Drainage Analysis

For

Stinson Beach Post Office & Residences

15 Calle Del Mar
Stinson Beach, California
APN 195-192-07

JN 25168
May 17, 2026

Prepared for:
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Stinson Beach Post Office & Residences
Drainage Narrative

Project Description

This project is located at 15 Calle Del Mar in Stinson Beach, California. The overall project site is approximately 0.80 acres. The site is currently developed and contains existing commercial buildings, AC parking lot, and associated hardscaping and landscaping. This project proposes to construct five new buildings, 4 single-family condominium units, and a post office/ 2-unit condominium combination building, AC driveway, associated hardscaping and landscaping.

Existing slopes in the proposed site vary between 0% to 25%. The existing building is the high point of the property. A portion of the building and property runoff flows north westly where it ultimately flows along Shoreline Highway. A portion of the building and property runoff flows south-easterly along the curb and gutter of Calle Del Mar towards an existing storm drain system. The soil type belons to hydrologic soil group C/D, see Soil Analysis in **Appendix** I. For existing conditions, see attached **Aerial Photo**.

For the proposed development, the design intent is to maintain the natural and existing drainage course as much as feasible. The proposed stormdrain system and bioretention facilities will limit runoff from the property site through detention within the bioretention to not exceed pre-development discharge off the site. Historic drainage patterns will remain, and release points off the property will not be changed due to this development.

Proposed Drainage Improvements

Stormwater runoff from the project site will be collected and directed towards four proposed bioretention facilities, BIO-1, BIO-2, BIO-3, BIO-4, via the proposed stormdrain network before releasing offsite, see **Exhibit 3 –** *Post-construction Hydrology Map.*

The four proposed bioretention facilities and the outlet structure have been designed to attenuate the post-construction discharge from the proposed development to not excess the peak runoff in pre-construction conditions for both 10-year and 100-year storm events.

Runoff from sub-watersheds A1 drains to the bioretention BIO-1. BIO-1 will retain stormwater through the facilities drain rock, amended soils section, and 6” of ponding above grade. As water level rises above 6”, it will flow into the outlet structure through its grate opening. The outlet structure discharges the flow through a rock rip-rap dissipator with a 4” perforated pipe installed level along the bioretention perimeter which will transition the discharge into sheet flow. (primary discharge). In larger storm events water level would rise further and sheet flow over the leveled edge of the perimeter wall (secondary discharge).

Runoff from sub-watersheds A2, A3 and A4 drains to the bioretention BIO-2, BIO-3, BIO-4, respectively. BIO-2, BIO-3, and BIO-4 will retain stormwater through the facilities drain rock, amended soils section, and 6" of ponding above grade. As water level rises above 6", it will start getting into the outlet structure through its grate opening and will release to a proposed storm drain system that will flow to an existing storm drain system along Calle Del Mar. After storm events, water stored in BIO-2, BIO-3, BIO-4 will eventually infiltrate down to the undisturbed native ground below and surrounding its storage chamber (Blucher-Cole complex, Hydrologic Soil Group D).

Bioretention

The four bioretention facilities have been designed to provide stormwater treatment and hydromodifications meeting the 2019 BASMAA Post-construction Manual. They will provide volume storage including surface ponding and subsurface bioretention storage by means of void space within the amended soil mixture and drain rock chamber.

Bioretention Facilities

Facility	Total Area required by BASMAA (SF)	Design Bioretention	
		Bioretention Area (SF)	Storage Volume (Cu.Ft)
BIO-1	358	362	489
BIO-2	52	55	155
BIO-3	112	115	247
BIO-4	145	150	903

Stormwater Detention & Peak Discharge Flow

This project is conditioned by the County of Marin to detain the increase of storm water volume on site prior to discharge from the property. The proposed site improvements aim to meet this goal through volume storage and outlet control to attenuate the discharge flow from the project site. The proposed drainage design controls the post-construction peak discharge to not excess the pre-construction peak runoff.

Detention analyses have been conducted to size and evaluate the detention effectiveness of the two facilities. Pre-construction peak runoff for the project site is analyzed based upon two total area (A1 and A2) using the pre-construction site condition (see **Appendix B** - *Pre-construction Peak Runoff Flow*). Pre-Construction peak runoff for A2 is being analyzed with an existing storm drain located along Calle Del Mar (Ex SD-1). The 10-yr pre-construction peak runoff for A1 is **0.38 cfs** and for Ex SD-1 **is 0.44 cfs**. The 100-yr pre-construction peak runoff for A1 is **0.57 cfs** and for Ex SD-1 **is 0.63 cfs**. (see **Appendix**

B). These peak runoffs are considered as the allowable peak flow rates for post-construction discharges.

Post-construction site's overflow, and peak discharge were analyzed for the project site and modeled based upon the proposed stormdrain network, see **Appendix C** - *Post Construction Peak Discharge*.

Pre- and post-construction runoff curve numbers were determined using Table 2-2a of the TR-55 manual. For the provided soil type D, the existing conditions were observed to be urban commercial district with an impervious area of 85% and residential district by average lot size 1/3 acre. The post construction conditions were conservatively analyzed as an urban commercial district with an impervious area of 85% and residential district by average lot size 1/8 acre or less (townhouse), see attached **Table 2-2a** in **Appendix C**.

The bioretention facility BIO-1 provides detention volume in the void space of the amended soil layer (18" thick, porosity =0.40 min), the drain rock section (12" thick, porosity =0.40 min), A 4" perorated pipe laying on top of the drain rock section, and surface ponded water. Holding water within the bioretention facilities is proposed to be drained through infiltration down to the negative ground.

The bioretention facility BIO-2 provides detention volume in the void space of the amended soil layer (18" thick, porosity =0.40 min), the drain rock section (18" thick, porosity =0.40 min), A 4" perorated pipe laying on top of the drain rock section, and surface ponded water. Holding water within the bioretention facilities is proposed to be drained through infiltration down to the negative ground.

The bioretention facility BIO-3 provides detention volume in the void space of the amended soil layer (18" thick, porosity =0.40 min), the drain rock section (36" thick, porosity =0.40 min), A 4" perorated pipe laying on top of the drain rock section, and surface ponded water. Holding water within the bioretention facilities is proposed to be drained through infiltration down to the negative ground.

The bioretention facility BIO-4 provides detention volume in the void space of the amended soil layer (18" thick, porosity =0.40 min), the drain rock section (36" thick, porosity =0.40 min), A 4" perorated pipe laying on top of the drain rock section, and surface ponded water. Holding water within the bioretention facilities is proposed to be drained through infiltration down to the negative ground.

Analysis results for post construction discharge flows are graphed in **Appendix C** and tabulated in the table below. With 10-yr storm events for A1, the post-construction peak discharge flow is **0.29** cfs (vs. **0.38 cfs** in pre-construction) and is all released thru the primary discharge (rock rip-rap pipe dissipator). With 10-yr storm events for Ex SD-1, the post-construction peak discharge flow is **0.36** cfs (vs. **0.44 cfs** in pre-construction) and is

all released thru the primary discharge (rock rip-rap pipe dissipator). With 100-yr storm events for A1, the total post-construction peak discharge flow is **0.41 cfs** (vs. **0.57 cfs** in pre-construction). With 100-yr storm events for EX SD-1, the total post-construction peak discharge flow is **0.63 cfs** (vs. **0.63 cfs** in pre-construction).

	Pre-construction Runoff/ Allowable Flow Rate (cfs)		**Post-construction Peak Discharge (cfs)**	
	10-yr	**100-yr**	**10-yr**	**100-yr**
A1	**0.38**	**0.57**	**0.29**	**0.41**
Ex SD-1	**0.44**	**0.63**	**0.36**	**0.63**

We were unable to obtain record drawings from the County of Marin and for the existing stormdrain network along Calle Del Mar. The County does not have an analysis of the stormdrain within Calle Del Mar. Therefore, the starting HGL for the 100-year event at the existing outfall to the creek along the intersection of Calle Del Mar and Arenal Avenue was assumed to be the FEMA Flood zone elevation of the location of the project site which is approximately 23.5 feet. Additionally, the existing pipe is assumed to be 15" pipe and the pipe was assumed to be 70% Full for the 100 Year flow based on Marin County Standards. The 100-Year hydrological calculations for the site, if no mitigations were provided, have been provided. However, the post construction flows are mitigated, so the HGL will not increase from pre-construction flow. The **Overland Release Map** shows drainage routing in the event of over inundation for 10 and 100-Year Storm Events.

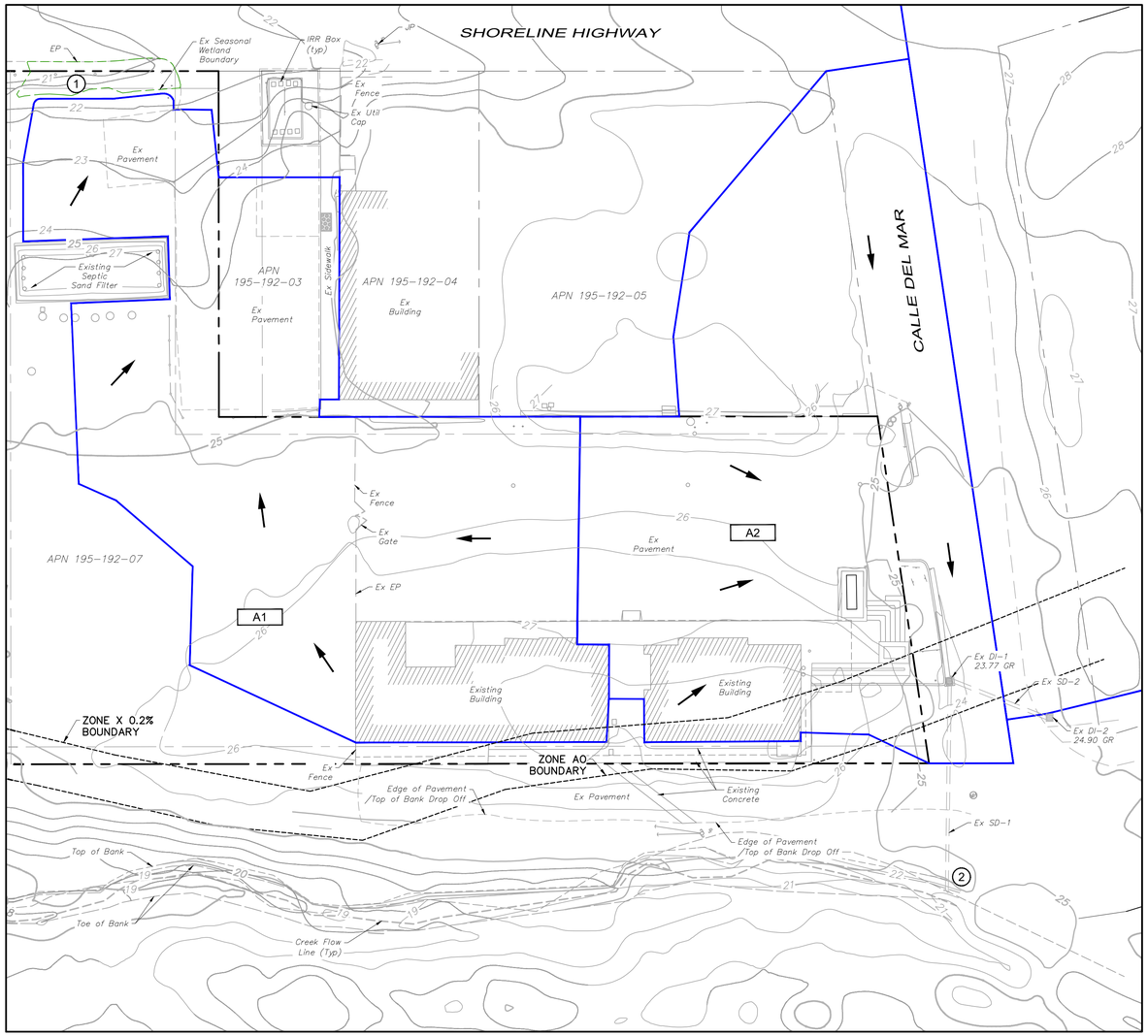
Conclusion

In accordance with the County of Marin's Hydrology Manual, all drainage facilities are designed to convey, without surcharge, runoff from the 10-yr storm event. Runoff from the impervious surfaces will be directed toward the proposed bioretention. For the 10 and 100-year storm, the increase in runoff volume due to the proposed improvements is detained in the bioretention facilities, hence there is no change from pre and post runoff conditions. Treatment will be achieved in the amended soil section, a specific mix of sand and compost for treatment, of the bioretention facility.

EXHIBITS

1. **Aerial Photo**
2. **Pre-construction Hydrology Map**
3. **Post-construction Hydrology Map**
4. **Overland Release Flood Routing Map**

Stinson Beach Post Office & Residence



PROJECT SITE CONSTRUCTION HYDROLOGY MAP

20' 10' 0 10' 20' 40' 60'

Graphic Scale: 1" = 20'

DRAINAGE AREA TABLE

A1 = 0.39 AC (17,371 SF)

A2 = 0.39 AC (17,120 SF)

DRAINAGE ROUTING

A1 → 1

A2 → 2

DRAINAGE AREA LEGEND

- DA-1 — DRAINAGE MANAGEMENT AREA
- (1) — POINT OF CONCENTRATION
- DRAINAGE AREA BOUNDARY
- PROPERTY LINE
- DIRECTION OF FLOW

NOTE:

1-FT & 5-FT CONTOURS SHOWN ARE FROM LIDAR AND ARE SHOWN FOR GRAPHIC PURPOSES ONLY

REFER TO SUBMITTED GRADING & DRAINAGE PLANS FOR INVERTS, FLOW LINES, TOP OF GRATE ELEVATIONS AND DRAINAGE SPECIFICATIONS

THIS MAP IS FOR REFERENCE ONLY

May 13, 2026

PRE CONSTRUCTION HYDROLOGY MAP

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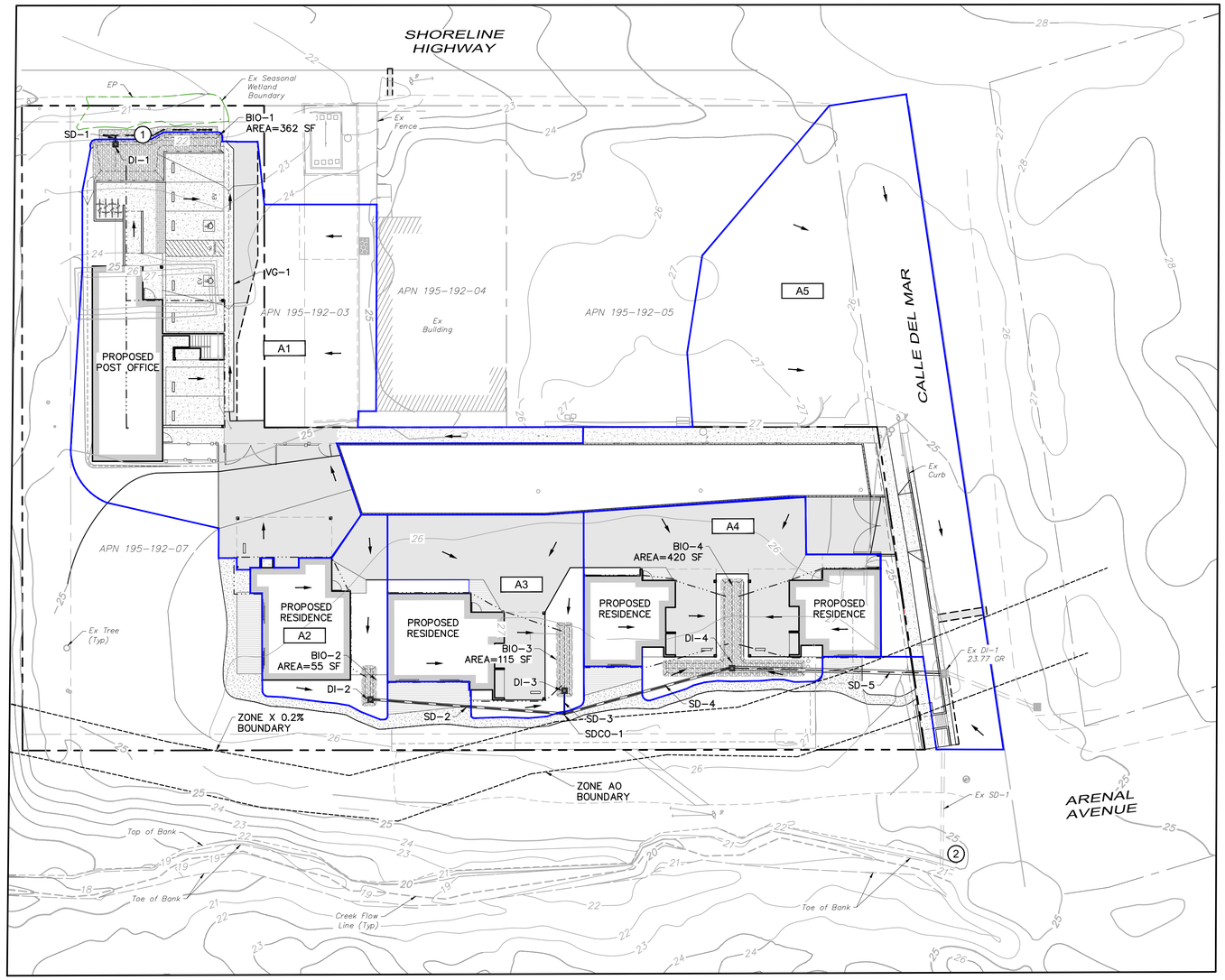


POST CONSTRUCTION HYDROLOGY MAP

20' 10' 0 10' 20' 40' 60'

Graphic Scale: 1" = 20'

DRAINAGE AREA TABLE

A1 = 0.24 AC (10,643 SF)

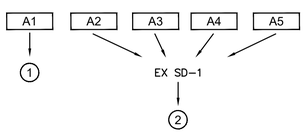
A2 = 0.04 AC (1,938 SF)

A3 = 0.08 AC (3,514 SF)

A4 = 0.10 AC (4,531 SF)

A5 = 0.30 AC (13,147 SF)

DRAINAGE ROUTING



DRAINAGE AREA LEGEND

- A1 — DRAINAGE MANAGEMENT AREA
- 1 — POINT OF CONCENTRATION
- DRAINAGE AREA BOUNDARY
- PROPERTY LINE
- DIRECTION OF FLOW

NOTE:

1-FT & 5-FT CONTOURS SHOWN ARE FROM LIDAR AND ARE SHOWN FOR GRAPHIC PURPOSES ONLY

REFER TO SUBMITTED GRADING & DRAINAGE PLANS FOR INVERTS, FLOW LINES, TOP OF GRATE ELEVATIONS AND DRAINAGE SPECIFICATIONS

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May 19, 2026

PRE CONSTRUCTION HYDROLOGY MAP

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SHORELINE HIGHWAY

CALLE DEL MAR

ARENAL AVENUE

PROPOSED POST OFFICE

PROPOSED RESIDENCE

PROPOSED RESIDENCE

PROPOSED RESIDENCE

PROPOSED RESIDENCE

APN 195-192-03

APN 195-192-04

APN 195-192-05

APN 195-192-07

Ex Building

Conc Post (typ)

EP

Ex Seasonal Wetland Boundary

Ex Fence

Ex Curb

Ex Tree (Typ)

Ex DI-1 23.77 GR

Ex SD-1

ZONE X 0.2% BOUNDARY

ZONE AO BOUNDARY

Top of Bank

Toe of Bank

Creek Flow Line (Typ)

Edge of Pavement /Top of Bank Drop Off

DRAINAGE LEGEND

PROPOSED 100-YEAR OVERLAND RELEASE ROUTE

EXISTING 100-YEAR OVERLAND RELEASE ROUTE

20' 10' 0 10' 20' 40' 60'

Graphic Scale: 1" = 20'

May 19, 2026

100-YEAR OVERLAND RELEASE MAP

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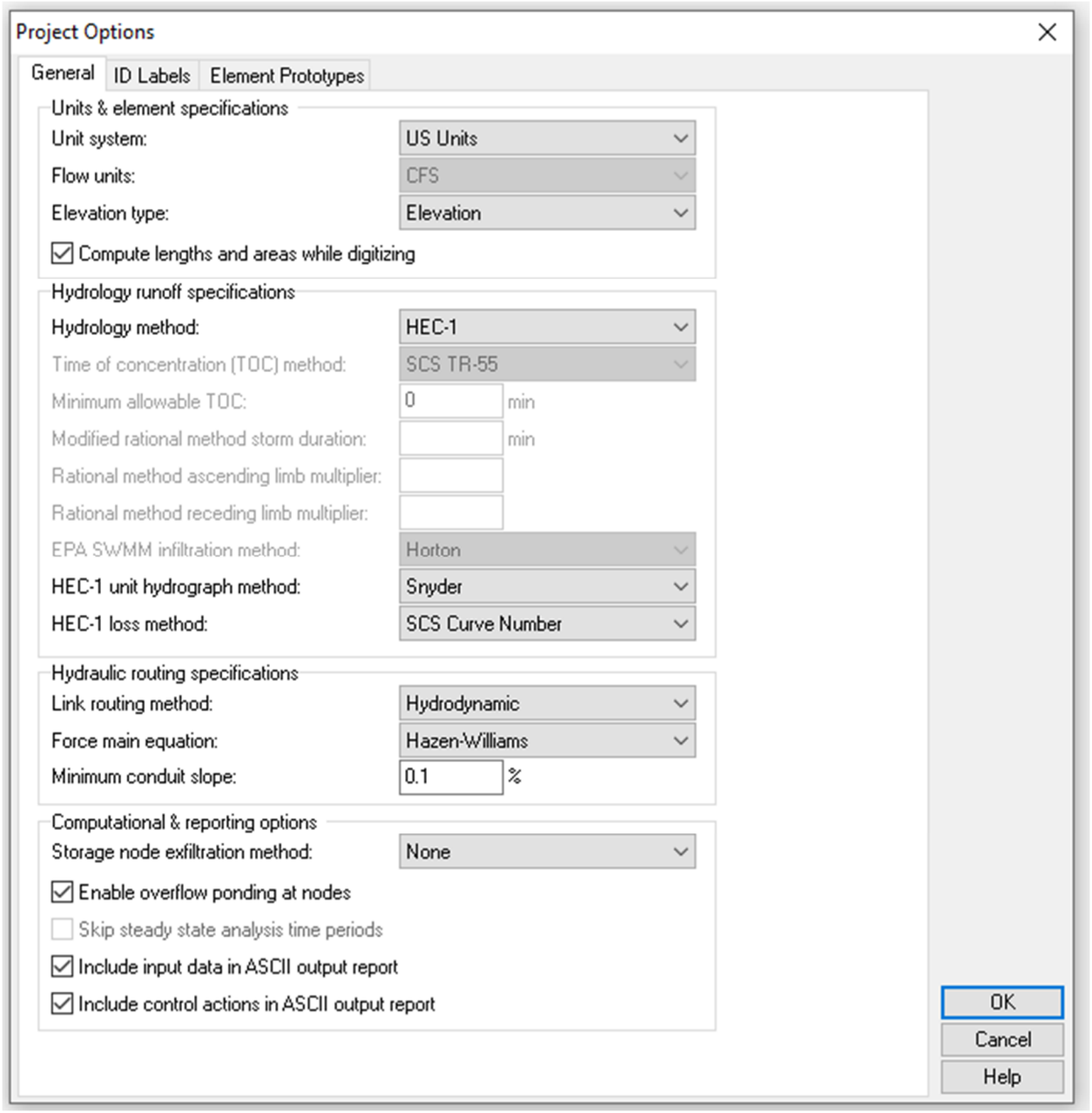
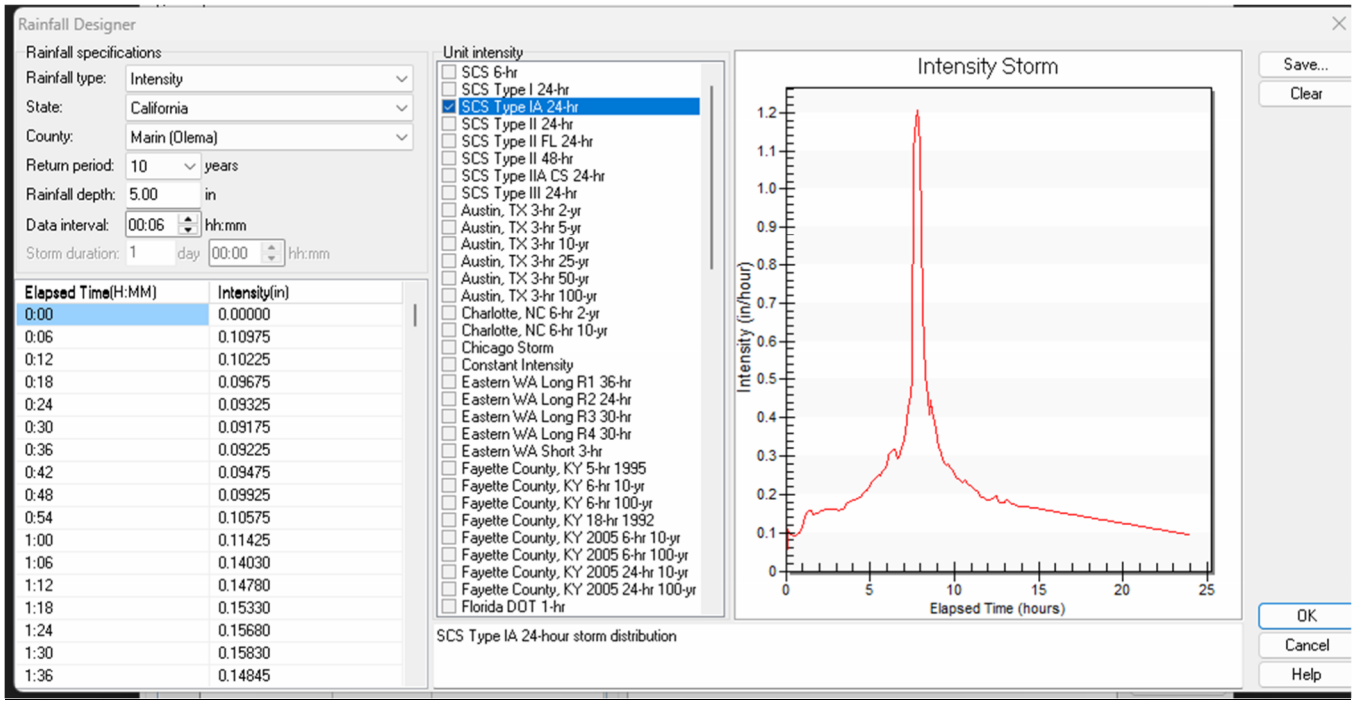
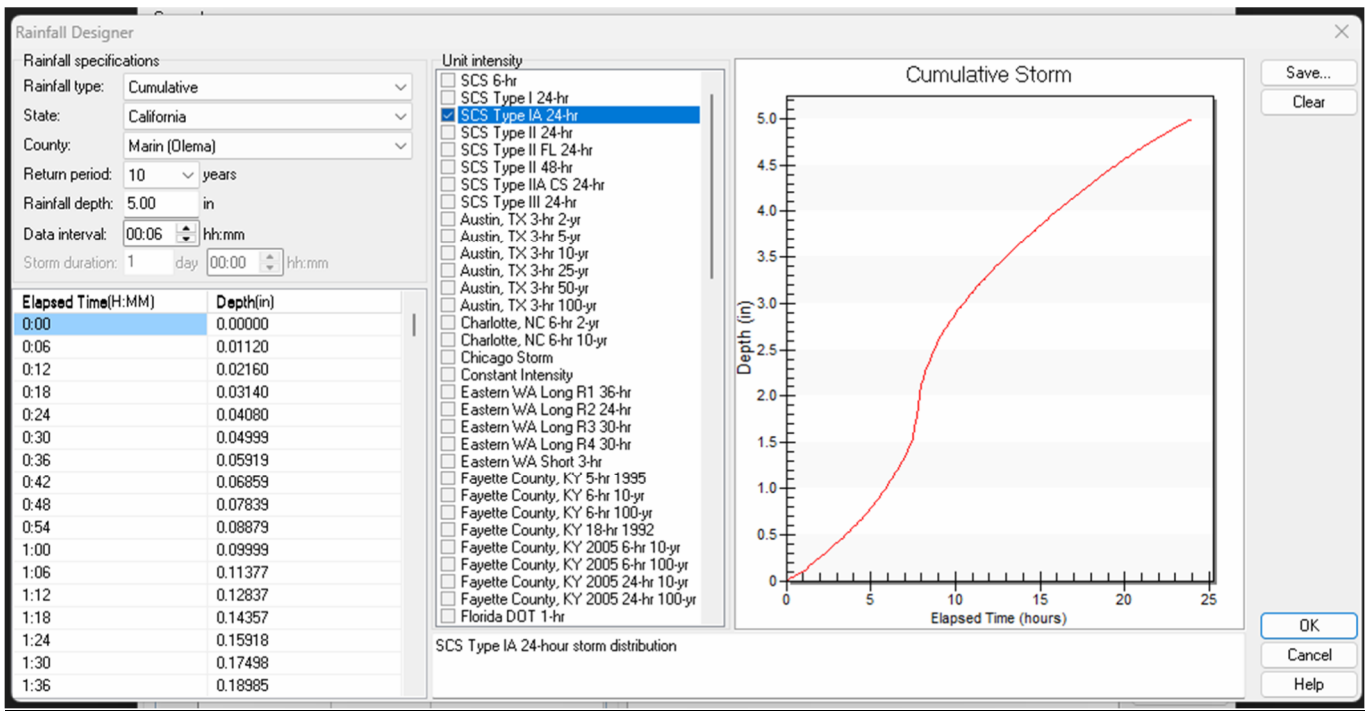
Appendix A

Drainage Analysis Model & Inputs

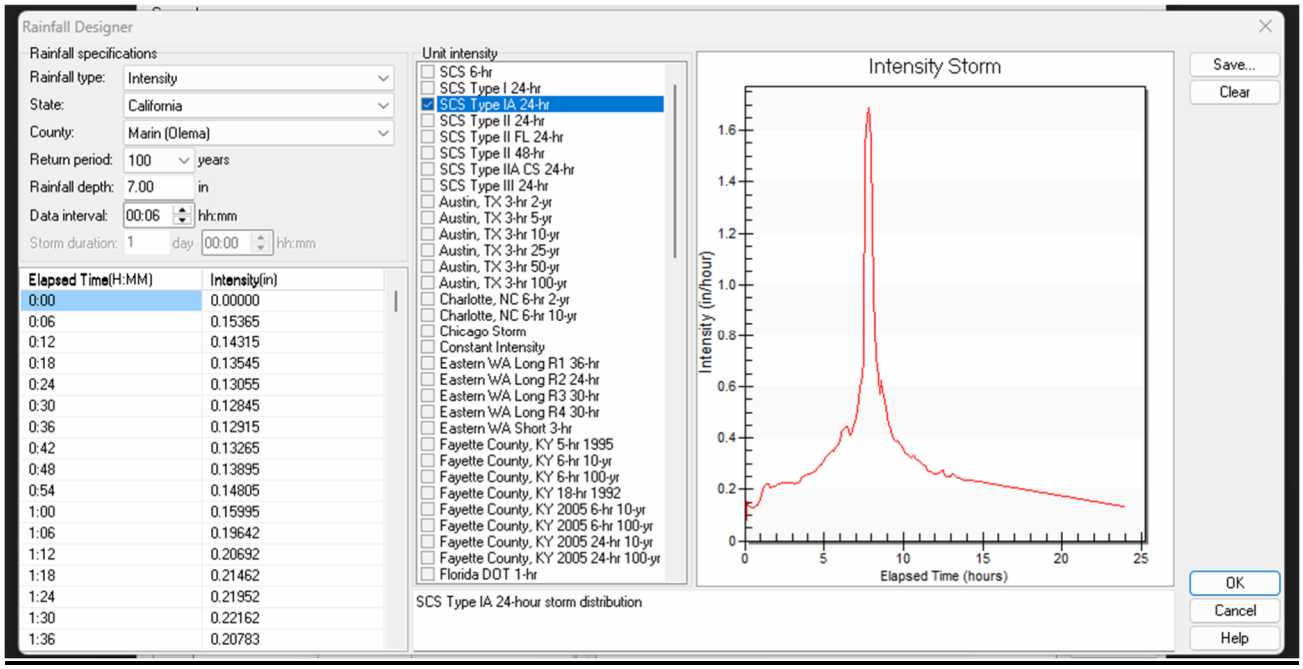

Project Options
General
ID Labels
Element Prototypes
Units & element specifications
Unit system:
US Units
Flow units:
CFS
Elevation type:
Elevation
Compute lengths and areas while digitizing
Hydrology runoff specifications
Hydrology method:
HEC-1
Time of concentration (TOC) method:
SCS TR-55
Minimum allowable TOC:
0
min
Modified rational method storm duration:
min
Rational method ascending limb multiplier:
Rational method receding limb multiplier:
EPA SWMM infiltration method:
Horton
HEC-1 unit hydrograph method:
Snyder
HEC-1 loss method:
SCS Curve Number
Hydraulic routing specifications
Link routing method:
Hydrodynamic
Force main equation:
Hazen-Williams
Minimum conduit slope:
0.1
%
Computational & reporting options
Storage node exfiltration method:
None
Enable overflow ponding at nodes
Skip steady state analysis time periods
Include input data in ASCII output report
Include control actions in ASCII output report
OK
Cancel
Help

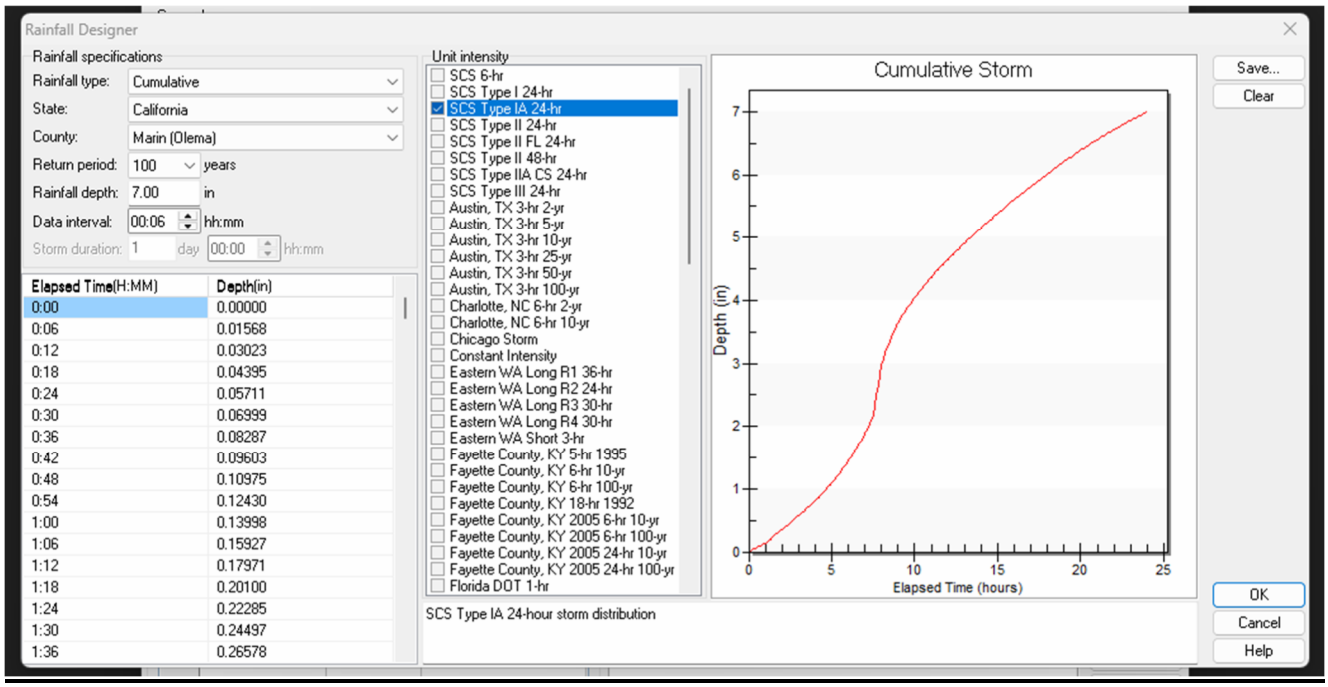
10-Yr Rain Gage



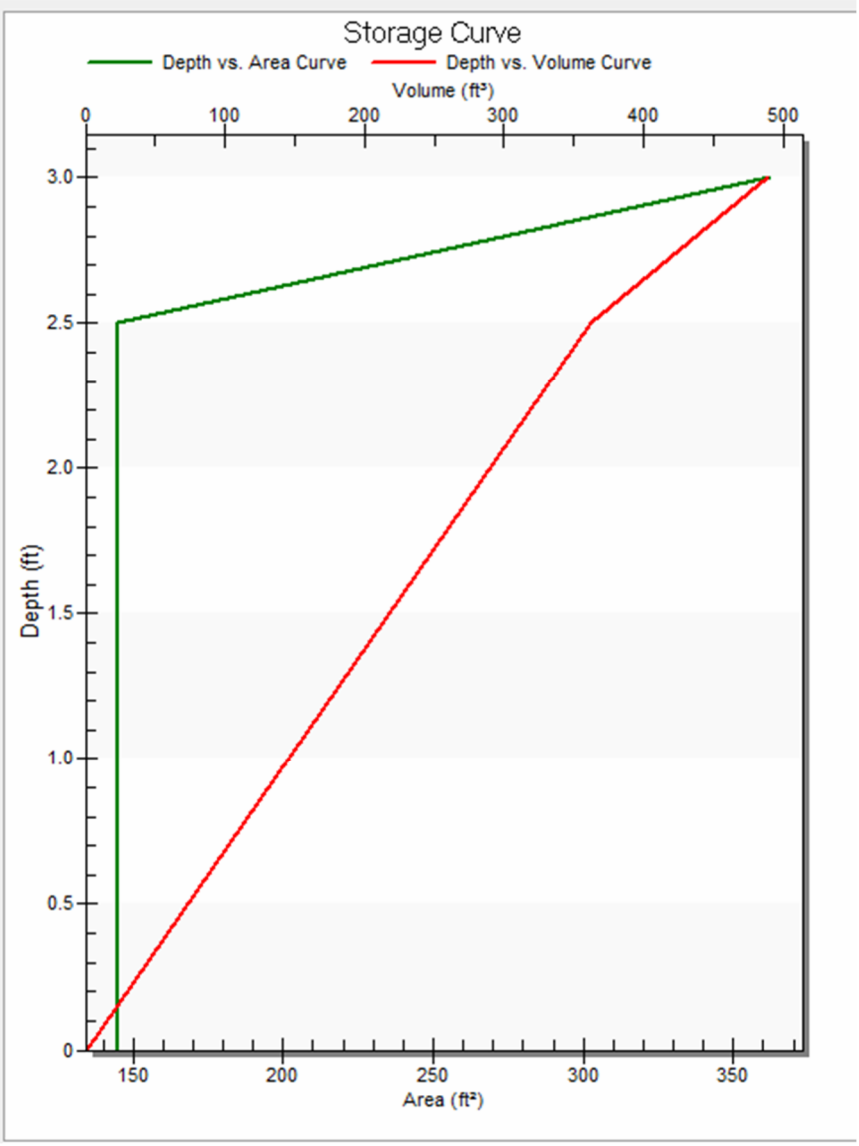


100-Yr Rain Gage





BIO-1 Storage Surve

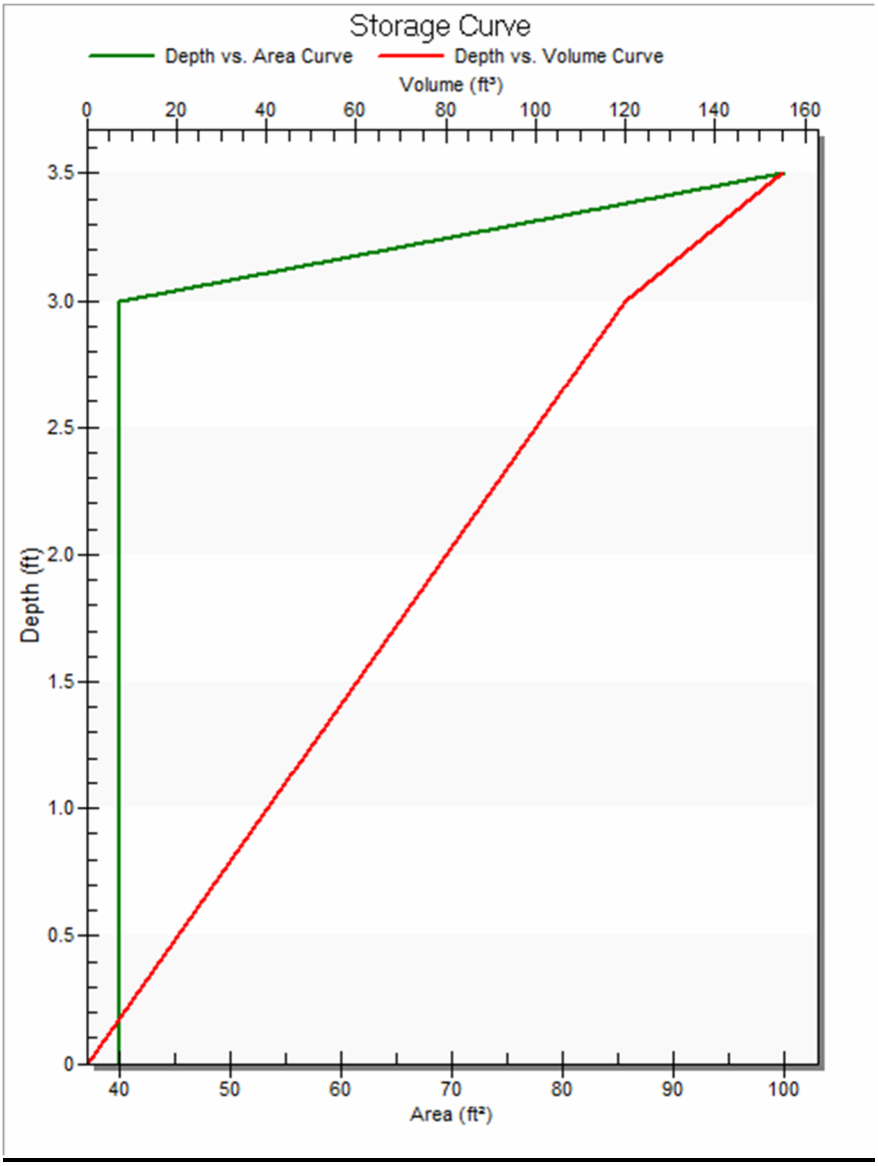


Storage curve data

Storage data type: Depth vs. Area

	Depth (ft)	Area (ft²)	Volume (ft³)
1	0	145	0.000
2	2.5	145	362.50
3	3	362	489.25
4			
5			
6			

BIO-2 Storage Surve

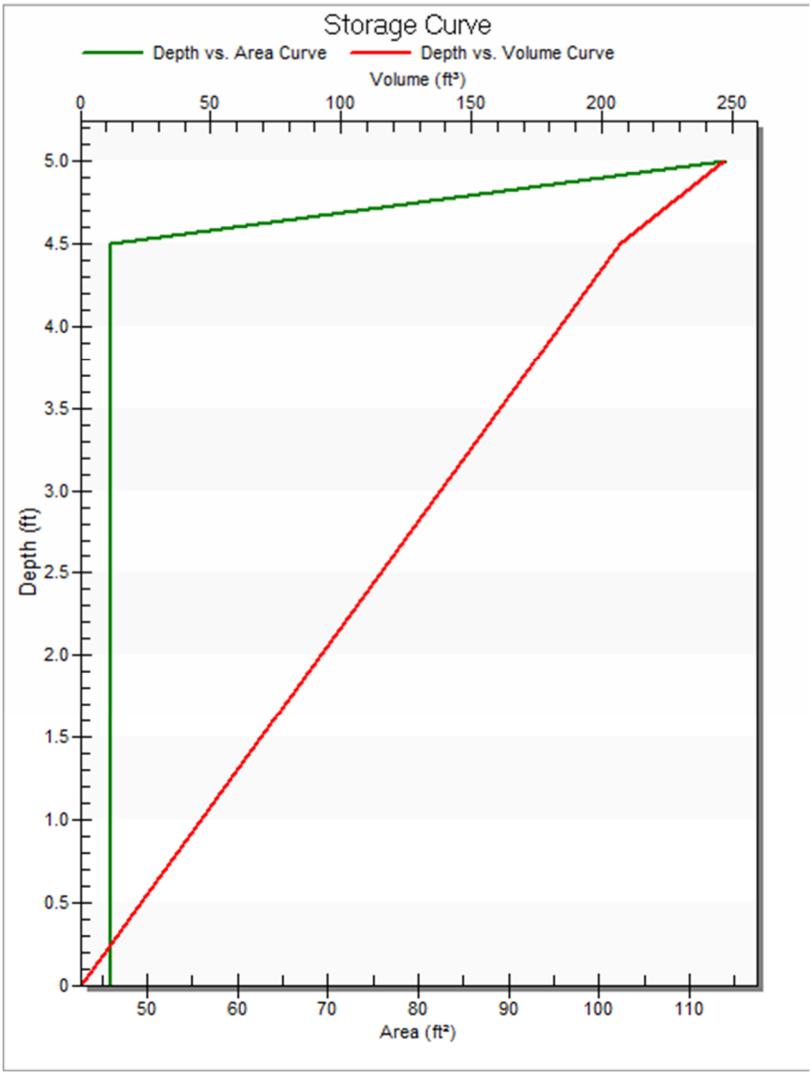


Storage curve data

Storage data type: Depth vs. Area

	Depth (ft)	Area (ft²)	Volume (ft³)
1	0	40	0.000
2	3	40	120.00
3	3.5	100	155.00
4			
5			
6			

BIO-3 Storage Surve

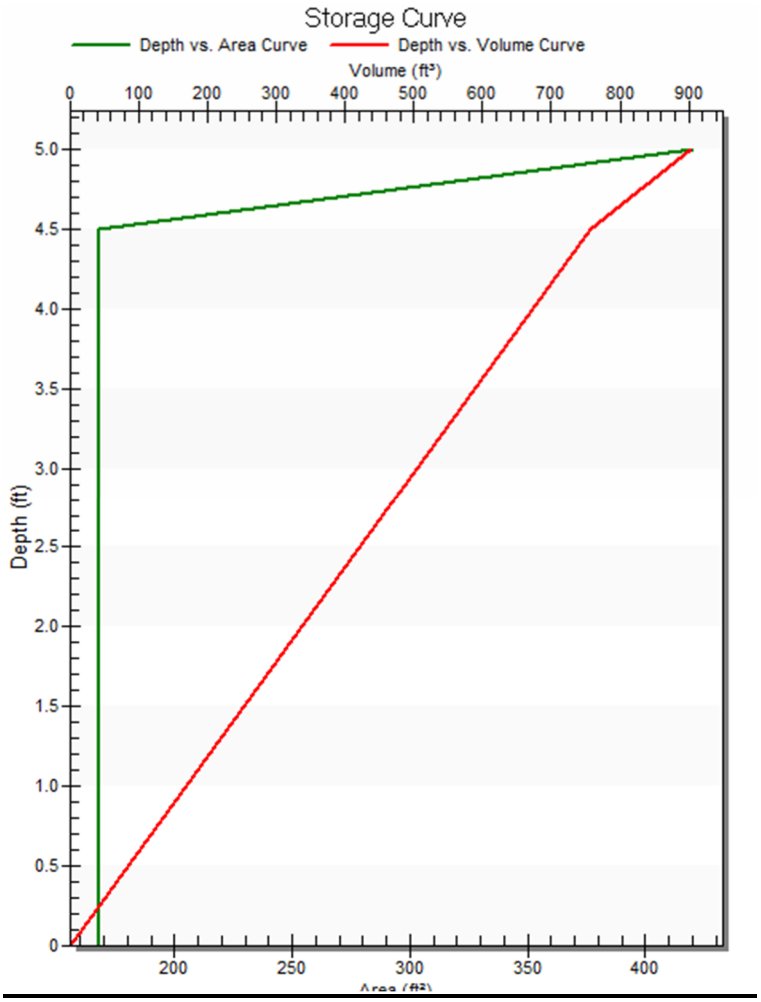


Storage curve data

Storage data type: Depth vs. Area

	Depth (ft)	Area (ft²)	Volume (ft³)
1	0	46	0.000
2	4.5	46	207.00
3	5	114	247.00
4			
5			
6			

BIO-4 Storage Surve



Storage curve data

Storage data type: Depth vs. Area

	Depth (ft)	Area (ft²)	Volume (ft³)
1	0	168	0.000
2	4.5	168	756.00
3	5	420	903.00
4			
5			
6			

Appendix B

Pre-construction Runoff/ Allowable Peak Discharge

Table 2-2a Runoff curve numbers for urban areas [1/]

Cover description		Curve numbers for hydrologic soil group			
Cover type and hydrologic condition	Average percent impervious area [2/]	A	B	C	D
Fully developed urban areas (vegetation established)					
Open space (lawns, parks, golf courses, cemeteries, etc.) [3/]:					
Poor condition (grass cover < 50%)		68	79	86	89
Fair condition (grass cover 50% to 75%)		49	69	79	84
Good condition (grass cover > 75%)		39	61	74	80
Impervious areas:					
Paved parking lots, roofs, driveways, etc. (excluding right-of-way)		98	98	98	98
Streets and roads:					
Paved; curbs and storm sewers (excluding right-of-way)		98	98	98	98
Paved; open ditches (including right-of-way)		83	89	92	93
Gravel (including right-of-way)		76	85	89	91
Dirt (including right-of-way)		72	82	87	89
Western desert urban areas:					
Natural desert landscaping (pervious areas only) [4/]		63	77	85	88
Artificial desert landscaping (impervious weed barrier, desert shrub with 1- to 2-inch sand or gravel mulch and basin borders)		96	96	96	96
Urban districts:					
Commercial and business	85	[illegible]	92	94	95
Industrial	72	81	88	91	93
Residential districts by average lot size:					
1/8 acre or less (town houses)	65	77	85	90	92
1/4 acre	38	61	75	83	87
1/3 acre	30	[illegible]	72	81	86
1/2 acre	25	54	70	80	85
1 acre	20	51	68	79	84
2 acres	12	46	65	77	82
Developing urban areas					
Newly graded areas (pervious areas only, no vegetation) [5/]		77	86	91	94
Idle lands (CN's are determined using cover types similar to those in table 2-2c).					

1 Average runoff condition, and $I_a = 0.2S$.

2 The average percent impervious area shown was used to develop the composite CN's. Other assumptions are as follows: impervious areas are directly connected to the drainage system, impervious areas have a CN of 98, and pervious areas are considered equivalent to open space in good hydrologic condition. CN's for other combinations of conditions may be computed using figure 2-3 or 2-4.

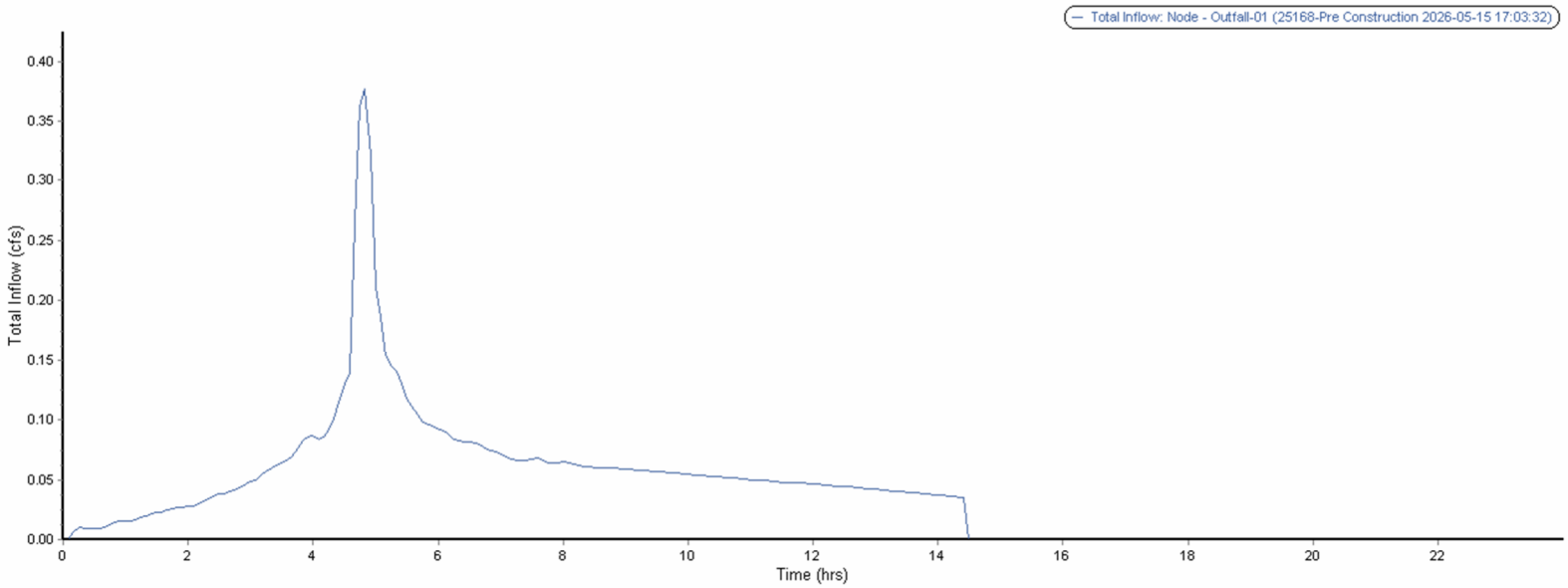
3 CN's shown are equivalent to those of pasture. Composite CN's may be computed for other combinations of open space cover type.

4 Composite CN's for natural desert landscaping should be computed using figures 2-3 or 2-4 based on the impervious area percentage (CN = 98) and the pervious area CN. The pervious area CN's are assumed equivalent to desert shrub in poor hydrologic condition.

5 Composite CN's to use for the design of temporary measures during grading and construction should be computed using figure 2-3 or 2-4 based on the degree of development (impervious area percentage) and the CN's for the newly graded pervious areas.

Pre-construction Peak Runoff Flows

10-Year Pre Development Runoff for A1



Total Inflow Summary Table

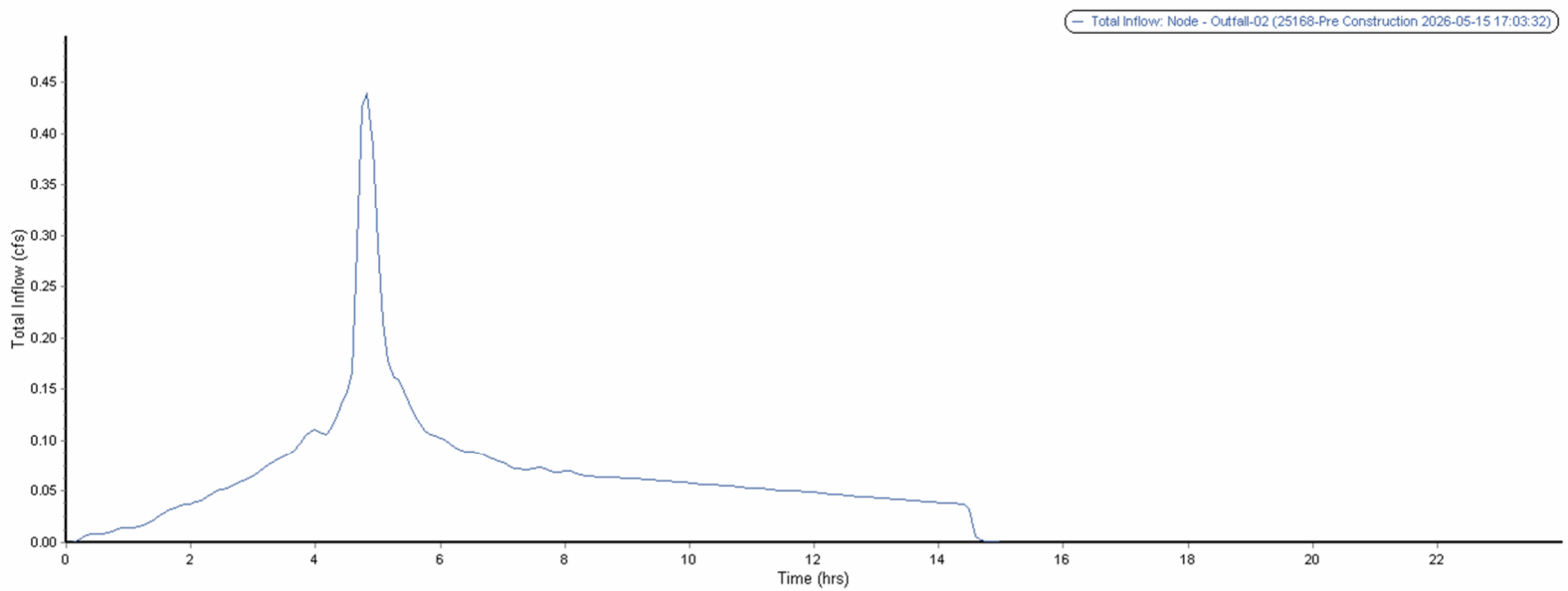
Time period
From: 05/12/2026, 12:00:00 AM
To: 05/13/2026, 12:00:00 AM

Thresholds
Exceedance: 0
Deficit: 0

Detention storage
Max flow: 0

Element ID	Outfall-01
Maximum Total Inflow (cfs)	0.38
Minimum Total Inflow (cfs)	0.00
Event Mean Total Inflow (cfs)	0.04
Duration of Exceedances (hrs)	N/A
Duration of Deficits (hrs)	N/A
Number of Exceedances	N/A
Number of Deficits	N/A
Volume of Exceedance (ft³)	N/A
Volume of Deficit (ft³)	N/A
Total Inflow Volume (ft³)	3288.52
Detention Storage (ft³)	N/A

10-Year Pre Development Runoff for Ex SD-1



Total Inflow Summary Table

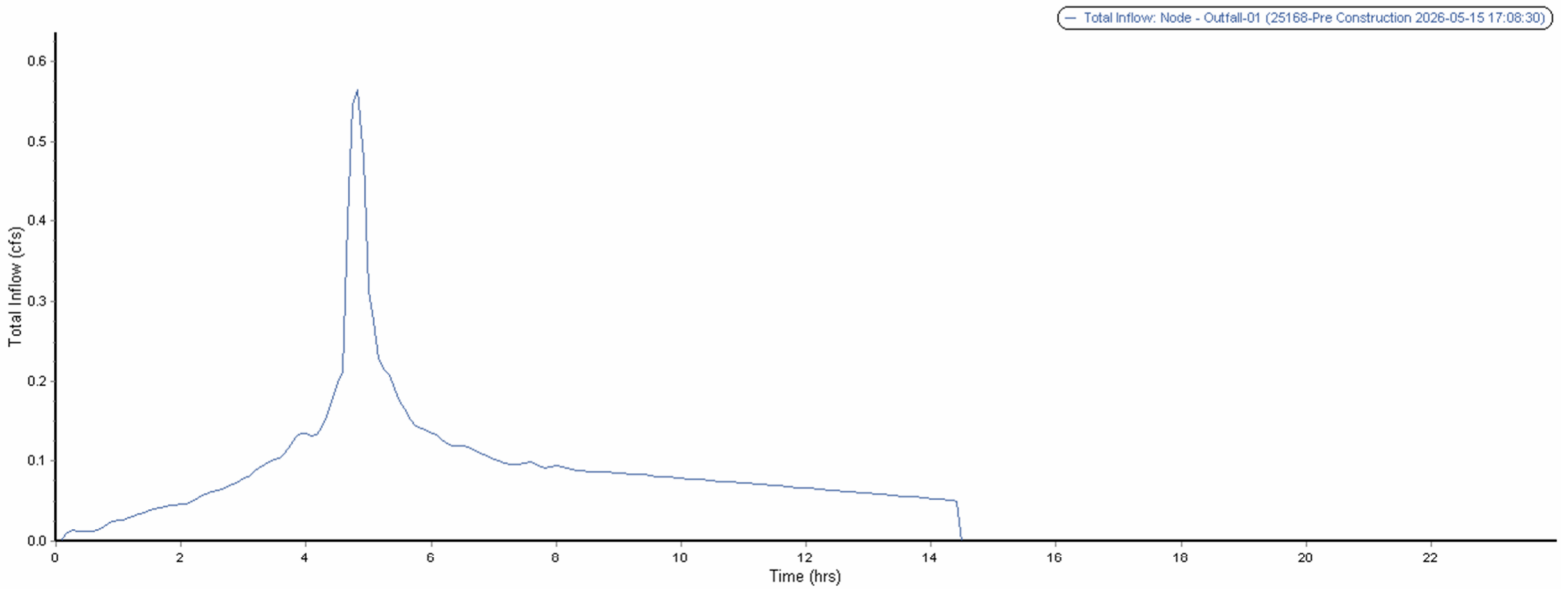
Time period
From: 05/12/2026, 12:00:00 AM
To: 05/13/2026, 12:00:00 AM

Thresholds
Exceedance: 0
Deficit: 0

Detention storage
Max flow: 0

Element ID	Outfall-02
Maximum Total Inflow (cfs)	0.44
Minimum Total Inflow (cfs)	0.00
Event Mean Total Inflow (cfs)	0.04
Duration of Exceedances (hrs)	N/A
Duration of Deficits (hrs)	N/A
Number of Exceedances	N/A
Number of Deficits	N/A
Volume of Exceedance (ft³)	N/A
Volume of Deficit (ft³)	N/A
Total Inflow Volume (ft³)	3741.71
Detention Storage (ft³)	N/A

100-Year Pre Development Runoff for A1



Total Inflow Summary Table

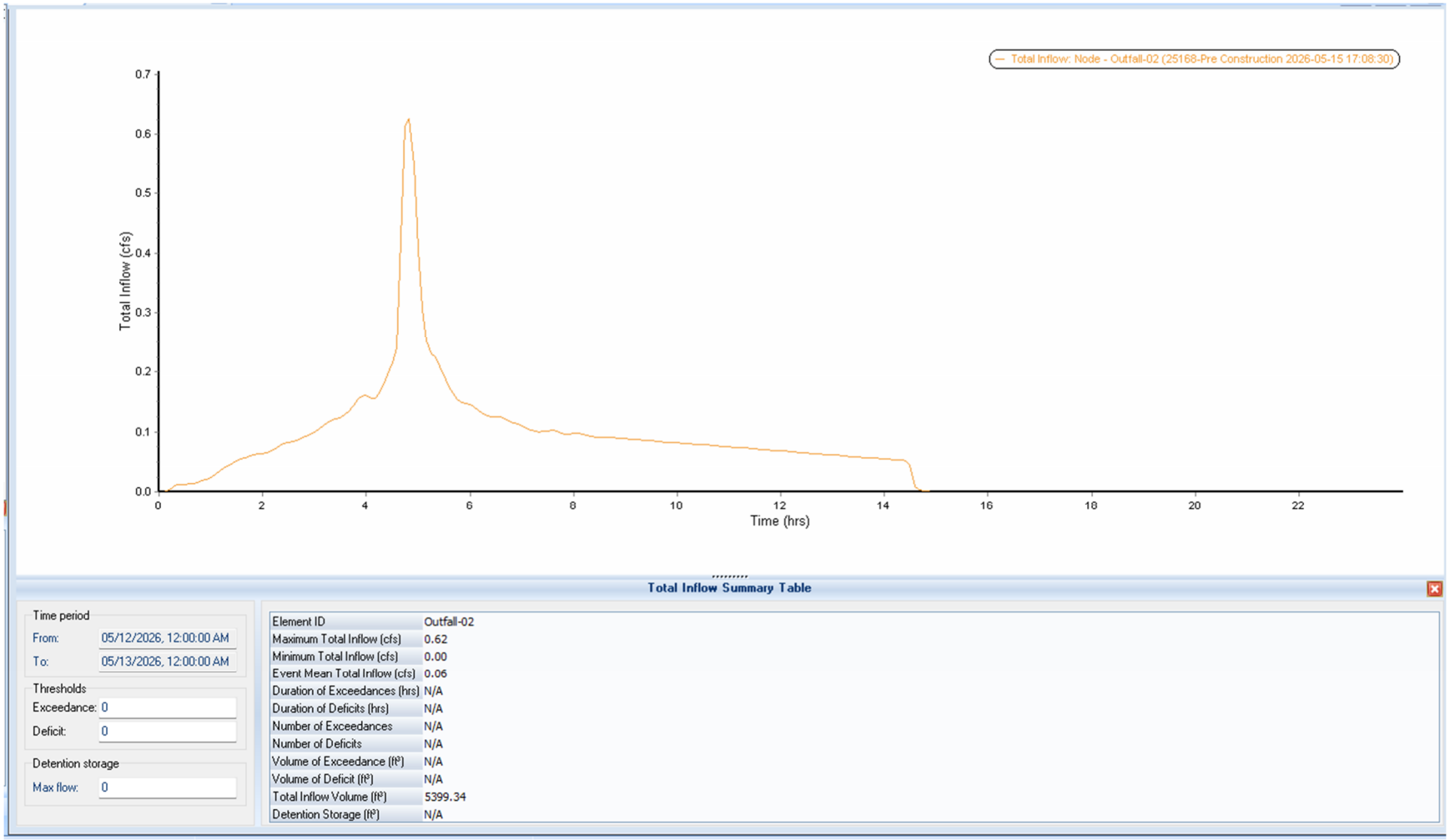
Time period
From: 05/12/2026, 12:00:00 AM
To: 05/13/2026, 12:00:00 AM

Thresholds
Exceedance: 0
Deficit: 0

Detention storage
Max flow: 0

Element ID	Outfall-01
Maximum Total Inflow (cfs)	0.56
Minimum Total Inflow (cfs)	0.00
Event Mean Total Inflow (cfs)	0.06
Duration of Exceedances (hrs)	N/A
Duration of Deficits (hrs)	N/A
Number of Exceedances	N/A
Number of Deficits	N/A
Volume of Exceedance (ft³)	N/A
Volume of Deficit (ft³)	N/A
Total Inflow Volume (ft³)	4884.33
Detention Storage (ft³)	N/A

100-Year Pre Development Runoff for Ex SD-1



Total Inflow Summary Table

Time period
From: 05/12/2026, 12:00:00 AM
To: 05/13/2026, 12:00:00 AM

Thresholds
Exceedance: 0
Deficit: 0

Detention storage
Max flow: 0

Element ID	Outfall-02
Maximum Total Inflow (cfs)	0.62
Minimum Total Inflow (cfs)	0.00
Event Mean Total Inflow (cfs)	0.06
Duration of Exceedances (hrs)	N/A
Duration of Deficits (hrs)	N/A
Number of Exceedances	N/A
Number of Deficits	N/A
Volume of Exceedance (ft³)	N/A
Volume of Deficit (ft³)	N/A
Total Inflow Volume (ft³)	5399.34
Detention Storage (ft³)	N/A

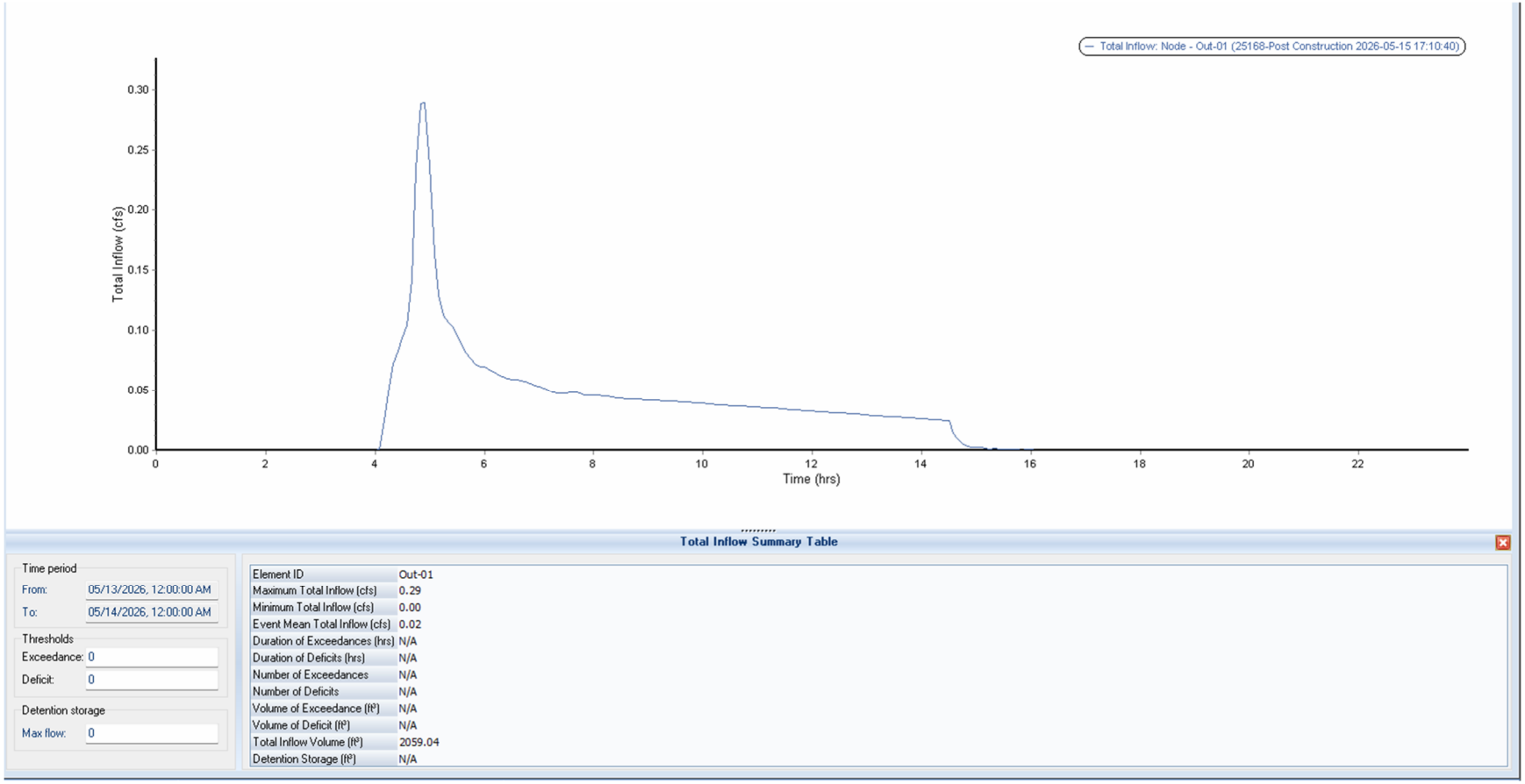
Appendix C

Detention Analysis Results
(Post-construction)

Post-construction Peak Discharge Flows

Post-construction Overland Flow Velocity

10-Year Post Development Runoff for A1



Total Inflow Summary Table

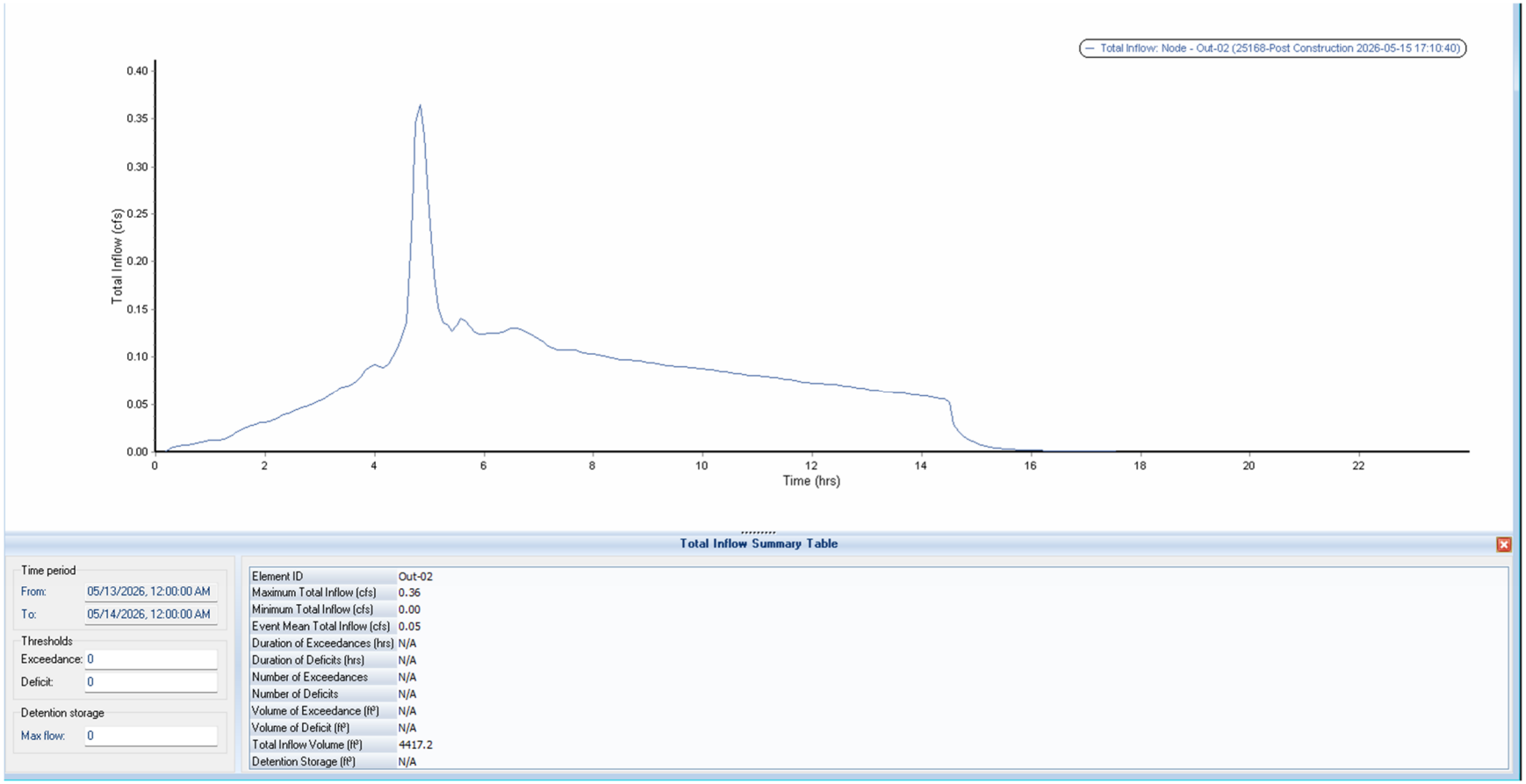
Time period
From: 05/13/2026, 12:00:00 AM
To: 05/14/2026, 12:00:00 AM

Thresholds
Exceedance: 0
Deficit: 0

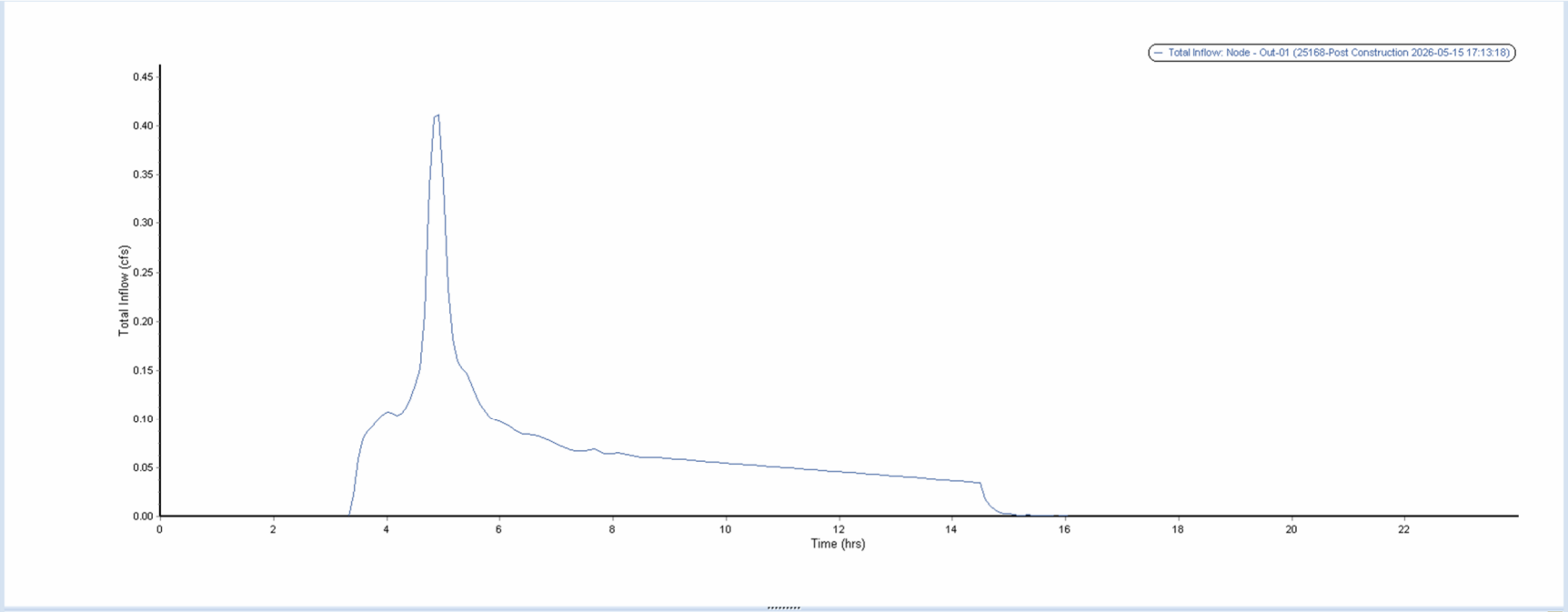
Detention storage
Max flow: 0

Element ID	Out-01
Maximum Total Inflow (cfs)	0.29
Minimum Total Inflow (cfs)	0.00
Event Mean Total Inflow (cfs)	0.02
Duration of Exceedances (hrs)	N/A
Duration of Deficits (hrs)	N/A
Number of Exceedances	N/A
Number of Deficits	N/A
Volume of Exceedance (ft³)	N/A
Volume of Deficit (ft³)	N/A
Total Inflow Volume (ft³)	2059.04
Detention Storage (ft³)	N/A

10-Year Post Development Runoff for Ex SD-1



100-Year Post Development Runoff for A1



Total Inflow Summary Table

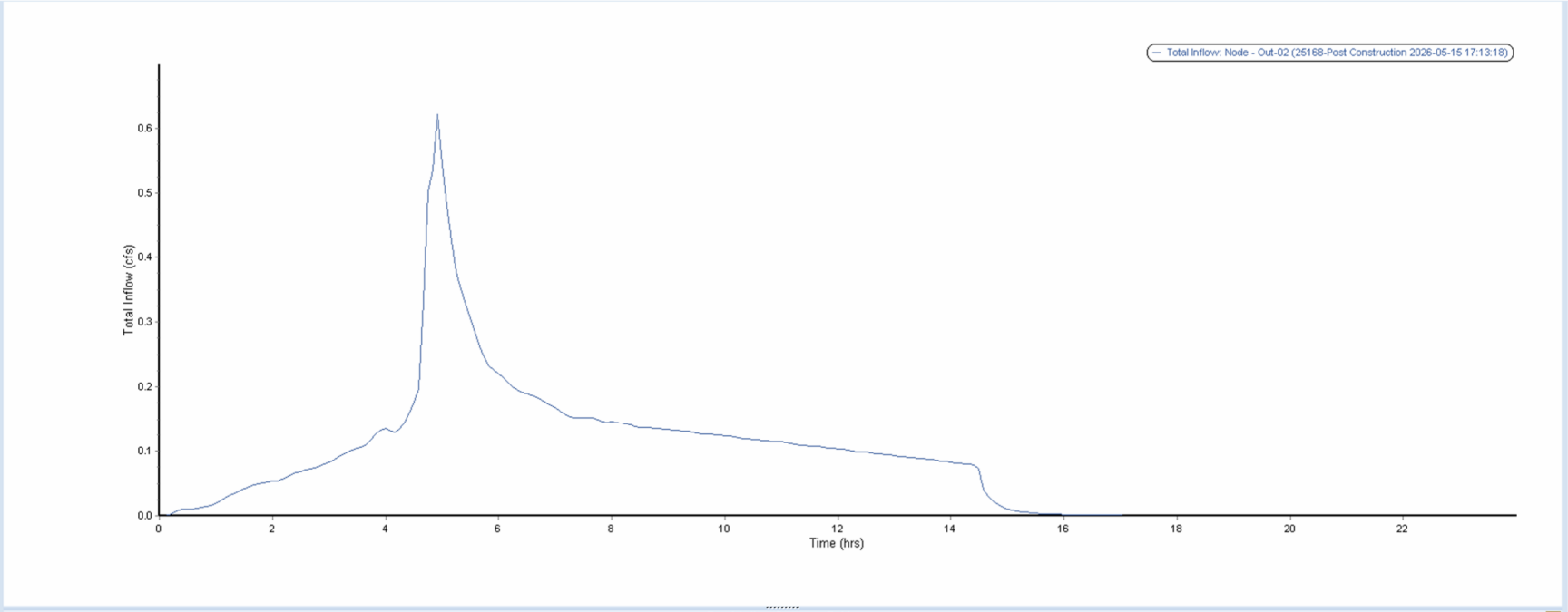
Time period
From: 05/13/2026, 12:00:00 AM
To: 05/14/2026, 12:00:00 AM

Thresholds
Exceedance: 0
Deficit: 0

Detention storage
Max flow: 0

Element ID	Out-01
Maximum Total Inflow (cfs)	0.41
Minimum Total Inflow (cfs)	0.00
Event Mean Total Inflow (cfs)	0.04
Duration of Exceedances (hrs)	N/A
Duration of Deficits (hrs)	N/A
Number of Exceedances	N/A
Number of Deficits	N/A
Volume of Exceedance (ft³)	N/A
Volume of Deficit (ft³)	N/A
Total Inflow Volume (ft³)	3163.96
Detention Storage (ft³)	N/A

100-Year Post Development Runoff for Ex SD-1



Total Inflow Summary Table

Time period
From: 05/13/2026, 12:00:00 AM
To: 05/14/2026, 12:00:00 AM

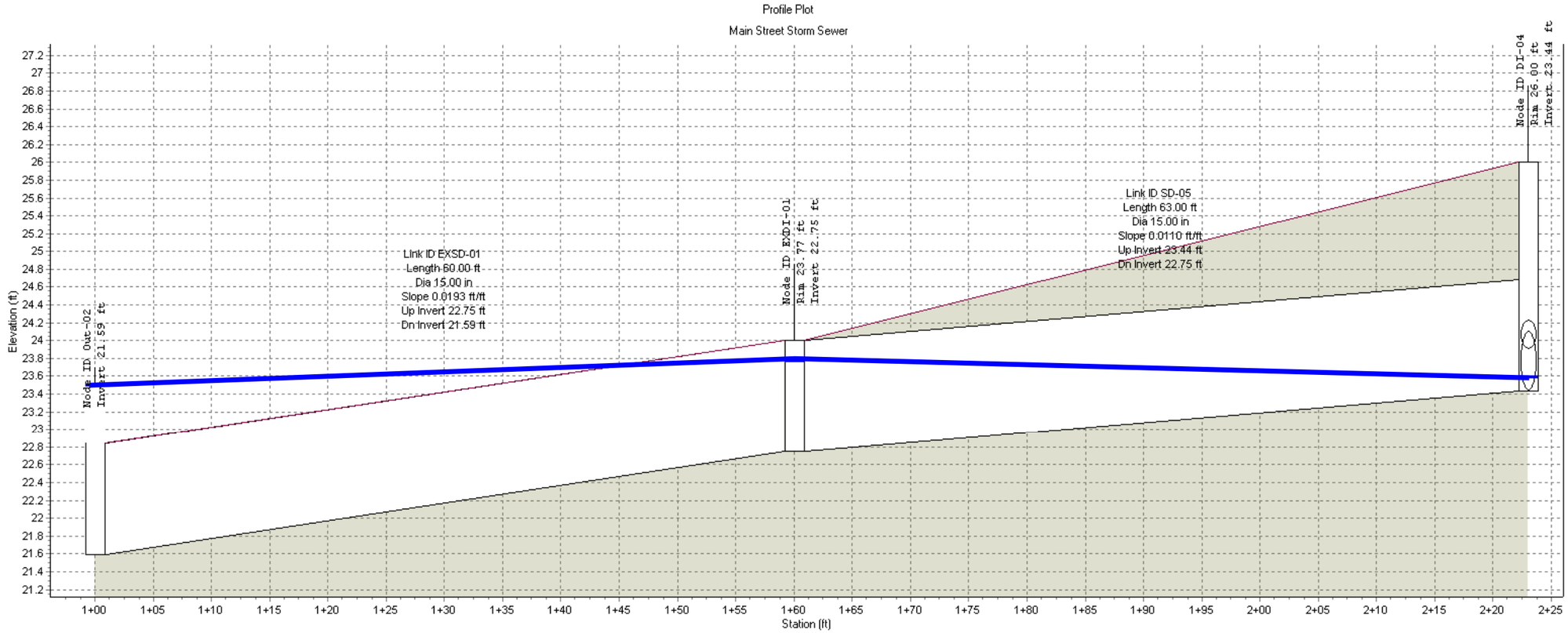
Thresholds
Exceedance: 0
Deficit: 0

Detention storage
Max flow: 0

Element ID	Out-02
Maximum Total Inflow (cfs)	0.62
Minimum Total Inflow (cfs)	0.00
Event Mean Total Inflow (cfs)	0.08
Duration of Exceedances (hrs)	N/A
Duration of Deficits (hrs)	N/A
Number of Exceedances	N/A
Number of Deficits	N/A
Volume of Exceedance (ft³)	N/A
Volume of Deficit (ft³)	N/A
Total Inflow Volume (ft³)	6898.05
Detention Storage (ft³)	N/A

Appendix D

100-Year Storm Drain Profile



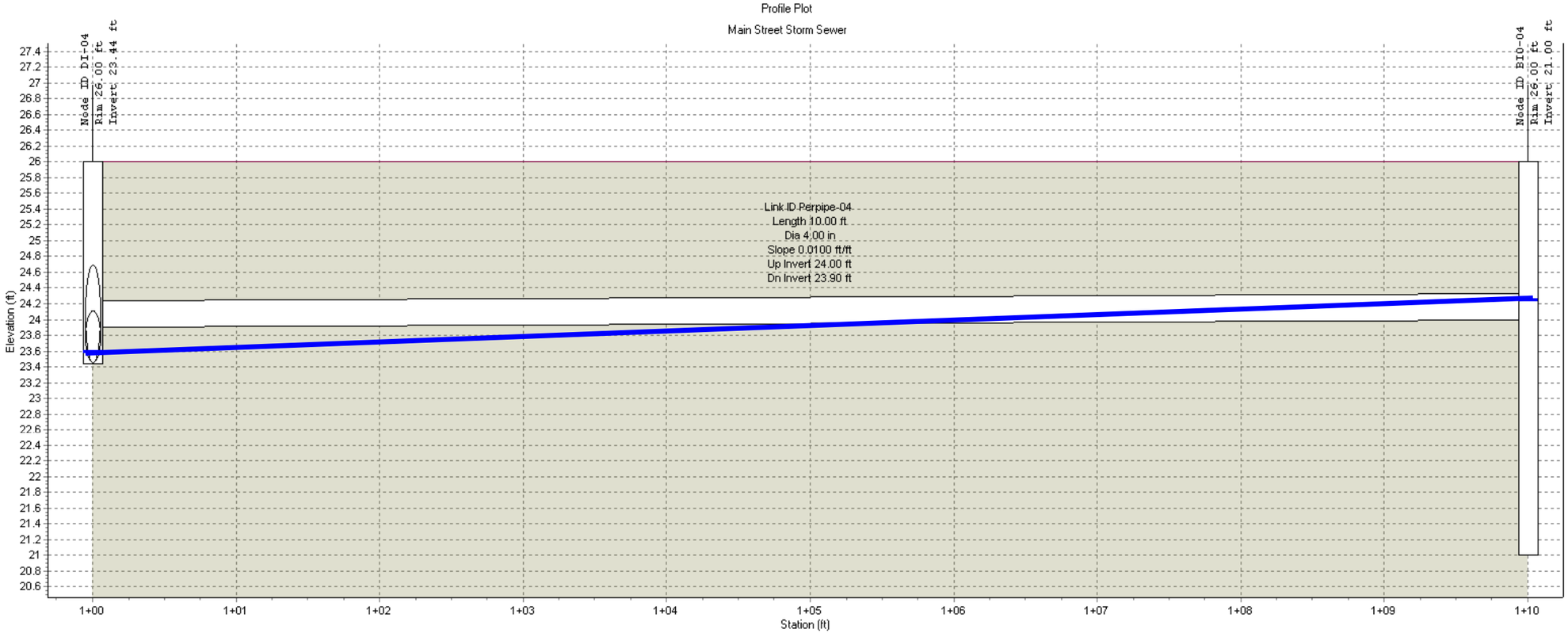
Node ID:	Out-02	EXDI-01	DI-04
Rim (ft):		23.77	26.00
Invert (ft):	21.59	22.75	23.44
Min Pipe Cover (ft):		0.00	0.00
Max HGL (ft):	23.50	23.77	23.76

Link ID:	EXSD-01	SD-05
Length (ft):	60.00	63.00
Dia (in):	15.00	15.00
Slope (ft/ft):	0.0193	0.0110
Up Invert (ft):	22.75	23.44
Dn Invert (ft):	21.59	22.75
Max Q (cfs):	2.60	0.79
Max Vel (ft/s):	2.86	1.59
Max Depth (ft):	1.14	0.56

MAX HGL

100-yr Storm Event

25168-15 Calle Del Mar

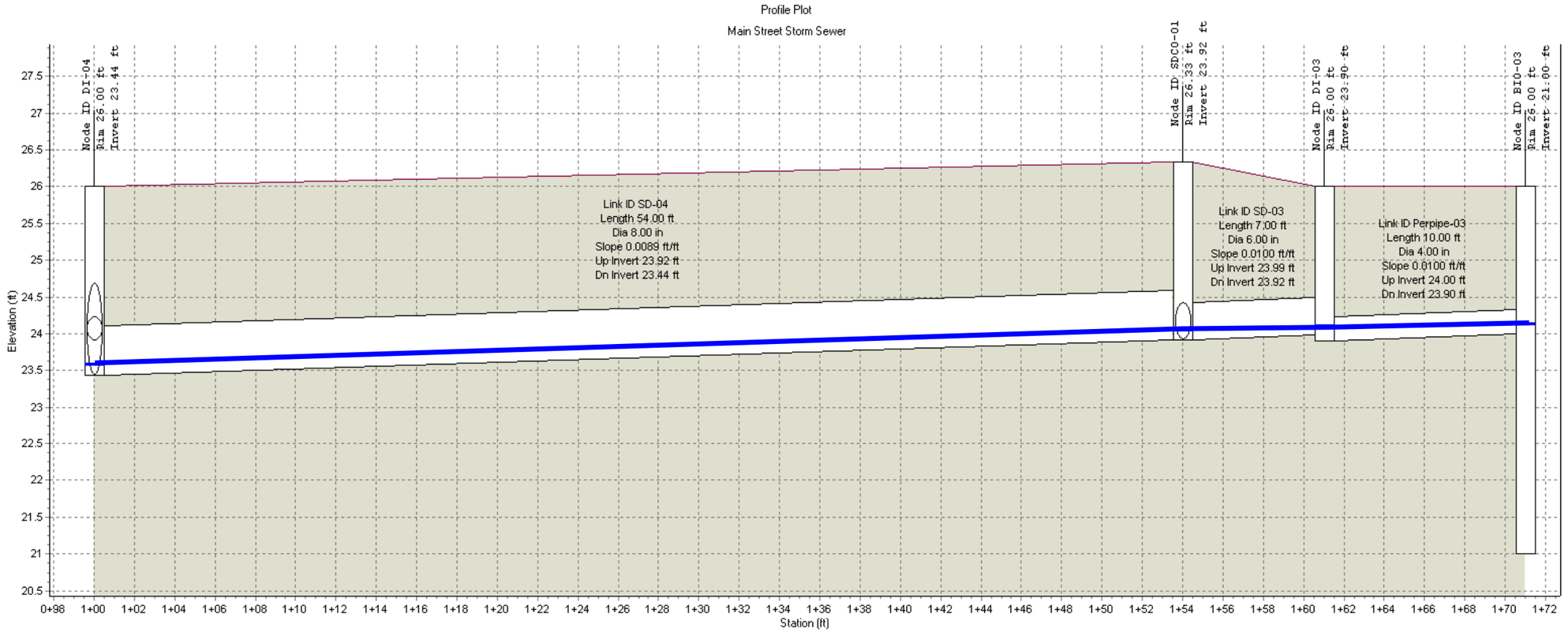


Node ID:	DI-04	BIO-04
Rim (ft):	26.00	26.00
Invert (ft):	23.44	21.00
Min Pipe Cover (ft):	0.00	
Max HGL (ft):	23.76	24.25

Link ID:	Perpipe-04
Length (ft):	10.00
Dia (in):	4.00
Slope (ft/ft):	0.0100
Up Invert (ft):	24.00
Dn Invert (ft):	23.90
Max Q (cfs):	0.19
Max Vel (ft/s):	2.73
Max Depth (ft):	0.24

MAX HGL

100-yr Storm Event



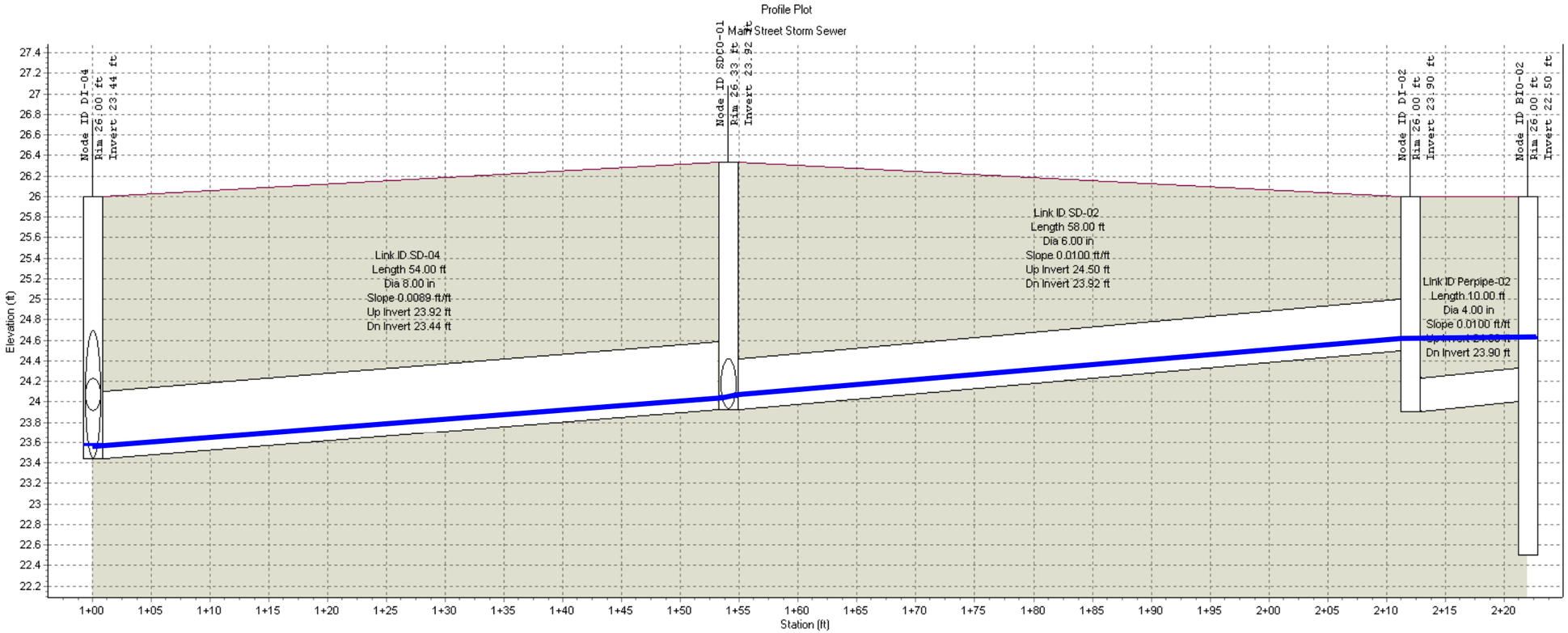
Node ID:	DI-04	SDCO-01	DI-03	BIO-03
Rim (ft):	26.00	26.33	26.00	26.00
Invert (ft):	23.44	23.92	23.90	21.00
Min Pipe Cover (ft):	0.00	1.74	0.00	
Max HGL (ft):	23.76	24.05	24.10	24.14

Link ID:	SD-04	SD-03	Perpipe-03
Length (ft):	54.00	7.00	10.00
Dia (in):	8.00	6.00	4.00
Slope (ft/ft):	0.0089	0.0100	0.0100
Up Invert (ft):	23.92	23.99	24.00
Dn Invert (ft):	23.44	23.92	23.90
Max Q (cfs):	0.11	0.05	0.07
Max Vel (ft/s):	2.03	1.54	3.25
Max Depth (ft):	0.14	0.12	0.16

MAX HGL

100-yr Storm Event

25168-15 Calle Del Mar

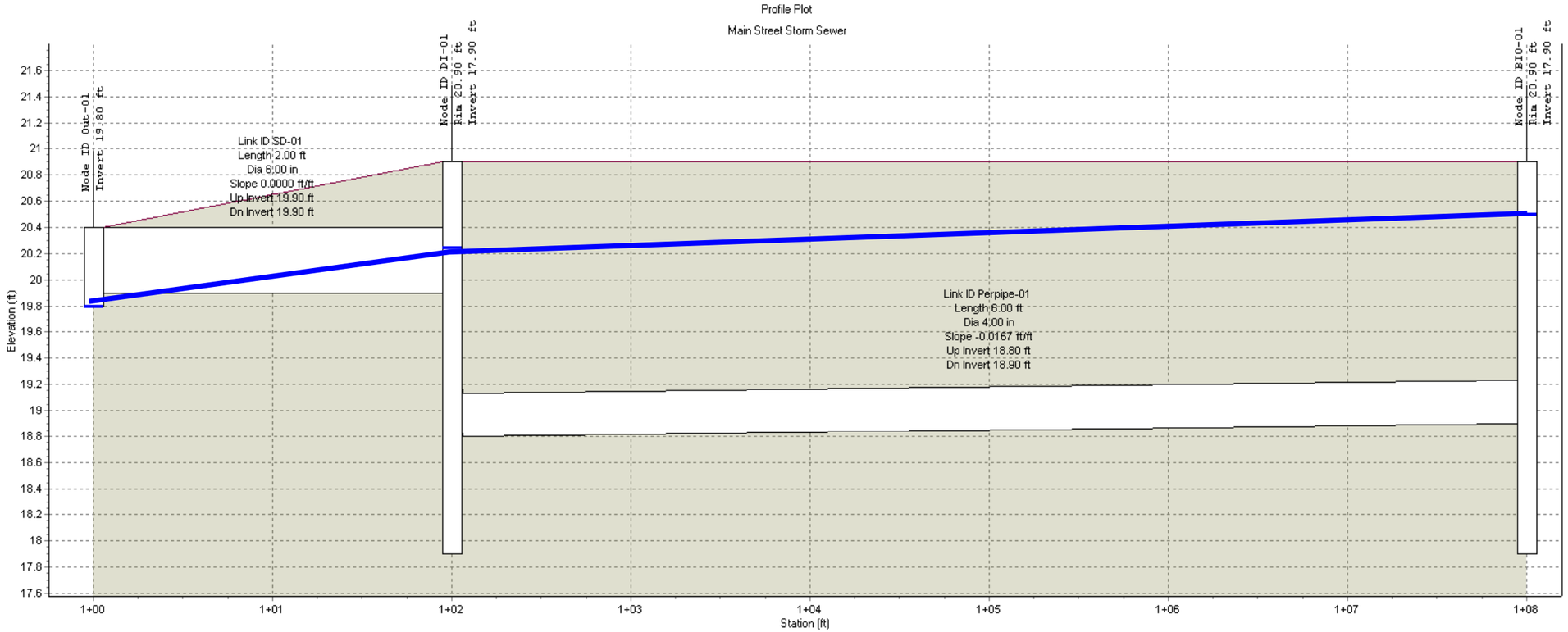


Node ID:	DI-04	SDCO-01	DI-02	BIO-02
Rim (ft):	26.00	26.33	26.00	26.00
Invert (ft):	23.44	23.92	23.90	22.50
Min Pipe Cover (ft):	0.00	1.74	0.00	
Max HGL (ft):	23.76	24.05	24.62	24.63

Link ID:	SD-04	SD-02	Perpipe-02
Length (ft):	54.00	58.00	10.00
Dia (in):	8.00	6.00	4.00
Slope (ft/ft):	0.0089	0.0100	0.0100
Up Invert (ft):	23.92	24.50	24.00
Dn Invert (ft):	23.44	23.92	23.90
Max Q (cfs):	0.11	0.07	0.08
Max Vel (ft/s):	2.03	2.76	2.22
Max Depth (ft):	0.14	0.12	0.33

MAX HGL

100-yr Storm Event



Node ID:	Out-01	DI-01	BIO-01
Rim (ft):		20.90	20.90
Invert (ft):	19.80	17.90	17.90
Min Pipe Cover (ft):		0.00	
Max HGL (ft):	19.80	20.25	20.50

Link ID:	SD-01	Perpipe-01
Length (ft):	2.00	6.00
Dia (in):	6.00	4.00
Slope (ft/ft):	0.0000	-0.0167
Up Invert (ft):	19.90	18.80
Dn Invert (ft):	19.90	18.90
Max Q (cfs):	0.42	0.41
Max Vel (ft/s):	2.92	4.75
Max Depth (ft):	0.34	0.33

MAX HGL

100-yr Storm Event

Appendix E

Soil Analysis

Map Scale: 1:818 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 10 20 40 60

Feet: 0 35 70 140 210

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 Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features

- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

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: Marin County, California
Survey Area Data: Version 19, Aug 29, 2025

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

Date(s) aerial images were photographed: Mar 7, 2021—Mar 31, 2021

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.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
105	Blucher-Cole complex, 2 to 5 percent slopes	1.7	94.4%
116	Cronkhite-Barnabe complex, 15 to 30 percent slopes	0.1	5.6%
Totals for Area of Interest		**1.8**	**100.0%**

Marin County, California

105—Blucher-Cole complex, 2 to 5 percent slopes

Map Unit Setting

National map unit symbol: hf18
Elevation: 0 to 500 feet
Mean annual precipitation: 25 to 35 inches
Mean annual air temperature: 57 to 61 degrees F
Frost-free period: 210 to 290 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Blucher and similar soils: 40 percent
Cole and similar soils: 30 percent
Minor components: 30 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Blucher

Setting

Landform: Basin floors, alluvial fans
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Tread, talf
Down-slope shape: Concave, linear
Across-slope shape: Linear
Parent material: Alluvium derived from sandstone, granite, or shale

Typical profile

H1 - 0 to 7 inches: silt loam
H2 - 7 to 23 inches: silt loam
H3 - 23 to 60 inches: clay loam

Properties and qualities

Slope: 2 to 5 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 0 inches
Frequency of flooding: Occasional
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: High (about 10.4 inches)

Interpretive groups

Land capability classification (irrigated): 2w
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: C/D

Ecological site: R015XC025CA - CLAYEY BOTTOMLAND
Hydric soil rating: Yes

Description of Cole

Setting

Landform: Basin floors, alluvial fans
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Base slope, tread
Down-slope shape: Linear, concave
Across-slope shape: Linear
Parent material: Alluvium derived from shale, sandstone, or granite

Typical profile

H1 - 0 to 5 inches: clay loam
H2 - 5 to 14 inches: silty clay loam
H3 - 14 to 60 inches: silty clay

Properties and qualities

Slope: 2 to 5 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 0 inches
Frequency of flooding: Occasional
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: High (about 9.1 inches)

Interpretive groups

Land capability classification (irrigated): 3w
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: C/D
Ecological site: R015XC025CA - CLAYEY BOTTOMLAND
Hydric soil rating: Yes

Minor Components

Clear lake

Percent of map unit: 10 percent
Landform: Depressions
Landform position (two-dimensional): Backslope
Hydric soil rating: Yes

Cortina

Percent of map unit: 10 percent
Hydric soil rating: No

Unnamed, slopes less than 2 percent

Percent of map unit: 10 percent

Hydric soil rating: No

Data Source Information

Soil Survey Area: Marin County, California
Survey Area Data: Version 19, Aug 29, 2025

Marin County, California

116—Cronkhite-Barnabe complex, 15 to 30 percent slopes

Map Unit Setting

National map unit symbol: hf1m
Elevation: 50 to 800 feet
Mean annual precipitation: 24 to 35 inches
Mean annual air temperature: 52 to 57 degrees F
Frost-free period: 275 to 300 days
Farmland classification: Not prime farmland

Map Unit Composition

Cronkhite and similar soils: 50 percent
Barnabe and similar soils: 30 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Cronkhite

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Residuum weathered from sandstone and shale

Typical profile

H1 - 0 to 15 inches: loam
H2 - 15 to 26 inches: clay loam
H3 - 26 to 45 inches: clay loam
H4 - 45 to 55 inches: bedrock

Properties and qualities

Slope: 15 to 30 percent
Depth to restrictive feature: 40 to 60 inches to paralithic bedrock
Drainage class: Moderately well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 7.4 inches)

Interpretive groups

Land capability classification (irrigated): 6e
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: C

Ecological site: R015XC028CA - COASTAL LOAMY CLAYPAN
Hydric soil rating: No

Description of Barnabe

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Concave
Across-slope shape: Convex
Parent material: Residuum weathered from sandstone and/or chert

Typical profile

H1 - 0 to 8 inches: very gravelly loam
H2 - 8 to 16 inches: very gravelly loam
H3 - 16 to 20 inches: bedrock

Properties and qualities

Slope: 15 to 30 percent
Depth to restrictive feature: 10 to 20 inches to lithic bedrock
Drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Very low (about 1.5 inches)

Interpretive groups

Land capability classification (irrigated): 6e
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: D
Ecological site: R015XY009CA - Hills 20-40"ppt

Minor Components

Centissima

Percent of map unit: 4 percent
Hydric soil rating: No

Dipsea

Percent of map unit: 4 percent
Hydric soil rating: No

Slopes less than 15 percent

Percent of map unit: 3 percent
Hydric soil rating: No

Henneke

Percent of map unit: 2 percent
Hydric soil rating: No

Rock outcrop

Percent of map unit: 2 percent

Hydric soil rating: No

Maymen

Percent of map unit: 1 percent
Hydric soil rating: No

Maymen variant

Percent of map unit: 1 percent
Hydric soil rating: No

Unnamed, shallow

Percent of map unit: 1 percent
Hydric soil rating: No

Slumps

Percent of map unit: 1 percent
Hydric soil rating: No

Unnamed, mod. deep

Percent of map unit: 1 percent
Hydric soil rating: No

Data Source Information

Soil Survey Area: Marin County, California
Survey Area Data: Version 19, Aug 29, 2025

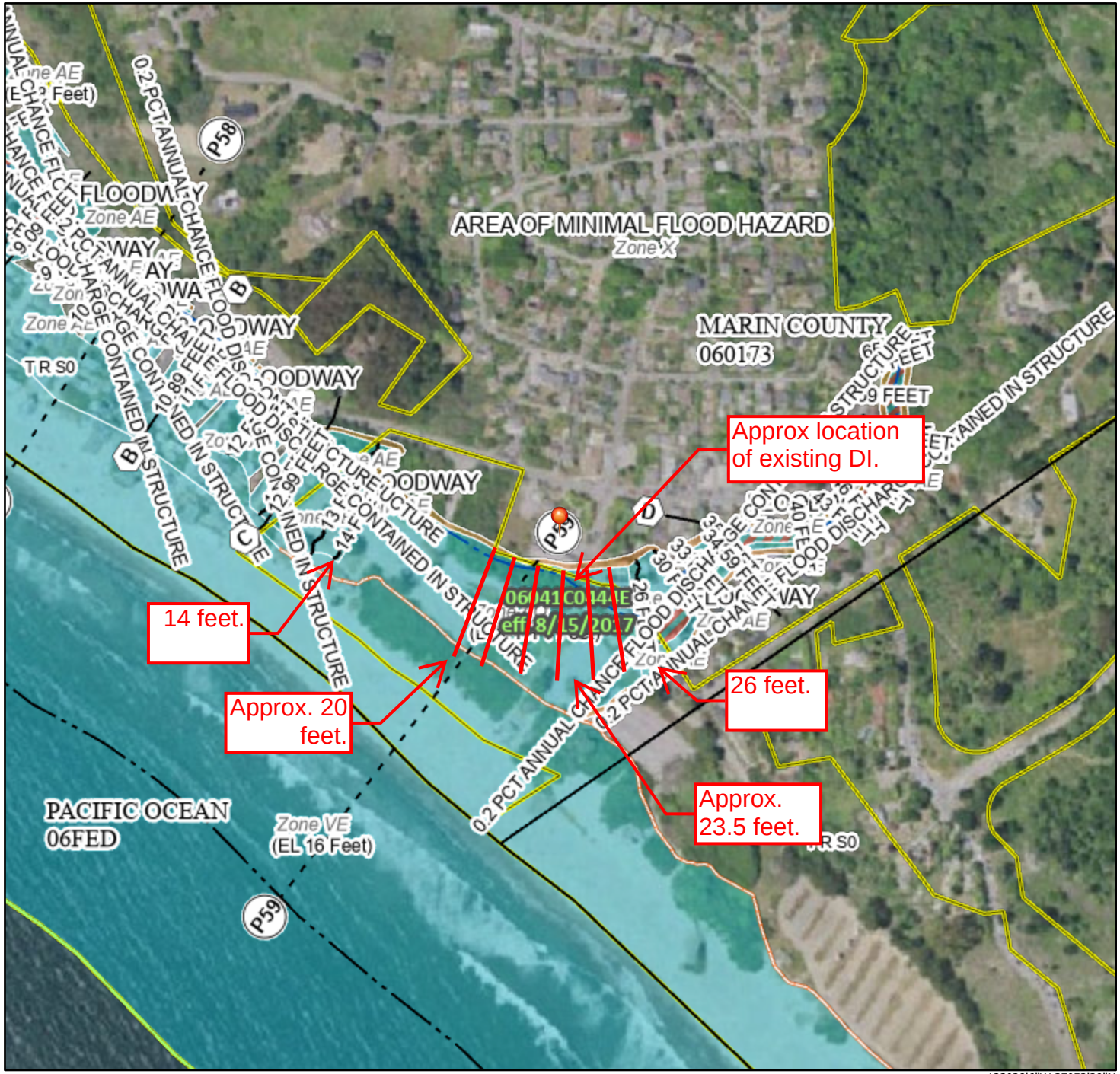
Appendix II

FEMA Exhibit

National Flood Hazard Layer FIRMette

FEMA

122°38'44"W 37°54'8"N



122°38'6"W 37°53'39"N

0 250 500 1,000 1,500 2,000 Feet

1:6,000

Basemap Imagery Source: USGS National Map 2023

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

- **SPECIAL FLOOD HAZARD AREAS**
  - Without Base Flood Elevation (BFE) *Zone A, V, A99*
  - With BFE or Depth *Zone AE, AO, AH, VE, AR*
  - Regulatory Floodway
- **OTHER AREAS OF FLOOD HAZARD**
  - 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
  - Future Conditions 1% Annual Chance Flood Hazard *Zone X*
  - Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
  - Area with Flood Risk due to Levee *Zone D*
- **OTHER AREAS**
  - NO SCREEN Area of Minimal Flood Hazard *Zone X*
  - Effective LOMRs
  - Area of Undetermined Flood Hazard *Zone D*
- **GENERAL STRUCTURES**
  - Channel, Culvert, or Storm Sewer
  - Levee, Dike, or Floodwall
- **OTHER FEATURES**
  - 20.2 Cross Sections with 1% Annual Chance
  - 17.5 Water Surface Elevation
  - Coastal Transect
  - 513 Base Flood Elevation Line (BFE)
  - Limit of Study
  - Jurisdiction Boundary
  - Coastal Transect Baseline
  - Profile Baseline
  - Hydrographic Feature
- **MAP PANELS**
  - Digital Data Available
  - No Digital Data Available
  - Unmapped

N

The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 11/24/2025 at 10:33 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.