EXHIBIT 23
CUP16-02

STORMWATER REPORT

FOR

LACAMAS HEIGHTS ELEMENTARY SCHOOL

CAMAS, WASHINGTON

Job No.: MLMA-02

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SECTION 1 – SUMMARY REPORT

Section A – Project Overview

This is the stormwater report for the Lacamas Heights Elementary School project. This report is submitted concurrently with the project land-use application.

This proposal consists of constructing a new elementary school with associated access roads, parking, playgrounds, utilities, and landscaping. These improvements are considered on-site improvements and private stormwater facilities are proposed to manage runoff from these areas and will be owned and maintained by the Camas School District (CSD).

A new public roadway is being constructed on the school property to provide access to the school. The new roadway, right-of-way, and all related construction will be dedicated to the City of Camas, who will maintain the associated off-site stormwater facilities.

The existing site contains approximately 12,850 SF of existing impervious surfaces (two residences and outbuildings) with bands of trees aligning the west and north site borders. Several hydrogeomorphic wetlands are present within the subject site and a Lacamas Lake tributary transects the northern half of the site. Site vegetation primarily consists of grass in open areas with mature conifers and several oak trees concentrated near the existing residences and the Lacamas Lake tributary. The wetlands are drained to the west and south, where water is conveyed under NE 232nd Avenue and NE 9th Street through multiple culverts. There is one wetland that drains to the east side of the property.

Section B – Minimum Requirements

This project consists of converting approximately 7,800 SF of existing impervious surface to natural vegetation, and constructing approximately 296,480 SF of new impervious surface. The total project disturbed area is approximately 14.5 acres (includes on-site and off-site). Since the site drains to Lacamas Lake, phosphorus treatment is required.

The zoning is R-7.5 (Residential 7,500) and therefore the project is considered an urban development. Because the existing impervious surface (12,850 SF) is less than 35% of the total project site (424,652 SF), the project is considered a New Development. New Developments that add more than 5,000 SF of impervious surface are required to meet Minimum Requirements 1-9 for <u>new</u> impervious and converted pervious surfaces.

Table 1 – Project Summary Table

Exist. Imperv. (SF)	New Imperv. (SF)	Replaced Imperv. (SF)	Native Veg. to Lawn (SF)	Native Veg. to Pasture (SF)	Land Disturbed (SF)
12,850	296,480	0	218,654	0	631,620

Some of the specific minimum requirements are addressed in this section, while others are addressed in subsequent sections.

Minimum Requirement #1 – Preparation of Stormwater Site Plans

The civil drawings show the proposed on-site and off-site stormwater systems.

Minimum Requirement #2 – Construction Stormwater Pollution Prevention

The contractor is responsible for conforming to City of Camas's Erosion Prevention & Sediment Control Codes (CMC 14.06). A construction SWPPP is required for this project, and the 12 elements of the Construction SWPPP must be considered and controls developed.

1. Preserve Vegetation/Mark Clearing Limits - Land disturbing activities will be limited to the extent practicable. The Lacamas Lake Tributary and Wetlands will be protected from activity. Silt fence and tree protection fencing will be utilized to mark the clearing limits.
2. Establish Construction Access - A gravel construction entrance will be installed to minimize sediment tracking off-site.
3. Control Flow Rates –Collected stormwater runoff is proposed to be detained on-site in a pond and off-site in an underground detention facility, and released at the City's flow control requirements.
4. Install Sediment Controls - The contractor shall install sediment controls per City of Camas standard details.
5. Stabilize soils - The project will replace any permanent vegetation that may be disturbed with this project.
6. Protect Slopes – There are no steep (>40%) slopes within the project area.
7. Protect Drain Inlets - The contractor shall install sediment controls per City of Camas standard details.
8. Stabilize Channels and Outlets – There are no existing or proposed channels associated with the project. All new outlets will be stabilized with rock.
9. Control Pollutants - The contractor shall conform to the Erosion Prevention & Sediment Control Code (CMC 14.06).
10. Control Dewatering – Some dewatering may be required on this site.
11. Maintain BMPs - The contractor shall conform to the Erosion Prevention & Sediment Control Code (CMC 14.06).
12. Manage the Project - The contractor shall conform to the Erosion Prevention & Sediment Control Code (CMC 14.06).

Minimum Requirement #4 – Preservation of Natural Drainage Systems and Outfalls

The project will maintain the existing Lacamas Lake Tributary, NE 232ND culverts and wetlands.

All proposed stormwater outfall locations will be stabilized with rock.

Section C – Soils Evaluation

The Clark County Soils Survey classifies these soils as Lauren Loam, Lauren Gravelly Loam, Cove Silty Clay Loam and McBee Silty Clay Loam. An on-site soils study by a geotechnical engineer describe the soils as three different soil types, depending on the location and depth. The USDA provides Hydrologic Soil Group designations, in which Lauren is listed as Hydrologic Group B. However, based on the

geotechnical report findings, Hydrologic Group D (SG4) is a more appropriate classification for the near surface soils on this site.

In-situ infiltration testing performed in October 2016 by Columbia West Engineering yielded infiltration rates ranging from 0-5.9inches per hour, as defined by the soil's approximate vertical coefficient of permeability (k).

Groundwater was encountered ranging from 3'-8.5' below existing ground surface.

Section D – Source Control (Minimum Requirement #3)

There are no existing or proposed sources of pollution on the project site requiring special BMP's under this minimum requirement.

Section E – On-Site Stormwater Management BMPs (Minimum Requirement #5)

There is not enough natural vegetation on the project site (outside of the wetland boundaries) to consider Full Dispersion. Furthermore, there are limited areas to disperse runoff in accordance with the dispersion BMP's design criteria, where it will not receive high-traffic use by students and community members.

Section F – Runoff Treatment Analysis and Design (Minimum Requirement #6)

On-Site

This project proposes to treat the new impervious and landscape surfaces using a combined wetpool/detention facility (BMP T10.10 Large Wetpond) designed in accordance with the City of Camas Stormwater Design Standards Manual (Resolution #1193) and DOE Stormwater Management Manual for Western Washington (SWMMWW). The wetpool utilizes the enhanced treatment design standards to treat phosphorus, given that the project is located within the Lacamas Lake watershed. Based on the infiltration test results it was determined not to apply an infiltration rate to the facility. See Section 2 for the WWHM screen shot of the trapezoidal pond for additional information.

Off-Site

The off-site roadway proposes to treat the pollution generating impervious surfaces using mechanical filtration. Treatment will be provided by proprietary products that have been approved by the Washington State Department of Ecology for both basic treatment and phosphorous removal. A single, end-of-line treatment vault will be placed downstream of the detention facility. As required by the SWMMWW for water quality treatment downstream of detention, the treatment facility will be sized to treat the full 2-year storm peak release rate.

Section G – Flow Control Analysis and Design (Minimum Requirement #7)

On-Site

A new flow control facility will be provided for the on-site system, proposed as a detention pond. Based on the infiltration test results it was determined not to apply an infiltration rate to the facility.

Since the project is required to meet the flow control standard for all new impervious and converted surfaces, the existing basin in the predeveloped model is sized at 420,195 SF (equal to the new impervious and converted surface) for the on-site system. Since the site has historically drained to wetlands, the predeveloped condition is required to be modeled as the existing condition

(prairie). As mentioned above, the Hydrologic Group selected is Group D. There are two points-of-compliance for the on-site project areas (Lacamas Lake Tributary and SW Wetland,). Detained stormwater will be released from the pond through a flow splitter that will convey water both to the tributary and SW Wetland.

Off-Site

Detention for the off-site areas is proposed as an underground detention facility (chambers or perforated pipe in a gravel bed). As with the on-site areas, all pre-developed areas for off-site basins are assumed the existing condition because the runoff has historically drained to a wetland (prairie and forest). There is a single point of compliance for the off-site basin (the southwest wetland). A french drain at the back of sidewalk will intercept water from north of the roadway and convey it under the road to the wetland, bypassing the new road's stormwater system.

Section H – Wetlands Protection (Minimum Requirement #8)

There are six wetlands on the project site. Wetlands will be protected and enhanced. The proposal includes no direct wetland impacts, only indirect wetland and buffer impacts. Wetland and buffer enhancements, as well as wetland creation are part of the mitigation plan for this project. All mitigation will be accomplished on-site.

Section I – Other Permits

Since this project disturbs more than one acre of land, a Construction General Stormwater Permit (CSGP) will be required through the Washington State Department of Ecology (WADOE).

Section J – Conveyance Systems Analysis and Design

All proposed stormwater pipes are sized to flow the 10-year peak flow as determined using a 24-hour peak flow method without surcharge in the final design. See Section 2 for all pipe sizing calculations for the on-site stormwater pipes. The design of the off-site stormwater pipes will be completed once we have received comments from the City on the roadway alignment and profile.

Section K – Off-Site Analysis

There are no significant portions of adjacent properties that discharge onto the project site that must flow through the proposed stormwater system.

Additionally, all of the collected stormwater runoff is detained to the flow control standards and discharged toward the applicable TDA, both of which are existing surface water bodies.

Therefore, there is no reason to assess off-site areas further.

Section L – Approval Conditions Summary

There are no project approval conditions to-date.

Section M – Special Reports and Studies

The land-use submittal for this project included special studies including geotechnical evaluation, wetland mitigation, and habitat mitigation. No other special studies have been requested.

Section N – Maintenance and Operations Manual (Minimum Requirement #9)

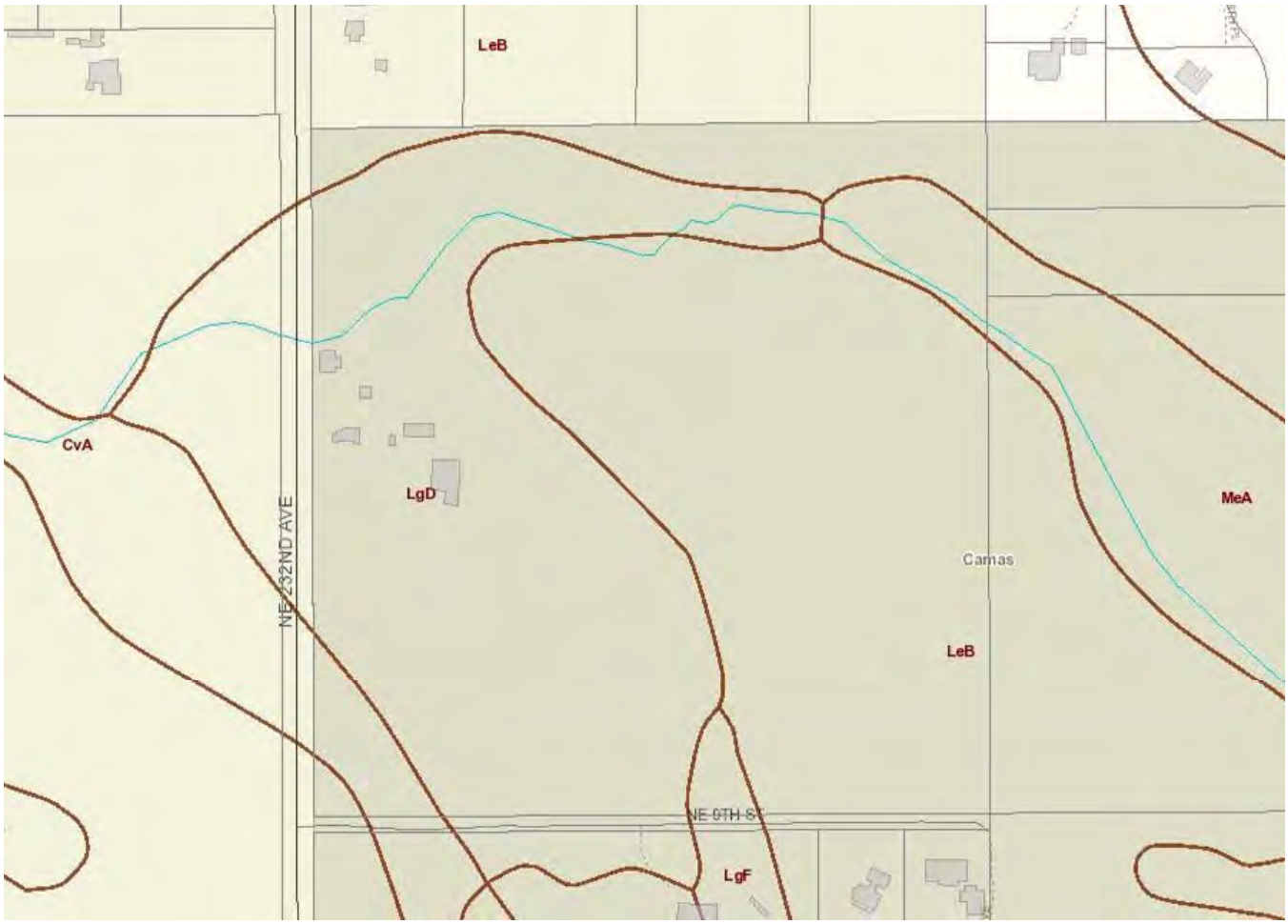
All maintenance of the proposed on-site stormwater collection, conveyance, treatment, and infiltration facilities will be provided by the Camas School District.

After dedication to the City of Camas, maintenance of all off-site stormwater facilities will be provided by the City.

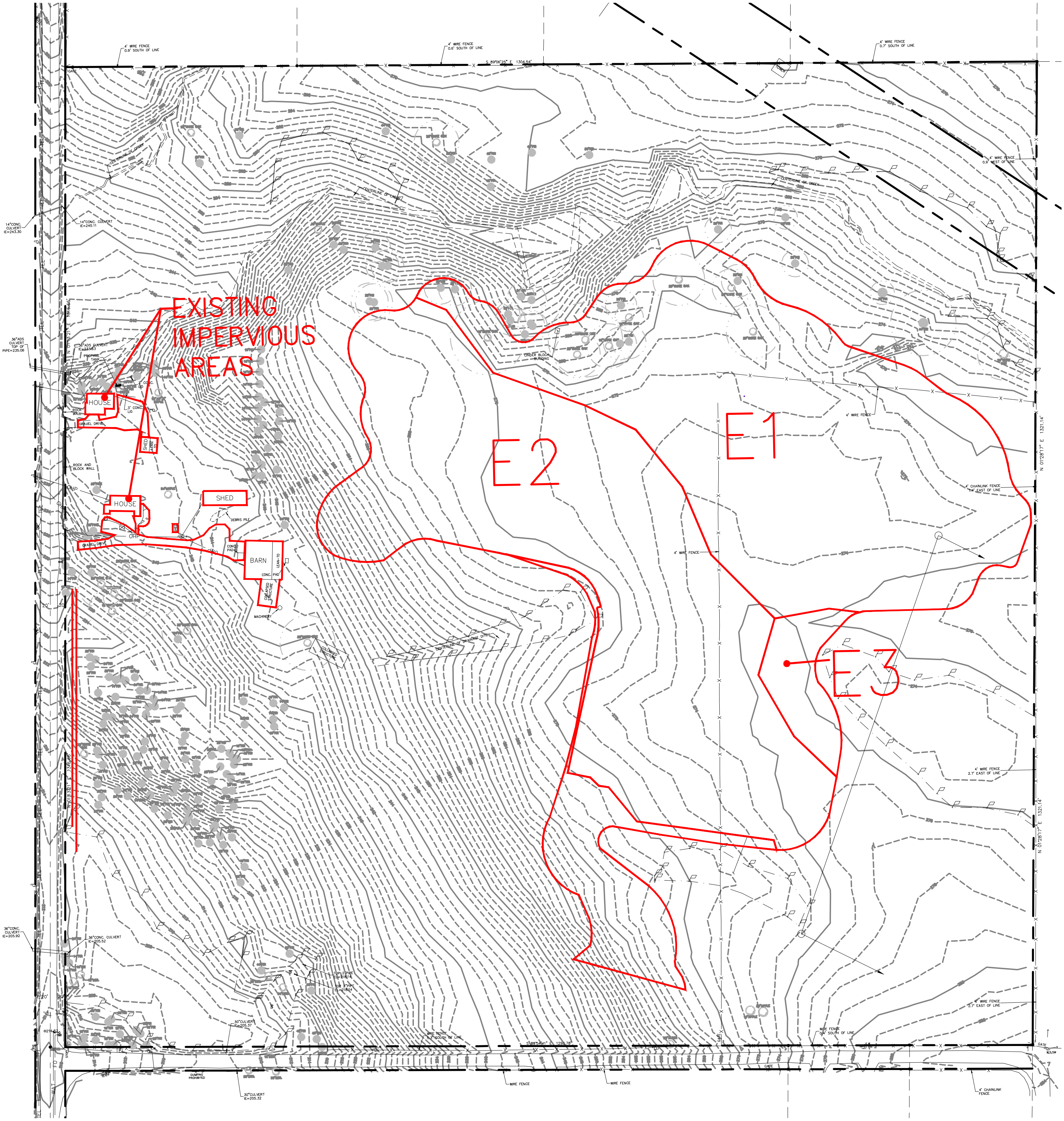
END OF SUMMARY REPORT

SECTION 2 – ON-SITE STORMWATER ANALYSIS AND CALCULATIONS

Lacamas Heights E.S. - Vicinity Map



LACAMAS HEIGHTS ELEMENTARY SCHOOL
SOILS MAP



EXISTING BASINS

SCALE: 1"=180'

PROPOSED BASINS

SCALE: 1"=180'

Lacamas Heights E.S.

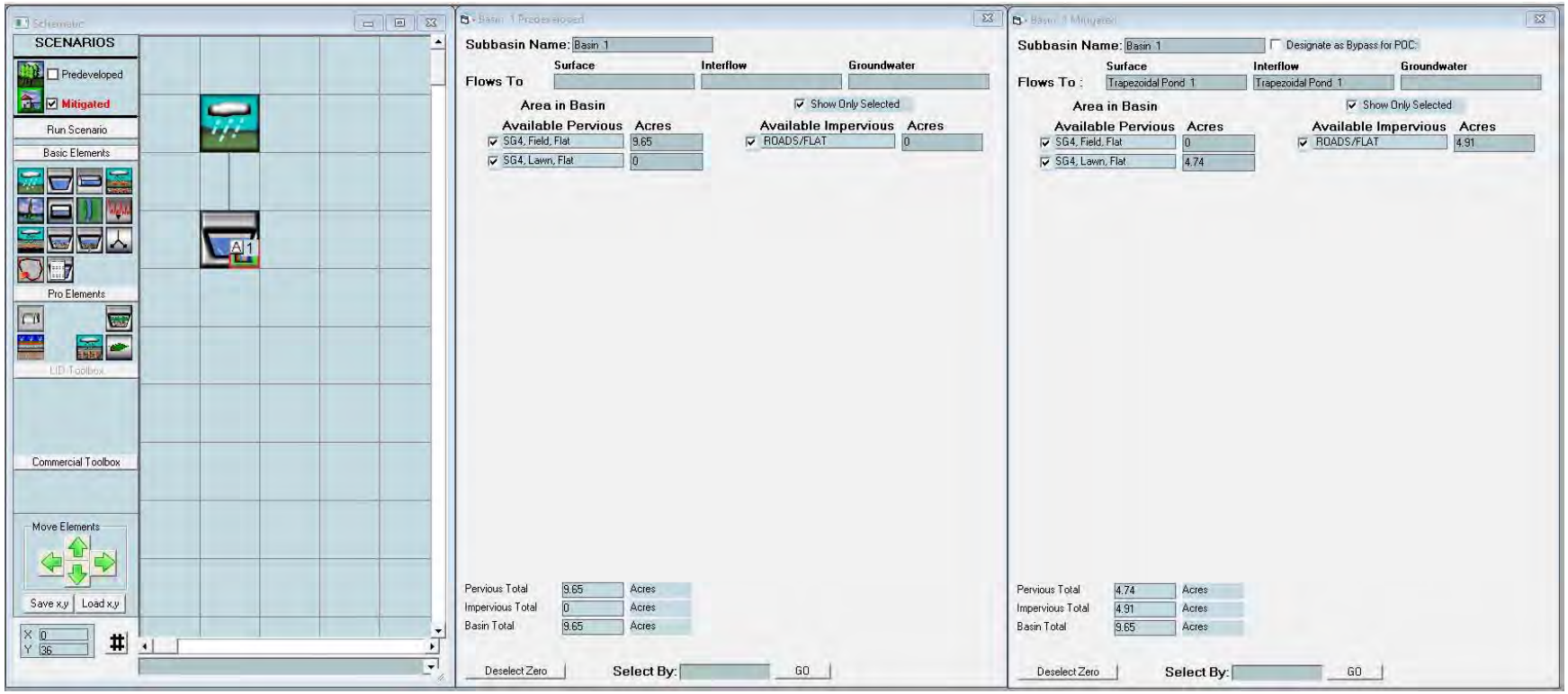
Drainage Basin Area Tabulation for WWHM Flow Control Modeling

Existing Basins

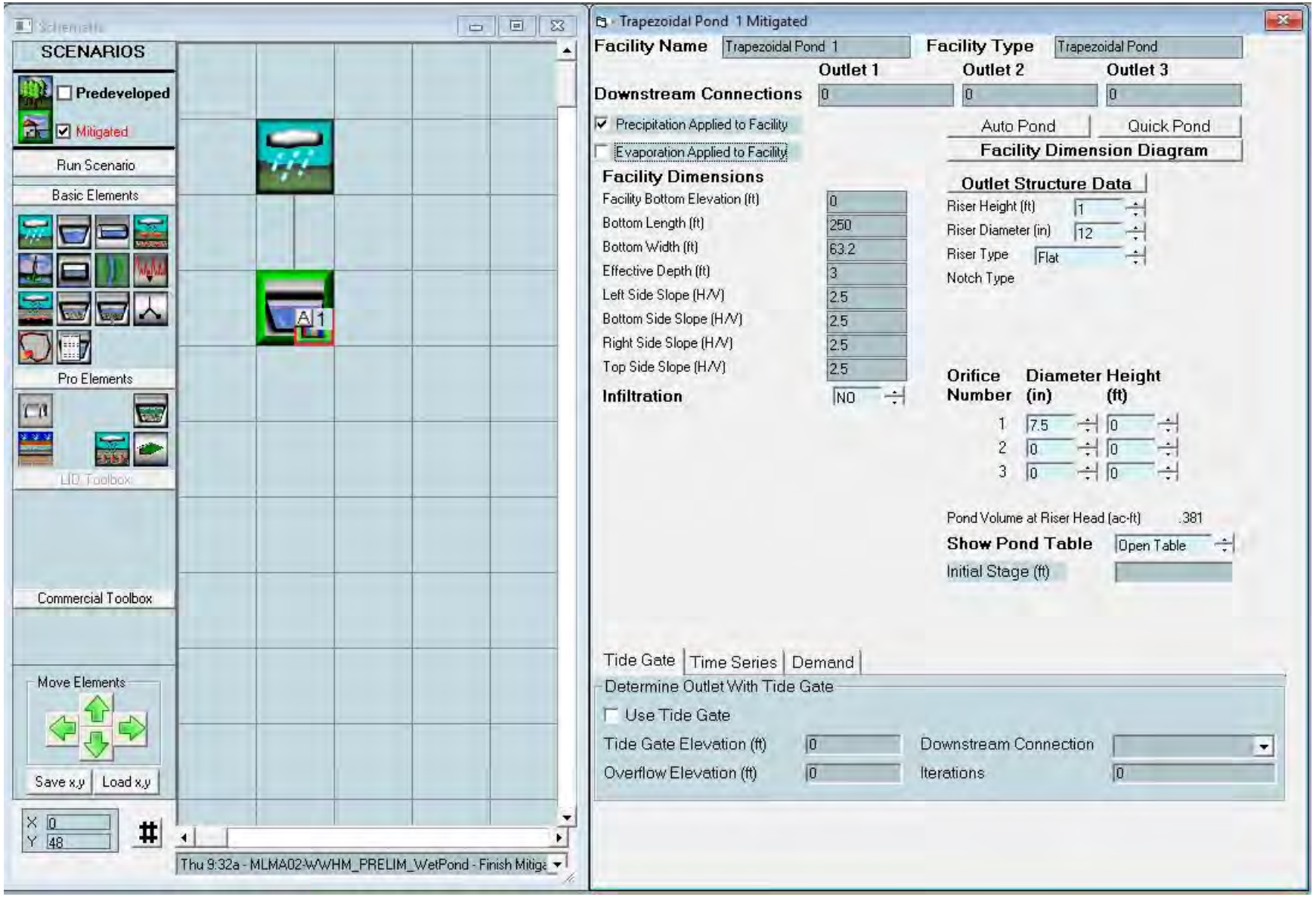
Basin	Description	Imperv. Area (SF|Ac)		Prairie Area (SF|Ac)		Total Area (SF)	Total Area (Ac)
E1	North	0	0.00	198,430	4.56	198,430	4.56
E2	West	0	0.00	206,986	4.75	206,986	4.75
E3	East	0	0.00	14,779	0.34	14,779	0.34
							9.65

Proposed Basins

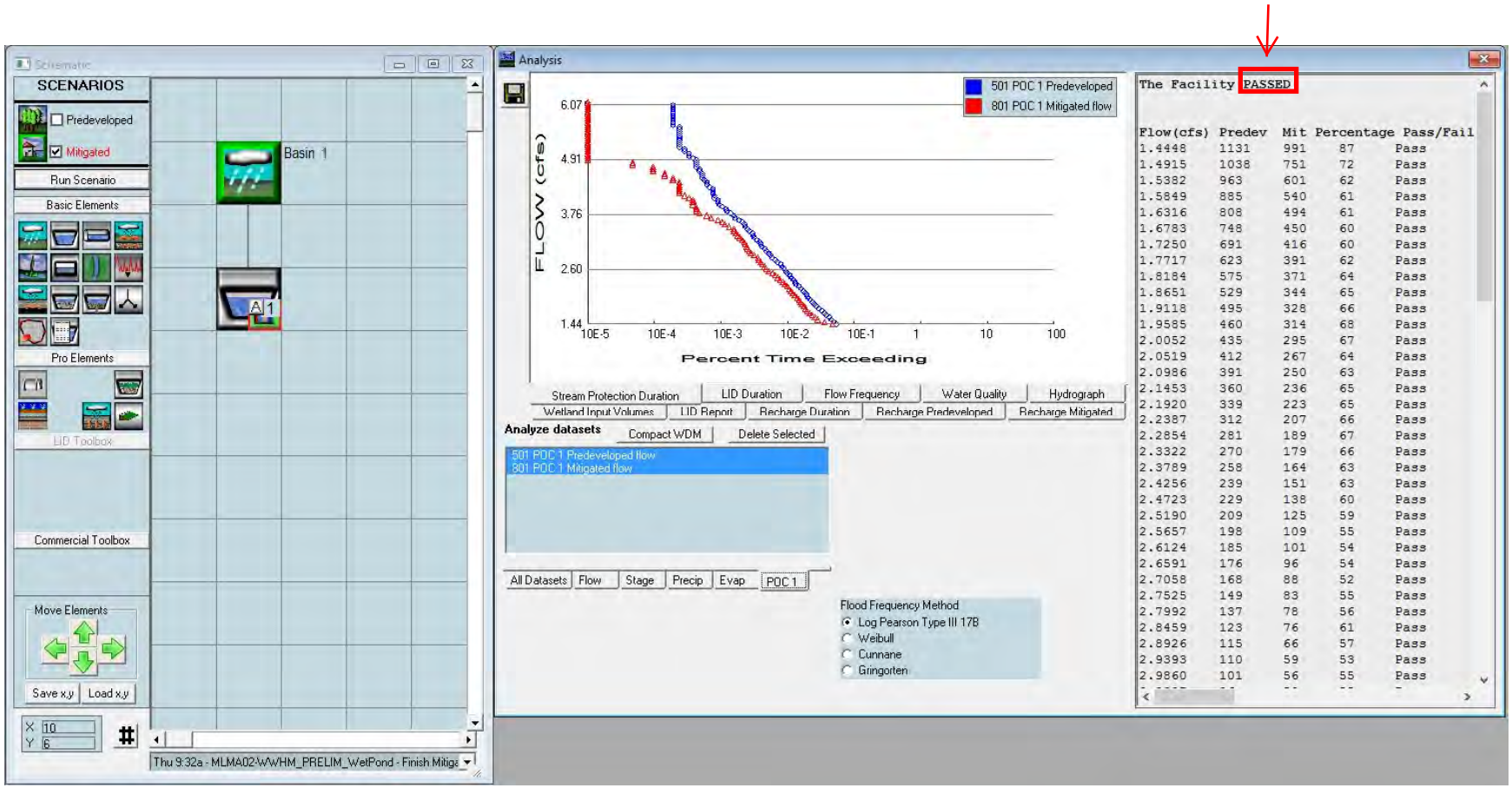
Basin	Description	Imperv. Area (SF|Ac)		Lawn Area (SF|Ac)		Total Area (SF)	Total Area (Ac)
System A - To New Wetpool/Detention Pond							
A1	AC/Sidewalk	154,999	3.56	0	0.00	154,999	3.56
A2	Building	54,374	1.25	0	0.00	54,374	1.25
A3	Portables	4,200	0.10	0	0.00	4,200	0.10
A4	Pervious	0	0.00	206,622	4.74	206,622	4.74
			4.90		4.74		9.65

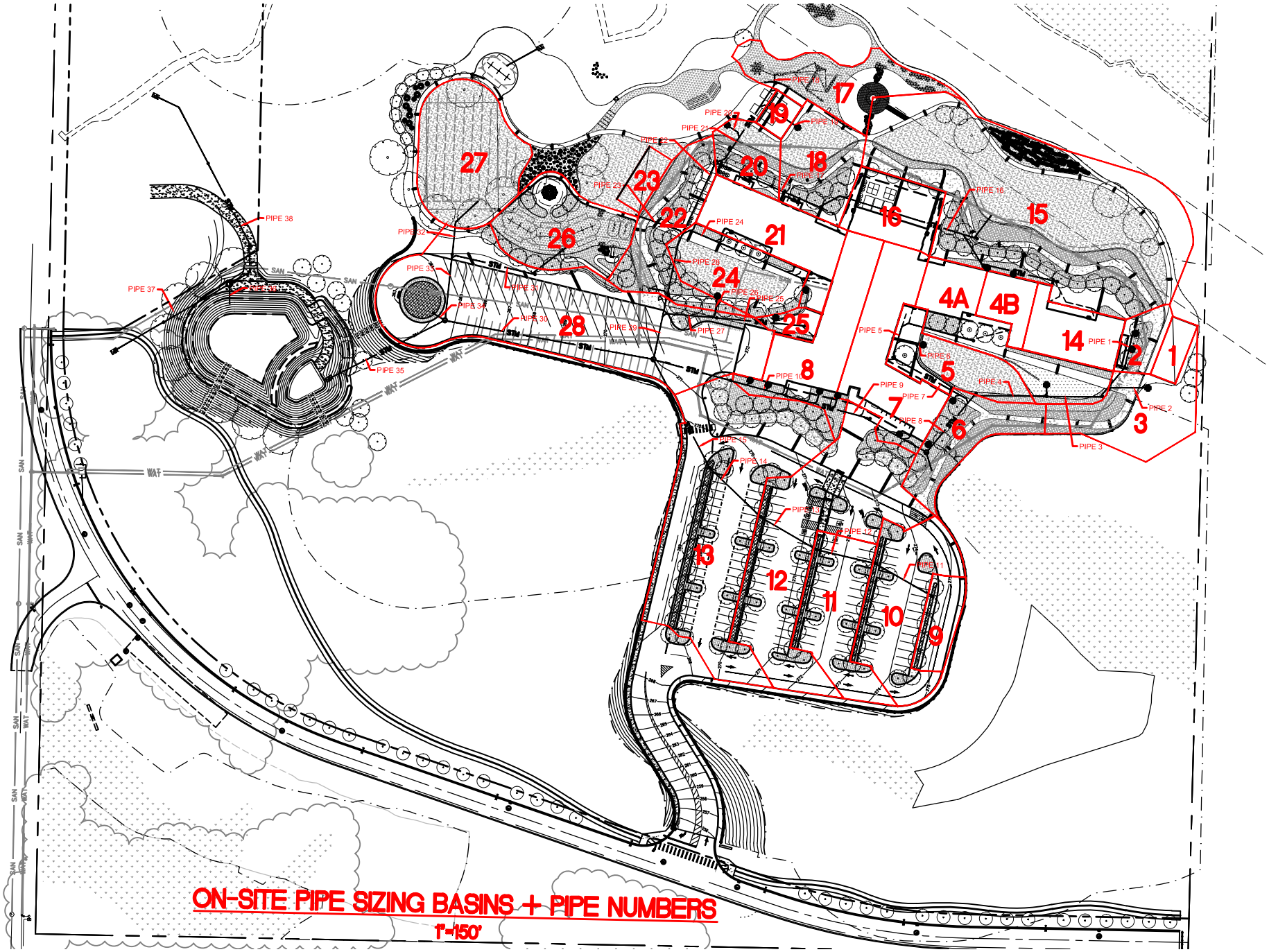


Basin Information



Wetpool/Detention Pond Summary


Schematic
SCENARIOS
Predeveloped
Mitigated
Run Scenario
Basic Elements
Pro Elements
LID Toolbox
Commercial Toolbox
Move Elements
Save x,y
Load x,y
X 10
Y 6
Basin 1
A 1
Thu 9:32a - MLMA02\WWHM_PRELIM_WetPond - Finish Mitiga
Analysis
501 POC 1 Predeveloped
801 POC 1 Mitigated flow
FLOW (cfs)
6.07
4.91
3.76
2.60
1.44
10E-5
10E-4
10E-3
10E-2
10E-1
1
10
100
Percent Time Exceeding
Stream Protection Duration
LID Duration
Flow Frequency
Water Quality
Hydrograph
Wetland Input Volumes
LID Report
Recharge Duration
Recharge Predeveloped
Recharge Mitigated
Analyze datasets
Compact WDM
Delete Selected
501 POC 1 Predeveloped flow
801 POC 1 Mitigated flow
All Datasets
Flow
Stage
Precip
Evap
POC 1
Flood Frequency Method
Log Pearson Type III 17B
Weibull
Cunnane
Gringorten
The Facility PASSED
Flow(cfs) Predev Mit Percentage Pass/Fail
1.4448 1131 991 87 Pass
1.4915 1038 751 72 Pass
1.5382 963 601 62 Pass
1.5849 885 540 61 Pass
1.6316 808 494 61 Pass
1.6783 748 450 60 Pass
1.7250 691 416 60 Pass
1.7717 623 391 62 Pass
1.8184 575 371 64 Pass
1.8651 529 344 65 Pass
1.9118 495 328 66 Pass
1.9585 460 314 68 Pass
2.0052 435 295 67 Pass
2.0519 412 267 64 Pass
2.0986 391 250 63 Pass
2.1453 360 236 65 Pass
2.1920 339 223 65 Pass
2.2387 312 207 66 Pass
2.2854 281 189 67 Pass
2.3322 270 179 66 Pass
2.3789 258 164 63 Pass
2.4256 239 151 63 Pass
2.4723 229 138 60 Pass
2.5190 209 125 59 Pass
2.5657 198 109 55 Pass
2.6124 185 101 54 Pass
2.6591 176 96 54 Pass
2.7058 168 88 52 Pass
2.7525 149 83 55 Pass
2.7992 137 78 56 Pass
2.8459 123 76 61 Pass
2.8926 115 66 57 Pass
2.9393 110 59 53 Pass
2.9860 101 56 55 Pass


ON-SITE PIPE SIZING BASINS + PIPE NUMBERS
1"=150'

Lacamas Heights Elementary School Replacement

Drainage Basin Area Tabulation for Pipe Sizing

Proposed Basins

Basin	Imperv. Area (SF|Ac)		Landscape Area (SF|Ac)		Total Area (SF)	Total Area (Ac)	Weighted CN	Q^{10}*
1	2,100	0.05	0	0.00	2,100	0.05	98.0	0.04
2	2,375	0.05	940	0.02	3,315	0.08	95.7	0.06
3	1,781	0.04	9,702	0.22	11,483	0.26	91.2	0.17
4A	7,464	0.17	4,834	0.11	12,298	0.28	94.9	0.21
4B	3,579	0.08	0	0.00	3,579	0.08	98.0	0.06
5	3,268	0.08	5,144	0.12	8,412	0.19	93.1	0.13
6	1,648	0.04	6,992	0.16	8,640	0.20	91.5	0.13
7	13,238	0.30	744	0.02	13,982	0.32	97.6	0.25
8	10,710	0.25	2,038	0.05	12,748	0.29	96.7	0.22
9	4,251	0.10	0	0.00	4,251	0.10	98.0	0.08
10	14,930	0.34	0	0.00	14,930	0.34	98.0	0.27
11	12,046	0.28	0	0.00	12,046	0.28	98.0	0.22
12	29,390	0.67	0	0.00	29,390	0.67	98.0	0.53
13	36,354	0.83	0	0.00	36,354	0.83	98.0	0.66
14	6,592	0.15	0	0.00	6,592	0.15	98.0	0.12
15	10,375	0.24	43,075	0.99	53,450	1.23	91.6	0.79
16	7,588	0.17	0	0.00	7,588	0.17	98.0	0.14
17	0	0.00	10,829	0.25	10,829	0.25	90.0	0.15
18	2,862	0.07	6,703	0.15	9,565	0.22	92.4	0.15
19	1,507	0.03	0	0.00	1,507	0.03	98.0	0.02
20	650	0.01	4,517	0.10	5,167	0.12	91.0	0.08
21	10,855	0.25	0	0.00	10,855	0.25	98.0	0.20
22	3,473	0.08	7,836	0.18	11,309	0.26	92.5	0.17
23	2,090	0.05	0	0.00	2,090	0.05	98.0	0.04
24	3,233	0.07	6,755	0.16	9,988	0.23	92.6	0.15
25	1,125	0.03	642	0.01	1,767	0.04	95.1	0.03
26	0	0.00	12,341	0.28	12,341	0.28	90.0	0.17
27	0	0.00	16,112	0.37	16,112	0.37	90.0	0.22
28	35,190	0.81	7,040	0.16	42,230	0.97	96.7	0.75
		5.25		3.36		8.61		

*Q10 flows from Hydraflow Hydrographs software.

Impervious CN=	98
Pervious CN=	90

Lacamas Heights Elementary School Replacement

Pipe Sizing Calculations Table

Proposed Pipes

Pipe #	Contributing Basins	Contributing Peak Flow (cfs)	Pipe Capacity (cfs)	Check Capacity > Demand	Comments
P1	2	0.06	0.61	Yes	
P2	1,3	0.21	0.61	Yes	
P3	P1,P2	0.27	0.88	Yes	
P4	P3,4A	0.48	0.61	Yes	
P5	4B	0.06	0.61	Yes	
P6	5	0.13	0.61	Yes	
P7	P5,P6	0.19	1.01	Yes	
P8	P4,P7,6	0.80	1.07	Yes	
P9	P8,7	1.05	1.07	Yes	
P10	P9,10	1.32	1.68	Yes	
P11	9	0.08	2.05	Yes	
P12	P11,10	0.35	2.04	Yes	
P13	P12,11	0.57	1.76	Yes	
P14	P13,12	1.10	1.67	Yes	
P15	P14,13	1.76	1.84	Yes	
P16	15	0.79	1.07	Yes	
P17	P16,16	0.93	1.07	Yes	
P18	17	0.15	0.61	Yes	
P19	18	0.15	1.31	Yes	
P20	20	0.08	8.14	Yes	
P21	P18,P19,P20,19	0.40	1.07	Yes	
P22	P17,P21	1.33	1.68	Yes	
P23	23	0.04	0.61	Yes	
P24	21	0.20	1.09	Yes	
P25	25	0.03	1.16	Yes	
P26	24	0.15	1.82	Yes	
P27	P25,P26	0.18	1.16	Yes	
P28	P22,P23,P24	1.57	1.68	Yes	
P29	P28,P27,22	1.92	2.44	Yes	
P30	P15,P10,P29	5.00	5.35	Yes	
P31	26	0.17	1.09	Yes	
P32	27	0.22	1.44	Yes	
P33	P31,P32	0.39	1.04	Yes	
P34	28	0.75	1.07	Yes	
P35	P30,P33,P34	6.14	13.73	Yes	
P36	-	5.26	-	Yes	Peak 100-year release rate from pond modeling.
P37	-	2.63	3.80	Yes	Half the 100-year peak release rate from pond modeling.
P38	-	2.63	3.18	Yes	Half the 100-year peak release rate from pond modeling.

Lacamas Heights Elementary School Replacement

Pipe Capacity Calculations Table

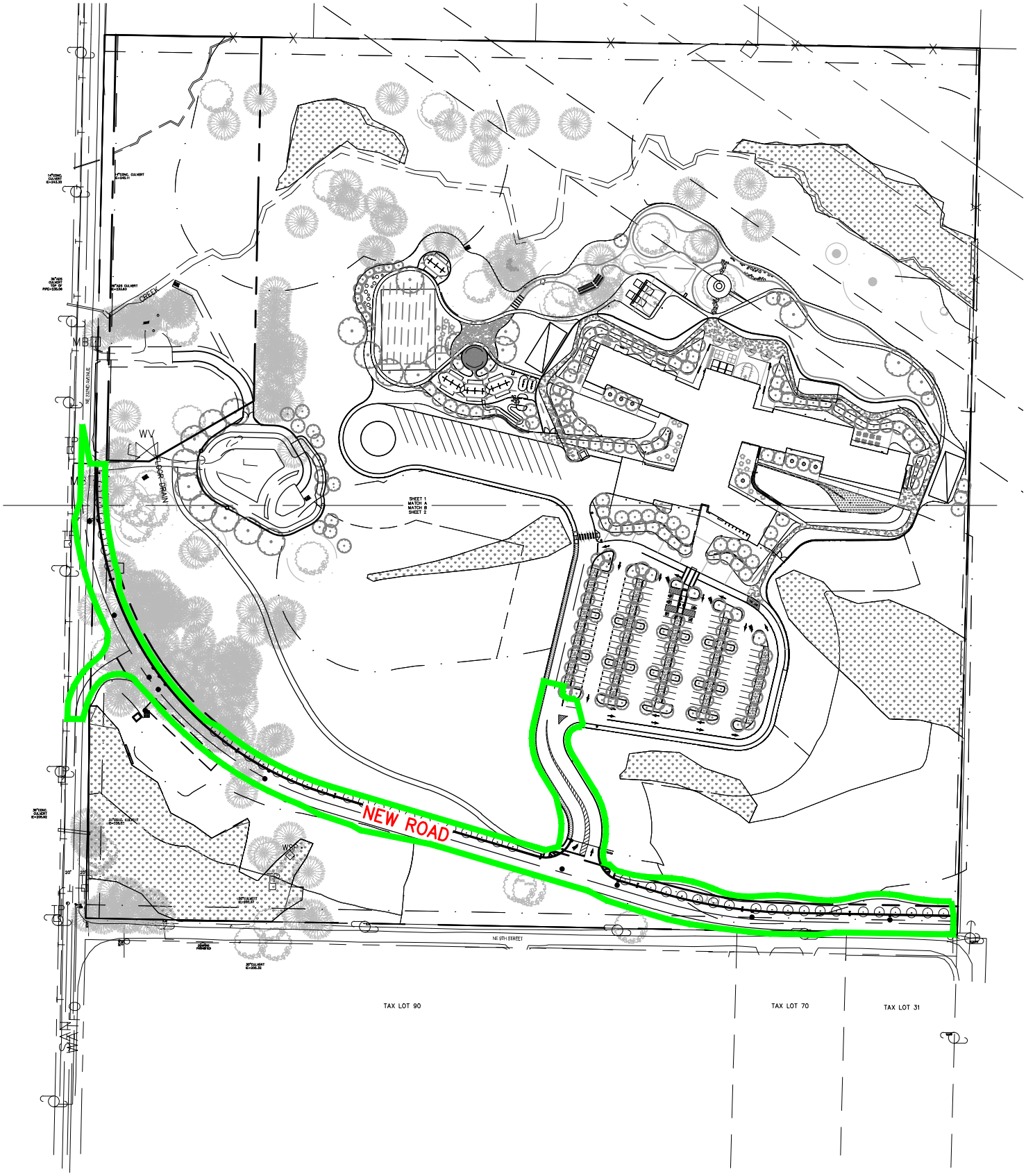
CivilTools Line #	Pipe Diameter (in)	Pipe Slope	Pipe Capacity (cfs from CivilTools)	Pipe #'s This Applies To
1	6	0.0100	0.61	2, 4, 5, 6, 18, 23
2	6	0.0209	0.88	3
3	6	0.0278	1.01	7
4	6	0.0293	1.04	33
5	6	0.0312	1.07	1
6	6	0.0321	1.09	24, 31
7	6	0.0365	1.16	25, 27
8	6	0.0466	1.31	19
9	6	0.0564	1.44	32
10	6	0.0692	8.14	20
11	6	0.0898	1.82	26
12	8	0.0067	1.07	8, 9, 16, 17, 21, 34
13	8	0.0162	1.67	14
14	8	0.0180	1.76	13
15	8	0.0242	2.04	12
16	8	0.0246	2.05	11
17	10	0.0050	1.68	10, 22, 28
18	10	0.0060	1.84	15
19	10	0.0179	3.18	38
20	10	0.0256	3.80	37
21	12	0.0040	2.44	29
22	12	0.0192	5.35	30
23	12	0.1265	13.73	35

Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2014 by Autodesk, Inc. v10.3

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SBUH Runoff	0.040	2	474	575	------	------	------	BASIN 1
2	SBUH Runoff	0.060	2	474	846	------	------	------	BASIN 2
3	SBUH Runoff	0.165	2	476	2,327	------	------	------	BASIN 3
4	SBUH Runoff	0.205	2	474	2,877	------	------	------	BASIN 4A
5	SBUH Runoff	0.064	2	474	920	------	------	------	BASIN 4B
6	SBUH Runoff	0.130	2	474	1,826	------	------	------	BASIN 5
7	SBUH Runoff	0.128	2	476	1,810	------	------	------	BASIN 6
8	SBUH Runoff	0.252	2	474	3,626	------	------	------	BASIN 7
9	SBUH Runoff	0.224	2	474	3,181	------	------	------	BASIN 8
10	SBUH Runoff	0.080	2	474	1,150	------	------	------	BASIN 9
11	SBUH Runoff	0.270	2	474	3,908	------	------	------	BASIN 10
12	SBUH Runoff	0.223	2	474	3,219	------	------	------	BASIN 11
13	SBUH Runoff	0.533	2	474	7,702	------	------	------	BASIN 12
14	SBUH Runoff	0.660	2	474	9,541	------	------	------	BASIN 13
15	SBUH Runoff	0.119	2	474	1,724	------	------	------	BASIN 14
16	SBUH Runoff	0.793	2	476	11,176	------	------	------	BASIN 15
17	SBUH Runoff	0.135	2	474	1,954	------	------	------	BASIN 16
18	SBUH Runoff	0.150	2	476	2,137	------	------	------	BASIN 17
19	SBUH Runoff	0.147	2	476	2,060	------	------	------	BASIN 18
20	SBUH Runoff	0.024	2	474	345	------	------	------	BASIN 19
21	SBUH Runoff	0.075	2	476	1,066	------	------	------	BASIN 20
22	SBUH Runoff	0.199	2	474	2,874	------	------	------	BASIN 21
23	SBUH Runoff	0.174	2	476	2,444	------	------	------	BASIN 22
24	SBUH Runoff	0.040	2	474	575	------	------	------	BASIN 23
25	SBUH Runoff	0.154	2	476	2,170	------	------	------	BASIN 24
26	SBUH Runoff	0.029	2	474	414	------	------	------	BASIN 25
27	SBUH Runoff	0.168	2	476	2,393	------	------	------	BASIN 26
28	SBUH Runoff	0.222	2	476	3,162	------	------	------	BASIN 27
29	SBUH Runoff	0.749	2	474	10,641	------	------	------	BASIN 28

SECTION 3 – OFF-SITE STORMWATER ANALYSIS AND CALCULATIONS



OFF-SITE ROADWAY BASIN

OFF-SITE BASIN SUMMARY TABLE

Existing Condition - Phase 1

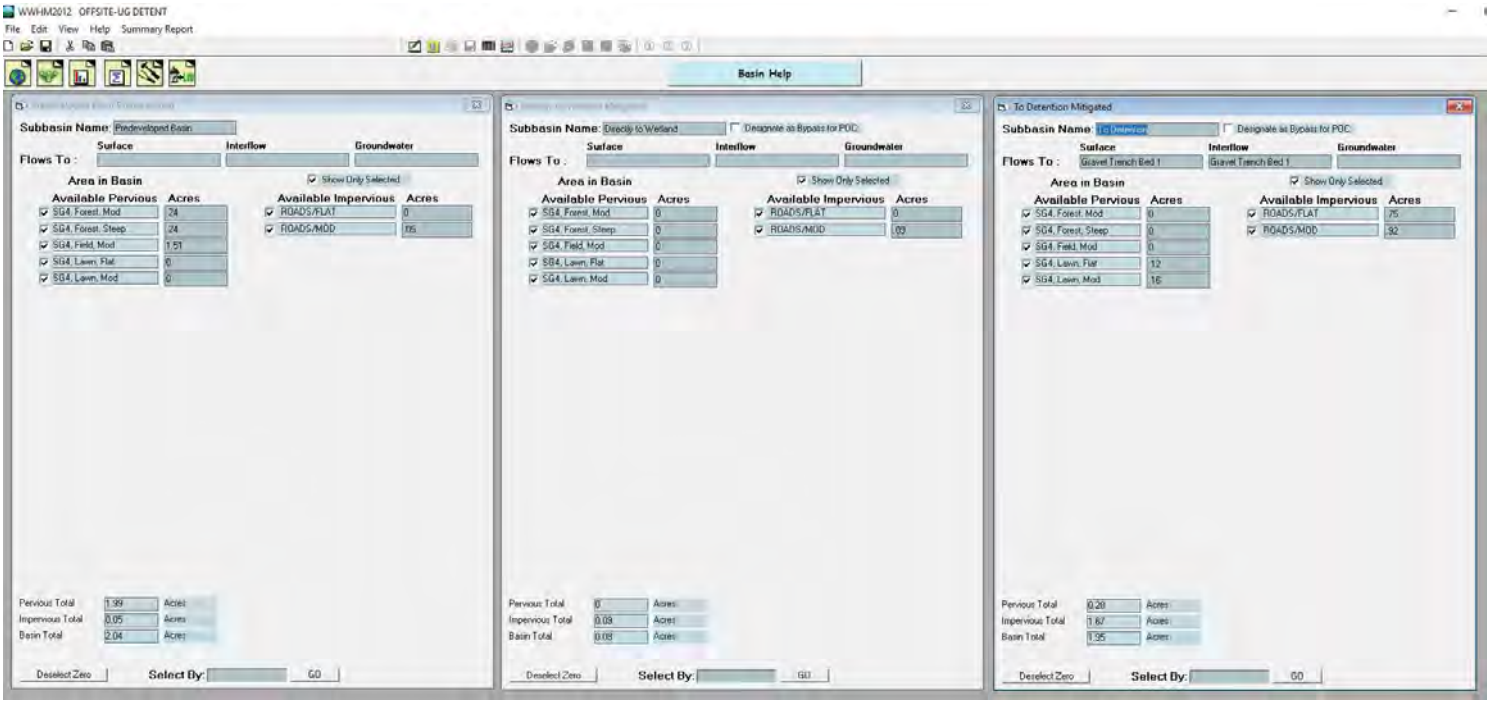
	s.f.	Total acre			acre	
Impervious	1,985	0.05	Moderate (5-15%)		0.05
Forest	20,934	0.48	Moderate (5-15%)		0.24
			Steep (>15%)		0.24
Pasture	65,977	1.51	Moderate (5-15%)		1.51
	88,896	2.04			2.04

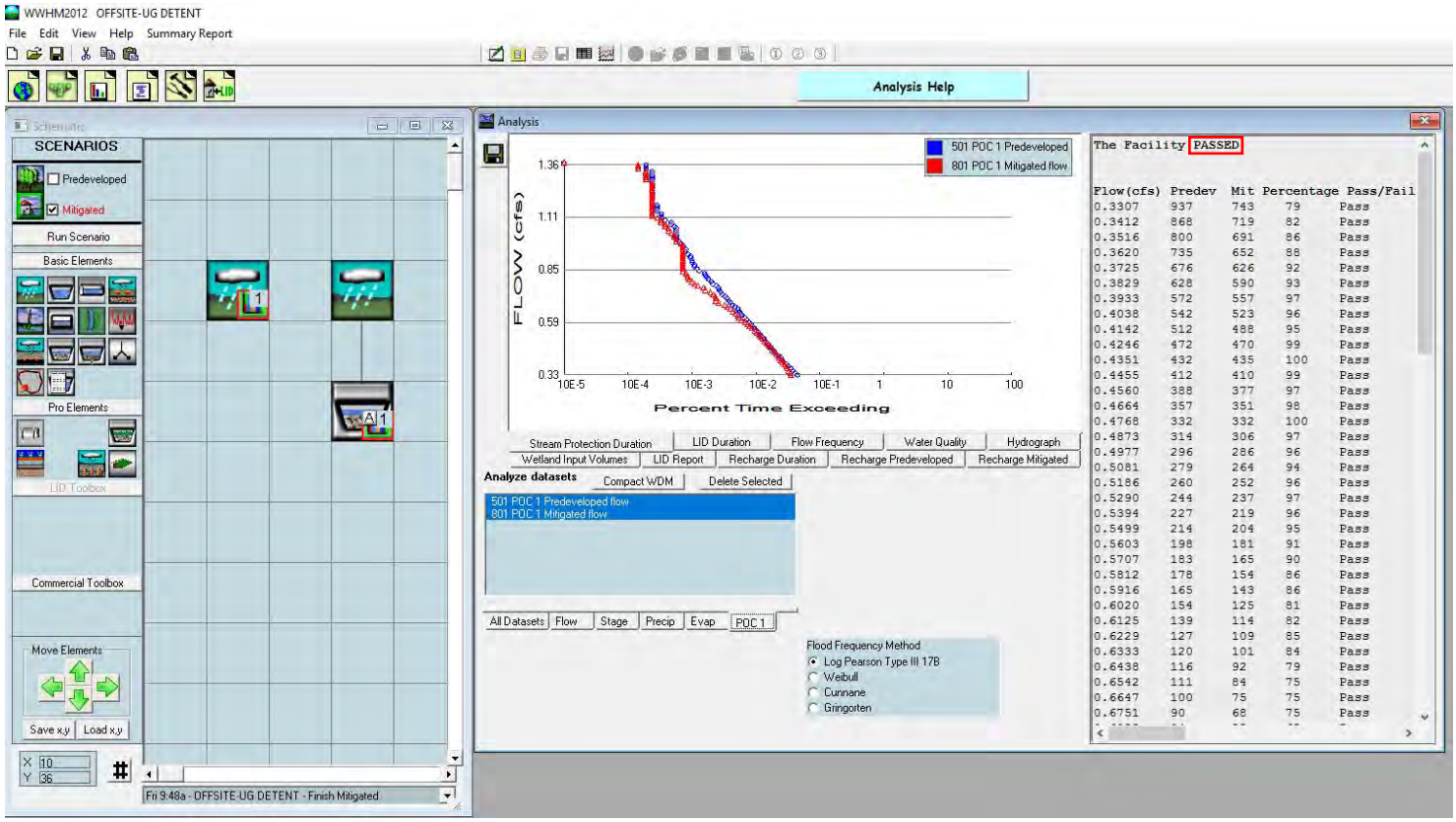
Proposed Condition - Phase 1

	s.f.	Total acre			acre	
Impervious - To Detent.	72,936	1.67	Flat (0-5%)		0.75
			Moderate (5-15%)		0.92
Impervious - To Wetland	3,928	0.09	Moderate (5-15%)		0.09
Landscape ("Lawn")	12,032	0.28	Flat (0-5%)		0.12
			Moderate (5-15%)		0.15
	88,896	2.04			2.04

Note:
The total area was estimated to be 45% flat, 55% moderate slope.

WWHM: OFF-SITE





WWHM: OFF-SITE