (15″ and 24″) as shown on the WQMP map which combine within the shopping center storm drain network before discharging to the public storm drain within Enterprise.

6.2 Pre-Development (Natural) Conditions

The site features a large slope between Enterprise and the parking field. At the intersection of Enterprise and Town Center, the parking field is roughly 4 feet lower than the public roadway. As Enterprise travels north, the roadway has an upward slope of approximately 7%, resulting in a 50 foot difference in elevation from the roadway down to the parking field at the northerly end of the project. Existing grades within the parking field are relatively flat with 1-2 feet of relief from one side of the site to the other.

The existing drainage pattern consists of overland flow to several drop inlets scattered across the parking field. The drop inlets connect to an onsite storm drain system that flows south and exits the property to through a 36" RCP connection to a County owned 90" RCP within Enterprise near its intersection with Aliso Creek Road.

6.3 Post-Development Conditions and Hydromodification BMPs

Proposed grading of the site will match existing grading in the parking field area. Portions of the proposed buildings extend into the existing slope adjacent to Enterprise and will require retaining walls to retain the existing grade up to Enterprise.

The proposed improvements feature courtyards between the blocks of apartment buildings that face the roadside slope. The drainage conditions of these courtyards will have a high importance in establishing the grading concept for the site. Runoff within these courtyards will be designed to freely flow away from the structures toward the roadside slope and continue down and around the complex within the proposed storm drain network.

The project includes two underground detention systems, one within the parking field and one below an outdoor courtyard, that will mitigate peak flows to satisfy the hydromodification requirements.

6.4 Measures for Avoidance of Critical Coarse Sediment Yield Areas

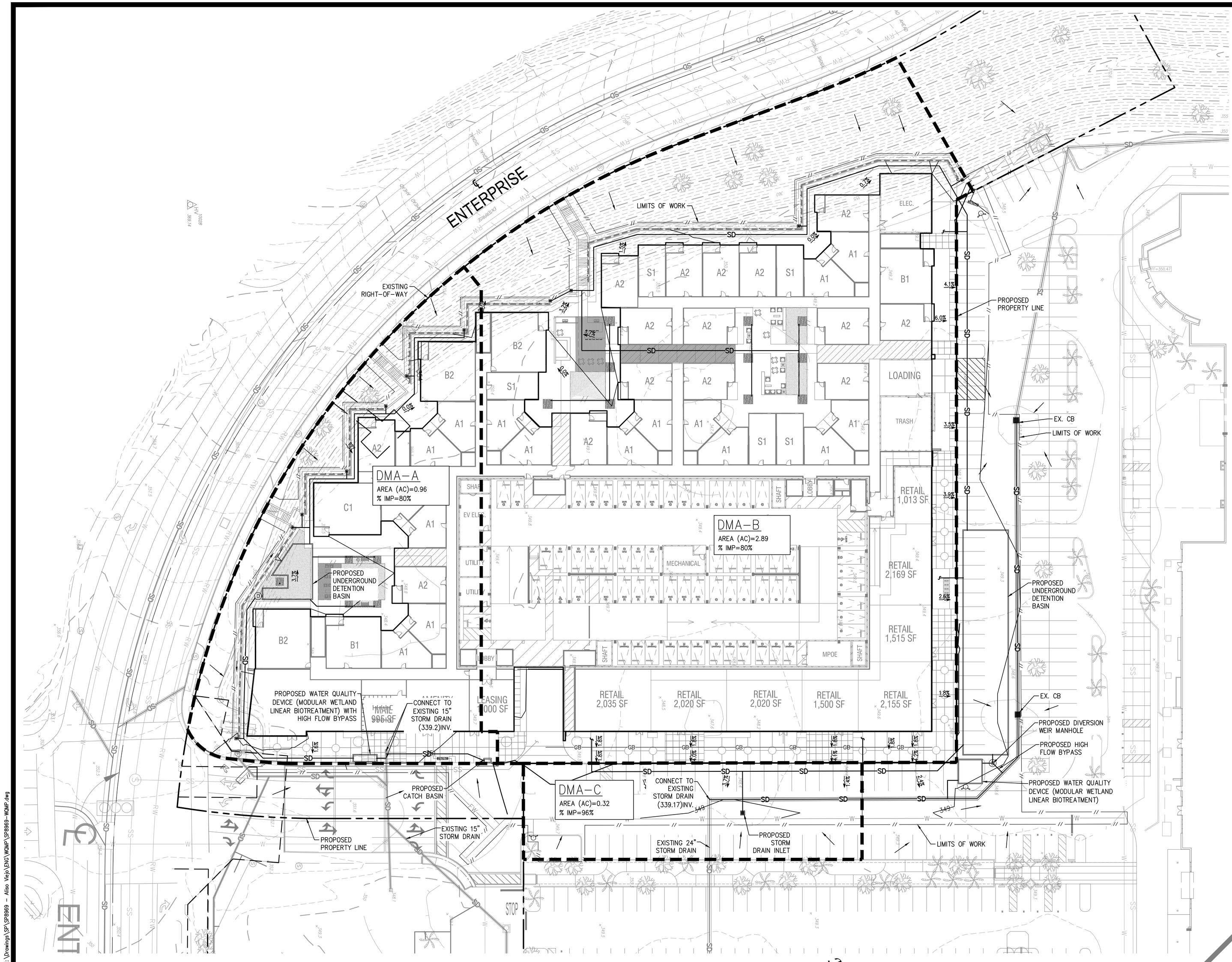
The potential for critical coarse sediment does not apply per map N.8 in the TGD. Sediment is not anticipated to be a contributing factor to discharge from the developed condition and storm drain network.

6.5 Hydrologic Modeling and Hydromodification Compliance

The proposed underground detention systems have been sized for hydromodification compliance and limit the proposed 10-year site discharge rate to the existing natural condition 2-year site discharge rate. See the South Orange County Hydrology Model (SOHM) in the Appendix for calculations.

Section 7 Educational Materials Index

Educational Materials			
Residential Material (http://www.ocwatersheds.com)	**Check If Applicable**	**Business Material (http://www.ocwatersheds.com)**	**Check If Applicable**
The Ocean Begins at Your Front Door	☒	Tips for the Automotive Industry	☐
Tips for Car Wash Fund-raisers	☐	Tips for Using Concrete and Mortar	☐
Tips for the Home Mechanic	☐	Tips for the Food Service Industry	☐
Homeowners Guide for Sustainable Water Use	☒	Proper Maintenance Practices for Your Business	☐
Household Tips	☒	Compliance BMPs for Mobile Businesses	☐
Proper Disposal of Household Hazardous Waste	☒	**Other Material**	**Check If Attached**
Recycle at Your Local Used Oil Collection Center (North County)	☐		
Recycle at Your Local Used Oil Collection Center (Central County)	☐		☐
Recycle at Your Local Used Oil Collection Center (South County)	☐		☐
Tips for Maintaining a Septic Tank System	☐		☐
Responsible Pest Control	☐		☐
Sewer Spill	☒		☐
Tips for the Home Improvement Projects	☐		☐
Tips for Horse Care	☐		☐
Tips for Landscaping and Gardening	☒		☐
Tips for Pet Care	☐		☐
Tips for Projects Using Paint	☐		☐



LEGEND

- MAJOR CONTOUR
- MINOR CONTOUR
- PARCEL LINE
- PROPERTY LINE
- OVERALL SHED AREA
- RIDGE LINE
- STORM DRAIN LINE
- STORM DRAIN MANHOLE (OR CDS, SEE PLAN)
- STORM DRAIN CATCH BASIN
- SLOPE ARROW

UNAUTHORIZED CHANGES & USES

THE ENGINEER PREPARING THESE PLANS WILL NOT BE RESPONSIBLE FOR, OR LIABLE FOR, UNAUTHORIZED CHANGES TO OR USES OF THESE PLANS. ALL CHANGES OF THESE PLANS MUST BE IN WRITING AND MUST BE APPROVED BY THE PREPARER OF THESE PLANS PRIOR TO CONSTRUCTION. CONSTRUCTION CONTRACTOR AGREES THAT IN ACCORDANCE WITH GENERALLY ACCEPTED CONSTRUCTION PRACTICES, CONSTRUCTION CONTRACTOR WILL BE REQUIRED TO ASSUME SOLE AND COMPLETE RESPONSIBILITY FOR JOB SITE CONDITIONS DURING THE COURSE OF CONSTRUCTION OF THE PROJECT, INCLUDING SAFETY OF ALL PERSONS AND PROPERTY, THAT THIS REQUIREMENT SHALL BE MADE TO APPLY CONTINUOUSLY AND NOT BE LIMITED TO NORMAL WORKING HOURS, AND CONSTRUCTION CONTRACTOR FURTHER AGREES TO DEFEND, INDEMNIFY AND HOLD DESIGN PROFESSIONAL HARMLESS FROM ANY AND ALL LIABILITY, REAL OR ALLEGED, IN CONNECTION WITH THE PERFORMANCE OF WORK ON THIS PROJECT, EXCEPTING LIABILITY ARISING FROM THE SOLE NEGLIGENCE OF DESIGN PROFESSIONAL.

811 Know what's below Call before you dig.

NOTE TO CONTRACTOR

THE EXISTENCE AND LOCATION OF ANY UNDERGROUND UTILITIES, PIPES, AND/OR STRUCTURES SHOWN ON THESE PLANS WERE OBTAINED BY A SEARCH OF AVAILABLE RECORDS. THERE MAYBE EXISTING UTILITIES NOT SHOWN ON THESE PLANS. THE CONTRACTOR SHALL ASCERTAIN THE TRUE VERTICAL AND HORIZONTAL LOCATION OF THOSE UNDERGROUND UTILITIES TO BE USED PRIOR TO CONSTRUCTION AND SHALL BE RESPONSIBLE FOR ANY DAMAGE TO ANY PUBLIC OR PRIVATE UTILITIES, SHOWN OR NOT SHOWN HEREON.

N

0 30' 60'

SCALE: 1" = 30'

NO.	DESCRIPTION	REVISIONS	BY	DATE

TAIT & ASSOCIATES
Since 1964
701 North Parkcenter Drive
Santa Ana, CA 92705
p: 714.560.8200
www.tait.com
ENGINEERING ENVIRONMENTAL BUILDING LAND
Santa Ana Sacramento Denver Dallos
San Diego Riverside Boise Atlanta

FOR REVIEW ONLY - NOT FOR CONSTRUCTION

CONCEPTUAL WQMP PLAN

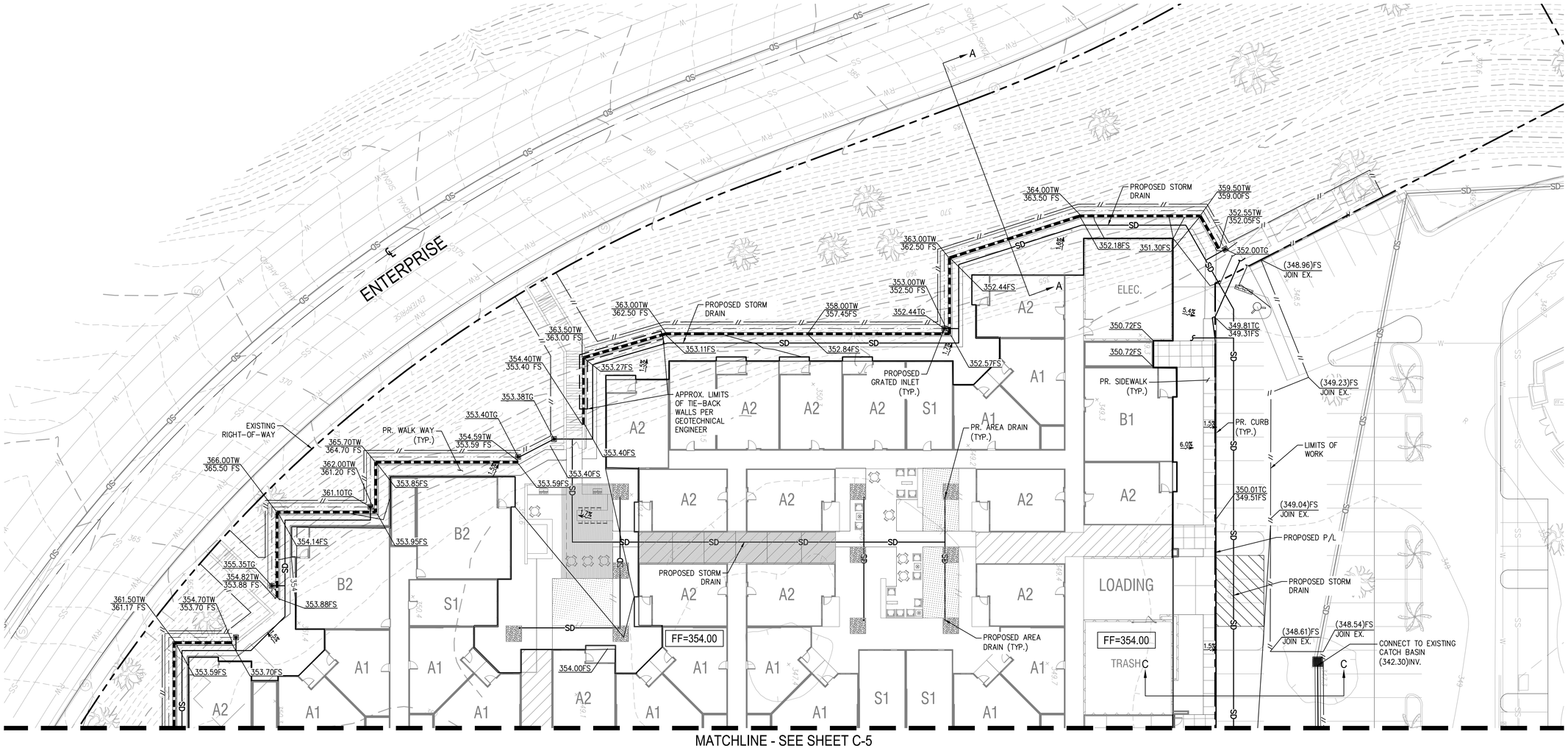
AVALON BAY COMMONS
NORTHWEST CORNER OF ENTERPRISE AND ALISO CREEK ROAD
ALISO VIEJO, CA 92656

FOR REVIEW ONLY NOT FOR CONSTRUCTION

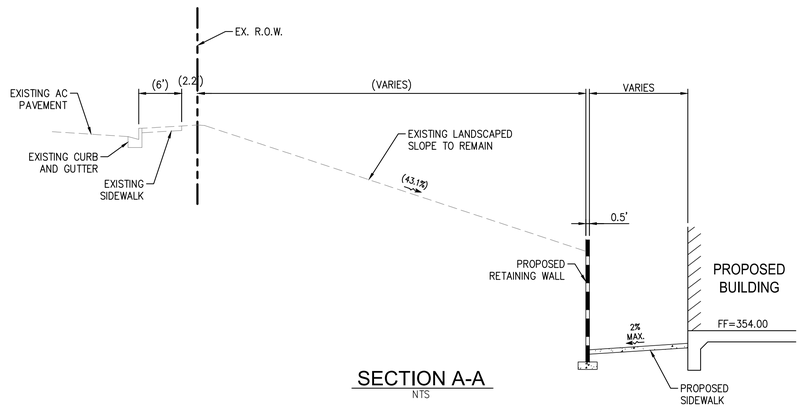
DRAWN: JM
DATE: 3/19/24
CHECKED: RH
DATE: 3/19/24
REVISION #:
DATE:
JOB NO. SP8969

C-8

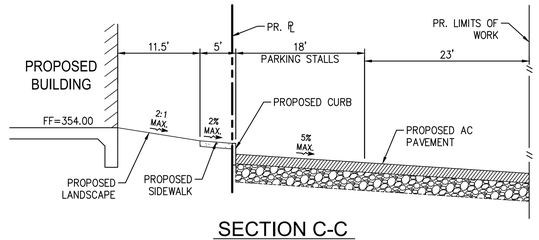
Jun 22, 2024 - 11:18am by rhoskin K:\Drawings\SP\SP8969 - Aliso Viejo\ENG\WQMP\SP8969 - WQMP.dwg



MATCHLINE - SEE SHEET C-5



SECTION A-A
NTS



SECTION C-C
NTS

0 20' 40'
SCALE: 1" = 20'

811 Know what's below Call before you dig.

UNAUTHORIZED CHANGES & USES

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NOTE TO CONTRACTOR

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NO.	DESCRIPTION	REVISIONS	BY	DATE

TAIT & ASSOCIATES
ENGINEERING ENVIRONMENTAL BUILDING LAND
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San Diego Riverside Boise
Dallas Atlanta
701 North Parkcenter Drive
Santa Ana, CA 92705
p: 714.560.8200
www.tait.com

CONCEPTUAL GRADING & DRAINAGE PLAN

AVALON BAY COMMONS
NORTHWEST CORNER OF ENTERPRISE
AND ALISO CREEK ROAD
ALISO VIEJO, CA 92656

DRAWN: JM
DATE: 3/19/24
CHECKED: RH
DATE: 3/19/24
REVISION #:
DATE:
JOB NO: SP8969

C-4

FOR REVIEW ONLY - NOT FOR CONSTRUCTION

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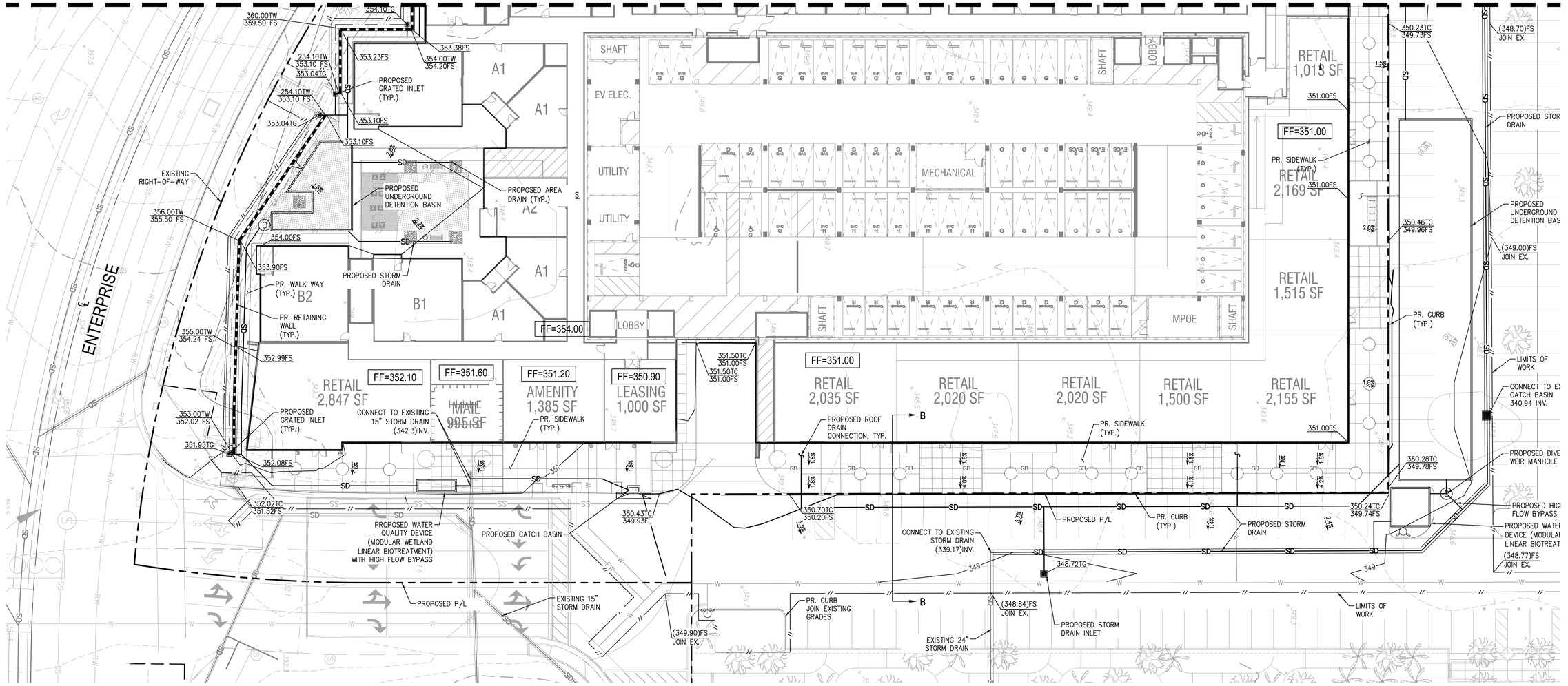

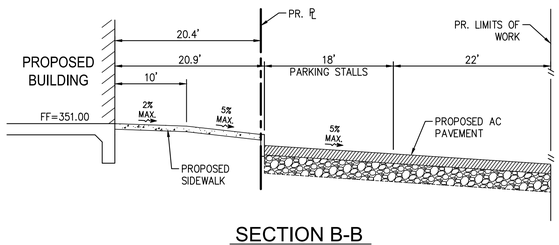

SECTION B-B
NTS

UNAUTHORIZED CHANGES & USES

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Know what's below Call before you dig.

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CONCEPTUAL GRADING & DRAINAGE PLAN

AVALON BAY COMMONS
NORTHWEST CORNER OF ENTERPRISE
AND ALISO CREEK ROAD
ALISO VIEJO, CA 92656

DRAWN: JM
DATE: 3/19/24
CHECKED: RH
DATE: 3/19/24
REVISION #:
DATE:
JOB NO: SP8869

C-5

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Project: SP8969
Total Area(AC) 4.17
Total DCV (required) cf 13,455

Capture Efficiency Method

Drainage Area	Area (sf)	Area (AC)	Rainfall Depth (in)	Pervious Area (sf)	Pervious Area (ac)	Impervious Area (ac)	Impervious ratio	C (0.75ximp+ 0.15)	TC (MIN)	DCV (cf) (CxdxA)	Biotreatment DCV (cf) (1.5 x DCV)	BMP USED
A	42,030	0.96	0.78	8406	0.19	0.77	0.80	0.75	10	2,049	3,073	MWS
B	125,873	2.89	0.78	25175	0.58	2.31	0.80	0.75	10	6,136	9,204	MWS
C	13,897	0.32	0.78	575	0.01	0.31	0.96	0.87	10	785	1,177	
Total	181,800	4.17		34,156	0.78	3.39	0.81	0.76		8,185	13,455	

Region 9 Aliso Creek	**River & Stream**	**4901.130000 / 18070301**	**Benthic Community Effects** **A Source Unknown**	**19 Miles**	**2010**	**5A**	**2025**
			Indicator Bacteria **A Source Unknown**	**19 Miles**	**2002**	**5B**	**2011**
			This listing for indicator bacteria applies to the Aliso Creek mainstem and all the major tributaries of Aliso Creek which are Sulphur Creek, Wood Canyon, Aliso Hills Canyon, Dairy Fork, and English Canyon.				
			Malathion **A Source Unknown**	**19 Miles**	**2014**	**5A**	**2029**
			Nitrogen **A Source Unknown**	**19 Miles**	**2014**	**5A**	**2019**
			Phosphorus **A Source Unknown**	**19 Miles**	**2002**	**5A**	**2019**
			This listing for phosphorus applies to the Aliso Creek mainstem and all the major tributaries of Aliso Creek which are Sulphur Creek, Wood Canyon, Aliso Hills Canyon, Dairy Fork, and English Canyon.				
			Selenium **A Source Unknown**	**19 Miles**	**2010**	**5A**	**2021**
			Toxicity **A Source Unknown** **Unknown Nonpoint Source** **Unknown Point Source**	**19 Miles**	**2002**	**5A**	**2019**
			This listing for toxicity applies to the Aliso Creek mainstem and all the major tributaries of Aliso Creek which are Sulphur Creek, Wood Canyon, Aliso Hills Canyon, Dairy Fork, and English Canyon.				

SOHM

PROJECT REPORT

REPORT 1 - VAULT 1

General Model Information

Project Name:	default[6]
Site Name:	Aliso Viejo
Site Address:	26501 Aliso Creek Rd
City:	Aliso Viejo
Report Date:	6/14/2023
Gage:	Laguna Beach
Data Start:	10/01/1949
Data End:	09/30/2006
Timestep:	15 Minute
Precip Scale:	1.000
Version Date:	2020/10/14

POC Thresholds

Low Flow Threshold for POC1:	10 Percent of the 2 Year
High Flow Threshold for POC1:	10 Year

Landuse Basin Data

Predeveloped Land Use

Basin 1

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
D,Open Brush,Mod	0.96
Pervious Total	0.96
Impervious Land Use	acre
Impervious Total	0
Basin Total	0.96

Element Flows To:

Surface	Interflow	Groundwater

Mitigated Land Use

Basin 1

Bypass:	No
GroundWater:	No

Pervious Land Use	acre
D,Open Brush,Mod	0.34
Pervious Total	0.34

Impervious Land Use	acre
Impervious,Mod(5-10)	0.62
Impervious Total	0.62
Basin Total	0.96

Element Flows To:

Surface	Interflow	Groundwater
Vault 1	Vault 1	

Mitigated Routing

Vault 1

Width: 35.5516582053359 ft.
Length: 35.5516582053359 ft.
Depth: 4 ft.
Discharge Structure
Riser Height: 3 ft.
Riser Diameter: 54 in.
Notch Type: Rectangular
Notch Width: 0.902 ft.
Notch Height: 0.347 ft.
Orifice 1 Diameter: 0.826 in. Elevation:0 ft.
Element Flows To:
Outlet 1 Outlet 2

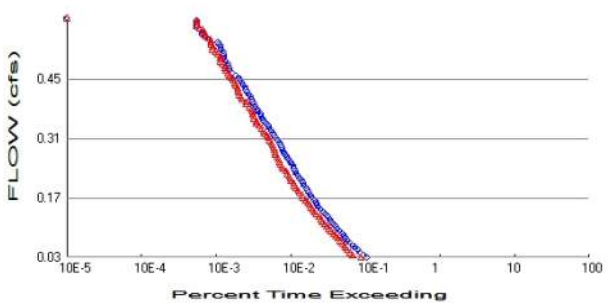
Vault Hydraulic Table

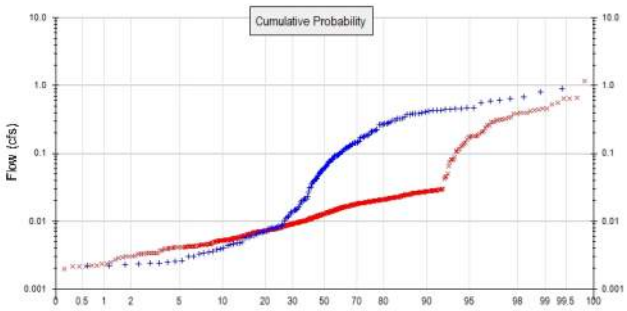
Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	Infilt(cfs)
0.0000	0.029	0.000	0.000	0.000
0.0444	0.029	0.001	0.003	0.000
0.0889	0.029	0.002	0.005	0.000
0.1333	0.029	0.003	0.006	0.000
0.1778	0.029	0.005	0.007	0.000
0.2222	0.029	0.006	0.008	0.000
0.2667	0.029	0.007	0.009	0.000
0.3111	0.029	0.009	0.010	0.000
0.3556	0.029	0.010	0.011	0.000
0.4000	0.029	0.011	0.011	0.000
0.4444	0.029	0.012	0.012	0.000
0.4889	0.029	0.014	0.012	0.000
0.5333	0.029	0.015	0.013	0.000
0.5778	0.029	0.016	0.014	0.000
0.6222	0.029	0.018	0.014	0.000
0.6667	0.029	0.019	0.015	0.000
0.7111	0.029	0.020	0.015	0.000
0.7556	0.029	0.021	0.016	0.000
0.8000	0.029	0.023	0.016	0.000
0.8444	0.029	0.024	0.017	0.000
0.8889	0.029	0.025	0.017	0.000
0.9333	0.029	0.027	0.017	0.000
0.9778	0.029	0.028	0.018	0.000
1.0222	0.029	0.029	0.018	0.000
1.0667	0.029	0.030	0.019	0.000
1.1111	0.029	0.032	0.019	0.000
1.1556	0.029	0.033	0.019	0.000
1.2000	0.029	0.034	0.020	0.000
1.2444	0.029	0.036	0.020	0.000
1.2889	0.029	0.037	0.021	0.000
1.3333	0.029	0.038	0.021	0.000
1.3778	0.029	0.040	0.021	0.000
1.4222	0.029	0.041	0.022	0.000
1.4667	0.029	0.042	0.022	0.000
1.5111	0.029	0.043	0.022	0.000
1.5556	0.029	0.045	0.023	0.000
1.6000	0.029	0.046	0.023	0.000

1.6444	0.029	0.047	0.023	0.000
1.6889	0.029	0.049	0.024	0.000
1.7333	0.029	0.050	0.024	0.000
1.7778	0.029	0.051	0.024	0.000
1.8222	0.029	0.052	0.025	0.000
1.8667	0.029	0.054	0.025	0.000
1.9111	0.029	0.055	0.025	0.000
1.9556	0.029	0.056	0.025	0.000
2.0000	0.029	0.058	0.026	0.000
2.0444	0.029	0.059	0.026	0.000
2.0889	0.029	0.060	0.026	0.000
2.1333	0.029	0.061	0.027	0.000
2.1778	0.029	0.063	0.027	0.000
2.2222	0.029	0.064	0.027	0.000
2.2667	0.029	0.065	0.027	0.000
2.3111	0.029	0.067	0.028	0.000
2.3556	0.029	0.068	0.028	0.000
2.4000	0.029	0.069	0.028	0.000
2.4444	0.029	0.070	0.028	0.000
2.4889	0.029	0.072	0.029	0.000
2.5333	0.029	0.073	0.029	0.000
2.5778	0.029	0.074	0.029	0.000
2.6222	0.029	0.076	0.030	0.000
2.6667	0.029	0.077	0.035	0.000
2.7111	0.029	0.078	0.073	0.000
2.7556	0.029	0.080	0.129	0.000
2.8000	0.029	0.081	0.200	0.000
2.8444	0.029	0.082	0.283	0.000
2.8889	0.029	0.083	0.376	0.000
2.9333	0.029	0.085	0.478	0.000
2.9778	0.029	0.086	0.588	0.000
3.0222	0.029	0.087	0.805	0.000
3.0667	0.029	0.089	1.469	0.000
3.1111	0.029	0.090	2.415	0.000
3.1556	0.029	0.091	3.575	0.000
3.2000	0.029	0.092	4.914	0.000
3.2444	0.029	0.094	6.410	0.000
3.2889	0.029	0.095	8.047	0.000
3.3333	0.029	0.096	9.811	0.000
3.3778	0.029	0.098	11.69	0.000
3.4222	0.029	0.099	13.68	0.000
3.4667	0.029	0.100	15.77	0.000
3.5111	0.029	0.101	17.94	0.000
3.5556	0.029	0.103	20.20	0.000
3.6000	0.029	0.104	22.54	0.000
3.6444	0.029	0.105	24.94	0.000
3.6889	0.029	0.107	27.40	0.000
3.7333	0.029	0.108	29.91	0.000
3.7778	0.029	0.109	32.46	0.000
3.8222	0.029	0.110	35.05	0.000
3.8667	0.029	0.112	37.67	0.000
3.9111	0.029	0.113	40.30	0.000
3.9556	0.029	0.114	42.94	0.000
4.0000	0.029	0.116	45.58	0.000
4.0444	0.029	0.117	48.22	0.000
4.0889	0.000	0.000	50.84	0.000

Analysis Results

POC 1





\+ Predeveloped x Mitigated

Predeveloped Landuse Totals for POC #1
Total Pervious Area: 0.96
Total Impervious Area: 0

Mitigated Landuse Totals for POC #1
Total Pervious Area: 0.34
Total Impervious Area: 0.62

Flow Frequency Method: Cunnane

Flow Frequency Return Periods for Predeveloped. POC #1

Return Period	**Flow(cfs)**
2 year	0.309626
5 year	0.448674
10 year	0.585656
25 year	0.699281

Flow Frequency Return Periods for Mitigated. POC #1

Return Period	**Flow(cfs)**
2 year	0.209518
5 year	0.404215
10 year	0.515124
25 year	0.649912

Duration Flows

The Facility PASSED

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.0310	2081	1737	83	Pass
0.0366	1866	1351	72	Pass
0.0422	1702	1245	73	Pass
0.0478	1571	1153	73	Pass
0.0534	1447	1086	75	Pass
0.0590	1352	1047	77	Pass
0.0646	1239	981	79	Pass
0.0702	1144	914	79	Pass
0.0758	1085	855	78	Pass
0.0814	1028	793	77	Pass
0.0870	968	747	77	Pass
0.0926	902	694	76	Pass
0.0982	829	649	78	Pass
0.1038	784	612	78	Pass
0.1094	737	563	76	Pass
0.1150	695	533	76	Pass
0.1206	669	507	75	Pass
0.1262	621	474	76	Pass
0.1318	585	435	74	Pass
0.1374	544	411	75	Pass
0.1430	502	394	78	Pass
0.1486	475	373	78	Pass
0.1542	449	356	79	Pass
0.1598	430	336	78	Pass
0.1654	408	315	77	Pass
0.1710	386	294	76	Pass
0.1766	372	284	76	Pass
0.1822	349	261	74	Pass
0.1878	331	253	76	Pass
0.1934	321	236	73	Pass
0.1991	302	221	73	Pass
0.2047	292	219	75	Pass
0.2103	282	201	71	Pass
0.2159	264	197	74	Pass
0.2215	250	191	76	Pass
0.2271	236	180	76	Pass
0.2327	229	172	75	Pass
0.2383	222	157	70	Pass
0.2439	216	151	69	Pass
0.2495	206	146	70	Pass
0.2551	197	141	71	Pass
0.2607	187	136	72	Pass
0.2663	177	132	74	Pass
0.2719	168	124	73	Pass
0.2775	161	123	76	Pass
0.2831	153	121	79	Pass
0.2887	151	118	78	Pass
0.2943	145	114	78	Pass
0.2999	140	110	78	Pass
0.3055	133	102	76	Pass
0.3111	122	100	81	Pass
0.3167	119	96	80	Pass
0.3223	114	88	77	Pass

0.3279	109	86	78	Pass
0.3335	104	82	78	Pass
0.3391	100	75	75	Pass
0.3447	92	69	75	Pass
0.3503	86	69	80	Pass
0.3559	83	65	78	Pass
0.3615	80	63	78	Pass
0.3671	78	62	79	Pass
0.3727	72	61	84	Pass
0.3783	70	59	84	Pass
0.3839	67	56	83	Pass
0.3896	63	51	80	Pass
0.3952	61	50	81	Pass
0.4008	60	45	75	Pass
0.4064	58	43	74	Pass
0.4120	55	41	74	Pass
0.4176	52	40	76	Pass
0.4232	50	39	78	Pass
0.4288	49	39	79	Pass
0.4344	46	37	80	Pass
0.4400	44	35	79	Pass
0.4456	42	34	80	Pass
0.4512	40	32	80	Pass
0.4568	37	30	81	Pass
0.4624	33	29	87	Pass
0.4680	30	27	90	Pass
0.4736	30	26	86	Pass
0.4792	29	26	89	Pass
0.4848	29	24	82	Pass
0.4904	27	23	85	Pass
0.4960	25	23	92	Pass
0.5016	25	23	92	Pass
0.5072	25	21	84	Pass
0.5128	25	20	80	Pass
0.5184	23	18	78	Pass
0.5240	23	18	78	Pass
0.5296	22	17	77	Pass
0.5352	21	17	80	Pass
0.5408	16	17	106	Pass
0.5464	14	15	107	Pass
0.5520	13	14	107	Pass
0.5576	13	14	107	Pass
0.5632	12	13	108	Pass
0.5688	11	12	109	Pass
0.5745	11	11	100	Pass
0.5801	11	11	100	Pass
0.5857	11	11	100	Pass

Water Quality

Model Default Modifications

Total of 0 changes have been made.

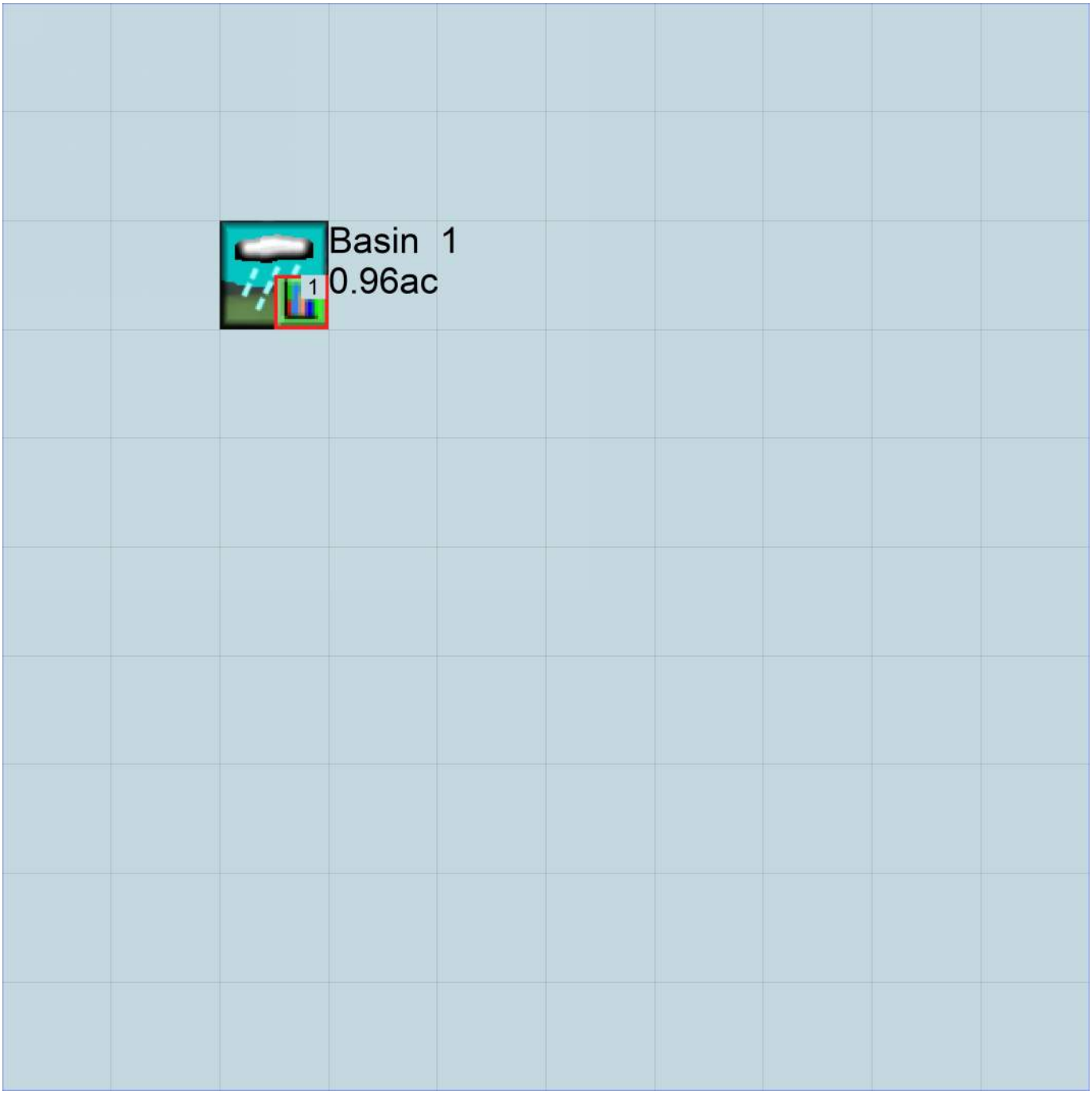
PERLND Changes

No PERLND changes have been made.

IMPLND Changes

No IMPLND changes have been made.

Appendix
Predeveloped Schematic



Mitigated Schematic

Predeveloped UCI File

```
RUN

GLOBAL
  WWHM4 model simulation
  START       1949 10 01        END    2006 09 30
  RUN INTERP OUTPUT LEVEL    3    0
  RESUME     0 RUN     1                    UNIT SYSTEM     1
END GLOBAL

FILES
<File>  <Un#>   <-----------File Name------------------------------>***
<-ID->                                                              ***
WDM         26   default[6].wdm
MESSU       25   Predefault[6].MES
            27   Predefault[6].L61
            28   Predefault[6].L62
            30   POCdefault[6]1.dat
END FILES

OPN SEQUENCE
    INGRP               INDELT 00:15
      PERLND      42
      COPY       501
      DISPLY       1
    END INGRP
END OPN SEQUENCE
DISPLY
  DISPLY-INFO1
    # -  #<----------Title---------->***TRAN PIVL DIG1 FIL1  PYR DIG2 FIL2 YRND
    1        Basin  1                   MAX                    1    2   30    9
  END DISPLY-INFO1
END DISPLY
COPY
  TIMESERIES
    # -  #  NPT  NMN ***
    1         1    1
  501         1    1
  END TIMESERIES
END COPY
GENER
  OPCODE
    #    # OPCD ***
  END OPCODE
  PARM
    #    #         K ***
  END PARM
END GENER
PERLND
  GEN-INFO
    <PLS ><-------Name------->NBLKS   Unit-systems   Printer ***
    # -  #                          User  t-series Engl Metr ***
                                       in  out           ***
   42     D,Open Brush,Mod        1    1    1    1   27    0
  END GEN-INFO
  *** Section PWATER***

  ACTIVITY
    <PLS > ************ Active Sections ******************************
    # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC ***
   42         0    0    1    0    0    0    0    0    0    0    0    0
  END ACTIVITY

  PRINT-INFO
    <PLS > ***************** Print-flags ***************************** PIVL  PYR
    # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC  *********
   42         0    0    4    0    0    0    0    0    0    0    0    0    1    9
  END PRINT-INFO
```

```
  PWAT-PARM1
    <PLS >  PWATER variable monthly parameter value flags  ***
    # -  # CSNO RTOP UZFG  VCS  VUZ  VNN VIFW VIRC  VLE INFC  HWT ***
   42         0    0    0    1    0    0    0    0    1    0    0
  END PWAT-PARM1

  PWAT-PARM2
    <PLS >      PWATER input info: Part 2         ***
    # -  # ***FOREST      LZSN    INFILT      LSUR     SLSUR     KVARY     AGWRC
   42             0       4.3     0.035       350       0.1       0.8     0.955
  END PWAT-PARM2

  PWAT-PARM3
    <PLS >      PWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN    INFEXP    INFILD    DEEPFR    BASETP    AGWETP
   42            40        35         4         2         0      0.03         0
  END PWAT-PARM3
  PWAT-PARM4
    <PLS >     PWATER input info: Part 4                              ***
    # -  #     CEPSC      UZSN      NSUR     INTFW       IRC     LZETP ***
   42             0      0.65      0.25       0.8      0.45         0
  END PWAT-PARM4
  MON-LZETPARM
    <PLS >      PWATER input info: Part 3         ***
    # -  #  JAN  FEB  MAR  APR  MAY  JUN  JUL  AUG  SEP  OCT  NOV  DEC  ***
   42       0.4  0.4  0.4  0.5 0.55 0.55 0.55 0.55 0.55 0.55 0.45  0.4
  END MON-LZETPARM
  MON-INTERCEP
    <PLS >      PWATER input info: Part 3         ***
    # -  #  JAN  FEB  MAR  APR  MAY  JUN  JUL  AUG  SEP  OCT  NOV  DEC  ***
   42      0.12 0.12 0.12 0.12 0.12 0.12 0.12 0.12 0.12 0.12 0.12 0.12
  END MON-INTERCEP

  PWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
               ran from 1990 to end of 1992 (pat 1-11-95) RUN 21 ***
    # -  # ***  CEPS      SURS       UZS      IFWS       LZS      AGWS      GWVS
   42             0         0     0.065         0      0.86       0.3      0.01
  END PWAT-STATE1

END PERLND

IMPLND
  GEN-INFO
    <PLS ><-------Name------->   Unit-systems   Printer ***
    # -  #                     User  t-series Engl Metr ***
                                     in  out           ***
  END GEN-INFO
  *** Section IWATER***

  ACTIVITY
    <PLS > ************ Active Sections ******************************
    # -  # ATMP SNOW IWAT  SLD  IWG IQAL   ***
  END ACTIVITY

  PRINT-INFO
    <ILS > ******** Print-flags ******** PIVL  PYR
    # -  # ATMP SNOW IWAT  SLD  IWG IQAL    *********
  END PRINT-INFO

  IWAT-PARM1
    <PLS >  IWATER variable monthly parameter value flags  ***
    # -  # CSNO RTOP  VRS  VNN RTLI     ***
  END IWAT-PARM1

  IWAT-PARM2
    <PLS >      IWATER input info: Part 2         ***
    # -  # ***  LSUR     SLSUR      NSUR     RETSC
  END IWAT-PARM2
```

```
  IWAT-PARM3
    <PLS >      IWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN
  END IWAT-PARM3

  IWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
    # -  # ***  RETS      SURS
  END IWAT-STATE1

END IMPLND

SCHEMATIC
<-Source->                  <--Area-->     <-Target->   MBLK   ***
<Name>   #                  <-factor->     <Name>   #   Tbl#   ***
Basin  1***
PERLND  42                        0.96     COPY   501     12
PERLND  42                        0.96     COPY   501     13

******Routing******
END SCHEMATIC

NETWORK
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   #        <Name> # #<-factor->strg <Name>   #   #        <Name> # #  ***
COPY   501 OUTPUT MEAN   1 1   48.4        DISPLY   1     INPUT  TIMSER 1



<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   #        <Name> # #<-factor->strg <Name>   #   #        <Name> # #  ***
END NETWORK

RCHRES
  GEN-INFO
    RCHRES       Name        Nexits   Unit Systems   Printer                 ***
    # -  #<------------------><---> User T-series  Engl Metr LKFG            ***
                                           in  out                           ***
  END GEN-INFO
  *** Section RCHRES***

  ACTIVITY
    <PLS > ************* Active Sections *****************************
    # -  # HYFG ADFG CNFG HTFG SDFG GQFG OXFG NUFG PKFG PHFG ***
  END ACTIVITY

  PRINT-INFO
    <PLS > ***************** Print-flags ******************* PIVL  PYR
    # -  # HYDR ADCA CONS HEAT  SED  GQL OXRX NUTR PLNK PHCB PIVL  PYR  *********
  END PRINT-INFO

  HYDR-PARM1
    RCHRES  Flags for each HYDR Section                                      ***
    # -  #  VC A1 A2 A3  ODFVFG for each *** ODGTFG for each     FUNCT  for each
            FG FG FG FG  possible  exit  *** possible  exit      possible  exit
             *  *  *  *    *  *  *  *  *       *  *  *  *  *         ***
  END HYDR-PARM1

  HYDR-PARM2
    # -  #    FTABNO       LEN     DELTH     STCOR        KS      DB50       ***
  <------><--------><--------><--------><--------><--------><-------->       ***
  END HYDR-PARM2
  HYDR-INIT
    RCHRES  Initial conditions for each HYDR section                         ***
    # -  # ***   VOL     Initial  value  of COLIND     Initial  value  of OUTDGT
           *** ac-ft     for each possible exit       for each possible exit
  <------><-------->     <---><---><---><---><---> *** <---><---><---><---><--->
  END HYDR-INIT
END RCHRES
```

```
SPEC-ACTIONS
END SPEC-ACTIONS
FTABLES
END FTABLES

EXT SOURCES
<-Volume-> <Member> SsysSgap<--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   # <Name> # tem strg<-factor->strg <Name>   #   #        <Name> # #  ***
WDM      2 PREC     ENGL    1              PERLND   1 999 EXTNL  PREC
WDM      2 PREC     ENGL    1              IMPLND   1 999 EXTNL  PREC
WDM      1 EVAP     ENGL    1              PERLND   1 999 EXTNL  PETINP
WDM      1 EVAP     ENGL    1              IMPLND   1 999 EXTNL  PETINP

END EXT SOURCES

EXT TARGETS
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Volume-> <Member> Tsys Tgap Amd ***
<Name>   #        <Name> # #<-factor->strg <Name>   # <Name>    tem strg strg***
COPY   501 OUTPUT MEAN   1 1     48.4      WDM    501 FLOW     ENGL      REPL
END EXT TARGETS

MASS-LINK
<Volume>   <-Grp> <-Member-><--Mult-->     <Target>       <-Grp> <-Member->***
<Name>            <Name> # #<-factor->     <Name>                <Name> # #***
  MASS-LINK       12
PERLND     PWATER SURO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK   12

  MASS-LINK       13
PERLND     PWATER IFWO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK   13


END MASS-LINK

END RUN
```

Mitigated UCI File

```
RUN

GLOBAL
  WWHM4 model simulation
  START       1949 10 01        END    2006 09 30
  RUN INTERP OUTPUT LEVEL    3    0
  RESUME     0 RUN     1                    UNIT SYSTEM     1
END GLOBAL

FILES
<File>  <Un#>   <-----------File Name------------------------------>***
<-ID->                                                              ***
WDM         26   default[6].wdm
MESSU       25   Mitdefault[6].MES
            27   Mitdefault[6].L61
            28   Mitdefault[6].L62
            30   POCdefault[6]1.dat
END FILES

OPN SEQUENCE
    INGRP               INDELT 00:15
      PERLND      42
      IMPLND       2
      RCHRES       1
      COPY         1
      COPY       501
      DISPLY       1
    END INGRP
END OPN SEQUENCE
DISPLY
  DISPLY-INFO1
    # -  #<----------Title---------->***TRAN PIVL DIG1 FIL1  PYR DIG2 FIL2 YRND
    1        Vault  1                   MAX                    1    2   30    9
  END DISPLY-INFO1
END DISPLY
COPY
  TIMESERIES
    # -  #  NPT  NMN ***
    1         1    1
  501         1    1
  END TIMESERIES
END COPY
GENER
  OPCODE
    #    # OPCD ***
  END OPCODE
  PARM
    #    #         K ***
  END PARM
END GENER
PERLND
  GEN-INFO
    <PLS ><-------Name------->NBLKS   Unit-systems   Printer ***
    # -  #                          User  t-series Engl Metr ***
                                      in  out           ***
   42     D,Open Brush,Mod        1    1    1    1   27    0
  END GEN-INFO
  *** Section PWATER***

  ACTIVITY
    <PLS > ************ Active Sections ******************************
    # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC ***
   42         0    0    1    0    0    0    0    0    0    0    0    0
  END ACTIVITY

  PRINT-INFO
    <PLS > ***************** Print-flags ***************************** PIVL  PYR
    # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC  *********
```

```
   42         0    0    4    0    0    0    0    0    0    0    0    0    1    9
  END PRINT-INFO

  PWAT-PARM1
    <PLS >  PWATER variable monthly parameter value flags  ***
    # -  # CSNO RTOP UZFG  VCS  VUZ  VNN VIFW VIRC  VLE INFC  HWT ***
   42         0    0    0    1    0    0    0    0    1    0    0
  END PWAT-PARM1

  PWAT-PARM2
    <PLS >      PWATER input info: Part 2         ***
    # -  # ***FOREST      LZSN    INFILT      LSUR     SLSUR     KVARY     AGWRC
   42              0       4.3     0.035       350       0.1       0.8     0.955
  END PWAT-PARM2

  PWAT-PARM3
    <PLS >      PWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN    INFEXP    INFILD    DEEPFR    BASETP    AGWETP
   42             40        35         4         2         0      0.03         0
  END PWAT-PARM3
  PWAT-PARM4
    <PLS >     PWATER input info: Part 4                              ***
    # -  #     CEPSC      UZSN      NSUR     INTFW       IRC     LZETP ***
   42              0      0.65      0.25       0.8      0.45         0
  END PWAT-PARM4
  MON-LZETPARM
    <PLS >      PWATER input info: Part 3         ***
    # -  #  JAN  FEB  MAR  APR  MAY  JUN  JUL  AUG  SEP  OCT  NOV  DEC  ***
   42       0.4  0.4  0.4  0.5 0.55 0.55 0.55 0.55 0.55 0.55 0.45  0.4
  END MON-LZETPARM
  MON-INTERCEP
    <PLS >      PWATER input info: Part 3         ***
    # -  #  JAN  FEB  MAR  APR  MAY  JUN  JUL  AUG  SEP  OCT  NOV  DEC  ***
   42      0.12 0.12 0.12 0.12 0.12 0.12 0.12 0.12 0.12 0.12 0.12 0.12
  END MON-INTERCEP

  PWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
               ran from 1990 to end of 1992 (pat 1-11-95) RUN 21 ***
    # -  # ***  CEPS      SURS       UZS      IFWS       LZS      AGWS      GWVS
   42              0         0     0.065         0      0.86       0.3      0.01
  END PWAT-STATE1

END PERLND

IMPLND
  GEN-INFO
    <PLS ><-------Name------->   Unit-systems   Printer ***
    # -  #                     User  t-series Engl Metr ***
                                   in  out           ***
    2     Impervious,Mod(5-10)    1    1    1   27    0
  END GEN-INFO
  *** Section IWATER***

  ACTIVITY
    <PLS > ************ Active Sections ******************************
    # -  # ATMP SNOW IWAT  SLD  IWG IQAL   ***
    2         0    0    1    0    0    0
  END ACTIVITY

  PRINT-INFO
    <ILS > ******** Print-flags ******** PIVL  PYR
    # -  # ATMP SNOW IWAT  SLD  IWG IQAL    *********
    2         0    0    4    0    0    0    1    9
  END PRINT-INFO

  IWAT-PARM1
    <PLS >  IWATER variable monthly parameter value flags  ***
    # -  # CSNO RTOP  VRS  VNN RTLI     ***
    2         0    0    0    0    0
```

```
  END IWAT-PARM1

  IWAT-PARM2
    <PLS >       IWATER input info: Part 2          ***
    # -  # ***  LSUR     SLSUR      NSUR     RETSC
    2            100       0.1       0.1      0.09
  END IWAT-PARM2

  IWAT-PARM3
    <PLS >       IWATER input info: Part 3          ***
    # -  # ***PETMAX    PETMIN
    2              0         0
  END IWAT-PARM3

  IWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
    # -  # ***  RETS      SURS
    2              0         0
  END IWAT-STATE1

END IMPLND

SCHEMATIC
<-Source->                 <--Area-->     <-Target->   MBLK    ***
<Name>   #                 <-factor->     <Name>   #   Tbl#    ***
Basin  1***
PERLND  42                       0.34     RCHRES   1      2
PERLND  42                       0.34     RCHRES   1      3
IMPLND   2                       0.62     RCHRES   1      5

******Routing******
PERLND  42                       0.34     COPY     1     12
IMPLND   2                       0.62     COPY     1     15
PERLND  42                       0.34     COPY     1     13
RCHRES   1                          1     COPY   501     16
END SCHEMATIC

NETWORK
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   #        <Name> # #<-factor->strg <Name>   #   #        <Name> # #  ***
COPY   501 OUTPUT MEAN   1 1   48.4        DISPLY   1     INPUT  TIMSER 1



<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   #        <Name> # #<-factor->strg <Name>   #   #        <Name> # #  ***
END NETWORK

RCHRES
  GEN-INFO
    RCHRES       Name        Nexits   Unit Systems   Printer                ***
    # -  #<----------------><---> User T-series  Engl Metr LKFG             ***
                                        in  out                             ***
    1     Vault  1                1    1    1    1   28    0    1
  END GEN-INFO
  *** Section RCHRES***

  ACTIVITY
    <PLS > ************ Active Sections ******************************
    # -  # HYFG ADFG CNFG HTFG SDFG GQFG OXFG NUFG PKFG PHFG ***
    1         1    0    0    0    0    0    0    0    0    0
  END ACTIVITY

  PRINT-INFO
    <PLS > ***************** Print-flags ******************* PIVL  PYR
    # -  # HYDR ADCA CONS HEAT  SED  GQL OXRX NUTR PLNK PHCB PIVL  PYR  *********
    1         4    0    0    0    0    0    0    0    0    0    1    9
  END PRINT-INFO

  HYDR-PARM1
```

```
    RCHRES  Flags for each HYDR Section                                    ***
    # -  #  VC A1 A2 A3  ODFVFG for each *** ODGTFG for each     FUNCT  for each
           FG FG FG FG  possible  exit  *** possible  exit      possible  exit
            *  *  *  *    *  *  *  *  *       *  *  *  *  *        ***
    1       0  1  0  0    4  0  0  0  0       0  0  0  0  0        2  2  2  2  2
  END HYDR-PARM1

  HYDR-PARM2
    # -  #    FTABNO       LEN     DELTH     STCOR        KS      DB50       ***
  <------><--------><--------><--------><--------><--------><-------->       ***
    1              1      0.01       0.0       0.0       0.5       0.0
  END HYDR-PARM2
  HYDR-INIT
    RCHRES  Initial conditions for each HYDR section                       ***
    # -  # ***   VOL     Initial  value  of COLIND     Initial  value  of OUTDGT
         *** ac-ft     for each possible exit        for each possible exit
  <------><-------->     <---><---><---><---><---> *** <---><---><---><---><--->
    1            0         4.0  0.0  0.0  0.0  0.0       0.0  0.0  0.0  0.0  0.0
  END HYDR-INIT
END RCHRES

SPEC-ACTIONS
END SPEC-ACTIONS
FTABLES
  FTABLE      1
   92    4
     Depth      Area    Volume  Outflow1 Velocity  Travel Time***
      (ft)   (acres) (acre-ft)   (cfs)   (ft/sec)    (Minutes)***
  0.000000  0.029016  0.000000  0.000000
  0.044444  0.029016  0.001290  0.003903
  0.088889  0.029016  0.002579  0.005520
  0.133333  0.029016  0.003869  0.006761
  0.177778  0.029016  0.005158  0.007807
  0.222222  0.029016  0.006448  0.008728
  0.266667  0.029016  0.007737  0.009561
  0.311111  0.029016  0.009027  0.010327
  0.355556  0.029016  0.010317  0.011040
  0.400000  0.029016  0.011606  0.011710
  0.444444  0.029016  0.012896  0.012343
  0.488889  0.029016  0.014185  0.012946
  0.533333  0.029016  0.015475  0.013521
  0.577778  0.029016  0.016765  0.014073
  0.622222  0.029016  0.018054  0.014605
  0.666667  0.029016  0.019344  0.015117
  0.711111  0.029016  0.020633  0.015613
  0.755556  0.029016  0.021923  0.016094
  0.800000  0.029016  0.023212  0.016560
  0.844444  0.029016  0.024502  0.017014
  0.888889  0.029016  0.025792  0.017456
  0.933333  0.029016  0.027081  0.017887
  0.977778  0.029016  0.028371  0.018308
  1.022222  0.029016  0.029660  0.018719
  1.066667  0.029016  0.030950  0.019122
  1.111111  0.029016  0.032240  0.019516
  1.155556  0.029016  0.033529  0.019903
  1.200000  0.029016  0.034819  0.020282
  1.244444  0.029016  0.036108  0.020654
  1.288889  0.029016  0.037398  0.021020
  1.333333  0.029016  0.038687  0.021379
  1.377778  0.029016  0.039977  0.021732
  1.422222  0.029016  0.041267  0.022080
  1.466667  0.029016  0.042556  0.022423
  1.511111  0.029016  0.043846  0.022760
  1.555556  0.029016  0.045135  0.023092
  1.600000  0.029016  0.046425  0.023420
  1.644444  0.029016  0.047715  0.023743
  1.688889  0.029016  0.049004  0.024061
  1.733333  0.029016  0.050294  0.024376
  1.777778  0.029016  0.051583  0.024686
  1.822222  0.029016  0.052873  0.024993
```

```
  1.866667  0.029016  0.054162  0.025296
  1.911111  0.029016  0.055452  0.025595
  1.955556  0.029016  0.056742  0.025891
  2.000000  0.029016  0.058031  0.026184
  2.044444  0.029016  0.059321  0.026473
  2.088889  0.029016  0.060610  0.026759
  2.133333  0.029016  0.061900  0.027043
  2.177778  0.029016  0.063190  0.027323
  2.222222  0.029016  0.064479  0.027600
  2.266667  0.029016  0.065769  0.027875
  2.311111  0.029016  0.067058  0.028147
  2.355556  0.029016  0.068348  0.028416
  2.400000  0.029016  0.069637  0.028683
  2.444444  0.029016  0.070927  0.028947
  2.488889  0.029016  0.072217  0.029209
  2.533333  0.029016  0.073506  0.029469
  2.577778  0.029016  0.074796  0.029726
  2.622222  0.029016  0.076085  0.029982
  2.666667  0.029016  0.077375  0.035230
  2.711111  0.029016  0.078665  0.072970
  2.755556  0.029016  0.079954  0.129932
  2.800000  0.029016  0.081244  0.200936
  2.844444  0.029016  0.082533  0.283599
  2.888889  0.029016  0.083823  0.376457
  2.933333  0.029016  0.085112  0.478490
  2.977778  0.029016  0.086402  0.588935
  3.022222  0.029016  0.087692  0.805532
  3.066667  0.029016  0.088981  1.469563
  3.111111  0.029016  0.090271  2.415809
  3.155556  0.029016  0.091560  3.575668
  3.200000  0.029016  0.092850  4.914661
  3.244444  0.029016  0.094140  6.410593
  3.288889  0.029016  0.095429  8.047264
  3.333333  0.029016  0.096719  9.811830
  3.377778  0.029016  0.098008  11.69346
  3.422222  0.029016  0.099298  13.68256
  3.466667  0.029016  0.100587  15.77033
  3.511111  0.029016  0.101877  17.94845
  3.555556  0.029016  0.103167  20.20885
  3.600000  0.029016  0.104456  22.54361
  3.644444  0.029016  0.105746  24.94486
  3.688889  0.029016  0.107035  27.40470
  3.733333  0.029016  0.108325  29.91519
  3.777778  0.029016  0.109615  32.46828
  3.822222  0.029016  0.110904  35.05587
  3.866667  0.029016  0.112194  37.66974
  3.911111  0.029016  0.113483  40.30163
  3.955556  0.029016  0.114773  42.94320
  4.000000  0.029016  0.116062  45.58611
  4.044444  0.029016  0.117352  48.22201
  END FTABLE  1
END FTABLES

EXT SOURCES
<-Volume-> <Member> SsysSgap<--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   # <Name> # tem strg<-factor->strg <Name>   #   #        <Name> # #  ***
WDM      2 PREC     ENGL    1             PERLND   1 999 EXTNL  PREC
WDM      2 PREC     ENGL    1             IMPLND   1 999 EXTNL  PREC
WDM      1 EVAP     ENGL    1             PERLND   1 999 EXTNL  PETINP
WDM      1 EVAP     ENGL    1             IMPLND   1 999 EXTNL  PETINP

END EXT SOURCES

EXT TARGETS
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Volume-> <Member> Tsys Tgap Amd ***
<Name>   #        <Name> # #<-factor->strg <Name>   # <Name>    tem strg strg***
RCHRES   1 HYDR   RO     1 1        1      WDM   1000 FLOW     ENGL      REPL
RCHRES   1 HYDR   STAGE  1 1        1      WDM   1001 STAG     ENGL      REPL
COPY     1 OUTPUT MEAN   1 1     48.4      WDM    701 FLOW     ENGL      REPL
COPY   501 OUTPUT MEAN   1 1     48.4      WDM    801 FLOW     ENGL      REPL
```

```
END EXT TARGETS

MASS-LINK
<Volume>   <-Grp> <-Member-><--Mult-->     <Target>       <-Grp> <-Member->***
<Name>            <Name> # #<-factor->     <Name>                <Name> # #***
  MASS-LINK         2
PERLND     PWATER SURO       0.083333      RCHRES         INFLOW IVOL
  END MASS-LINK     2

  MASS-LINK         3
PERLND     PWATER IFWO       0.083333      RCHRES         INFLOW IVOL
  END MASS-LINK     3

  MASS-LINK         5
IMPLND     IWATER SURO       0.083333      RCHRES         INFLOW IVOL
  END MASS-LINK     5

  MASS-LINK        12
PERLND     PWATER SURO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK    12

  MASS-LINK        13
PERLND     PWATER IFWO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK    13

  MASS-LINK        15
IMPLND     IWATER SURO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK    15

  MASS-LINK        16
RCHRES     ROFLOW                          COPY           INPUT  MEAN
  END MASS-LINK    16


END MASS-LINK

END RUN
```

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SOHM

PROJECT REPORT

REPORT 2 - VAULT 2

General Model Information

Project Name:	default[6]
Site Name:	Aliso Viejo
Site Address:	26501 Aliso Creek Rd
City:	Aliso Viejo
Report Date:	6/14/2023
Gage:	Laguna Beach
Data Start:	10/01/1949
Data End:	09/30/2006
Timestep:	15 Minute
Precip Scale:	1.000
Version Date:	2020/10/14

POC Thresholds

Low Flow Threshold for POC1:	10 Percent of the 2 Year
High Flow Threshold for POC1:	10 Year

Landuse Basin Data

Predeveloped Land Use

Basin 1

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
D,Open Brush,Mod	3.1
Pervious Total	3.1
Impervious Land Use	acre
Impervious Total	0
Basin Total	3.1

Element Flows To:

Surface	Interflow	Groundwater

Mitigated Land Use

Basin 1

Bypass:	No
GroundWater:	No

Pervious Land Use	acre
D,Open Brush,Mod	0.12
Pervious Total	0.12

Impervious Land Use	acre
Impervious,Mod(5-10)	2.97
Impervious Total	2.97
Basin Total	3.09

Element Flows To:

Surface	Interflow	Groundwater
Vault 1	Vault 1	

Mitigated Routing

Vault 1

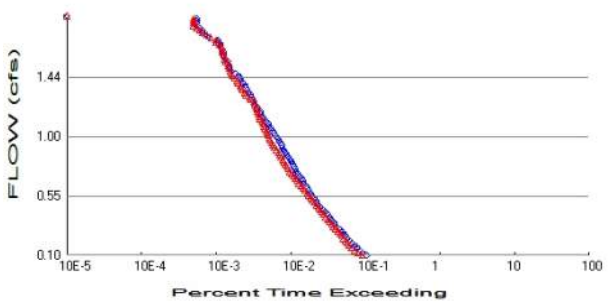
Width: 80.6409780071213 ft.
Length: 80.6409780071213 ft.
Depth: 4 ft.
Discharge Structure
Riser Height: 3 ft.
Riser Diameter: 54 in.
Notch Type: Rectangular
Notch Width: 2.626 ft.
Notch Height: 0.323 ft.
Orifice 1 Diameter: 1.49 in. Elevation:0 ft.
Element Flows To:
Outlet 1 Outlet 2

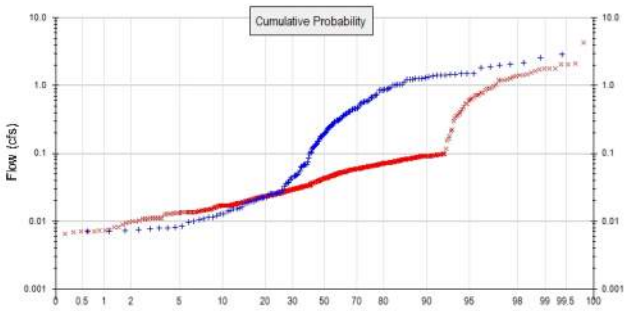
Vault Hydraulic Table

Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	Infilt(cfs)
0.0000	0.149	0.000	0.000	0.000
0.0444	0.149	0.006	0.012	0.000
0.0889	0.149	0.013	0.018	0.000
0.1333	0.149	0.019	0.022	0.000
0.1778	0.149	0.026	0.025	0.000
0.2222	0.149	0.033	0.028	0.000
0.2667	0.149	0.039	0.031	0.000
0.3111	0.149	0.046	0.033	0.000
0.3556	0.149	0.053	0.035	0.000
0.4000	0.149	0.059	0.038	0.000
0.4444	0.149	0.066	0.040	0.000
0.4889	0.149	0.073	0.042	0.000
0.5333	0.149	0.079	0.044	0.000
0.5778	0.149	0.086	0.045	0.000
0.6222	0.149	0.092	0.047	0.000
0.6667	0.149	0.099	0.049	0.000
0.7111	0.149	0.106	0.050	0.000
0.7556	0.149	0.112	0.052	0.000
0.8000	0.149	0.119	0.053	0.000
0.8444	0.149	0.126	0.055	0.000
0.8889	0.149	0.132	0.056	0.000
0.9333	0.149	0.139	0.058	0.000
0.9778	0.149	0.146	0.059	0.000
1.0222	0.149	0.152	0.060	0.000
1.0667	0.149	0.159	0.062	0.000
1.1111	0.149	0.165	0.063	0.000
1.1556	0.149	0.172	0.064	0.000
1.2000	0.149	0.179	0.066	0.000
1.2444	0.149	0.185	0.067	0.000
1.2889	0.149	0.192	0.068	0.000
1.3333	0.149	0.199	0.069	0.000
1.3778	0.149	0.205	0.070	0.000
1.4222	0.149	0.212	0.071	0.000
1.4667	0.149	0.219	0.073	0.000
1.5111	0.149	0.225	0.074	0.000
1.5556	0.149	0.232	0.075	0.000
1.6000	0.149	0.238	0.076	0.000

1.6444	0.149	0.245	0.077	0.000
1.6889	0.149	0.252	0.078	0.000
1.7333	0.149	0.258	0.079	0.000
1.7778	0.149	0.265	0.080	0.000
1.8222	0.149	0.272	0.081	0.000
1.8667	0.149	0.278	0.082	0.000
1.9111	0.149	0.285	0.083	0.000
1.9556	0.149	0.291	0.084	0.000
2.0000	0.149	0.298	0.085	0.000
2.0444	0.149	0.305	0.086	0.000
2.0889	0.149	0.311	0.087	0.000
2.1333	0.149	0.318	0.088	0.000
2.1778	0.149	0.325	0.088	0.000
2.2222	0.149	0.331	0.089	0.000
2.2667	0.149	0.338	0.090	0.000
2.3111	0.149	0.345	0.091	0.000
2.3556	0.149	0.351	0.092	0.000
2.4000	0.149	0.358	0.093	0.000
2.4444	0.149	0.364	0.094	0.000
2.4889	0.149	0.371	0.095	0.000
2.5333	0.149	0.378	0.095	0.000
2.5778	0.149	0.384	0.096	0.000
2.6222	0.149	0.391	0.097	0.000
2.6667	0.149	0.398	0.098	0.000
2.7111	0.149	0.404	0.154	0.000
2.7556	0.149	0.411	0.293	0.000
2.8000	0.149	0.418	0.478	0.000
2.8444	0.149	0.424	0.701	0.000
2.8889	0.149	0.431	0.956	0.000
2.9333	0.149	0.437	1.239	0.000
2.9778	0.149	0.444	1.547	0.000
3.0222	0.149	0.451	1.869	0.000
3.0667	0.149	0.457	2.534	0.000
3.1111	0.149	0.464	3.480	0.000
3.1556	0.149	0.471	4.641	0.000
3.2000	0.149	0.477	5.980	0.000
3.2444	0.149	0.484	7.477	0.000
3.2889	0.149	0.491	9.114	0.000
3.3333	0.149	0.497	10.87	0.000
3.3778	0.149	0.504	12.76	0.000
3.4222	0.149	0.510	14.75	0.000
3.4667	0.149	0.517	16.83	0.000
3.5111	0.149	0.524	19.01	0.000
3.5556	0.149	0.530	21.27	0.000
3.6000	0.149	0.537	23.61	0.000
3.6444	0.149	0.544	26.01	0.000
3.6889	0.149	0.550	28.47	0.000
3.7333	0.149	0.557	30.98	0.000
3.7778	0.149	0.564	33.54	0.000
3.8222	0.149	0.570	36.12	0.000
3.8667	0.149	0.577	38.74	0.000
3.9111	0.149	0.583	41.37	0.000
3.9556	0.149	0.590	44.01	0.000
4.0000	0.149	0.597	46.66	0.000
4.0444	0.149	0.603	49.29	0.000
4.0889	0.000	0.000	51.91	0.000

Analysis Results
POC 1





\+ Predeveloped x Mitigated

Predeveloped Landuse Totals for POC #1
Total Pervious Area: 3.1
Total Impervious Area: 0

Mitigated Landuse Totals for POC #1
Total Pervious Area: 0.12
Total Impervious Area: 2.97

Flow Frequency Method: Cunnane

Flow Frequency Return Periods for Predeveloped. POC #1

Return Period	**Flow(cfs)**
2 year	0.999834
5 year	1.448843
10 year	1.891181
25 year	2.258096

Flow Frequency Return Periods for Mitigated. POC #1

Return Period	**Flow(cfs)**
2 year	0.746977
5 year	1.442559
10 year	1.775871
25 year	2.081494

Duration Flows

The Facility PASSED

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.1000	2063	1830	88	Pass
0.1181	1849	1596	86	Pass
0.1362	1700	1437	84	Pass
0.1543	1551	1308	84	Pass
0.1724	1443	1199	83	Pass
0.1904	1335	1144	85	Pass
0.2085	1235	1080	87	Pass
0.2266	1144	1023	89	Pass
0.2447	1074	969	90	Pass
0.2628	1024	911	88	Pass
0.2809	962	860	89	Pass
0.2990	899	806	89	Pass
0.3171	827	753	91	Pass
0.3352	780	707	90	Pass
0.3533	734	661	90	Pass
0.3714	696	622	89	Pass
0.3895	666	581	87	Pass
0.4076	621	550	88	Pass
0.4257	583	519	89	Pass
0.4437	542	492	90	Pass
0.4618	502	470	93	Pass
0.4799	471	437	92	Pass
0.4980	448	413	92	Pass
0.5161	427	390	91	Pass
0.5342	407	369	90	Pass
0.5523	386	344	89	Pass
0.5704	368	330	89	Pass
0.5885	349	311	89	Pass
0.6066	331	292	88	Pass
0.6247	321	275	85	Pass
0.6428	304	256	84	Pass
0.6609	292	244	83	Pass
0.6790	282	231	81	Pass
0.6970	261	219	83	Pass
0.7151	250	205	82	Pass
0.7332	236	194	82	Pass
0.7513	229	185	80	Pass
0.7694	221	179	80	Pass
0.7875	214	171	79	Pass
0.8056	206	160	77	Pass
0.8237	197	157	79	Pass
0.8418	186	149	80	Pass
0.8599	176	142	80	Pass
0.8780	168	136	80	Pass
0.8961	161	128	79	Pass
0.9142	153	120	78	Pass
0.9323	151	117	77	Pass
0.9503	145	111	76	Pass
0.9684	138	106	76	Pass
0.9865	133	103	77	Pass
1.0046	122	99	81	Pass
1.0227	119	97	81	Pass
1.0408	114	95	83	Pass

1.0589	109	89	81	Pass
1.0770	103	86	83	Pass
1.0951	100	85	85	Pass
1.1132	92	82	89	Pass
1.1313	85	77	90	Pass
1.1494	83	75	90	Pass
1.1675	80	73	91	Pass
1.1856	78	72	92	Pass
1.2037	72	70	97	Pass
1.2217	70	69	98	Pass
1.2398	66	66	100	Pass
1.2579	63	64	101	Pass
1.2760	61	58	95	Pass
1.2941	60	56	93	Pass
1.3122	58	51	87	Pass
1.3303	55	48	87	Pass
1.3484	52	45	86	Pass
1.3665	50	43	86	Pass
1.3846	49	42	85	Pass
1.4027	46	40	86	Pass
1.4208	43	38	88	Pass
1.4389	42	35	83	Pass
1.4570	40	33	82	Pass
1.4750	37	32	86	Pass
1.4931	32	31	96	Pass
1.5112	30	30	100	Pass
1.5293	30	29	96	Pass
1.5474	29	29	100	Pass
1.5655	29	27	93	Pass
1.5836	27	26	96	Pass
1.6017	25	26	104	Pass
1.6198	25	25	100	Pass
1.6379	25	24	96	Pass
1.6560	24	24	100	Pass
1.6741	23	24	104	Pass
1.6922	23	22	95	Pass
1.7103	21	20	95	Pass
1.7283	21	20	95	Pass
1.7464	16	17	106	Pass
1.7645	14	15	107	Pass
1.7826	13	13	100	Pass
1.8007	13	12	92	Pass
1.8188	12	11	91	Pass
1.8369	11	10	90	Pass
1.8550	11	10	90	Pass
1.8731	11	10	90	Pass
1.8912	11	10	90	Pass

Water Quality

Model Default Modifications

Total of 0 changes have been made.

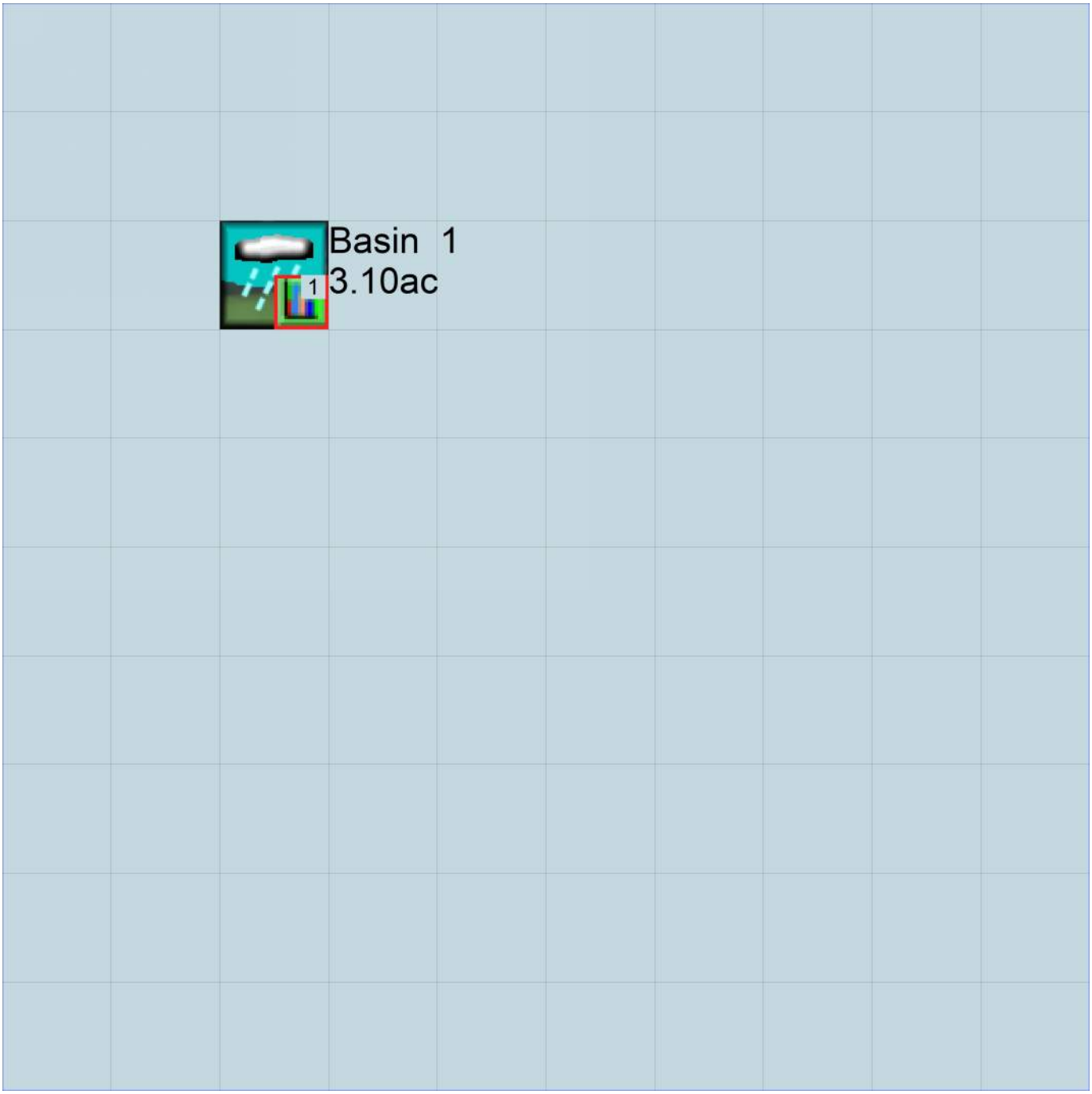
PERLND Changes

No PERLND changes have been made.

IMPLND Changes

No IMPLND changes have been made.

Appendix
Predeveloped Schematic



Mitigated Schematic

Predeveloped UCI File

```
RUN

GLOBAL
  WWHM4 model simulation
  START       1949 10 01        END    2006 09 30
  RUN INTERP OUTPUT LEVEL    3    0
  RESUME     0 RUN     1                    UNIT SYSTEM     1
END GLOBAL

FILES
<File>  <Un#>   <-----------File Name------------------------------>***
<-ID->                                                              ***
WDM         26   default[6].wdm
MESSU       25   Predefault[6].MES
            27   Predefault[6].L61
            28   Predefault[6].L62
            30   POCdefault[6]1.dat
END FILES

OPN SEQUENCE
    INGRP               INDELT 00:15
      PERLND      42
      COPY       501
      DISPLY       1
    END INGRP
END OPN SEQUENCE
DISPLY
  DISPLY-INFO1
    # -  #<----------Title---------->***TRAN PIVL DIG1 FIL1  PYR DIG2 FIL2 YRND
    1        Basin  1                   MAX                    1    2   30    9
  END DISPLY-INFO1
END DISPLY
COPY
  TIMESERIES
    # -  #  NPT  NMN ***
    1         1    1
  501         1    1
  END TIMESERIES
END COPY
GENER
  OPCODE
    #    # OPCD ***
  END OPCODE
  PARM
    #    #         K ***
  END PARM
END GENER
PERLND
  GEN-INFO
    <PLS ><-------Name------->NBLKS   Unit-systems   Printer ***
    # -  #                         User  t-series Engl Metr ***
                                      in  out           ***
   42     D,Open Brush,Mod        1    1    1    1   27    0
  END GEN-INFO
  *** Section PWATER***

  ACTIVITY
    <PLS > ************ Active Sections ******************************
    # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC ***
   42         0    0    1    0    0    0    0    0    0    0    0    0
  END ACTIVITY

  PRINT-INFO
    <PLS > ***************** Print-flags **************************** PIVL  PYR
    # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC  *********
   42         0    0    4    0    0    0    0    0    0    0    0    0    1    9
  END PRINT-INFO
```

```
  PWAT-PARM1
    <PLS >  PWATER variable monthly parameter value flags  ***
    # -  # CSNO RTOP UZFG  VCS  VUZ  VNN VIFW VIRC  VLE INFC  HWT ***
   42         0    0    0    1    0    0    0    0    1    0    0
  END PWAT-PARM1

  PWAT-PARM2
    <PLS >      PWATER input info: Part 2         ***
    # -  # ***FOREST      LZSN    INFILT      LSUR     SLSUR     KVARY     AGWRC
   42             0       4.3     0.035       350       0.1       0.8     0.955
  END PWAT-PARM2

  PWAT-PARM3
    <PLS >      PWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN    INFEXP    INFILD    DEEPFR    BASETP    AGWETP
   42            40        35         4         2         0      0.03         0
  END PWAT-PARM3
  PWAT-PARM4
    <PLS >     PWATER input info: Part 4                              ***
    # -  #     CEPSC      UZSN      NSUR     INTFW       IRC     LZETP ***
   42             0      0.65      0.25       0.8      0.45         0
  END PWAT-PARM4
  MON-LZETPARM
    <PLS >      PWATER input info: Part 3         ***
    # -  #  JAN  FEB  MAR  APR  MAY  JUN  JUL  AUG  SEP  OCT  NOV  DEC  ***
   42       0.4  0.4  0.4  0.5 0.55 0.55 0.55 0.55 0.55 0.55 0.45  0.4
  END MON-LZETPARM
  MON-INTERCEP
    <PLS >      PWATER input info: Part 3         ***
    # -  #  JAN  FEB  MAR  APR  MAY  JUN  JUL  AUG  SEP  OCT  NOV  DEC  ***
   42      0.12 0.12 0.12 0.12 0.12 0.12 0.12 0.12 0.12 0.12 0.12 0.12
  END MON-INTERCEP

  PWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
               ran from 1990 to end of 1992 (pat 1-11-95) RUN 21 ***
    # -  # ***  CEPS      SURS       UZS       IFWS       LZS       AGWS      GWVS
   42             0         0     0.065          0      0.86        0.3      0.01
  END PWAT-STATE1

END PERLND

IMPLND
  GEN-INFO
    <PLS ><-------Name------->   Unit-systems   Printer ***
    # -  #                     User  t-series Engl Metr ***
                                     in  out           ***
  END GEN-INFO
  *** Section IWATER***

  ACTIVITY
    <PLS > ************ Active Sections ******************************
    # -  # ATMP SNOW IWAT  SLD  IWG IQAL   ***
  END ACTIVITY

  PRINT-INFO
    <ILS > ******** Print-flags ******** PIVL  PYR
    # -  # ATMP SNOW IWAT  SLD  IWG IQAL    *********
  END PRINT-INFO

  IWAT-PARM1
    <PLS >  IWATER variable monthly parameter value flags  ***
    # -  # CSNO RTOP  VRS  VNN RTLI     ***
  END IWAT-PARM1

  IWAT-PARM2
    <PLS >      IWATER input info: Part 2         ***
    # -  # ***  LSUR     SLSUR      NSUR     RETSC
  END IWAT-PARM2
```

```
  IWAT-PARM3
    <PLS >      IWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN
  END IWAT-PARM3

  IWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
    # -  # ***  RETS      SURS
  END IWAT-STATE1

END IMPLND

SCHEMATIC
<-Source->                  <--Area-->     <-Target->   MBLK   ***
<Name>   #                  <-factor->     <Name>   #   Tbl#   ***
Basin  1***
PERLND  42                         3.1     COPY   501     12
PERLND  42                         3.1     COPY   501     13

******Routing******
END SCHEMATIC

NETWORK
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   #        <Name> # #<-factor->strg <Name>   #   #        <Name> # #  ***
COPY   501 OUTPUT MEAN   1 1   48.4        DISPLY   1     INPUT  TIMSER 1



<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   #        <Name> # #<-factor->strg <Name>   #   #        <Name> # #  ***
END NETWORK

RCHRES
  GEN-INFO
    RCHRES       Name        Nexits   Unit Systems   Printer                 ***
    # -  #<------------------><---> User T-series  Engl Metr LKFG            ***
                                          in  out                            ***
  END GEN-INFO
  *** Section RCHRES***

  ACTIVITY
    <PLS > ************* Active Sections *****************************
    # -  # HYFG ADFG CNFG HTFG SDFG GQFG OXFG NUFG PKFG PHFG ***
  END ACTIVITY

  PRINT-INFO
    <PLS > ***************** Print-flags ****************** PIVL  PYR
    # -  # HYDR ADCA CONS HEAT  SED  GQL OXRX NUTR PLNK PHCB PIVL  PYR  *********
  END PRINT-INFO

  HYDR-PARM1
    RCHRES  Flags for each HYDR Section                                      ***
    # -  #  VC A1 A2 A3  ODFVFG for each *** ODGTFG for each     FUNCT  for each
            FG FG FG FG  possible  exit  *** possible  exit      possible  exit
             *  *  *  *    *  *  *  *  *        *  *  *  *  *         ***
  END HYDR-PARM1

  HYDR-PARM2
    # -  #    FTABNO       LEN     DELTH     STCOR        KS      DB50       ***
  <------><--------><--------><--------><--------><--------><-------->       ***
  END HYDR-PARM2
  HYDR-INIT
    RCHRES  Initial conditions for each HYDR section                         ***
    # -  # ***   VOL     Initial  value  of COLIND     Initial  value  of OUTDGT
           *** ac-ft     for each possible exit       for each possible exit
  <------><-------->     <---><---><---><---><---> *** <---><---><---><---><--->
  END HYDR-INIT
END RCHRES
```

```
SPEC-ACTIONS
END SPEC-ACTIONS
FTABLES
END FTABLES

EXT SOURCES
<-Volume-> <Member> SsysSgap<--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   # <Name> # tem strg<-factor->strg <Name>   #   #        <Name> # #  ***
WDM      2 PREC     ENGL    1              PERLND   1 999 EXTNL  PREC
WDM      2 PREC     ENGL    1              IMPLND   1 999 EXTNL  PREC
WDM      1 EVAP     ENGL    1              PERLND   1 999 EXTNL  PETINP
WDM      1 EVAP     ENGL    1              IMPLND   1 999 EXTNL  PETINP

END EXT SOURCES

EXT TARGETS
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Volume-> <Member> Tsys Tgap Amd ***
<Name>   #        <Name> # #<-factor->strg <Name>   # <Name>    tem strg strg***
COPY   501 OUTPUT MEAN   1 1     48.4      WDM    501 FLOW     ENGL      REPL
END EXT TARGETS

MASS-LINK
<Volume>   <-Grp> <-Member-><--Mult-->     <Target>       <-Grp> <-Member->***
<Name>            <Name> # #<-factor->     <Name>                <Name> # #***
  MASS-LINK       12
PERLND     PWATER SURO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK   12

  MASS-LINK       13
PERLND     PWATER IFWO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK   13


END MASS-LINK

END RUN
```

Mitigated UCI File

```
RUN

GLOBAL
  WWHM4 model simulation
  START       1949 10 01        END    2006 09 30
  RUN INTERP OUTPUT LEVEL    3    0
  RESUME     0 RUN     1                    UNIT SYSTEM     1
END GLOBAL

FILES
<File>  <Un#>   <-----------File Name------------------------------>***
<-ID->                                                              ***
WDM         26   default[6].wdm
MESSU       25   Mitdefault[6].MES
            27   Mitdefault[6].L61
            28   Mitdefault[6].L62
            30   POCdefault[6]1.dat
END FILES

OPN SEQUENCE
    INGRP               INDELT 00:15
      PERLND      42
      IMPLND       2
      RCHRES       1
      COPY         1
      COPY       501
      DISPLY       1
    END INGRP
END OPN SEQUENCE
DISPLY
  DISPLY-INFO1
    # -  #<----------Title---------->***TRAN PIVL DIG1 FIL1  PYR DIG2 FIL2 YRND
    1        Vault  1                   MAX                    1    2   30    9
  END DISPLY-INFO1
END DISPLY
COPY
  TIMESERIES
    # -  #  NPT  NMN ***
    1         1    1
  501         1    1
  END TIMESERIES
END COPY
GENER
  OPCODE
    #    # OPCD ***
  END OPCODE
  PARM
    #    #         K ***
  END PARM
END GENER
PERLND
  GEN-INFO
    <PLS ><-------Name------->NBLKS   Unit-systems   Printer ***
    # -  #                          User  t-series Engl Metr ***
                                      in  out           ***
   42     D,Open Brush,Mod        1    1    1    1   27    0
  END GEN-INFO
  *** Section PWATER***

  ACTIVITY
    <PLS > ************ Active Sections ******************************
    # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC ***
   42         0    0    1    0    0    0    0    0    0    0    0    0
  END ACTIVITY

  PRINT-INFO
    <PLS > ***************** Print-flags ***************************** PIVL  PYR
    # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC  *********
```

```
 42         0    0    4    0    0    0    0    0    0    0    0    0    1    9
  END PRINT-INFO

  PWAT-PARM1
    <PLS >  PWATER variable monthly parameter value flags  ***
    # -  # CSNO RTOP UZFG  VCS  VUZ  VNN VIFW VIRC  VLE INFC  HWT ***
   42         0    0    0    1    0    0    0    0    1    0    0
  END PWAT-PARM1

  PWAT-PARM2
    <PLS >      PWATER input info: Part 2         ***
    # -  # ***FOREST      LZSN    INFILT      LSUR     SLSUR     KVARY     AGWRC
   42              0       4.3     0.035       350       0.1       0.8     0.955
  END PWAT-PARM2

  PWAT-PARM3
    <PLS >      PWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN    INFEXP    INFILD    DEEPFR    BASETP    AGWETP
   42             40        35         4         2         0      0.03         0
  END PWAT-PARM3
  PWAT-PARM4
    <PLS >     PWATER input info: Part 4                              ***
    # -  #     CEPSC      UZSN      NSUR     INTFW       IRC     LZETP ***
   42              0      0.65      0.25       0.8      0.45         0
  END PWAT-PARM4
  MON-LZETPARM
    <PLS >      PWATER input info: Part 3         ***
    # -  #  JAN  FEB  MAR  APR  MAY  JUN  JUL  AUG  SEP  OCT  NOV  DEC  ***
   42       0.4  0.4  0.4  0.5 0.55 0.55 0.55 0.55 0.55 0.55 0.45  0.4
  END MON-LZETPARM
  MON-INTERCEP
    <PLS >      PWATER input info: Part 3         ***
    # -  #  JAN  FEB  MAR  APR  MAY  JUN  JUL  AUG  SEP  OCT  NOV  DEC  ***
   42      0.12 0.12 0.12 0.12 0.12 0.12 0.12 0.12 0.12 0.12 0.12 0.12
  END MON-INTERCEP

  PWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
               ran from 1990 to end of 1992 (pat 1-11-95) RUN 21 ***
    # -  # ***  CEPS      SURS       UZS      IFWS       LZS      AGWS      GWVS
   42              0         0     0.065         0      0.86       0.3      0.01
  END PWAT-STATE1

END PERLND

IMPLND
  GEN-INFO
    <PLS ><-------Name------->   Unit-systems   Printer ***
    # -  #                     User  t-series Engl Metr ***
                                   in  out           ***
    2     Impervious,Mod(5-10)    1    1    1   27    0
  END GEN-INFO
  *** Section IWATER***

  ACTIVITY
    <PLS > ************ Active Sections ******************************
    # -  # ATMP SNOW IWAT  SLD  IWG IQAL   ***
    2         0    0    1    0    0    0
  END ACTIVITY

  PRINT-INFO
    <ILS > ******** Print-flags ******** PIVL  PYR
    # -  # ATMP SNOW IWAT  SLD  IWG IQAL    *********
    2         0    0    4    0    0    0    1    9
  END PRINT-INFO

  IWAT-PARM1
    <PLS >  IWATER variable monthly parameter value flags  ***
    # -  # CSNO RTOP  VRS  VNN RTLI     ***
    2         0    0    0    0    0
```

```
  END IWAT-PARM1

  IWAT-PARM2
    <PLS >       IWATER input info: Part 2          ***
    # -  # ***  LSUR     SLSUR      NSUR     RETSC
    2            100       0.1       0.1      0.09
  END IWAT-PARM2

  IWAT-PARM3
    <PLS >       IWATER input info: Part 3          ***
    # -  # ***PETMAX    PETMIN
    2              0         0
  END IWAT-PARM3

  IWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
    # -  # ***  RETS      SURS
    2              0         0
  END IWAT-STATE1

END IMPLND

SCHEMATIC
<-Source->                 <--Area-->     <-Target->   MBLK    ***
<Name>   #                 <-factor->     <Name>   #   Tbl#    ***
Basin  1***
PERLND  42                       0.12     RCHRES   1      2
PERLND  42                       0.12     RCHRES   1      3
IMPLND   2                       2.97     RCHRES   1      5

******Routing******
PERLND  42                       0.12     COPY     1     12
IMPLND   2                       2.97     COPY     1     15
PERLND  42                       0.12     COPY     1     13
RCHRES   1                          1     COPY   501     16
END SCHEMATIC

NETWORK
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   #        <Name> # #<-factor->strg <Name>   #   #        <Name> # #  ***
COPY   501 OUTPUT MEAN   1 1   48.4        DISPLY   1     INPUT  TIMSER 1



<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   #        <Name> # #<-factor->strg <Name>   #   #        <Name> # #  ***
END NETWORK

RCHRES
  GEN-INFO
    RCHRES       Name        Nexits   Unit Systems   Printer                ***
    # -  #<----------------><---> User T-series  Engl Metr LKFG             ***
                                        in  out                             ***
    1     Vault  1                1    1    1    1   28    0    1
  END GEN-INFO
  *** Section RCHRES***

  ACTIVITY
    <PLS > ************ Active Sections ****************************
    # -  # HYFG ADFG CNFG HTFG SDFG GQFG OXFG NUFG PKFG PHFG ***
    1         1    0    0    0    0    0    0    0    0    0
  END ACTIVITY

  PRINT-INFO
    <PLS > ***************** Print-flags ******************* PIVL  PYR
    # -  # HYDR ADCA CONS HEAT  SED  GQL OXRX NUTR PLNK PHCB PIVL  PYR  *********
    1         4    0    0    0    0    0    0    0    0    0    1    9
  END PRINT-INFO

  HYDR-PARM1
```

```
    RCHRES  Flags for each HYDR Section                                    ***
    # -  #  VC A1 A2 A3  ODFVFG for each *** ODGTFG for each     FUNCT  for each
           FG FG FG FG  possible  exit  *** possible  exit      possible  exit
            *  *  *  *    *  *  *  *  *      *  *  *  *  *         ***
    1       0  1  0  0    4  0  0  0  0       0  0  0  0  0         2  2  2  2  2
  END HYDR-PARM1

  HYDR-PARM2
    # -  #    FTABNO       LEN     DELTH     STCOR        KS      DB50       ***
  <------><--------><--------><--------><--------><--------><-------->       ***
    1              1      0.02       0.0       0.0       0.5       0.0
  END HYDR-PARM2
  HYDR-INIT
    RCHRES  Initial conditions for each HYDR section                       ***
    # -  # ***   VOL     Initial  value  of COLIND     Initial  value  of OUTDGT
         *** ac-ft     for each possible exit        for each possible exit
  <------><-------->     <---><---><---><---><---> *** <---><---><---><---><--->
    1            0         4.0  0.0  0.0  0.0  0.0       0.0  0.0  0.0  0.0  0.0
  END HYDR-INIT
END RCHRES

SPEC-ACTIONS
END SPEC-ACTIONS
FTABLES
  FTABLE      1
   92    4
     Depth      Area    Volume  Outflow1 Velocity  Travel Time***
      (ft)   (acres) (acre-ft)   (cfs)   (ft/sec)    (Minutes)***
  0.000000  0.149288  0.000000  0.000000
  0.044444  0.149288  0.006635  0.012701
  0.088889  0.149288  0.013270  0.017962
  0.133333  0.149288  0.019905  0.021999
  0.177778  0.149288  0.026540  0.025402
  0.222222  0.149288  0.033175  0.028400
  0.266667  0.149288  0.039810  0.031111
  0.311111  0.149288  0.046445  0.033604
  0.355556  0.149288  0.053080  0.035924
  0.400000  0.149288  0.059715  0.038103
  0.444444  0.149288  0.066350  0.040164
  0.488889  0.149288  0.072985  0.042125
  0.533333  0.149288  0.079620  0.043998
  0.577778  0.149288  0.086255  0.045794
  0.622222  0.149288  0.092890  0.047523
  0.666667  0.149288  0.099525  0.049191
  0.711111  0.149288  0.106160  0.050804
  0.755556  0.149288  0.112795  0.052368
  0.800000  0.149288  0.119430  0.053886
  0.844444  0.149288  0.126065  0.055363
  0.888889  0.149288  0.132700  0.056801
  0.933333  0.149288  0.139335  0.058204
  0.977778  0.149288  0.145970  0.059573
  1.022222  0.149288  0.152605  0.060912
  1.066667  0.149288  0.159240  0.062222
  1.111111  0.149288  0.165875  0.063505
  1.155556  0.149288  0.172510  0.064763
  1.200000  0.149288  0.179145  0.065997
  1.244444  0.149288  0.185780  0.067208
  1.288889  0.149288  0.192415  0.068397
  1.333333  0.149288  0.199050  0.069567
  1.377778  0.149288  0.205685  0.070717
  1.422222  0.149288  0.212320  0.071848
  1.466667  0.149288  0.218955  0.072962
  1.511111  0.149288  0.225590  0.074059
  1.555556  0.149288  0.232225  0.075140
  1.600000  0.149288  0.238860  0.076206
  1.644444  0.149288  0.245495  0.077258
  1.688889  0.149288  0.252130  0.078295
  1.733333  0.149288  0.258765  0.079318
  1.777778  0.149288  0.265400  0.080329
  1.822222  0.149288  0.272035  0.081326
```

```
  1.866667  0.149288  0.278670  0.082312
  1.911111  0.149288  0.285305  0.083286
  1.955556  0.149288  0.291940  0.084249
  2.000000  0.149288  0.298575  0.085201
  2.044444  0.149288  0.305210  0.086143
  2.088889  0.149288  0.311845  0.087074
  2.133333  0.149288  0.318480  0.087996
  2.177778  0.149288  0.325115  0.088907
  2.222222  0.149288  0.331750  0.089810
  2.266667  0.149288  0.338385  0.090704
  2.311111  0.149288  0.345020  0.091589
  2.355556  0.149288  0.351655  0.092465
  2.400000  0.149288  0.358290  0.093333
  2.444444  0.149288  0.364925  0.094194
  2.488889  0.149288  0.371560  0.095046
  2.533333  0.149288  0.378195  0.095891
  2.577778  0.149288  0.384830  0.096728
  2.622222  0.149288  0.391465  0.097559
  2.666667  0.149288  0.398100  0.098382
  2.711111  0.149288  0.404735  0.154700
  2.755556  0.149288  0.411370  0.293162
  2.800000  0.149288  0.418005  0.478809
  2.844444  0.149288  0.424640  0.701676
  2.888889  0.149288  0.431275  0.956322
  2.933333  0.149288  0.437910  1.239172
  2.977778  0.149288  0.444545  1.547644
  3.022222  0.149288  0.451180  1.869532
  3.066667  0.149288  0.457815  2.534094
  3.111111  0.149288  0.464450  3.480867
  3.155556  0.149288  0.471085  4.641250
  3.200000  0.149288  0.477720  5.980764
  3.244444  0.149288  0.484355  7.477212
  3.288889  0.149288  0.490990  9.114397
  3.333333  0.149288  0.497625  10.87947
  3.377778  0.149288  0.504260  12.76161
  3.422222  0.149288  0.510895  14.75121
  3.466667  0.149288  0.517530  16.83949
  3.511111  0.149288  0.524165  19.01810
  3.555556  0.149288  0.530800  21.27899
  3.600000  0.149288  0.537435  23.61424
  3.644444  0.149288  0.544070  26.01598
  3.688889  0.149288  0.550705  28.47631
  3.733333  0.149288  0.557340  30.98727
  3.777778  0.149288  0.563975  33.54085
  3.822222  0.149288  0.570610  36.12891
  3.866667  0.149288  0.577245  38.74325
  3.911111  0.149288  0.583880  41.37561
  3.955556  0.149288  0.590515  44.01765
  4.000000  0.149288  0.597150  46.66102
  4.044444  0.149288  0.603785  49.29738
  END FTABLE  1
END FTABLES

EXT SOURCES
<-Volume-> <Member> SsysSgap<--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   # <Name> # tem strg<-factor->strg <Name>   #   #        <Name> # #  ***
WDM      2 PREC     ENGL    1             PERLND   1 999 EXTNL  PREC
WDM      2 PREC     ENGL    1             IMPLND   1 999 EXTNL  PREC
WDM      1 EVAP     ENGL    1             PERLND   1 999 EXTNL  PETINP
WDM      1 EVAP     ENGL    1             IMPLND   1 999 EXTNL  PETINP

END EXT SOURCES

EXT TARGETS
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Volume-> <Member> Tsys Tgap Amd ***
<Name>   #        <Name> # #<-factor->strg <Name>   # <Name>    tem strg strg***
RCHRES   1 HYDR   RO     1 1        1      WDM   1000 FLOW     ENGL      REPL
RCHRES   1 HYDR   STAGE  1 1        1      WDM   1001 STAG     ENGL      REPL
COPY     1 OUTPUT MEAN   1 1     48.4      WDM    701 FLOW     ENGL      REPL
COPY   501 OUTPUT MEAN   1 1     48.4      WDM    801 FLOW     ENGL      REPL
```

```
END EXT TARGETS

MASS-LINK
<Volume>   <-Grp> <-Member-><--Mult-->     <Target>       <-Grp> <-Member->***
<Name>            <Name> # #<-factor->     <Name>                <Name> # #***
  MASS-LINK         2
PERLND     PWATER SURO       0.083333      RCHRES         INFLOW IVOL
  END MASS-LINK     2

  MASS-LINK         3
PERLND     PWATER IFWO       0.083333      RCHRES         INFLOW IVOL
  END MASS-LINK     3

  MASS-LINK         5
IMPLND     IWATER SURO       0.083333      RCHRES         INFLOW IVOL
  END MASS-LINK     5

  MASS-LINK        12
PERLND     PWATER SURO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK    12

  MASS-LINK        13
PERLND     PWATER IFWO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK    13

  MASS-LINK        15
IMPLND     IWATER SURO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK    15

  MASS-LINK        16
RCHRES     ROFLOW                          COPY           INPUT  MEAN
  END MASS-LINK    16


END MASS-LINK

END RUN
```

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NMG Geotechnical, Inc.

June 20, 2022

Project No. 22048-01

To: Avalon Bay Communities
11111 Santa Monica Boulevard Suite 1700
Los Angeles, California 90025

Attention: Mr. Christopher Bench

Subject: Preliminary Geotechnical Due Diligence Study, Proposed Commons Mixed-Use Apartment Development, City of Aliso Viejo, California

INTRODUCTION

At your request, NMG Geotechnical, Inc. (NMG) has prepared this preliminary geotechnical due diligence report for the proposed Commons project located northwest of the intersection of Aliso Creek Road and Enterprise in the city of Aliso Viejo. Our summary is based on review of available geotechnical reports and maps provided by you and the City of Aliso Viejo, review of historic aerial photographs and topographic maps; a site reconnaissance; our knowledge of geological conditions and constraints in the region; our experience during design, grading and construction of the Summit Business Park; and our experience with similar residential developments.

SITE LOCATION AND DESCRIPTION

The approximately 4.1-acre site is located northwest of the intersection of Aliso Creek Road and Enterprise in the city of Aliso Viejo, California. The site currently consists of an asphalt surface parking lot with planter medians and a 2H:1V slope that ascends up to 45 feet to Enterprise. The elevation across the asphalt parking lot is fairly flat, ranging from approximately 348 to 351 feet above mean sea level (msl).

The northwestern portion of the site consists of a 2H:1V buttress slope that ascends approximately 5 to 45 feet to Enterprise. We understand this compacted buttress fill slope was constructed with a subdrain system with subdrain outlets that extend to the slope face; some of these outlets were observed during our recent site reconnaissance. The fill material exposed in the slope and planters in the parking lot was observed to be white diatomaceous silt with small siltstone fragments. The asphalt surface and concrete V-ditches/curbs appear to be in moderately good condition, with some linear cracks throughout, generally consistent with aging improvements.

SITE HISTORY

Based on our knowledge of the development in Aliso Viejo, the site was mass graded in the early 1990s by the Mission Viejo Company under the geotechnical observation and testing of The Earth Technology Corporation (Earth Tech), who also performed the initial investigation during the design stages of the site. We have not been able to obtain copies of these reports through requests from the City of Aliso Viejo.

Based on review of historic aerial photographs dating to 1946 and topographic maps dating to 1949, the site originally consisted of gentle hillside terrain ranging from 340 to 400 feet above msl. The site sloped to the north to an incised channel in the location of the current State Route 73 Toll Road (SR 73). Historically, this region was used for dry farming and cattle grazing until the late 1980s when the Mission Viejo Company started development. The northeastern portion of the site was mass graded between 1988 and 1992, and included construction of Aliso Creek Road. By 1995, the entire site was graded to essentially its current condition, which included grading of the abutting slope and paving of Enterprise from Aliso Creek Road to the Town Center. Between 1996 and 1997, SR 73 was constructed and the adjacent commercial property to the northwest had been graded.

In 2006, Kleinfelder, Inc. (Kleinfelder) performed a feasibility study and provided design parameters specific to the subject site for a prior land use plan. The prior land use plan included two levels of subterranean development and retaining structures up to 55 feet high, essentially cutting out the buttress slope that ascends to Enterprise. Their study included three bucket-auger borings and slope stability analysis along the buttress slope. Their report did not include geotechnical borings logs, but provided a description of the fill and bedrock encountered and included cross-sections showing the bedrock layers dipping out of slope. They concluded that excavation into the buttress slope would render it unstable, and as such, they recommended a tie-back anchor wall be designed and constructed (Kleinfelder, 2006).

PROPOSED DEVELOPMENT

Based on review of the yield study exhibits, the proposed mixed-use apartment development will be a wrap-style construction with up to six stories of retail and apartments around the perimeter, and a central eight-story parking structure. No subterranean structures are anticipated at the site. The recreation area is anticipated to be constructed atop the parking structure. Although a grading study was not available for our review, the yield study exhibits show the buildings may encroach significantly into the adjacent buttress slope.

GEOLOGIC CONDITIONS

The subject site is located in the San Joaquin Hills within the coastal section of the Peninsular Range Province. This geomorphic province includes the Los Angeles Basin and has a long, active geologic history, including deep marine sedimentation followed by uplift and fluvial and marine erosion.

The subject site is underlain by artificial fill materials and interbedded diatomaceous siltstone/ claystone bedrock of the Monterey Formation. The bedrock was originally deposited within the Capistrano Embayment, which extended from San Clemente northward to the Santa Ana Mountains. During the Quaternary period, active faulting (associated with the San Andreas Fault system) subjected the embayment to compression and regional uplift. Also, during the Quaternary period, active streams channels cut canyons into the emergent bedrock. However, during past grading operations, the natural terrain was modified by cutting the ridges and filling canyon areas resulting in the current site configuration.

Geologic Units and Structure

We anticipate the northeast portion of the site and the buttress fill slope to consist of up to 20 to 40 feet of previously placed artificial fill primarily derived from bedrock of the Monterey Formation and placed under the observation and testing of Earth Tech (1995). Although we do not have the referenced report available, we have encountered the subject fill material during various phases of exploration for the adjacent Summit Business Park. Also, Kleinfelder encountered the fill during their site feasibility study (Kleinfelder, 2006) in two of their three borings. We anticipate the fill to consist of various mixtures of diatomaceous silt, elastic silt, clay, silty clay, and silty sand that is generally dry to moist, stiff, slightly to moderately plastic, and containing bedrock fragments.

The majority of the site may consist of sedimentary bedrock of the Monterey Formation, which also underlies the artificial fill. Within Aliso Viejo, the Monterey Formation consists predominately of light gray to light brown highly diatomaceous clayey siltstone, which is moist, stiff to hard, and locally highly fractured and jointed. The clayey siltstone is interbedded with abundant sheared clay beds and vitric tuff horizons. The material is locally highly laminated and well-bedded, and has been found to be compressible under significant loading. During their feasibility study, Kleinfelder (2006) encountered this bedrock in all three of their bucket-auger borings and described it as diatomaceous siltstone and shale deposits that are friable and relatively weak. They also encountered some very soft sheared clay beds every few feet within the siltstone and local lenses of volcanic ash, concretionary limestone, calcareous sandstone and thin sandstone beds.

The geologic structure within the area can be somewhat variable due to regional faulting and folding; however, bedding was identified and measured by Kleinfelder (2006) and found to dip 6 to 41 degrees consistently to the northeast. These dips correlate to an apparent dip of 8 to 39 degrees out of slope, for an adverse bedding condition within the slope adjacent to Enterprise.

Faulting

The site is not located within a fault-rupture hazard zone as defined by the Alquist-Priolo Special Studies Zones Act (California Geological Survey, 2018 and Hart and Bryant, 2007), and no evidence of active faulting was observed during this investigation or during rough grading operations. Also, based on mapping by the State (California Geological Survey, 2010), there are no active faults mapped at the site.

Using the USGS computer program (USGS, 2022) and the site coordinates of 33.5786 degrees north latitude and 117.7253 degrees west longitude, the controlling fault at the site is the San Joaquin Hills Blind Thrust Fault located 3.8 kilometers (≈ 2.4 miles) at depth below the site. The maximum moment magnitude for the Controlling Fault is 7.1 M_W. The other faults noted that can produce strong ground shaking at the site include the Newport-Inglewood (Offshore), Elsinore Glen Ivy and Oceanside. Based on review of published maps, historic aerial photographs, and topographic maps, the potential for primary ground rupture due to an earthquake is considered very low.

Seismic Hazards

The primary seismic hazard at the subject site is ground shaking due to a future earthquake on a major regional active fault, such as the San Joaquin Hills Blind Thrust Fault mentioned above. The site is not located in a seismic hazard zone for liquefaction as mapped by the State, but the slope adjacent to the site that ascends to Enterprise is located in a seismic hazard zone for earthquake induced landslides (CDMG, 2001a), likely due to the regional geology. Figure 2 shows the subject site in relation to the seismic hazard zones mapped by the State. Development of the site by the Mission Viejo Company included slope stabilization measures to mitigate this potential hazard.

Groundwater

Groundwater was encountered in the form of seepage zones by Kleinfelder (2006) at approximate elevations of 320 to 328 feet above msl, which is roughly 20 feet below the existing asphalt parking lot. Groundwater was not encountered by NMG during our prior study for the adjacent business development (NMG, 1997). Historic high groundwater is in excess of 30 feet below ground surface (bgs) (CDMG, 2001b).

LABORATORY TESTING

The Kleinfelder feasibility study did not include tabulated laboratory test results, but it did indicate the soils are corrosive to concrete and metals, have moderate to very high expansion potential, and have low shear strengths with an average friction angle of 12 degrees and a cohesion of 100 pounds per square foot (psf) along bedding and 25 degrees and 500 psf cohesion for across bedding (Kleinfelder, 2006).

Prior laboratory testing by NMG (1997) for the adjacent business development indicated the compacted fill soils are generally comprised of silty clay with liquid limits of 66 to 81 percent and plasticity indices of 37 to 49 percent (USCS classification of CH). Sieve analysis of the same compacted fill soils shows 74 to 82 percent passing the No. 200 sieve and 37 to 47 percent passing the two-micron sieve. Expansion indices ranged from 73 to 111, falling in the medium to high expansion potential range and direct shear tests indicated ultimate friction angles of 30 to 47 degrees with 0 to 200 psf cohesion.

GEOTECHNICAL CONDITIONS/CONSTRAINTS

Based on the geotechnical data provided in the referenced reports (References) and review of published geologic maps/reports, the following conditions are anticipated.

- Soil conditions across the site consist of artificial fill up to 20 to 40 feet thick within the buttress slope and the northeast portion of the site, and diatomaceous siltstone/claystone bedrock of the Monterey Formation exposed at existing grade for the southern and western portion of the existing parking lot.
- Overexcavation of both the bedrock and artificial fill materials should be anticipated, such that a minimum of 5 feet of new compacted fill underlies the building and footings.
- Groundwater in the form of seepage was previously encountered at a depth of 20 feet below the existing parking lot grades. Other nuisance seepage may be encountered in heavily landscaped areas.
- Storm water infiltration into the subsurface soils is not considered feasible due to the presence of clayey subgrade soils and diatomaceous siltstone bedrock.
- If grading/construction is proposed to encroach into the existing buttress slope, excavations into this slope may de-stabilize the slope and adversely impact Enterprise. Use of tie-back supported retaining structures and shoring should be anticipated during construction of the walls impacting this slope.
- The proposed parking structure and residential units may straddle a contact between siltstone bedrock and moderately deep artificial fill. Both of these earth units are considered compressible; thus, total and differential settlement under the heavy building load may be a significant constraint. Use of mat slab foundations, deep foundations and/or ground improvement (i.e., geopiers) may be required at the site.
- Laboratory testing by NMG and others indicates the expansion index (EI) for soils at the site range from medium to very high.
- Based on chemical testing by Kleinfelder and on our experience at the adjacent business park, the sulfate exposure of the onsite soils is in the severe ("S4") range and may also be categorized as "severely corrosive" with respect to ferrous metals.
- The site is not located in a seismic hazard zone for liquefaction, but the buttress slope along the western and northern border of the site is located in a seismic hazard zone for earthquake-induced landslides. We anticipate that the prior grading of the buttress slope has adequately mitigated the potential for earthquake induced landslides. The most significant seismic hazard at the site is strong ground shaking due to an earthquake on a nearby active fault, such as the San Joaquin Hills Blind Thrust, Newport-Inglewood (Offshore), Elsinore Glen Ivy and Oceanside Faults.

EXPLORATION, PLANNING AND DESIGN RECOMMENDATIONS

The following presents a summary of our recommendations during the next phase of due diligence and future design stages.

1. A detailed subsurface exploration and laboratory testing program should be performed to verify the geotechnical conditions described herein in light of the proposed development.
2. Coordination with the design team, including the structural engineers for the parking structure foundation, residential building foundation, and the perimeter retaining structure will be important during analysis of the collected data.
3. Engineering analysis should be performed based on the subsurface exploration and should include settlement analysis, slope stability analysis, seismic design parameters, and foundation and wall design parameters. A geotechnical exploration and design report should be prepared documenting the geotechnical findings and site-specific conditions.
4. Future rough and precise grading plans should be reviewed and a report prepared to provide geotechnical parameters for design in accordance with the most recent requirements of the California Building Code (CBC).
5. The structural and foundation plans should be reviewed to confirm that the parameters used for design are in accordance with the recommendations of the design report.
6. The street improvement and utility plans should be reviewed and recommendations provided as needed.

If you have any questions regarding this preliminary due diligence study, please contact our office. We appreciate the opportunity to offer our services.

Respectfully submitted,

NMG GEOTECHNICAL, INC.

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Principal Engineer

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Principal Geologist

LY/SBK/grd

Attachments: References
Figure 1 – Site Location Map
Figure 2 – Seismic Hazards Map

Distribution: Addressee (E-Mail)

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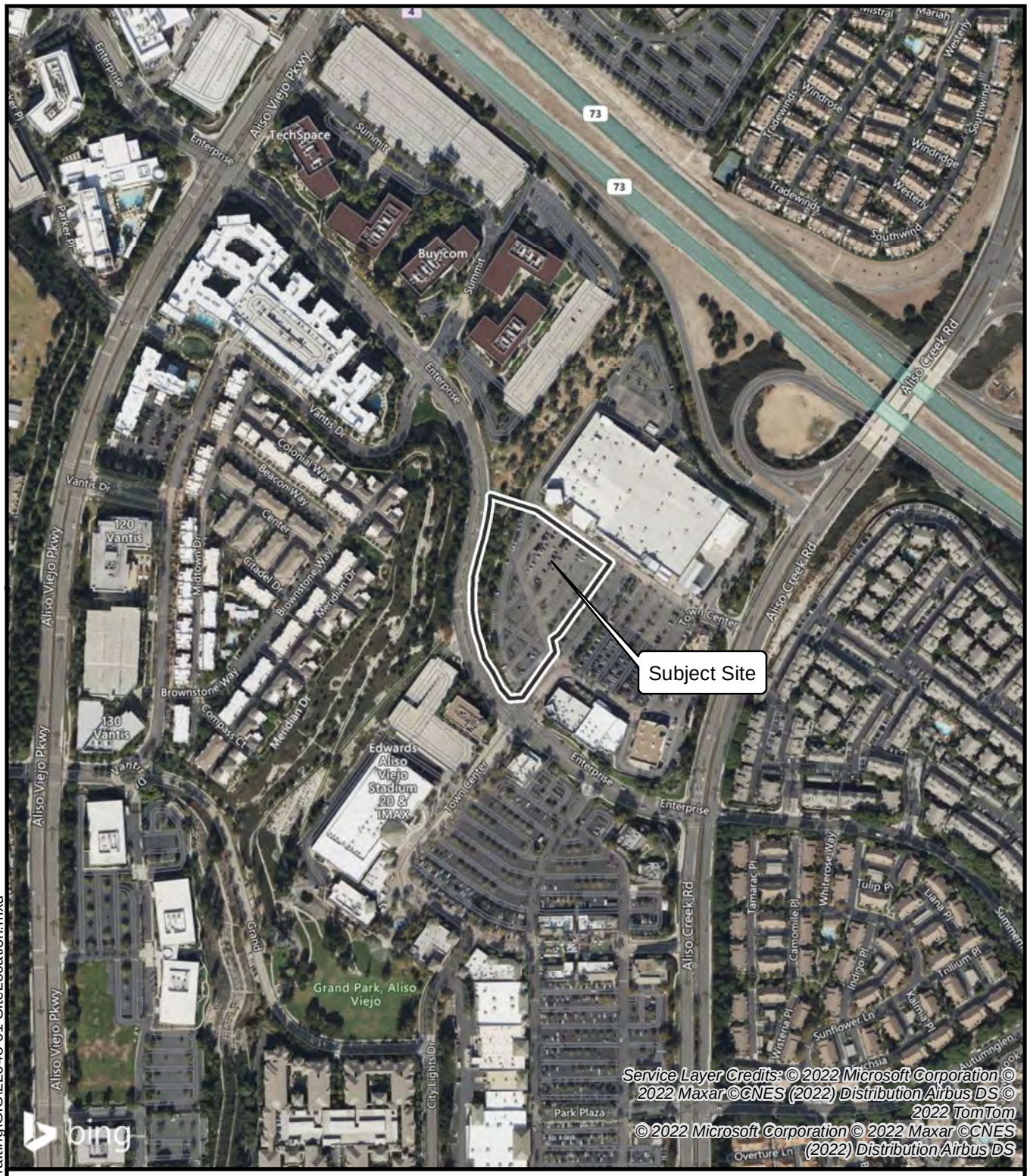

0 250 500 Feet

1 inch = 500 feet

N

SITE LOCATION MAP

PROPOSED RESIDENTIAL DEVELOPMENT
COMMONS AT ALISO VIEJO
ALISO VIEJO, California

Project Number: 22048-01 By: SBK/LY
Project Name: Avalon/Aliso Viejo
Date: 6/20/2022 Figure 1

NMG

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Legend

- Earthquake-Induced Landslide Zones
- Liquefaction Zones

0 250 500 Feet

1 inch = 1,000 feet

N

SEISMIC HAZARDS AND FAULT ZONES MAP

Base: California Geological Survey, Earthquake Zones of Required Investigation, San Juan Capistrano Quadrangle
Dated: December 21, 2001

PROPOSED RESIDENTIAL DEVELOPMENT
COMMONS AT ALISO VIEJO
ALISO VIEJO, California

Project Number: 22048-01 By: WG/TM
Project Name: Avalon/Aliso Viejo
Date: 6/20/2022 Figure 2

NMG

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