Appendix G:
Hydrology and Water Quality Supporting Information

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Preliminary Drainage and Stormwater Control Plan

MITCHELL DRIVE TOWNHOMES

WALNUT CREEK, CALIFORNIA

December 5, 2024

Prepared by:

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I. PROJECT DATA

Project Name/Number	Mitchell Drive Townhomes
Application Submittal Date	December 5, 2024
Project Location	2775 Mitchell Drive
Name of Developer	Signature Homes
Project Phase No.	N/A
Project Type and Description	Residential
Project Watershed	Pine Creek / Galindo Creek
Total Project Site Area (acres)	22.2 Acres
Total Area of Land Disturbed (acres)	22.2 Acres
Total New Impervious Surface Area (sq. ft.)	56,628 SF (1.3 AC)
Total Replaced Impervious Surface Area	696,960 SF (16 AC)
Total Pre-Project Impervious Surface Area	696,960 SF (16 AC)
Total Post-Project Impervious Surface Area	753,588 SF (17.3 AC)
50% Rule[*]	Applies
Project Density	19 Units/Acre
Applicable Special Project Categories	None
Percent LID and non LID treatment	100% LID
HMP Compliance [†]	Applies

II. PROJECT SETTING

A. Project Location and Description

This report summarizes the stormwater treatment measures that will be utilized for the Mitchell Townhome project. The 22-acre project is located west of Oak Grove Road, South of Mitchell Drive and North of Shadelands Drive in the City of Walnut Creek, Contra Costa County, CA.

The project proposes to construct 422 multi-family condominium units, roadways and landscape areas. The overall proposed site consists of approximately 78% impervious surfaces and 22% pervious surfaces.

B. Existing Site Features and Conditions

The project site is currently developed and consists of an existing office park. The existing site consists of approximately 72% impervious surfaces and 28% pervious surfaces.

Existing Topography

The project is on relatively flat site sloping approximately 1% towards the northwest corner of the site.

Soil Type

According to the USDA Web Soil Survey, the project site is classified mostly as Hydrologic Soil Group C. It is underlain by clay.

C. Opportunities and Constraints for Stormwater Control

Opportunities

- *Landscape Areas* - All landscape areas within the proposed site including open space areas provide an opportunity for infiltration. These landscape areas will also provide space for the bioretention areas.

Constraints

- *Low Soil Permeability* – The soil on the project site is designated as hydrologic soil group C, indicating low to no infiltration.

III. LOW IMPACT DEVELOPMENT DESIGN STRATEGIES

A. Optimization of Site Layout

The proposed project was planned with water quality treatment goals at its forefront. Every effort was made to minimize impervious surfaces. The following design strategies will aid in achieving these goals.

- *Using Drainage as a Design Element* – Bioretention areas will be integrated into the overall landscape design of the site.

- *Limitation of Development Envelope* – The project will take advantage of a compact design within the areas being developed.

B. Integrated Management Practices

Bioretention areas are selected as the best methods to fulfill on-site treatment requirements. These BMP's will provide a level of treatment that meets the C.3 requirements for the runoff generated by the project improvements.

Selected landscaping areas will be used as bioretention best management practices (BMP's). Where feasible, adjacent sidewalk and street runoff will be directed to bioretention areas.

IV. DOCUMENTATION OF DRAINAGE DESIGN

A. Descriptions of Drainage Management Areas

Runoff from impervious areas has been divided into Drainage Management Areas (DMAs) as depicted in the Stormwater Control Plan (Figure 1). Runoff from each of these areas is managed by a treatment IMP. A summary of the various DMA's and the corresponding treatment integrated management practices (IMP) are shown on the Stormwater Control Plan (Figure 1).

For DMAs 1, 2, 3, 5, 6, 9, 12A & 12B a low flow storm drain pump will be used to convey the water quality treatment flow required by the City of Walnut Creek (0.4 in/hr), which exceeds the treatment flow required by the MRP (0.2 in/hr), into each IMP through the force main. All larger flow events, which are not required to be treated, will bypass via gravity into the storm drain system.

B. Hydromodification

The Mitchell Drive project increases the total impervious area for the project site by approximately 6% (approximately 1 acre). The project falls within Contra Costa County Hydromodification Susceptibility Area. As a result of these two criteria the project is required to provide Hydromodification per provision C.3 of the Municipal Regional Stormwater Permit. A storm water vault will mitigate the C.3 Hydromodification requirements. BAHM calculations are included in Appendix A.

C. Detention

The City of Walnut Creek requires that the developed site not increase the pre-developed runoff from the project site for a 10 year storm event.

The pre-project site currently drains all the flow from the existing office complex into an existing 24" - 36" storm drain pipe within Mitchell Drive. The post condition will follow very similar drainage patterns while slightly increasing the total impervious surface.

To mitigate the increased peak flow, a storm water vault serves as the detention facility on site and is sized using BAHM to meet C.3 requirements. An outfall control structure manhole has an orifice plate and weir to detain water and lower the peak discharge from the site, as well as two additional orifices to control the flow.

The on-site detention facility has been designed to accommodate the 10-year detention requirements. Using the 10-year storm event data from the National Oceanic and Atmospheric Administration (NOAA) we used Autodesk Hydraflow Hydrograph software to calculate peak flows. Using the 24-hour storm distribution and a composite curve number, our calculations show the mitigated peak flows are reduced to existing peak flows. See Appendix B for the Peak flow calculations.

Table 1 and 2 summarizes the Hydrograph calculations for the western and eastern drainage sheds, demonstrating the proposed mitigation methods (where required) reduce drainage impacts to downstream facilities. See Figure 2 for the map showing the boundaries of the proposed West and East Watersheds.

Table 1 – Hydrograph Summary (West Watershed)

Hydrograph No.	Hydrograph Description	10-Year Peak Flow (cfs)
1.	Existing Condition (West Watershed)	3.19
2.	Developed Condition Watershed (West Watershed)	5.46
3.	Developed Condition Watershed through Detention (West Watershed)	3.16

Table 2 – Hydrograph Summary (East Watershed)

Hydrograph No.	Hydrograph Description	10-Year Peak Flow (cfs)
1.	Existing Condition (Eastern Drainage Shed)	8.88
2.	Developed Condition Watershed (Eastern Drainage Shed)	7.66

Note: The Eastern Drainage Shed has an overall decrease in flow from the existing condition, therefore detention is not required.

D. Tabulation and Sizing Calculations

All IMPs provided are sized for treatment only and not flow control. A table including areas and descriptions of each DMA is provided on the Stormwater Control Plan (Figure 1).

V. SOURCE CONTROL MEASURES

Potential Source of Pollutants	Structural Source Controls	Operational Source Controls
On-site Drain Inlets	"No Dumping – Drains to Bay" signs to be located at all storm drain inlets.	Inlet markings will be inspected annually and replaced or renewed as needed.
Landscape/Outdoor Pesticide Use	Landscaping will be designed to minimize required irrigation and runoff, to promote surface infiltration, and to minimize the use of fertilizers and pesticides that can contribute to stormwater pollution. Where possible, pest-resistant plants will be selected, especially for locations adjacent to hardscape. Plants will be selected appropriate to site soils, slopes, climate, sun, wind, rain, land use, air movement, ecological consistency, use of recycled water, and plant interactions.	All site landscaping is to be maintained by a professional landscaping contractor. Contract to state that landscaping is to be maintained using Integrated Pest Management (IPM) principles, with minimal or no use of pesticides.

VI. FACILITY MAINTENANCE REQUIREMENTS

A. Ownership and Responsibility for BMP Maintenance

Proper operation and maintenance of stormwater management facilities will be the responsibility of the property owner in perpetuity. The property owner will be subject to an annual fee (set by the City's standard fee schedule) to offset the cost of inspecting the site or verifying that the stormwater management facilities are being maintained.

The applicant will prepare and submit, for the City's review, an acceptable Stormwater Control Operation and Maintenance Plan prior to the completion of construction and will execute a Stormwater Management Facilities Operation and Maintenance Agreement before sale, transfer, or permanent occupancy of the site. The applicant accepts the responsibility for maintenance of stormwater management facilities until such responsibility is transferred to another entity.

B. Summary of Maintenance Requirements

Treatment BMP's require minimum maintenance similar to that for any landscape areas. BMP's must be regularly maintained to ensure that they continue to be effective and do not cause flooding or other harmful nuisances. The maintenance requirements are:

Bioretention

- Limit the use of fertilizers and/or pesticides. Mosquito larvicides should be applied only when absolutely necessary.
- Replace and amend plants and soils as necessary to ensure the planters are effective and attractive. Plants must remain healthy and trimmed if overgrown. Soils must be maintained to efficiently filter the storm water.
- Visually inspect for ponding water to ensure that filtration is occurring.
- After all major storm events remove trash, inspect drain pipes and bubble-up risers for obstructions and remove if necessary.
- Continue general landscape maintenance, including pruning and cleanup throughout the year.
- Irrigate throughout the dry season. Irrigation should be provided with sufficient quantity and frequency to allow plants to thrive.
- Excavate, clean and or replace filter media (sand, gravel, topsoil) to ensure adequate infiltration rate (annually or as needed).

Pumps

Typical maintenance requirements of the pump will include:

- Inspection of pump during storm events to ensure proper operation and replacement of parts when necessary.
- Inspection of sump pit manholes after large storm events to confirm adequate dewatering within 48 hours.
- Removal of sediment buildup within manhole.
- Removal of trash and all other debris with potential to clog pump inlets.
- Pre-wet season inspection and activation of sump pump.
- See the manufacturer's specifications for detailed maintenance requirements.

Vault & Flow Control Structure

- Ensure flow control structure orifices and manhole are clear of debris and sediment.
- Ensure storage vault / box is clear of sediment and debris.
- See the manufacturer's specifications for detailed maintenance requirements.

VII. CONSTRUCTION PLAN C.3 CHECKLIST

Stormwater Control Plan Reference	BMP Description	See Figure No.
BR 1-14	Bioretention Area collecting roof, pavement, concrete and landscape drainage from DMAs 1-14	1

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 R2-2022-0018 and R2-2023-0019.

Appendix A

BAHM2023

PROJECT REPORT

General Model Information

BAHM2023 Project Name: mitchell bahm-no bio

Site Name:	2775 Mitchell Ave
Site Address:	2775 Mitchell Ave
City:	Walnut Creek
Report Date:	12/6/2024
Gage:	Flood Control
Data Start:	1959/10/01
Data End:	2021/09/30
Timestep:	Hourly
Precip Scale:	1.500
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

Landuse Basin Data

Pre-Project Land Use

Basin 1

Bypass:	No
GroundWater:	No

Pervious Land Use	acre
C D,Urban,Flat(0-5%)	6.2
Pervious Total	6.2

Impervious Land Use	acre
Roads,Flat(0-5%)	16
Impervious Total	16
Basin Total	22.2

Element Flow Componants:

Surface	Interflow	Groundwater
Componant Flows To:		
POC 1	POC 1	

Mitigated Land Use

West Watershed

Bypass:	No
GroundWater:	No

Pervious Land Use	acre
C D,Urban,Flat(0-5%)	2.66
Pervious Total	2.66

Impervious Land Use	acre
Roads,Flat(0-5%)	7.57
Impervious Total	7.57
Basin Total	10.23

Element Flow Componants:

Surface	Interflow	Groundwater

Componant Flows To:

Vault 1	Vault 1

East Watershed

Bypass:	Yes
GroundWater:	No
Pervious Land Use	acre
C D,Urban,Flat(0-5%)	3.1
Pervious Total	3.1
Impervious Land Use	acre
Roads,Flat(0-5%)	8.9
Impervious Total	8.9
Basin Total	12

Element Flow Componants:

Surface	Interflow	Groundwater
Componant Flows To:		
POC 1	POC 1	

Mitigated Routing

Vault 1

Width: 24 ft.
Length: 106 ft.
Depth: 6 ft.
Discharge Structure
Riser Height: 5 ft.
Riser Diameter: 24 in.
Orifice 1 Diameter: 4.400 in. Elevation:0 ft.
Orifice 2 Diameter: 4.500 in. Elevation:4.5 ft.
Orifice 3 Diameter: 5.000 in. Elevation:1 ft.
Element Outlets:
Outlet 1 Outlet 2
Outlet Flows To:

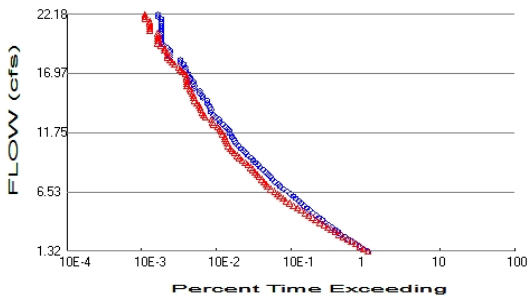
Vault Hydraulic Table

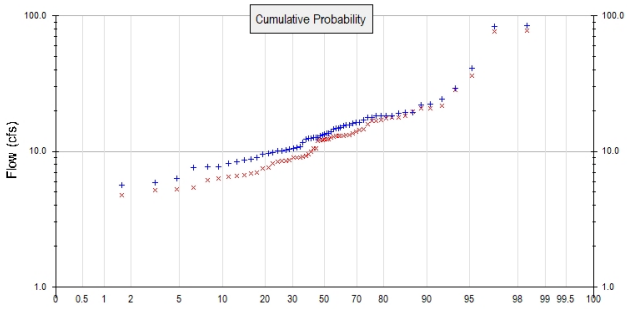
Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	Infilt(cfs)
0.0000	0.058	0.000	0.000	0.000
0.0667	0.058	0.003	0.135	0.000
0.1333	0.058	0.007	0.191	0.000
0.2000	0.058	0.011	0.235	0.000
0.2667	0.058	0.015	0.271	0.000
0.3333	0.058	0.019	0.303	0.000
0.4000	0.058	0.023	0.332	0.000
0.4667	0.058	0.027	0.358	0.000
0.5333	0.058	0.031	0.383	0.000
0.6000	0.058	0.035	0.406	0.000
0.6667	0.058	0.038	0.429	0.000
0.7333	0.058	0.042	0.449	0.000
0.8000	0.058	0.046	0.469	0.000
0.8667	0.058	0.050	0.489	0.000
0.9333	0.058	0.054	0.507	0.000
1.0000	0.058	0.058	0.525	0.000
1.0667	0.058	0.062	0.717	0.000
1.1333	0.058	0.066	0.807	0.000
1.2000	0.058	0.070	0.878	0.000
1.2667	0.058	0.074	0.941	0.000
1.3333	0.058	0.077	0.998	0.000
1.4000	0.058	0.081	1.050	0.000
1.4667	0.058	0.085	1.099	0.000
1.5333	0.058	0.089	1.146	0.000
1.6000	0.058	0.093	1.190	0.000
1.6667	0.058	0.097	1.232	0.000
1.7333	0.058	0.101	1.272	0.000
1.8000	0.058	0.105	1.311	0.000
1.8667	0.058	0.109	1.349	0.000
1.9333	0.058	0.112	1.385	0.000
2.0000	0.058	0.116	1.421	0.000
2.0667	0.058	0.120	1.455	0.000
2.1333	0.058	0.124	1.489	0.000
2.2000	0.058	0.128	1.522	0.000
2.2667	0.058	0.132	1.554	0.000
2.3333	0.058	0.136	1.585	0.000
2.4000	0.058	0.140	1.616	0.000

2.4667	0.058	0.144	1.646	0.000
2.5333	0.058	0.148	1.676	0.000
2.6000	0.058	0.151	1.705	0.000
2.6667	0.058	0.155	1.733	0.000
2.7333	0.058	0.159	1.761	0.000
2.8000	0.058	0.163	1.789	0.000
2.8667	0.058	0.167	1.816	0.000
2.9333	0.058	0.171	1.843	0.000
3.0000	0.058	0.175	1.869	0.000
3.0667	0.058	0.179	1.895	0.000
3.1333	0.058	0.183	1.920	0.000
3.2000	0.058	0.186	1.946	0.000
3.2667	0.058	0.190	1.970	0.000
3.3333	0.058	0.194	1.995	0.000
3.4000	0.058	0.198	2.019	0.000
3.4667	0.058	0.202	2.043	0.000
3.5333	0.058	0.206	2.067	0.000
3.6000	0.058	0.210	2.090	0.000
3.6667	0.058	0.214	2.113	0.000
3.7333	0.058	0.218	2.136	0.000
3.8000	0.058	0.221	2.159	0.000
3.8667	0.058	0.225	2.181	0.000
3.9333	0.058	0.229	2.203	0.000
4.0000	0.058	0.233	2.225	0.000
4.0667	0.058	0.237	2.247	0.000
4.1333	0.058	0.241	2.269	0.000
4.2000	0.058	0.245	2.290	0.000
4.2667	0.058	0.249	2.311	0.000
4.3333	0.058	0.253	2.332	0.000
4.4000	0.058	0.257	2.353	0.000
4.4667	0.058	0.260	2.373	0.000
4.5333	0.058	0.264	2.494	0.000
4.6000	0.058	0.268	2.587	0.000
4.6667	0.058	0.272	2.658	0.000
4.7333	0.058	0.276	2.719	0.000
4.8000	0.058	0.280	2.774	0.000
4.8667	0.058	0.284	2.825	0.000
4.9333	0.058	0.288	2.874	0.000
5.0000	0.058	0.292	2.920	0.000
5.0667	0.058	0.295	3.329	0.000
5.1333	0.058	0.299	4.037	0.000
5.2000	0.058	0.303	4.934	0.000
5.2667	0.058	0.307	5.971	0.000
5.3333	0.058	0.311	7.106	0.000
5.4000	0.058	0.315	8.299	0.000
5.4667	0.058	0.319	9.510	0.000
5.5333	0.058	0.323	10.69	0.000
5.6000	0.058	0.327	11.81	0.000
5.6667	0.058	0.330	12.83	0.000
5.7333	0.058	0.334	13.72	0.000
5.8000	0.058	0.338	14.46	0.000
5.8667	0.058	0.342	15.06	0.000
5.9333	0.058	0.346	15.54	0.000
6.0000	0.058	0.350	15.94	0.000
6.0667	0.058	0.354	16.52	0.000
6.1333	0.000	0.000	16.95	0.000

Analysis Results

POC 1





\+ Pre-Project x Mitigated

Pre-Project Landuse Totals for POC #1
Total Pervious Area: 6.2
Total Impervious Area: 16

Mitigated Landuse Totals for POC #1
Total Pervious Area: 5.76
Total Impervious Area: 16.47

Flow Frequency Method: Weibull

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

Return Period	**Flow(cfs)**
2 year	13.18119
5 year	18.289124
10 year	22.184867
25 year	57.501233

Flow Frequency Return Periods for Mitigated. POC #1

Return Period	**Flow(cfs)**
2 year	12.164917
5 year	17.243586
10 year	20.6654
25 year	51.619914

Annual Peaks

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

Year	**Pre-Project**	**Mitigated**
1960	15.993	12.932
1961	10.712	8.522
1962	10.367	9.497
1963	18.286	18.316
1964	29.161	28.313
1965	9.710	8.097
1966	8.583	6.448
1967	13.619	13.212
1968	12.650	12.717
1969	17.770	17.714
1970	41.283	36.332
1971	18.294	17.134
1972	4.661	4.099
1973	12.661	10.572

1974	15.446	12.748
1975	17.721	17.422
1976	5.594	4.734
1977	12.487	9.303
1978	15.583	11.991
1979	14.671	12.138
1980	24.402	20.667
1981	6.318	5.406
1982	85.054	77.614
1983	83.856	76.463
1984	7.674	6.347
1985	9.005	6.969
1986	18.211	14.511
1987	14.710	13.002
1988	8.802	6.905
1989	8.397	6.616
1990	10.098	9.058
1991	10.851	8.368
1992	7.598	6.105
1993	8.134	6.696
1994	10.105	7.479
1995	19.027	16.903
1996	14.917	12.935
1997	22.316	20.662
1998	12.713	12.372
1999	11.668	8.981
2000	9.762	8.608
2001	15.586	12.193
2002	13.457	12.308
2003	21.922	21.553
2004	16.358	13.917
2005	12.384	9.100
2006	18.378	16.910
2007	7.677	5.240
2008	13.085	13.033
2009	13.517	9.956
2010	16.412	15.804
2011	14.013	10.556
2012	12.313	12.267
2013	19.445	19.599
2014	10.536	7.584
2015	19.239	17.728
2016	9.543	9.055
2017	13.281	13.206
2018	10.292	8.547
2019	14.798	14.328
2020	17.018	13.583
2021	5.856	5.208

Ranked Annual Peaks

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

Rank	Pre-Project	Mitigated
1	85.0536	77.6144
2	83.8557	76.4631
3	41.2831	36.3318
4	29.1608	28.3125
5	24.4020	21.5525
6	22.3162	20.6671

7	21.9222	20.6620
8	19.4450	19.5992
9	19.2388	18.3162
10	19.0274	17.7283
11	18.3781	17.7136
12	18.2942	17.4215
13	18.2860	17.1341
14	18.2106	16.9104
15	17.7697	16.9032
16	17.7212	15.8035
17	17.0176	14.5110
18	16.4124	14.3284
19	16.3583	13.9173
20	15.9926	13.5827
21	15.5857	13.2120
22	15.5827	13.2055
23	15.4457	13.0333
24	14.9166	13.0018
25	14.7978	12.9352
26	14.7097	12.9322
27	14.6714	12.7477
28	14.0131	12.7168
29	13.6187	12.3724
30	13.5165	12.3077
31	13.4567	12.2665
32	13.2810	12.1926
33	13.0845	12.1381
34	12.7126	11.9910
35	12.6611	10.5723
36	12.6499	10.5555
37	12.4873	9.9556
38	12.3835	9.4969
39	12.3128	9.3027
40	11.6682	9.1000
41	10.8514	9.0582
42	10.7120	9.0553
43	10.5363	8.9807
44	10.3667	8.6078
45	10.2916	8.5467
46	10.1050	8.5219
47	10.0977	8.3680
48	9.7623	8.0966
49	9.7104	7.5842
50	9.5432	7.4787
51	9.0047	6.9693
52	8.8017	6.9050
53	8.5833	6.6963
54	8.3972	6.6158
55	8.1338	6.4478
56	7.6775	6.3467
57	7.6737	6.1049
58	7.5983	5.4057
59	6.3184	5.2399
60	5.8563	5.2079
61	5.5939	4.7341
62	4.6615	4.0993

Duration Flows

The Facility PASSED

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
1.3181	5821	5864	100	Pass
1.5289	5132	5157	100	Pass
1.7397	4549	4576	100	Pass
1.9504	4032	4023	99	Pass
2.1612	3605	3532	97	Pass
2.3720	3218	3120	96	Pass
2.5828	2871	2733	95	Pass
2.7935	2586	2429	93	Pass
3.0043	2341	2140	91	Pass
3.2151	2113	1902	90	Pass
3.4259	1919	1695	88	Pass
3.6366	1731	1519	87	Pass
3.8474	1577	1337	84	Pass
4.0582	1444	1180	81	Pass
4.2690	1308	1057	80	Pass
4.4797	1185	942	79	Pass
4.6905	1070	838	78	Pass
4.9013	974	747	76	Pass
5.1121	896	669	74	Pass
5.3228	822	590	71	Pass
5.5336	750	524	69	Pass
5.7444	700	470	67	Pass
5.9552	632	429	67	Pass
6.1659	587	391	66	Pass
6.3767	536	359	66	Pass
6.5875	488	330	67	Pass
6.7983	437	295	67	Pass
7.0091	391	267	68	Pass
7.2198	370	254	68	Pass
7.4306	337	237	70	Pass
7.6414	309	223	72	Pass
7.8522	287	205	71	Pass
8.0629	272	193	70	Pass
8.2737	250	179	71	Pass
8.4845	233	169	72	Pass
8.6953	215	157	73	Pass
8.9060	197	145	73	Pass
9.1168	182	134	73	Pass
9.3276	169	122	72	Pass
9.5384	160	111	69	Pass
9.7491	146	104	71	Pass
9.9599	136	95	69	Pass
10.1707	126	89	70	Pass
10.3815	116	84	72	Pass
10.5922	108	79	73	Pass
10.8030	100	77	77	Pass
11.0138	97	74	76	Pass
11.2246	92	72	78	Pass
11.4353	88	71	80	Pass
11.6461	83	67	80	Pass
11.8569	82	63	76	Pass
12.0677	78	61	78	Pass
12.2784	73	57	78	Pass

12.4892	67	51	76	Pass
12.7000	62	49	79	Pass
12.9108	59	47	79	Pass
13.1215	53	39	73	Pass
13.3323	50	37	74	Pass
13.5431	47	35	74	Pass
13.7539	46	34	73	Pass
13.9646	45	33	73	Pass
14.1754	43	32	74	Pass
14.3862	41	30	73	Pass
14.5970	41	28	68	Pass
14.8077	36	27	75	Pass
15.0185	35	27	77	Pass
15.2293	33	26	78	Pass
15.4401	33	25	75	Pass
15.6508	28	24	85	Pass
15.8616	28	22	78	Pass
16.0724	27	22	81	Pass
16.2832	27	22	81	Pass
16.4939	25	22	88	Pass
16.7047	24	22	91	Pass
16.9155	23	21	91	Pass
17.1263	21	19	90	Pass
17.3370	21	18	85	Pass
17.5478	21	17	80	Pass
17.7586	20	15	75	Pass
17.9694	18	14	77	Pass
18.1801	18	13	72	Pass
18.3909	13	12	92	Pass
18.6017	13	12	92	Pass
18.8125	13	12	92	Pass
19.0232	13	11	84	Pass
19.2340	12	11	91	Pass
19.4448	11	10	90	Pass
19.6556	10	9	90	Pass
19.8663	10	9	90	Pass
20.0771	10	9	90	Pass
20.2879	10	9	90	Pass
20.4987	10	9	90	Pass
20.7094	10	7	70	Pass
20.9202	10	7	70	Pass
21.1310	10	7	70	Pass
21.3418	10	7	70	Pass
21.5525	10	7	70	Pass
21.7633	10	6	60	Pass
21.9741	9	6	66	Pass
22.1849	9	6	66	Pass

Water Quality

Model Default Modifications

Total of 0 changes have been made.

PERLND Changes

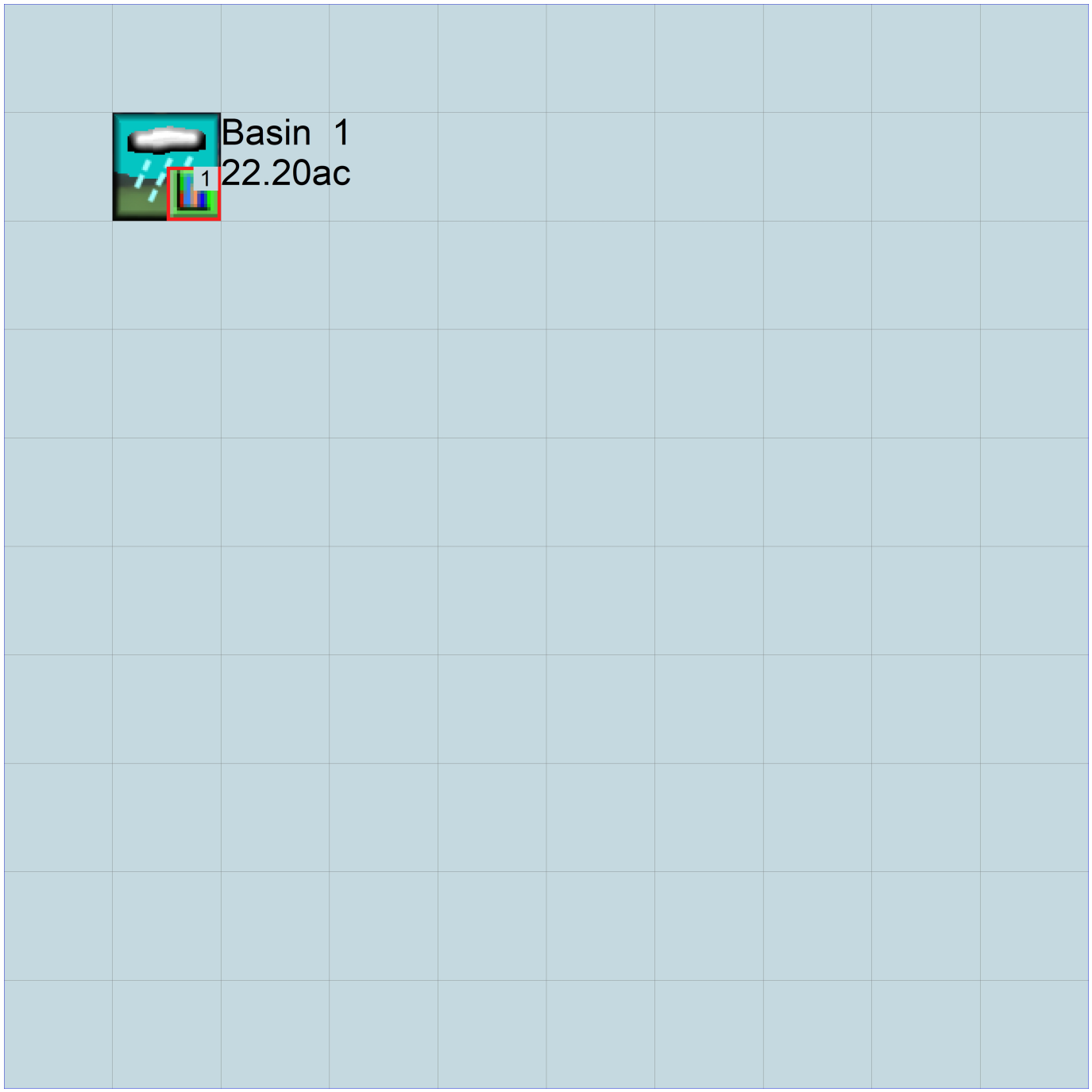
No PERLND changes have been made.

IMPLND Changes

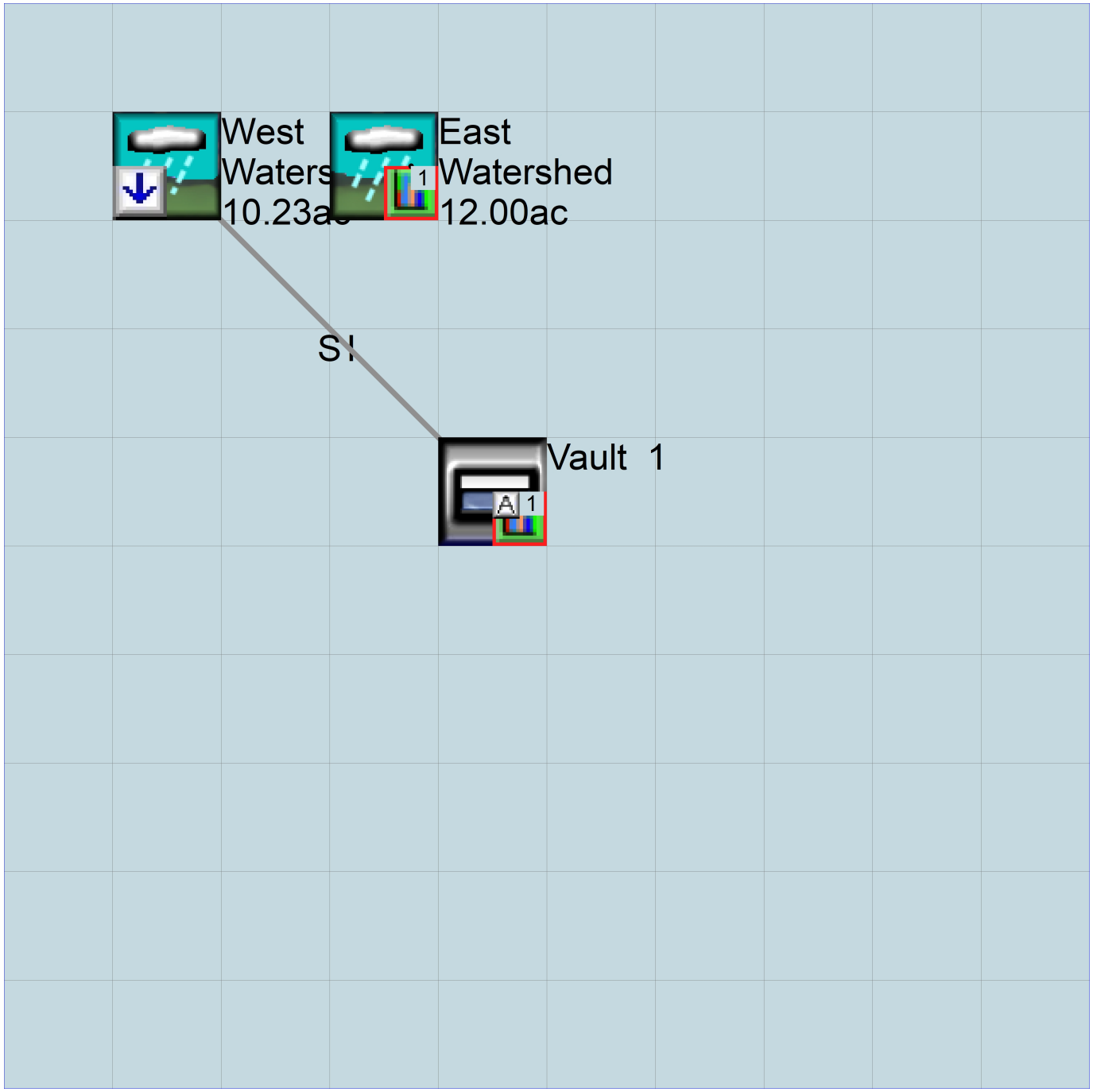
No IMPLND changes have been made.

Appendix

Pre-Project Schematic



Mitigated Schematic



Disclaimer

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Appendix B

Hydrograph Report

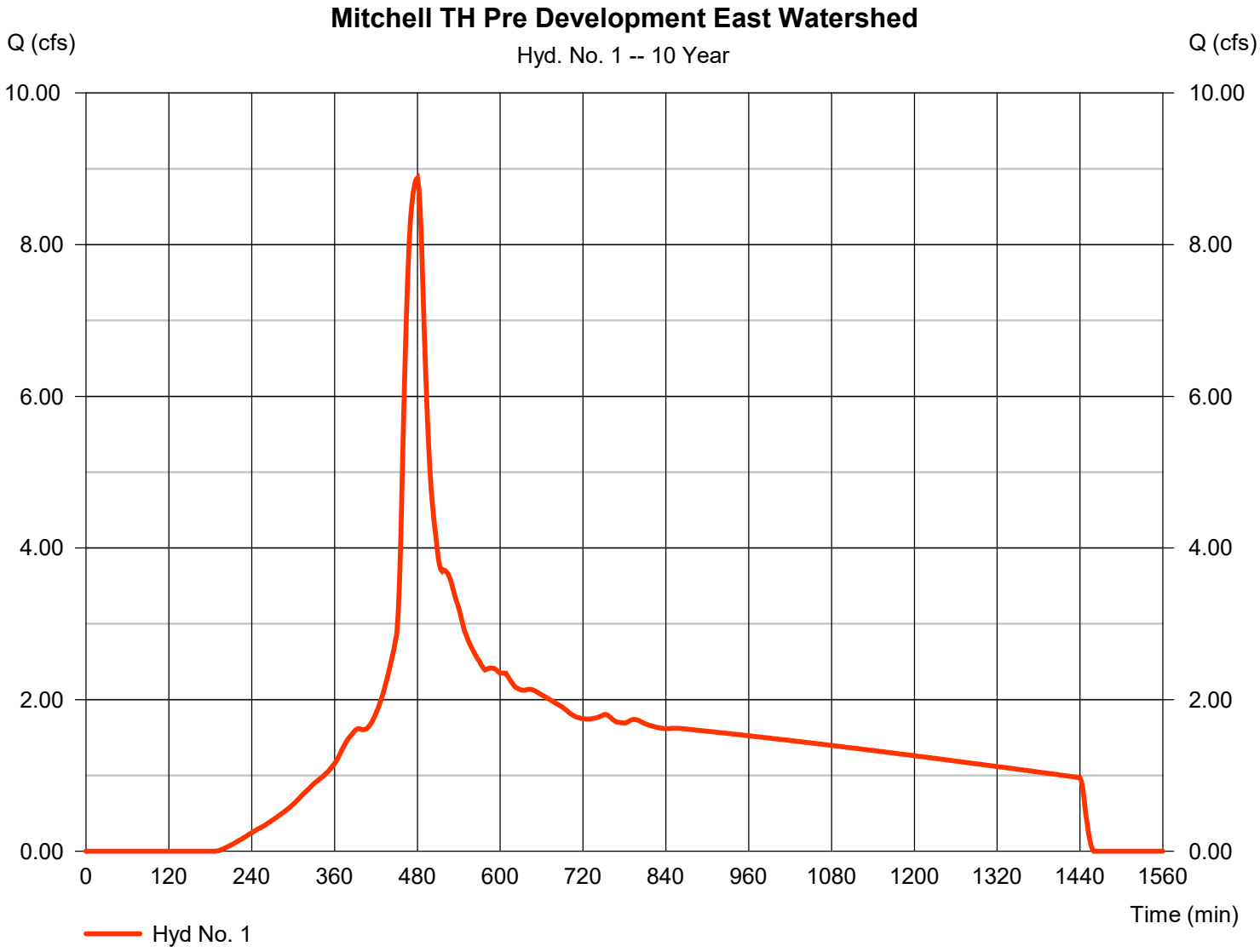
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Thursday, 12 / 5 / 2024

Hyd. No. 1

Mitchell TH Pre Development East Watershed

Hydrograph type	=	SCS Runoff	Peak discharge	=	8.881 cfs
Storm frequency	=	10 yrs	Time to peak	=	480 min
Time interval	=	2 min	Hyd. volume	=	128,244 cuft
Drainage area	=	16.630 ac	Curve number	=	88*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	12.40 min
Total precip.	=	3.27 in	Distribution	=	Type IA
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(4.260 x 94) + (1.720 x 74)] / 16.630



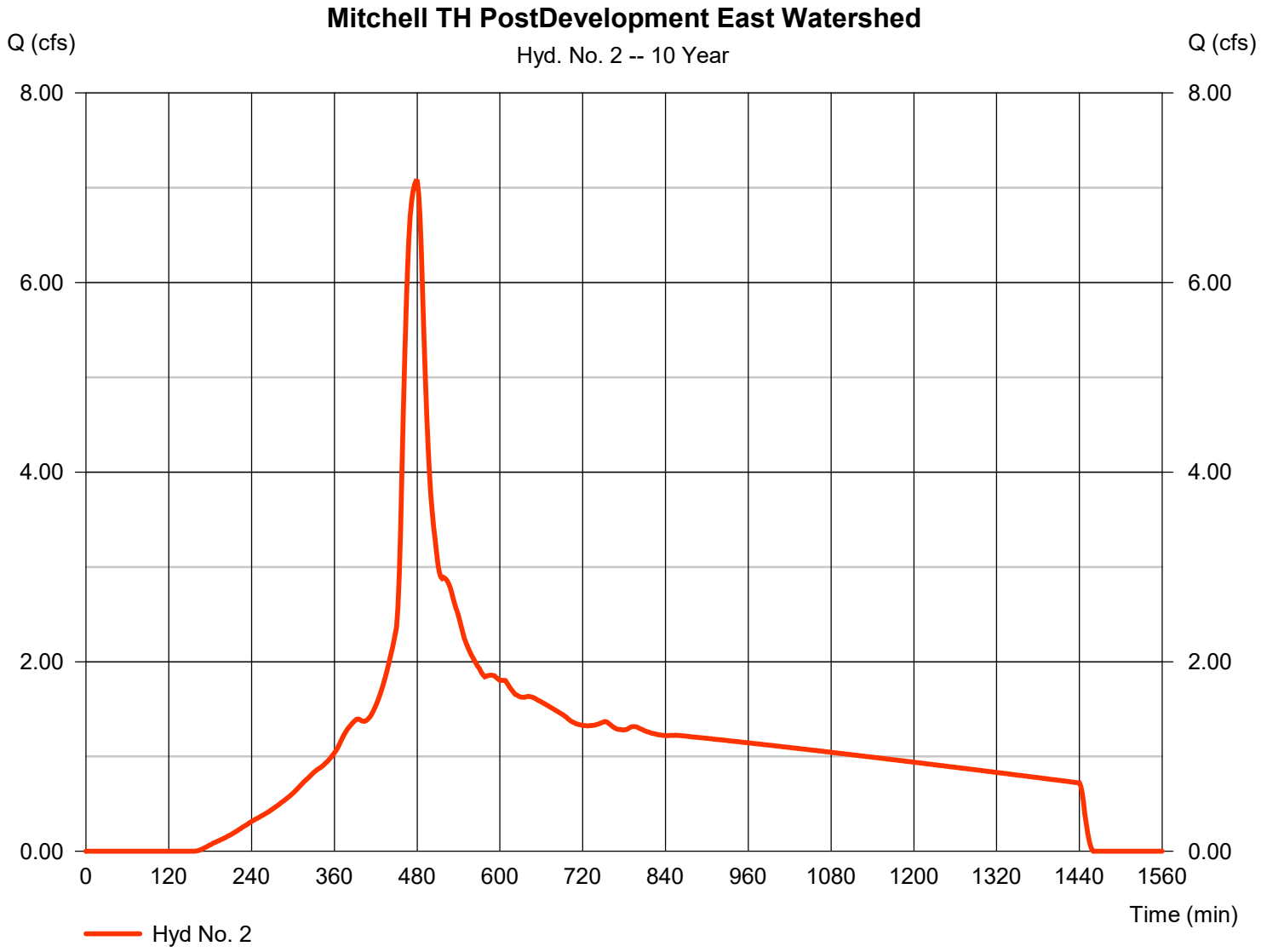
Hydrograph Report

Hyd. No. 2

Mitchell TH PostDevelopment East Watershed

Hydrograph type	= SCS Runoff	Peak discharge	= 7.069 cfs
Storm frequency	= 10 yrs	Time to peak	= 478 min
Time interval	= 2 min	Hyd. volume	= 100,332 cuft
Drainage area	= 12.000 ac	Curve number	= 90*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 12.40 min
Total precip.	= 3.27 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(10.100 x 94) + (2.900 x 74)] / 12.000



Hydrograph Report

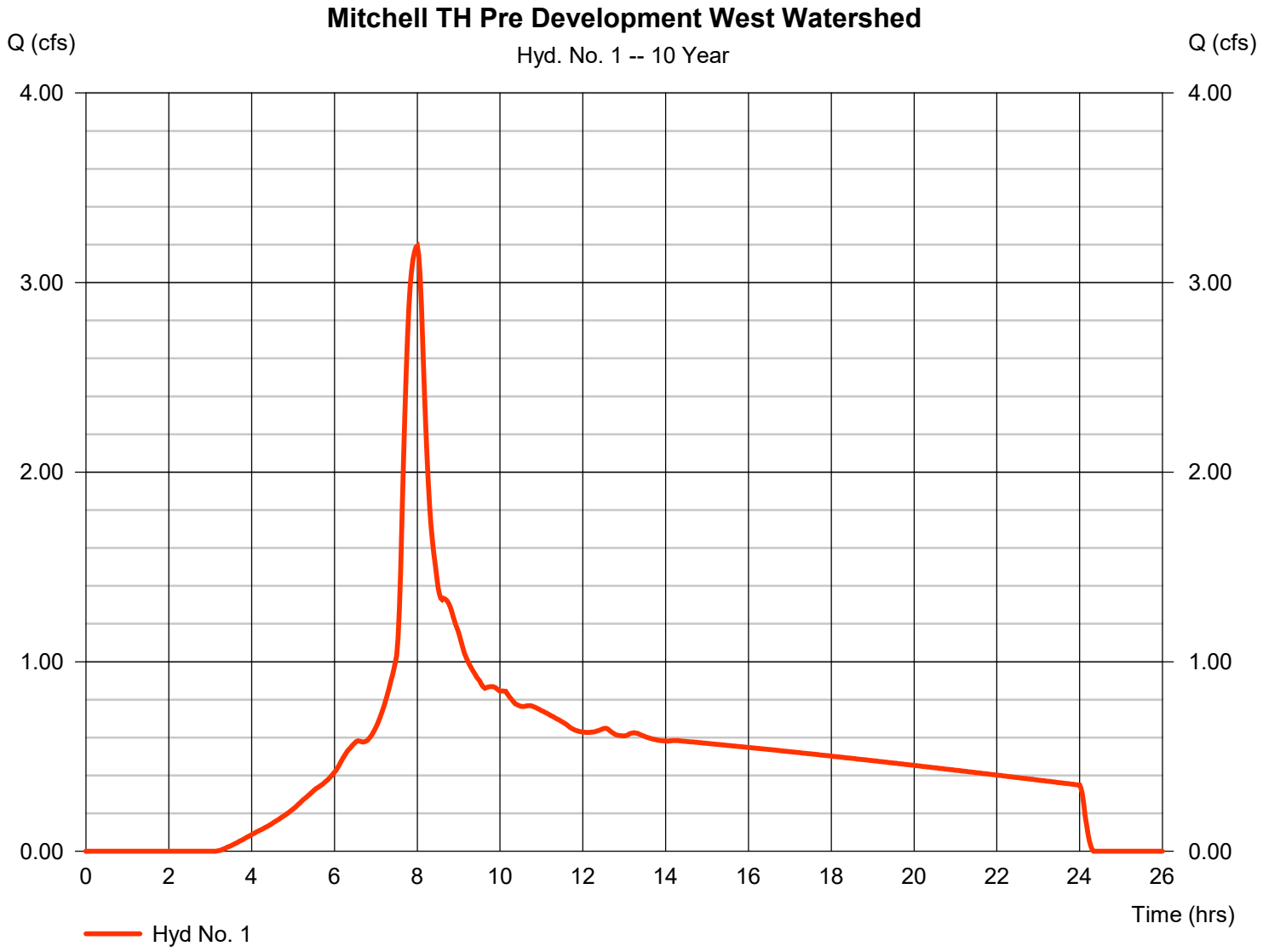
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Friday, 12 / 6 / 2024

Hyd. No. 1

Mitchell TH Pre Development West Watershed

Hydrograph type	= SCS Runoff	Peak discharge	= 3.194 cfs
Storm frequency	= 10 yrs	Time to peak	= 8.00 hrs
Time interval	= 2 min	Hyd. volume	= 46,116 cuft
Drainage area	= 5.980 ac	Curve number	= 88*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 12.40 min
Total precip.	= 3.27 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(4.260 x 94) + (1.720 x 74)] / 5.980



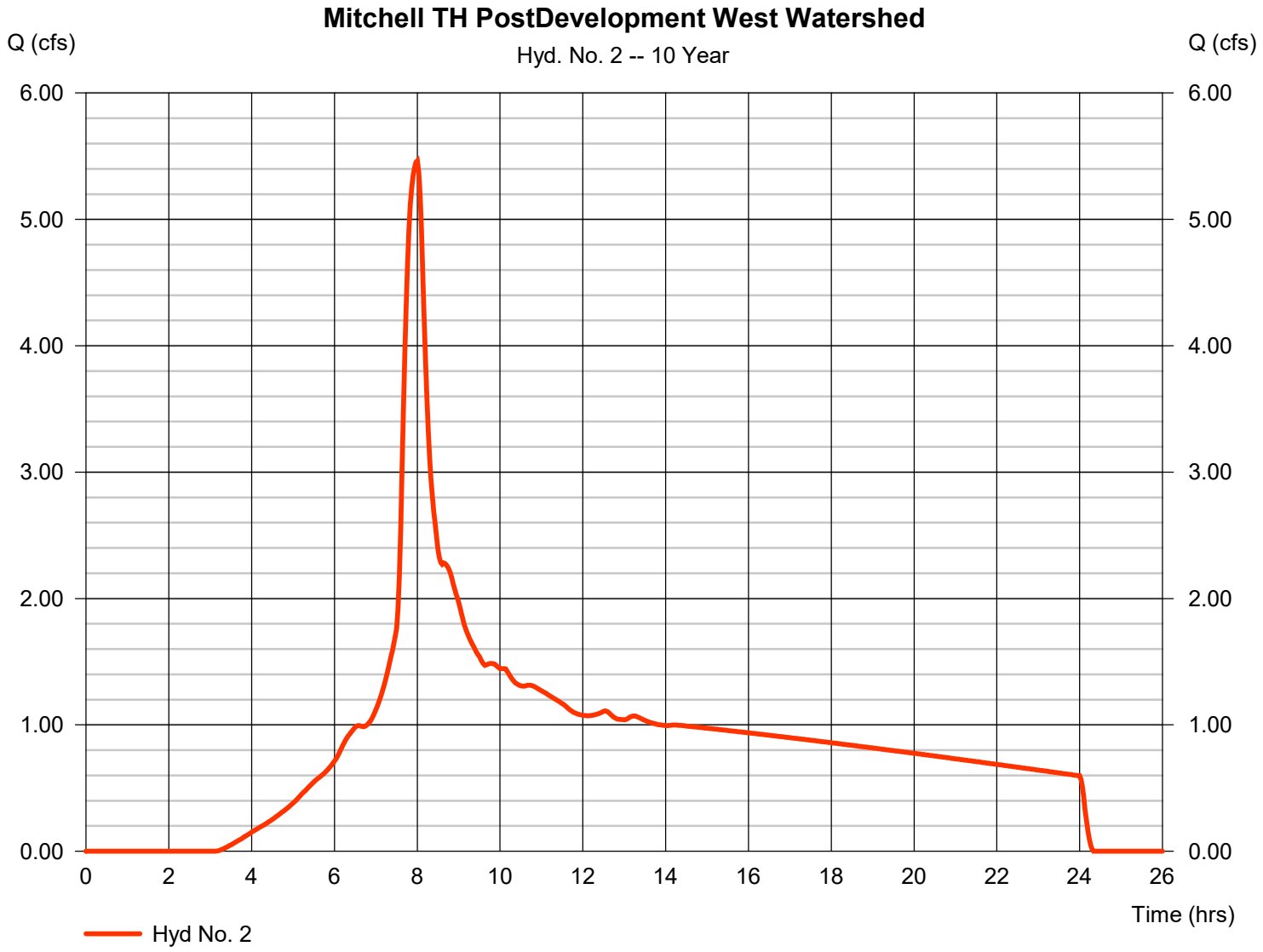
Hydrograph Report

Hyd. No. 2

Mitchell TH PostDevelopment West Watershed

Hydrograph type	=	SCS Runoff	Peak discharge	=	5.463 cfs
Storm frequency	=	10 yrs	Time to peak	=	8.00 hrs
Time interval	=	2 min	Hyd. volume	=	78,890 cuft
Drainage area	=	10.230 ac	Curve number	=	88*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	12.40 min
Total precip.	=	3.27 in	Distribution	=	Type IA
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(7.160 x 94) + (2.340 x 74)] / 10.230



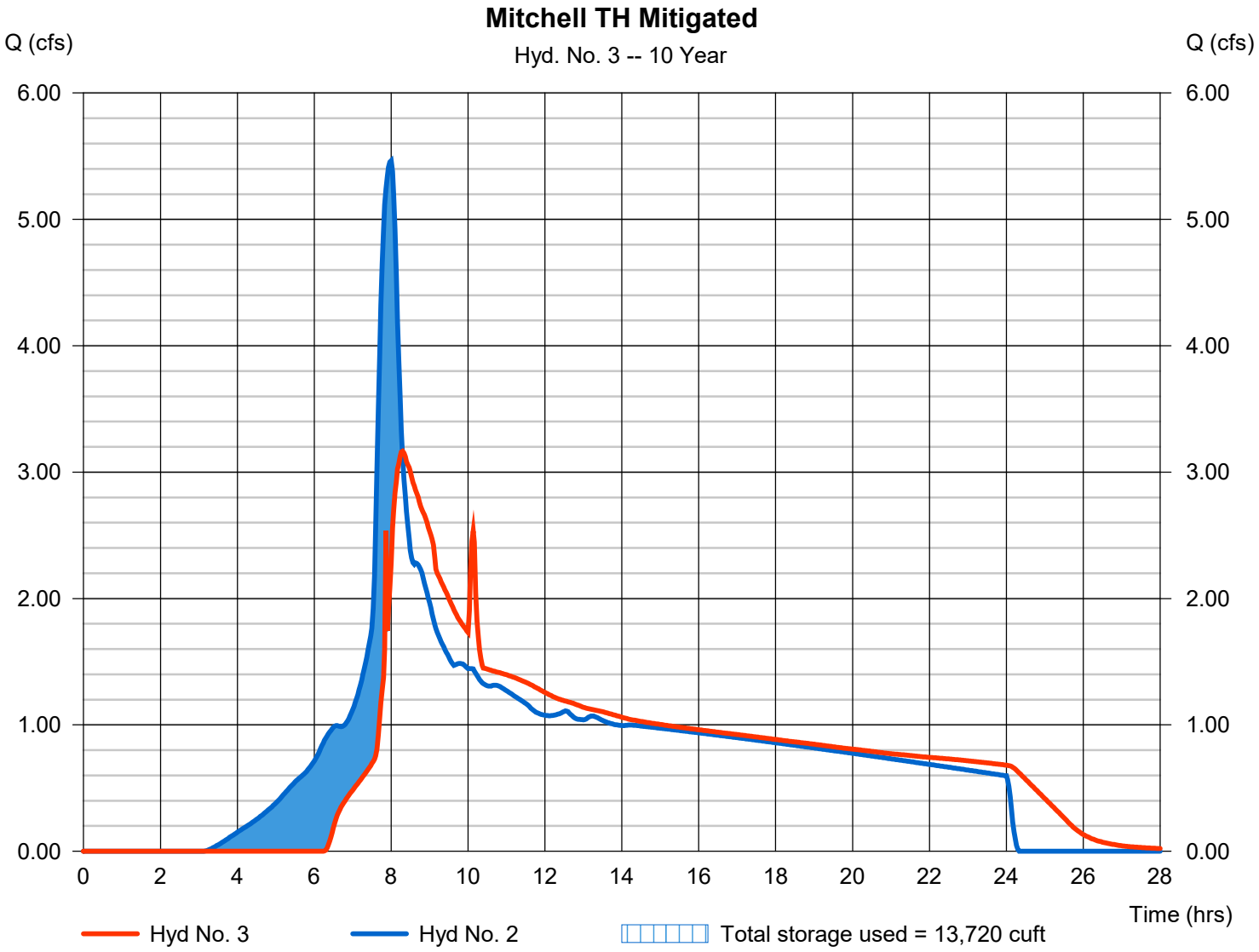
Hydrograph Report

Hyd. No. 3

Mitchell TH Mitigated

Hydrograph type	=	Reservoir	Peak discharge	=	3.165 cfs
Storm frequency	=	10 yrs	Time to peak	=	8.30 hrs
Time interval	=	2 min	Hyd. volume	=	75,049 cuft
Inflow hyd. No.	=	2 - Mitchell TH PostDevelopmentMitWestWatershed	Max. Elevation	=	6.38 ft
Reservoir name	=	DETENTION PIPE	Max. Storage	=	13,720 cuft

Storage Indication method used.



Pond Report

Pond No. 1 - DETENTION PIPE

Pond Data

UG Chambers -Invert elev. = 1.00 ft, Rise x Span = 6.00 x 51.00 ft, Barrel Len = 50.00 ft, No. Barrels = 1, Slope = 0.00%, Headers = No

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	1.00	n/a	0	0
0.60	1.60	n/a	1,530	1,530
1.20	2.20	n/a	1,530	3,061
1.80	2.80	n/a	1,530	4,591
2.40	3.40	n/a	1,530	6,121
3.00	4.00	n/a	1,530	7,652
3.60	4.60	n/a	1,530	9,182
4.20	5.20	n/a	1,530	10,712
4.80	5.80	n/a	1,530	12,242
5.40	6.40	n/a	1,530	13,773
6.00	7.00	n/a	1,530	15,303

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 4.40	5.00	4.50	Inactive
Span (in)	= 4.40	5.00	4.50	24.00
No. Barrels	= 1	1	1	1
Invert El. (ft)	= 1.00	2.50	4.00	5.00
Length (ft)	= 0.00	0.00	0.00	0.00
Slope (%)	= 0.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

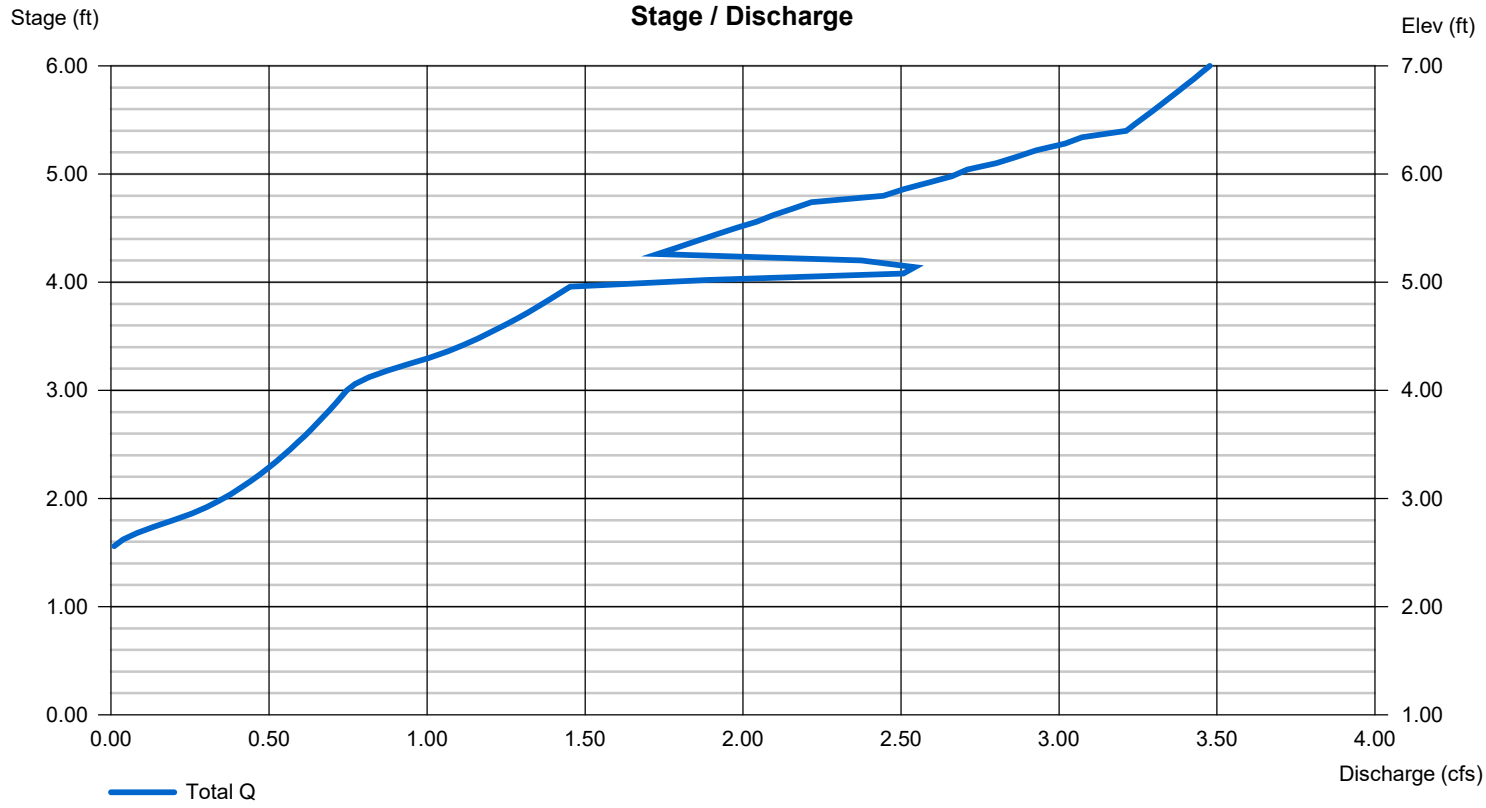
Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 43.00	Inactive	Inactive	0.00
Crest El. (ft)	= 5.00	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= 1	---	---	---
Multi-Stage	= Yes	No	No	No

Exfil.(in/hr) = 0.000 (by Contour)

TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).



Figures

60' 0' 30' 60' 120'
GRAPHIC SCALE

LEGEND

- PROJECT BOUNDARY
- PROPERTY LINE
- RIGHT-OF-WAY
- DRAINAGE AREA BOUNDARY
- CURB, GUTTER AND SIDEWALK
- EXISTING STORM DRAIN (EX SD)
- STORM DRAIN (SD)
- STORM DRAIN (TREATED) (SD-T)
- STORM DRAIN FORCE MAIN (SDFM)
- MANHOLE
- CATCH BASIN
- FIELD INLET
- PORTION OF DMA TREATED BY SURFACE FLOW
- LOW FLOW WATER QUALITY PUMP
- CURB CUT (CC)
- DIRECTION OF FLOW
- BIORETENTION AREA
- ASPHALT
- DMA 1 — DRAINAGE MANAGEMENT AREA
- BR 1 — BIORETENTION AREA
- PROPOSED HMP/DETENTION VAULT

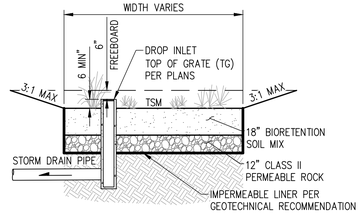
PRELIMINARY STORMWATER TREATMENT CALCULATIONS

DMA	DMA AREA (AC)	C FACTOR	TREATMENT AREA REQUIRED (SF)	TREATMENT AREA PROVIDED (SF)
1	3.29	0.85	4,873	4,931
2	0.17	0.85	252	305
3	2.53	0.85	3,747	3,813
4	0.28	0.85	415	419
5	4.86	0.85	7,198	7,362
6	1.52	0.85	2,251	2,589
7	0.39	0.80	544	551
8	0.83	0.80	1,157	1,392
9	2.97	0.85	4,399	5,172
10	0.65	0.85	963	1,005
11	0.08	0.85	118	206
12	4.15	0.85	6,146	6,787
13	0.23	0.85	341	357
14	0.25	0.85	370	402

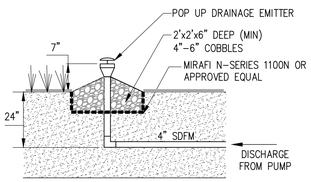
PRELIMINARY LOW FLOW PUMP CALCULATIONS

PUMP	AREA (AC)	C FACTOR	WATER QUALITY RAINFALL INTENSITY (IN/HR)**	FLOW (CFS)	FLOW (GPM)
1	2.91	0.85	0.40	0.99	444
3	1.86	0.85	0.40	0.63	283
5	3.79	0.85	0.40	1.29	579
6	1.32	0.80	0.40	0.42	188
9	1.62	0.85	0.40	0.55	247
12A	0.51	0.85	0.40	0.17	76
12B	2.79	0.85	0.40	0.95	426

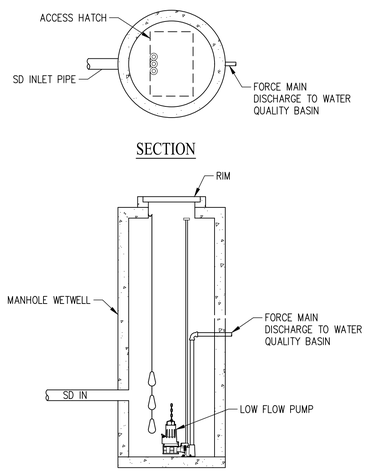
**NOTE:
PUMPS SHALL BE SIZED TO PUMP A RAINFALL INTENSITY OF 0.4 IN/HR PER COORDINATION WITH THE CITY OF WALNUT CREEK ENGINEERING DEPARTMENT.



TYPICAL BIORETENTION AREA
NOT TO SCALE



TYPICAL SDFM BUBBLE UP DETAIL
NOT TO SCALE



SAMPLE LOW FLOW PUMP DETAIL
NOT TO SCALE

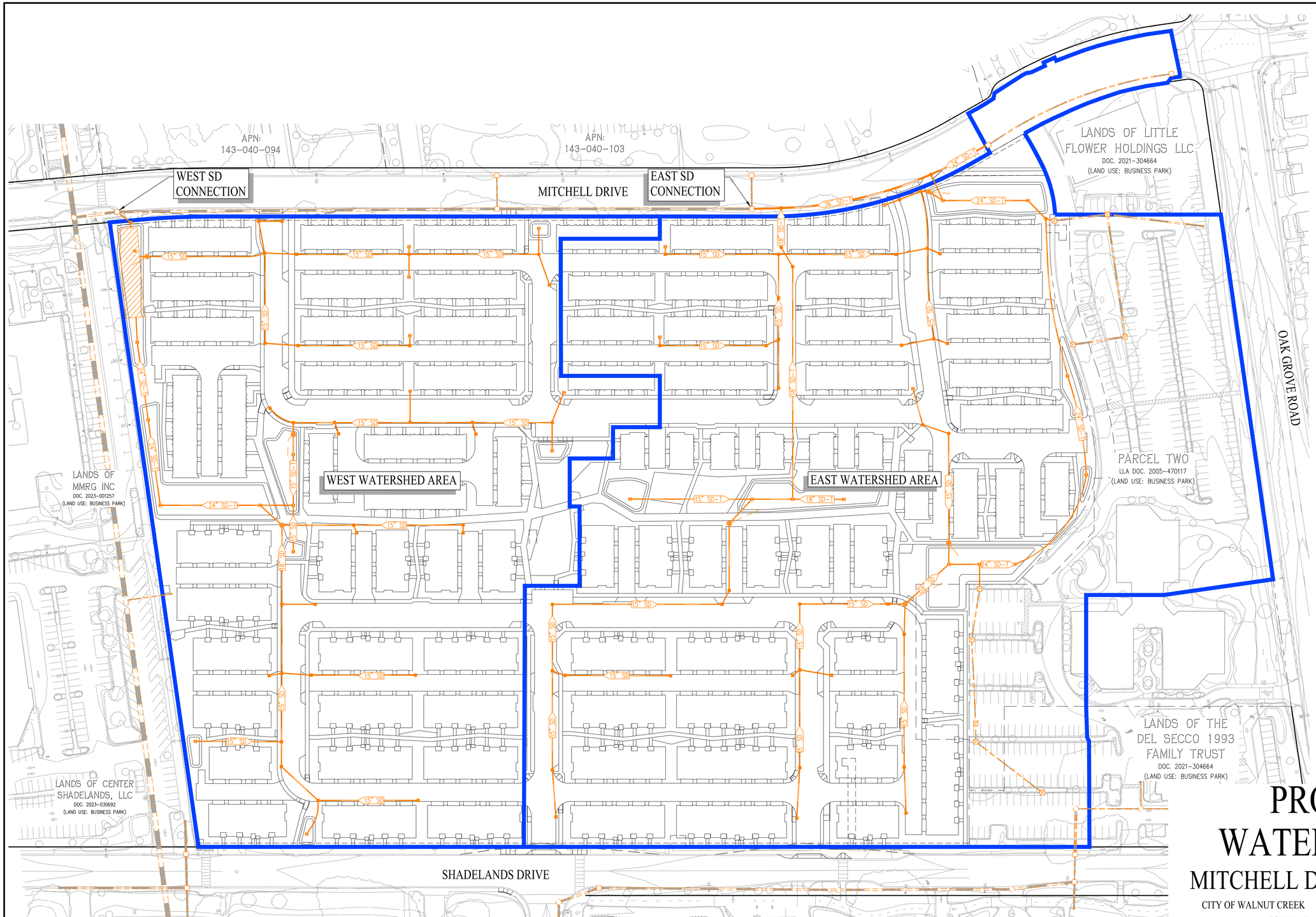
SIGNATURE DEVELOPMENT GROUP | ktgy | cbg | TGP

Mitchell Drive Townhomes
Walnut Creek, CA

PROJECT SUBMITTAL
DECEMBER 6, 2024

PRELIMINARY STORMWATER CONTROL PLAN

C6.0



LEGEND

WATERSHED BOUNDARY

PROPOSED WATERSHED MAP

MITCHELL DRIVE TOWNHOMES

CITY OF WALNUT CREEK CONTRA COSTA COUNTY CALIFORNIA

SCALE: 1" = 60' DATE: DECEMBER 2024

0 60 120 180

cbg CIVIL ENGINEERS ▪ SURVEYORS ▪ PLANNERS

SAN RAMON ▪ (925) 866-0322
ROSEVILLE ▪ (916) 788-4456
WWW.CBANDG.COM

H:\3848\ACAD\EXHIBITS\SWMP\PROPOSED WATERSHED MAP.DWG