STORMWATER CONTROL PLAN

for

VINEYARDS

CONTRA COSTA COUNTY

December 19, 2024

Carlson, Barbee & Gibson, Inc.

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APPENDICES

This Stormwater Control Plan was prepared using the template dated March 2024.

I. PROJECT DATA

Table 1. Project Data.

Project Name/Number	Vineyard Crossing
Application Submittal Date	December, 2024
Project Location	APN: 051-190-034; 051-190-021; 051-190-034
Name of Developer	Brightsky Residential
Project Phase No.	NA
Project Type and Description	Residential project with up to 45 single-family homes, 40 auxiliary dwelling units, and 26 duet buildings.
Project Watershed	East Antioch Creek; East County Delta Drainages
Total Project Site Area (acres)*	20.4 acres
Total Area of Land Disturbed (acres)	14.6 acres
Total New Impervious Surface Area (sq. ft.)	341,711 square feet
Total Replaced Impervious Surface Area	27,930 square feet
Total Pre-Project Impervious Surface Area*	54,190 square feet
Total Post-Project Impervious Surface Area*	395,901 square feet
50% Rule[1]	Applies
Project Density*	7 DU/acre
Applicable Special Project Categories [Complete even if all treatment is LID]	Does not apply
Percent LID and non-LID treatment	100% LID for areas that require treatment
HM Compliance[2]	Applies

*Please note the area totals summarized in this table include substantial off-site areas that drain onto the project site, thereby increasing the Total Project Site Area, and Total Impervious Areas (Pre-Project and Post-Project) to greater than the subject property boundary as shown on the project plans. This was done to correctly size the on-site IMPs based on the total areas draining to them, rather than just on-site areas.

[1] 50% rule applies if: Total Replaced Impervious Surface Area > 0.5 x Pre-Project Impervious Surface Area.

[2] HM required (unless project meets one of the exemptions on Guidebook p. 9) if:
(Total New Impervious Surface Area + Total Replaced Impervious Surface Area) ≥ 1 acre

II. SETTING

II.A. Project Location and Description

The Vineyard Crossing Project (Project) is located on a 15.6-acre site in the City of Antioch, Contra Costa County, California. A vicinity map showing the location of the site is included as **Appendix A**. The existing property consists of a vineyard. Oakley Road is along the southern project boundary and Phillips Lane is along the eastern edge of the project boundary. The northern and western boundaries of the project site border exist in residential neighborhoods. Overhead utility lines are located above the eastern and northern portions of the project site.

The Project proposes to develop 14.6-acres of the property into approximately 71 medium- to low-density residential lots with a total of 137 dwelling units. The developed area will include residential buildings, several amenity buildings, as well as two stormwater basins to meet pertinent water-quality and hydromodification requirements following the standards set forth by the City of Antioch, the Central Valley Regional Water Quality Control Board (RWQCB or Regional Board), the Municipal Regional Stormwater NPDES Permit issued by the San Francisco Bay Regional Water Quality Control Board, the Contra Costa County Clean Water Program (CCCWP), and the Contra Costa County Flood Control and Water Conservation District (CCCFCWCD, among others.

All elevations used in this report reference the NAVD 88 vertical datum.

II.B. Existing Site Features and Conditions

The Project site topography is characterized by shallow hills and troughs. The terrain with the highest elevation is approximately 81 feet (NAVD 88) located at the top of the western hill. The lowest elevation is approximately 60 feet in the southeast corner where there is an existing infiltration basin, as shown in the existing conditions sheet, **Appendix A**. The existing site conditions drain to two ultimate points of compliance. The first of these drains the northern portions of the site to existing storm drain lines to the north along Filbert Street and northwest along Honeycut Street which later combine in a storm trunk line that drains northerly to discharge into the San Joaquin River adjacent to the Antioch Power Station site. The second point of compliance includes runoff that travels by sheetflow, as well as an existing stormwater system along Oakley Road, to East Antioch Creek located south of the site. **Appendix B** provides a summary of the pre-project land use for the drainage areas in the Project watershed.

The Project site is currently used as a vineyard with no large existing impervious areas within the proposed development envelope. The mean annual precipitation (MAP) at the site is roughly 12.6 inches. This estimate is based on the Project's location and information in the 1977 Mean Seasonal Isohyetal Map (Drawing B-166) updated in 2009 by the Contra Costa County Flood Control and Water Conservation District (see **Appendix C**). Precipitation falling on the Project footprint currently travels as sheetflow from the hill sides into either depression in the topography which allow for infiltration, or towards existing storm water infrastructure including an infiltration basin on the southeast corner of the project.

There is only one soil type mapped at the site per information from the National Resources Conservation Service (NRCS) Web Soil Survey (USDA, 2012), see **Appendix D**. The entire site is underlain by Delhi sands (DaC), which are classified in soil group A under the NRCS hydrologic soil group (HSG)[3] system, with very high infiltration rate of 13 inches/hour.

The channel of East Antioch Creek is located approximately 700 feet to the south and includes special flood hazard areas (SFHA) as mapped by the Federal Emergency Management Agency (FEMA) on Flood Insurance Rate Map panel 060C0332F. The SFHA is mapped as Zone AE, AH, and X, indicating that the creek was mapped using a detailed hydraulic study to identify the extents of the flood hazard. However, the entire project site is outside of the Zones AE or AH and is mapped as an unshaded Zone X, indicating areas of minimal flood hazard. The Flood Insurance Rate Map is included in **Appendix E**.

Using the Contra Costa County Hydromodification Applicability GIS Map, the Project site primarily is categorized as hydromodification applicable (see **Appendix F** for snippet of the County's Hydromodification Applicability Map showing the Project location).

II.C. Opportunities and Constraints for Stormwater Control

There are a number of constraints and opportunities related to the integrated management practices (IMP) selection and design for the Project as proposed. The Project has been designed in a high-density residential configuration reducing the amount of area that can be used for stormwater infrastructure. There are also two overhead utility corridors that reduce the usable space within the project area. The stormwater infrastructure has been designed to accommodate these space limitations.

The biggest design opportunity at the site is the highly infiltrative soils that underlain the entire site. The soil at the site is classified as Hydrologic Soil Group A, that has naturally very high percolation rates that allow for the use of direct infiltration of stormwater. This opportunity achieves water-quality treatment and groundwater recharge through direct infiltration. By directly infiltrating water back into the groundwater this also helps with peak flow control in the creeks reducing hydromodification impacts.

Given these factors, the stormwater management approach will be to collect and convey runoff from the developed and undeveloped areas to two stormwater basins (Integrated Management Practices) used for infiltration. One will be located west of the east-central utility corridor (Basin 1), and one will be located in the western portion of the project (Basin 2). The basins will be connected to the existing storm drain system on Honeynut Street via conventional gravity flow stormwater lines to provide capacity for exceptionally large or prolonged storm events that could exceed the infiltration capacity of the IMPs. The drainage design will also utilize self-treating areas encompassing the relatively large open space areas within the two utility corridors in the central east and northern portions of the site.

[3] The NRCS hydrologic soil groups divide all soil types into four categories on the basis of potential to produce runoff. Type A soils, typically sands or gravels, have the lowest runoff potential and typically have high infiltration rates. Type D soils have the highest runoff potential and typically have low infiltration rates. Type D soils are generally heavy clays or are very shallow.

III. LOW IMPACT DEVELOPMENT DESIGN STRATEGIES

III.A. Optimization of Site Layout

III.A.1. Limitation of development envelope. As previously mentioned, the Project proposed to construct 137 dwelling units within the project site. There will be two utility corridors that will allow for the preservation of portions of the existing vineyards, with minimal impervious area introduced by including a pedestrian trail along the northern corridor. These corridors will be self-treating.

III.A.2. Preservation of natural drainage features. There are no existing natural drainage features such as creeks, streams, or rivers at the site, but there is an existing infiltration basin in the southeast corner that will be removed. The existing topography will be utilized to send the majority of the site's drainage to the existing storm drainage infrastructure on Honeynut Street.

III.A.3. Setbacks from creeks, wetlands, and riparian habitats. There are no existing natural features such as creeks, wetlands, or riparian habitat areas on the site.

III.A.4. Minimization of imperviousness. The Project has been designed to minimize the area of impervious cover by restricting it to only areas for roadways, attached sidewalks, driveways, and building footprints within a relatively high-density configuration.

III.A.5. Use of drainage as a design element. The drainage design makes use of existing flow paths to convey runoff during large storms from open space areas to specific collection points where it can be conveyed to the receiving waters. The two utility corridors are categorized as "self-treating" drainage areas. The use of self-treating areas increases the effectiveness of the proposed stormwater basins by reducing the volume of runoff they must accommodate.

III.B. Use of Permeable Pavements

Permeable pavement was not included in the design of this project.

III.C. Dispersal of Runoff to Pervious Areas

The compact nature of the Project design limits the potential for dispersal of runoff to pervious areas. Therefore, the stormwater management approach is based on effectively conveying runoff from the reduced Project footprint to stormwater basins.

III.D. Bioretention or other Integrated Management Practices

The proposed grading plan divides the site into six Drainage Management Areas (DMAs) as illustrated in **Appendix A**. The largest, DMA 1, encompasses the eastern residential area, the majority of the eastern central utility corridor (that is self-treating but is included as a conservative assumption), and the area of Phillips Lane that drains into the project's stormwater collection system. DMA 1 drains to the first IMP (Basin 1). The second largest, DMA 2, drains the majority of the western residential areas and drains to the second and larger IMP (Basin 2). The three northern post-project DMAs (Northwest, North Central, and Northeast) are all self-treating areas with field inlets for any overland flow. The Northwest DMA has an overland flow field drain that connects into the Honeynut Street storm drain. Both the North Central and Northeast DMAs have overland flow draining to the existing Filbert Street storm drain. Due to the

grade constraints the Southwest DMA, an approximately 0.42-acre area, cannot be picked up in the proposed drainage system. The runoff drains immediately off-site to the southwest along Oakley Road into an existing storm drainage system. An equivalent area along Phillips Road is picked up and treated by IMP 1.

The stormwater system will utilize conventional gravity-flow methods to convey runoff from all lots and roads to the two stormwater basins that utilize infiltration for treatment and hydromodification management. These basins are sized sufficiently to meet the water quality treatment requirements and allow for hydromodification management. The two stormwater basins were sized using the 2023 version of the Bay Area Hydrologic Model (BAHM 2023, updated June 2024) to ensure appropriate hydromodification control at each point of compliance (POC) and water quality treatment. Both basins utilize direct infiltration into the soils as the main outlet and have riser structures as overflow releases during large storm events. A typical profile of the stormwater facility is shown in **Appendix A.**

Access roads and ramps will be installed for each stormwater basin to provide maintenance crews with regular access to the bays. Maintenance crews will be responsible for removing any coarse debris and/or sediment accumulation that would otherwise have the potential to impair infiltration rates or obstruct the high-flow release outlets. Stormwater facility maintenance requirements are outlined in **Section 6**.

IV. DOCUMENTATION OF DRAINAGE DESIGN

The following section details the parameterization and calculation for the Project's stormwater facilities. The labeling of drainage management areas (DMAs) is consistent with the Project watersheds and includes some off-site areas that drain on-site. The post-project drainage management areas are illustrated in **Appendix A**.

IV.A. Descriptions of each Drainage Management Area

IV.A.1. Table of Drainage Management Areas

Table 2. Drainage Management Areas

DMA Name	*Area (sq ft)*	*Surface Type / Description*	*DMA Type / Drains to*
Northwest	52,600	Agricultural open space	Self-Treating / Honeynut Street SD
DMA 1	383,700	Roof, asphalt roadway, landscaping	Drains to Basin 1 / Honeynut Street SD
DMA 2	368,200	Roof, asphalt roadway, landscaping	Drains to Basin 2 / Honeynut Street SD
North Central	37,400	Agricultural open space	Self-Treating / Filbert Street SD
Northeast	28,400	Agricultural open space	Self-Treating / Filbert Street SD
Southwest	18,200	Asphalt roadway	Drains off-site to Oakley Road SD. Equivalent Area picked up in DMA 1

IV.A.2. Drainage Management Area Descriptions

DMA Northwest, totaling 52,600 square feet, drains the northwestern corner of the preserved vineyard with a small amount of impervious area introduced by the creation of a pedestrian path. DMA Northwest is a self-retaining area with any additional overland flow draining to an existing storm water system on Honeynut Street.

DMA 1, totaling 383,700 square feet, drains the eastern residential developed area and sends the collected stormwater to IMP 1. The main outlet from IMP 1 is direct infiltration through the basin floor. The secondary outlet is through a high-flow release riser structure that would route runoff directly to the Honeynut Street storm drain system during exceptionally large storm events.

DMA 2, totaling 368,200 square feet, drains the western residential developed area and sends the collected stormwater to IMP 2. The main outlet to IMP 2 is direct infiltration through the basin floor. The secondary outlet is through a high-flow release riser structure that would route runoff to the Honeynut Street storm drain system during large storm events.

DMA North Central, totaling 37,400 square feet, drains the northern central area of the preserved vineyard with a small amount of impervious area introduced by the creation of a pedestrian path. DMA North Central is a self-retaining area with any additional overland flow draining to an existing storm water system on Filbert Street.

DMA Northeast, totaling 28,400 square feet, drains the northeastern corner of the preserved vineyard with a small amount of impervious area introduced by the creation of a pedestrian path. DMA Northeast is a self-retaining area with any additional overland flow draining to an existing storm water system on Filbert Street.

DMA Southwest, totaling 18,200 square feet, drains the southwest corner of the Project and part of Oakley Road. DMA Southwest drains immediately off-site to an existing storm water system along Oakley Road. Due to the grade constraints of this area of the Project, an equivalent off-site area is included in DMA 1 to offset this uncollected drainage area.

IV.B. Integrated Management Practice Descriptions

Both stormwater basins (IMP 1 and IMP 2) utilize infiltration to treat the runoff and reduce the volume of runoff sent to the existing off-site storm drain system. Runoff collected in the gutter and on-site storm drain system will be sent to both basins. Water infiltrates into the highly infiltrative HSG Type A soils that underly the site. This infiltration technique treats the stormwater runoff and helps recharge the groundwater table. During exceptionally large storm events, if the infiltration rate cannot keep up with the runoff rate, the overflow releases would be activated once the ponding depth in the basin meets a specific depth. Runoff in that case would be conveyed to the Honeynut Street storm drain system through conventional gravity flow methods. BAHM 2023 was used to test the basins design to ensure they meet the water quality treatment and hydromodification management requirements.

IV.B.1. Areas Draining to Non-LID Treatment

There are no areas that drain to non-LID treatment as defined by the C.3 manual.

IV.C. Tabulation and Sizing Calculations

This Project uses stormwater basins that utilize infiltration for water-quality treatment and hydromodification control. Typically, the IMP calculator would be used to show the basins are appropriately sized. However, the IMP calculator does not include infiltration basins as an option. Therefore, the IMP calculator was not used to size the stormwater basins (IMP 1 and IMP 2). Instead, sizing of the basins was confirmed using the BAHM 2023 model to show compliance with water-quality treatment and hydromodification control. The BAHM model indicates that both IMPs will treat (infiltrate) over 99% of the long-term runoff, surprising the 80% required treatment standard in the Municipal Regional Permit, and both points of compliance meet hydromodification control requirements. These results and the model set up can be seen in the BAHM model output report included in **Appendix G**.

V. SOURCE CONTROL MEASURES

V.A. Site activities and potential sources of pollutants

Pollutants typically found in urban runoff include household and lawn-care chemicals (insecticides, herbicides, fungicides, and rodenticides), heavy metals (such as copper, zinc, and cadmium), oils and greases, and nutrients (nitrogen and phosphorus).

The goal of the Project's water-quality sensitive site design is to limit the release of these pollutants into the stormwater system through source control. The high infiltration rates at the site make this a great opportunity to implement direct infiltration using two stormwater basins.

Other pollution control measures include regular maintenance activities such as street sweeping and storm drain inlet cleaning, and stenciling all storm drain inlets with appropriate warnings indicating that the runoff flows to East Antioch Creek and the San Joaquin Delta. Access to educational materials will also be provided to assist homeowners in reducing the introduction of pollutants to the stormwater management system.

V.B. Source Control Table

Table 3. Source Controls

Potential Source of Runoff Pollutants	***Permanent Source Control BMPs***	***Operational Source Control BMPs***
On-site Storm Drain Inlets	Stenciled storm drain inlets with appropriate warnings indicating that runoff flows to the East Antioch Creek and San Joaquin Delta.	- Maintain and periodically repaint or replace inlet markings. - Provide stormwater pollution prevention information to new site owners, lessees, or operators.
Landscape/Outdoor Pesticide Use	The landscape plans will accomplish the following: - Design landscaping to minimize irrigation and runoff, to promote surface infiltration where appropriate, and to minimize the use of fertilizers and pesticides. - Where landscaped areas are used to retain or detain stormwater, specify plants that are tolerant of saturated soil conditions. - Consider using pest-resistant plants. - For successful establishment, select plants appropriate to site soils, slopes, climate, sun, wind, rain, land use, air movement, ecological consistency, and plant interactions.	- Maintain landscaping using minimum or no pesticides. - Provide IPM information to new owners, lessees, and operators.
Vehicle and Equipment Cleaning	Because a car wash area is not provided within the Project site, car washing will not be allowed in the development site.	Vehicle and equipment cleaning information will be provided to new site owners, lessees, and operators.
Roofing, Gutters, and Trim	Roofing, gutters, and trim made of copper or other unprotected metals that may leach into runoff will be avoided.	Roofing, gutters, and trim information will be provided to new site owners, lessees, and operators.
Sidewalks, and Street Parking		- Maintain and regularly sweep sidewalks and streets to prevent accumulation of litter and debris. - Collect debris from pressure washing to prevent entry into the storm drain system.

V.C. Features, Materials, and Methods of Construction of Source Control BMPs

The features, materials, and methods of construction of source control BMPs will be specified in the Grading, Improvement, and Landscape construction plans. However, the bioretention facility will be constructed per the CCCCWP's Stormwater C.3 Guidebook (Guidebook). Energy dissipaters, curb cuts, and grate inlets will be used as necessary to reduce erosion within the infiltration areas. Overflow risers will connect pipes to the downstream storm drain system during high flow events.

VI. STORMWATER FACILITY MAINTENANCE

VI.A. Ownership and Responsibility for Maintenance in Perpetuity

The HOA will assume ownership and responsibility for maintenance of the IMPs. Operation and maintenance of the facility will be the responsibility of the owner until transferred to HOA.

VI.B. Summary of Maintenance Requirements for Each Stormwater Facility

The stormwater basin areas will require regular inspections of the inlets, outlets, and side slopes for evidence of erosion, obstructions, and instabilities. The soil at the bottom of the feature will require regular observations to check for uniform percolation and will require removal of any invasive plants that may reduce the effective area of the basin. Vegetation surrounding the stormwater facility will be observed and maintained regularly, with invasive and noxious plants removed, fallen leaves disposed of, and mulch replenished as necessary. Any potential vector sources will be abated by filling holes in the ground and eliminating standing water that persists for more than 48 hours. In addition, Contra Costa Mosquito and Vector Control District (CCMVCD) will be informed if mosquito larvae are found present at the stormwater facility. A copy of the O&M plan, schedule of routine activities, and maintenance reports will be given to the CCMVCD in an effort to cooperatively facilitate control of mosquitos and vectors. Non-routine maintenance may include the removal of accumulated sediment every five to fifteen years.

VII. CONSTRUCTION PLAN C.3 CHECKLIST

Table 4. Construction Plan C.3 Checklist

Stormwater Control Plan Page #	*BMP Description*	*See Plan Sheet #s*
7	Stormwater Basins	
9	Marked storm drain inlets	

VIII. CERTIFICATIONS

The selection, sizing, and preliminary design of stormwater treatment and other control measures in this plan meet the requirements of Regional Water Quality Control Board Order R2-2015-0049.

Local staff will be contacted regarding other certification requirements.

By

Edward D. Ballman, P.E.

Claire Bareilles, E.I.T.

APPENDICES

APPENDIX A

Stormwater Control Plan and Maps of DMAs

LEGEND

- DMA 1 — DRAINAGE MAINTENANCE AREA
- SR 1 — SELF RETAINING AREA
- DRAINAGE MAINTENANCE AREA BOUNDARY
- IMP 1 — INTEGRATED MANAGEMENT PLAN (STORMWATER BASIN)

DRAINAGE MANAGEMENT AREA (DMA)	TOTAL AREA	TOTAL IMPERVIOUS (SF)	TOTAL PERVIOUS (SF)	PROVIDED TREATMENT AREA (SF)	TREATMENT TYPE
DMA 1	383,743	201,915	181,828	12,885*	STORMWATER BASIN
DMA 2	368,222	178,158	190,064	16,815*	STORMWATER BASIN
DMA 3 (SOUTHWEST)	18,219	15,828	2,391	–	IN-LIEU TREATMENT
SR 1 (NORTHWEST)	52,606	0	52,606	–	SELF-RETAINING
SR 2 (NORTH CENTRAL)	37,970	0	37,970	–	SELF-RETAINING
SR 3 (NORTHEAST)	28,396	0	28,396	–	SELF-RETAINING

*NOTE:
PROVIDED TREATMENT AREA IS CALCULATED USING THE U.S. ARMY CORPS OF ENGINEERS HEC-HMS PER CCCFCWCD GUIDANCE. SEE PRELIMINARY DRAINAGE REPORT PREPARED BY BALANCE HYDROLOGICS, INC. DATED DECEMBER 2024 FOR CALCULATIONS.

VESTING TENTATIVE MAP
STORMWATER CONTROL PLAN
VINEYARD CROSSING

CITY OF ANTIOCH CONTRA COSTA COUNTY CALIFORNIA

SCALE: 1" = 50' DATE: DECEMBER 2024

0 50 100 150

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SAN RAMON ▪ (925) 866-0322
ROSEVILLE ▪ (916) 788-4456
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SHEET NO. C6.0 OF 8 SHEETS

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APPENDIX B

BAHM Model Inputs

PRE-PROJECT WATERSHED AREAS

Watershed Area	Total Area		Impervious Total		Impervious Roads		Impervious Roof		Pervious	
	(sf)	*(acres)*	*(sf)*	*(acres)*	*(sf)*	*(acres)*	*(sf)*	*(acres)*	*(sf)*	*(acres)*
Northwest	292,428	6.71	0	0.00	0	0.00	0	0.00	292,428	6.71
North Central	56,220	1.29	0	0.00	0	0.00	0	0.00	56,220	1.29
Northeast	66,581	1.53	0	0.00	0	0.00	0	0.00	66,581	1.53
Subtotal to Wilbur Avenue	415,229	9.53	0	0.00	0	0.00	0	0.00	415,229	9.53
Southwest	35,709	0.82	5,860	0.13	5,860	0.13	0	0.00	29,849	0.69
South Central	305,330	7.01	11,288	0.26	5,882	0.14	5,406	0.12	294,042	6.75
Southeast	132,551	3.04	37,042	0.85	37,042	0.85	0	0.00	95,509	2.19
Subtotal to East Antioch Creek	473,590	10.87	54,190	1.24	48,784	1.12	5,406	0.12	419,400	9.63
Total	**888,819**	**20.40**	**54,190**	**1.24**	**48,784**	**1.12**	**5,406**	**0.12**	**834,629**	**19.16**

POST-PROJECT WATERSHED AREAS

Watershed Area	Total Area		Impervious Total		Impervious Roads		Impervious Roof		Pervious	
	(sf)	*(acres)*	*(sf)*	*(acres)*	*(sf)*	*(acres)*	*(sf)*	*(acres)*	*(sf)*	*(acres)*
Northwest	52,606	1.21	0	0.00	0	0.00	0	0.00	52,606	1.21
DMA 1	383,743	8.81	201,915	4.64	100,101	2.30	101,814	2.34	181,828	4.17
DMA 2	368,222	8.45	178,158	4.09	100,924	2.32	77,234	1.77	190,064	4.36
Subtotal to Honeynut St	804,571	18.47	380,073	8.73	201,025	4.61	179,048	4.11	424,498	9.75
North Central	37,397	0.86	0	0.00	0	0.00	0	0.00	37,397	0.86
Northeast	28,396	0.65	0	0.00	0	0.00	0	0.00	28,396	0.65
Subtotal to Wilbur Avenue	870,364	19.98	380,073	8.73	201,025	4.61	179,048	4.11	490,291	11.26
Southwest	18,219	0.42	15,828	0.36	15,828	0.36	0	0.00	2,391	0.05
Total	**888,583**	**20.40**	**395,901**	**9.09**	**216,853**	**4.98**	**179,048**	**4.11**	**492,682**	**11.31**

APPENDIX C

Mean Seasonal Isohyetal Map

122°15′ 122°00′ 121°45′

38°00′ 37°45′

Project Site

ISOHYETS SHOWN IN INCHES
ISOHYETS SHOWN IN MILLIMETERS

Legend

These layers were added in 2010 and do not reflect an update to the original 2.5" interval isohyets.

- County Boundary
- 0.50" Isohyets
- 0.25" Isohyets

SCALE
MILES 0 1 2 3 4 5 MILES
KILOMETERS 0 1 2 3 4 5 6 7 8 KILOMETERS
ONE KILOMETER = ⅝ MILE

CONTRA COSTA COUNTY
PUBLIC WORKS DEPARTMENT

CONTRA COSTA COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

MEAN SEASONAL ISOHYETS
COMPILED FROM PRECIPITATION RECORDS
1879 - 1973

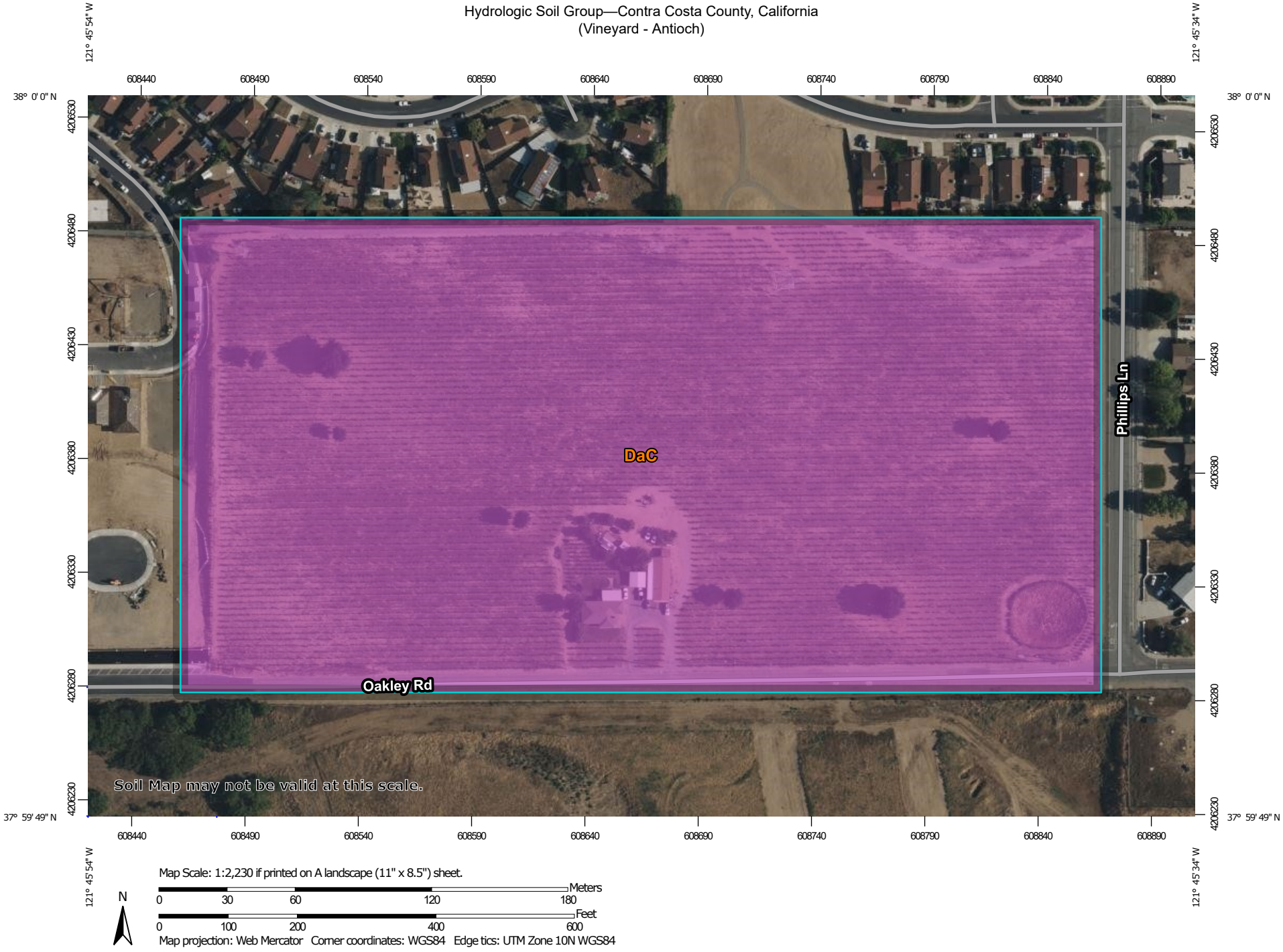
DESIGNED: P. W.	CHECKED: L. H.	DRAWING NUMBER: B-166
DRAWN: L. L. H.	DATE: 12-77	

0.25" & 0.50" ISOHYETS ADDED 01-2010 | BY: MB

APPENDIX D

Web Soil Survey Soils Report

Hydrologic Soil Group—Contra Costa County, California
(Vineyard - Antioch)



Map Scale: 1:2,230 if printed on A landscape (11" x 8.5") sheet.

N

Meters
0 30 60 120 180

Feet
0 100 200 400 600

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 10N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils

Soil Rating Polygons
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Lines
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Points
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Contra Costa County, California
Survey Area Data: Version 21, Sep 9, 2024

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Apr 23, 2022—Apr 24, 2022

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
DaC	Delhi sand, 2 to 9 percent slopes	A	21.0	100.0%
Totals for Area of Interest			**21.0**	**100.0%**

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

APPENDIX E

FEMA FIRM

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The **community map repository** should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations** (BFEs) and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Coastal Base Flood Elevations shown on this map apply only landward of 0.0' North American Vertical Datum of 1988 (NAVD 88). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations tables in the Flood Insurance Study report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations tables should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study report for information on flood control structures for this jurisdiction.

The **projection** used in the preparation of this map was Universal Transverse Mercator (UTM) zone 10. The **horizontal datum** was NAD 83, GRS80 spheroid. Differences in datum, spheroid, projection or UTM zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum**. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at http://www.ngs.noaa.gov or contact the National Geodetic Survey at the following address:

NGS Information Services
NOAA, N/NGS12
National Geodetic Survey
SSMC-3, #9202
1315 East-West Highway
Silver Spring, Maryland 20910-3282
(301) 713-3242

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at **(301) 713-3242**, or visit its website at http://www.ngs.noaa.gov.

Base map information shown on this FIRM was provided in digital format by the USDA National Agriculture Imagery Program (NAIP). This information was photogrammetrically compiled at a scale of 1:24,000 from aerial photography dated 2005.

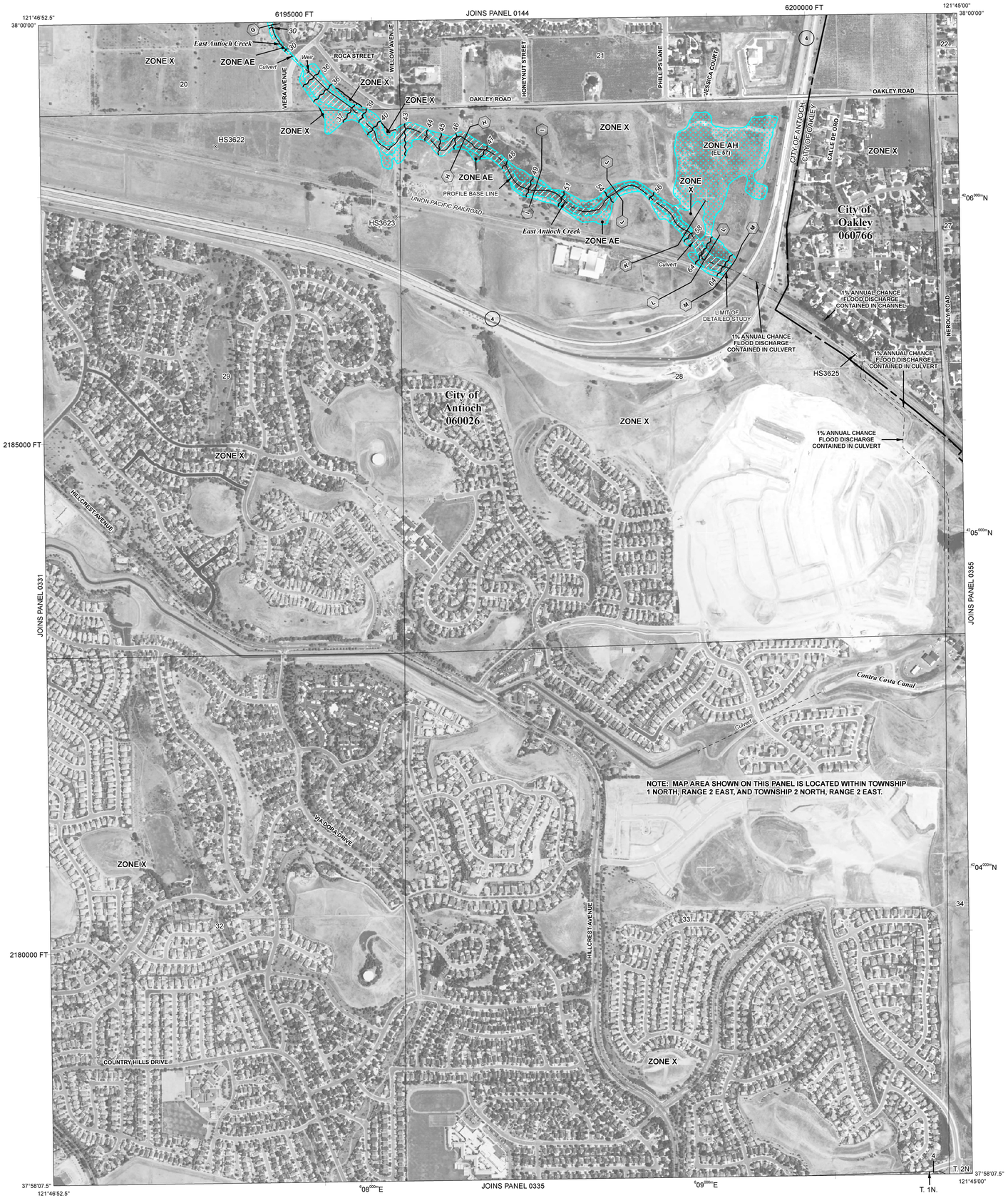
This map reflects more detailed and up-to-date **stream channel configurations** than those shown on the previous FIRM for this jurisdiction. The floodplains and floodways that were transferred from the previous FIRM may have been adjusted to conform to these new stream channel configurations. As a result, the Flood Profiles and Floodway Data in the Flood Insurance Study Report (which contains authoritative hydraulic data) may reflect stream channel distances that differ from what is shown on this map.

Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels; community map repository addresses; and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

Contact the **FEMA Map Service Center** at 1-800-358-9616 for information on available products associated with this FIRM. Available products may include previously issued Letters of Map Change, a Flood Insurance Study report, and/or digital versions of this map. The FEMA Map Service Center may also be reached by Fax at 1-800-358-9620 and its website at http://msc.fema.gov.

If you have **questions about this map** or questions concerning the National Flood Insurance Program in general, please call **1-877-FEMA MAP** (1-877-336-2627) or visit the FEMA website at http://www.fema.gov.



LEGEND

SPECIAL FLOOD HAZARD AREAS SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A	No Base Flood Elevations determined.
ZONE AE	Base Flood Elevations determined.
ZONE AH	Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
ZONE AO	Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE AR	Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
ZONE A99	Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
ZONE V	Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
ZONE VE	Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X	Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X	Areas determined to be outside the 0.2% annual chance floodplain.
ZONE D	Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

	1% annual chance floodplain boundary
	0.2% annual chance floodplain boundary
	Floodway boundary
	Zone D boundary
	CBRS and OPA boundary
	Boundary dividing Special Flood Hazard Area Zones and boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.
513	Base Flood Elevation line and value; elevation in feet*
(EL 987)	Base Flood Elevation value where uniform within zone; elevation in feet*

* Referenced to the North American Vertical Datum of 1988

A — A	Cross section line
23 — 23	Transect line
87°07'45", 32°22'30"	Geographic coordinates referenced to the North American Datum of 1983 (NAD 83), Western Hemisphere
4376000mN	1000-meter Universal Transverse Mercator grid values, zone 10N
600000 FT	5000-foot grid ticks: California State Plane coordinate system, zone III (FIPSZONE 0403), Lambert Conformal Conic projection
DX5510 ×	Bench mark (see explanation in Notes to Users section of this FIRM panel)
● M1.5	River Mile

MAP REPOSITORY
Refer to listing of Map Repositories on Map Index

EFFECTIVE DATE OF COUNTYWIDE
FLOOD INSURANCE RATE MAP
June 16, 2009

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your Insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

MAP SCALE 1" = 500'

250 0 500 1000 FEET

150 0 150 300 METERS

NFIP
NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0332F

FIRM

FLOOD INSURANCE RATE MAP

CONTRA COSTA COUNTY, CALIFORNIA
AND INCORPORATED AREAS

PANEL 332 OF 602

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
ANTIOCH, CITY OF	060026	0332	F
OAKLEY, CITY OF	060766	0332	F

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
06013C0332F

EFFECTIVE DATE
JUNE 16, 2009

Federal Emergency Management Agency

APPENDIX F

Contra Costa County Hydromodification Applicability Map

2023 Hydromodification Management Applicability Map for Contra Costa Jurisdictions

Legend
Basemap Gallery
Layers

Parcels

Parcels_Public

Creeks And Drainages

Non-Concrete
Concrete

City Limits

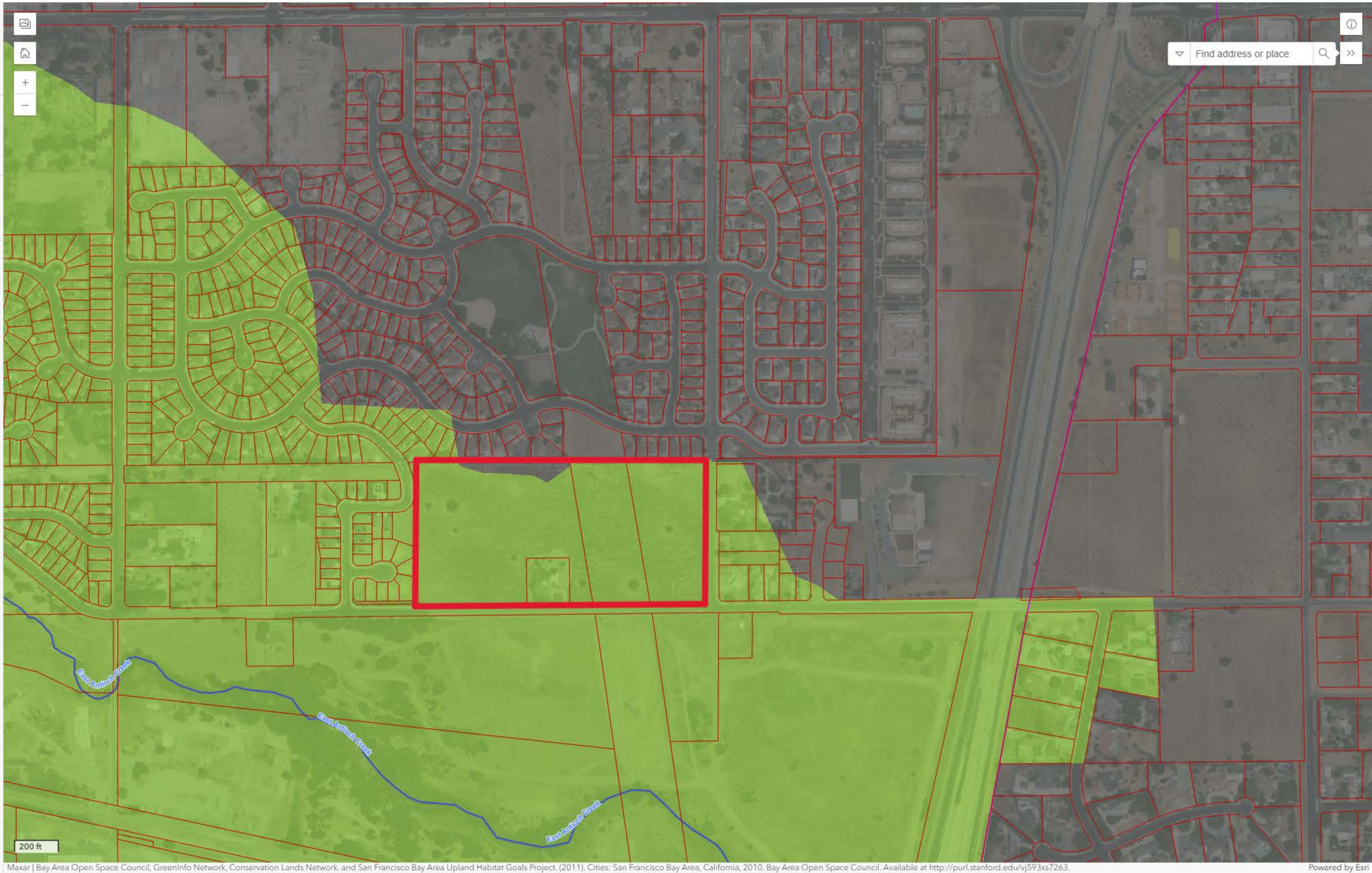
HM Applicability Categories

HM Applicable

HM Applicable

HM Exempt

Bay Lands
Tidally Influenced
> 70% Impervious
Drains to Hardened Channel



Collapse

APPENDIX G

BAHM Model Report

BAHM2023

PROJECT REPORT

General Model Information

BAHM2023 Project Name: 224159 BAHM Dec 2024 Rev

Site Name:	Vineyards
Site Address:	
City:	
Report Date:	12/19/2024
Gage:	Brentwood
Data Start:	1959/10/01
Data End:	2021/09/30
Timestep:	Hourly
Precip Scale:	1.000
Version Date:	2024/01/22

POC Thresholds

Low Flow Threshold for POC1:	10 Percent of the 2 Year
High Flow Threshold for POC1:	10 Year
Low Flow Threshold for POC2:	10 Percent of the 2 Year
High Flow Threshold for POC2:	10 Year

Landuse Basin Data

Pre-Project Land Use

Northwest

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
A,Grass,Flat(0-5%)	6.713
Pervious Total	6.713
Impervious Land Use	acre
Impervious Total	0
Basin Total	6.713

Element Flow Componants:

Surface	Interflow	Groundwater

Componant Flows To:

POC 1	POC 1

North Central

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
A,Grass,Flat(0-5%)	1.291
Pervious Total	1.291
Impervious Land Use	acre
Impervious Total	0
Basin Total	1.291

Element Flow Componants:

Surface	Interflow	Groundwater

Componant Flows To:

POC 1	POC 1

Northeast

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
A,Grass,Flat(0-5%)	1.528
Pervious Total	1.528
Impervious Land Use	acre
Impervious Total	0
Basin Total	1.528

Element Flow Componants:

Surface	Interflow	Groundwater

Componant Flows To:

POC 1	POC 1

Southwest

Bypass:	No
GroundWater:	No

Pervious Land Use	acre
A,Grass,Flat(0-5%)	0.685
Pervious Total	0.685

Impervious Land Use	acre
Roads,Flat(0-5%)	0.135
Impervious Total	0.135
Basin Total	0.82

Element Flow Componants:

Surface	Interflow	Groundwater

Componant Flows To:

POC 2	POC 2

South Central

Bypass:	No
GroundWater:	No

Pervious Land Use	acre
A,Grass,Flat(0-5%)	6.75
Pervious Total	6.75

Impervious Land Use	acre
Roads,Flat(0-5%)	0.135
Roof Area	0.124
Impervious Total	0.259
Basin Total	7.009

Element Flow Componants:

Surface	Interflow	Groundwater
Componant Flows To:		
POC 2	POC 2	

Southeast

Bypass:	No
GroundWater:	No

Pervious Land Use	acre
A,Grass,Flat(0-5%)	2.193
Pervious Total	2.193

Impervious Land Use	acre
Roads,Flat(0-5%)	0.85
Impervious Total	0.85
Basin Total	3.043

Element Flow Componants:

Surface	Interflow	Groundwater
Componant Flows To:		
Ex SE Infiltration Basin	Ex SE Infiltration Basin	

Mitigated Land Use

DMA 2

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
A,Grass,Flat(0-5%)	4.363
Pervious Total	4.363
Impervious Land Use	acre
Roads,Flat(0-5%)	2.317
Roof Area	1.773
Impervious Total	4.09
Basin Total	8.453

Element Flow Componants:

Surface	Interflow	Groundwater

Componant Flows To:

Surface Basin 2	Surface Basin 2

DMA 1

Bypass:	No
GroundWater:	No

Pervious Land Use	acre
A,Grass,Flat(0-5%)	4.174
Pervious Total	4.174

Impervious Land Use	acre
Roads,Flat(0-5%)	2.298
Roof Area	2.337
Impervious Total	4.635
Basin Total	8.809

Element Flow Componants:

Surface	Interflow	Groundwater
Componant Flows To:		
Surface Basin 1	Surface Basin 1	

Northwest

Bypass:	Yes
GroundWater:	No
Pervious Land Use	acre
A,Grass,Flat(0-5%)	1.208
Pervious Total	1.208
Impervious Land Use	acre
Impervious Total	0
Basin Total	1.208

Element Flow Componants:

Surface	Interflow	Groundwater

Componant Flows To:

POC 1	POC 1

North Central

Bypass:	Yes
GroundWater:	No
Pervious Land Use	acre
A,Grass,Flat(0-5%)	0.859
Pervious Total	0.859
Impervious Land Use	acre
Impervious Total	0
Basin Total	0.859

Element Flow Componants:

Surface	Interflow	Groundwater

Componant Flows To:

POC 1	POC 1

Northeast

Bypass:	Yes
GroundWater:	No
Pervious Land Use	acre
A,Grass,Flat(0-5%)	0.652
Pervious Total	0.652
Impervious Land Use	acre
Impervious Total	0
Basin Total	0.652

Element Flow Componants:

Surface	Interflow	Groundwater

Componant Flows To:

POC 1	POC 1

Southwest

Bypass:	No
GroundWater:	No

Pervious Land Use	acre
A,Grass,Flat(0-5%)	0.055
Pervious Total	0.055

Impervious Land Use	acre
Roads,Flat(0-5%)	0.363
Impervious Total	0.363
Basin Total	0.418

Element Flow Componants:

Surface	Interflow	Groundwater

Componant Flows To:

POC 2	POC 2	

Routing Elements

Pre-Project Routing

Ex SE Infiltration Basin

Depth: 69 ft.
Discharge Structure: 1
Riser Height: 68.5 ft.
Riser Diameter: 96 in.
Element Outlets:
Outlet 1 Outlet 2
Outlet Flows To:

SSD Table Hydraulic Table

Stage (feet)	Area (ac.)	Volume (ac-ft.)	Outlet Struct	Infilt/ Recharge	NotUsed	NotUsed	NotUsed
60.00	0.007	0.000	0.000	0.030	0.000	0.000	0.000
61.00	0.025	0.016	0.000	0.108	0.000	0.000	0.000
62.00	0.043	0.050	0.000	0.186	0.000	0.000	0.000
63.00	0.058	0.101	0.000	0.251	0.000	0.000	0.000
64.00	0.074	0.167	0.000	0.320	0.000	0.000	0.000
65.00	0.091	0.249	0.000	0.394	0.000	0.000	0.000
66.00	0.108	0.349	0.000	0.467	0.000	0.000	0.000
67.00	0.126	0.466	0.000	0.545	0.000	0.000	0.000
68.00	0.144	0.600	0.000	0.623	0.000	0.000	0.000
69.00	0.379	0.862	29.95	1.639	0.000	0.000	0.000

Discharge Structure: 1
Riser Height: 68.5 ft.
Riser Diameter: 96 in.
Element Flow Outlets:
Outlet 1 Outlet 2
Outlets Flow To:

SSD Table Hydraulic Table

Stage (feet)	Area (ac.)	Volume (ac-ft.)	Outlet Struct	Infilt/ Recharge	NotUsed	NotUsed	NotUsed
60.00	0.007	0.000	0.000	0.030	0.000	0.000	0.000
61.00	0.025	0.016	0.000	0.108	0.000	0.000	0.000
62.00	0.043	0.050	0.000	0.186	0.000	0.000	0.000
63.00	0.058	0.101	0.000	0.251	0.000	0.000	0.000
64.00	0.074	0.167	0.000	0.320	0.000	0.000	0.000
65.00	0.091	0.249	0.000	0.394	0.000	0.000	0.000
66.00	0.108	0.349	0.000	0.467	0.000	0.000	0.000
67.00	0.126	0.466	0.000	0.545	0.000	0.000	0.000
68.00	0.144	0.600	0.000	0.623	0.000	0.000	0.000
69.00	0.379	0.862	29.95	1.639	0.000	0.000	0.000

Mitigated Routing

Basin 2

Bottom Length:	100.00 ft.
Bottom Width:	35.40 ft.
Material thickness of first layer:	1
Material type for first layer:	Sand
Material thickness of second layer:	0
Material type for second layer:	GRAVEL
Material thickness of third layer:	0
Material type for third layer:	GRAVEL
Infiltration On	
Infiltration rate:	13
Infiltration reduction factor:	0.33
Wetted surface area On	
Total Volume Infiltrated (ac-ft.):	243.638
Total Volume Through Riser (ac-ft.):	0.556
Total Volume Through Facility (ac-ft.):	244.194
Percent Infiltrated:	99.77
Total Precip Applied to Facility:	3.962
Total Evap From Facility:	2.099
Underdrain not used	
Discharge Structure	
Riser Height:	6.3 ft.
Riser Diameter:	24 in.
Orifice 1 Diameter:	3.500 in. Elevation:4 ft.
Element Outlets:	
Outlet 1	Outlet 2
Outlet Flows To:	

Bioretention Hydraulic Table

Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	Infilt(cfs)
63.500	0.0813	0.0000	0.0000	0.0000
63.604	0.0813	0.0034	0.0000	0.0001
63.709	0.0813	0.0068	0.0000	0.0151
63.813	0.0813	0.0102	0.0000	0.0414
63.918	0.0813	0.0136	0.0000	0.0849
64.022	0.0813	0.0170	0.0000	0.1482
64.126	0.0813	0.0204	0.0000	0.2336
64.231	0.0813	0.0238	0.0000	0.3432
64.335	0.0813	0.0271	0.0000	0.3515
64.440	0.0813	0.0305	0.0000	0.3515
64.500	0.0813	0.0325	0.0000	0.3515

Bioretention Surface Hydraulic Table

Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	To Amended(cfs)	Infilt(cfs)
1.0000	0.0813	0.0325	0.0000	0.7601	0.0113
1.1044	0.0839	0.0411	0.0000	0.7601	0.0227
1.2088	0.0865	0.0500	0.0000	0.9188	0.0343
1.3132	0.0892	0.0592	0.0000	0.9981	0.0460
1.4176	0.0919	0.0686	0.0000	1.0775	0.0579
1.5220	0.0946	0.0784	0.0000	1.1568	0.0699
1.6264	0.0974	0.0884	0.0000	1.2362	0.0820
1.7308	0.1002	0.0987	0.0000	1.3155	0.0943
1.8352	0.1031	0.1093	0.0000	1.3949	0.1067

1.9396	0.1059	0.1202	0.0000	1.4742	0.1192
2.0440	0.1088	0.1315	0.0000	1.5536	0.1319
2.1484	0.1118	0.1430	0.0000	1.6329	0.1447
2.2527	0.1147	0.1548	0.0000	1.7123	0.1577
2.3571	0.1177	0.1669	0.0000	1.7916	0.1708
2.4615	0.1207	0.1794	0.0000	1.8710	0.1840
2.5659	0.1238	0.1921	0.0000	1.9503	0.1974
2.6703	0.1269	0.2052	0.0000	2.0297	0.2109
2.7747	0.1300	0.2186	0.0000	2.1090	0.2246
2.8791	0.1332	0.2324	0.0000	2.1884	0.2384
2.9835	0.1364	0.2464	0.0000	2.2677	0.2523
3.0879	0.1396	0.2609	0.0000	2.3471	0.2664
3.1923	0.1428	0.2756	0.0000	2.4264	0.2806
3.2967	0.1461	0.2907	0.0000	2.5058	0.2949
3.4011	0.1494	0.3061	0.0000	2.5851	0.3094
3.5055	0.1528	0.3219	0.0000	2.6645	0.3240
3.6099	0.1562	0.3380	0.0000	2.7438	0.3388
3.7143	0.1596	0.3545	0.0000	2.8232	0.3537
3.8187	0.1630	0.3713	0.0000	2.9025	0.3687
3.9231	0.1665	0.3885	0.0000	2.9819	0.3839
4.0275	0.1700	0.4061	0.0000	3.0612	0.3992
4.1319	0.1736	0.4240	0.0000	3.1406	0.4147
4.2363	0.1771	0.4423	0.0000	3.2199	0.4303
4.3407	0.1807	0.4610	0.0000	3.2993	0.4460
4.4451	0.1844	0.4801	0.0000	3.3786	0.4619
4.5495	0.1880	0.4995	0.0000	3.4580	0.4779
4.6538	0.1917	0.5193	0.0000	3.5373	0.4940
4.7582	0.1955	0.5396	0.0000	3.6167	0.5103
4.8626	0.1992	0.5602	0.0000	3.6960	0.5267
4.9670	0.2030	0.5812	0.0000	3.7754	0.5433
5.0714	0.2069	0.6025	0.0888	3.8547	0.5600
5.1758	0.2107	0.6243	0.1394	3.9341	0.5768
5.2802	0.2146	0.6465	0.1760	4.0134	0.5938
5.3846	0.2185	0.6692	0.2062	4.0928	0.6109
5.4890	0.2225	0.6922	0.2325	4.1721	0.6282
5.5934	0.2265	0.7156	0.2561	4.2515	0.6456
5.6978	0.2305	0.7395	0.2777	4.3308	0.6631
5.8022	0.2346	0.7637	0.2977	4.4102	0.6808
5.9066	0.2387	0.7884	0.3165	4.4895	0.6986
6.0110	0.2428	0.8136	0.3342	4.5689	0.7166
6.1154	0.2469	0.8391	0.3511	4.6482	0.7346
6.2198	0.2511	0.8651	0.3671	4.7276	0.7529
6.3242	0.2553	0.8916	0.3825	4.8069	0.7712
6.4286	0.2596	0.9184	0.3973	4.8863	0.7897
6.5330	0.2638	0.9458	0.4116	4.9656	0.8084
6.6374	0.2681	0.9735	0.4254	5.0450	0.8272
6.7418	0.2725	1.0017	0.4387	5.1243	0.8461
6.8462	0.2769	1.0304	0.4517	5.2037	0.8651
6.9505	0.2813	1.0596	0.4643	5.2830	0.8843
7.0549	0.2857	1.0891	0.4765	5.3623	0.9037
7.1593	0.2902	1.1192	0.4885	5.4417	0.9231
7.2637	0.2947	1.1497	0.5002	5.5210	0.9427
7.3681	0.2992	1.1807	0.8887	5.5486	0.9625
7.4725	0.3038	1.2122	2.0372	5.5486	0.9824
7.5769	0.3084	1.2442	3.5799	5.5486	1.0024
7.6813	0.3130	1.2766	5.3516	5.5486	1.0226
7.7857	0.3177	1.3095	7.1949	5.5486	1.0429
7.8901	0.3224	1.3429	8.9499	5.5486	1.0633

7.9945	0.3271	1.3768	10.472	5.5486	1.0839
8.0989	0.3318	1.4112	11.662	5.5486	1.1046
8.2033	0.3366	1.4461	12.504	5.5486	1.1255
8.3077	0.3414	1.4815	13.251	5.5486	1.1465
8.4121	0.3463	1.5174	13.900	5.5486	1.1676
8.5165	0.3512	1.5538	14.519	5.5486	1.1889
8.6209	0.3561	1.5907	15.112	5.5486	1.2103
8.7253	0.3611	1.6282	15.682	5.5486	1.2318
8.8297	0.3660	1.6661	16.232	5.5486	1.2535
8.9341	0.3711	1.7046	16.764	5.5486	1.2754
9.0385	0.3761	1.7436	17.279	5.5486	1.2973
9.1429	0.3812	1.7831	17.779	5.5486	1.3194
9.2473	0.3863	1.8232	18.266	5.5486	1.3417
9.3516	0.3914	1.8638	18.739	5.5486	1.3640
9.4560	0.3966	1.9049	19.201	5.5486	1.3735
9.5000	0.3988	1.9224	19.651	5.5486	0.7272

Basin 1

Bottom Length:	100.00 ft.
Bottom Width:	12.10 ft.
Material thickness of first layer:	1
Material type for first layer:	Sand
Material thickness of second layer:	0
Material type for second layer:	GRAVEL
Material thickness of third layer:	0
Material type for third layer:	GRAVEL
Infiltration On	
Infiltration rate:	13
Infiltration reduction factor:	0.33
Wetted surface area On	
Total Volume Infiltrated (ac-ft.):	270.471
Total Volume Through Riser (ac-ft.):	2.584
Total Volume Through Facility (ac-ft.):	273.055
Percent Infiltrated:	99.05
Total Precip Applied to Facility:	2.848
Total Evap From Facility:	1
Underdrain not used	
Discharge Structure	
Riser Height:	6.3 ft.
Riser Diameter:	24 in.
Orifice 1 Diameter:	3.750 in. Elevation:4 ft.
Element Outlets:	
Outlet 1	Outlet 2
Outlet Flows To:	

Bioretention Hydraulic Table

Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	Infilt(cfs)
60.500	0.0498	0.0000	0.0000	0.0000
60.604	0.0484	0.0012	0.0000	0.0000
60.709	0.0460	0.0025	0.0000	0.0060
60.813	0.0436	0.0039	0.0000	0.0175
60.918	0.0412	0.0054	0.0000	0.0383
61.022	0.0389	0.0070	0.0000	0.0710
61.126	0.0366	0.0086	0.0000	0.1186
61.231	0.0344	0.0104	0.0000	0.1842
61.335	0.0321	0.0123	0.0000	0.1990
61.440	0.0299	0.0142	0.0000	0.2094
61.500	0.0278	0.0154	0.0000	0.2156

Bioretention Surface Hydraulic Table

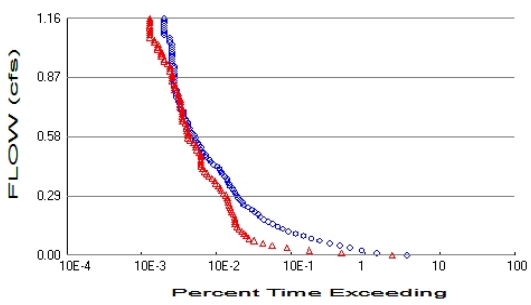
Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	To Amended(cfs)	Infilt(cfs)
1.0000	0.0498	0.0154	0.0000	0.2598	0.0107
1.1044	0.0523	0.0208	0.0000	0.2598	0.0215
1.2088	0.0548	0.0263	0.0000	0.3140	0.0325
1.3132	0.0573	0.0322	0.0000	0.3412	0.0436
1.4176	0.0599	0.0383	0.0000	0.3683	0.0549
1.5220	0.0625	0.0447	0.0000	0.3954	0.0662
1.6264	0.0651	0.0514	0.0000	0.4225	0.0778
1.7308	0.0678	0.0583	0.0000	0.4497	0.0894
1.8352	0.0705	0.0655	0.0000	0.4768	0.1012
1.9396	0.0732	0.0730	0.0000	0.5039	0.1132
2.0440	0.0760	0.0808	0.0000	0.5310	0.1252

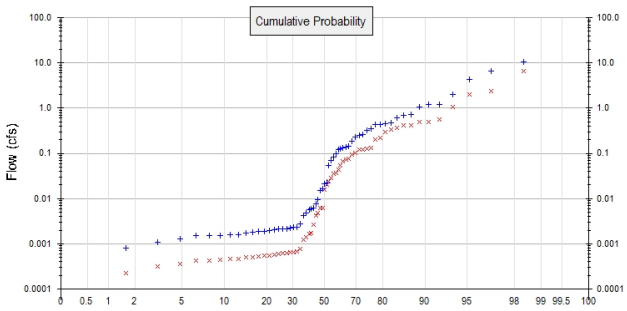
2.1484	0.0788	0.0889	0.0000	0.5581	0.1375
2.2527	0.0816	0.0973	0.0000	0.5853	0.1498
2.3571	0.0845	0.1060	0.0000	0.6124	0.1623
2.4615	0.0874	0.1149	0.0000	0.6395	0.1749
2.5659	0.0903	0.1242	0.0000	0.6666	0.1877
2.6703	0.0932	0.1338	0.0000	0.6938	0.2006
2.7747	0.0962	0.1437	0.0000	0.7209	0.2137
2.8791	0.0992	0.1539	0.0000	0.7480	0.2269
2.9835	0.1023	0.1644	0.0000	0.7751	0.2402
3.0879	0.1054	0.1752	0.0000	0.8022	0.2537
3.1923	0.1085	0.1864	0.0000	0.8294	0.2673
3.2967	0.1116	0.1979	0.0000	0.8565	0.2810
3.4011	0.1148	0.2097	0.0000	0.8836	0.2949
3.5055	0.1180	0.2218	0.0000	0.9107	0.3089
3.6099	0.1212	0.2343	0.0000	0.9379	0.3231
3.7143	0.1245	0.2472	0.0000	0.9650	0.3373
3.8187	0.1278	0.2603	0.0000	0.9921	0.3518
3.9231	0.1312	0.2738	0.0000	1.0192	0.3664
4.0275	0.1345	0.2877	0.0000	1.0463	0.3811
4.1319	0.1379	0.3019	0.0000	1.0735	0.3959
4.2363	0.1414	0.3165	0.0000	1.1006	0.4109
4.3407	0.1448	0.3314	0.0000	1.1277	0.4260
4.4451	0.1483	0.3468	0.0000	1.1548	0.4413
4.5495	0.1519	0.3624	0.0000	1.1820	0.4567
4.6538	0.1554	0.3785	0.0000	1.2091	0.4722
4.7582	0.1590	0.3949	0.0000	1.2362	0.4879
4.8626	0.1626	0.4117	0.0000	1.2633	0.5037
4.9670	0.1663	0.4288	0.0000	1.2904	0.5197
5.0714	0.1700	0.4464	0.1020	1.3176	0.5358
5.1758	0.1737	0.4643	0.1600	1.3447	0.5520
5.2802	0.1774	0.4826	0.2020	1.3718	0.5684
5.3846	0.1812	0.5014	0.2367	1.3989	0.5849
5.4890	0.1851	0.5205	0.2669	1.4261	0.6016
5.5934	0.1889	0.5400	0.2940	1.4532	0.6184
5.6978	0.1928	0.5599	0.3188	1.4803	0.6353
5.8022	0.1967	0.5803	0.3418	1.5074	0.6523
5.9066	0.2006	0.6010	0.3634	1.5345	0.6695
6.0110	0.2046	0.6222	0.3837	1.5617	0.6869
6.1154	0.2086	0.6437	0.4030	1.5888	0.7044
6.2198	0.2127	0.6657	0.4215	1.6159	0.7220
6.3242	0.2167	0.6881	0.4391	1.6430	0.7398
6.4286	0.2208	0.7110	0.4561	1.6702	0.7576
6.5330	0.2250	0.7342	0.4725	1.6973	0.7757
6.6374	0.2292	0.7579	0.4883	1.7244	0.7939
6.7418	0.2334	0.7821	0.5036	1.7515	0.8122
6.8462	0.2376	0.8067	0.5185	1.7786	0.8306
6.9505	0.2419	0.8317	0.5330	1.8058	0.8492
7.0549	0.2462	0.8572	0.5470	1.8329	0.8679
7.1593	0.2505	0.8831	0.5608	1.8600	0.8868
7.2637	0.2548	0.9095	0.5742	1.8871	0.9058
7.3681	0.2592	0.9363	0.9644	1.8966	0.9250
7.4725	0.2637	0.9636	2.1146	1.8966	0.9442
7.5769	0.2681	0.9914	3.6588	1.8966	0.9637
7.6813	0.2726	1.0196	5.4321	1.8966	0.9832
7.7857	0.2771	1.0483	7.2770	1.8966	1.0029
7.8901	0.2817	1.0774	9.0335	1.8966	1.0228
7.9945	0.2863	1.1071	10.557	1.8966	1.0427
8.0989	0.2909	1.1372	11.749	1.8966	1.0628

8.2033	0.2955	1.1678	12.592	1.8966	1.0831
8.3077	0.3002	1.1989	13.341	1.8966	1.1035
8.4121	0.3049	1.2305	13.991	1.8966	1.1240
8.5165	0.3097	1.2626	14.611	1.8966	1.1447
8.6209	0.3145	1.2952	15.206	1.8966	1.1655
8.7253	0.3193	1.3282	15.777	1.8966	1.1864
8.8297	0.3241	1.3618	16.329	1.8966	1.2075
8.9341	0.3290	1.3959	16.862	1.8966	1.2287
9.0385	0.3339	1.4305	17.378	1.8966	1.2501
9.1429	0.3388	1.4656	17.879	1.8966	1.2716
9.2473	0.3438	1.5013	18.367	1.8966	1.2932
9.3516	0.3488	1.5374	18.842	1.8966	1.3150
9.4560	0.3538	1.5741	19.305	1.8966	1.3242
9.5000	0.3560	1.5897	19.757	1.8966	0.0000

Analysis Results

POC 1





\+ Pre-Project x Mitigated

Pre-Project Landuse Totals for POC #1
Total Pervious Area: 9.532
Total Impervious Area: 0

Mitigated Landuse Totals for POC #1
Total Pervious Area: 11.256
Total Impervious Area: 8.725

Flow Frequency Method: Weibull

Flow Frequency Return Periods for Pre-Project. POC #1

Return Period	**Flow(cfs)**
2 year	0.015856
5 year	0.437147
10 year	1.155807
25 year	5.168854

Flow Frequency Return Periods for Mitigated. POC #1

Return Period	**Flow(cfs)**
2 year	0.00619
5 year	0.249999
10 year	0.501008
25 year	2.15858

Annual Peaks

Annual Peaks for Pre-Project and Mitigated. POC #1

Year	**Pre-Project**	**Mitigated**
1960	0.084	0.024
1961	0.002	0.001
1962	4.280	1.994
1963	1.071	0.419
1964	0.005	0.001
1965	0.140	0.408
1966	0.009	0.003
1967	0.704	0.502
1968	0.004	0.001
1969	0.432	0.123
1970	0.147	0.499
1971	0.124	0.035
1972	0.002	0.000
1973	0.445	0.127

1974	0.266	0.076
1975	0.022	0.006
1976	0.001	0.000
1977	0.001	0.000
1978	1.198	0.342
1979	0.070	0.020
1980	0.355	0.101
1981	0.002	0.001
1982	1.226	1.062
1983	10.737	6.564
1984	0.017	0.005
1985	0.015	0.004
1986	1.998	0.570
1987	0.002	0.001
1988	0.002	0.001
1989	0.006	0.002
1990	0.002	0.001
1991	0.002	0.001
1992	0.712	0.203
1993	0.600	0.297
1994	0.002	0.001
1995	6.613	2.426
1996	0.098	0.028
1997	0.324	0.092
1998	0.431	0.123
1999	0.002	0.000
2000	0.002	0.001
2001	0.002	0.000
2002	0.006	0.221
2003	0.130	0.044
2004	0.002	0.001
2005	0.190	0.054
2006	0.231	0.066
2007	0.002	0.001
2008	0.002	0.001
2009	0.001	0.000
2010	0.008	0.373
2011	0.006	0.002
2012	0.002	0.000
2013	0.126	0.036
2014	0.002	0.000
2015	0.055	0.016
2016	0.022	0.006
2017	0.471	0.134
2018	0.003	0.001
2019	0.253	0.072
2020	0.001	0.000
2021	0.001	0.000

Ranked Annual Peaks

Ranked Annual Peaks for Pre-Project and Mitigated. POC #1

Rank	Pre-Project	Mitigated
1	10.7370	6.5644
2	6.6134	2.4255
3	4.2799	1.9943
4	1.9977	1.0615
5	1.2261	0.5698
6	1.1984	0.5022

7	1.0707	0.4986
8	0.7117	0.4185
9	0.7043	0.4084
10	0.6002	0.3729
11	0.4712	0.3418
12	0.4449	0.2975
13	0.4324	0.2208
14	0.4314	0.2030
15	0.3550	0.1344
16	0.3241	0.1269
17	0.2663	0.1233
18	0.2532	0.1231
19	0.2307	0.1013
20	0.1898	0.0924
21	0.1466	0.0760
22	0.1397	0.0722
23	0.1304	0.0658
24	0.1263	0.0541
25	0.1236	0.0436
26	0.0981	0.0360
27	0.0843	0.0353
28	0.0698	0.0280
29	0.0545	0.0240
30	0.0218	0.0199
31	0.0216	0.0156
32	0.0167	0.0062
33	0.0150	0.0062
34	0.0092	0.0048
35	0.0075	0.0043
36	0.0060	0.0026
37	0.0060	0.0017
38	0.0057	0.0016
39	0.0048	0.0014
40	0.0042	0.0012
41	0.0027	0.0008
42	0.0023	0.0007
43	0.0023	0.0007
44	0.0022	0.0006
45	0.0022	0.0006
46	0.0021	0.0006
47	0.0021	0.0006
48	0.0020	0.0006
49	0.0019	0.0005
50	0.0019	0.0005
51	0.0019	0.0005
52	0.0018	0.0005
53	0.0017	0.0005
54	0.0016	0.0005
55	0.0016	0.0005
56	0.0015	0.0004
57	0.0015	0.0004
58	0.0015	0.0004
59	0.0013	0.0004
60	0.0011	0.0003
61	0.0008	0.0002
62	0.0007	0.0002

Duration Flows

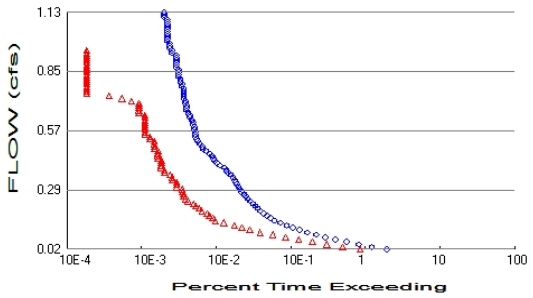
The Facility PASSED

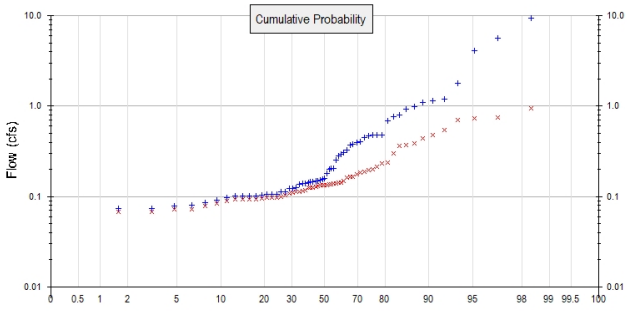
Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.0016	19756	12457	63	Pass
0.0132	7810	2604	33	Pass
0.0249	4841	972	20	Pass
0.0366	3367	482	14	Pass
0.0482	2467	304	12	Pass
0.0599	1807	228	12	Pass
0.0715	1333	175	13	Pass
0.0832	1019	150	14	Pass
0.0949	802	137	17	Pass
0.1065	633	129	20	Pass
0.1182	509	119	23	Pass
0.1298	422	110	26	Pass
0.1415	362	104	28	Pass
0.1532	310	98	31	Pass
0.1648	271	98	36	Pass
0.1765	237	97	40	Pass
0.1881	215	95	44	Pass
0.1998	197	92	46	Pass
0.2114	181	88	48	Pass
0.2231	165	86	52	Pass
0.2348	146	84	57	Pass
0.2464	128	81	63	Pass
0.2581	121	79	65	Pass
0.2697	113	78	69	Pass
0.2814	107	77	71	Pass
0.2931	102	73	71	Pass
0.3047	98	68	69	Pass
0.3164	93	64	68	Pass
0.3280	89	62	69	Pass
0.3397	82	58	70	Pass
0.3513	81	53	65	Pass
0.3630	77	52	67	Pass
0.3747	75	48	64	Pass
0.3863	70	43	61	Pass
0.3980	66	41	62	Pass
0.4096	63	38	60	Pass
0.4213	60	36	60	Pass
0.4330	56	34	60	Pass
0.4446	50	34	68	Pass
0.4563	47	34	72	Pass
0.4679	44	34	77	Pass
0.4796	40	34	85	Pass
0.4913	39	34	87	Pass
0.5029	36	32	88	Pass
0.5146	34	30	88	Pass
0.5262	34	29	85	Pass
0.5379	32	29	90	Pass
0.5495	31	27	87	Pass
0.5612	29	24	82	Pass
0.5729	29	23	79	Pass
0.5845	28	23	82	Pass
0.5962	26	23	88	Pass
0.6078	24	22	91	Pass

0.6195	24	22	91	Pass
0.6312	23	22	95	Pass
0.6428	23	21	91	Pass
0.6545	22	19	86	Pass
0.6661	21	19	90	Pass
0.6778	20	19	95	Pass
0.6895	20	19	95	Pass
0.7011	20	19	95	Pass
0.7128	18	19	105	Pass
0.7244	18	18	100	Pass
0.7361	18	18	100	Pass
0.7477	17	18	105	Pass
0.7594	17	18	105	Pass
0.7711	16	17	106	Pass
0.7827	16	17	106	Pass
0.7944	16	17	106	Pass
0.8060	16	15	93	Pass
0.8177	15	15	100	Pass
0.8294	15	15	100	Pass
0.8410	15	15	100	Pass
0.8527	15	14	93	Pass
0.8643	15	14	93	Pass
0.8760	15	14	93	Pass
0.8877	15	14	93	Pass
0.8993	15	13	86	Pass
0.9110	15	13	86	Pass
0.9226	15	13	86	Pass
0.9343	14	12	85	Pass
0.9459	14	11	78	Pass
0.9576	14	11	78	Pass
0.9693	14	10	71	Pass
0.9809	14	10	71	Pass
0.9926	14	10	71	Pass
1.0042	14	9	64	Pass
1.0159	14	9	64	Pass
1.0276	14	9	64	Pass
1.0392	13	8	61	Pass
1.0509	13	8	61	Pass
1.0625	13	7	53	Pass
1.0742	11	7	63	Pass
1.0859	11	7	63	Pass
1.0975	11	7	63	Pass
1.1092	11	7	63	Pass
1.1208	11	7	63	Pass
1.1325	11	7	63	Pass
1.1441	11	7	63	Pass
1.1558	11	7	63	Pass

Water Quality

POC 2





\+ Pre-Project x Mitigated

Pre-Project Landuse Totals for POC #2
Total Pervious Area: 9.628
Total Impervious Area: 1.244

Mitigated Landuse Totals for POC #2
Total Pervious Area: 0.055
Total Impervious Area: 0.363

Flow Frequency Method: Weibull

Flow Frequency Return Periods for Pre-Project. POC #2

Return Period	**Flow(cfs)**
2 year	0.153437
5 year	0.562074
10 year	1.12837
25 year	4.716153

Flow Frequency Return Periods for Mitigated. POC #2

Return Period	**Flow(cfs)**
2 year	0.133028
5 year	0.233048
10 year	0.466582
25 year	0.734455

Annual Peaks

Annual Peaks for Pre-Project and Mitigated. POC #2

Year	**Pre-Project**	**Mitigated**
1960	0.146	0.112
1961	0.107	0.098
1962	4.118	0.743
1963	1.192	0.370
1964	0.155	0.142
1965	0.771	0.705
1966	0.125	0.115
1967	0.689	0.136
1968	0.160	0.147
1969	0.470	0.124
1970	0.802	0.729
1971	0.202	0.161
1972	0.102	0.094
1973	0.480	0.125
1974	0.372	0.184

1975	0.113	0.098
1976	0.097	0.089
1977	0.101	0.093
1978	1.141	0.197
1979	0.398	0.366
1980	0.477	0.439
1981	0.092	0.084
1982	1.102	0.142
1983	9.338	0.949
1984	0.122	0.109
1985	0.138	0.117
1986	1.797	0.232
1987	0.122	0.112
1988	0.144	0.133
1989	0.147	0.135
1990	0.105	0.096
1991	0.136	0.125
1992	0.933	0.388
1993	0.986	0.480
1994	0.101	0.093
1995	5.688	0.546
1996	0.204	0.176
1997	0.403	0.141
1998	0.452	0.297
1999	0.073	0.068
2000	0.086	0.079
2001	0.102	0.094
2002	0.256	0.235
2003	0.279	0.200
2004	0.206	0.189
2005	0.292	0.134
2006	0.305	0.135
2007	0.066	0.060
2008	0.079	0.073
2009	0.079	0.072
2010	0.178	0.164
2011	0.107	0.098
2012	0.103	0.094
2013	0.330	0.214
2014	0.113	0.104
2015	0.140	0.128
2016	0.152	0.140
2017	0.484	0.110
2018	0.147	0.135
2019	0.377	0.166
2020	0.073	0.067
2021	0.144	0.132

Ranked Annual Peaks

Ranked Annual Peaks for Pre-Project and Mitigated. POC #2

Rank	Pre-Project	Mitigated
1	9.3377	0.9490
2	5.6879	0.7432
3	4.1182	0.7291
4	1.7972	0.7045
5	1.1916	0.5456
6	1.1414	0.4803
7	1.1024	0.4392

8	0.9856	0.3880
9	0.9330	0.3703
10	0.8020	0.3664
11	0.7711	0.2974
12	0.6893	0.2352
13	0.4838	0.2317
14	0.4796	0.2139
15	0.4772	0.1998
16	0.4695	0.1973
17	0.4524	0.1894
18	0.4035	0.1835
19	0.3983	0.1762
20	0.3766	0.1664
21	0.3724	0.1641
22	0.3299	0.1613
23	0.3047	0.1471
24	0.2918	0.1420
25	0.2795	0.1416
26	0.2556	0.1407
27	0.2060	0.1404
28	0.2043	0.1364
29	0.2019	0.1353
30	0.1781	0.1348
31	0.1598	0.1345
32	0.1545	0.1336
33	0.1524	0.1325
34	0.1475	0.1322
35	0.1473	0.1280
36	0.1462	0.1250
37	0.1444	0.1248
38	0.1435	0.1243
39	0.1396	0.1172
40	0.1383	0.1146
41	0.1357	0.1119
42	0.1251	0.1115
43	0.1222	0.1099
44	0.1218	0.1091
45	0.1131	0.1039
46	0.1130	0.0982
47	0.1068	0.0979
48	0.1065	0.0977
49	0.1049	0.0961
50	0.1034	0.0944
51	0.1018	0.0937
52	0.1016	0.0935
53	0.1012	0.0932
54	0.1012	0.0931
55	0.0965	0.0888
56	0.0919	0.0841
57	0.0861	0.0793
58	0.0794	0.0726
59	0.0786	0.0724
60	0.0734	0.0676
61	0.0733	0.0675
62	0.0657	0.0603

Duration Flows

The Facility PASSED

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.0153	10462	4651	44	Pass
0.0266	6593	2701	40	Pass
0.0378	4433	1665	37	Pass
0.0491	3018	1056	34	Pass
0.0603	2156	691	32	Pass
0.0716	1574	461	29	Pass
0.0828	1200	311	25	Pass
0.0940	899	211	23	Pass
0.1053	712	153	21	Pass
0.1165	573	120	20	Pass
0.1278	477	95	19	Pass
0.1390	393	69	17	Pass
0.1503	327	53	16	Pass
0.1615	291	49	16	Pass
0.1727	259	44	16	Pass
0.1840	237	41	17	Pass
0.1952	215	35	16	Pass
0.2065	194	32	16	Pass
0.2177	182	29	15	Pass
0.2290	169	27	15	Pass
0.2402	155	23	14	Pass
0.2514	147	21	14	Pass
0.2627	136	20	14	Pass
0.2739	129	20	15	Pass
0.2852	119	19	15	Pass
0.2964	115	19	16	Pass
0.3077	109	16	14	Pass
0.3189	103	16	15	Pass
0.3301	99	16	16	Pass
0.3414	96	14	14	Pass
0.3526	91	14	15	Pass
0.3639	85	13	15	Pass
0.3751	78	11	14	Pass
0.3864	74	11	14	Pass
0.3976	70	10	14	Pass
0.4088	62	10	16	Pass
0.4201	55	10	18	Pass
0.4313	52	10	19	Pass
0.4426	50	9	18	Pass
0.4538	48	9	18	Pass
0.4651	44	9	20	Pass
0.4763	40	9	22	Pass
0.4875	36	8	22	Pass
0.4988	35	8	22	Pass
0.5100	33	8	24	Pass
0.5213	31	8	25	Pass
0.5325	30	7	23	Pass
0.5438	29	7	24	Pass
0.5550	29	6	20	Pass
0.5662	29	6	20	Pass
0.5775	28	6	21	Pass
0.5887	28	6	21	Pass
0.6000	27	6	22	Pass

0.6112	27	6	22	Pass
0.6224	26	6	23	Pass
0.6337	24	6	25	Pass
0.6449	24	6	25	Pass
0.6562	23	5	21	Pass
0.6674	22	5	22	Pass
0.6787	22	5	22	Pass
0.6899	22	5	22	Pass
0.7011	21	5	23	Pass
0.7124	21	4	19	Pass
0.7236	20	3	15	Pass
0.7349	20	2	10	Pass
0.7461	20	1	5	Pass
0.7574	20	1	5	Pass
0.7686	20	1	5	Pass
0.7798	19	1	5	Pass
0.7911	19	1	5	Pass
0.8023	18	1	5	Pass
0.8136	18	1	5	Pass
0.8248	17	1	5	Pass
0.8361	17	1	5	Pass
0.8473	17	1	5	Pass
0.8585	17	1	5	Pass
0.8698	16	1	6	Pass
0.8810	16	1	6	Pass
0.8923	16	1	6	Pass
0.9035	16	1	6	Pass
0.9148	16	1	6	Pass
0.9260	16	1	6	Pass
0.9372	14	1	7	Pass
0.9485	14	1	7	Pass
0.9597	13	0	0	Pass
0.9710	13	0	0	Pass
0.9822	13	0	0	Pass
0.9935	12	0	0	Pass
1.0047	12	0	0	Pass
1.0159	12	0	0	Pass
1.0272	12	0	0	Pass
1.0384	12	0	0	Pass
1.0497	12	0	0	Pass
1.0609	12	0	0	Pass
1.0722	12	0	0	Pass
1.0834	12	0	0	Pass
1.0946	12	0	0	Pass
1.1059	11	0	0	Pass
1.1171	11	0	0	Pass
1.1284	11	0	0	Pass

Water Quality

Model Default Modifications

Total of 0 changes have been made.

PERLND Changes

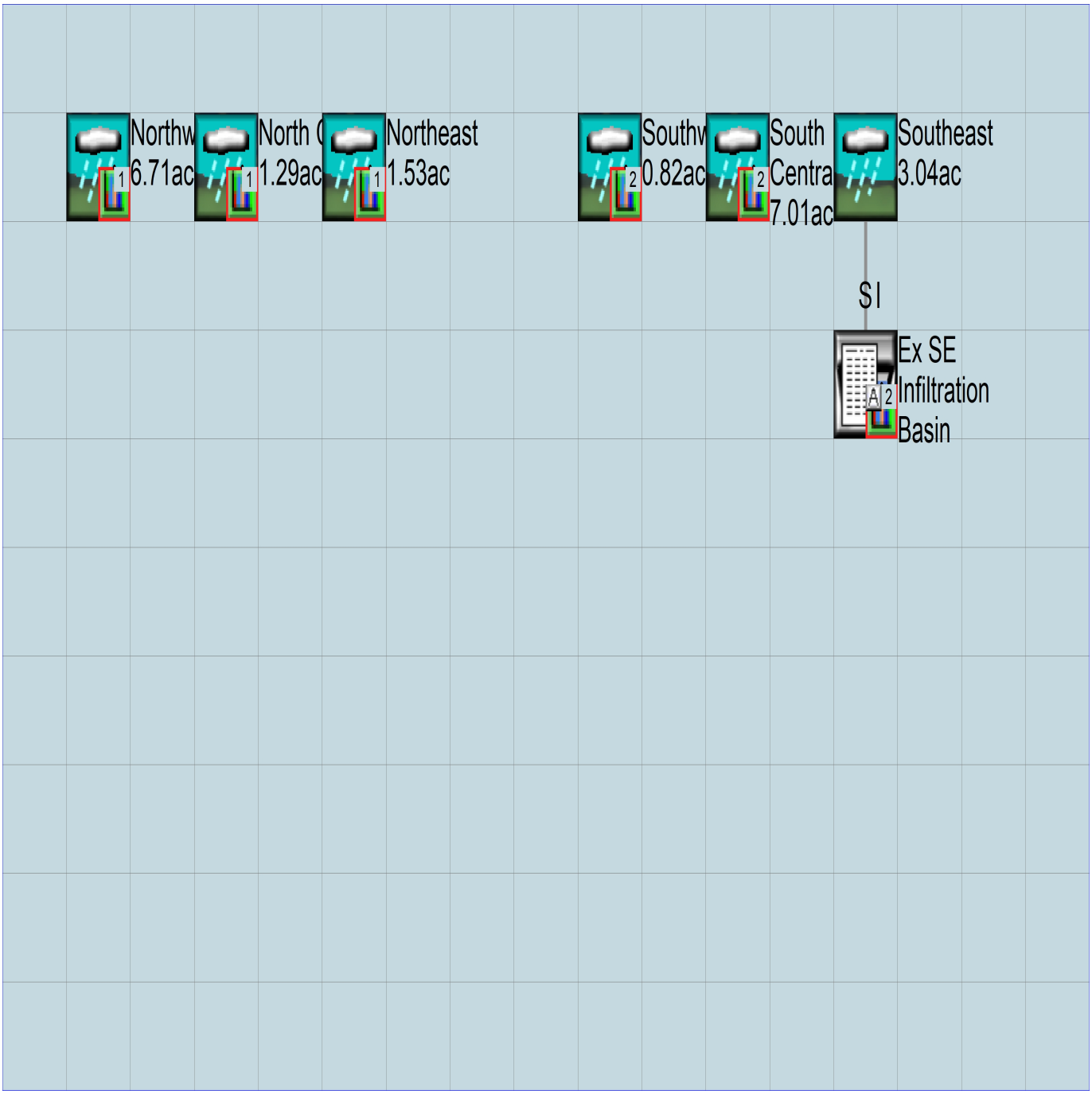
No PERLND changes have been made.

IMPLND Changes

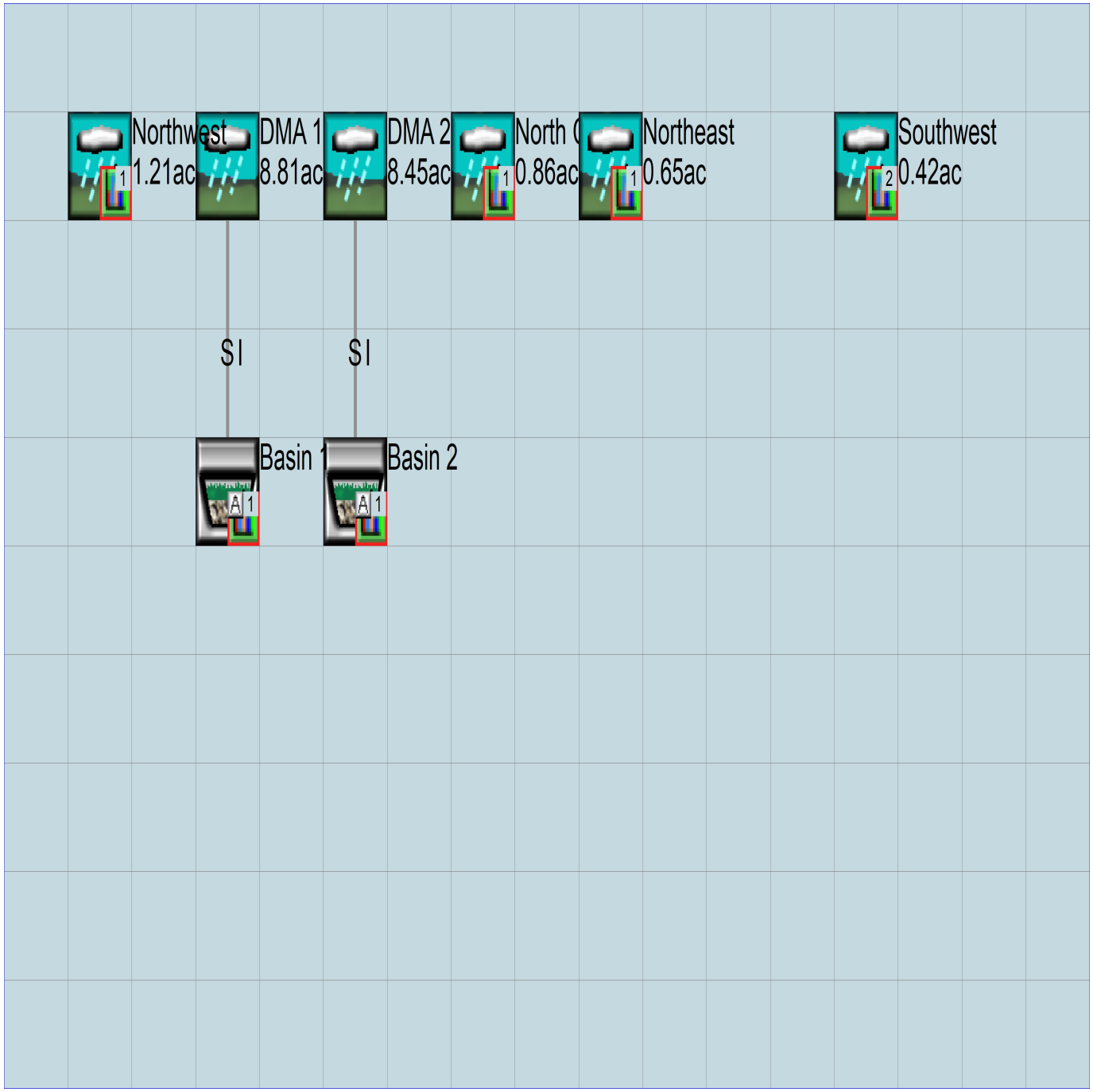
No IMPLND changes have been made.

Appendix

Pre-Project Schematic



Mitigated Schematic



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