Received 6/24/2024

Stormwater Site Plan

Affinity at DuPont
DuPont, WA

Prepared For:
Inland Group
120 W Cataldo Ave
Spokane, WA 99201

Prepared By:
LDC, Inc.
321 Cleveland Ave SE, Ste 209
Tumwater, WA 98501
425.806.1869

LDC | Surveying Engineering Planning

June 2024

Stormwater Site Plan

Project Information

Project:	**Affinity at DuPont**
Prepared for:	**Inland Group** 120 W Cataldo Ave Spokane, WA 99201 Contact Name: Josh Goudge

Reviewing Agency

Jurisdiction:	City of DuPont

Project Representative

Prepared by:	**LDC, Inc.** 321 Cleveland Ave. SE, Ste 209 Tumwater, WA 98501 425.806.1869 ldccorp.com
Contact:	Ross Jarvis, PE RJarvis@ldccorp.com
Project Reference:	C24-124

PROJECT ENGINEER'S CERTIFICATION

I hereby certify that this Stormwater Site Plan for the Affinity at DuPont project has been prepared by me or under my supervision and meets the minimum standards of the City of DuPont and normal standards of engineering practice. I hereby acknowledge and agree that the jurisdiction does not and will not assume liability for the sufficiency, suitability, or performance of drainage facilities designed by me.

Margaret G. Howsden

06/21/2024

Prepared by: Maggie Howsden, EIT Date
MHowsden@LDCCorp.com
360-634-2074

ROSS D. JARVIS
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Ross Jarvis

06/21/2024

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1. PROJECT OVERVIEW

The following report was prepared for the Affinity at DuPont project in DuPont, WA. This report was prepared to comply with the minimum technical standards and requirements that are set forth in the *2019 Department of Ecology Stormwater Management Manual for Western Washington (SWMMWW).*

Project Proponent: Inland Group

Parcel Numbers: 0119341007

Total Parcel Area: 17.86 Acres

Current Zoning: R-5 – Residential 5

Required Permits: Grading, Utility, Paving, Building, etc.

Site Address: Unassigned on Garry Oakes Ave

Section, Township, Range: Section 34, Township 19 N, Range 1 E

The proposed Affinity at DuPont project is located on one parcel that is 17.86 acres located within the Patriot's Landing Master Plan area. The 17.86-acre parcel will be broken into three lots: Lot 1 – 7.71 acres, Lot 2 – 6.79 acres, and Lot 3 – 3.36 acres. See the Flow Control Map in **Appendix 3**.

The proposed Affinity at DuPont project will develop Lot 1. It is important to note that Lot 3 contains the previously approved Patriots Landing Memory Care Facility project. At the time of approval, Lot 3 was 3.26 acres. Due to the regional stormwater facility, the proposed lot line between Lot 1 and Lot 3 has been adjusted to add an additional 0.10 acres to Lot 3 to accommodate the regional stormwater facility.

The proposed construction with this project includes one senior living apartment building, one clubhouse, associated community play areas, parking lots, drive aisles, and site accesses, as well as the extension of available utilities and stormwater improvements. The project will export fill to Lot 2 for its future development. The proposed improvements will disturb approximately 10.20 acres, 6.52 acres of the 7.71-acre Lot 1, 3.58 acres of Lot 2, and 0.10 acres of Lot 3. Specifically, the proposed site improvements/construction activities for this project include the following:

- Site preparation, grading, and erosion control activities
- Construction of one senior living apartment buildings
- Construction of one clubhouse
- Construction of community play areas such as a pickleball court
- Construction of parking lots, drive aisles, and accesses associated with the development
- Construction/installation of on-site stormwater management BMPs
- Extension of available utilities (water, sewer, etc.)

A site vicinity map of the proposed project location is enclosed herein as **Appendix 1**. A worksheet for determining the number of Minimum Requirements for this project per the *2019 SWMMWW* has been prepared and enclosed herein as **Appendix 2**. The proposed project is considered a new development and will create over 5,000 square feet of new plus replaced hard surface areas. Therefore, the project will trigger minimum requirements #1-9 for the new and replaced impervious surfaces and the land disturbed.

1.1 SUMMARY OF COMPLIANCE ON-SITE

The stormwater design complies with the 9 minimum requirements as follows:

Minimum Requirement #1 – Preparation of Stormwater Site Plans – The Stormwater Site Plan is prepared per the *2019 SWMMWW*.

Minimum Requirement #2 – Construction Stormwater Pollution Prevention – A pollution prevention plan describing the 13 required elements will be completed and included herein as **Appendix 6** at the time of civil permit submittal. Further, an erosion control plan has been prepared as part of the preliminary construction plans within **Appendix 3** of this report.

Minimum Requirement #3 – Source Control of Pollution – BMPs listed below are the minimum required for the site, additional BMPs not listed here may need to be implemented to meet the minimum requirements discussed in the *2019 SWMMWW*.

- S410 BMPs for Correcting Illicit Discharges to Storm Drains
- S453 BMPs for Formation of a Pollution Prevention Team
- S454 BMPs for Preventive Maintenance / Good Housekeeping
- S455 BMPs for Spill Prevention and Cleanup
- S456 BMPs for Employee Training
- S457 BMPS for Inspections
- S458 BMPs for Record Keeping
- S411 BMPs for Landscaping and Lawn/Vegetation Management
- S417 BMPs for Maintenance of Stormwater Drainage and Treatment Systems
- S421 BMPs for Parking and Storage of Vehicles and Equipment

Minimum Requirement #4 – Preservation of Natural Drainage Systems and Outfalls – Currently, the stormwater runoff within the project area sheet flows to one of three existing low points on the project site. There is no evidence of channelized flow or runoff from the project areas and therefore it is believed the stormwater runoff on the parcel infiltrates within the native soils in the existing low points. After construction, the stormwater runoff from the majority of the proposed improvements will be fully infiltrated on-site, preserving the existing drainage pattern.

Minimum Requirement #5 – On-Site Stormwater Management – In accordance with Minimum Requirement #7, this project is not flow control exempt, triggers Minimum Requirements #1-9, and is located on a parcel inside the UGA. Therefore, the project shall employ the On-Site Stormwater Management BMPs in accordance with List #2 or the LID Performance Standard. The proposed project will utilize BMPs per List #2, see below.

Lawn and Landscaped Areas:

- Per the *2019 SWMMWW* manual, **BMP T5.13: Post Construction Soil Quality and Depth** will be utilized to the maximum extent practicable. See landscape plans for details.

Roofs:

- **Full Dispersion (BMP T5.30) or Downspout Full Infiltration Systems (BMP T5.10A):** Full dispersion is not feasible for this project site. Full dispersion requires that the site protects at least 65% of the site in a forest or native condition. For this reason alone, this BMP is not feasible. Downspout Full Infiltration Systems are feasible and will be utilized for the proposed roof areas. See Section 4 of this report for more information.

Other Hard Surfaces:

- **Full Dispersion (BMP T5.30):** Full Dispersion is not feasible for the project site due to the reason stated above.
- **Permeable Pavement (BMP T5.15):** Permeable Pavement is not feasible for the project site due to the fact that the project requires basic treatment and the native soils do not meet the criteria for runoff treatment.
- **Bioretention (BMP T7.30):** Bioretention is not feasible for the proposed project because there is insufficient surface area to provide a bioretention facility for the development that meets the minimum design requirements including setbacks from structures, utilities, and property lines due to the proposed project site layout and existing and proposed property lines.
- **Sheet Flow Dispersion (BMP T5.12) or Concentrated Flow Dispersion (BMP T5.11):** Dispersion BMPs are not feasible for the proposed development for the reason stated above.
- The stormwater runoff from the proposed other hard surfaces will be mitigated via a shared infiltration pond sized per BMP T7.10 Infiltration Basins. The majority of the stormwater runoff generated with this project will be fully infiltrated on-site. See Section 4 of this report for more information.

Minimum Requirement #6: Runoff Treatment: The proposed project will construct more than 5,000 square feet of new pollution-generating impervious surfaces and will infiltrate stormwater runoff within a quarter mile of Hodge Lake and an unnamed fresh water body that is assumed to have an existing aquatic life use. Per conversations with the City engineer, since the project will fully infiltrate stormwater runoff locally, Hodge Lake and the unnamed waterbody are not in a direct discharge downstream path of the project site. Therefore, basic treatment is required for the pollution generating surfaces. See Section 4 for more information.

Minimum Requirement #7: Flow Control: The proposed project will construct over 10,000 SF of impervious surface and does not discharge to a flow control exempt water body, therefore flow control is required. Flow control for the project will be provided through the use of downspout infiltration trenches and a shared infiltration pond. See Section 4 for more information.

Minimum Requirement #8: Wetlands Protection: Per the Critical Areas Report prepared by Wet.land, LLC dated March 14, 2022, no wetlands or streams occur on the project site. However, two wetlands are located within the 200-foot study area. The nearby wetlands are rated as Category III wetlands which require a 75-foot standard buffer. Neither buffer extends onto the project parcel. See **Appendix 10** for the Critical Areas Report.

Minimum Requirement #9: Operation and Maintenance: An operations and maintenance manual will be completed and provided herein as an attachment to the Stormwater Management Agreement provided herein as **Appendix 8** at the time of civil permit submittal.

2. EXISTING CONDITIONS SUMMARY

2.1 EXISTING ON-SITE CONDITIONS

The project parcel is +/- 17.86 acres in size. The project site is currently vacant and undeveloped but has been previously subjected to some clearing and earthwork operations. The site topography generally descends to the south with about 45 to 50 feet of elevation change occurring across the site. Topographic change is nonuniform; the northern site area is relatively flat with about ten feet of topographic relief, while the southern site area possesses various sloping areas ranging from 0 to 40% and about 40 feet of elevation change. Today, the parcel is predominantly covered in grasses, shrubs, and trees with no evidence of concentrated discharge or runoff from the parcel. There are no known flooding problems downstream of the project site. There are no flow control facilities on the project site. See Figures 1, and 2, Existing Conditions Maps below.

Figure 1: Existing Conditions (1990)

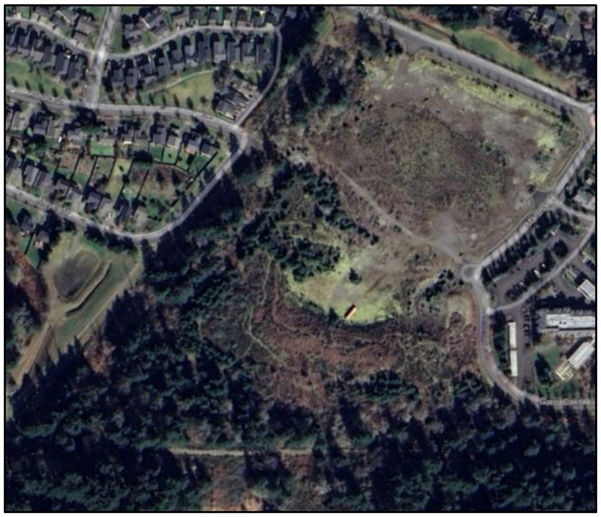


Figure 2: Existing Conditions (2024)

2.1.1 Flood Hazard Zone

The project parcel is located within Federal Emergency Mapping Agency (FEMA) National Flood Insurance Program – Flood Insurance Rate Map (FIRM) Panel No. 53053C0506E and 53053C0507E, effective March 7, 2017. The project is within Zone X, an area of minimal flood hazard. See **Appendix 7** for the FEMA FIRM.

2.1.2 On-Site Soils Information

A geotechnical investigation was conducted by Earth Solutions NW, LLC dated June 16, 2022. Nineteen (19) test pits to a maximum of 16.5 feet were logged and sampled from the February 16, 2022, investigation. The subsurface exploration indicated the site is underlain by native soils consisting primarily of recessional outwash with poorly to well-graded gravel with sand. Groundwater was not observed within any of the test pit excavations. Perched groundwater is not anticipated to develop within the recessional outwash deposit. Mottling or other signs of seasonal groundwater were not observed. Therefore, it is assumed the groundwater table is located below elevation 197.5. A long-term design infiltration rate of 20 in/hr within the recessional outwash was recommended. See **Appendix 5** for the geotechnical report.

Per the Limited Phase II Environmental Site Assessment prepared by Earth Solutions NW on April 19, 2022, the project site contains shallow soil contamination associated with airborne arsenic and lead fallout from the historical Asarco Smelter, formerly located in Tacoma, Washington (also referred to as the Tacoma Smelter Plume, TSP). The project site will have a soil remediation plan and complete remediation activities prior to development. See **Appendix 10** for the Limited Phase II Environmental Site Assessment.

3. OFFSITE ANALYSIS REPORT

3.1 QUALITATIVE UPSTREAM ANALYSIS

Currently, it appears that there is minimal to no on-site run on from adjacent parcels, roadways, or drainage facilities to the project parcel. Due to the high infiltrative capacity of the soil in the area, run-on onto the project parcel from this parcel is anticipated to be minimal to none.

3.2 QUALITATIVE DOWNSTREAM ANALYSIS

Currently, the stormwater runoff within the project area sheet flows to one of three existing low points on the project site. There is no evidence of channelized flow or runoff from the project areas and therefore it is believed the stormwater runoff on the parcel infiltrates within the native soils in the existing low points.

After construction, the stormwater runoff from the majority of the proposed improvements will be fully infiltrated on-site, following the existing drainage pattern. The proposed roof areas will be infiltrated on Lot 1 – Affinity at DuPont while the stormwater runoff generated by the other hard surfaces will be collected, conveyed, treated, and discharged to the regional stormwater infiltration facility on Lot 3 – Patriots Landing Memory Care Facility. No adverse impacts to the downstream systems are anticipated.

4. PERMANENT STORMWATER CONTROL PLAN

4.1 SUMMARY SECTION

The proposed project follows the development requirements stated in the *2019 SWMMWW*. Following Figure 2.4.1 (See **Appendix 2**), this project classifies as a new development that triggers minimum requirements #1-9. The site does not have 35% or more of existing impervious coverage, and the project will add more than 5,000 square feet of new impervious surfaces. See **Appendix 4** for the proposed stormwater conveyance locations and details. Table 1 and 2 below illustrate the existing and proposed impervious and pervious areas of the disturbed areas (See **Appendix 3** for the basin maps).

Table 1: On-Site Land Type Designations Existing vs. Proposed

LAND TYPE DESIGNATIONS	AREA (ACRES)	% OF TOTAL AREA
Existing Areas	**17.86**	**100**
Impervious	0.00	0
Pervious	17.68	100
Proposed Areas	**17.86**	**100**
Lot 1	**7.71**	**43.2**
Roof	1.73	9.7
Asphalt	2.21	12.4
Concrete	0.46	2.6
Pervious	3.31	18.5
Lot 2	**6.79**	**38.0**
Pervious	6.79	38.0
Lot 3	**3.36**	**18.8**
Pervious	3.36	18.8

4.1.1 Performance Standards and Goals

Following Figure 2.4.1 – Flow Chart for Determining Requirements for New Development, the project is considered a new development that triggers the use of Minimum Requirements #1-9 for the new and replaced hard surfaces and the land disturbed.

The proposed project will create more than 5,000 square feet of pollution generating impervious surfaces; therefore, Minimum Requirement #6 is required. The proposed senior living project will infiltrate stormwater runoff within a quarter mile of Hodge Lake and an unnamed waterbody that is assumed to have an existing aquatic life use. Per conversations with the City engineer, since the project will fully infiltrate stormwater runoff locally, Hodge Lake and the unnamed waterbody are not in a direct discharge downstream path of the project site. Therefore, basic treatment is required for the pollution generating surfaces. See Section 4.1.2 for more information on how this requirement will be met.

The proposed project will create more than 10,000 square feet of impervious surfaces; therefore, Minimum Requirement #7 Flow Control is required. See Section 4.1.3 for more information on how this requirement will be met.

4.1.2 Water Quality System

Basic treatment is required for the proposed pollution generating impervious surfaces and will be provided through the use of pretreatment devices and a soil treatment layer in the infiltration pond.

Pretreatment will be provided for the pollution-generating surfaces from Lot 1 (Affinity at DuPont) and Lot 4 (Steilacoom Historical School District No. 1 School) via a Contech CDS system, a mechanical pretreatment device equipped with an internal bypass. The Western Washington Hydrology Model (WWHM 2012) was used to calculate the water quality flow rate and peak 100-year flow rate. Preliminary modeling resulted in an off-line water quality treatment flow rate of 0.5916 cfs and a peak 100-year flow rate of 6.62 cfs. Therefore, in order to provide pretreatment from the stormwater runoff generated by Lot 1 and Lot 4, a Contech CDS2015-4 system is required.

It is important to note that at the time of this report only the pretreatment device for the proposed pollution generating surfaces from Lot 1 and Lot 4 was sized. Lot 2 and Lot 3 must provide pretreatment prior to discharging to the regional infiltration facility.

4.1.3 Flow Control System

Flow control is required for the proposed project and will be provided through the use of downspout infiltration trenches and a shared infiltration pond. The infiltration facilities were sized using WWHM 2012 and the 42-inch West Pierce County gage with precipitation scale 1.000. Per the geotechnical report, the long-term design infiltration rate for the proposed underground infiltration trenches is 20 inches per hour. For the preliminary sizing of facilities, a conservative infiltration rate of 10 inches per hour was used for the design. All of the landscaping areas will be amended per BMP T5.13 and are modeled as pasture. See Table 3 below for the proposed flow control basin breakdown.

Table 2: Flow Control Basin for Regional Facility

LAND TYPE DESIGNATIONS	AREA (ACRES)
Total Basin	**21.13**
Lot 1[1]	**5.99**
Concrete	0.47
Asphalt	2.21
Pervious	3.31
Lot 2[2]	**5.70**
Impervious	2.27
Pervious	3.43
Lot 3[3]	**0.74**
Impervious	0.52
Pervious	0.22
Lot 4[4]	**8.70**
Impervious	3.15
Pervious	5.55

[1] Lot 1 = Proposed Affinity at DuPont
[2] Lot 2 = Proposed Senior Living
[3] Lot 3 = Approved Patriots Landing Memory Care Facility
[4] Lot 4 = Proposed Steilacoom Historical School District No. 1 School

The proposed shared infiltration pond was sized for the areas provided in Table 2 or a total of 8.62 acres of impervious surfaces and 12.51 acres of pervious surfaces. Per WWHM2012, in order to fully infiltrate the stormwater runoff generated by these surfaces, the infiltration pond must have a minimum bottom area of 4,500 square feet, 5 feet of live storage, 1 foot of freeboard, and 3 to 1 side slopes. See **Appendix 9** for the WWHM report.

For the preliminary sizing of the infiltration pond, it was assumed that the entire site would be conveyed to the proposed pond. However, due to the site grades, 0.90 acres of undisturbed pervious, 0.23 acres of disturbed pervious, and 0.08 acres of walkway cannot be collected. The stormwater runoff from the proposed walkway will disperse through the existing vegetation and fully infiltrate. No adverse impacts to the downstream are anticipated.

It is important to note that Table 2 does not include the roof areas associated with each lot development. Per the Master Plan, each lot will mitigate the stormwater runoff from their proposed roof areas via underground infiltration facilities. Each lot will size the infiltration trenches required by their proposed roof areas at the time of development. The proposed roof areas associated with Lot 2 – Affinity at DuPont will be mitigated via downspout infiltration trenches. See Table 3 below for the infiltration trench information for the applicable roof areas.

Table 3: Proposed Downspout Infiltration Trenches

TRENCH	BUILDING	ROOF AREA (ACRES)	INFILRATION TRENCH DIMENSIONS
1	Affinity 1[1]	0.19	30′ x 10′ x 5′ (including 1′ freeboard)
2	Affinity 2[1]	0.44	57′ x 12′ x 5′ (including 1′ freeboard)
3	Affinity 3[1]	0.40	56′ x 11′ x 5′ (including 1′ freeboard)
4	Affinity 4[1]	0.19	30′ x 10′ x 5′ (including 1′ freeboard)
5	Clubhouse	0.14	22′ x 10′ x 5′ (including 1′ freeboard)
6	2 Carports + 1 Garage	0.10	22′ x 7′ x 5′ (including 1′ freeboard)
7	1 Carport + 4 Garages	0.22	56′ x 6′ x 5′ (including 1′ freeboard)
8	2 Carports	0.05	15′ x 5′ x 5′ (including 1′ freeboard)

[1] The proposed Affinity building roof area is split into four basins due to the size of the roof and the location of the downspouts.

See **Appendix 3** for the flow control basin map and **Appendix 9** for WWHM reports.

4.1.4 Conveyance System Analysis and Design

Stormwater runoff for the proposed drive aisles, parking areas, and sidewalks will sheet flow to grated inlets and be conveyed through 12-inch diameter storm drainage pipes at a minimum 0.5% slope to the proposed water quality system and shared infiltration pond. Stormwater runoff from the proposed roof areas will be collected in downspouts and tight-lined to one of the eight downspout infiltration trenches via a 6-inch diameter storm drainage pipe at a minimum 0.5% slope. The stormwater drainage conveyance and backwater analysis will be completed to convey the 25-year, 24-hour design storm event and to contain the 100-year, 24-hour design storm event at the time of civil permit submittal.

5. CONSTRUCTION STORMWATER POLLUTION PREVENTION PLAN (C-SWPPP)

A SWPPP will be completed and included herein as **Appendix 6** with the final construction plans.

6. SPECIAL REPORTS AND STUDIES

A full geotechnical report was prepared for this project and is provided within **Appendix 5** of this report.

The following special reports and studies were prepared for this project and are provided within **Appendix 10** of this report:

- Limited Phase II Environmental Site Assessment, prepared by Earth Solutions NW on April 19, 2022
- Critical Areas Report, prepared by Wet.land on March 14, 2022

No other special reports or studies were required or prepared for this project.

7. OTHER PERMITS

The following permits are anticipated to be required for the proposed development:

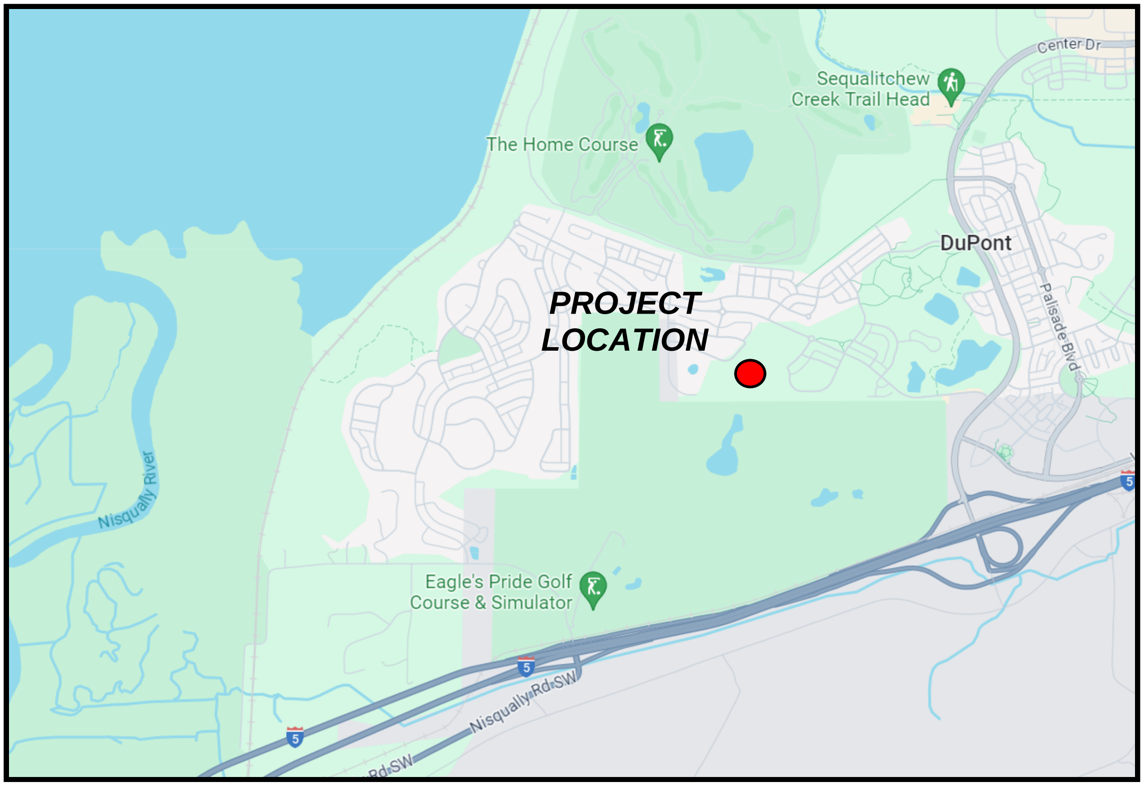
- National Pollutant Discharge Elimination System (NPDES) Permit
- Forest Practice Permit
- Clearing and Grading Permit
- Building Permit

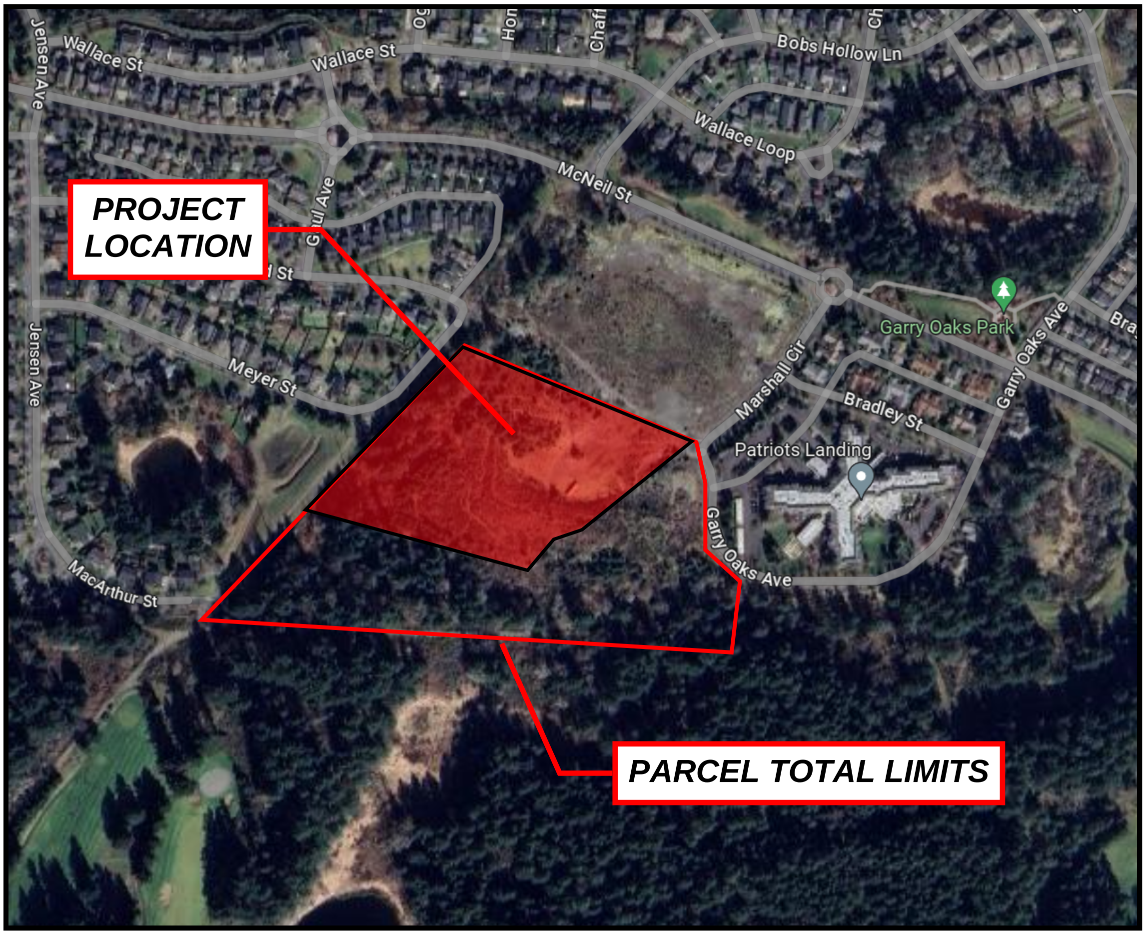
8. OPERATION AND MAINTENANCE MANUAL

Inland Group will be responsible for maintaining the downspout infiltration trenches and water quality treatment system on their parcel. The responsibility for maintaining the shared stormwater infiltration pond will be shared between the owners of the four lots utilizing the system. An operation and maintenance manual will be completed and included as an attachment to the stormwater maintenance agreement provided herein as **Appendix 8** at the time of civil permit submittal.

END OF STORMWATER SITE PLAN

APPENDIX 1
SITE VICINITY MAP


PROJECT LOCATION
Sequalitchew Creek Trail Head
Center Dr
The Home Course
DuPont
Palisade Blvd
Nisqually River
Eagle's Pride Golf Course & Simulator
5
Nisqually Rd SW
Rd SW


PROJECT LOCATION
PARCEL TOTAL LIMITS
Wallace St
Jensen Ave
Bobs Hollow Ln
Wallace Loop
McNeil St
Marshall Cir
Garry Oaks Park
Garry Oaks Ave
Bradley St
Patriots Landing
Meyer St
MacArthur St

APPENDIX 2

DETERMINATION OF MINIMUM REQUIREMENTS WORKSHEET

Figure I-3.1: Flow Chart for Determining Requirements for New Development

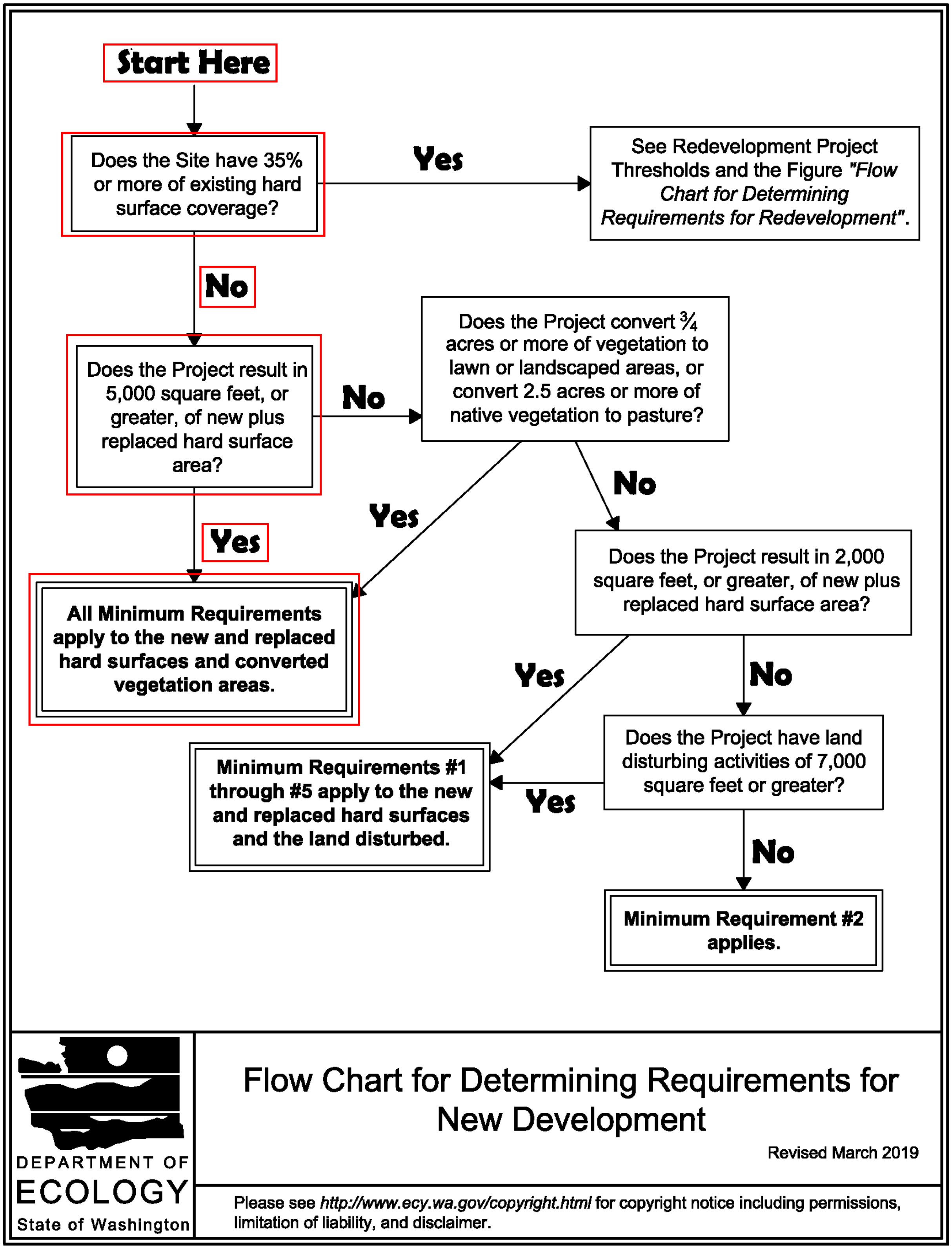
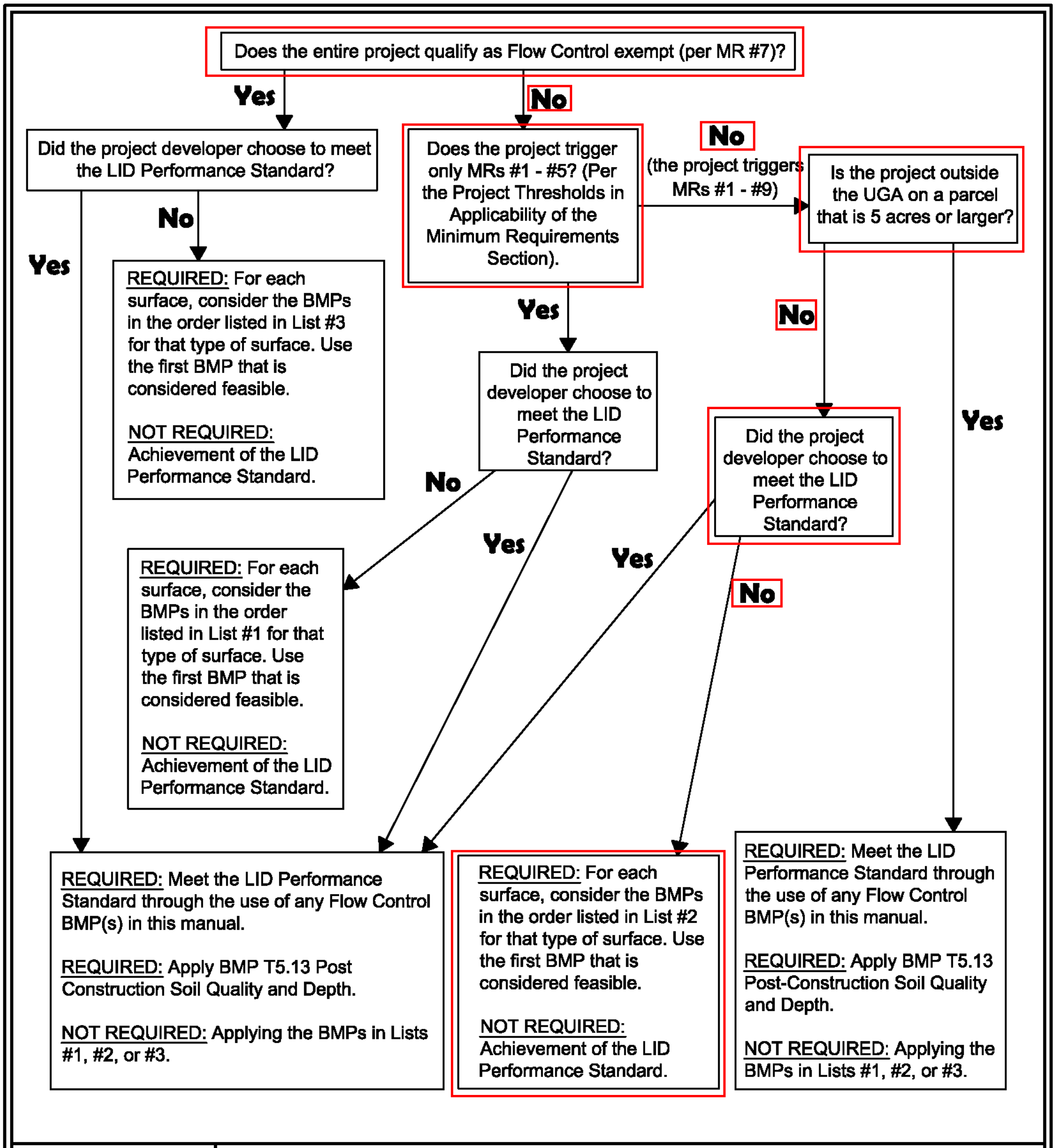


Figure I-3.3: Flow Chart for Determining MR #5 Requirements



Does the entire project qualify as Flow Control exempt (per MR #7)?

Did the project developer choose to meet the LID Performance Standard?

REQUIRED: For each surface, consider the BMPs in the order listed in List #3 for that type of surface. Use the first BMP that is considered feasible.

NOT REQUIRED: Achievement of the LID Performance Standard.

Does the project trigger only MRs #1 - #5? (Per the Project Thresholds in Applicability of the Minimum Requirements Section).

(the project triggers MRs #1 - #9)

Is the project outside the UGA on a parcel that is 5 acres or larger?

Did the project developer choose to meet the LID Performance Standard?

REQUIRED: For each surface, consider the BMPs in the order listed in List #1 for that type of surface. Use the first BMP that is considered feasible.

NOT REQUIRED: Achievement of the LID Performance Standard.

Did the project developer choose to meet the LID Performance Standard?

REQUIRED: Meet the LID Performance Standard through the use of any Flow Control BMP(s) in this manual.

REQUIRED: Apply BMP T5.13 Post Construction Soil Quality and Depth.

NOT REQUIRED: Applying the BMPs in Lists #1, #2, or #3.

REQUIRED: For each surface, consider the BMPs in the order listed in List #2 for that type of surface. Use the first BMP that is considered feasible.

NOT REQUIRED: Achievement of the LID Performance Standard.

REQUIRED: Meet the LID Performance Standard through the use of any Flow Control BMP(s) in this manual.

REQUIRED: Apply BMP T5.13 Post-Construction Soil Quality and Depth.

NOT REQUIRED: Applying the BMPs in Lists #1, #2, or #3.

DEPARTMENT OF
ECOLOGY
State of Washington

Flow Chart for Determining MR #5 Requirements

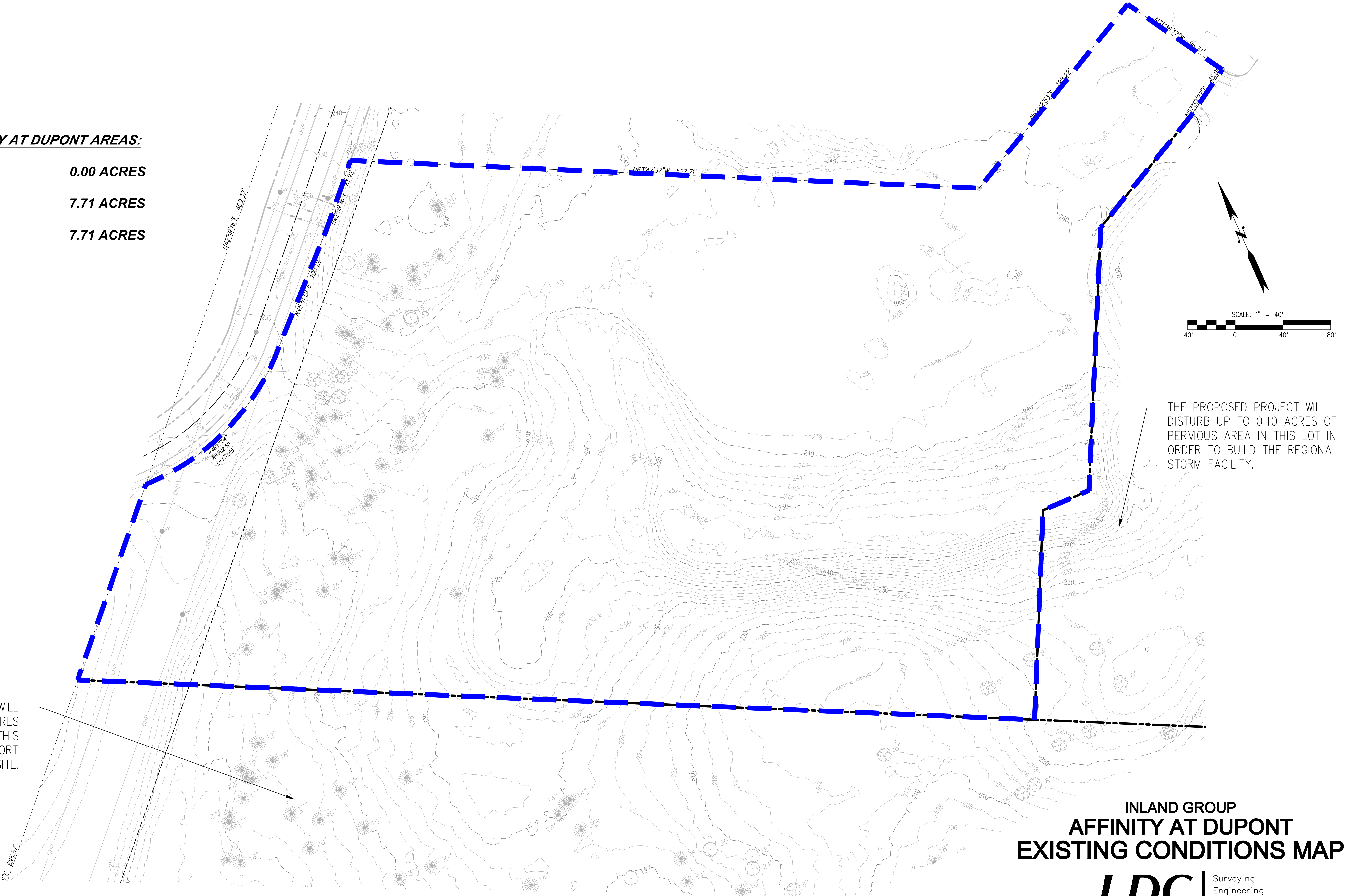
Revised March 2019

APPENDIX 3

BASIN MAP EXHIBITS

EXISTING AFFINITY AT DUPONT AREAS:

IMPERVIOUS:	***0.00 ACRES***
PERVIOUS:	***7.71 ACRES***
TOTAL:	***7.71 ACRES***



THE PROPOSED PROJECT WILL DISTURB UP TO 0.10 ACRES OF PERVIOUS AREA IN THIS LOT IN ORDER TO BUILD THE REGIONAL STORM FACILITY.

THE PROPOSED PROJECT WILL DISTURB UP TO 3.58 ACRES OF PERVIOUS AREA IN THIS LOT TO STOCK PILE EXPORT FROM THE AFFINITY SITE.

INLAND GROUP
AFFINITY AT DUPONT
EXISTING CONDITIONS MAP

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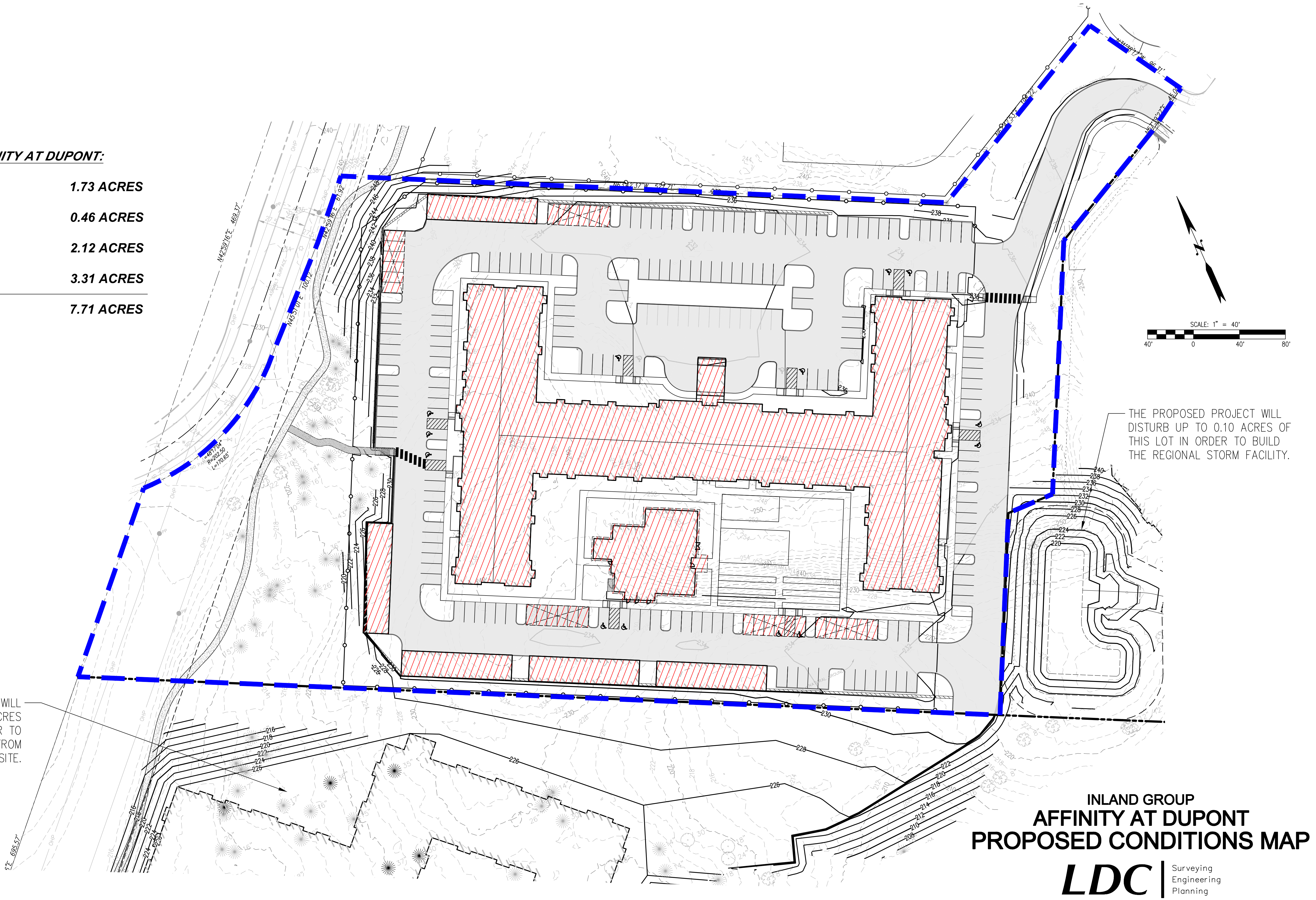
ISSUE DATE: 06-06-24

▬ ▬	***PROPOSED AFFINITY AT DUPONT:***	
▨	***ROOF:***	***1.73 ACRES***
░	***CONCRETE:***	***0.46 ACRES***
▒	***ASPHALT:***	***2.12 ACRES***
	PERVIOUS:	***3.31 ACRES***
	TOTAL:	***7.71 ACRES***



THE PROPOSED PROJECT WILL DISTURB UP TO 0.10 ACRES OF THIS LOT IN ORDER TO BUILD THE REGIONAL STORM FACILITY.

THE PROPOSED PROJECT WILL DISTURB UP TO 3.58 ACRES OF THIS LOT IN ORDER TO STOCK PILE EXPORT FROM THE AFFINITY SITE.

INLAND GROUP

AFFINITY AT DUPONT
PROPOSED CONDITIONS MAP

LDC Surveying
Engineering
Planning

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T 425.806.1869 www.LDCcorp.com F 425.482.2893

ISSUE DATE: 06-06-24

REGIONAL STORMWATER FACILITY BASIN*:

LOT 1 - PROPOSED AFFINITY AT DUPONT:

▨ ***CONCRETE:***	***0.47 ACRES***
▨ ***ASPHALT:***	***2.21 ACRES***
PERVIOUS:	***3.31 ACRES***

LOT 2 - PROPOSED SENIOR LIVING:

IMPERVIOUS:	***2.27 ACRES***
PERVIOUS:	***3.43 ACRES***

LOT 3 - PROPOSED MULTICARE FACILITY:

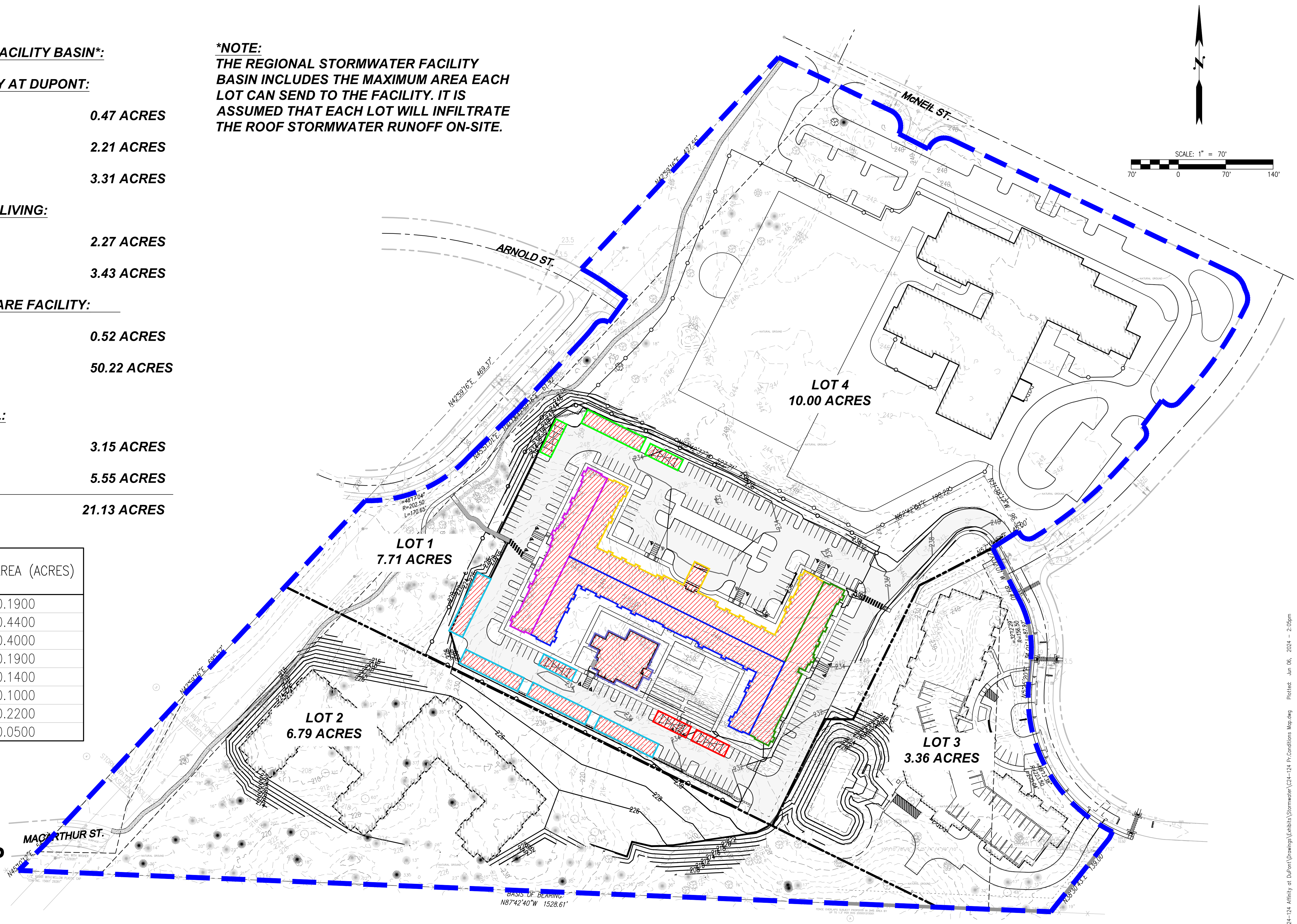
IMPERVIOUS:	***0.52 ACRES***
PERVIOUS:	***50.22 ACRES***

LOT 4 - PROPOSED SCHOOL:

IMPERVIOUS:	***3.15 ACRES***
PERVIOUS:	***5.55 ACRES***
TOTAL:	***21.13 ACRES***

****NOTE:***
THE REGIONAL STORMWATER FACILITY BASIN INCLUDES THE MAXIMUM AREA EACH LOT CAN SEND TO THE FACILITY. IT IS ASSUMED THAT EACH LOT WILL INFILTRATE THE ROOF STORMWATER RUNOFF ON-SITE.

BASIN	ROOF AREA (ACRES)
1	0.1900
2	0.4400
3	0.4000
4	0.1900
5	0.1400
6	0.1000
7	0.2200
8	0.0500



INLAND GROUP

AFFINITY AT DUPONT
FLOW CONTROL MAP

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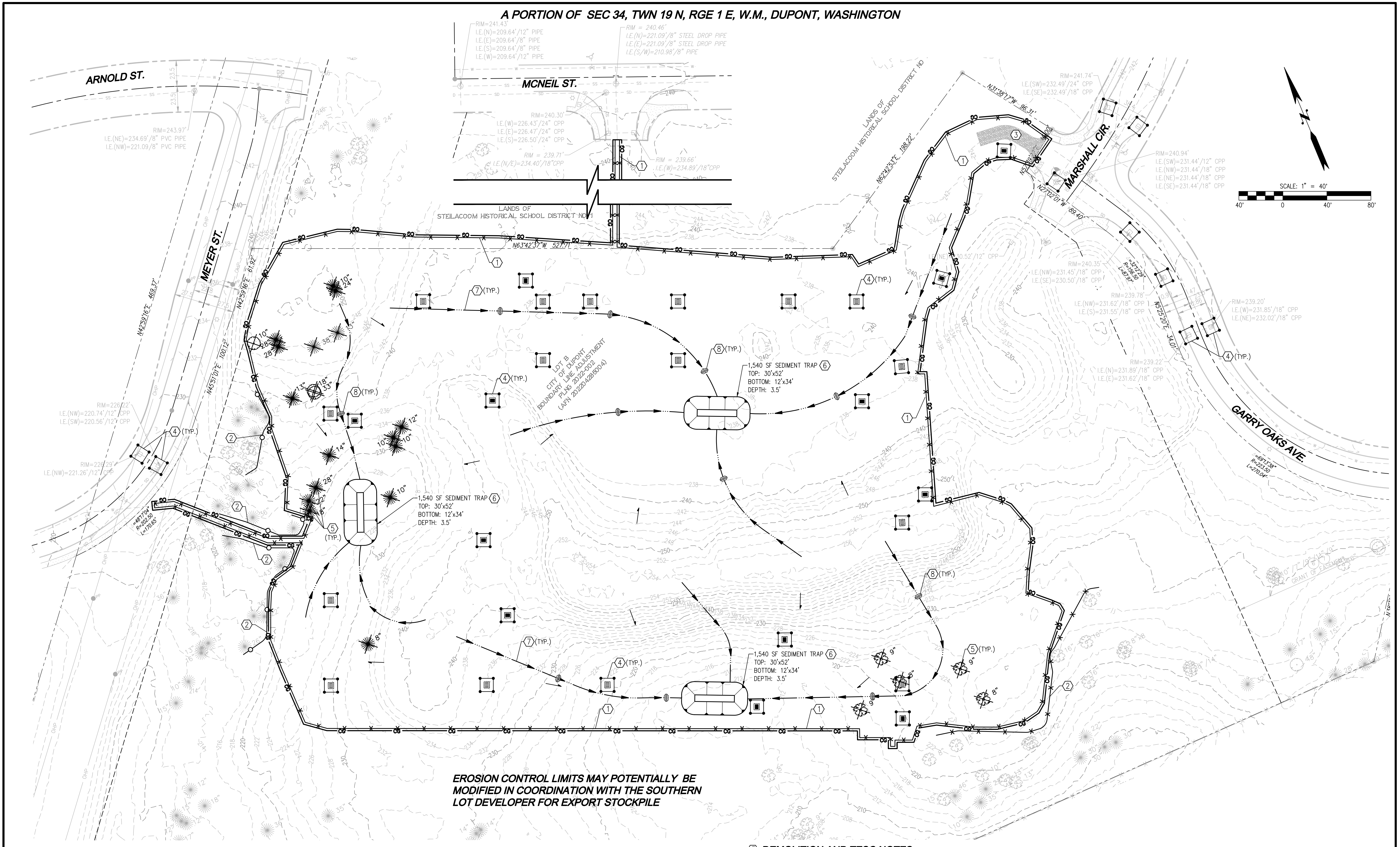
ISSUE DATE: 06-06-24

Drawing: P:\Civil\2024\C24-124 Affinity at DuPont\Drawings\Exhibits\Stormwater\C24-124 Pr.Conditions Map.dwg Plotted: Jun 06, 2024 - 2:05pm

APPENDIX 4

PRELIMINARY CONSTRUCTION PLANS

A PORTION OF SEC 34, TWN 19 N, RGE 1 E, W.M., DUPONT, WASHINGTON



EROSION CONTROL LIMITS MAY POTENTIALLY BE MODIFIED IN COORDINATION WITH THE SOUTHERN LOT DEVELOPER FOR EXPORT STOCKPILE

⟨#⟩ DEMOLITION AND TESC NOTES:

1. INSTALL SILT FENCE PER DETAIL SHOWN ON SHEET EC–02
2. INSTALL TREE PROTECTION FENCE PER DETAIL SHOWN ON SHEET EC–02
3. INSTALL STABILIZED CONSTRUCTION ENTRANCE PER DETAIL SHOWN ON SHEET EC–02
4. INSTALL STORM DRAIN INLET PROTECTION PER DETAIL SHOWN ON SHEET EC–02
5. REMOVE AND DISPOSE OF EXISTING TREE AND ROOT BALL
6. INSTALL SEDIMENT TRAP PER DETAIL SHOWN ON SHEET EC–02
7. INSTALL CONVEYANCE SWALE PER DETAIL SHOWN ON SHEET EC–02
8. INSTALL CHECK DAMS WITH MAXIMUM SPACING 100' PER DETAIL SHOWN ON SHEET EC–02

LEGEND

— – – —	PROPERTY LINE	▣ ▣	STORM DRAIN INLET PROTECTION PER DETAIL SHOWN ON SHEET EC–02
━ ━ ━	PROPOSED PROPERTY LINE	→	PRE DEVELOPMENT DRAINAGE PATTERN
—CG—	CLEARING LIMITS	✳ ☒	EXISTING TREE TO BE REMOVED
—×—×—	SILT FENCE PER DETAIL SHOWN ON SHEET EC–02	⬭	SEDIMENT TRAP PER DETAIL SHOWN ON SHEET EC–02
—○—○—	TREE PROTECTION FENCE PER DETAIL SHOWN ON SHEET EC–02	⬬	CHECK DAM PER DETAIL SHOWN ON SHEET EC–02
—►···	CONVEYANCE SWALE PER DETAIL SHOWN ON SHEET EC–02		
▨	STABILIZED CONSTRUCTION ENTRANCE PER DETAIL SHOWN ON SHEET EC–02		

Call 2 Business Days Before You Dig
811 or 1-800-424-5555
Utilities Underground Location Center

DISCLAIMER

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UTILITY NOTE

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NO.	DATE	DESCRIPTION	BY

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INLAND GROUP

AFFINITY AT DUPONT

DEMOLITION AND TESC PLAN

ROSS D. JARVIS
43668
06/21/24

JOB NUMBER:	C24–124
DRAWING NAME:	C24–124 EC–01
DESIGNER:	RW
DRAFTING BY:	AW
DATE:	JUNE 2024
SCALE:	AS SHOWN
JURISDICTION:	DUPONT, WA

EC-01

SHEET 2 OF 28

A PORTION OF SEC 34, TWN 19 N, RGE 1 E, W.M., DUPONT, WASHINGTON

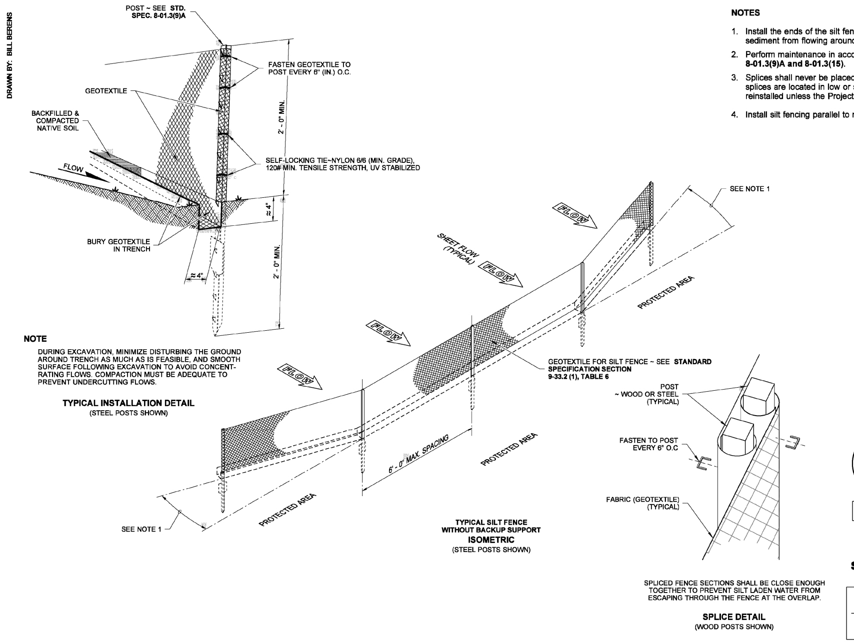
11.2 CITY OF DUPONT EROSION / SEDIMENTATION NOTES

THE CONTRACTOR SHALL PROVIDE EROSION CONTROL METHODS ACCORDING TO THE WASHINGTON STATE DEPARTMENT OF ECOLOGY'S (WDOE) "STORMWATER MANAGEMENT MANUAL FOR WESTERN WASHINGTON." THE FOLLOWING NOTES ARE ONLY A FEW OF THE MINIMUM REQUIREMENTS AND SHOULD NOT BE INTERPRETED TO EXCLUDE ANY EROSION CONTROL PRACTICES AS SPECIFIED IN THE WDOE STORMWATER MANUAL.

1. ALL LIMITS OF CLEARING AND AREAS OF VEGETATION PRESERVATION AS PRESCRIBED ON THE PLAN SHALL BE CLEARLY FLAGGED BY THE ENGINEER IN THE FIELD AND OBSERVED DURING CONSTRUCTION.
2. ALL REQUIRED SEDIMENTATION/EROSION CONTROL FACILITIES MUST BE IN OPERATION PRIOR TO LAND CLEARING AND/OR OTHER CONSTRUCTION TO INSURE THAT SEDIMENT LADEN WATER DOES NOT ENTER THE NATURAL DRAINAGE SYSTEM. ALL EROSION AND SEDIMENT FACILITIES SHALL BE MAINTAINED IN A SATISFACTORY CONDITION UNTIL SUCH TIME THAT CLEARING AND/OR CONSTRUCTION IS COMPLETED AND POTENTIAL FOR ON-SITE EROSION HAS PASSED. THE IMPLEMENTATION, MAINTENANCE, REPLACEMENT AND ADDITIONS TO EROSION/SEDIMENTATION CONTROL SYSTEMS SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR.
3. THE EROSION AND SEDIMENTATION CONTROL SYSTEMS DEPICTED ON THIS DRAWING ARE INTENDED TO BE MINIMUM REQUIREMENTS TO MEET ANTICIPATED SITE CONDITIONS. AS CONSTRUCTION PROGRESSES AND AS UNEXPECTED OR SEASONAL CONDITIONS DICTATE, THE CONTRACTOR SHOULD ANTICIPATE THAT MORE EROSION AND SEDIMENTATION CONTROL FACILITIES WILL BE NECESSARY TO INSURE COMPLETE SILTATION CONTROL ON THE PROPOSED SITE. DURING THE COURSE OF CONSTRUCTION, IT SHALL BE THE OBLIGATION AND RESPONSIBILITY OF THE CONTRACTOR TO ADDRESS ANY NEW CONDITIONS THAT MAY BE CREATED BY HIS ACTIVITIES AND TO PROVIDE ADDITIONAL FACILITIES, OVER AND ABOVE MINIMUM REQUIREMENTS, AS MAY BE NEEDED TO PROTECT ADJACENT PROPERTIES AND WATER QUALITY OF THE RECEIVING DRAINAGE SYSTEM.
4. AT NO TIME SHALL MORE THAN 1 FOOT OF SEDIMENT BE ALLOWED TO ACCUMULATE WITHIN A CATCH BASIN. THE CONTRACTOR SHALL BE RESPONSIBLE FOR REMOVING AND DISPOSING OF THE SEDIMENT. ALL CATCH BASINS, CONVEYANCE LINES AND DITCHES ALONG [STREET SHALL BE CLEANED PRIOR TO PAVING.
5. THE CONTRACTOR SHALL REMOVE MATERIAL DROPPED, WASHED OR TRACKED FROM VEHICLES ONTO THE CITY RIGHT-OF-WAY OR INTO THE STORM DRAINAGE SYSTEM ON MARSHALL CIR. OR GARRY OAKS AVE. DEBRIS SHALL NOT BE WASHED INTO THE STORM DRAINAGE SYSTEM.
6. TEMPORARY EROSION CONTROL FACILITIES SHALL BE INSPECTED WEEKLY AND MAINTAINED WITHIN 24 HOURS FOLLOWING A STORM EVENT. SEDIMENT SHALL BE REMOVED TO ENSURE THE FACILITIES WILL FUNCTION PROPERLY. THE FACILITIES SHALL BE SATISFACTORILY MAINTAINED UNTIL CONSTRUCTION IS COMPLETED AND THE POTENTIAL FOR ON-SITE EROSION HAS PASSED.
7. ALL STORM DRAIN INLETS MADE OPERABLE DURING CONSTRUCTION SHALL BE PROTECTED SO THAT STORMWATER RUNOFF SHALL NOT ENTER THE CONVEYANCE SYSTEM WITHOUT FIRST BEING FILTERED OR OTHERWISE TREATED TO REMOVE SEDIMENT.
8. NO DISTURBED SOIL SHALL REMAIN UNSTABILIZED FOR MORE THAN TWO DAYS.
9. SEDIMENT TRAP/POND BAFFLES SHALL BE EMBEDDED IN SIDE SLOPES.

CONSTRUCTION SEQUENCE

1. INSTALL FILTER FABRIC AND N.G.P.E. FENCE WHERE INDICATED.
2. IDENTIFY LIMITS OF CLEARING.
3. INSTALL ROCK-LINED CONSTRUCTION ENTRANCE.
4. CLEAR TO LIMITS SHOWN ON DRAWINGS.
5. ROUGH GRADE ROADWAY AS DESIGNED AND INSTALL INTERCEPTOR DITCHES.
6. INSTALL SEDIMENT TRAPS AND PONDS.
7. INSTALL SANITARY SEWER SYSTEM.
8. INSTALL DOMESTIC WATER SYSTEM.
9. INSTALL STORM DRAINAGE SYSTEM.



NOTE

DURING EXCAVATION, MINIMIZE DISTURBING THE GROUND AROUND TRENCH AS MUCH AS IS FEASIBLE, AND SMOOTH SURFACE FOLLOWING EXCAVATION TO AVOID CONCENTRATING FLOWS. COMPACTION MUST BE ADEQUATE TO PREVENT UNDERCUTTING FLOWS.

TYPICAL INSTALLATION DETAIL
(STEEL POSTS SHOWN)

TYPICAL SILT FENCE WITHOUT BACKUP SUPPORT
ISOMETRIC
(STEEL POSTS SHOWN)

SPLICED FENCE SECTIONS SHALL BE CLOSE ENOUGH TOGETHER TO PREVENT SILT LADEN WATER FROM ESCAPING THROUGH THE FENCE AT THE OVERLAP.

SPLICE DETAIL
(WOOD POSTS SHOWN)

NOTES

1. Install the ends of the silt fence to point slightly upslope to prevent sediment from flowing around the ends of the fence.
2. Perform maintenance in accordance with **Standard Specifications 8-01.3(9)A and 8-01.3(15)**.
3. Splices shall never be placed in low spots or sump locations. If splices are located in low or sump areas, the fence may need to be reinstalled unless the Project Engineer approves the installation.
4. Install silt fencing parallel to mapped contour lines.

STATE OF WASHINGTON REGISTERED LANDSCAPE ARCHITECT
SANDRA L. SALISBURY
CERTIFICATE NO. 000860

NOTE: THIS PLAN IS NOT A LEGAL ENGINEERING DOCUMENT BUT AN ELECTRONIC DUPLICATE. THE ORIGINAL, SIGNED BY THE ENGINEER AND APPROVED FOR PUBLICATION, IS KEPT ON FILE AT THE WASHINGTON STATE DEPARTMENT OF TRANSPORTATION. A COPY MAY BE OBTAINED UPON REQUEST.

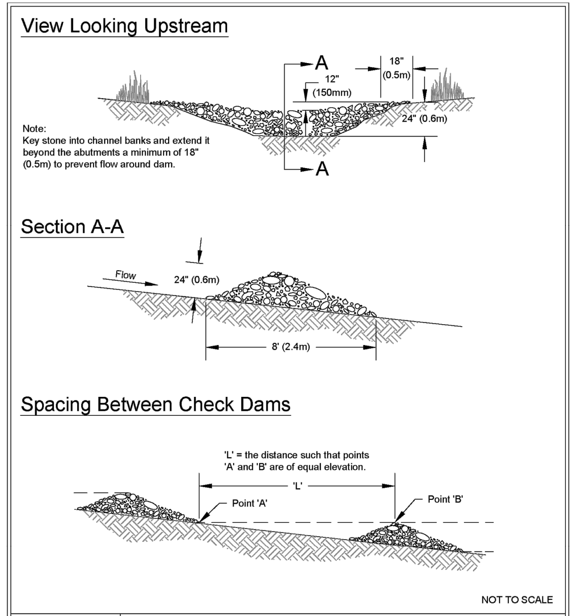
SILT FENCE

STANDARD PLAN I-30.15-02

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION
Pasco Bakotich III — ***3/22/13***
STATE DESIGN ENGINEER — DATE
Washington State Department of Transportation

Figure II-3.16: Rock Check Dam



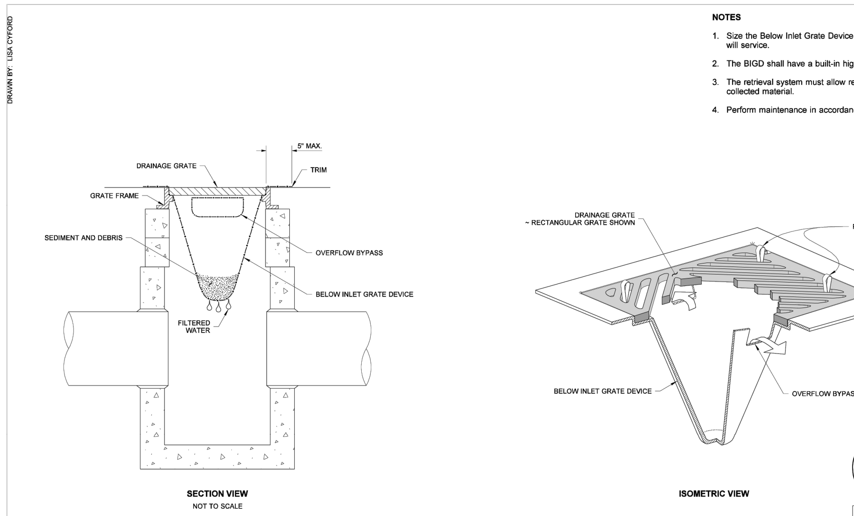
Note:
Key stone into channel banks and extend it beyond the abutments a minimum of 18" (0.5m) to prevent flow around dam.

'L' = the distance such that points 'A' and 'B' are of equal elevation.

NOT TO SCALE

DEPARTMENT OF ECOLOGY
State of Washington

Rock Check Dam
Revised June 2016



SECTION VIEW
NOT TO SCALE

ISOMETRIC VIEW

NOTES

1. Size the Below Inlet Grate Device (BIGD) for the storm water structure it will service.
2. The BIGD shall have a built-in high-flow relief system (overflow bypass).
3. The retrieval system must allow removal of the BIGD without spilling the collected material.
4. Perform maintenance in accordance with Standard Specification 8-01.3(15).

STATE OF WASHINGTON REGISTERED LANDSCAPE ARCHITECT
MARK W. MAURER
CERTIFICATE NO. 000598

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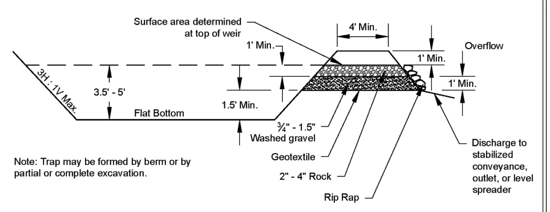
STORM DRAIN INLET PROTECTION

STANDARD PLAN I-40.20-00

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION
Pasco Bakotich III — ***09-20-07***
STATE DESIGN ENGINEER — DATE
Washington State Department of Transportation

Figure II-3.26: Cross Section of Sediment Trap



Note: Trap may be formed by berm or by partial or complete excavation.

Q2 = PEAK VOLUMETRIC FLOW RATE CALCULATED USING A 10-MINUTE TIME STEP FROM A TYPE 1A, 2-YEAR, 24-HOUR FREQUENCY STORM FOR THE DEVELOPED CONDITIONS = 2.220 CFS

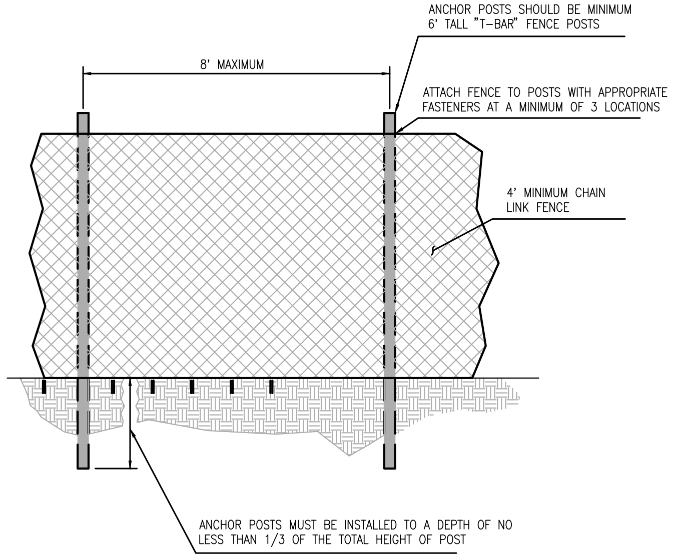
**THE Q2 FOR THE WHOLE SITE IS 2.220 CFS. THE FLOW WILL BE SPLIT INTO THREE BASINS. EACH SEDIMENT TRAP WILL HAVE A MAXIMUM OF 3 ACRES GRADED TO IT WITH A PEAK Q2 OF 0.74 CFS.

SA = 2080 SF PER CFS OF INFLOW = 2,080 SF/CFS X 0.74 CFS = 1,540 SF

NOT TO SCALE

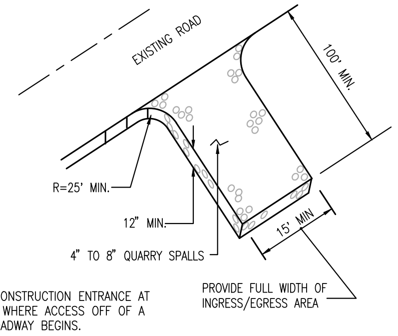
DEPARTMENT OF ECOLOGY
State of Washington

Cross Section of Sediment Trap
Revised June 2016



NOTES:
1. THE TREE, SOIL AND VEGETATION PROTECTION FENCE SHOULD BE MAINTAINED THROUGHOUT THE CONSTRUCTION AND GRADING, AND NOT TO BE REMOVED UNTIL FINAL LANDSCAPING IS IN PROGRESS AND WITH APPROVAL BE PROJECT FORESTER.
2. AT NO TIME SHALL EQUIPMENT ENTER INTO THE CRITICAL ROOT ZONE (CRZ).
3. ALL BRUSH CLEANUP WITHIN THE CRZ SHOULD BE COMPLETED BY HAND TO PREVENT DISTURBANCE OF NATIVE GROUND COVERS.
4. NO CUTS OR FILLS, UTILITY TRENCHING, MODIFICATIONS TO DRAINAGE, OR CONCRETE RINSE WATER SHOULD IMPACT THE CRZ.
5. NO WIRES, CABLES, OR OTHER DEVICES SHOULD BE ATTACHED TO PROTECTED TREES DURING CONSTRUCTION.
6. IF IMPACTS MUST OCCUR WITHIN THE CRZ, CONTACT PROJECT FORESTER PRIOR TO THE OPERATIONS TO DETERMINE THE PROPER PROCEDURE TO PROTECT THE TREE'S HEALTH.

TREE PROTECTION FENCE
NTS



NOTE:
INSTALL CONSTRUCTION ENTRANCE AT LOCATION WHERE ACCESS OFF OF A PAVED ROADWAY BEGINS.

STABILIZED CONSTRUCTION ENTRANCE
NTS

Call 2 Business Days Before You Dig
811 or 1-800-424-5555
Utilities Underground Location Center

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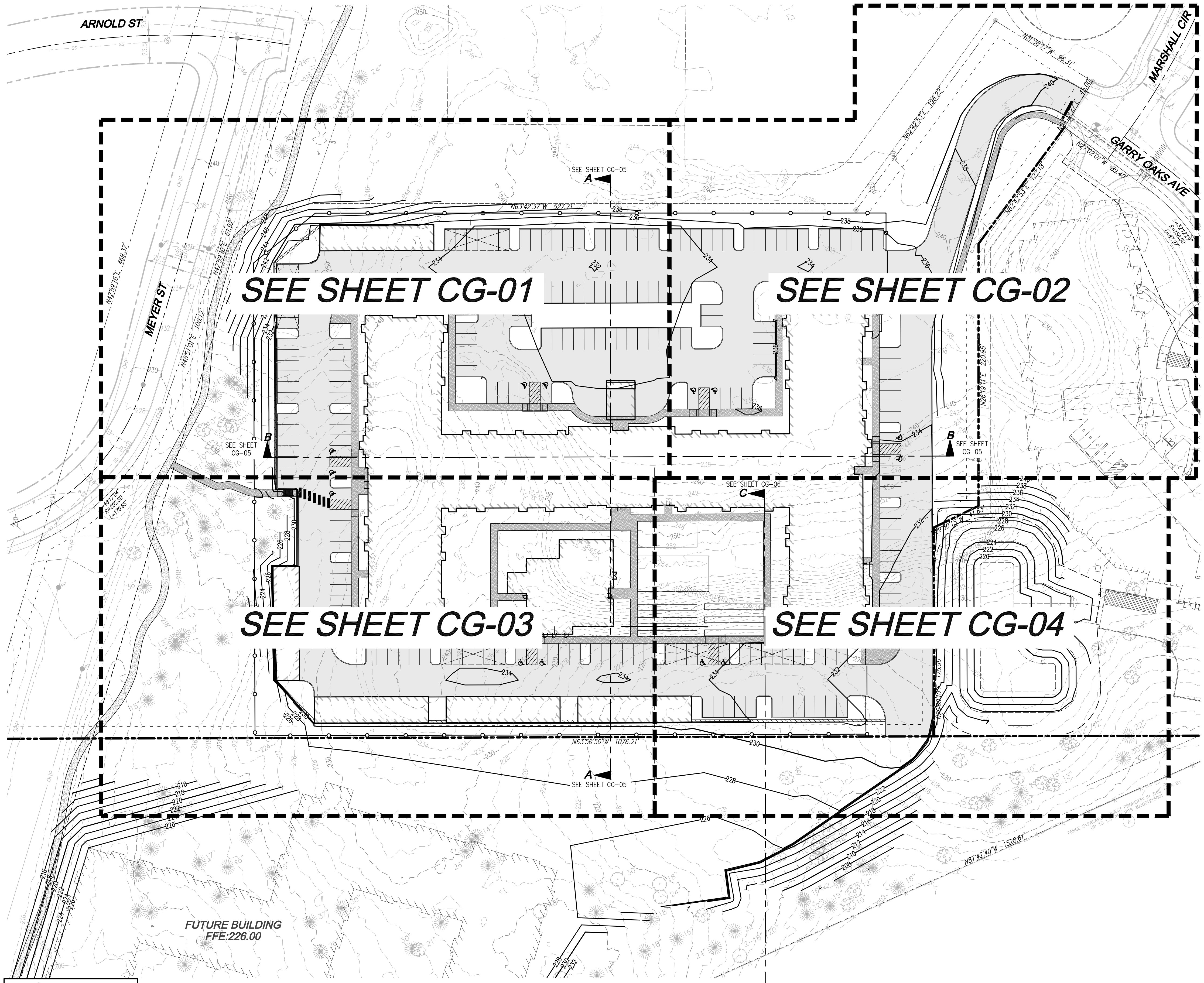
INLAND GROUP
AFFINITY AT DUPONT
DEMOLITION AND TESC NOTES AND DETAILS

ROSS D. JARVIS
43668
06/21/24

JOB NUMBER:	C24-124
DRAWING NAME:	C24-124 EC-01
DESIGNER:	RW
DRAFTING BY:	AW
DATE:	JUNE 2024
SCALE:	AS SHOWN
JURISDICTION:	DUPONT, WA

EC-02
SHEET **3** OF **28**

A PORTION OF SEC 34, TWN 19 N, RGE 1 E, W.M., DUPONT, WASHINGTON



SCALE: 1" = 40'

40' 0 40' 80'

LEGEND

XXX.XX	SPOT ELEVATION
X.XX%	SLOPE ARROW
XX	EXISTING CONTOURS
XX	PROPOSED CONTOURS
▨	PROPOSED RETAINING WALL

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INLAND GROUP

AFFINITY AT DUPONT

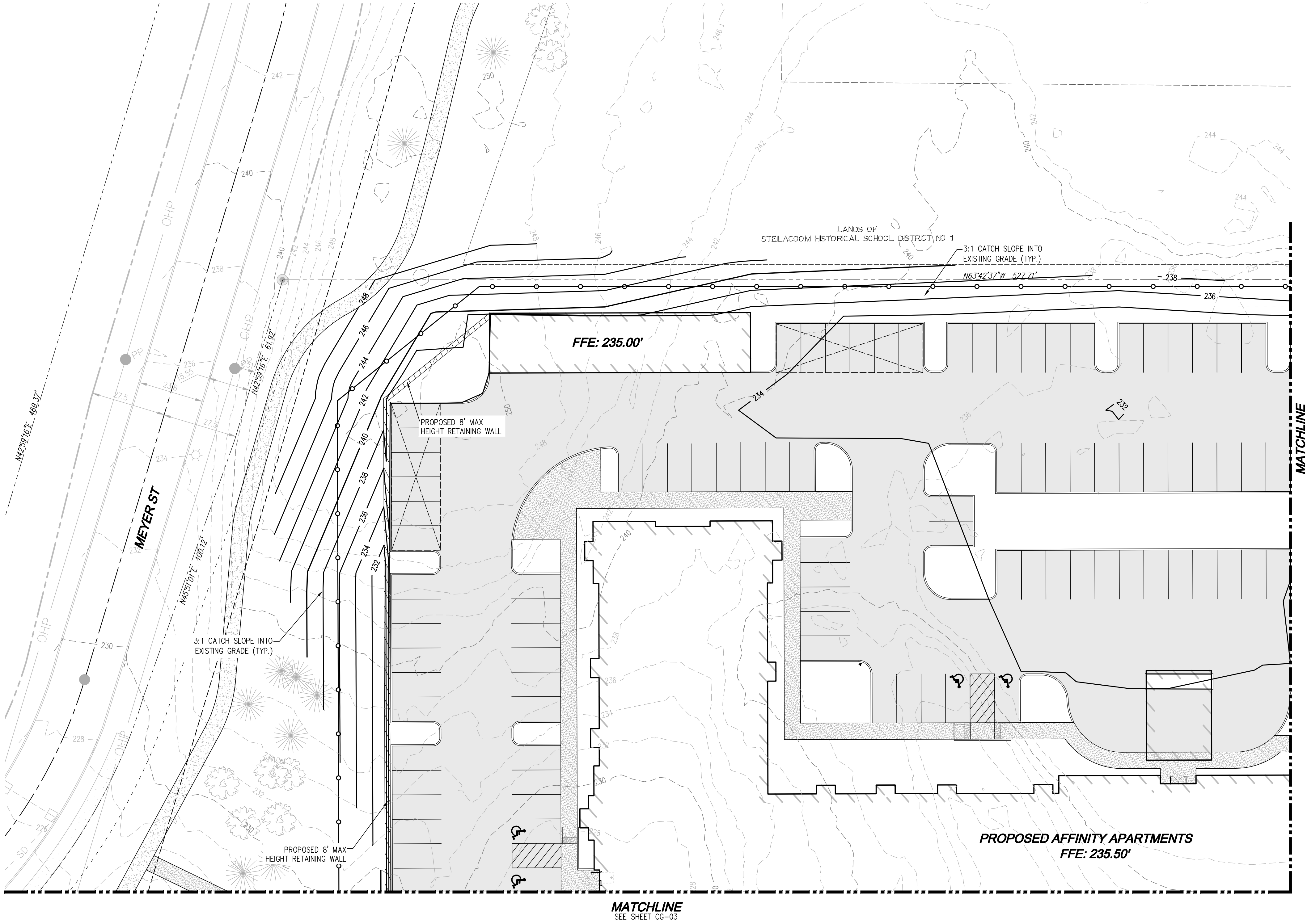
OVERALL GRADING PLAN MAP

ROSS D. JARVIS
43668
06/21/24

JOB NUMBER:	C24-124
DRAWING NAME:	C24-124 CG-01
DESIGNER:	RW
DRAFTING BY:	AW
DATE:	JUNE 2024
SCALE:	AS SHOWN
JURISDICTION:	DUPONT, WA

CG-00

A PORTION OF SEC 34, TWN 19 N, RGE 1 E, W.M., DUPONT, WASHINGTON



N

SCALE: 1" = 20'

20' 0 20' 40'

LEGEND

XXX.XX	SPOT ELEVATION
X.XX%	SLOPE ARROW
XX XX	EXISTING CONTOURS
XX XX	PROPOSED CONTOURS
▨	PROPOSED RETAINING WALL

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INLAND GROUP

AFFINITY AT DUPONT

GRADING PLAN

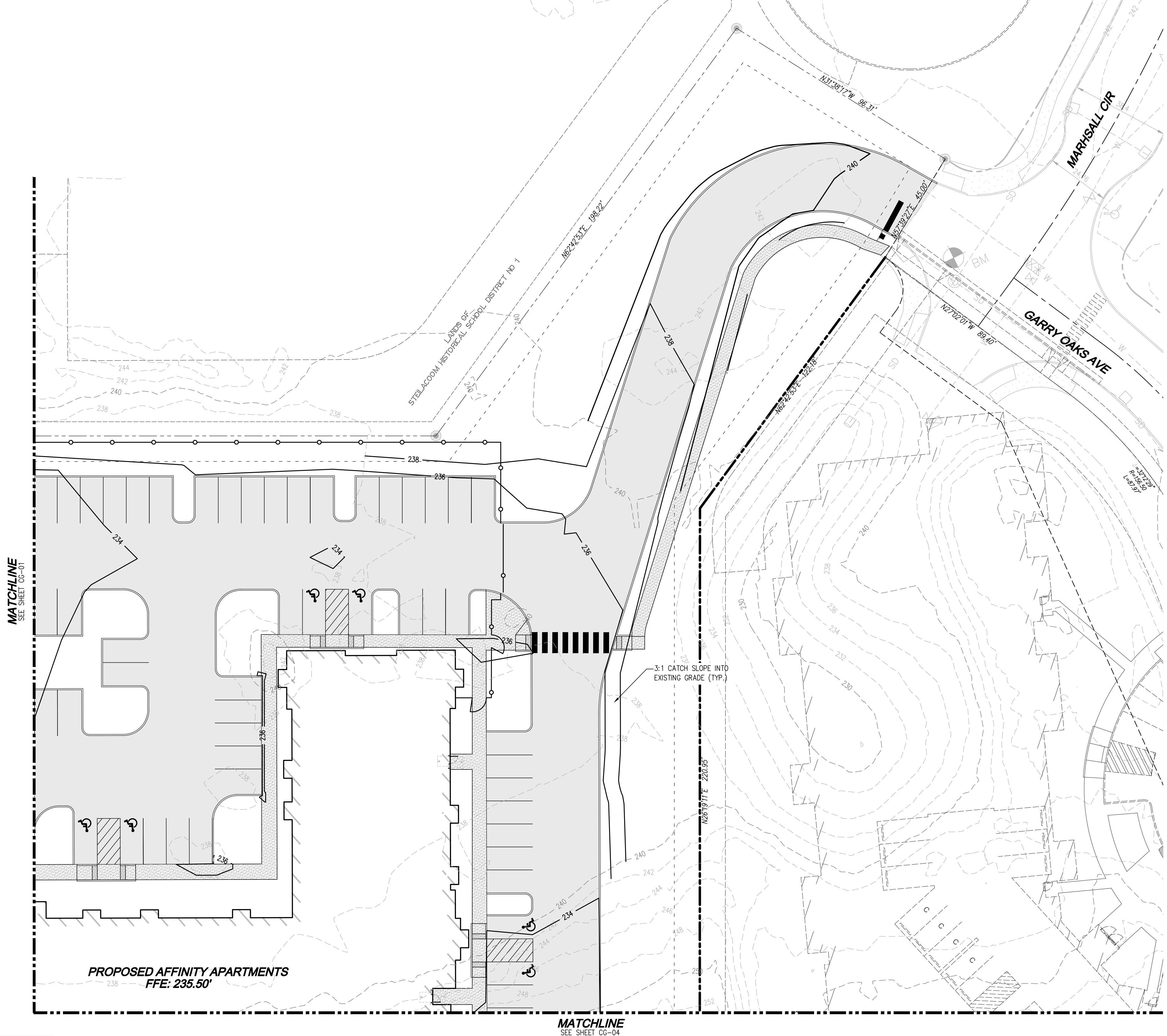
ROSS D. JARVIS
43668
06/21/24

JOB NUMBER:	C24-124
DRAWING NAME:	C24-124 CG-01
DESIGNER:	RW
DRAFTING BY:	AW
DATE:	JUNE 2024
SCALE:	AS SHOWN
JURISDICTION:	DUPONT, WA

CG-01

SHEET 10 OF 28

A PORTION OF SEC 34, TWN 19 N, RGE 1 E, W.M., DUPONT, WASHINGTON



SCALE: 1" = 20'

20' 0 20' 40'

LEGEND

XXX.XX	SPOT ELEVATION
X.XX%	SLOPE ARROW
XX	EXISTING CONTOURS
XX	PROPOSED CONTOURS
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GRADING PLAN

ROSS D. JARVIS
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DRAWING NAME:	C24-124 CG-01
DESIGNER:	RW
DRAFTING BY:	AW
DATE:	JUNE 2024
SCALE:	AS SHOWN
JURISDICTION:	DUPONT, WA

CG-02

SHEET **11** OF **28**

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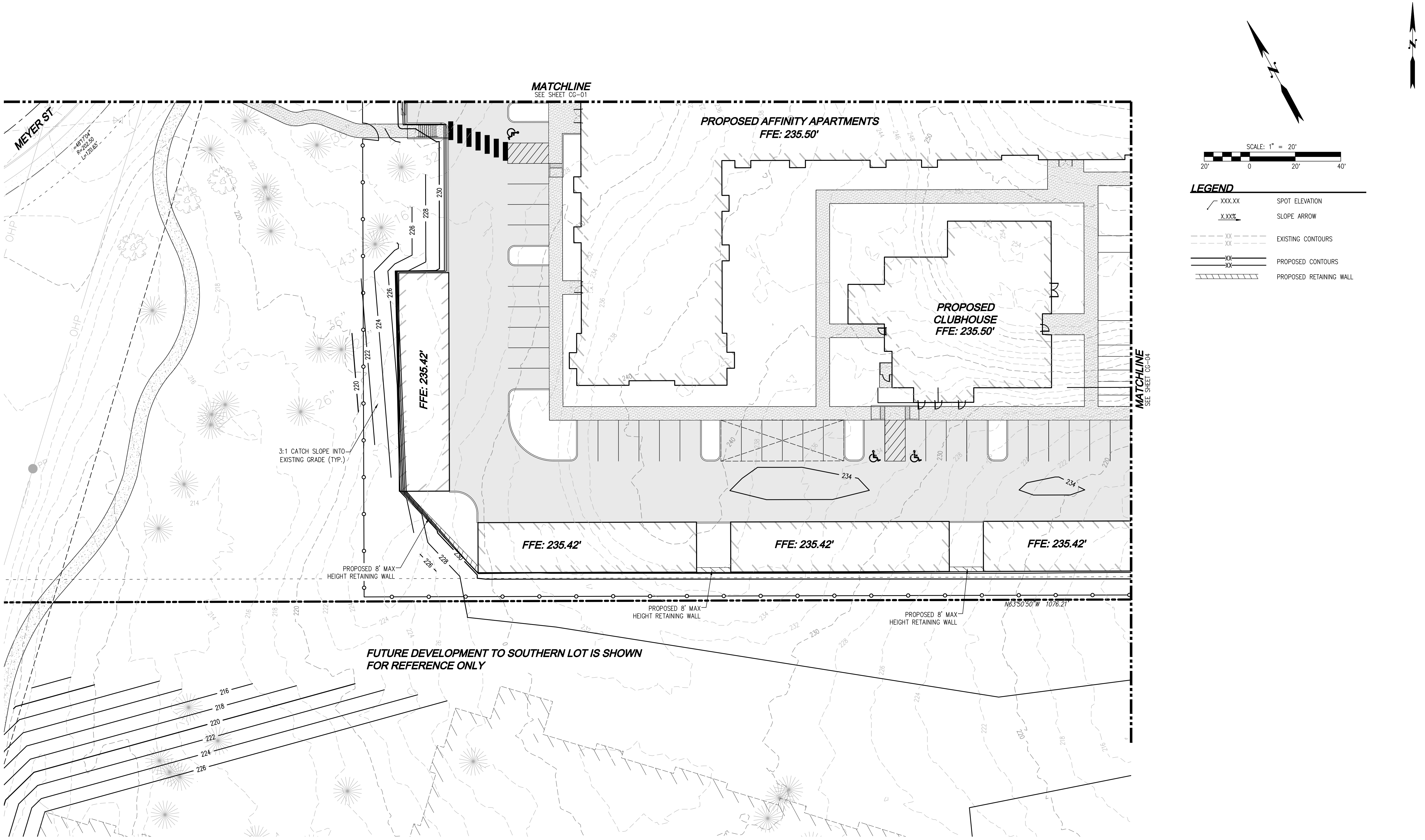

LEGEND

XXX.XX	SPOT ELEVATION
X.XX%	SLOPE ARROW
XX XX	EXISTING CONTOURS
XX XX	PROPOSED CONTOURS
▨	PROPOSED RETAINING WALL

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INLAND GROUP
AFFINITY AT DUPONT
GRADING PLAN

ROSS D. JARVIS
43668
Ross Jarvis
06/21/24

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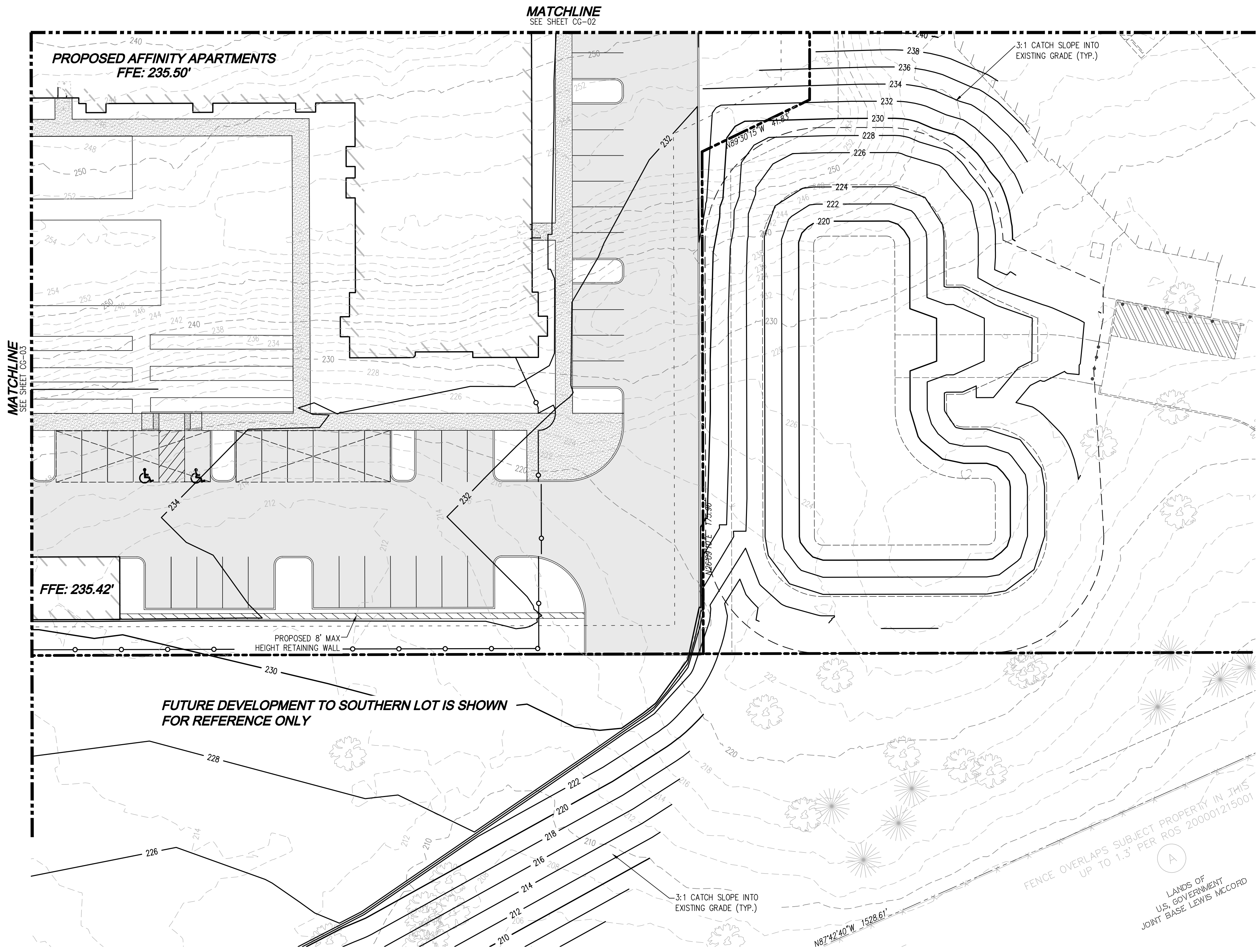
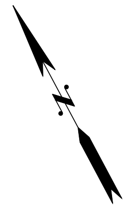
DESIGNER:	RW
DRAFTING BY:	AW
DATE:	JUNE 2024
SCALE:	AS SHOWN
JURISDICTION:	DUPONT, WA

CG-03

SHEET 12 OF 28

A PORTION OF SEC 34, TWN 19 N, RGE 1 E, W.M., DUPONT, WASHINGTON





SCALE: 1" = 20'

20' 0 20' 40'

LEGEND

XXX.XX	SPOT ELEVATION
X.XX%	SLOPE ARROW
XX XX	EXISTING CONTOURS
XX XX	PROPOSED CONTOURS
▨	PROPOSED RETAINING WALL

Call 2 Business Days Before You Dig
811 or 1-800-424-5555
Utilities Underground Location Center

DISCLAIMER

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UTILITY NOTE

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REVISIONS

NO.	DATE	DESCRIPTION	BY

LDC | Surveying
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Woodinville
Olympia
321 Cleveland Ave SE, #209
Tumwater, WA 98501
Kent
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INLAND GROUP

AFFINITY AT DUPONT

GRADING PLAN

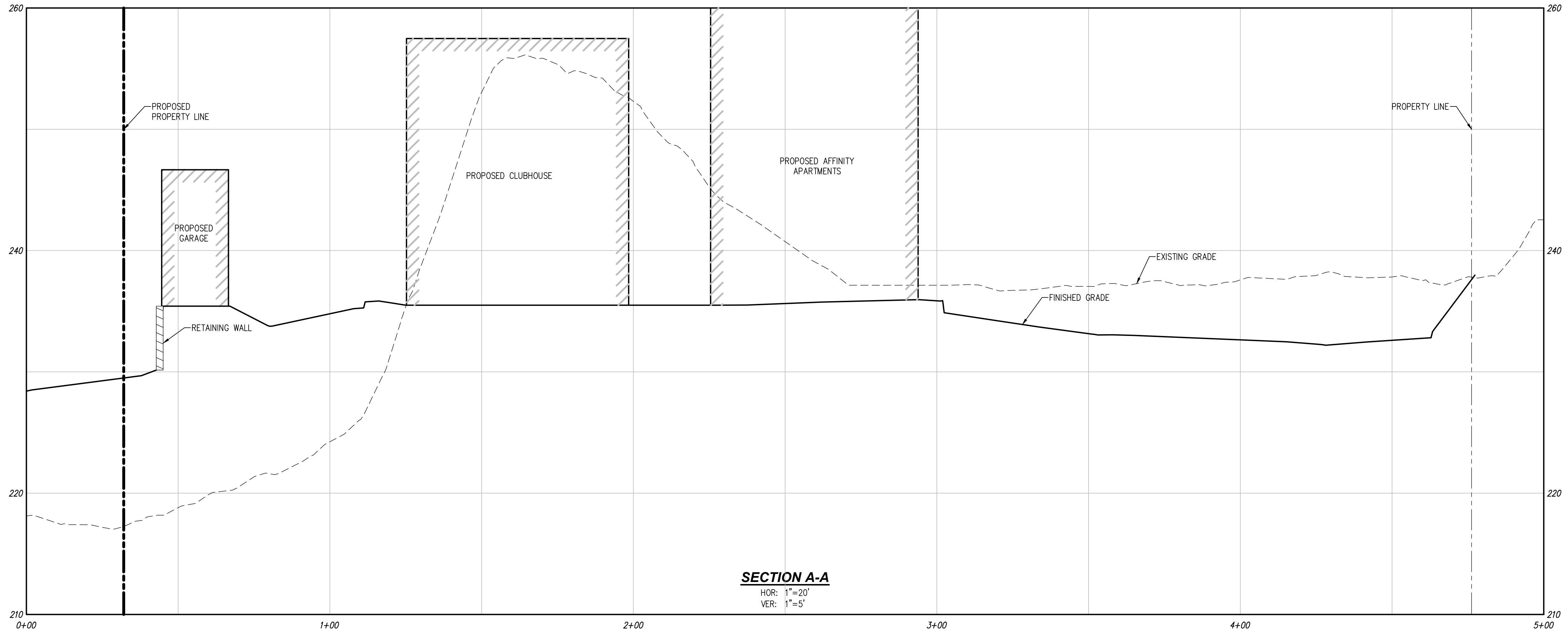
ROSS D. JARVIS
43668
06/21/24

JOB NUMBER:	C24-124
DRAWING NAME:	C24-124 CG-01
DESIGNER:	RW
DRAFTING BY:	AW
DATE:	JUNE 2024
SCALE:	AS SHOWN
JURISDICTION:	DUPONT, WA

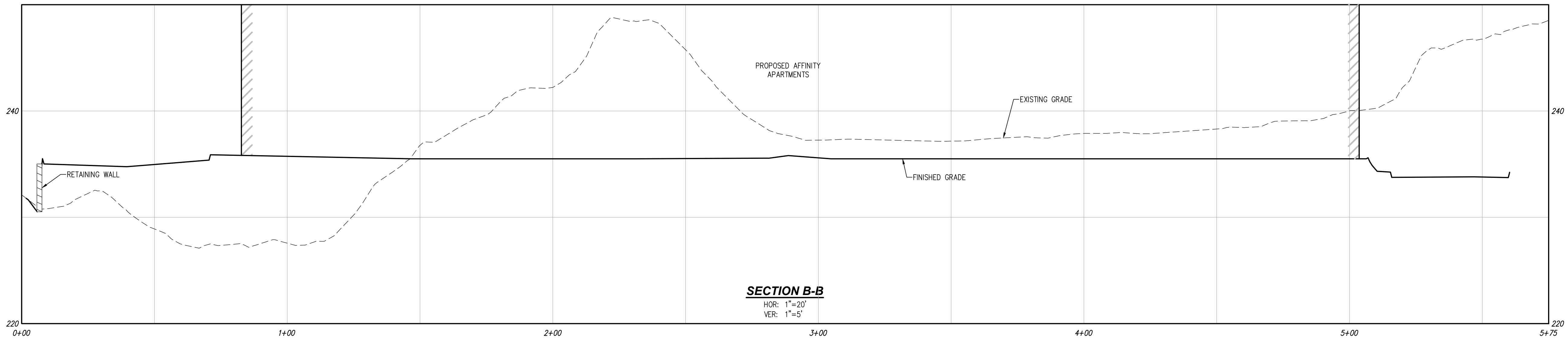
CG-04

SHEET **13** OF **28**

A PORTION OF SEC 34, TWN 19 N, RGE 1 E, W.M., DUPONT, WASHINGTON



SECTION A-A
HOR: 1"=20'
VER: 1"=5'



SECTION B-B
HOR: 1"=20'
VER: 1"=5'

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Drawing: P:\Civil\2024\C24-124 Affinity at DuPont\Drawings\Preliminary\C24-124 CG-01.dwg Plotted: Jun 21, 2024 - 10:58am

REVISIONS

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AFFINITY AT DUPONT
GRADING PROFILES

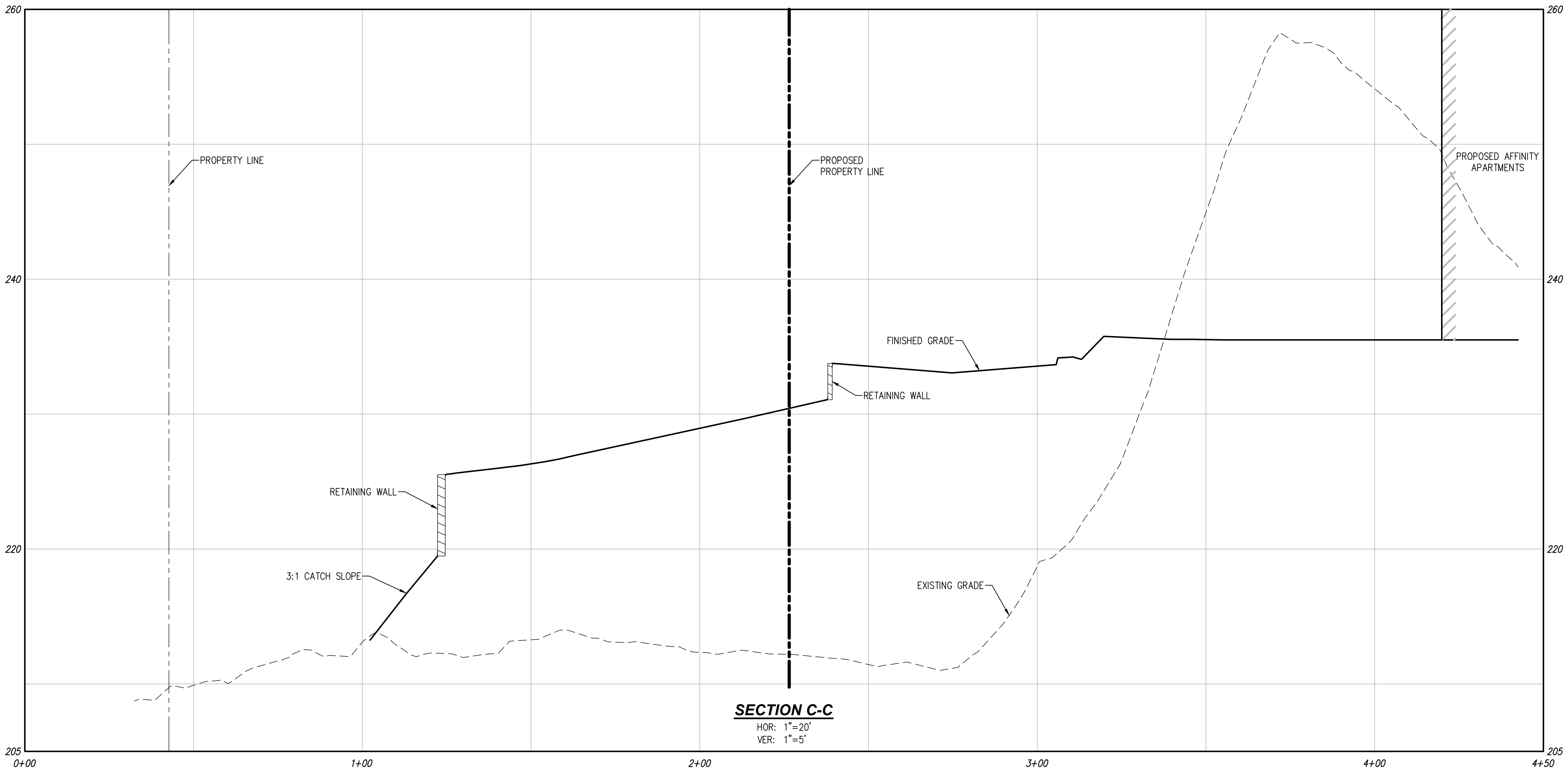
ROSS D. JARVIS
43668
Ross Jarvis
06/21/24

JOB NUMBER:	C24-124
DRAWING NAME:	C24-124 CG-01
DESIGNER:	RW
DRAFTING BY:	AW
DATE:	JUNE 2024
SCALE:	AS SHOWN
JURISDICTION:	DUPONT, WA

CG-05

SHEET **14** OF **28**

A PORTION OF SEC 34, TWN 19 N, RGE 1 E, W.M., DUPONT, WASHINGTON



SECTION C-C
HOR: 1"=20'
VER: 1"=5'

Call 2 Business Days Before You Dig
811 or 1-800-424-5555
Utilities Underground Location Center

DISCLAIMER

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Drawing: P:\Civil\2024\C24-124 Affinity at DuPont\Drawings\Preliminary\C24-124 CG-01.dwg Plotted: Jun 21, 2024 - 10:58am

REVISIONS

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INLAND GROUP
AFFINITY AT DUPONT
GRADING PROFILES

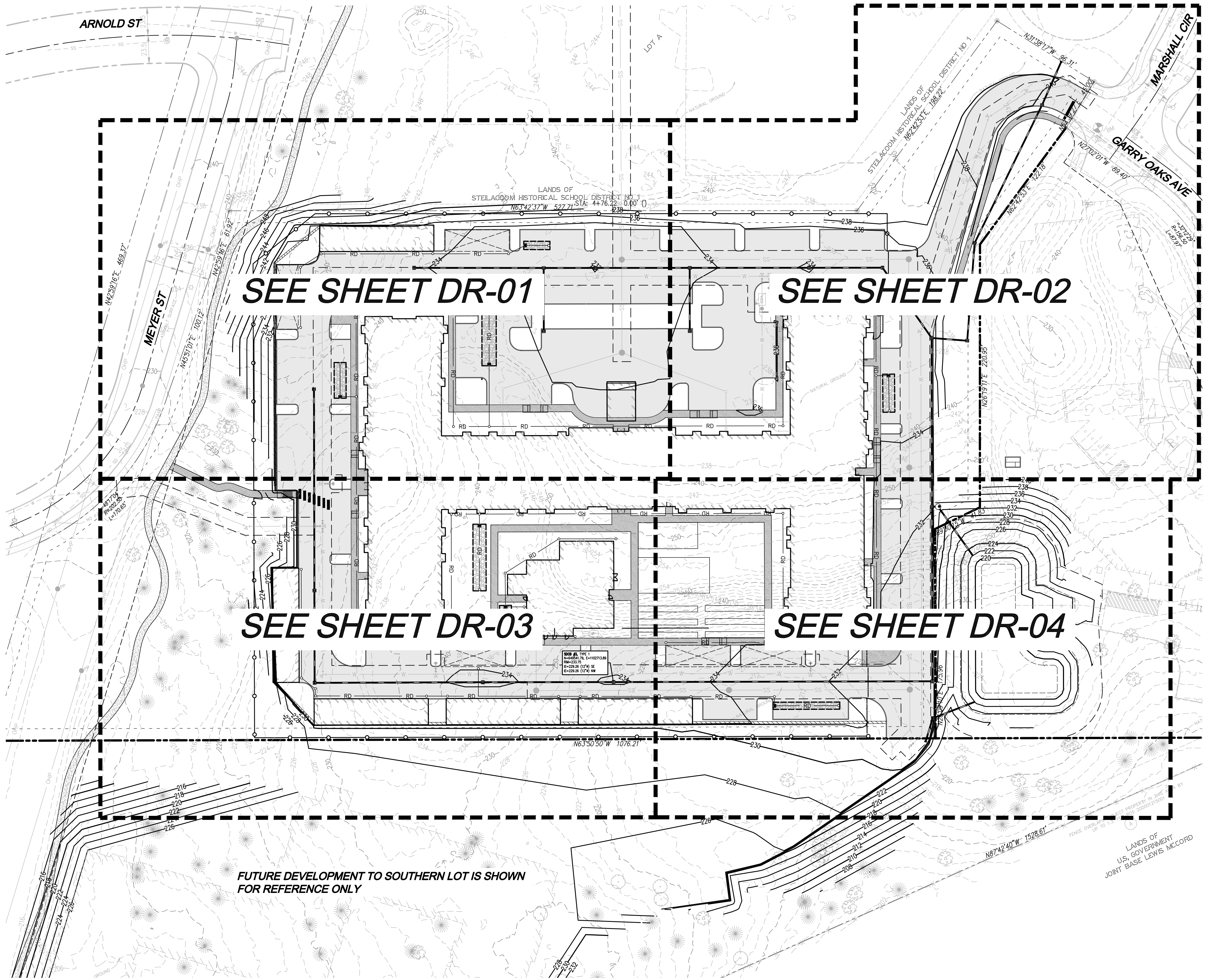
ROSS D. JARVIS
43668
Ross Jarvis
06/21/24

JOB NUMBER:	C24-124
DRAWING NAME:	C24-124 CG-01
DESIGNER:	RW
DRAFTING BY:	AW
DATE:	JUNE 2024
SCALE:	AS SHOWN
JURISDICTION:	DUPONT, WA

CG-06

SHEET 15 OF 28

A PORTION OF SEC 34, TWN 19 N, RGE 1 E, W.M., DUPONT, WASHINGTON



SCALE: 1" = 40'

40' 0 40' 80'

LEGEND

○	PROPOSED STORM DRAIN CLEANOUT PER DETAIL SHOWN ON SHEET DR-06
■	PROPOSED TYPE 1 CATCH BASIN WITH SOLID LID, SEE CITY OF DUPONT STD. 7.4-1
▤	PROPOSED TYPE 1 CATCH BASIN WITH GRATED LID, SEE CITY OF DUPONT STD. 7.4-1
▬	PROPOSED ADS N-12 STORM PIPE (UNLESS OTHERWISE NOTED)
—— RD ——	PROPOSED 6" PVC ASTM D-3034 SDR 35 ROOF DRAIN
▨	PROPOSED DOWNSPOUT INFILTRATION TRENCH PER DETAIL SHOWN ON SHEET DR-06
— — — —	PROPOSED STORMWATER EASEMENT
◀	PROPOSED STORM PIPE FLOW DIRECTION

Call 2 Business Days Before You Dig
811 or 1-800-424-5555
Utilities Underground Location Center

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Drawing: P:\Civil\2024\C24-124 Affinity at DuPont\Drawings\Preliminary\C24-124 DR-01.dwg Plotted: Jun 21, 2024 - 10:59am

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AFFINITY AT DUPONT

OVERALL DRAINAGE PLAN MAP

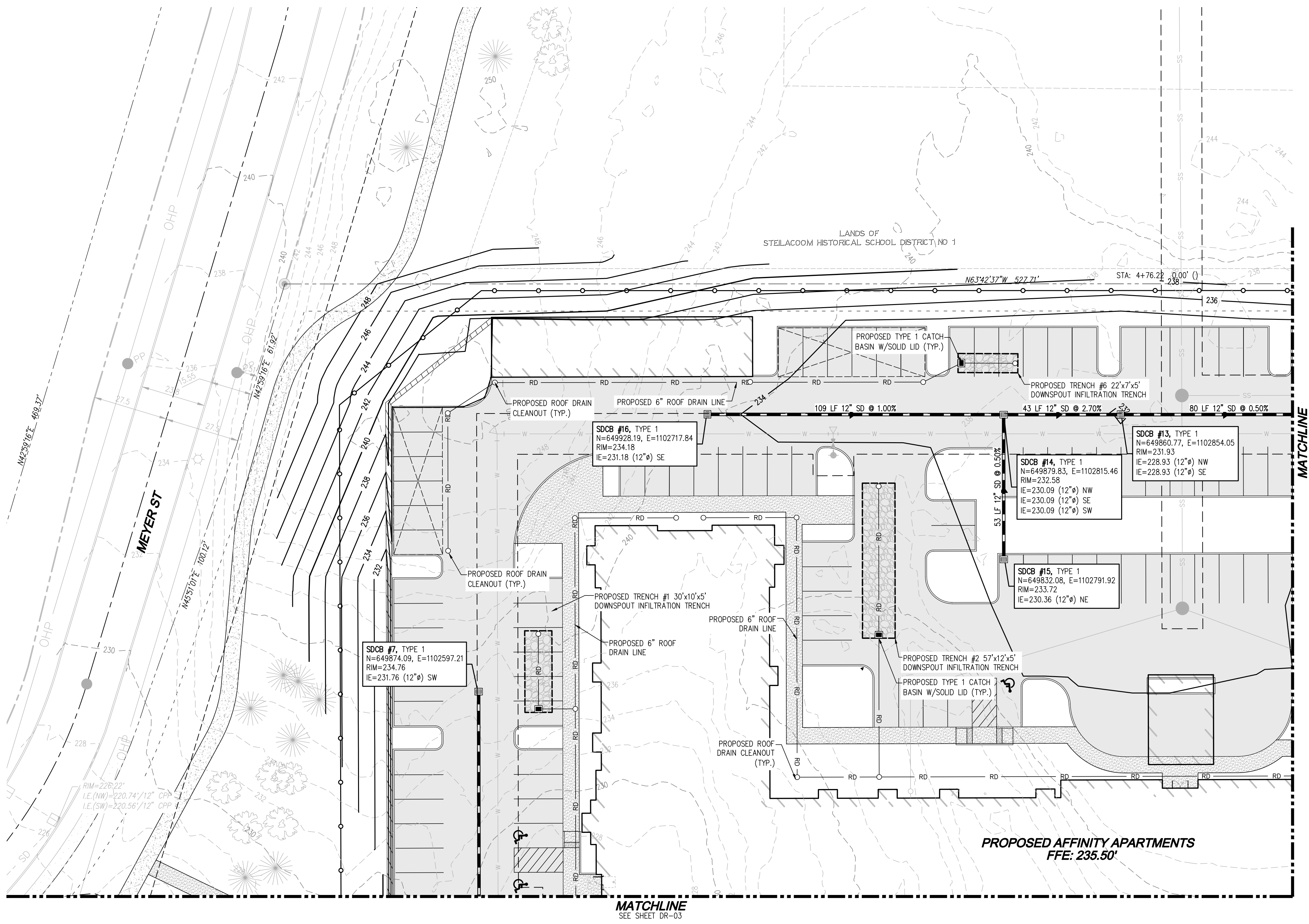
ROSS D. JARVIS
43668
06/21/24

JOB NUMBER:	C24-124
DRAWING NAME:	C24-124 DR-01
DESIGNER:	RW
DRAFTING BY:	AW
DATE:	JUNE 2024
SCALE:	AS SHOWN
JURISDICTION:	DUPONT, WA

DR-00

SHEET 16 OF 28

A PORTION OF SEC 34, TWN 19 N, RGE 1 E, W.M., DUPONT, WASHINGTON



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

LEGEND

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▣	PROPOSED TYPE 1 CATCH BASIN WITH SOLID LID, SEE CITY OF DUPONT STD. 7.4-1
▥	PROPOSED TYPE 1 CATCH BASIN WITH GRATED LID, SEE CITY OF DUPONT STD. 7.4-1
▬	PROPOSED ADS N-12 STORM PIPE (UNLESS OTHERWISE NOTED)
—— RD ——	PROPOSED 6" PVC ASTM D-3034 SDR 35 ROOF DRAIN
▨	PROPOSED DOWNSPOUT INFILTRATION TRENCH PER DETAIL SHOWN ON SHEET DR-06
— — — —	PROPOSED STORMWATER EASEMENT
▶	PROPOSED STORM PIPE FLOW DIRECTION

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INLAND GROUP

AFFINITY AT DUPONT

DRAINAGE PLAN

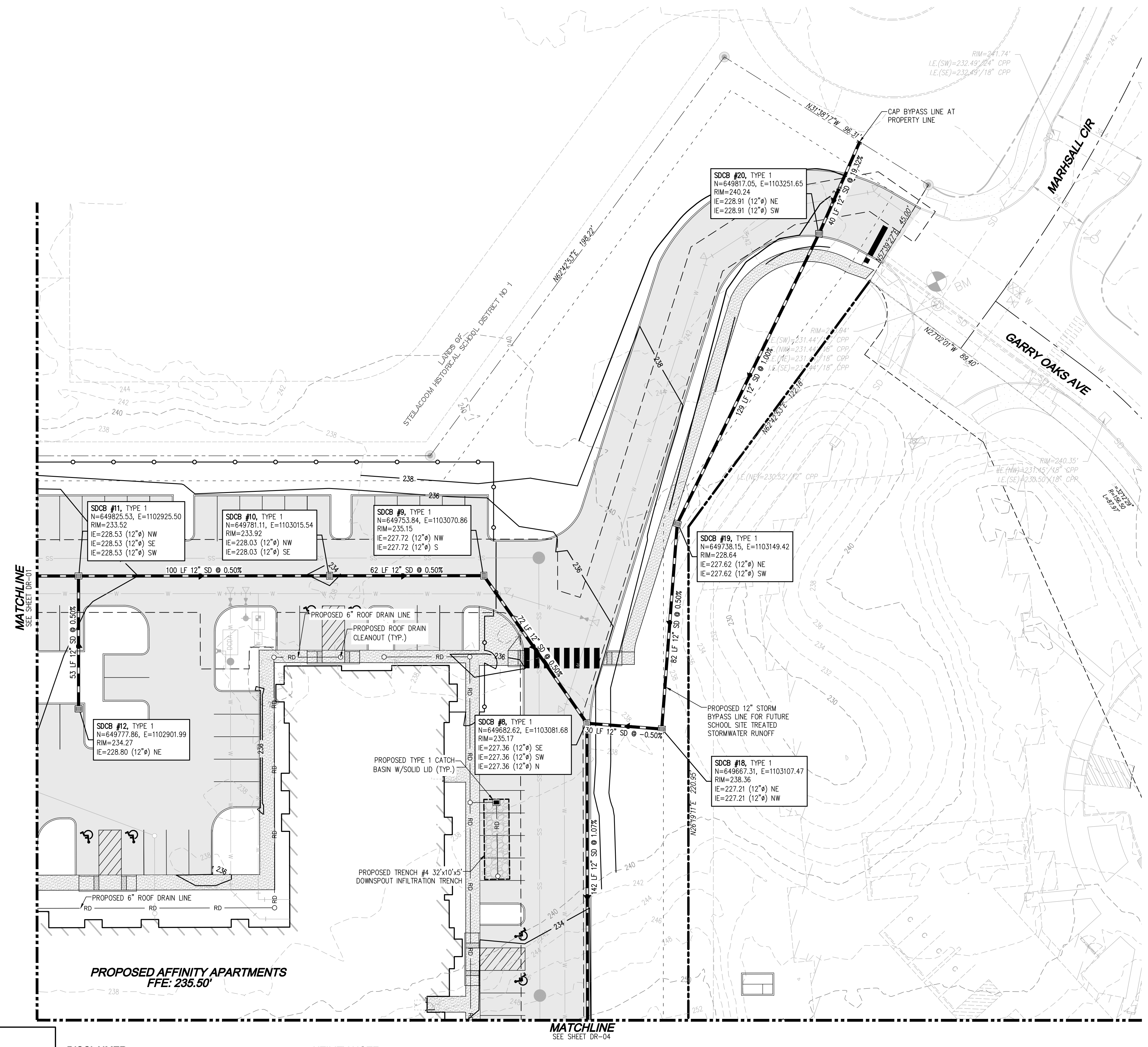
ROSS D. JARVIS
43668
06/21/24

JOB NUMBER:	C24-124
DRAWING NAME:	C24-124 DR-01
DESIGNER:	RW
DRAFTING BY:	AW
DATE:	JUNE 2024
SCALE:	AS SHOWN
JURISDICTION:	DUPONT, WA

DR-01

SHEET 17 OF 28

A PORTION OF SEC 34, TWN 19 N, RGE 1 E, W.M., DUPONT, WASHINGTON



SCALE: 1" = 20'

20' 0 20' 40'

LEGEND

○	PROPOSED STORM DRAIN CLEANOUT PER DETAIL SHOWN ON SHEET DR-06
▣	PROPOSED TYPE 1 CATCH BASIN WITH SOLID LID, SEE CITY OF DUPONT STD. 7.4-1
▥	PROPOSED TYPE 1 CATCH BASIN WITH GRATED LID, SEE CITY OF DUPONT STD. 7.4-1
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▨	PROPOSED DOWNSPOUT INFILTRATION TRENCH PER DETAIL SHOWN ON SHEET DR-06
— — — —	PROPOSED STORMWATER EASEMENT
▶	PROPOSED STORM PIPE FLOW DIRECTION

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INLAND GROUP
AFFINITY AT DUPONT
DRAINAGE PLAN

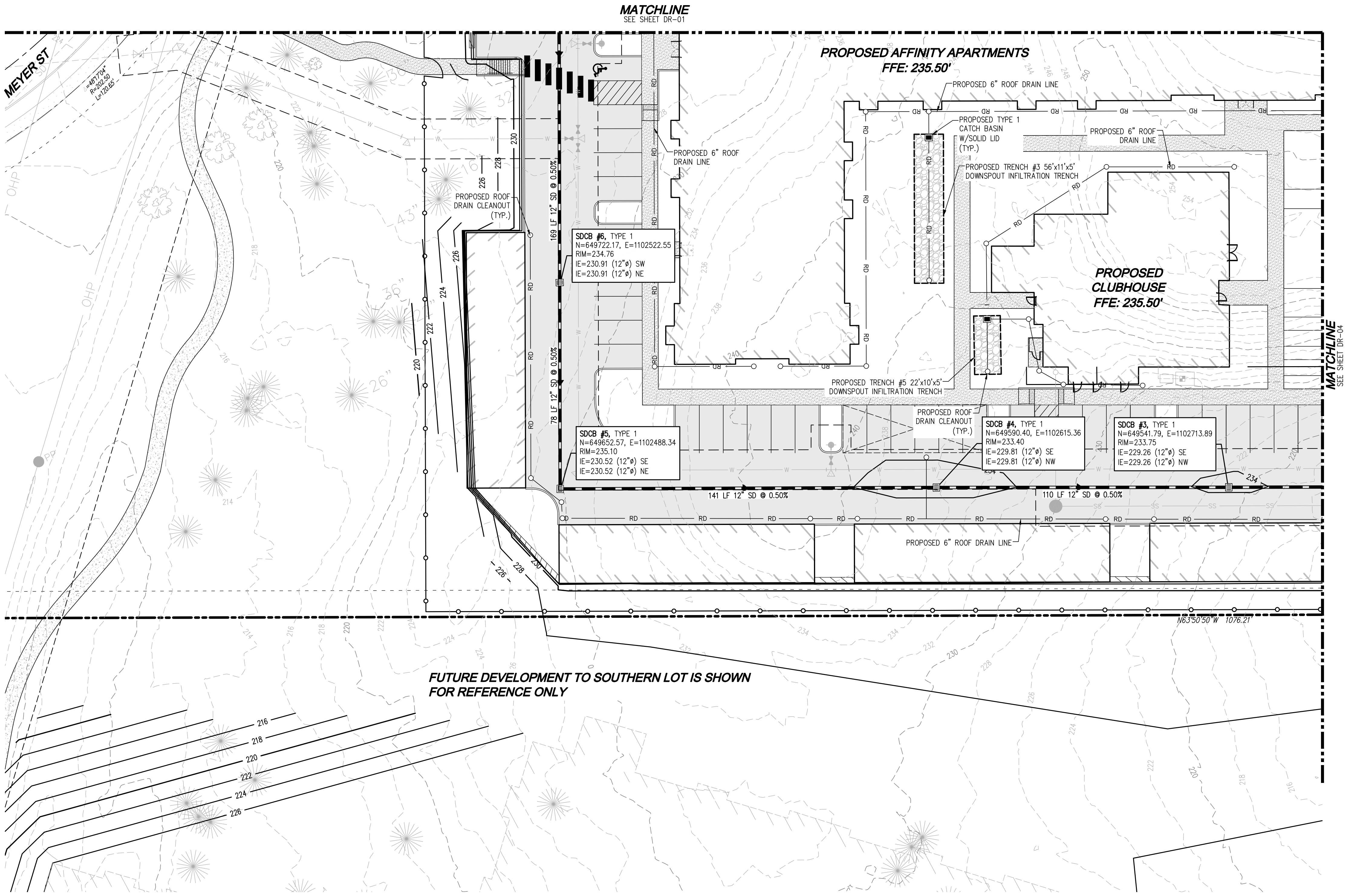
ROSS D. JARVIS
43668
06/21/24

JOB NUMBER:	C24-124
DRAWING NAME:	C24-124 DR-01
DESIGNER:	RW
DRAFTING BY:	AW
DATE:	JUNE 2024
SCALE:	AS SHOWN
JURISDICTION:	DUPONT, WA

DR-02

SHEET 18 OF 28

A PORTION OF SEC 34, TWN 19 N, RGE 1 E, W.M., DUPONT, WASHINGTON



SCALE: 1" = 20'

20' 0 20' 40'

LEGEND

○	PROPOSED STORM DRAIN CLEANOUT PER DETAIL SHOWN ON SHEET DR-06
▣	PROPOSED TYPE 1 CATCH BASIN WITH SOLID LID, SEE CITY OF DUPONT STD. 7.4-1
▥	PROPOSED TYPE 1 CATCH BASIN WITH GRATED LID, SEE CITY OF DUPONT STD. 7.4-1
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— — —	PROPOSED STORMWATER EASEMENT
▶	PROPOSED STORM PIPE FLOW DIRECTION

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INLAND GROUP

AFFINITY AT DUPONT

DRAINAGE PLAN

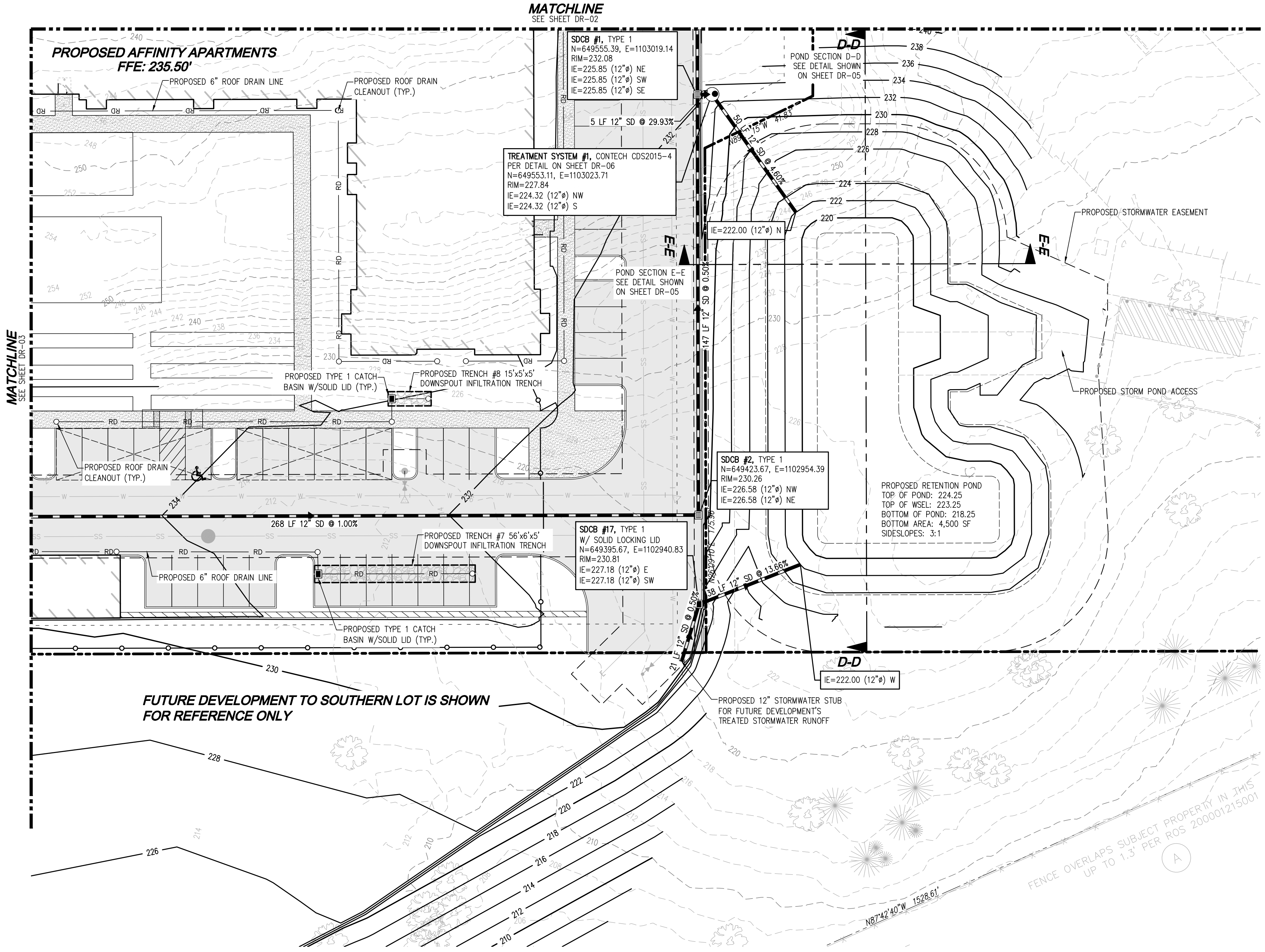
ROSS D. JARVIS
43668
06/21/24

JOB NUMBER:	C24-124
DRAWING NAME:	C24-124 DR-01
DESIGNER:	RW
DRAFTING BY:	AW
DATE:	JUNE 2024
SCALE:	AS SHOWN
JURISDICTION:	DUPONT, WA

DR-03

SHEET **19** OF **28**

A PORTION OF SEC 34, TWN 19 N, RGE 1 E, W.M., DUPONT, WASHINGTON



SCALE: 1" = 20'

20' 0 20' 40'

LEGEND

○	PROPOSED STORM DRAIN CLEANOUT PER DETAIL SHOWN ON SHEET DR-06
▣	PROPOSED TYPE 1 CATCH BASIN WITH SOLID LID, SEE CITY OF DUPONT STD. 7.4-1
▥	PROPOSED TYPE 1 CATCH BASIN WITH GRATED LID, SEE CITY OF DUPONT STD. 7.4-1
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INLAND GROUP

AFFINITY AT DUPONT

DRAINAGE PLAN

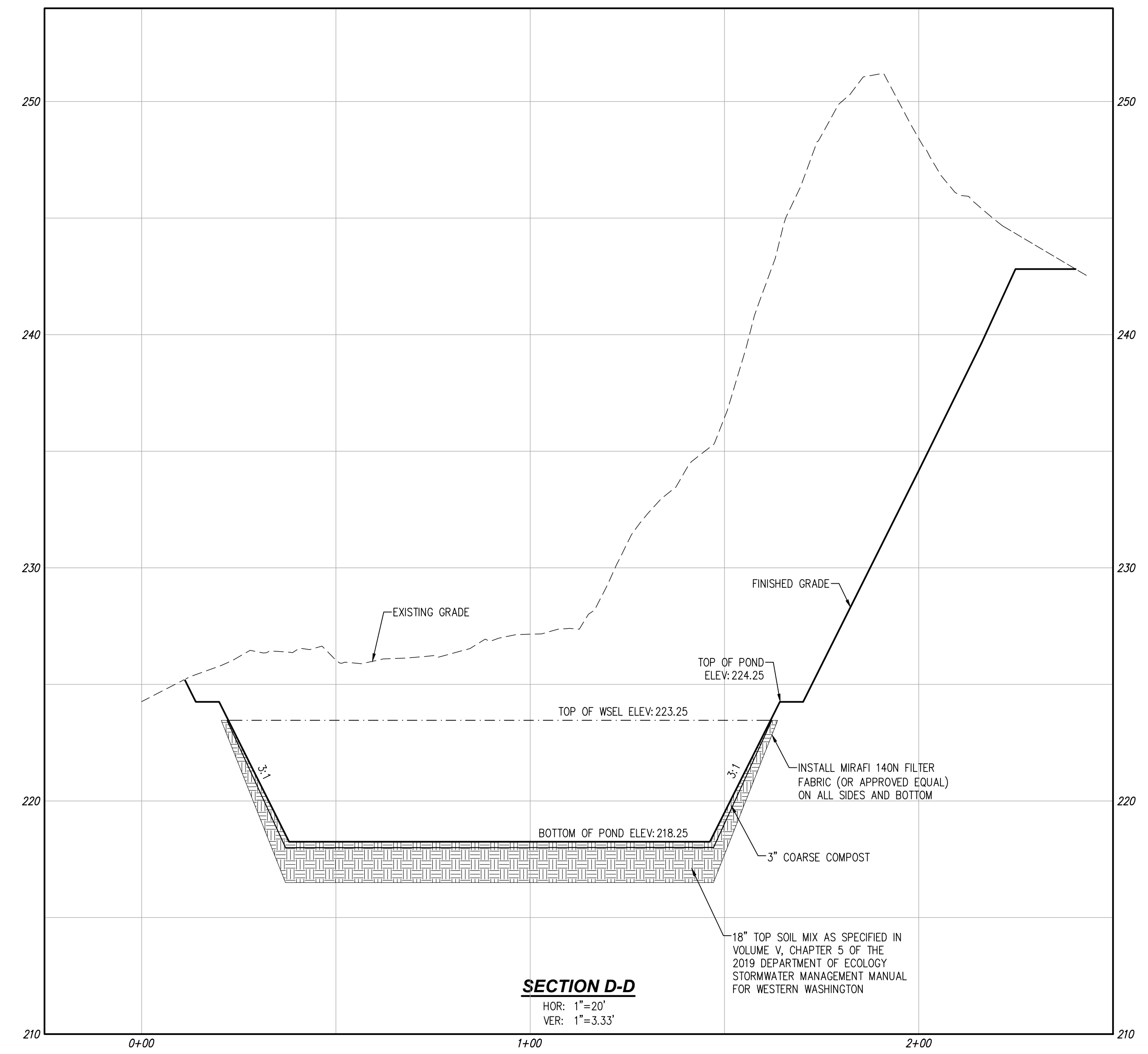
ROSS D. JARVIS
43668
06/21/24

JOB NUMBER:	C24-124
DRAWING NAME:	C24-124 DR-01
DESIGNER:	RW
DRAFTING BY:	AW
DATE:	JUNE 2024
SCALE:	AS SHOWN
JURISDICTION:	DUPONT, WA

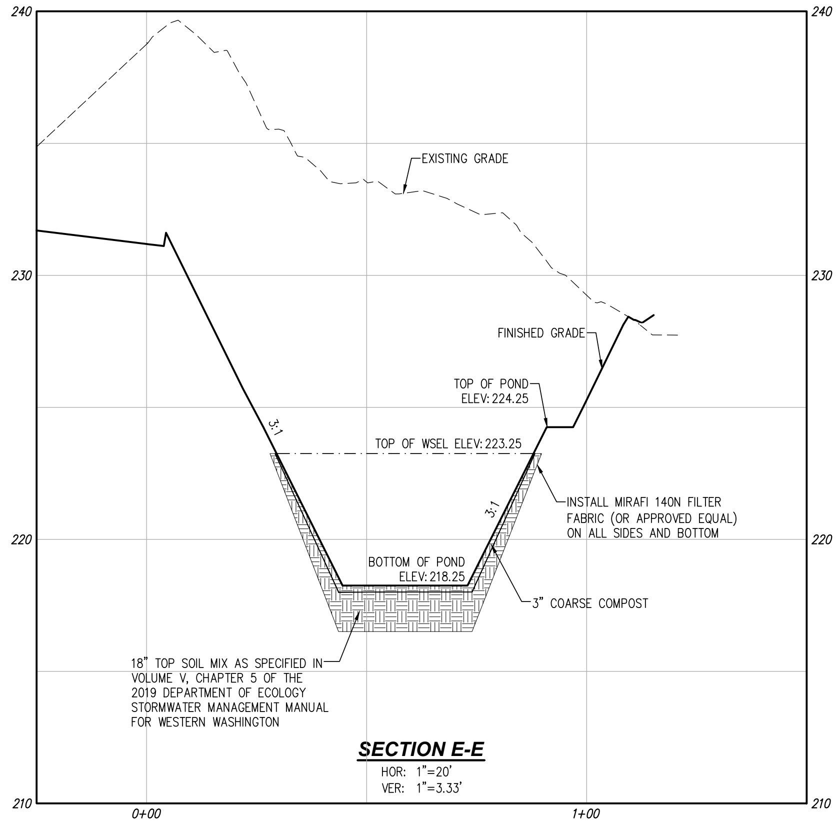
DR-04

SHEET 20 OF 28

A PORTION OF SEC 34, TWN 19 N, RGE 1 E, W.M., DUPONT, WASHINGTON



RETENTION POND SECTION D-D



RETENTION POND SECTION E-E

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Tumwater, WA 98501
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INLAND GROUP

AFFINITY AT DUPONT

STORMWATER RETENTION POND SECTIONS

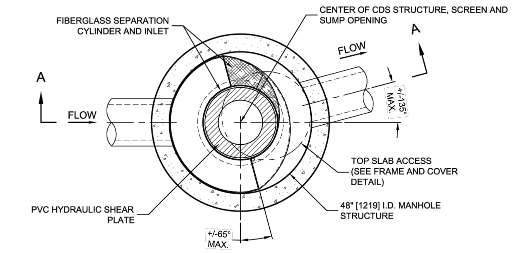
ROSS D. JARVIS
43668
06/21/24

JOB NUMBER:	C24-124
DRAWING NAME:	C24-124 DR-01
DESIGNER:	RW
DRAFTING BY:	AW
DATE:	JUNE 2024
SCALE:	AS SHOWN
JURISDICTION:	DUPONT, WA

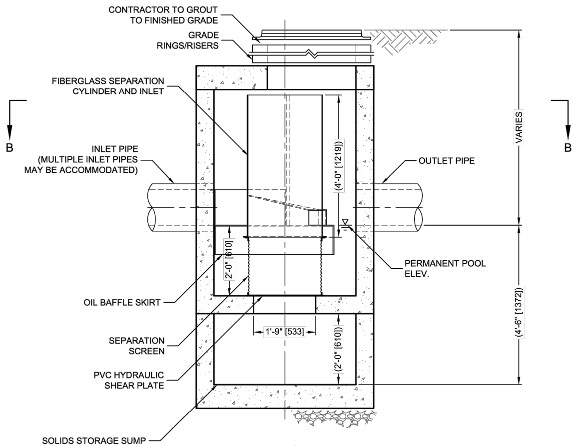
DR-05

SHEET **21** OF **28**

C:\USERS\SCHLACHTERH\DESKTOP\CDS DETAILS 180 MICRON SIZING\ACAD\CDS2015-4-C-DTL.DWG 5/19/2014 5:16 PM



PLAN VIEW B-B
N.T.S.



ELEVATION A-A
N.T.S.

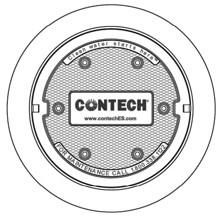
THIS PRODUCT MAY BE PROTECTED BY ONE OR MORE OF THE FOLLOWING U.S. PATENTS: 5,788,848; 6,641,720; 6,511,595; 6,581,783; RELATED FOREIGN PATENTS, OR OTHER PATENTS PENDING.

CDS2015-4-C DESIGN NOTES

THE STANDARD CDS2015-4-C CONFIGURATION IS SHOWN. ALTERNATE CONFIGURATIONS ARE AVAILABLE AND ARE LISTED BELOW. SOME CONFIGURATIONS MAY BE COMBINED TO SUIT SITE REQUIREMENTS.

CONFIGURATION DESCRIPTION
GRATED INLET ONLY (NO INLET PIPE)
GRATED INLET WITH INLET PIPE OR PIPES
CURB INLET ONLY (NO INLET PIPE)
CURB INLET WITH INLET PIPE OR PIPES
SEPARATE OIL BAFFLE (SINGLE INLET PIPE REQUIRED FOR THIS CONFIGURATION)
SEDIMENT WEIR FOR NJDEP / NJCAT CONFORMING UNITS

SOLID LID WITH INLET PIPE



FRAME AND COVER
(DIAMETER VARIES)
N.T.S.

SITE SPECIFIC DATA REQUIREMENTS

STRUCTURE ID			
WATER QUALITY FLOW RATE (CFS OR L/s)			0.5916
PEAK FLOW RATE (CFS OR L/s)			6.614
RETURN PERIOD OF PEAK FLOW (YRS)			100
SCREEN APERTURE (2400 OR 4700)			*
PIPE DATA:	I.E.	MATERIAL	DIAMETER
INLET PIPE 1	224.32	ADS N-12	12"
INLET PIPE 2	*	*	*
OUTLET PIPE	224.32	ADS N-12	12"
RIM ELEVATION			12"
ANTI-FLOTATION BALLAST		WIDTH	HEIGHT
		*	*

NOTES/SPECIAL REQUIREMENTS:

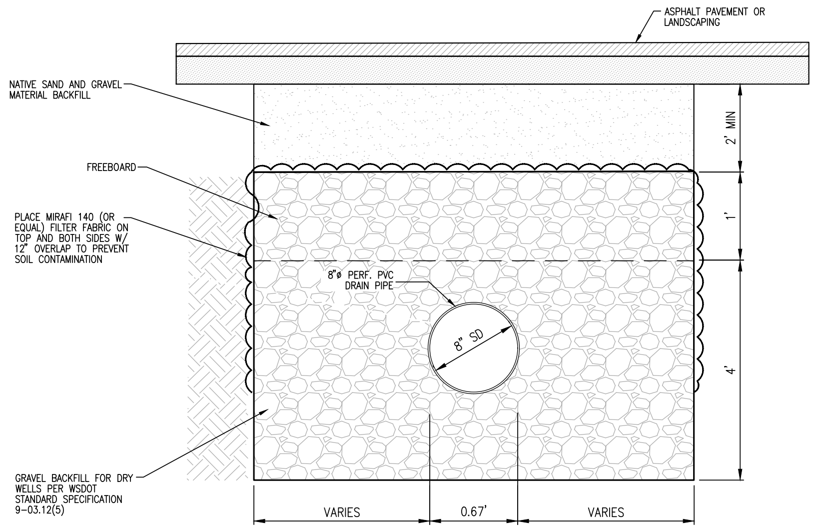
* PER ENGINEER OF RECORD

GENERAL NOTES
1. CONTECH TO PROVIDE ALL MATERIALS UNLESS NOTED OTHERWISE.
2. DIMENSIONS MARKED WITH ( ) ARE REFERENCE DIMENSIONS. ACTUAL DIMENSIONS MAY VARY.
3. FOR FABRICATION DRAWINGS WITH DETAILED STRUCTURE DIMENSIONS AND WEIGHTS, PLEASE CONTACT YOUR CONTECH ENGINEERED SOLUTIONS LLC REPRESENTATIVE. www.contechES.com
4. CDS WATER QUALITY STRUCTURE SHALL BE IN ACCORDANCE WITH ALL DESIGN DATA AND INFORMATION CONTAINED IN THIS DRAWING.
5. STRUCTURE SHALL MEET AASHTO HS20 AND CASTINGS SHALL MEET HS20 (AASHTO M 306) LOAD RATING, ASSUMING GROUNDWATER ELEVATION AT, OR BELOW, THE OUTLET PIPE INVERT ELEVATION. ENGINEER OF RECORD TO CONFIRM ACTUAL GROUNDWATER ELEVATION.
6. PVC HYDRAULIC SHEAR PLATE IS PLACED ON SHELF AT BOTTOM OF SCREEN CYLINDER. REMOVE AND REPLACE AS NECESSARY DURING MAINTENANCE CLEANING.

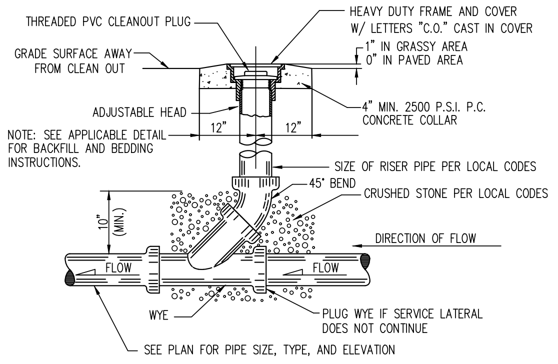
INSTALLATION NOTES
A. ANY SUB-BASE, BACKFILL DEPTH, AND/OR ANTI-FLOTATION PROVISIONS ARE SITE-SPECIFIC DESIGN CONSIDERATIONS AND SHALL BE SPECIFIED BY ENGINEER OF RECORD.
B. CONTRACTOR TO PROVIDE EQUIPMENT WITH SUFFICIENT LIFTING AND REACH CAPACITY TO LIFT AND SET THE CDS MANHOLE STRUCTURE (LIFTING CLUTCHES PROVIDED).
C. CONTRACTOR TO ADD JOINT SEALANT BETWEEN ALL STRUCTURE SECTIONS, AND ASSEMBLE STRUCTURE.
D. CONTRACTOR TO PROVIDE, INSTALL, AND GROUT PIPES. MATCH PIPE INVERTS WITH ELEVATIONS SHOWN.
E. CONTRACTOR TO TAKE APPROPRIATE MEASURES TO ASSURE UNIT IS WATER TIGHT, HOLDING WATER TO FLOWLINE INVERT MINIMUM. IT IS SUGGESTED THAT ALL JOINTS BELOW PIPE INVERTS ARE GROUTED.

CONTECH
ENGINEERED SOLUTIONS LLC
www.contechES.com
9025 Centre Pointe Dr., Suite 400, West Chester, OH 45069
800-338-1122 513-645-7000 513-645-7993 FAX

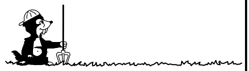
CDS2015-4-C
INLINE CDS
STANDARD DETAIL



DOWNSPOUT INFILTRATION TRENCH SECTION
NOT TO SCALE



ROOF DRAIN CLEANOUT
NOT TO SCALE



Call 2 Business Days Before You Dig
811 or 1-800-424-5555
Utilities Underground Location Center

DISCLAIMER

TOPOGRAPHIC SURVEY INFORMATION CONTAINED ON THESE PLANS HAS BEEN PROVIDED BY DURYEA & ASSOC. LDC, INC. (LAND DEVELOPMENT CONSULTANTS, INC.) ASSUMES NO LIABILITY AS TO THE ACCURACY AND COMPLETENESS OF THIS DATA. ANY DISCREPANCIES FOUND BETWEEN WHAT IS SHOWN ON THE PLANS AND WHAT IS NOTED IN THE FIELD SHOULD BE BROUGHT IMMEDIATELY TO THE ATTENTION OF THE ENGINEER.

UTILITY NOTE

THE CONTRACTOR SHALL VERIFY THE LOCATION OF ALL EXISTING UTILITIES PRIOR TO ANY CONSTRUCTION. AGENCIES INVOLVED SHALL BE NOTIFIED WITHIN A REASONABLE TIME PRIOR TO THE START OF CONSTRUCTION.

Drawing: P:\Civil\2024\C24-124 Affinity at DuPont\Drawings\Preliminary\C24-124 DR-01.dwg Plotted: Jun 21, 2024 - 11:00am

REVISIONS			
NO.	DATE	DESCRIPTION	BY

LDC
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INLAND GROUP

AFFINITY AT DUPONT

DRAINAGE NOTES AND DETAILS

ROSS D. JARVIS
43668
06/21/24

JOB NUMBER:	C24-124
DRAWING NAME:	C24-124 DR-01
DESIGNER:	RW
DRAFTING BY:	AW
DATE:	JUNE 2024
SCALE:	AS SHOWN
JURISDICTION:	DUPONT, WA

DR-06

SHEET 22 OF 28

APPENDIX 5

GEOTECHNICAL REPORT

Earth Solutions NW LLC

Geotechnical Engineering
Construction Observation/Testing
Environmental Services

GEOTECHNICAL ENGINEERING STUDY
PATRIOTS LANDING – SCHOOL SITE AND MORNINGSIDE SITE SOUTHWEST OF MCNEIL STREET AND MARSHALL CIRCLE
DUPONT, WASHINGTON

ES-7005.01

15365 N.E. 90th Street, Suite 100   Redmond, WA 98052
(425) 449-4704   Fax (425) 449-4711
www.earthsolutionsnw.com

PREPARED FOR

CAREAGE CONSTRUCTION, INC.

June 16, 2022

19110613

06/16/2022

Chase G. Halsen

Chase G. Halsen, L.G.
Senior Project Geologist

KEVEN D. HOFFMANN

53734

06/16/2022

Keven D. Hoffmann, P.E.
Associate Principal Engineer

GEOTECHNICAL ENGINEERING STUDY
PATRIOTS LANDING – SCHOOL SITE AND MORNINGSIDE SITE
SOUTHWEST OF MCNEIL STREET AND MARSHALL CIRCLE
DUPONT, WASHINGTON

ES-7005.01

Earth Solutions NW, LLC
15365 Northeast 90th Street, Suite 100
Redmond, Washington 98052
Phone: 425-449-4704 | Fax: 425-449-4711
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Important Information about This

Geotechnical-Engineering Report

Subsurface problems are a principal cause of construction delays, cost overruns, claims, and disputes.

While you cannot eliminate all such risks, you can manage them. The following information is provided to help.

The Geoprofessional Business Association (GBA) has prepared this advisory to help you – assumedly a client representative – interpret and apply this geotechnical-engineering report as effectively as possible. In that way, you can benefit from a lowered exposure to problems associated with subsurface conditions at project sites and development of them that, for decades, have been a principal cause of construction delays, cost overruns, claims, and disputes. If you have questions or want more information about any of the issues discussed herein, contact your GBA-member geotechnical engineer. Active engagement in GBA exposes geotechnical engineers to a wide array of risk-confrontation techniques that can be of genuine benefit for everyone involved with a construction project.

Understand the Geotechnical-Engineering Services Provided for this Report

Geotechnical-engineering services typically include the planning, collection, interpretation, and analysis of exploratory data from widely spaced borings and/or test pits. Field data are combined with results from laboratory tests of soil and rock samples obtained from field exploration (if applicable), observations made during site reconnaissance, and historical information to form one or more models of the expected subsurface conditions beneath the site. Local geology and alterations of the site surface and subsurface by previous and proposed construction are also important considerations. Geotechnical engineers apply their engineering training, experience, and judgment to adapt the requirements of the prospective project to the subsurface model(s). Estimates are made of the subsurface conditions that will likely be exposed during construction as well as the expected performance of foundations and other structures being planned and/or affected by construction activities.

The culmination of these geotechnical-engineering services is typically a geotechnical-engineering report providing the data obtained, a discussion of the subsurface model(s), the engineering and geologic engineering assessments and analyses made, and the recommendations developed to satisfy the given requirements of the project. These reports may be titled investigations, explorations, studies, assessments, or evaluations. Regardless of the title used, the geotechnical-engineering report is an engineering interpretation of the subsurface conditions within the context of the project and does not represent a close examination, systematic inquiry, or thorough investigation of all site and subsurface conditions.

Geotechnical-Engineering Services are Performed for Specific Purposes, Persons, and Projects, and At Specific Times

Geotechnical engineers structure their services to meet the specific needs, goals, and risk management preferences of their clients. A geotechnical-engineering study conducted for a given civil engineer will not likely meet the needs of a civil-works constructor or even a different civil engineer. Because each geotechnical-engineering study is unique, each geotechnical-engineering report is unique, prepared *solely* for the client.

Likewise, geotechnical-engineering services are performed for a specific project and purpose. For example, it is unlikely that a geotechnical-engineering study for a refrigerated warehouse will be the same as one prepared for a parking garage; and a few borings drilled during a preliminary study to evaluate site feasibility will not be adequate to develop geotechnical design recommendations for the project.

Do not rely on this report if your geotechnical engineer prepared it:

- for a different client;
- for a different project or purpose;
- for a different site (that may or may not include all or a portion of the original site); or
- before important events occurred at the site or adjacent to it; e.g., man-made events like construction or environmental remediation, or natural events like floods, droughts, earthquakes, or groundwater fluctuations.

Note, too, the reliability of a geotechnical-engineering report can be affected by the passage of time, because of factors like changed subsurface conditions; new or modified codes, standards, or regulations; or new techniques or tools. *If you are the least bit uncertain* about the continued reliability of this report, contact your geotechnical engineer before applying the recommendations in it. A minor amount of additional testing or analysis after the passage of time – if any is required at all – could prevent major problems.

Read this Report in Full

Costly problems have occurred because those relying on a geotechnical-engineering report did not read the report in its entirety. Do not rely on an executive summary. Do not read selective elements only. *Read and refer to the report in full.*

You Need to Inform Your Geotechnical Engineer About Change

Your geotechnical engineer considered unique, project-specific factors when developing the scope of study behind this report and developing the confirmation-dependent recommendations the report conveys. Typical changes that could erode the reliability of this report include those that affect:

- the site's size or shape;
- the elevation, configuration, location, orientation, function or weight of the proposed structure and the desired performance criteria;
- the composition of the design team; or
- project ownership.

As a general rule, *always* inform your geotechnical engineer of project or site changes – even minor ones – and request an assessment of their impact. *The geotechnical engineer who prepared this report cannot accept* *responsibility or liability for problems that arise because the geotechnical engineer was not informed about developments the engineer otherwise would have considered.*

Most of the "Findings" Related in This Report Are Professional Opinions

Before construction begins, geotechnical engineers explore a site's subsurface using various sampling and testing procedures. *Geotechnical engineers can observe actual subsurface conditions only at those specific locations where sampling and testing is performed.* The data derived from that sampling and testing were reviewed by your geotechnical engineer, who then applied professional judgement to form opinions about subsurface conditions throughout the site. Actual sitewide-subsurface conditions may differ – maybe significantly – from those indicated in this report. Confront that risk by retaining your geotechnical engineer to serve on the design team through project completion to obtain informed guidance quickly, whenever needed.

This Report's Recommendations Are Confirmation-Dependent

The recommendations included in this report – including any options or alternatives – are confirmation-dependent. In other words, they are <u>not</u> final, because the geotechnical engineer who developed them relied heavily on judgement and opinion to do so. Your geotechnical engineer can finalize the recommendations *only after observing actual subsurface conditions* exposed during construction. If through observation your geotechnical engineer confirms that the conditions assumed to exist actually do exist, the recommendations can be relied upon, assuming no other changes have occurred. *The geotechnical engineer who prepared this report cannot assume responsibility or liability for confirmation-dependent recommendations if you fail to retain that engineer to perform construction observation.*

This Report Could Be Misinterpreted

Other design professionals' misinterpretation of geotechnical-engineering reports has resulted in costly problems. Confront that risk by having your geotechnical engineer serve as a continuing member of the design team, to:

- confer with other design-team members;
- help develop specifications;
- review pertinent elements of other design professionals' plans and specifications; and
- be available whenever geotechnical-engineering guidance is needed.

You should also confront the risk of constructors misinterpreting this report. Do so by retaining your geotechnical engineer to participate in prebid and preconstruction conferences and to perform construction-phase observations.

Give Constructors a Complete Report and Guidance

Some owners and design professionals mistakenly believe they can shift unanticipated-subsurface-conditions liability to constructors by limiting the information they provide for bid preparation. To help prevent the costly, contentious problems this practice has caused, include the complete geotechnical-engineering report, along with any attachments or appendices, with your contract documents, *but be certain to note conspicuously that you've included the material for information purposes only.* To avoid misunderstanding, you may also want to note that "informational purposes" means constructors have no right to rely on the interpretations, opinions, conclusions, or recommendations in the report. Be certain that constructors know they may learn about specific project requirements, including options selected from the report, *only* from the design drawings and specifications. Remind constructors that they may perform their own studies if they want to, and *be sure to allow enough time* to permit them to do so. Only then might you be in a position to give constructors the information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions. Conducting prebid and preconstruction conferences can also be valuable in this respect.

Read Responsibility Provisions Closely

Some client representatives, design professionals, and constructors do not realize that geotechnical engineering is far less exact than other engineering disciplines. This happens in part because soil and rock on project sites are typically heterogeneous and not manufactured materials with well-defined engineering properties like steel and concrete. That lack of understanding has nurtured unrealistic expectations that have resulted in disappointments, delays, cost overruns, claims, and disputes. To confront that risk, geotechnical engineers commonly include explanatory provisions in their reports. Sometimes labeled "limitations," many of these provisions indicate where geotechnical engineers' responsibilities begin and end, to help others recognize their own responsibilities and risks. *Read these provisions closely.* Ask questions. Your geotechnical engineer should respond fully and frankly.

Geoenvironmental Concerns Are <u>Not</u> Covered

The personnel, equipment, and techniques used to perform an environmental study – e.g., a "phase-one" or "phase-two" environmental site assessment – differ significantly from those used to perform a geotechnical-engineering study. For that reason, a geotechnical-engineering report does not usually provide environmental findings, conclusions, or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. *Unanticipated subsurface environmental problems have led to project failures.* If you have not obtained your own environmental information about the project site, ask your geotechnical consultant for a recommendation on how to find environmental risk-management guidance.

Obtain Professional Assistance to Deal with Moisture Infiltration and Mold

While your geotechnical engineer may have addressed groundwater, water infiltration, or similar issues in this report, the engineer's services were not designed, conducted, or intended to prevent migration of moisture – including water vapor – from the soil through building slabs and walls and into the building interior, where it can cause mold growth and material-performance deficiencies. Accordingly, ***proper implementation of the geotechnical engineer's recommendations will <u>not</u> of itself be sufficient to prevent moisture infiltration. Confront the risk of moisture infiltration*** by including building-envelope or mold specialists on the design team. ***Geotechnical engineers are <u>not</u> building-envelope or mold specialists.***

GEOPROFESSIONAL
BUSINESS
ASSOCIATION

Telephone: 301/565-2733
e-mail: info@geoprofessional.org www.geoprofessional.org

Earth Solutions NW LLC

Earth Solutions NW LLC
Geotechnical Engineering, Construction
Observation/Testing and Environmental Services

June 16, 2022
ES-7005.01

Careage Construction, Inc.
4411 Point Fosdick Drive, Suite 203
Gig Harbor, Washington 98335

Attention: Mr. Mike Campeau

Greetings, Mr. Campeau:

Earth Solutions NW, LLC (ESNW), is pleased to present this geotechnical report to support the proposed project. Based on the results of our investigation, construction of the proposed school and residential development is feasible from a geotechnical standpoint. Our study indicates the site is underlain by gravelly recessional outwash deposits. ESNW did not encounter groundwater at the exploration locations during the February 2022 fieldwork.

Based on our findings, the proposed school and multi-family residential structures may be constructed on conventional continuous and spread footing foundations bearing upon competent native soil, recompacted native soil, or new structural fill placed directly on competent native soil. Competent native soil considered suitable for support of the proposed structures will likely be encountered beginning at a depth of about two to four feet below existing grades across most of the site. Where loose or unsuitable soil conditions are exposed at foundation subgrade elevations, compaction of the soil to the specifications of structural fill or overexcavation and replacement with suitable structural fill will be necessary.

A large strippings pile is present within the central portion of the site and will need to be removed prior to mass grading activities and placement of structural fill in the area. The potential of re-utilizing the stripping pile as structural fill is discussed in this report.

From a geotechnical standpoint, infiltration into the native recessional outwash is feasible. A further discussion of infiltration feasibility and design considerations are provided in this report.

Pertinent geotechnical recommendations are provided in this study. We appreciate the opportunity to be of service to you on this project. If you have any questions regarding the content of this geotechnical engineering study, please call.

Sincerely,

EARTH SOLUTIONS NW, LLC

Chase G. Halsen, L.G.
Senior Project Geologist

15365 N.E. 90th Street, Suite 100 • Redmond, WA 98052 • (425) 449-4704 • FAX (425) 449-4711

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ES-7005.01

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ES-7005.01

GEOTECHNICAL ENGINEERING STUDY
PATRIOTS LANDING – SCHOOL SITE AND MORNINGSIDE SITE
SOUTHWEST OF MCNEIL STREET AND MARSHALL CIRCLE
DUPONT, WASHINGTON

ES-7005.01

INTRODUCTION

General

This geotechnical engineering study (study) was prepared for the proposed residential and school development to be constructed southwest of the McNeil Street and Marshall Circle intersection, in DuPont, Washington. This study was prepared to provide geotechnical recommendations for currently proposed development plans and included the following geotechnical services:

- Test pits to characterize soil and groundwater conditions.
- Laboratory testing of representative soil samples collected at the test pit locations.
- Geotechnical engineering analyses.

The following documents and maps were reviewed as part of our study preparation:

- Online Web Soil Survey (WSS) resource, maintained by the Natural Resources Conservation Service under the United States Department of Agriculture (USDA).
- Geologic Map of the Nisqually Quadrangle, Washington, by Henry W. Schasse et al., 2003.
- Patriots Landing Site Plan, prepared by ESM Consulting Engineers, LLC, Job No. 845-021-017, dated September 10, 2021.
- DuPont Municipal Code (DMC) Chapter 25.105 – Critical Areas.
- Stormwater Management Manual for Western Washington, prepared by the Washington State Department of Ecology, amended December 2014.

Project Description

We understand the project is pursuing to divide the existing parcel for two purposes: the northern proposed parcel (referred to as the “School Site” herein) will be developed with a school and will total approximately 10 acres, and the southern proposed parcel (referred to as the “Morningside Site” herein) will be developed for residential purposes and will total about 14.6 acres. For clarity, any further reference to “subject site” within this report will pertain to both the School Site and Morningside Site, unless stated otherwise. Site ingress and egress will be provided from McNeil Street and Marshall Circle, while continuation of existing right-of-way areas associated with the westerly adjacent residential development may also provide local access to the property. We presume the project will utilize infiltration to the extent feasible.

At the time of report submission, site plans (including layout, grading, and building load plans) were not available for review; however, based on our experience with similar developments, the proposed residential structures will likely be two to three stories and constructed using relatively lightly loaded wood framing supported on conventional foundations. Perimeter footing loads are expected to be about 2 to 3 kips per lineal foot (klf) for these structures. The proposed school building(s) will presumably utilize concrete masonry units or concrete tilt-up panels supported on a conventional foundation system, with perimeter footing loads on the order of 3 to 5 klf. Slab-on-grade loading is anticipated to be approximately 150 pounds per square foot (psf). Grade cuts and/or fills of up to about 10 feet are expected to achieve design elevations for the Morningside Site. Lesser grading activities will likely be required across the School Site given that existing elevations are relatively level in the area. Deeper excavations may be required to install utilities and construct stormwater management facilities.

If the above design assumptions either change or are incorrect, ESNW should be contacted to review the recommendations provided in this report. ESNW should review final designs to confirm that appropriate geotechnical recommendations have been incorporated into the plans.

SITE CONDITIONS

Surface

The subject site is located at the southwest corner of the intersection between McNeil Street and Marshall Circle, in DuPont, Washington. The approximate site location is depicted on Plate 1 (Vicinity Map). The roughly rectangular site consists of Pierce County Parcel No. 011934-1004, totaling about 24.6 acres.

The site is bordered to the north by McNeil Street, to the east by Marshall Circle and undeveloped land, to the south by Eagle’s Pride Golf Course (associated with Joint Base Lewis-McChord), and to the west by residential development. The site is currently undeveloped; however, review of historical aerial photography indicates the northern site area has been previously subjected to some clearing and earthwork operations. Vegetation consists primarily of brush within the northern site half and forest-like growth within the southern site half. Site topography generally descends to the south with about 45 to 50 feet of elevation change occurring across the site. Topographic change is nonuniform; the northern site area is relatively flat with about five feet of topographic relief, while the southern site area possesses various sloping areas and about 40 feet of elevation change.

A large mound is present within the central site area and interrupts the natural topographic change across the site. Based on our field investigation (as summarized below), the mound is a topsoil stripping stockpile. Herein, the mound will be referred to as the “central strippings stockpile”.

Subsurface

An ESNW representative observed, logged, and sampled the excavation of 19 test pits within readily accessible areas of the property, on February 16, 2022. The test pits were excavated using a trackhoe and operator retained by ESNW. The approximate locations of the test pits are depicted on Plate 2 (Test Pit Location Plan). Please refer to the test pit logs provided in Appendix A for a more detailed description of the encountered subsurface conditions. Representative soil samples collected at the test pit locations were analyzed in accordance with both Unified Soil Classification System (USCS) and USDA methods and procedures.

Topsoil and Fill

Topsoil was encountered at 16 of the test pit locations, generally within the upper 1 to 18 inches of existing grades, with an estimated average topsoil thickness of eight inches. The topsoil was characterized by a dark brown color, the presence of fine organic material, and small root intrusions. Relic topsoil horizons were encountered underlying the existing fill at two test pit locations. The relic horizons were observed to be between one to two feet thick and were exposed beginning at a depth of about one-and-one-half to two feet below the ground surface (bgs).

Fill was encountered at six test pit locations and was designated as follows:

- *Topsoil fill (central strippings stockpile):* Characterized primarily as dark brown well-graded gravel with sand as well as silty sand (USCS: GW-GM and SM, respectively) in a loose to medium dense and moist condition. The topsoil fill was observed to possess some organics and woody debris. Representative testing suggests the majority of the topsoil has an organic content ranging between 4.1 to 8.2 percent. It should be noted that native soils were not exposed at TP-10 or TP-11, where excavation depths of about 16.5 and 18 feet bgs, respectively, were achieved. These explorations were preformed near the top of the central strippings stockpile.

- *General fill:* Characterized as silty gravel with sand and poorly graded gravel with sand (USCS: GW-GM and GP, respectively). The fill was encountered in a loose to dense and moist condition and was observed extending to depths of about one-and-one-half to two feet bgs.

Native Soil and Geologic Setting

Underlying the topsoil, native soils were characterized as recessional outwash deposits and were classified primarily as poorly to well-graded gravel with sand (USCS: GP to GW, respectively). The native soils were generally encountered in a loose to medium dense and moist condition. Local variations with respect to grain size distribution were observed; however, the site is considered to be primarily underlain by poorly to well-graded outwash gravel. Native soils were observed extending to a maximum depth of about 16.5 feet bgs.

The presence of poorly to well-graded gravels corresponds to local geologic mapping designations of recessional outwash deposits (Qgog), which are locally know as Steilacoom Gravel. Ice-contact deposits (Qgic) have also been mapped within the southern site area; however, our explorations within that portion of the property suggest the presence of outwash gravels. The WSS resource indicates the presence of Spanaway gravelly sandy loam and the Everett-Spanaway-Spana complex as underlying the proposed development area. These soils series are associated with outwash plains and terraces and are derived from glacial outwash. Based on the conditions encountered at the test pit locations, native soils are representative of outwash gravels in general accordance with local geologic mapping designations.

Groundwater

Groundwater was not encountered within the explored depths of the test pit locations during the February 2022 fieldwork. In our experience, zones of perched groundwater seepage are unlikely to develop within the recessional outwash deposit. ESNW did not observe any obvious indications at the test pit locations that would suggest the presence of a perennial shallow groundwater table.

Preliminary Geologically Hazardous Areas Review

Per DMC 25.105.050(3), the City of DuPont categorizes areas susceptible to erosion and landsliding as geologically hazardous areas. Based on our review of applicable City of DuPont code and our field observations during the site investigation, it is our opinion the site does not contain geologically hazardous areas recognized by the DMC.

It should be noted that the central strippings stockpile may possess slope inclinations which may meet certain landslide hazard area criteria, such as the slope inclination and vertical relief criteria outlined in DMC 25.105.050(3)(a)(i)(G). However, because the central strippings stockpile is a manmade feature that will be removed in association with site development, it is our opinion development restrictions, including buffer and setback requirements, need not apply to the central strippings stockpile.

DISCUSSION AND RECOMMENDATIONS

General

Based on the results of our investigation, construction of the proposed school and residential development is feasible from a geotechnical standpoint. The primary geotechnical considerations for the proposed development are in reference to structural fill placement and compaction, foundation design, and stormwater management design.

Site Preparation and Earthwork

Initial site preparation activities will consist of installing temporary erosion control measures, establishing grading limits, and site clearing and stripping activities. Subsequent earthwork activities will involve mass site grading and installation of infrastructure and stormwater management improvements.

Temporary Erosion Control

The following temporary erosion and sediment control (TESC) measures are offered:

- Temporary construction entrances and drive lanes should be constructed with at least six inches of quarry spalls to both minimize off-site soil tracking and provide a stable access entrance surface. A woven geotextile fabric can be placed beneath the quarry spalls to provide greater stability, if needed.
- Silt fencing should be placed around the site perimeter.
- When not in use, soil stockpiles should be covered or otherwise protected.
- Temporary measures for controlling surface water runoff, such as interceptor trenches, sumps, or interceptor swales, should be installed prior to beginning earthwork activities.
- Dry soils disturbed during construction should be wetted to reduce dust.
- When appropriate, permanent planting or hydroseeding will help to stabilize site soils.

Additional Best Management Practices (BMPs), as specified on the TESC plans, should be incorporated into construction activities. TESC measures will require upkeep and potential modification during construction to ensure proper function; such upkeep should be coordinated with the site erosion control lead, where applicable.

Stripping

Topsoil was generally encountered in the upper 1 to 18 inches of existing grades at the majority of the test pit locations. Based on our field observations, an average topsoil thickness of about eight inches can be assumed across the site. Where encountered, organic-rich topsoil should be stripped and segregated into a stockpile for later use on site or to be exported.

Excavations and Slopes

Based on the soil conditions observed at the test pit locations, a maximum allowable temporary slope inclination of one-and-one-half horizontal to one vertical (1.5H:1V) may be used during construction. This recommendation is consistent with applicable Federal Occupation Safety and Health Administration (OSHA) and Washington Industrial Safety and Health Act (WISHA) guidelines for Type C soil.

Steeper temporary slope inclinations within undisturbed, dense native soil may be feasible based on the soil and groundwater conditions exposed within the excavations. ESNW can evaluate the feasibility of utilizing steeper temporary slopes at the time of construction on a case-by-case basis. In any event, an ESNW representative should observe temporary slopes to confirm inclinations are suitable for the exposed soil conditions and to provide additional excavation and slope stability recommendations, as necessary.

If the recommended temporary slope inclinations cannot be achieved, temporary shoring may be necessary to support excavations. Permanent slopes should be graded to 2H:1V (or flatter) and planted with vegetation to enhance stability and minimize erosion potential. Permanent slopes should be observed by ESNW prior to vegetation and landscaping.

In-situ and Imported Soil

Successful use of the on-site soil as structural fill will largely be dictated by the moisture content at the time of placement and compaction. Based on the conditions observed during the subsurface exploration, the native gravels are considered to possess a low moisture sensitivity. Depending on the time of year construction occurs, moisture conditioning may be necessary as part of site grading and earthwork activities. If the on-site soil cannot be successfully compacted, the use of an imported soil may be necessary.

Where necessary, imported structural fill soil should consist of a well-graded, granular soil that is properly moisture conditioned at the time of placement and compaction. During wet weather conditions, imported soil intended for use as structural fill should consist of a well-graded, granular soil with a fines content of 5 percent or less (where the fines content is defined as the percent passing the Number 200 sieve, based on the minus three-quarter-inch fraction).

Central Strippings Stockpile

The central stockpile was observed to consist largely of topsoil strippings. Based on our explorations, field classifications, and representative sieve testing, the material is primarily classified as well-graded gravel with silt and sand as well as silty sand. Fines contents were roughly 10 percent at the locations tested, and organic contents ranged between about 4.1 to 8.2 percent at the locations tested. Because of the mineralogical nature of the stockpiled material, there is potential to repurpose a portion of the stockpile as structural fill. In general, soil possessing an organic content of greater than 5 percent is not acceptable for use as general structural fill but may be appropriate for use as structural fill in areas where deep fills are required. In its current condition, the stockpiled material may be placed and compacted within non-structural areas, such as within landscaping areas or open space tracts. However, if screening operations are employed during earthwork and grading activities to remove excess organic matter from the stockpiled material, it is likely the stockpiled material would be suitable for use as general structural fill.

If pursued, ESNW must be present during screening and/or mixing operations to further evaluate the suitability of the stockpiled material for use as general structural fill. Prior to construction, additional design parameters and recommendations may be necessary and can be provided by ESNW upon request.

Subgrade Preparation

Foundation and slab subgrade surfaces should consist of competent, undisturbed native soil or structural fill placed and compacted atop competent native soil. ESNW should observe subgrade areas prior to placing formwork. Supplementary recommendations for subgrade improvement may be provided at the time of construction; such recommendations would likely include further mechanical compaction effort or overexcavation and replacement with suitable structural fill.

Structural Fill

Structural fill is defined as compacted soil placed in foundation, slab-on-grade, roadway, permanent slope, retaining wall, and utility trench backfill areas. The following recommendations are provided for soils intended for use as structural fill:

Moisture content	At or slightly above optimum
Relative compaction (minimum)	95 percent (per ASTM D1557)
Loose lift thickness (maximum)	12 inches

Existing site soil may only be considered suitable for use as structural fill if it can achieve a suitable moisture content at the time of placement and compaction. If the on-site soil cannot achieve the above specifications, use of an imported structural fill material will likely be necessary. With respect to underground utility installations and backfill, local jurisdictions will likely dictate soil type(s) and compaction requirements.

As mentioned in the *Central Strippings Stockpile* section of this report, the stockpiled material in the central site area may be suitable for use as general structural fill if screening operations are employed during earthwork and grading activities to remove excess organic matter from the stockpiled material, it is likely the stockpiled material would be suitable for use as general structural fill.

Foundations

In our opinion, the proposed multi-family residences may be constructed on conventional continuous and spread footing foundations bearing upon competent native soil, recompacted native soil, or new structural fill placed directly on competent native soil. Competent native soil suitable for support of foundations will likely be encountered beginning at a depth of about two to four feet bgs. Where loose or unsuitable soil conditions are exposed at foundation subgrade elevations, compaction of the soil to the specifications of structural fill or overexcavation and replacement with suitable structural fill will be necessary.

The proposed school building(s) can likely also be suitably supported by conventional continuous and spread footing foundations bearing upon competent native soil, recompacted native soil, or new structural fill placed directly on competent native soil. As the project progresses and site plans are made available, ESNW should be contacted to review the recommendations provided in this section to evaluate the need for potentially more stringent foundation design parameters to support the proposed school building(s).

Provided the foundations will be supported as prescribed, the following parameters may be used for design:

Allowable soil bearing capacity	2,500 psf
Passive earth pressure	300 pcf (equivalent fluid)
Coefficient of friction	0.40

The above passive pressure and friction values include a factor-of-safety (FOS) of 1.5. A one-third increase in the allowable soil bearing capacity may be assumed for short-term wind and seismic loading conditions. With structural loading as expected, total settlement in the range of one inch and differential settlement of about one-half inch is anticipated. Most settlement should occur during construction when dead loads are applied.

Seismic Design

The 2018 International Building Code (2018 IBC) recognizes the most recent edition of the Minimum Design Loads for Buildings and Other Structures manual (ASCE 7-16) for seismic design, specifically with respect to earthquake loads. Based on the soil conditions encountered at the test pit locations, the parameters and values provided below are recommended for seismic design per the 2018 IBC.

Parameter	**Value**
Site Class	D*
Mapped short period spectral response acceleration, S_S (g)	1.370
Mapped 1-second period spectral response acceleration, S_1 (g)	0.487
Short period site coefficient, F_a	1.0
Long period site coefficient, F_v	1.813†
Adjusted short period spectral response acceleration, S_{MS} (g)	1.370
Adjusted 1-second period spectral response acceleration, S_{M1} (g)	0.883†
Design short period spectral response acceleration, S_{DS} (g)	0.913
Design 1-second period spectral response acceleration, S_{D1} (g)	0.589†

* *Assumes medium dense native soil conditions, encountered to a maximum depth of 16.5 feet bgs during the February 2022 field exploration, remain medium dense (if not denser) to at least 100 feet bgs.*

† *Values assume F_v may be determined using linear interpolation per Table 11.4-2 in ASCE 7-16.*

As indicated in the table footnote, several of the seismic design values provided above are dependent on the assumption that site-specific ground motion analysis (per Section 11.4.8 of ASCE 7-16) will not be required for the subject project. ESNW recommends the validity of this assumption be confirmed at the earliest available opportunity during the planning and early design stages of the project. Further discussion between the project structural engineer, the project owner, and ESNW may be prudent to determine the possible impacts to the structural design due to increased earthquake load requirements under the 2018 IBC. ESNW can provide additional consulting services to aid with design efforts, including supplementary geotechnical and geophysical investigation, upon request.

The parameters and values provided in this section assume risk category II applies to structural design. Should a higher risk category apply to this project per the 2018 IBC, such as for design of the school building(s), ESNW should be contacted to review and update the parameters and values provided in this section, as necessary.

Liquefaction is a phenomenon where saturated or loose soil suddenly loses internal strength and behaves as a fluid. This behavior is in response to increased pore water pressures resulting from an earthquake or another intense ground shaking. In our opinion, site susceptibility to liquefaction may be considered low given the gravelly nature of the deposit and the absence of shallow groundwater across the proposed development area.

Slab-on-Grade Floors

Slab-on-grade floors for the proposed building structures should be supported on competent, firm, and unyielding subgrades. Unstable or yielding subgrade areas should be recompacted or overexcavated and replaced with suitable structural fill prior to slab construction. A capillary break consisting of at least four inches of free-draining crushed rock or gravel should be placed below each slab. The free-draining material should have a fines content of 5 percent or less (where the fines content is defined as the percent passing the Number 200 sieve, based on the minus three-quarter-inch fraction). In areas where slab moisture is undesirable, installation of a vapor barrier below the slab should be considered. Vapor barriers should be made from material specifically designed for use as a vapor barrier and should be installed in accordance with the manufacturer’s recommendations.

Retaining Walls

Retaining walls must be designed to resist earth pressures and applicable surcharge loads. The following parameters may be used for design:

Active earth pressure (unrestrained condition)	35 pcf (equivalent fluid)
At-rest earth pressure (restrained condition)	55 pcf
Traffic surcharge* (passenger vehicles)	70 psf (rectangular distribution)
Passive earth pressure	300 pcf (equivalent fluid)
Coefficient of friction	0.40
Seismic surcharge	8H psf[†]

* *Where applicable.*
[†] *Where H equals the retained height (in feet).*

The above passive pressure and friction values include a FOS of 1.5 and are based on a level backfill condition and level grade at the wall toe. Revised design values will be necessary if sloping grades are to be used above or below retaining walls. Additional surcharge loading from adjacent foundations, sloped backfill, or other relevant loads should be included in the retaining wall design.

Retaining walls should be backfilled with free-draining material that extends along the height of the wall and a distance of at least 18 inches behind the wall. The upper 12 inches of the wall backfill may consist of a less permeable soil, if desired. A sheet drain may be considered in lieu of free-draining backfill. A perforated drainpipe should be placed along the base of the wall and connected to an approved discharge location. A typical retaining wall drainage detail is provided on Plate 3. If drainage is not provided, hydrostatic pressures should be included in the wall design.

Drainage

Temporary measures to control surface water runoff and groundwater during construction would likely involve interceptor trenches, interceptor swales, and sumps. ESNW should be consulted during preliminary grading to both identify areas of seepage and provide recommendations to reduce the potential for seepage-related instability.

Finish grades must be designed to direct surface drain water away from structures and slopes. Water must not be allowed to pond adjacent to structures or slopes. In our opinion, foundation drains should be installed along building perimeter footings. A typical foundation drain detail is provided on Plate 4. It may be feasible to omit perimeter footing drains where foundation elements are founded within free-draining gravels. ESNW should observe and evaluate foundation subgrades at the time of construction to confirm the acceptability of omitting footing drains on a case-by-case basis, if pursued.

Infiltration Feasibility

From a geotechnical standpoint, infiltration into the recessional outwash gravel is considered feasible from a geotechnical standpoint. The referenced 2014 Stormwater Management Manual for Western Washington (2014 SWMMWW) allows for saturated hydraulic conductivity (Ksat) values to be calculated using the grain size analysis method for unconsolidated glacial outwash deposits. Because the site is underlain by recessional outwash gravel (Steilacoom gravel), determination of site infiltration rates utilizing the prescribed grain size correlation is considered feasible both per the 2014 SWMMWW and from a geotechnical standpoint. Based on calculations using data from representative sieve analyses, encountered soil conditions during the February 2022 exploration, and our overall evaluation, a long-term design infiltration rate of 20 in/hr is recommended for design of facilities targeted to the outwash gravel. This rate is applicable to both large (communal) and small (lot-specific) infiltration designs.

As discussed earlier in this report, groundwater was not encountered during the February 2022 subsurface exploration. However, it may be prudent to perform groundwater monitoring to define the seasonal high groundwater condition (if present) across the site. Additionally, the recommended design infiltration rate presented in this report should be confirmed through in-situ infiltration testing at the appropriate phase of design or construction. ESNW would be pleased to assist in continued infiltration discussion and/or testing services as the project progresses.

Preliminary Pavement Sections

The performance of site pavements is largely related to the condition of the underlying subgrade. To ensure adequate pavement performance, the subgrade should be in a firm and unyielding condition when subjected to proofrolling with a loaded dump truck. Structural fill in pavement areas should be compacted to the specifications previously detailed in this report. Soft, wet, or otherwise unsuitable subgrade areas may still exist after base grading activities. Areas containing unsuitable or yielding subgrade conditions will require remedial measures, such as overexcavation and/or placement of thicker crushed rock or structural fill sections, prior to pavement.

We anticipate new pavement sections will be subjected primarily to passenger vehicle traffic. For lightly loaded pavement areas subjected primarily to passenger vehicles, the following preliminary pavement sections may be considered:

- A minimum of two inches of hot-mix asphalt (HMA) placed over four inches of crushed rock base (CRB).
- A minimum of two inches of HMA placed over three inches of asphalt-treated base (ATB).

Heavier traffic areas generally require thicker pavement sections depending on site usage, pavement life expectancy, and site traffic. For preliminary design purposes, the following pavement sections for occasional truck traffic and access roadways areas may be considered:

- Three inches of HMA placed over six inches of CRB.

- Three inches of HMA placed over four-and-one-half inches of ATB.

An ESNW representative should be requested to observe subgrade conditions prior to placement of CRB or ATB. As necessary, supplemental recommendations for achieving subgrade stability and drainage can be provided. If the on-site roads will be constructed with an inverted crown, additional drainage measures may be recommended to assist in maintaining road subgrade and pavement stability.

Final pavement design recommendations, including recommendations for heavy traffic areas, access roads, and frontage improvement areas, can be provided once final traffic loading has been determined. Road standards utilized by the governing jurisdiction may supersede the recommendations provided in this report. The HMA, ATB, and CRB materials should conform to WSDOT specifications. All soil base material should be compacted to a relative compaction of 95 percent, based on the laboratory maximum dry density as determined by ASTM D1557.

Utility Support and Trench Backfill

In our opinion, the native soil will generally be suitable for support of utilities. Remedial measures may be necessary in some areas to provide support for utilities, such as overexcavation and replacement with structural fill and/or placement of geotextile fabric. Groundwater seepage may be encountered within utility excavations, and caving of trench walls may occur where groundwater is encountered. Depending on the time of year and conditions encountered, dewatering or temporary trench shoring may be necessary during utility excavation and installation.

The on-site soil is not considered suitable for use as structural backfill throughout the utility trench excavations unless the soil is at (or slightly above) the optimum moisture content at the time of placement and compaction. Moisture conditioning of the soil may be necessary at some locations prior to use as structural fill. Each section of the utility lines must be adequately supported in the bedding material. Utility trench backfill should be placed and compacted to the structural fill specifications previously detailed in this report or to the applicable specifications of the presiding jurisdiction.

LIMITATIONS

This study has been prepared for the exclusive use of Careage Construction, Inc., and its representatives. The recommendations and conclusions provided in this study are professional opinions consistent with the level of care and skill that is typical of other members in the profession currently practicing under similar conditions in this area. No warranty, express or implied, is made. Variations in the soil and groundwater conditions observed at the test pit locations may exist and may not become evident until construction. ESNW should reevaluate the conclusions provided in this study if variations are encountered.

Additional Services

ESNW should have an opportunity to review final project plans with respect to the geotechnical recommendations provided in this report. ESNW should also be retained to provide testing and consultation services during construction.

Reference:
Pierce County, Washington
OpenStreetMap.org

NORTH

NOTE: This plate may contain areas of color. ESNW cannot be responsible for any subsequent misinterpretation of the information resulting from black & white reproductions of this plate.

Earth Solutions NW LLC

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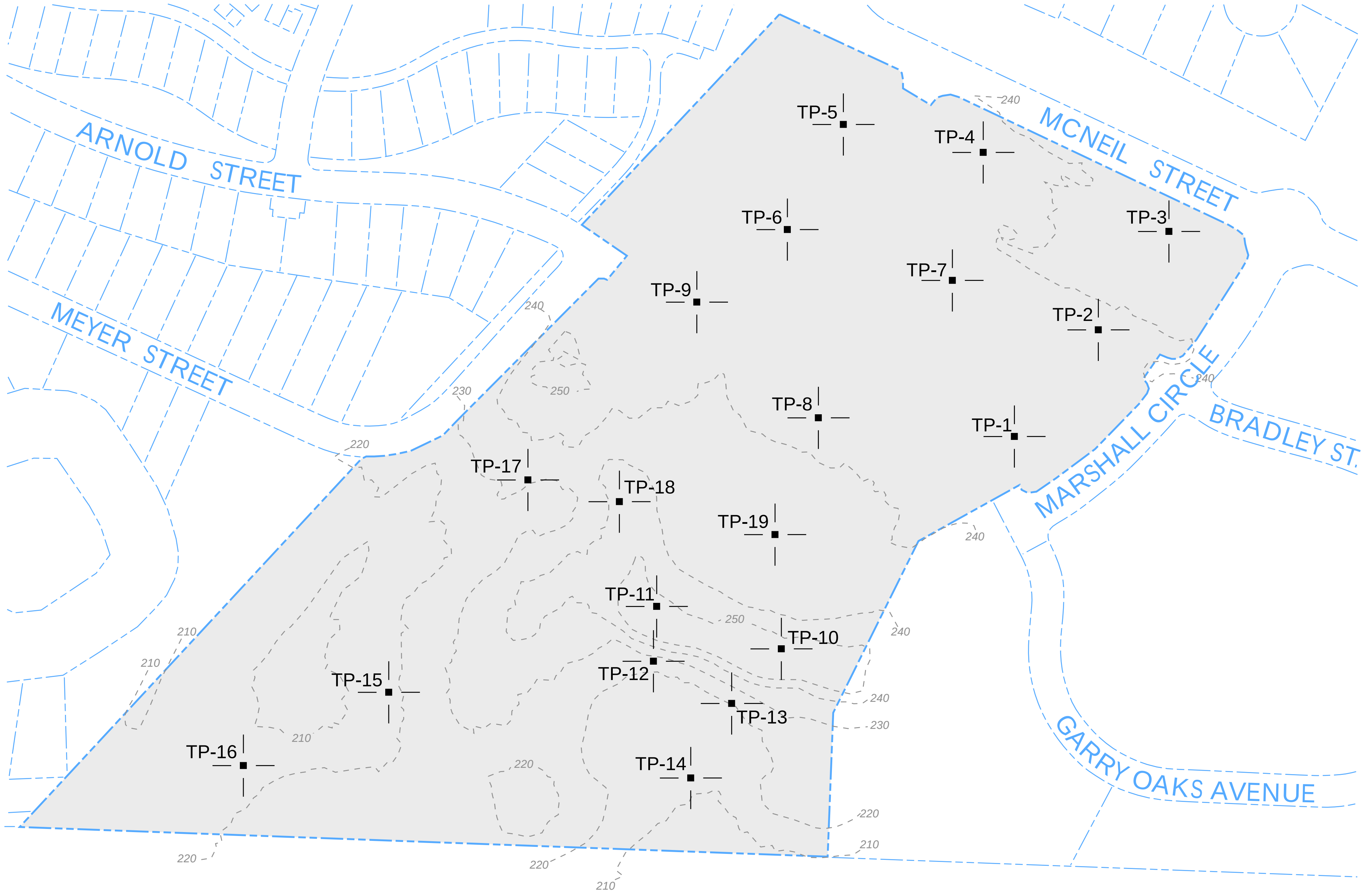
Geotechnical Engineering, Construction Observation/Testing and Environmental Services

Vicinity Map
Patriots Landing – School Site & Morningside Site
DuPont, Washington

Drwn. MRS	Date 04/22/2022	Proj. No. 7005.01
Checked CGH	Date April 2022	Plate 1



LEGEND

TP-1 ✛	Approximate Location of ESNW Test Pit, Proj. No. ES-7005.01, Feb. 2022
▨	Subject Site

NORTH

1"=200'

0 100 200

Scale in Feet

NOTE: The graphics shown on this plate are not intended for design purposes or precise scale measurements, but only to illustrate the approximate test locations relative to the approximate locations of existing and / or proposed site features. The information illustrated is largely based on data provided by the client at the time of our study. ESNW cannot be responsible for subsequent design changes or interpretation of the data by others.

NOTE: This plate may contain areas of color. ESNW cannot be responsible for any subsequent misinterpretation of the information resulting from black & white reproductions of this plate.

Test Pit Location Plan

Patriots Landing – School Site & Morningside Site
DuPont, Washington

Earth Solutions NW LLC
Geotechnical Engineering, Construction
Observation/Testing and Environmental Services

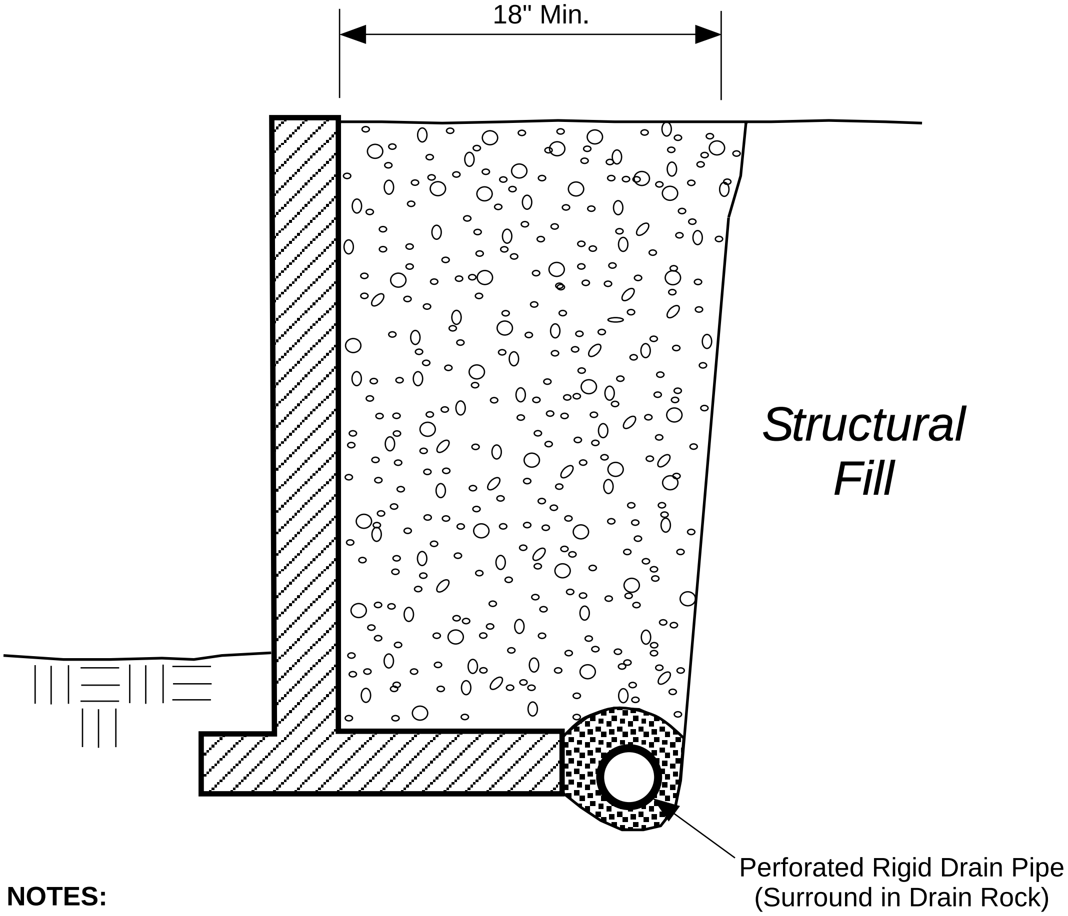
Drwn. By
MRS

Checked By
CGH

Date
04/25/2022

Proj. No.
7005.01

Plate
2



NOTES:

- Free-draining Backfill should consist of soil having less than 5 percent fines. Percent passing No. 4 sieve should be 25 to 75 percent.
- Sheet Drain may be feasible in lieu of Free-draining Backfill, per ESNW recommendations.
- Drain Pipe should consist of perforated, rigid PVC Pipe surrounded with 1-inch Drain Rock.

SCHEMATIC ONLY - NOT TO SCALE
NOT A CONSTRUCTION DRAWING

LEGEND:

○	Free-draining Structural Backfill
▦	1-inch Drain Rock

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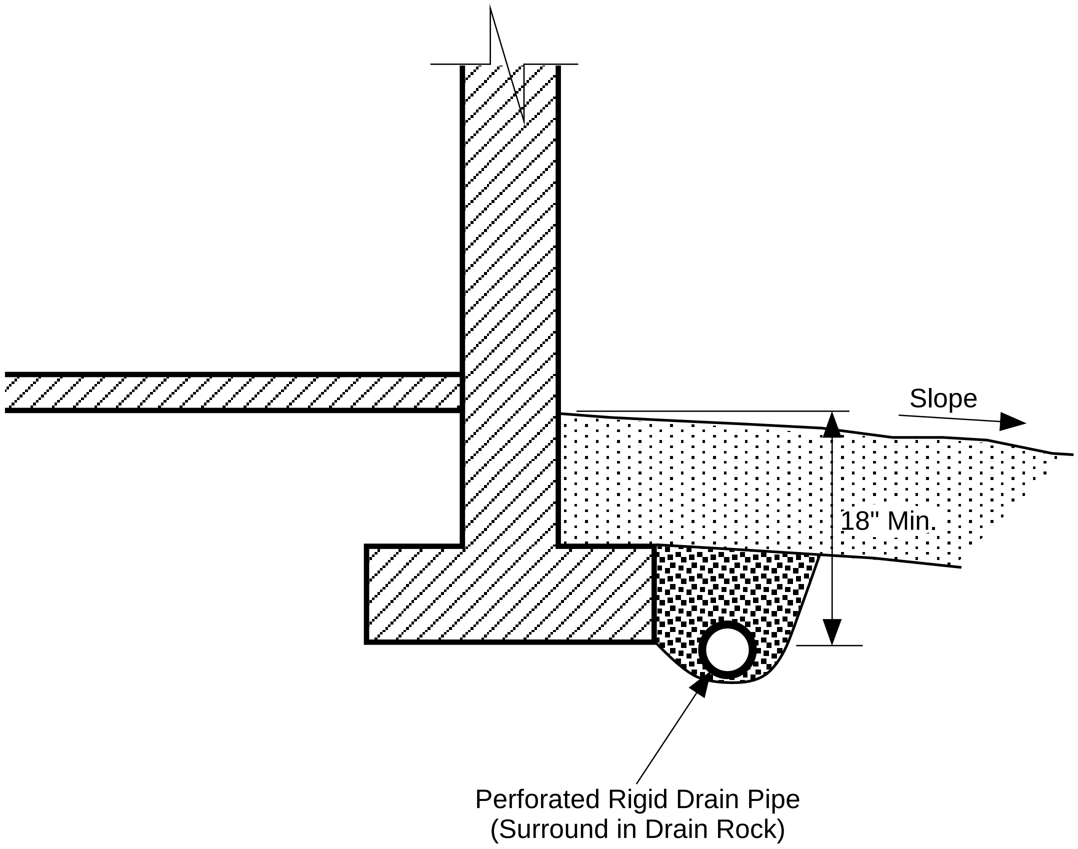
Retaining Wall Drainage Detail
Patriots Landing – School Site & Morningside Site
DuPont, Washington

Drwn. MRS	Date 04/22/2021	Proj. No. 7005.01
Checked CGH	Date April 2022	Plate 3



NOTES:

- Do NOT tie roof downspouts to Footing Drain.
- Surface Seal to consist of 12" of less permeable, suitable soil. Slope away from building.

SCHEMATIC ONLY - NOT TO SCALE
NOT A CONSTRUCTION DRAWING

LEGEND:

░ Surface Seal: native soil or other low-permeability material.

▩ 1-inch Drain Rock

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Footing Drain Detail
Patriots Landing – School Site & Morningside Site
DuPont, Washington

Drwn. MRS	Date 04/22/2022	Proj. No. 7005.01
Checked CGH	Date April 2022	Plate 4

Appendix A

Subsurface Exploration
Test Pit Logs

ES-7005.01

Subsurface conditions at the subject site were explored on February 16, 2022. Nineteen test pits were excavated using a mini-trackhoe and operator retained by our firm. The approximate locations of the test pits are illustrated on Plate 2 of this study. The test pit logs are provided in this Appendix. The test pits were advanced to a maximum depth of approximately 18 feet bgs.

The final logs represent the interpretations of the field logs and the results of laboratory analyses. The stratification lines on the logs represent the approximate boundaries between soil types. In actuality, the transitions may be more gradual.

Earth Solutions NWLLC

SOIL CLASSIFICATION CHART

MAJOR DIVISIONS			SYMBOLS		TYPICAL DESCRIPTIONS
			GRAPH	LETTER	
COARSE GRAINED SOILS MORE THAN 50% OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE	GRAVEL AND GRAVELLY SOILS MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	CLEAN GRAVELS (LITTLE OR NO FINES)	●	**GW**	WELL-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
			○	**GP**	POORLY-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
		GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)	○	**GM**	SILTY GRAVELS, GRAVEL - SAND - SILT MIXTURES
			▨	**GC**	CLAYEY GRAVELS, GRAVEL - SAND - CLAY MIXTURES
	SAND AND SANDY SOILS MORE THAN 50% OF COARSE FRACTION PASSING ON NO. 4 SIEVE	CLEAN SANDS (LITTLE OR NO FINES)	⁘	**SW**	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
			⁘	**SP**	POORLY-GRADED SANDS, GRAVELLY SAND, LITTLE OR NO FINES
		SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES)	⁘	**SM**	SILTY SANDS, SAND - SILT MIXTURES
			▨	**SC**	CLAYEY SANDS, SAND - CLAY MIXTURES
FINE GRAINED SOILS MORE THAN 50% OF MATERIAL IS SMALLER THAN NO. 200 SIEVE SIZE	SILTS AND CLAYS	LIQUID LIMIT LESS THAN 50	▥	**ML**	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
			▨	**CL**	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
			▤	**OL**	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS	LIQUID LIMIT GREATER THAN 50	▥	**MH**	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS
			▨	**CH**	INORGANIC CLAYS OF HIGH PLASTICITY
			≈	**OH**	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS			ѱ	**PT**	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS

DUAL SYMBOLS are used to indicate borderline soil classifications.

The discussion in the text of this report is necessary for a proper understanding of the nature of the material presented in the attached logs.

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TEST PIT NUMBER TP-1

PAGE 1 OF 1

PROJECT NUMBER ES-7005.01
PROJECT NAME Patriots Landing – School Site & Morningside Site
DATE STARTED 2/16/22 **COMPLETED** 2/16/22
GROUND ELEVATION ~240
EXCAVATION CONTRACTOR NW Excavating
LATITUDE 47.09526 **LONGITUDE** -122.65669
EXCAVATION METHOD
GROUND WATER LEVEL:
LOGGED BY CGH **CHECKED BY** KDH
∇ **AT TIME OF EXCAVATION**
NOTES Depth of Topsoil & Sod 6": gravel

DEPTH (ft)	SAMPLE TYPE NUMBER	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
0.0			TPSL	0.5	Dark brown TOPSOIL, roots to 1'
			GW		Gray well-graded GRAVEL, loose to medium dense, moist -slight to moderate caving throughout -abundant cobbles
		MC = 3.1%			
2.5					
5.0					
		MC = 4.3%			
7.5					
10.0					
				11.0	[USDA Classification: extremely gravelly loamy coarse SAND]
		MC = 2.9% Fines = 1.1%			

Test pit terminated at 11.0 feet below existing grade. No groundwater encountered during excavation. Caving observed from 1.0 foot to BOH.

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TEST PIT NUMBER TP-2

PAGE 1 OF 1

PROJECT NUMBER ES-7005.01

PROJECT NAME Patriots Landing – School Site & Morningside Site

DATE STARTED 2/16/22 **COMPLETED** 2/16/22

GROUND ELEVATION ~240

EXCAVATION CONTRACTOR NW Excavating

LATITUDE 47.09572 **LONGITUDE** -122.65623

EXCAVATION METHOD

GROUND WATER LEVEL:

LOGGED BY CGH **CHECKED BY** KDH

▽ **AT TIME OF EXCAVATION**

NOTES Depth of Topsoil & Sod 6"- 8": grass

DEPTH (ft)	SAMPLE TYPE NUMBER	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
0.0			TPSL	0.5	Dark brown TOPSOIL, roots to 1'
			GP		Gray poorly graded GRAVEL with sand, medium dense, moist -slight caving to ~9' -abundant cobbles, trace boulders
2.5					
		MC = 4.4%			
5.0					-distinct bedding throughout
		MC = 3.0%			
7.5					
					-severe caving to BOH
10.0					
		MC = 5.5%		11.0	Test pit terminated at 11.0 feet below existing grade. No groundwater encountered during excavation. Caving observed from 1.0 foot to BOH.

TEST PIT NUMBER TP-3

PAGE 1 OF 1

PROJECT NUMBER ES-7005.01

PROJECT NAME Patriots Landing – School Site & Morningside Site

DATE STARTED 2/16/22 **COMPLETED** 2/16/22

GROUND ELEVATION ~240

EXCAVATION CONTRACTOR NW Excavating

LATITUDE 47.09616 **LONGITUDE** -122.65594

EXCAVATION METHOD

GROUND WATER LEVEL:

LOGGED BY CGH **CHECKED BY** KDH

∇ **AT TIME OF EXCAVATION**

NOTES Depth of Topsoil & Sod 6"- 8": gravel

DEPTH (ft)	SAMPLE TYPE NUMBER	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
0.0			TPSL	0.5	Dark brown TOPSOIL, roots to 1'
			GP-GM		Gray poorly graded GRAVEL with silt and sand, medium dense, moist -moderate caving throughout -abundant cobbles
2.5		MC = 5.5%		3.0	
			GP		Gray poorly graded GRAVEL with sand, medium dense, moist
5.0					-distinct bedding throughout
		MC = 3.0%			
7.5					
10.0					
		MC = 9.7%		12.0	

Test pit terminated at 12.0 feet below existing grade. No groundwater encountered during excavation. Caving observed from 1.0 foot to BOH.

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TEST PIT NUMBER TP-4

PAGE 1 OF 1

PROJECT NUMBER ES-7005.01

PROJECT NAME Patriots Landing – School Site & Morningside Site

DATE STARTED 2/16/22 **COMPLETED** 2/16/22

GROUND ELEVATION ~240

EXCAVATION CONTRACTOR NW Excavating

LATITUDE 47.09637 **LONGITUDE** -122.6568

EXCAVATION METHOD

GROUND WATER LEVEL:

LOGGED BY CGH **CHECKED BY** KDH

▽ **AT TIME OF EXCAVATION**

NOTES Depth of Topsoil & Sod 1"- 2": gravel

DEPTH (ft) 0.0	SAMPLE TYPE NUMBER	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
			GM	2.0	Brown silty GRAVEL with sand, medium dense to dense, moist -becomes gray, roots to 1' -abundant cobbles -moderate caving throughout
2.5		MC = 3.2% Fines = 1.3%	GP	3.5	Gray poorly graded GRAVEL with sand, medium dense, moist -abundant cobbles
5.0			SP	5.0	Gray poorly graded SAND, loose to medium dense, moist
7.5		MC = 5.0%	GP	9.5	Gray poorly graded GRAVE with sand, loose to medium dense, moist
10.0		MC = 5.7%	SP	12.0	Gray poorly graded SAND, loose to medium dense, moist

Test pit terminated at 12.0 feet below existing grade. No groundwater encountered during excavation. Caving observed from 1.0 foot to BOH.

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TEST PIT NUMBER TP-5

PAGE 1 OF 1

PROJECT NUMBER ES-7005.01
PROJECT NAME Patriots Landing – School Site & Morningside Site
DATE STARTED 2/16/22 **COMPLETED** 2/16/22
GROUND ELEVATION ~240
EXCAVATION CONTRACTOR NW Excavating
LATITUDE 47.0965 **LONGITUDE** -122.65776
EXCAVATION METHOD
GROUND WATER LEVEL:
LOGGED BY CGH **CHECKED BY** KDH
▽ **AT TIME OF EXCAVATION**
NOTES Depth of Topsoil & Sod 1"- 2": gravel

DEPTH (ft)	SAMPLE TYPE NUMBER	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
0.0					Gray poorly graded GRAVEL with sand, loose to medium dense, moist
					-abundant cobbles, minor caving to BOH
2.5					
		MC = 5.4%			
					-increased sand content
5.0					
					-distinct bedding to 11'
		MC = 2.9%			
7.5			GP		
10.0					
					-increased moisture content (still moist)
					-increased sand content
12.5					
15.0		MC = 4.0%			15.0

Test pit terminated at 15.0 feet below existing grade. No groundwater encountered during excavation. Caving observed from 1.0 foot to BOH.

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TEST PIT NUMBER TP-6

PAGE 1 OF 1

PROJECT NUMBER ES-7005.01

PROJECT NAME Patriots Landing – School Site & Morningside Site

DATE STARTED 2/16/22 **COMPLETED** 2/16/22

GROUND ELEVATION ~240

EXCAVATION CONTRACTOR NW Excavating

LATITUDE 47.09611 **LONGITUDE** -122.65801

EXCAVATION METHOD

GROUND WATER LEVEL:

LOGGED BY CGH **CHECKED BY** KDH

∇ **AT TIME OF EXCAVATION**

NOTES Depth of Topsoil & Sod 12": brush

DEPTH (ft)	SAMPLE TYPE NUMBER	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
0.0			TPSL	1.0	Dark brown TOPSOIL, roots to 2'
			SM	2.0	Brown silty SAND with gravel, loose to medium dense, moist
2.5			GP		Tan poorly graded GRAVEL with sand, loose to medium dense, moist
					-becomes gray
		MC = 3.9%			
5.0					
7.5					
10.0					
		MC = 3.2%		11.0	

Test pit terminated at 11.0 feet below existing grade. No groundwater encountered

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TEST PIT NUMBER TP-7

PAGE 1 OF 1

PROJECT NUMBER ES-7005.01
PROJECT NAME Patriots Landing – School Site & Morningside Site
DATE STARTED 2/16/22 **COMPLETED** 2/16/22
GROUND ELEVATION ~240
EXCAVATION CONTRACTOR NW Excavating
LATITUDE 47.09592 **LONGITUDE** -122.65713
EXCAVATION METHOD
GROUND WATER LEVEL:
LOGGED BY CGH **CHECKED BY** KDH
▽ **AT TIME OF EXCAVATION**
NOTES Depth of Topsoil & Sod 18": brush

DEPTH (ft)	SAMPLE TYPE NUMBER	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
0.0			TPSL		Dark brown TOPSOIL, roots to 2'
				1.5	Gray poorly graded GRAVEL with sand, loose to medium dense, moist
2.5					
		MC = 1.9%			
5.0					
			GP		
7.5					
10.0					
		MC = 3.0%		11.0	
					Test pit terminated at 11.0 feet below existing grade. No groundwater encountered during excavation. No caving observed.

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TEST PIT NUMBER TP-8

PAGE 1 OF 2

PROJECT NUMBER ES-7005.01

PROJECT NAME Patriots Landing – School Site & Morningside Site

DATE STARTED 2/16/22 **COMPLETED** 2/16/22

GROUND ELEVATION ~240

EXCAVATION CONTRACTOR NW Excavating

LATITUDE 47.09544 **LONGITUDE** -122.65787

EXCAVATION METHOD

GROUND WATER LEVEL:

LOGGED BY CGH **CHECKED BY** KDH

▽ **AT TIME OF EXCAVATION**

NOTES Depth of Topsoil & Sod 8"- 10": gravel

DEPTH (ft)	SAMPLE TYPE NUMBER	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
0.0			TPSL	0.6	Dark brown TOPSOIL, roots to 5'
					Gray poorly graded GRAVEL with sand, loose to medium dense, moist
					-abundant cobbles, severe caving to 11'
2.5		MC = 3.1%			
					-distinct bedding, erratic and irregular
5.0					
7.5			GP		
		MC = 4.3%			
10.0					
					-increased sand contents
12.5					
15.0					

(Continued Next Page)

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TEST PIT NUMBER TP-8

PAGE 2 OF 2

PROJECT NUMBER ES-7005.01

PROJECT NAME Patriots Landing – School Site & Morningside Site

DATE STARTED 2/16/22 **COMPLETED** 2/16/22

GROUND ELEVATION ~240

EXCAVATION CONTRACTOR NW Excavating

LATITUDE 47.09544 **LONGITUDE** -122.65787

EXCAVATION METHOD

GROUND WATER LEVEL:

LOGGED BY CGH **CHECKED BY** KDH

∇ **AT TIME OF EXCAVATION**

NOTES Depth of Topsoil & Sod 8"- 10": gravel

DEPTH (ft)	SAMPLE TYPE NUMBER	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
15.0		MC = 2.5% Fines = 1.4%	GP		Gray poorly graded GRAVEL with sand, loose to medium dense, moist *(continued)* [USDA Classification: extremely gravelly coarse SAND]
				16.5	Test pit terminated at 16.5 feet below existing grade. No groundwater encountered during excavation. Caving observed from 1.0 to 11.0 feet.

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TEST PIT NUMBER TP-9

PAGE 1 OF 1

PROJECT NUMBER ES-7005.01

PROJECT NAME Patriots Landing – School Site & Morningside Site

DATE STARTED 2/16/22 **COMPLETED** 2/16/22

GROUND ELEVATION ~240

EXCAVATION CONTRACTOR NW Excavating

LATITUDE 47.09586 **LONGITUDE** -122.65858

EXCAVATION METHOD

GROUND WATER LEVEL:

LOGGED BY CGH **CHECKED BY** KDH

∇ **AT TIME OF EXCAVATION**

NOTES Depth of Topsoil & Sod 6": gravel

DEPTH (ft)	SAMPLE TYPE NUMBER	TESTS	U.S.C.S.	GRAPHIC LOG		MATERIAL DESCRIPTION
0.0			TPSL		0.5	Dark brown TOPSOIL, roots to 5' (Fill)
			GM		1.5	Gray silty GRAVEL with sand, dense, moist (Fill)
			SM		2.5	Brown silty SAND, medium dense, moist -relic topsoil horizon?
2.5			GP			Gray poorly graded GRAVEL with sand, loose to medium dense, moist
		MC = 3.4%				-abundant cobbles
5.0						-banded iron oxide staining to 5'
7.5						
		MC = 3.6%				
10.0						
		MC = 3.6%			12.0	

Test pit terminated at 12.0 feet below existing grade. No groundwater encountered during excavation. No caving observed.

TEST PIT NUMBER TP-10

PROJECT NUMBER ES-7005.01

PROJECT NAME Patriots Landing – School Site & Morningside Site

DATE STARTED 2/16/22 **COMPLETED** 2/16/22

GROUND ELEVATION ~250

EXCAVATION CONTRACTOR NW Excavating

LATITUDE 47.09442 **LONGITUDE** -122.65806

EXCAVATION METHOD

GROUND WATER LEVEL:

LOGGED BY CGH **CHECKED BY** KDH

∇ **AT TIME OF EXCAVATION**

NOTES Depth of Topsoil & Sod 2": brush

DEPTH (ft)	SAMPLE TYPE NUMBER	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
0.0				▨	Dark brown well-graded GRAVEL with silt and sand, loose to medium dense, moist (Fill)
					-strippings pile
					-trace organics
					-trace woody debris
2.5					
		MC = 10.5% OC = 4.1%			
5.0					
7.5			GW-GM		
		MC = 17.4% Fines = 10.3%			[USDA Classification: extremely gravelly coarse SAND]
10.0					
12.5					
15.0					

(Continued Next Page)

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TEST PIT NUMBER TP-10

PAGE 2 OF 2

PROJECT NUMBER ES-7005.01

PROJECT NAME Patriots Landing – School Site & Morningside Site

DATE STARTED 2/16/22 **COMPLETED** 2/16/22

GROUND ELEVATION ~250

EXCAVATION CONTRACTOR NW Excavating

LATITUDE 47.09442 **LONGITUDE** -122.65806

EXCAVATION METHOD

GROUND WATER LEVEL:

LOGGED BY CGH **CHECKED BY** KDH

▽ **AT TIME OF EXCAVATION**

NOTES Depth of Topsoil & Sod 2": brush

DEPTH (ft)	SAMPLE TYPE NUMBER	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
15.0		MC = 13.9% OC = 4.5%	GW-GM	▨ 16.0	Dark brown well-graded GRAVEL with silt and sand, loose to medium dense, moist (Fill) *(continued)*
					Test pit terminated at 16.0 feet below existing grade. No groundwater encountered during excavation. No caving observed.

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TEST PIT NUMBER TP-11

PAGE 1 OF 2

PROJECT NUMBER ES-7005.01
PROJECT NAME Patriots Landing – School Site & Morningside Site
DATE STARTED 2/16/22 **COMPLETED** 2/16/22
GROUND ELEVATION ~250
EXCAVATION CONTRACTOR NW Excavating
LATITUDE 47.09455 **LONGITUDE** -122.65883
EXCAVATION METHOD
GROUND WATER LEVEL:
LOGGED BY CGH **CHECKED BY** KDH
∇ **AT TIME OF EXCAVATION**
NOTES Surface Conditions: brush

DEPTH (ft)	SAMPLE TYPE NUMBER	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
0.0				▨	Dark brown well-graded GRAVEl with silt and sand, loose to medium dense, moist (Fill) -strippings pile -trace organics, trace woody debris -abundant cobbles
2.5				▨	
		MC = 20.3%		▨	
5.0				▨	
7.5			GW-GM	▨	
10.0				▨	
		MC = 22.0% OC = 8.2%		▨	
12.5				▨	
15.0				▨	

(Continued Next Page)

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TEST PIT NUMBER TP-11

PROJECT NUMBER ES-7005.01
PROJECT NAME Patriots Landing – School Site & Morningside Site
DATE STARTED 2/16/22 **COMPLETED** 2/16/22
GROUND ELEVATION ~250
EXCAVATION CONTRACTOR NW Excavating
LATITUDE 47.09455 **LONGITUDE** -122.65883
EXCAVATION METHOD
GROUND WATER LEVEL:
LOGGED BY CGH **CHECKED BY** KDH
∇ **AT TIME OF EXCAVATION**
NOTES Surface Conditions: brush

DEPTH (ft)	SAMPLE TYPE NUMBER	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
15.0			GW-GM	▨	Dark brown well-graded GRAVEl with silt and sand, loose to medium dense, moist (Fill) *(continued)*
17.5		MC = 17.5% Fines = 9.5%		▨ 18.0	[USDA Classification: extremely gravelly loamy coarse SAND]

Test pit terminated at 18.0 feet below existing grade. No groundwater encountered during excavation. No caving observed.

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TEST PIT NUMBER TP-12

PAGE 1 OF 1

PROJECT NUMBER ES-7005.01

PROJECT NAME Patriots Landing – School Site & Morningside Site

DATE STARTED 2/16/22 **COMPLETED** 2/16/22

GROUND ELEVATION ~230

EXCAVATION CONTRACTOR NW Excavating

LATITUDE 47.09436 **LONGITUDE** -122.65886

EXCAVATION METHOD

GROUND WATER LEVEL:

LOGGED BY CGH **CHECKED BY** KDH

∇ **AT TIME OF EXCAVATION**

NOTES Surface Conditions: brush

DEPTH (ft)	SAMPLE TYPE NUMBER	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
0.0			SM		Dark brown silty SAND, loose, moist (Fill) -stripping pile, roots to 3'
2.5					
			GP	3.5	Gray poorly graded GRAVEL with sand, loose, moist -heavy iron oxide staining -slight caving to BOH
5.0		MC = 4.8%			
7.5					
10.0					
		MC = 4.9%		11.0	

Test pit terminated at 11.0 feet below existing grade. No groundwater encountered during excavation. Caving observed from 3.5 feet to BOH.

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TEST PIT NUMBER TP-13

PAGE 1 OF 1

PROJECT NUMBER ES-7005.01

PROJECT NAME Patriots Landing – School Site & Morningside Site

DATE STARTED 2/16/22 **COMPLETED** 2/16/22

GROUND ELEVATION ~220

EXCAVATION CONTRACTOR NW Excavating

LATITUDE 47.0942 **LONGITUDE** -122.65834

EXCAVATION METHOD

GROUND WATER LEVEL:

∇ **AT TIME OF EXCAVATION**

LOGGED BY CGH **CHECKED BY** KDH

NOTES Depth of Topsoil & Sod 10": brush

DEPTH (ft)	SAMPLE TYPE NUMBER	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
0.0			TPSL	0.8	Dark brown TOPSOIL, roots to 7'
			GP		Gray poorly graded GRAVEL with sand, loose to medium dense, moist
					-abundant cobbles, slight caving throughout
2.5					
		MC = 3.2%			
5.0					
7.5					
10.0					
		MC = 3.4%		11.0	Test pit terminated at 11.0 feet below existing grade. No groundwater encountered during excavation. Caving observed from 1.0 foot to BOH.

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TEST PIT NUMBER TP-14

PAGE 1 OF 1

PROJECT NUMBER ES-7005.01

PROJECT NAME Patriots Landing – School Site & Morningside Site

DATE STARTED 2/16/22 **COMPLETED** 2/16/22

GROUND ELEVATION ~220

EXCAVATION CONTRACTOR NW Excavating

LATITUDE 47.09391 **LONGITUDE** -122.65885

EXCAVATION METHOD

GROUND WATER LEVEL:

LOGGED BY CGH **CHECKED BY** KDH

∇ **AT TIME OF EXCAVATION**

NOTES Depth of Topsoil & Sod 6": brush

DEPTH (ft)	SAMPLE TYPE NUMBER	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
0.0			TPSL	0.5	Dark brown TOPSOIL, roots to 2' (Fill)
			GP	2.0	Gray poorly graded GRAVEL with sand, loose, moist (Fill)
2.5			SM	4.0	Dark brown silty SAND, loose, moist (Relic Topsoil)
5.0		MC = 10.2%	SP	6.0	Tan poorly graded SAND, loose to medium dense, moist -moderate caving to BOH
7.5 10.0		MC = 3.3% MC = 3.4%	GP	12.0	Gray poorly graded GRAVEL with sand, loose to medium dense, moist -abundant cobbles

Test pit terminated at 2.0 feet below existing grade. No groundwater encountered during excavation. Caving observed from 4.0 feet to BOH.

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TEST PIT NUMBER TP-15

PAGE 1 OF 1

PROJECT NUMBER ES-7005.01

PROJECT NAME Patriots Landing – School Site & Morningside Site

DATE STARTED 2/16/22 **COMPLETED** 2/16/22

GROUND ELEVATION ~220

EXCAVATION CONTRACTOR NW Excavating

LATITUDE 47.09438 **LONGITUDE** -122.66006

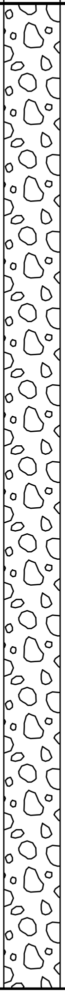
EXCAVATION METHOD

GROUND WATER LEVEL:

LOGGED BY CGH **CHECKED BY** KDH

∇ **AT TIME OF EXCAVATION**

NOTES Depth of Topsoil & Sod 4": brush

DEPTH (ft)	SAMPLE TYPE NUMBER	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
0.0					Tan poorly graded GRAVEL with sand, loose to medium dense, moist -roots to 5' -becomes gray, moderate caving to BOH -abundant cobbles
2.5					
		MC = 5.6%			
5.0					
			GP		
7.5					
10.0					
		MC = 4.8%		11.0	Test pit terminated at 11.0 feet below existing grade. No groundwater encountered during excavation. Caving observed from 1.0 foot to BOH.

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TEST PIT NUMBER TP-16

PAGE 1 OF 1

PROJECT NUMBER ES-7005.01

PROJECT NAME Patriots Landing – School Site & Morningside Site

DATE STARTED 2/16/22 **COMPLETED** 2/16/22

GROUND ELEVATION ~210

EXCAVATION CONTRACTOR NW Excavating

LATITUDE 47.09392 **LONGITUDE** -122.66073

EXCAVATION METHOD

GROUND WATER LEVEL:

LOGGED BY CGH **CHECKED BY** KDH

∇ **AT TIME OF EXCAVATION**

NOTES Depth of Topsoil & Sod 18": brush

DEPTH (ft)	SAMPLE TYPE NUMBER	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
0.0			TPSL	1.5	Dark brown TOPSOIL, roots to 9' -slight caving throughout
2.5 5.0 7.5		MC = 3.1% Fines = 0.4%	GP	7.5	Gray poorly graded GRAVEL with sand, loose to medium dense, moist -abundant cobbles [USDA Classification: extremely gravelly coarse SAND]
10.0			SP	11.0	Gray poorly graded SAND with gravel, medium dense, moist -grades finer
12.5		MC = 4.1%	GP	13.0	Gray poorly graded GRAVEL with sand, loose to medium dense, moist

Test pit terminated at 13.0 below existing grade. No groundwater encountered during excavation. Caving observed from 1.0 foot to BOH.

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TEST PIT NUMBER TP-17

PAGE 1 OF 1

PROJECT NUMBER ES-7005.01

PROJECT NAME Patriots Landing – School Site & Morningside Site

DATE STARTED 2/16/22 **COMPLETED** 2/16/22

GROUND ELEVATION ~230

EXCAVATION CONTRACTOR NW Excavating

LATITUDE 47.09504 **LONGITUDE** -122.65933

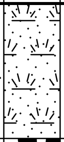
EXCAVATION METHOD

GROUND WATER LEVEL:

LOGGED BY CGH **CHECKED BY** KDH

▽ **AT TIME OF EXCAVATION**

NOTES Depth of Topsoil & Sod 18": brush

DEPTH (ft)	SAMPLE TYPE NUMBER	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
0.0			TPSL	 1.5	Dark brown TOPSOIL, roots to 5' -slight caving throughout
2.5 5.0 7.5 10.0		MC = 2.3% Fines = 0.6% MC = 3.3%	GW	 10.0	Gray well-graded GRAVEL with sand, loose to medium dense, moist -abundant cobbles [USDA Classification: extremely gravelly coarse SAND]

Test pit terminated at 10.0 feet below existing grade. No groundwater encountered during excavation. Caving observed from 1.0 foot to BOH.

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TEST PIT NUMBER TP-18

PROJECT NUMBER ES-7005.01

PROJECT NAME Patriots Landing – School Site & Morningside Site

DATE STARTED 2/16/22 **COMPLETED** 2/16/22

GROUND ELEVATION ~240

EXCAVATION CONTRACTOR NW Excavating

LATITUDE 47.09503 **LONGITUDE** -122.65893

EXCAVATION METHOD

GROUND WATER LEVEL:

LOGGED BY CGH **CHECKED BY** KDH

∇ **AT TIME OF EXCAVATION**

NOTES Surface Conditions: brush

DEPTH (ft)	SAMPLE TYPE NUMBER	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
0.0			SM	▨	Dark brown silty SAND with gravel, loose to medium dense, moist (Fill) -strippings pile -roots to 1'
2.5		MC = 11.9%		3.5	
			GP	○	Gray poorly graded GRAVEL with sand, loose to medium dense, moist
5.0					-abundant cobbles
7.5		MC = 8.3%		8.0	

Test pit terminated at 8.0 feet below existing grade. No groundwater encountered during excavation. No caving observed.

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TEST PIT NUMBER TP-19

PAGE 1 OF 1

PROJECT NUMBER ES-7005.01

PROJECT NAME Patriots Landing – School Site & Morningside Site

DATE STARTED 2/16/22 **COMPLETED** 2/16/22

GROUND ELEVATION ~240

EXCAVATION CONTRACTOR NW Excavating

LATITUDE 47.09488 **LONGITUDE** -122.65816

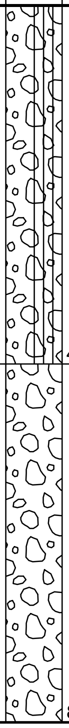
EXCAVATION METHOD

GROUND WATER LEVEL:

LOGGED BY CGH **CHECKED BY** KDH

∇ **AT TIME OF EXCAVATION**

NOTES Depth of Topsoil & Sod 4": moss



DEPTH (ft)	SAMPLE TYPE NUMBER	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
0.0			GP-GM		Gray poorly graded GRAVEL with silt and sand, loose to medium dense, moist to wet -severe caving to BOH, roots to 1'
2.5		MC = 2.7%			
4.0			GP		Gray poorly graded GRAVEL with sand, loose, moist
5.0					
7.5					
8.0		MC = 3.4%			Test pit terminated at 8.0 feet below existing grade. No groundwater encountered during excavation. Caving observed from 1.0 foot to BOH.

Appendix B

Laboratory Test Results

ES-7005.01

Earth Solutions NW, LLC
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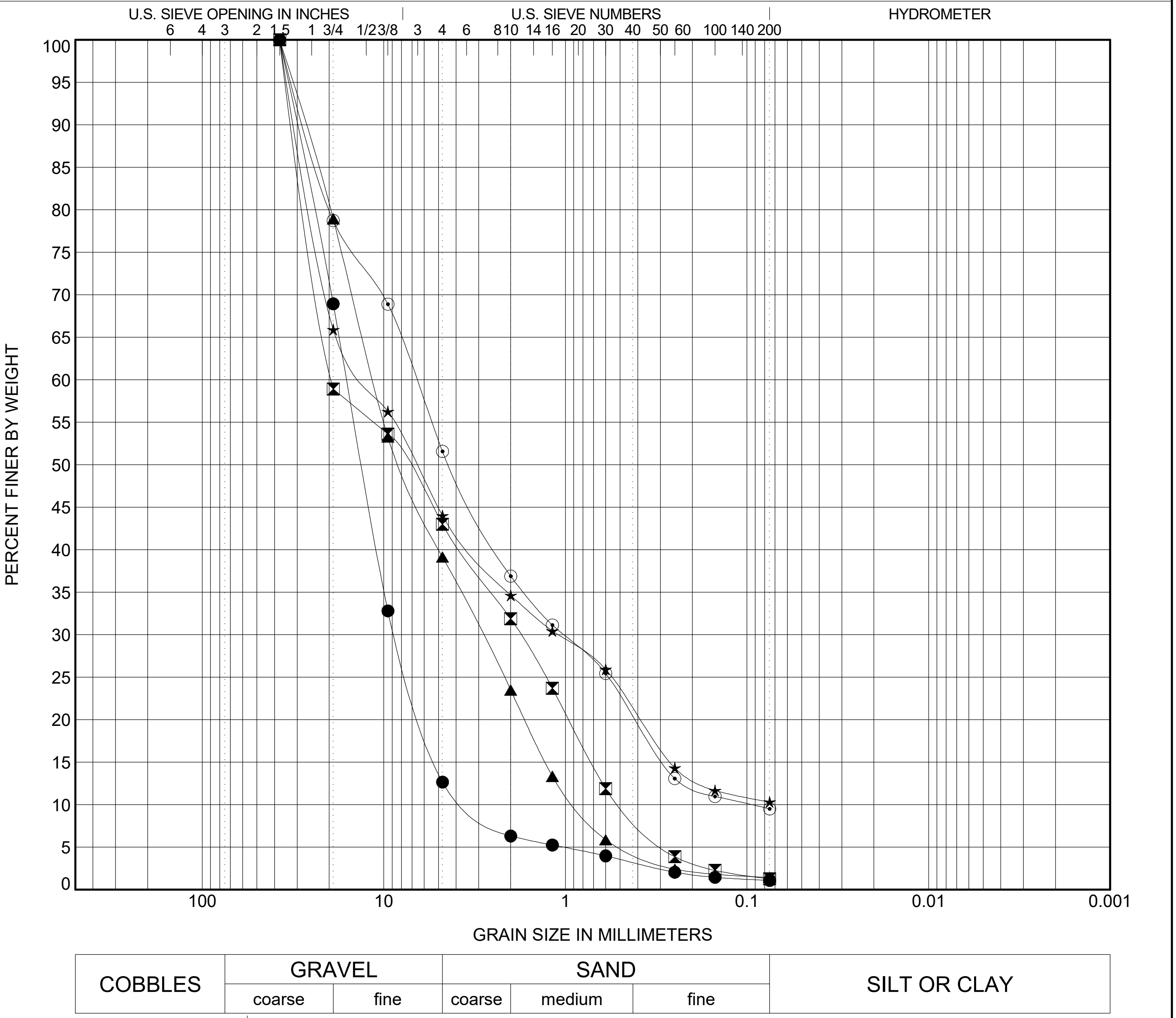
GRAIN SIZE DISTRIBUTION

PROJECT NUMBER ES-7005.01

PROJECT NAME Patriots Landing – School Site & Morningside Site



	Specimen Identification		Classification	Cc	Cu
●	**TP-01**	**11.00ft.**	**USDA: Gray Extremely Gravelly Loamy Coarse Sand. USCS: GW.**	**1.41**	**4.84**
⧗	**TP-04**	**2.50ft.**	**USDA: Gray Extremely Gravelly Coarse Sand. USCS: GP w Sand.**	**0.33**	**39.60**
▲	**TP-08**	**16.50ft.**	**USDA: Gray Extremely Gravelly Coarse Sand. USCS: GP w Sand.**	**0.83**	**13.06**
★	**TP-10**	**9.00ft.**	**USDA: Dk Brn Extremely Gravelly Coarse Sandy Loam. USCS: GW-GM w Sand.**	**1.54**	**195.74**
⊙	**TP-11**	**18.00ft.**	**USDA: Dk Brn Extremely Gravelly Loamy Coarse Sand. USCS: GW-GM w Sand.**	**1.68**	**70.06**

	Specimen Identification		D100	D60	D30	D10	LL	PL	PI	%Silt	%Clay
●	**TP-01**	**11.0ft.**	**37.5**	**16.007**	**8.628**	**3.309**				**1.1**	
⧗	**TP-04**	**2.5ft.**	**37.5**	**19.349**	**1.773**	**0.489**				**1.3**	
▲	**TP-08**	**16.5ft.**	**37.5**	**11.397**	**2.867**	**0.873**				**1.4**	
★	**TP-10**	**9.0ft.**	**37.5**	**12.423**	**1.103**					**10.3**	
⊙	**TP-11**	**18.0ft.**	**37.5**	**6.657**	**1.031**	**0.095**				**9.5**	

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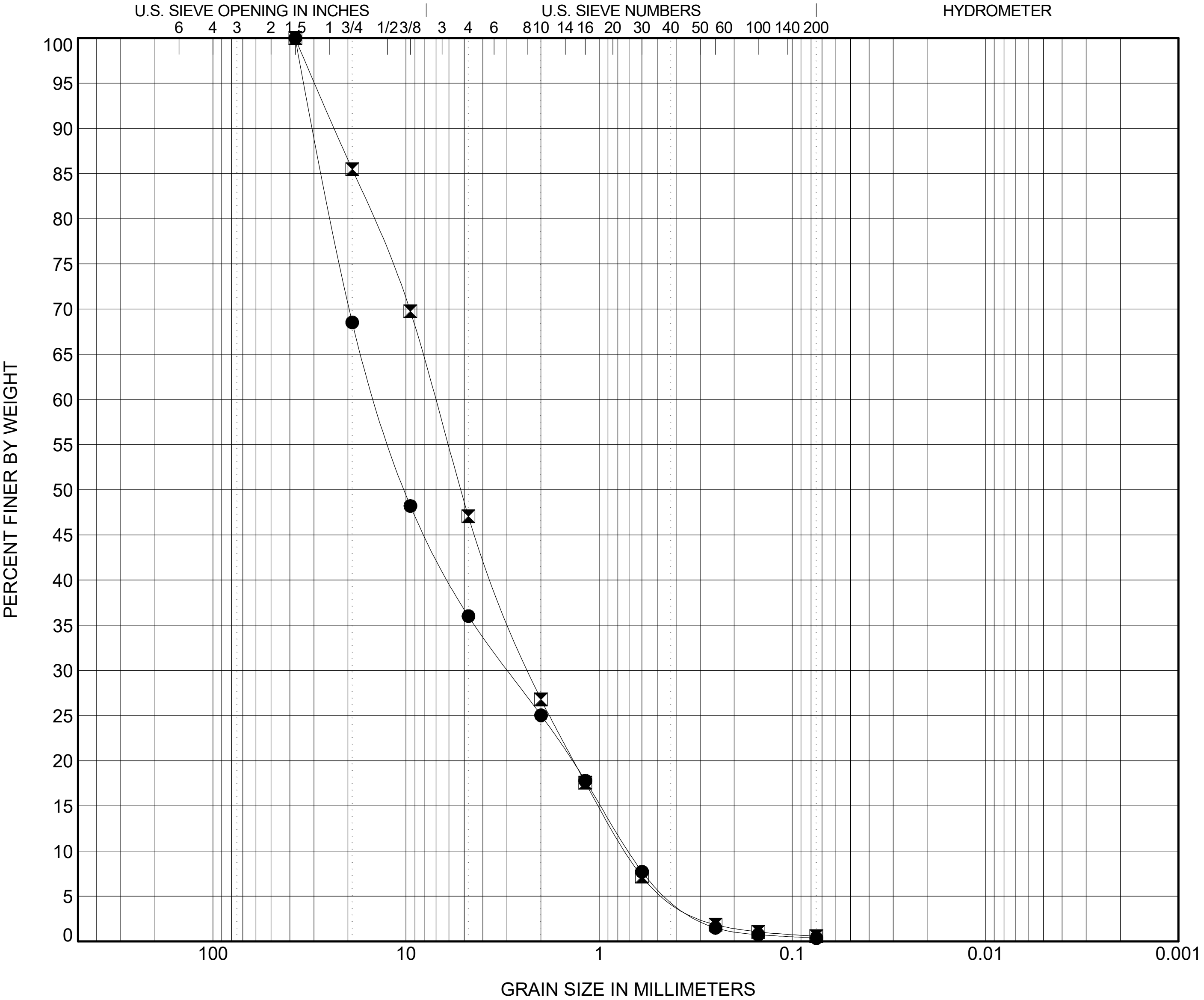
GRAIN SIZE DISTRIBUTION

PROJECT NUMBER ES-7005.01 **PROJECT NAME** Patriots Landing – School Site & Morningside Site



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification			Classification	Cc	Cu
●	**TP-16**	**3.00ft.**	**USDA: Gray Extremely Gravelly Coarse Sand. USCS: GP w Sand.**	**0.88**	**20.31**
⧗	**TP-17**	**4.00ft.**	**USDA: Gray Extremely Gravelly Coarse Sand. USCS: GW w Sand.**	**1.03**	**9.78**

Specimen Identification			D100	D60	D30	D10	LL	PL	PI	%Silt	%Clay
●	**TP-16**	**3.0ft.**	**37.5**	**14.207**	**2.959**	**0.699**				**0.4**	
⧗	**TP-17**	**4.0ft.**	**37.5**	**7.053**	**2.294**	**0.721**				**0.6**	

Report Distribution

ES-7005.01

EMAIL ONLY

Careage Construction, Inc.
4411 Point Fosdick Drive, Suite 203
Gig Harbor, Washington 98335

Attention: Mr. Mike Campeau

APPENDIX 6

CONSTRUCTION STORMWATER POLLUTION PREVENTION PLAN

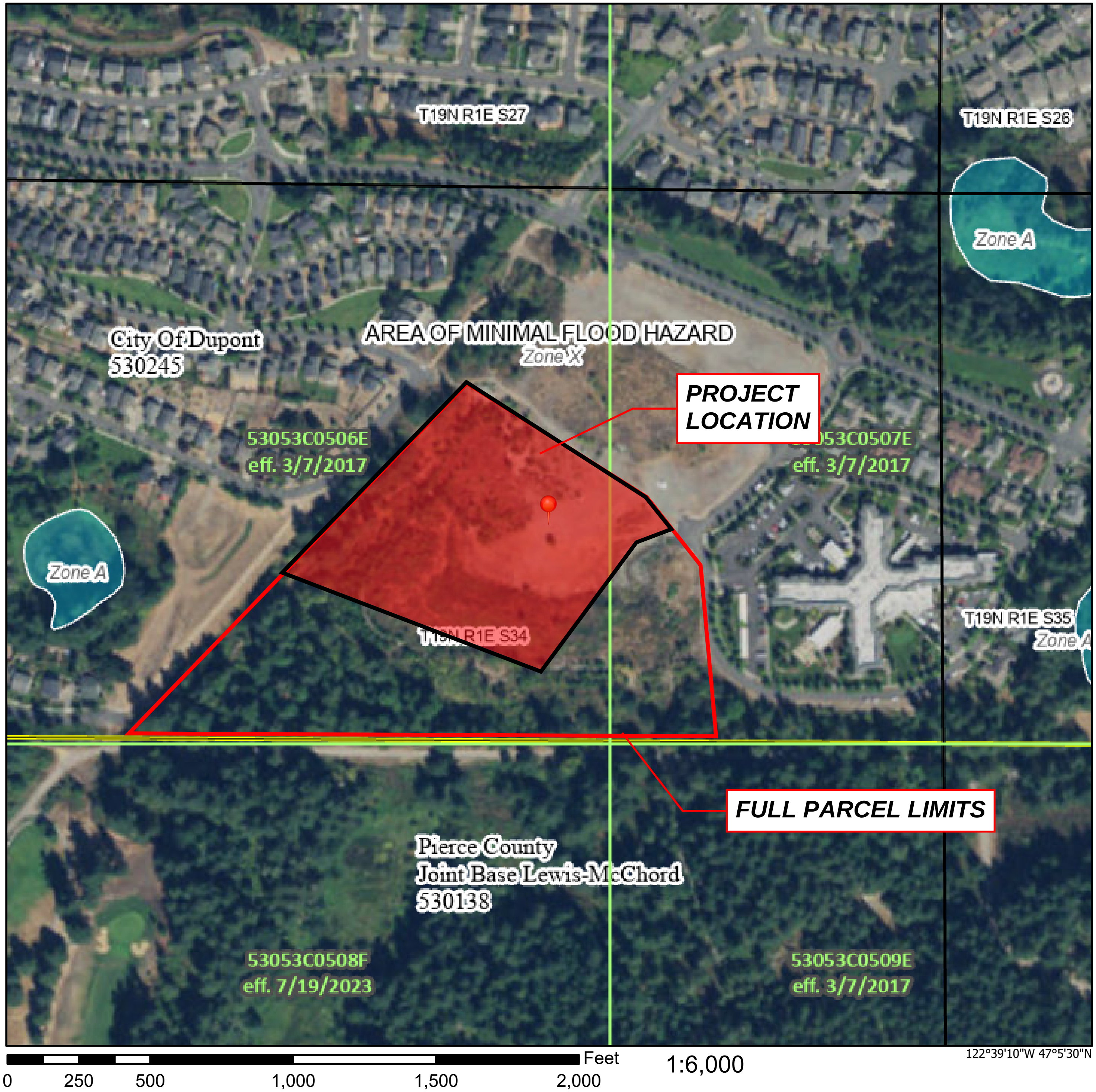
TO BE INLCUDED WITH THE CIVIL PERMIT SUBMITTAL

APPENDIX 7

FEMA FLOOD INSURANCE MAP

National Flood Hazard Layer FIRMette

122°39'48"W 47°5'54"N



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	B 20.2 17.5	Cross Sections with 1% Annual Chance Water Surface Elevation
	8 — — —	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

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 6/4/2024 at 6:22 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.

APPENDIX 8
STORMWATER MAINTENANCE AGREEMENT

TO BE INLCUDED WITH THE CIVIL PERMIT SUBMITTAL

APPENDIX 9

DESIGN CALCULATIONS AND COMPUTATIONS

WWHM2012

PROJECT REPORT

FLOW CONTROL

INFILTRATION POND

General Model Information

WWHM2012 Project Name: C24-124 Infiltration Pond

Site Name:	Affinity at Dupont
Site Address:	
City:	
Report Date:	6/4/2024
Gage:	42 IN WEST
Data Start:	10/01/1901
Data End:	09/30/2059
Timestep:	15 Minute
Precip Scale:	1.000
Version Date:	2023/01/27
Version:	4.2.19

POC Thresholds

Low Flow Threshold for POC1:	50 Percent of the 2 Year
High Flow Threshold for POC1:	50 Year

Landuse Basin Data

Predeveloped Land Use

Basin 1

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
A B, Forest, Mod	21.13
Pervious Total	21.13
Impervious Land Use	acre
Impervious Total	0
Basin Total	21.13

Mitigated Land Use

Basin 1

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
A B, Pasture, Mod	12.51
Pervious Total	12.51
Impervious Land Use	acre
ROADS MOD	8.62
Impervious Total	8.62
Basin Total	21.13

Mitigated Routing

Trapezoidal Pond 1

Bottom Length:	100.00 ft.	
Bottom Width:	45.00 ft.	
Depth:	6 ft.	
Volume at riser head:	0.8006 acre-feet.	
Infiltration On		
Infiltration rate:	20	
Infiltration safety factor:	0.5	
Wetted surface area On		
Total Volume Infiltrated (ac-ft.):		3997.827
Total Volume Through Riser (ac-ft.):		0
Total Volume Through Facility (ac-ft.):		3997.827
Percent Infiltrated:		100
Total Precip Applied to Facility:		0
Total Evap From Facility:		0
Side slope 1:	3 To 1	
Side slope 2:	3 To 1	
Side slope 3:	3 To 1	
Side slope 4:	3 To 1	
Discharge Structure		
Riser Height:	5 ft.	
Riser Diameter:	12 in.	
Element Flows To:		
Outlet 1	Outlet 2	

Pond Hydraulic Table

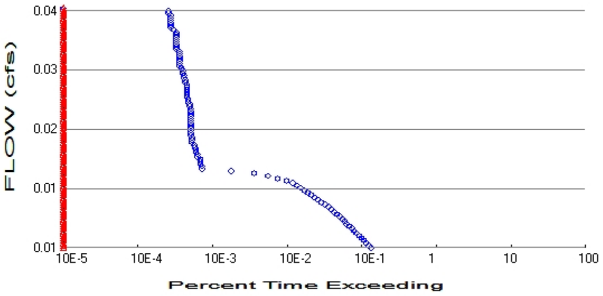
Stage(feet)	**Area(ac.)**	**Volume(ac-ft.)**	**Discharge(cfs)**	**Infilt(cfs)**
207.00	0.103	0.000	0.000	0.000
207.07	0.104	0.006	0.000	1.055
207.13	0.106	0.014	0.000	1.068
207.20	0.107	0.021	0.000	1.082
207.27	0.108	0.028	0.000	1.096
207.33	0.110	0.035	0.000	1.109
207.40	0.111	0.042	0.000	1.123
207.47	0.112	0.050	0.000	1.137
207.53	0.114	0.058	0.000	1.151
207.60	0.115	0.065	0.000	1.165
207.67	0.117	0.073	0.000	1.179
207.73	0.118	0.081	0.000	1.193
207.80	0.119	0.089	0.000	1.208
207.87	0.121	0.097	0.000	1.222
207.93	0.122	0.105	0.000	1.236
208.00	0.124	0.113	0.000	1.251
208.07	0.125	0.121	0.000	1.266
208.13	0.127	0.130	0.000	1.280
208.20	0.128	0.138	0.000	1.295
208.27	0.129	0.147	0.000	1.310
208.33	0.131	0.156	0.000	1.325
208.40	0.132	0.165	0.000	1.339
208.47	0.134	0.173	0.000	1.355
208.53	0.135	0.182	0.000	1.370
208.60	0.137	0.192	0.000	1.385
208.67	0.138	0.201	0.000	1.400

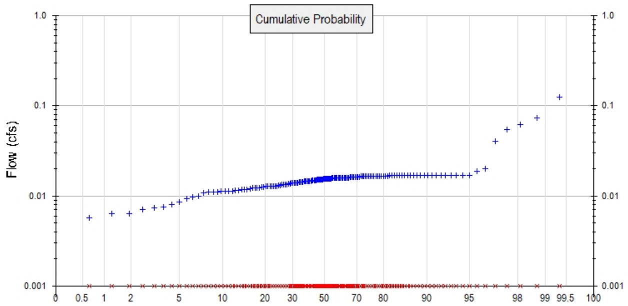
208.73	0.140	0.210	0.000	1.415
208.80	0.141	0.219	0.000	1.431
208.87	0.143	0.229	0.000	1.446
208.93	0.145	0.239	0.000	1.462
209.00	0.146	0.248	0.000	1.477
209.07	0.148	0.258	0.000	1.493
209.13	0.149	0.268	0.000	1.509
209.20	0.151	0.278	0.000	1.525
209.27	0.152	0.288	0.000	1.541
209.33	0.154	0.298	0.000	1.556
209.40	0.156	0.309	0.000	1.573
209.47	0.157	0.319	0.000	1.589
209.53	0.159	0.330	0.000	1.605
209.60	0.160	0.340	0.000	1.621
209.67	0.162	0.351	0.000	1.638
209.73	0.164	0.362	0.000	1.654
209.80	0.165	0.373	0.000	1.670
209.87	0.167	0.384	0.000	1.687
209.93	0.169	0.395	0.000	1.704
210.00	0.170	0.407	0.000	1.720
210.07	0.172	0.418	0.000	1.737
210.13	0.174	0.430	0.000	1.754
210.20	0.175	0.441	0.000	1.771
210.27	0.177	0.453	0.000	1.788
210.33	0.179	0.465	0.000	1.805
210.40	0.180	0.477	0.000	1.822
210.47	0.182	0.489	0.000	1.840
210.53	0.184	0.501	0.000	1.857
210.60	0.185	0.514	0.000	1.874
210.67	0.187	0.526	0.000	1.892
210.73	0.189	0.539	0.000	1.909
210.80	0.191	0.551	0.000	1.927
210.87	0.192	0.564	0.000	1.945
210.93	0.194	0.577	0.000	1.962
211.00	0.196	0.590	0.000	1.980
211.07	0.198	0.603	0.000	1.998
211.13	0.200	0.617	0.000	2.016
211.20	0.201	0.630	0.000	2.034
211.27	0.203	0.644	0.000	2.052
211.33	0.205	0.657	0.000	2.070
211.40	0.207	0.671	0.000	2.089
211.47	0.209	0.685	0.000	2.107
211.53	0.210	0.699	0.000	2.125
211.60	0.212	0.713	0.000	2.144
211.67	0.214	0.727	0.000	2.163
211.73	0.216	0.741	0.000	2.181
211.80	0.218	0.756	0.000	2.200
211.87	0.220	0.771	0.000	2.219
211.93	0.222	0.785	0.000	2.238
212.00	0.223	0.800	0.000	2.256
212.07	0.225	0.815	0.182	2.276
212.13	0.227	0.830	0.509	2.295
212.20	0.229	0.846	0.907	2.314
212.27	0.231	0.861	1.318	2.333
212.33	0.233	0.876	1.683	2.352
212.40	0.235	0.892	1.960	2.372
212.47	0.237	0.908	2.138	2.391
212.53	0.239	0.924	2.300	2.411

212.60	0.241	0.940	2.439	2.430
212.67	0.243	0.956	2.571	2.450
212.73	0.245	0.972	2.697	2.470
212.80	0.246	0.988	2.817	2.490
212.87	0.248	1.005	2.932	2.510
212.93	0.250	1.022	3.042	2.529
213.00	0.252	1.038	3.149	2.550
213.07	0.254	1.055	3.252	2.570

Analysis Results

POC 1





+ Predeveloped x Mitigated

Predeveloped Landuse Totals for POC #1	
Total Pervious Area:	21.13
Total Impervious Area:	0

Mitigated Landuse Totals for POC #1	
Total Pervious Area:	12.51
Total Impervious Area:	8.62

Flow Frequency Method: Log Pearson Type III 17B

Flow Frequency Return Periods for Predeveloped. POC #1

Return Period	**Flow(cfs)**
2 year	0.013847
5 year	0.01932
10 year	0.02394
25 year	0.031078
50 year	0.037464
100 year	0.044882

Flow Frequency Return Periods for Mitigated. POC #1

Return Period	**Flow(cfs)**
2 year	0
5 year	0
10 year	0
25 year	0
50 year	0
100 year	0

Annual Peaks

Annual Peaks for Predeveloped and Mitigated. POC #1

Year	**Predeveloped**	**Mitigated**
1902	0.016	0.000
1903	0.005	0.000
1904	0.016	0.000
1905	0.016	0.000
1906	0.012	0.000
1907	0.016	0.000
1908	0.017	0.000
1909	0.015	0.000
1910	0.016	0.000
1911	0.015	0.000

1912	0.073	0.000
1913	0.016	0.000
1914	0.010	0.000
1915	0.016	0.000
1916	0.012	0.000
1917	0.009	0.000
1918	0.016	0.000
1919	0.013	0.000
1920	0.016	0.000
1921	0.014	0.000
1922	0.016	0.000
1923	0.017	0.000
1924	0.013	0.000
1925	0.013	0.000
1926	0.017	0.000
1927	0.011	0.000
1928	0.016	0.000
1929	0.017	0.000
1930	0.016	0.000
1931	0.017	0.000
1932	0.013	0.000
1933	0.016	0.000
1934	0.040	0.000
1935	0.011	0.000
1936	0.017	0.000
1937	0.016	0.000
1938	0.015	0.000
1939	0.012	0.000
1940	0.015	0.000
1941	0.013	0.000
1942	0.014	0.000
1943	0.014	0.000
1944	0.017	0.000
1945	0.017	0.000
1946	0.015	0.000
1947	0.013	0.000
1948	0.015	0.000
1949	0.016	0.000
1950	0.013	0.000
1951	0.012	0.000
1952	0.017	0.000
1953	0.020	0.000
1954	0.016	0.000
1955	0.008	0.000
1956	0.006	0.000
1957	0.016	0.000
1958	0.062	0.000
1959	0.016	0.000
1960	0.015	0.000
1961	0.017	0.000
1962	0.017	0.000
1963	0.012	0.000
1964	0.012	0.000
1965	0.019	0.000
1966	0.013	0.000
1967	0.016	0.000
1968	0.014	0.000
1969	0.015	0.000

1970	0.015	0.000
1971	0.017	0.000
1972	0.017	0.000
1973	0.017	0.000
1974	0.016	0.000
1975	0.017	0.000
1976	0.017	0.000
1977	0.010	0.000
1978	0.017	0.000
1979	0.015	0.000
1980	0.016	0.000
1981	0.013	0.000
1982	0.011	0.000
1983	0.016	0.000
1984	0.016	0.000
1985	0.013	0.000
1986	0.014	0.000
1987	0.014	0.000
1988	0.015	0.000
1989	0.015	0.000
1990	0.015	0.000
1991	0.014	0.000
1992	0.017	0.000
1993	0.014	0.000
1994	0.016	0.000
1995	0.009	0.000
1996	0.017	0.000
1997	0.016	0.000
1998	0.013	0.000
1999	0.011	0.000
2000	0.016	0.000
2001	0.008	0.000
2002	0.017	0.000
2003	0.014	0.000
2004	0.016	0.000
2005	0.016	0.000
2006	0.015	0.000
2007	0.011	0.000
2008	0.016	0.000
2009	0.015	0.000
2010	0.015	0.000
2011	0.014	0.000
2012	0.012	0.000
2013	0.017	0.000
2014	0.013	0.000
2015	0.016	0.000
2016	0.015	0.000
2017	0.017	0.000
2018	0.054	0.000
2019	0.017	0.000
2020	0.016	0.000
2021	0.017	0.000
2022	0.012	0.000
2023	0.017	0.000
2024	0.014	0.000
2025	0.011	0.000
2026	0.016	0.000
2027	0.016	0.000

2028	0.006	0.000
2029	0.017	0.000
2030	0.017	0.000
2031	0.006	0.000
2032	0.011	0.000
2033	0.007	0.000
2034	0.011	0.000
2035	0.017	0.000
2036	0.012	0.000
2037	0.012	0.000
2038	0.017	0.000
2039	0.016	0.000
2040	0.012	0.000
2041	0.014	0.000
2042	0.016	0.000
2043	0.014	0.000
2044	0.016	0.000
2045	0.015	0.000
2046	0.016	0.000
2047	0.017	0.000
2048	0.015	0.000
2049	0.014	0.000
2050	0.016	0.000
2051	0.014	0.000
2052	0.016	0.000
2053	0.015	0.000
2054	0.017	0.000
2055	0.011	0.000
2056	0.007	0.000
2057	0.015	0.000
2058	0.013	0.000
2059	0.125	0.000

Ranked Annual Peaks

Ranked Annual Peaks for Predeveloped and Mitigated. POC #1

Rank	**Predeveloped**	**Mitigated**
1	0.1249	0.0000
2	0.0730	0.0000
3	0.0623	0.0000
4	0.0545	0.0000
5	0.0404	0.0000
6	0.0202	0.0000
7	0.0190	0.0000
8	0.0170	0.0000
9	0.0170	0.0000
10	0.0170	0.0000
11	0.0170	0.0000
12	0.0170	0.0000
13	0.0170	0.0000
14	0.0169	0.0000
15	0.0169	0.0000
16	0.0169	0.0000
17	0.0169	0.0000
18	0.0169	0.0000
19	0.0169	0.0000
20	0.0168	0.0000
21	0.0168	0.0000
22	0.0168	0.0000

23	0.0168	0.0000
24	0.0168	0.0000
25	0.0168	0.0000
26	0.0168	0.0000
27	0.0167	0.0000
28	0.0167	0.0000
29	0.0167	0.0000
30	0.0167	0.0000
31	0.0167	0.0000
32	0.0166	0.0000
33	0.0166	0.0000
34	0.0166	0.0000
35	0.0166	0.0000
36	0.0166	0.0000
37	0.0166	0.0000
38	0.0165	0.0000
39	0.0165	0.0000
40	0.0165	0.0000
41	0.0165	0.0000
42	0.0164	0.0000
43	0.0164	0.0000
44	0.0164	0.0000
45	0.0164	0.0000
46	0.0164	0.0000
47	0.0163	0.0000
48	0.0163	0.0000
49	0.0163	0.0000
50	0.0163	0.0000
51	0.0162	0.0000
52	0.0160	0.0000
53	0.0160	0.0000
54	0.0160	0.0000
55	0.0160	0.0000
56	0.0159	0.0000
57	0.0159	0.0000
58	0.0159	0.0000
59	0.0159	0.0000
60	0.0159	0.0000
61	0.0159	0.0000
62	0.0159	0.0000
63	0.0158	0.0000
64	0.0158	0.0000
65	0.0158	0.0000
66	0.0158	0.0000
67	0.0157	0.0000
68	0.0157	0.0000
69	0.0157	0.0000
70	0.0157	0.0000
71	0.0157	0.0000
72	0.0156	0.0000
73	0.0156	0.0000
74	0.0156	0.0000
75	0.0156	0.0000
76	0.0156	0.0000
77	0.0155	0.0000
78	0.0155	0.0000
79	0.0154	0.0000
80	0.0154	0.0000

81	0.0153	0.0000
82	0.0153	0.0000
83	0.0153	0.0000
84	0.0152	0.0000
85	0.0152	0.0000
86	0.0151	0.0000
87	0.0150	0.0000
88	0.0150	0.0000
89	0.0149	0.0000
90	0.0149	0.0000
91	0.0148	0.0000
92	0.0148	0.0000
93	0.0147	0.0000
94	0.0147	0.0000
95	0.0147	0.0000
96	0.0146	0.0000
97	0.0146	0.0000
98	0.0145	0.0000
99	0.0145	0.0000
100	0.0145	0.0000
101	0.0144	0.0000
102	0.0144	0.0000
103	0.0142	0.0000
104	0.0141	0.0000
105	0.0141	0.0000
106	0.0141	0.0000
107	0.0141	0.0000
108	0.0140	0.0000
109	0.0140	0.0000
110	0.0138	0.0000
111	0.0138	0.0000
112	0.0136	0.0000
113	0.0135	0.0000
114	0.0134	0.0000
115	0.0134	0.0000
116	0.0133	0.0000
117	0.0132	0.0000
118	0.0130	0.0000
119	0.0130	0.0000
120	0.0129	0.0000
121	0.0128	0.0000
122	0.0128	0.0000
123	0.0128	0.0000
124	0.0128	0.0000
125	0.0127	0.0000
126	0.0127	0.0000
127	0.0125	0.0000
128	0.0125	0.0000
129	0.0124	0.0000
130	0.0123	0.0000
131	0.0123	0.0000
132	0.0121	0.0000
133	0.0119	0.0000
134	0.0119	0.0000
135	0.0119	0.0000
136	0.0118	0.0000
137	0.0116	0.0000
138	0.0114	0.0000

139	0.0114	0.0000
140	0.0112	0.0000
141	0.0112	0.0000
142	0.0112	0.0000
143	0.0111	0.0000
144	0.0110	0.0000
145	0.0110	0.0000
146	0.0107	0.0000
147	0.0099	0.0000
148	0.0097	0.0000
149	0.0093	0.0000
150	0.0086	0.0000
151	0.0080	0.0000
152	0.0076	0.0000
153	0.0074	0.0000
154	0.0070	0.0000
155	0.0064	0.0000
156	0.0063	0.0000
157	0.0057	0.0000
158	0.0053	0.0000

Duration Flows

The Facility PASSED

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.0069	7363	0	0	Pass
0.0072	6798	0	0	Pass
0.0075	6266	0	0	Pass
0.0078	5884	0	0	Pass
0.0082	5458	0	0	Pass
0.0085	5136	0	0	Pass
0.0088	4739	0	0	Pass
0.0091	4382	0	0	Pass
0.0094	4071	0	0	Pass
0.0097	3737	0	0	Pass
0.0100	3474	0	0	Pass
0.0103	3246	0	0	Pass
0.0106	3033	0	0	Pass
0.0109	2772	0	0	Pass
0.0112	2549	0	0	Pass
0.0116	2339	0	0	Pass
0.0119	2167	0	0	Pass
0.0122	1957	0	0	Pass
0.0125	1767	0	0	Pass
0.0128	1580	0	0	Pass
0.0131	1422	0	0	Pass
0.0134	1282	0	0	Pass
0.0137	1151	0	0	Pass
0.0140	1049	0	0	Pass
0.0143	941	0	0	Pass
0.0146	841	0	0	Pass
0.0149	754	0	0	Pass
0.0153	652	0	0	Pass
0.0156	541	0	0	Pass
0.0159	409	0	0	Pass
0.0162	307	0	0	Pass
0.0165	199	0	0	Pass
0.0168	99	0	0	Pass
0.0171	40	0	0	Pass
0.0174	40	0	0	Pass
0.0177	38	0	0	Pass
0.0180	38	0	0	Pass
0.0183	38	0	0	Pass
0.0186	35	0	0	Pass
0.0190	35	0	0	Pass
0.0193	33	0	0	Pass
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0.0208	29	0	0	Pass
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0.0217	28	0	0	Pass
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0.0245	28	0	0	Pass
0.0248	28	0	0	Pass
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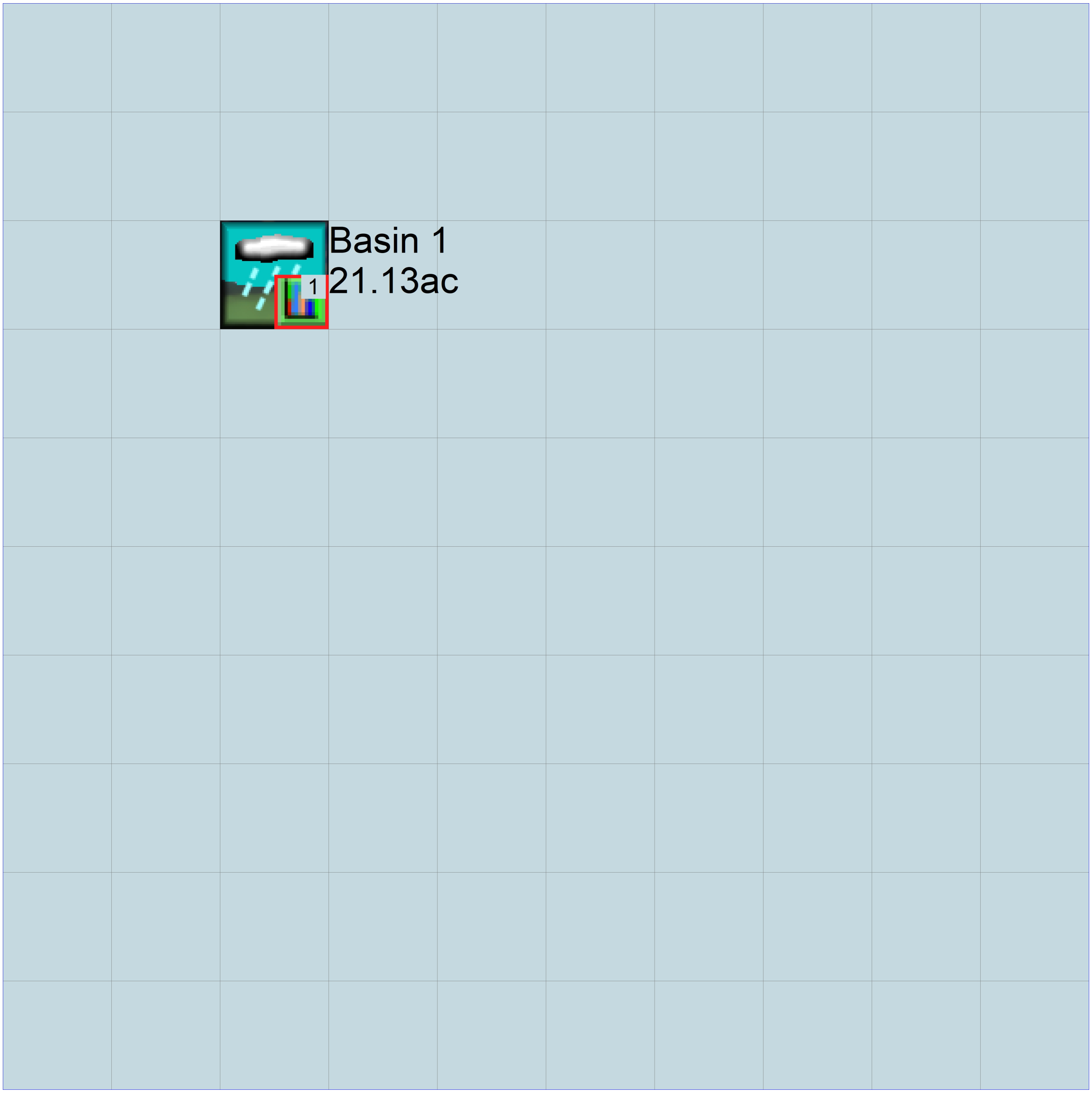
0.0267	25	0	0	Pass
0.0270	25	0	0	Pass
0.0273	25	0	0	Pass
0.0276	25	0	0	Pass
0.0279	25	0	0	Pass
0.0282	24	0	0	Pass
0.0285	24	0	0	Pass
0.0288	23	0	0	Pass
0.0291	23	0	0	Pass
0.0294	22	0	0	Pass
0.0298	22	0	0	Pass
0.0301	21	0	0	Pass
0.0304	20	0	0	Pass
0.0307	20	0	0	Pass
0.0310	20	0	0	Pass
0.0313	20	0	0	Pass
0.0316	20	0	0	Pass
0.0319	20	0	0	Pass
0.0322	20	0	0	Pass
0.0325	18	0	0	Pass
0.0328	18	0	0	Pass
0.0331	18	0	0	Pass
0.0335	18	0	0	Pass
0.0338	18	0	0	Pass
0.0341	18	0	0	Pass
0.0344	18	0	0	Pass
0.0347	18	0	0	Pass
0.0350	17	0	0	Pass
0.0353	15	0	0	Pass
0.0356	15	0	0	Pass
0.0359	15	0	0	Pass
0.0362	15	0	0	Pass
0.0365	15	0	0	Pass
0.0368	15	0	0	Pass
0.0372	14	0	0	Pass
0.0375	14	0	0	Pass

LID Report

LID Technique	Used for Treatment ?	Total Volume Needs Treatment (ac-ft)	Volume Through Facility (ac-ft)	Infiltration Volume (ac-ft)	Cumulative Volume Infiltration Credit	Percent Volume Infiltrated	Water Quality	Percent Water Quality Treated	Comment
Trapezoidal Pond 1 POC	☐	3638.02			☐	100.00			
Total Volume Infiltrated		3638.02	0.00	0.00		100.00	0.00	0%	No Treat. Credit
Compliance with LID Standard 8% of 2-yr to 50% of 2-yr									Duration Analysis Result = Passed

Appendix

Predeveloped Schematic



Mitigated Schematic

Disclaimer

Legal Notice

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Olympia, WA. 98501
Toll Free 1(866)943-0304
Local (360)943-0304

www.clearcreeksolutions.com

WWHM2012

PROJECT REPORT

FLOW CONTROL
TRENCH #1 & #4
AFFINITY BUILDING

NOTE: TRENCH 1 AND TRENCH 4 ARE BOTH 0.19 ACRES OF ROOF AREA AND REQUIRE THE SAME SIZED INFILTRATION TRENCH.

General Model Information

WWHM2012 Project Name: C24-124 Building 1

Site Name:	Affinity at Dupont
Site Address:	
City:	
Report Date:	6/4/2024
Gage:	42 IN WEST
Data Start:	10/01/1901
Data End:	09/30/2059
Timestep:	15 Minute
Precip Scale:	1.000
Version Date:	2023/01/27
Version:	4.2.19

POC Thresholds

Low Flow Threshold for POC1:	50 Percent of the 2 Year
High Flow Threshold for POC1:	50 Year

Landuse Basin Data

Predeveloped Land Use

Basin 1

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
A B, Forest, Flat	0.19
Pervious Total	0.19
Impervious Land Use	acre
Impervious Total	0
Basin Total	0.19

Mitigated Land Use

Basin 1

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
Pervious Total	0
Impervious Land Use	acre
ROOF TOPS FLAT	0.19
Impervious Total	0.19
Basin Total	0.19

Mitigated Routing

Gravel Trench Bed 1

Bottom Length:	30.00 ft.
Bottom Width:	10.00 ft.
Trench bottom slope 1:	0 To 1
Trench Left side slope 0:	0 To 1
Trench right side slope 2:	0 To 1
Material thickness of first layer:	5
Pour Space of material for first layer:	0.33
Material thickness of second layer:	0
Pour Space of material for second layer:	0
Material thickness of third layer:	0
Pour Space of material for third layer:	0
Infiltration On	
Infiltration rate:	20
Infiltration safety factor:	0.5
Wetted surface area On	
Total Volume Infiltrated (ac-ft.):	85.805
Total Volume Through Riser (ac-ft.):	0
Total Volume Through Facility (ac-ft.):	85.805
Percent Infiltrated:	100
Total Precip Applied to Facility:	0
Total Evap From Facility:	0

Discharge Structure
Riser Height: 4 ft.
Riser Diameter: 10 in.
Element Flows To:
Outlet 1 Outlet 2

Gravel Trench Bed Hydraulic Table

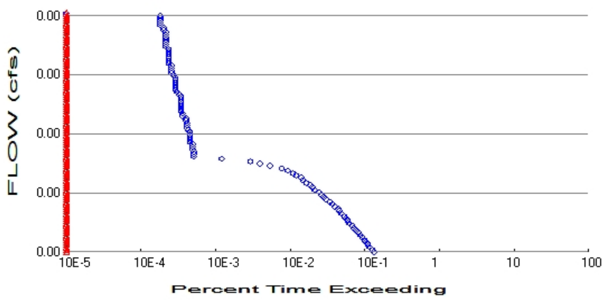
Stage(feet)	**Area(ac.)**	**Volume(ac-ft.)**	**Discharge(cfs)**	**Infilt(cfs)**
0.0000	0.006	0.000	0.000	0.000
0.0556	0.006	0.000	0.000	0.069
0.1111	0.006	0.000	0.000	0.069
0.1667	0.006	0.000	0.000	0.069
0.2222	0.006	0.000	0.000	0.069
0.2778	0.006	0.000	0.000	0.069
0.3333	0.006	0.000	0.000	0.069
0.3889	0.006	0.000	0.000	0.069
0.4444	0.006	0.001	0.000	0.069
0.5000	0.006	0.001	0.000	0.069
0.5556	0.006	0.001	0.000	0.069
0.6111	0.006	0.001	0.000	0.069
0.6667	0.006	0.001	0.000	0.069
0.7222	0.006	0.001	0.000	0.069
0.7778	0.006	0.001	0.000	0.069
0.8333	0.006	0.001	0.000	0.069
0.8889	0.006	0.002	0.000	0.069
0.9444	0.006	0.002	0.000	0.069
1.0000	0.006	0.002	0.000	0.069
1.0556	0.006	0.002	0.000	0.069
1.1111	0.006	0.002	0.000	0.069
1.1667	0.006	0.002	0.000	0.069
1.2222	0.006	0.002	0.000	0.069

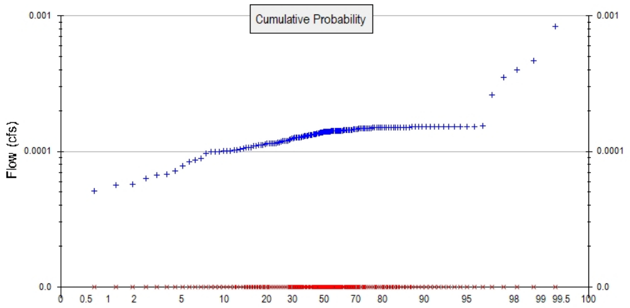
1.2778	0.006	0.002	0.000	0.069
1.3333	0.006	0.003	0.000	0.069
1.3889	0.006	0.003	0.000	0.069
1.4444	0.006	0.003	0.000	0.069
1.5000	0.006	0.003	0.000	0.069
1.5556	0.006	0.003	0.000	0.069
1.6111	0.006	0.003	0.000	0.069
1.6667	0.006	0.003	0.000	0.069
1.7222	0.006	0.003	0.000	0.069
1.7778	0.006	0.004	0.000	0.069
1.8333	0.006	0.004	0.000	0.069
1.8889	0.006	0.004	0.000	0.069
1.9444	0.006	0.004	0.000	0.069
2.0000	0.006	0.004	0.000	0.069
2.0556	0.006	0.004	0.000	0.069
2.1111	0.006	0.004	0.000	0.069
2.1667	0.006	0.004	0.000	0.069
2.2222	0.006	0.005	0.000	0.069
2.2778	0.006	0.005	0.000	0.069
2.3333	0.006	0.005	0.000	0.069
2.3889	0.006	0.005	0.000	0.069
2.4444	0.006	0.005	0.000	0.069
2.5000	0.006	0.005	0.000	0.069
2.5556	0.006	0.005	0.000	0.069
2.6111	0.006	0.005	0.000	0.069
2.6667	0.006	0.006	0.000	0.069
2.7222	0.006	0.006	0.000	0.069
2.7778	0.006	0.006	0.000	0.069
2.8333	0.006	0.006	0.000	0.069
2.8889	0.006	0.006	0.000	0.069
2.9444	0.006	0.006	0.000	0.069
3.0000	0.006	0.006	0.000	0.069
3.0556	0.006	0.006	0.000	0.069
3.1111	0.006	0.007	0.000	0.069
3.1667	0.006	0.007	0.000	0.069
3.2222	0.006	0.007	0.000	0.069
3.2778	0.006	0.007	0.000	0.069
3.3333	0.006	0.007	0.000	0.069
3.3889	0.006	0.007	0.000	0.069
3.4444	0.006	0.007	0.000	0.069
3.5000	0.006	0.008	0.000	0.069
3.5556	0.006	0.008	0.000	0.069
3.6111	0.006	0.008	0.000	0.069
3.6667	0.006	0.008	0.000	0.069
3.7222	0.006	0.008	0.000	0.069
3.7778	0.006	0.008	0.000	0.069
3.8333	0.006	0.008	0.000	0.069
3.8889	0.006	0.008	0.000	0.069
3.9444	0.006	0.009	0.000	0.069
4.0000	0.006	0.009	0.000	0.069
4.0556	0.006	0.009	0.115	0.069
4.1111	0.006	0.009	0.323	0.069
4.1667	0.006	0.009	0.575	0.069
4.2222	0.006	0.009	0.835	0.069
4.2778	0.006	0.009	1.067	0.069
4.3333	0.006	0.009	1.242	0.069
4.3889	0.006	0.010	1.355	0.069
4.4444	0.006	0.010	1.458	0.069

4.5000	0.006	0.010	1.546	0.069
4.5556	0.006	0.010	1.630	0.069
4.6111	0.006	0.010	1.709	0.069
4.6667	0.006	0.010	1.785	0.069
4.7222	0.006	0.010	1.858	0.069
4.7778	0.006	0.010	1.929	0.069
4.8333	0.006	0.011	1.996	0.069
4.8889	0.006	0.011	2.062	0.069
4.9444	0.006	0.011	2.125	0.069
5.0000	0.006	0.011	2.187	0.069

Analysis Results

POC 1





+ Predeveloped x Mitigated

Predeveloped Landuse Totals for POC #1

Total Pervious Area:	0.19
Total Impervious Area:	0

Mitigated Landuse Totals for POC #1

Total Pervious Area:	0
Total Impervious Area:	0.19

Flow Frequency Method: Log Pearson Type III 17B

Flow Frequency Return Periods for Predeveloped. POC #1

Return Period	**Flow(cfs)**
2 year	0.000125
5 year	0.000168
10 year	0.000201
25 year	0.000249
50 year	0.00029
100 year	0.000336

Flow Frequency Return Periods for Mitigated. POC #1

Return Period	**Flow(cfs)**
2 year	0
5 year	0
10 year	0
25 year	0
50 year	0
100 year	0

Annual Peaks

Annual Peaks for Predeveloped and Mitigated. POC #1

Year	**Predeveloped**	**Mitigated**
1902	0.000	0.000
1903	0.000	0.000
1904	0.000	0.000
1905	0.000	0.000
1906	0.000	0.000
1907	0.000	0.000
1908	0.000	0.000
1909	0.000	0.000
1910	0.000	0.000
1911	0.000	0.000

1912	0.000	0.000
1913	0.000	0.000
1914	0.000	0.000
1915	0.000	0.000
1916	0.000	0.000
1917	0.000	0.000
1918	0.000	0.000
1919	0.000	0.000
1920	0.000	0.000
1921	0.000	0.000
1922	0.000	0.000
1923	0.000	0.000
1924	0.000	0.000
1925	0.000	0.000
1926	0.000	0.000
1927	0.000	0.000
1928	0.000	0.000
1929	0.000	0.000
1930	0.000	0.000
1931	0.000	0.000
1932	0.000	0.000
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1967	0.000	0.000
1968	0.000	0.000
1969	0.000	0.000

1970	0.000	0.000
1971	0.000	0.000
1972	0.000	0.000
1973	0.000	0.000
1974	0.000	0.000
1975	0.000	0.000
1976	0.000	0.000
1977	0.000	0.000
1978	0.000	0.000
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2010	0.000	0.000
2011	0.000	0.000
2012	0.000	0.000
2013	0.000	0.000
2014	0.000	0.000
2015	0.000	0.000
2016	0.000	0.000
2017	0.000	0.000
2018	0.000	0.000
2019	0.000	0.000
2020	0.000	0.000
2021	0.000	0.000
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2023	0.000	0.000
2024	0.000	0.000
2025	0.000	0.000
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2027	0.000	0.000

2028	0.000	0.000
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2033	0.000	0.000
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2036	0.000	0.000
2037	0.000	0.000
2038	0.000	0.000
2039	0.000	0.000
2040	0.000	0.000
2041	0.000	0.000
2042	0.000	0.000
2043	0.000	0.000
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2047	0.000	0.000
2048	0.000	0.000
2049	0.000	0.000
2050	0.000	0.000
2051	0.000	0.000
2052	0.000	0.000
2053	0.000	0.000
2054	0.000	0.000
2055	0.000	0.000
2056	0.000	0.000
2057	0.000	0.000
2058	0.000	0.000
2059	0.001	0.000

Ranked Annual Peaks

Ranked Annual Peaks for Predeveloped and Mitigated. POC #1

Rank	**Predeveloped**	**Mitigated**
1	0.0008	0.0000
2	0.0005	0.0000
3	0.0004	0.0000
4	0.0004	0.0000
5	0.0003	0.0000
6	0.0002	0.0000
7	0.0002	0.0000
8	0.0002	0.0000
9	0.0002	0.0000
10	0.0002	0.0000
11	0.0002	0.0000
12	0.0002	0.0000
13	0.0002	0.0000
14	0.0002	0.0000
15	0.0002	0.0000
16	0.0002	0.0000
17	0.0002	0.0000
18	0.0002	0.0000
19	0.0002	0.0000
20	0.0002	0.0000
21	0.0002	0.0000
22	0.0002	0.0000

23	0.0002	0.0000
24	0.0002	0.0000
25	0.0002	0.0000
26	0.0002	0.0000
27	0.0002	0.0000
28	0.0002	0.0000
29	0.0002	0.0000
30	0.0002	0.0000
31	0.0001	0.0000
32	0.0001	0.0000
33	0.0001	0.0000
34	0.0001	0.0000
35	0.0001	0.0000
36	0.0001	0.0000
37	0.0001	0.0000
38	0.0001	0.0000
39	0.0001	0.0000
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42	0.0001	0.0000
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72	0.0001	0.0000
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74	0.0001	0.0000
75	0.0001	0.0000
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77	0.0001	0.0000
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80	0.0001	0.0000

81	0.0001	0.0000
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142	0.0001	0.0000
143	0.0001	0.0000
144	0.0001	0.0000
145	0.0001	0.0000
146	0.0001	0.0000
147	0.0001	0.0000
148	0.0001	0.0000
149	0.0001	0.0000
150	0.0001	0.0000
151	0.0001	0.0000
152	0.0001	0.0000
153	0.0001	0.0000
154	0.0001	0.0000
155	0.0001	0.0000
156	0.0001	0.0000
157	0.0001	0.0000
158	0.0000	0.0000

Duration Flows

The Facility PASSED

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.0001	7402	0	0	Pass
0.0001	6958	0	0	Pass
0.0001	6377	0	0	Pass
0.0001	6055	0	0	Pass
0.0001	5778	0	0	Pass
0.0001	5468	0	0	Pass
0.0001	5125	0	0	Pass
0.0001	4825	0	0	Pass
0.0001	4571	0	0	Pass
0.0001	4214	0	0	Pass
0.0001	3970	0	0	Pass
0.0001	3725	0	0	Pass
0.0001	3442	0	0	Pass
0.0001	3261	0	0	Pass
0.0001	3118	0	0	Pass
0.0001	2944	0	0	Pass
0.0001	2706	0	0	Pass
0.0001	2541	0	0	Pass
0.0001	2407	0	0	Pass
0.0001	2171	0	0	Pass
0.0001	2038	0	0	Pass
0.0001	1887	0	0	Pass
0.0001	1659	0	0	Pass
0.0001	1550	0	0	Pass
0.0001	1434	0	0	Pass
0.0001	1343	0	0	Pass
0.0001	1177	0	0	Pass
0.0001	1102	0	0	Pass
0.0001	1022	0	0	Pass
0.0001	905	0	0	Pass
0.0001	824	0	0	Pass
0.0001	779	0	0	Pass
0.0001	667	0	0	Pass
0.0001	603	0	0	Pass
0.0001	512	0	0	Pass
0.0001	426	0	0	Pass
0.0001	294	0	0	Pass
0.0001	218	0	0	Pass
0.0001	162	0	0	Pass
0.0002	67	0	0	Pass
0.0002	28	0	0	Pass
0.0002	28	0	0	Pass
0.0002	28	0	0	Pass
0.0002	27	0	0	Pass
0.0002	27	0	0	Pass
0.0002	27	0	0	Pass
0.0002	25	0	0	Pass
0.0002	25	0	0	Pass
0.0002	25	0	0	Pass
0.0002	25	0	0	Pass
0.0002	25	0	0	Pass
0.0002	24	0	0	Pass
0.0002	23	0	0	Pass

0.0002	23	0	0	Pass
0.0002	23	0	0	Pass
0.0002	22	0	0	Pass
0.0002	22	0	0	Pass
0.0002	20	0	0	Pass
0.0002	20	0	0	Pass
0.0002	19	0	0	Pass
0.0002	19	0	0	Pass
0.0002	19	0	0	Pass
0.0002	19	0	0	Pass
0.0002	19	0	0	Pass
0.0002	19	0	0	Pass
0.0002	19	0	0	Pass
0.0002	18	0	0	Pass
0.0002	17	0	0	Pass
0.0002	16	0	0	Pass
0.0002	16	0	0	Pass
0.0002	16	0	0	Pass
0.0002	16	0	0	Pass
0.0002	16	0	0	Pass
0.0002	16	0	0	Pass
0.0002	15	0	0	Pass
0.0002	14	0	0	Pass
0.0002	14	0	0	Pass
0.0002	14	0	0	Pass
0.0002	14	0	0	Pass
0.0002	13	0	0	Pass
0.0002	13	0	0	Pass
0.0002	13	0	0	Pass
0.0003	13	0	0	Pass
0.0003	13	0	0	Pass
0.0003	13	0	0	Pass
0.0003	13	0	0	Pass
0.0003	12	0	0	Pass
0.0003	12	0	0	Pass
0.0003	12	0	0	Pass
0.0003	12	0	0	Pass
0.0003	12	0	0	Pass
0.0003	12	0	0	Pass
0.0003	12	0	0	Pass
0.0003	11	0	0	Pass
0.0003	11	0	0	Pass
0.0003	10	0	0	Pass
0.0003	10	0	0	Pass
0.0003	10	0	0	Pass
0.0003	10	0	0	Pass
0.0003	10	0	0	Pass

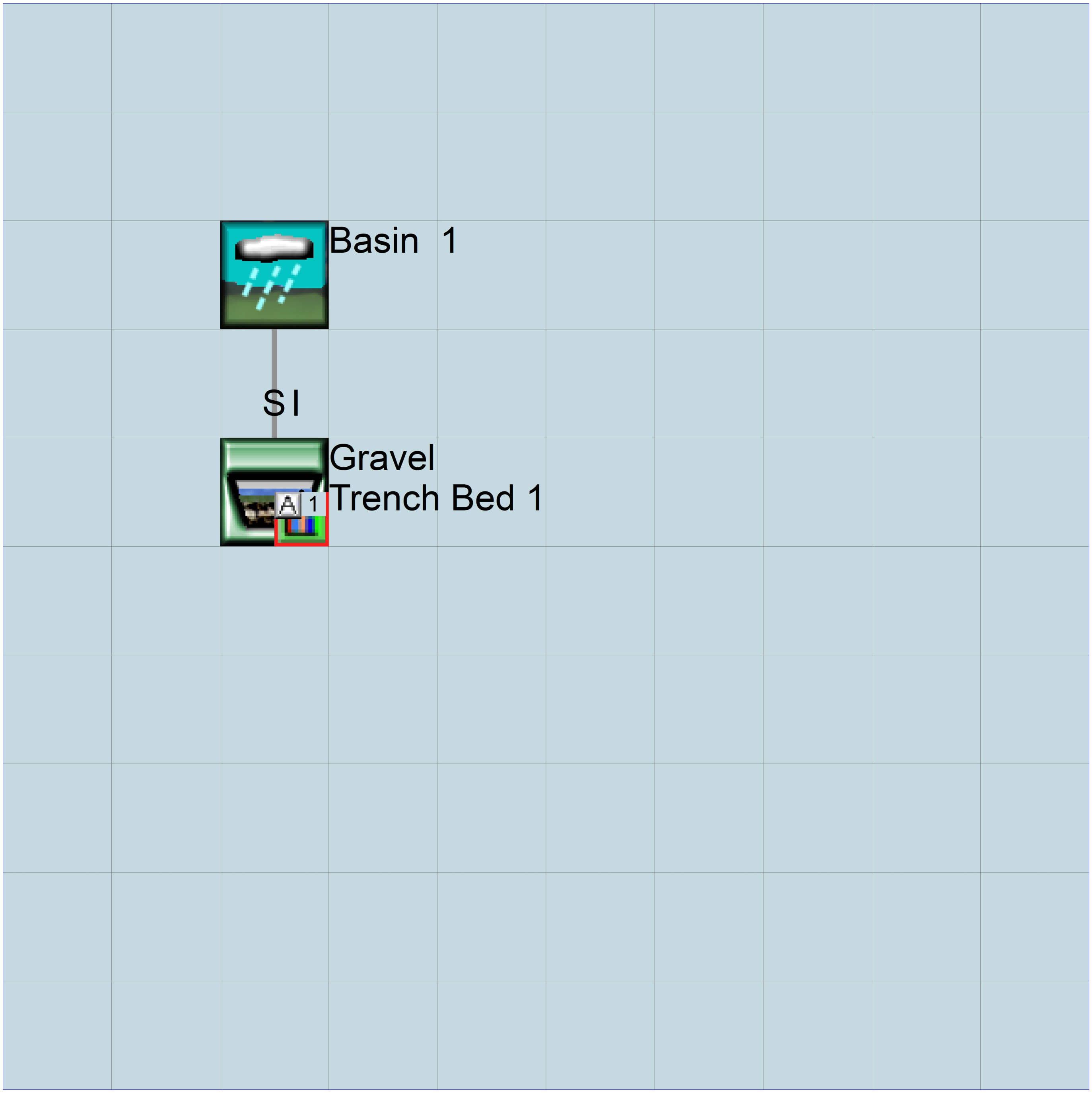
LID Report

LID Technique	Used for Treatment ?	Total Volume Needs Treatment (ac-ft)	Volume Through Facility (ac-ft)	Infiltration Volume (ac-ft)	Cumulative Volume Infiltration Credit	Percent Volume Infiltrated	Water Quality	Percent Water Quality Treated	Comment
Gravel Trench Bed 1 POC	☐	78.08			☐	100.00			
Total Volume Infiltrated		78.08	0.00	0.00		100.00	0.00	0%	No Treat. Credit
Compliance with LID Standard 8% of 2-yr to 50% of 2-yr									Duration Analysis Result = Passed

Appendix

Predeveloped Schematic

Mitigated Schematic



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Local (360)943-0304

www.clearcreeksolutions.com

WWHM2012

PROJECT REPORT

FLOW CONTROL
TRENCH #2
AFFINITY BUILDING

General Model Information

WWHM2012 Project Name: C24-124 Building 2

Site Name:	Affinity at Dupont
Site Address:	
City:	
Report Date:	6/4/2024
Gage:	42 IN WEST
Data Start:	10/01/1901
Data End:	09/30/2059
Timestep:	15 Minute
Precip Scale:	1.000
Version Date:	2023/01/27
Version:	4.2.19

POC Thresholds

Low Flow Threshold for POC1:	50 Percent of the 2 Year
High Flow Threshold for POC1:	50 Year

Landuse Basin Data

Predeveloped Land Use

Basin 2

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
A B, Forest, Flat	0.44
Pervious Total	0.44
Impervious Land Use	acre
Impervious Total	0
Basin Total	0.44

Mitigated Land Use

Basin 2

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
Pervious Total	0
Impervious Land Use	acre
ROOF TOPS FLAT	0.44
Impervious Total	0.44
Basin Total	0.44

Mitigated Routing

Gravel Trench Bed 1

Bottom Length: 57.00 ft.
Bottom Width: 12.00 ft.
Trench bottom slope 1: 0 To 1
Trench Left side slope 0: 0 To 1
Trench right side slope 2: 0 To 1
Material thickness of first layer: 5
Pour Space of material for first layer: 0.33
Material thickness of second layer: 0
Pour Space of material for second layer: 0
Material thickness of third layer: 0
Pour Space of material for third layer: 0
Infiltration On
Infiltration rate: 20
Infiltration safety factor: 0.5
Wetted surface area On
Total Volume Infiltrated (ac-ft.): 199.558
Total Volume Through Riser (ac-ft.): 0
Total Volume Through Facility (ac-ft.): 199.558
Percent Infiltrated: 100
Total Precip Applied to Facility: 0
Total Evap From Facility: 0
Discharge Structure
Riser Height: 4 ft.
Riser Diameter: 10 in.
Element Flows To:
Outlet 1 Outlet 2

Gravel Trench Bed Hydraulic Table

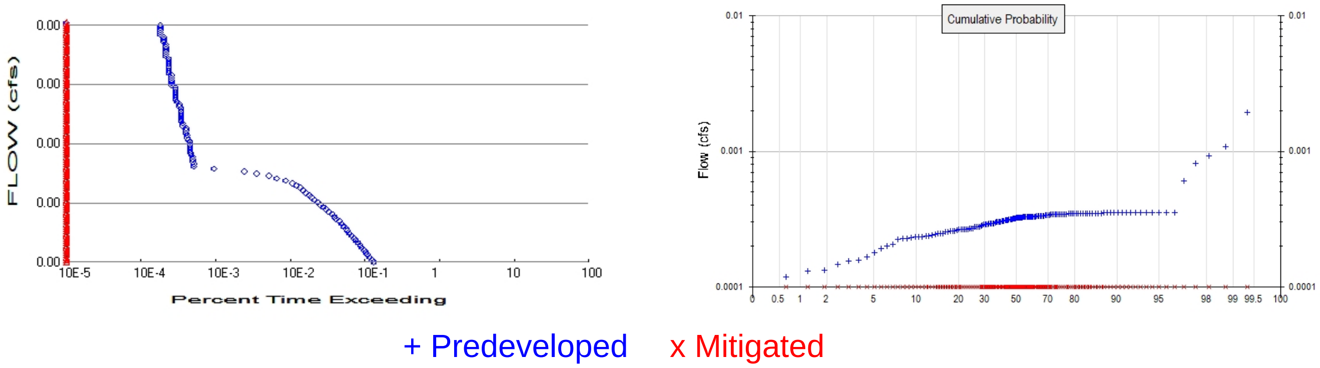
Stage(feet)	**Area(ac.)**	**Volume(ac-ft.)**	**Discharge(cfs)**	**Infilt(cfs)**
0.0000	0.015	0.000	0.000	0.000
0.0556	0.015	0.000	0.000	0.158
0.1111	0.015	0.000	0.000	0.158
0.1667	0.015	0.000	0.000	0.158
0.2222	0.015	0.001	0.000	0.158
0.2778	0.015	0.001	0.000	0.158
0.3333	0.015	0.001	0.000	0.158
0.3889	0.015	0.002	0.000	0.158
0.4444	0.015	0.002	0.000	0.158
0.5000	0.015	0.002	0.000	0.158
0.5556	0.015	0.002	0.000	0.158
0.6111	0.015	0.003	0.000	0.158
0.6667	0.015	0.003	0.000	0.158
0.7222	0.015	0.003	0.000	0.158
0.7778	0.015	0.004	0.000	0.158
0.8333	0.015	0.004	0.000	0.158
0.8889	0.015	0.004	0.000	0.158
0.9444	0.015	0.004	0.000	0.158
1.0000	0.015	0.005	0.000	0.158
1.0556	0.015	0.005	0.000	0.158
1.1111	0.015	0.005	0.000	0.158
1.1667	0.015	0.006	0.000	0.158
1.2222	0.015	0.006	0.000	0.158

1.2778	0.015	0.006	0.000	0.158
1.3333	0.015	0.006	0.000	0.158
1.3889	0.015	0.007	0.000	0.158
1.4444	0.015	0.007	0.000	0.158
1.5000	0.015	0.007	0.000	0.158
1.5556	0.015	0.008	0.000	0.158
1.6111	0.015	0.008	0.000	0.158
1.6667	0.015	0.008	0.000	0.158
1.7222	0.015	0.008	0.000	0.158
1.7778	0.015	0.009	0.000	0.158
1.8333	0.015	0.009	0.000	0.158
1.8889	0.015	0.009	0.000	0.158
1.9444	0.015	0.010	0.000	0.158
2.0000	0.015	0.010	0.000	0.158
2.0556	0.015	0.010	0.000	0.158
2.1111	0.015	0.010	0.000	0.158
2.1667	0.015	0.011	0.000	0.158
2.2222	0.015	0.011	0.000	0.158
2.2778	0.015	0.011	0.000	0.158
2.3333	0.015	0.012	0.000	0.158
2.3889	0.015	0.012	0.000	0.158
2.4444	0.015	0.012	0.000	0.158
2.5000	0.015	0.013	0.000	0.158
2.5556	0.015	0.013	0.000	0.158
2.6111	0.015	0.013	0.000	0.158
2.6667	0.015	0.013	0.000	0.158
2.7222	0.015	0.014	0.000	0.158
2.7778	0.015	0.014	0.000	0.158
2.8333	0.015	0.014	0.000	0.158
2.8889	0.015	0.015	0.000	0.158
2.9444	0.015	0.015	0.000	0.158
3.0000	0.015	0.015	0.000	0.158
3.0556	0.015	0.015	0.000	0.158
3.1111	0.015	0.016	0.000	0.158
3.1667	0.015	0.016	0.000	0.158
3.2222	0.015	0.016	0.000	0.158
3.2778	0.015	0.017	0.000	0.158
3.3333	0.015	0.017	0.000	0.158
3.3889	0.015	0.017	0.000	0.158
3.4444	0.015	0.017	0.000	0.158
3.5000	0.015	0.018	0.000	0.158
3.5556	0.015	0.018	0.000	0.158
3.6111	0.015	0.018	0.000	0.158
3.6667	0.015	0.019	0.000	0.158
3.7222	0.015	0.019	0.000	0.158
3.7778	0.015	0.019	0.000	0.158
3.8333	0.015	0.019	0.000	0.158
3.8889	0.015	0.020	0.000	0.158
3.9444	0.015	0.020	0.000	0.158
4.0000	0.015	0.020	0.000	0.158
4.0556	0.015	0.021	0.115	0.158
4.1111	0.015	0.021	0.323	0.158
4.1667	0.015	0.021	0.575	0.158
4.2222	0.015	0.021	0.835	0.158
4.2778	0.015	0.022	1.067	0.158
4.3333	0.015	0.022	1.242	0.158
4.3889	0.015	0.022	1.355	0.158
4.4444	0.015	0.023	1.458	0.158

4.5000	0.015	0.023	1.546	0.158
4.5556	0.015	0.023	1.630	0.158
4.6111	0.015	0.023	1.709	0.158
4.6667	0.015	0.024	1.785	0.158
4.7222	0.015	0.024	1.858	0.158
4.7778	0.015	0.024	1.929	0.158
4.8333	0.015	0.025	1.996	0.158
4.8889	0.015	0.025	2.062	0.158
4.9444	0.015	0.025	2.125	0.158
5.0000	0.015	0.025	2.187	0.158

Analysis Results

POC 1



Predeveloped Landuse Totals for POC #1

Total Pervious Area:	0.44
Total Impervious Area:	0

Mitigated Landuse Totals for POC #1

Total Pervious Area:	0
Total Impervious Area:	0.44

Flow Frequency Method: Log Pearson Type III 17B

Flow Frequency Return Periods for Predeveloped. POC #1

Return Period	**Flow(cfs)**
2 year	0.00029
5 year	0.000388
10 year	0.000465
25 year	0.000577
50 year	0.000673
100 year	0.000778

Flow Frequency Return Periods for Mitigated. POC #1

Return Period	**Flow(cfs)**
2 year	0
5 year	0
10 year	0
25 year	0
50 year	0
100 year	0

Annual Peaks

Annual Peaks for Predeveloped and Mitigated. POC #1

Year	**Predeveloped**	**Mitigated**
1902	0.000	0.000
1903	0.000	0.000
1904	0.000	0.000
1905	0.000	0.000
1906	0.000	0.000
1907	0.000	0.000
1908	0.000	0.000
1909	0.000	0.000
1910	0.000	0.000
1911	0.000	0.000

1912	0.001	0.000
1913	0.000	0.000
1914	0.000	0.000
1915	0.000	0.000
1916	0.000	0.000
1917	0.000	0.000
1918	0.000	0.000
1919	0.000	0.000
1920	0.000	0.000
1921	0.000	0.000
1922	0.000	0.000
1923	0.000	0.000
1924	0.000	0.000
1925	0.000	0.000
1926	0.000	0.000
1927	0.000	0.000
1928	0.000	0.000
1929	0.000	0.000
1930	0.000	0.000
1931	0.000	0.000
1932	0.000	0.000
1933	0.000	0.000
1934	0.001	0.000
1935	0.000	0.000
1936	0.000	0.000
1937	0.000	0.000
1938	0.000	0.000
1939	0.000	0.000
1940	0.000	0.000
1941	0.000	0.000
1942	0.000	0.000
1943	0.000	0.000
1944	0.000	0.000
1945	0.000	0.000
1946	0.000	0.000
1947	0.000	0.000
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1950	0.000	0.000
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1953	0.000	0.000
1954	0.000	0.000
1955	0.000	0.000
1956	0.000	0.000
1957	0.000	0.000
1958	0.001	0.000
1959	0.000	0.000
1960	0.000	0.000
1961	0.000	0.000
1962	0.000	0.000
1963	0.000	0.000
1964	0.000	0.000
1965	0.000	0.000
1966	0.000	0.000
1967	0.000	0.000
1968	0.000	0.000
1969	0.000	0.000

1970	0.000	0.000
1971	0.000	0.000
1972	0.000	0.000
1973	0.000	0.000
1974	0.000	0.000
1975	0.000	0.000
1976	0.000	0.000
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1981	0.000	0.000
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1984	0.000	0.000
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1986	0.000	0.000
1987	0.000	0.000
1988	0.000	0.000
1989	0.000	0.000
1990	0.000	0.000
1991	0.000	0.000
1992	0.000	0.000
1993	0.000	0.000
1994	0.000	0.000
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2003	0.000	0.000
2004	0.000	0.000
2005	0.000	0.000
2006	0.000	0.000
2007	0.000	0.000
2008	0.000	0.000
2009	0.000	0.000
2010	0.000	0.000
2011	0.000	0.000
2012	0.000	0.000
2013	0.000	0.000
2014	0.000	0.000
2015	0.000	0.000
2016	0.000	0.000
2017	0.000	0.000
2018	0.001	0.000
2019	0.000	0.000
2020	0.000	0.000
2021	0.000	0.000
2022	0.000	0.000
2023	0.000	0.000
2024	0.000	0.000
2025	0.000	0.000
2026	0.000	0.000
2027	0.000	0.000

2028	0.000	0.000
2029	0.000	0.000
2030	0.000	0.000
2031	0.000	0.000
2032	0.000	0.000
2033	0.000	0.000
2034	0.000	0.000
2035	0.000	0.000
2036	0.000	0.000
2037	0.000	0.000
2038	0.000	0.000
2039	0.000	0.000
2040	0.000	0.000
2041	0.000	0.000
2042	0.000	0.000
2043	0.000	0.000
2044	0.000	0.000
2045	0.000	0.000
2046	0.000	0.000
2047	0.000	0.000
2048	0.000	0.000
2049	0.000	0.000
2050	0.000	0.000
2051	0.000	0.000
2052	0.000	0.000
2053	0.000	0.000
2054	0.000	0.000
2055	0.000	0.000
2056	0.000	0.000
2057	0.000	0.000
2058	0.000	0.000
2059	0.002	0.000

Ranked Annual Peaks

Ranked Annual Peaks for Predeveloped and Mitigated. POC #1

Rank	Predeveloped	Mitigated
1	0.0019	0.0000
2	0.0011	0.0000
3	0.0009	0.0000
4	0.0008	0.0000
5	0.0006	0.0000
6	0.0004	0.0000
7	0.0004	0.0000
8	0.0004	0.0000
9	0.0004	0.0000
10	0.0004	0.0000
11	0.0004	0.0000
12	0.0004	0.0000
13	0.0004	0.0000
14	0.0004	0.0000
15	0.0004	0.0000
16	0.0004	0.0000
17	0.0004	0.0000
18	0.0004	0.0000
19	0.0004	0.0000
20	0.0004	0.0000
21	0.0003	0.0000
22	0.0003	0.0000

23	0.0003	0.0000
24	0.0003	0.0000
25	0.0003	0.0000
26	0.0003	0.0000
27	0.0003	0.0000
28	0.0003	0.0000
29	0.0003	0.0000
30	0.0003	0.0000
31	0.0003	0.0000
32	0.0003	0.0000
33	0.0003	0.0000
34	0.0003	0.0000
35	0.0003	0.0000
36	0.0003	0.0000
37	0.0003	0.0000
38	0.0003	0.0000
39	0.0003	0.0000
40	0.0003	0.0000
41	0.0003	0.0000
42	0.0003	0.0000
43	0.0003	0.0000
44	0.0003	0.0000
45	0.0003	0.0000
46	0.0003	0.0000
47	0.0003	0.0000
48	0.0003	0.0000
49	0.0003	0.0000
50	0.0003	0.0000
51	0.0003	0.0000
52	0.0003	0.0000
53	0.0003	0.0000
54	0.0003	0.0000
55	0.0003	0.0000
56	0.0003	0.0000
57	0.0003	0.0000
58	0.0003	0.0000
59	0.0003	0.0000
60	0.0003	0.0000
61	0.0003	0.0000
62	0.0003	0.0000
63	0.0003	0.0000
64	0.0003	0.0000
65	0.0003	0.0000
66	0.0003	0.0000
67	0.0003	0.0000
68	0.0003	0.0000
69	0.0003	0.0000
70	0.0003	0.0000
71	0.0003	0.0000
72	0.0003	0.0000
73	0.0003	0.0000
74	0.0003	0.0000
75	0.0003	0.0000
76	0.0003	0.0000
77	0.0003	0.0000
78	0.0003	0.0000
79	0.0003	0.0000
80	0.0003	0.0000

81	0.0003	0.0000
82	0.0003	0.0000
83	0.0003	0.0000
84	0.0003	0.0000
85	0.0003	0.0000
86	0.0003	0.0000
87	0.0003	0.0000
88	0.0003	0.0000
89	0.0003	0.0000
90	0.0003	0.0000
91	0.0003	0.0000
92	0.0003	0.0000
93	0.0003	0.0000
94	0.0003	0.0000
95	0.0003	0.0000
96	0.0003	0.0000
97	0.0003	0.0000
98	0.0003	0.0000
99	0.0003	0.0000
100	0.0003	0.0000
101	0.0003	0.0000
102	0.0003	0.0000
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110	0.0003	0.0000
111	0.0003	0.0000
112	0.0003	0.0000
113	0.0003	0.0000
114	0.0003	0.0000
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117	0.0003	0.0000
118	0.0003	0.0000
119	0.0003	0.0000
120	0.0003	0.0000
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122	0.0003	0.0000
123	0.0003	0.0000
124	0.0003	0.0000
125	0.0003	0.0000
126	0.0003	0.0000
127	0.0003	0.0000
128	0.0003	0.0000
129	0.0003	0.0000
130	0.0003	0.0000
131	0.0003	0.0000
132	0.0003	0.0000
133	0.0002	0.0000
134	0.0002	0.0000
135	0.0002	0.0000
136	0.0002	0.0000
137	0.0002	0.0000
138	0.0002	0.0000

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141	0.0002	0.0000
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143	0.0002	0.0000
144	0.0002	0.0000
145	0.0002	0.0000
146	0.0002	0.0000
147	0.0002	0.0000
148	0.0002	0.0000
149	0.0002	0.0000
150	0.0002	0.0000
151	0.0002	0.0000
152	0.0002	0.0000
153	0.0002	0.0000
154	0.0001	0.0000
155	0.0001	0.0000
156	0.0001	0.0000
157	0.0001	0.0000
158	0.0001	0.0000

Duration Flows

The Facility PASSED

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.0001	7257	0	0	Pass
0.0002	6803	0	0	Pass
0.0002	6393	0	0	Pass
0.0002	6011	0	0	Pass
0.0002	5656	0	0	Pass
0.0002	5375	0	0	Pass
0.0002	5069	0	0	Pass
0.0002	4755	0	0	Pass
0.0002	4477	0	0	Pass
0.0002	4147	0	0	Pass
0.0002	3907	0	0	Pass
0.0002	3650	0	0	Pass
0.0002	3406	0	0	Pass
0.0002	3238	0	0	Pass
0.0002	3073	0	0	Pass
0.0002	2828	0	0	Pass
0.0002	2685	0	0	Pass
0.0002	2502	0	0	Pass
0.0002	2289	0	0	Pass
0.0002	2161	0	0	Pass
0.0003	2003	0	0	Pass
0.0003	1819	0	0	Pass
0.0003	1647	0	0	Pass
0.0003	1534	0	0	Pass
0.0003	1397	0	0	Pass
0.0003	1288	0	0	Pass
0.0003	1168	0	0	Pass
0.0003	1074	0	0	Pass
0.0003	988	0	0	Pass
0.0003	899	0	0	Pass
0.0003	816	0	0	Pass
0.0003	749	0	0	Pass
0.0003	667	0	0	Pass
0.0003	584	0	0	Pass
0.0003	482	0	0	Pass
0.0003	366	0	0	Pass
0.0003	285	0	0	Pass
0.0003	196	0	0	Pass
0.0003	135	0	0	Pass
0.0004	53	0	0	Pass
0.0004	28	0	0	Pass
0.0004	28	0	0	Pass
0.0004	27	0	0	Pass
0.0004	27	0	0	Pass
0.0004	27	0	0	Pass
0.0004	26	0	0	Pass
0.0004	25	0	0	Pass
0.0004	25	0	0	Pass
0.0004	25	0	0	Pass
0.0004	25	0	0	Pass
0.0004	25	0	0	Pass
0.0004	24	0	0	Pass
0.0004	23	0	0	Pass

0.0004	23	0	0	Pass
0.0004	22	0	0	Pass
0.0004	22	0	0	Pass
0.0004	22	0	0	Pass
0.0004	20	0	0	Pass
0.0005	20	0	0	Pass
0.0005	19	0	0	Pass
0.0005	19	0	0	Pass
0.0005	19	0	0	Pass
0.0005	19	0	0	Pass
0.0005	19	0	0	Pass
0.0005	19	0	0	Pass
0.0005	18	0	0	Pass
0.0005	18	0	0	Pass
0.0005	17	0	0	Pass
0.0005	16	0	0	Pass
0.0005	16	0	0	Pass
0.0005	16	0	0	Pass
0.0005	16	0	0	Pass
0.0005	16	0	0	Pass
0.0005	16	0	0	Pass
0.0005	14	0	0	Pass
0.0005	14	0	0	Pass
0.0006	14	0	0	Pass
0.0006	14	0	0	Pass
0.0006	14	0	0	Pass
0.0006	13	0	0	Pass
0.0006	13	0	0	Pass
0.0006	13	0	0	Pass
0.0006	13	0	0	Pass
0.0006	13	0	0	Pass
0.0006	13	0	0	Pass
0.0006	13	0	0	Pass
0.0006	12	0	0	Pass
0.0006	12	0	0	Pass
0.0006	12	0	0	Pass
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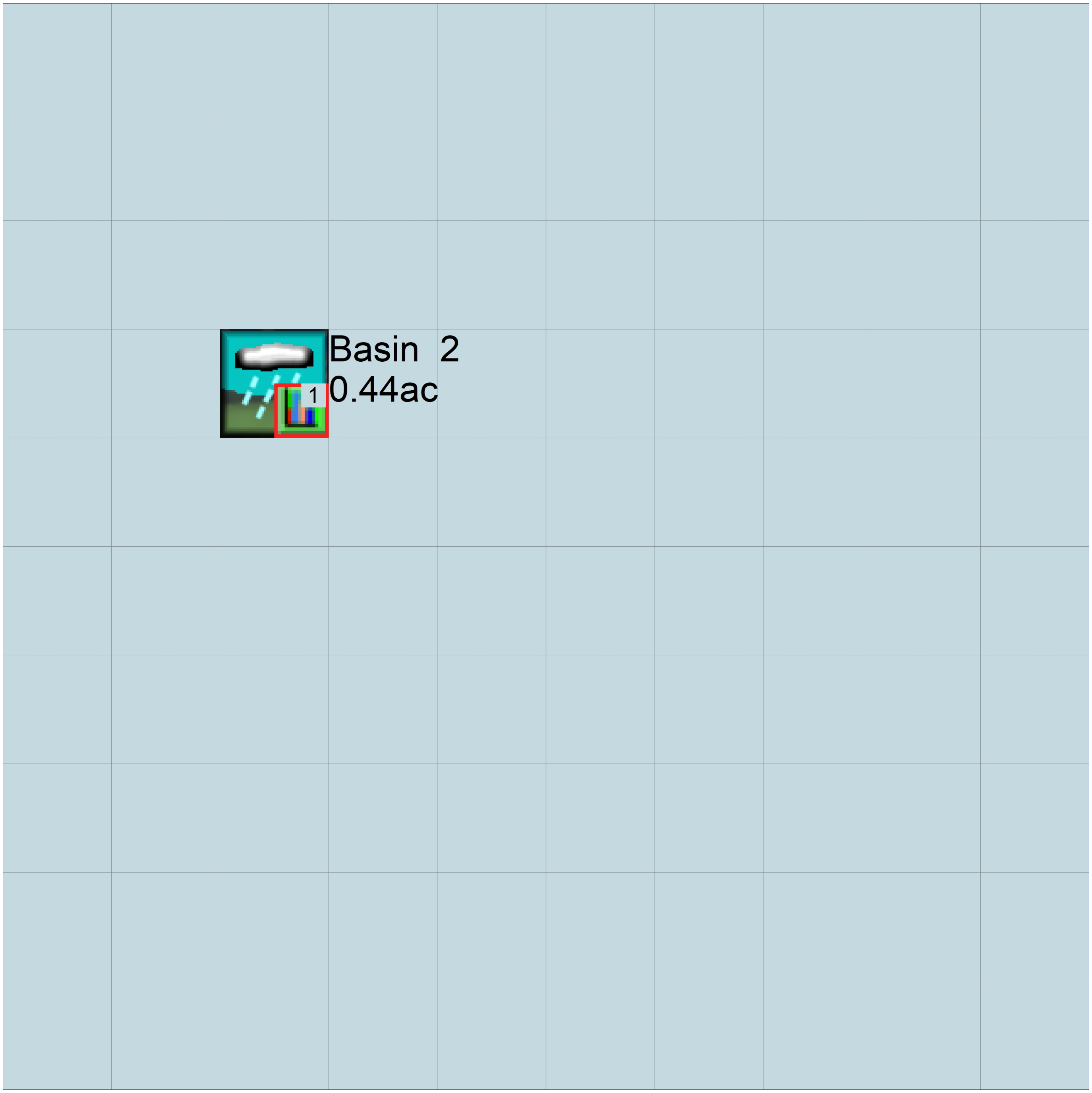
0.0006	12	0	0	Pass
0.0006	12	0	0	Pass
0.0006	11	0	0	Pass
0.0006	11	0	0	Pass
0.0006	11	0	0	Pass
0.0007	10	0	0	Pass
0.0007	10	0	0	Pass
0.0007	10	0	0	Pass
0.0007	10	0	0	Pass
0.0007	10	0	0	Pass

LID Report

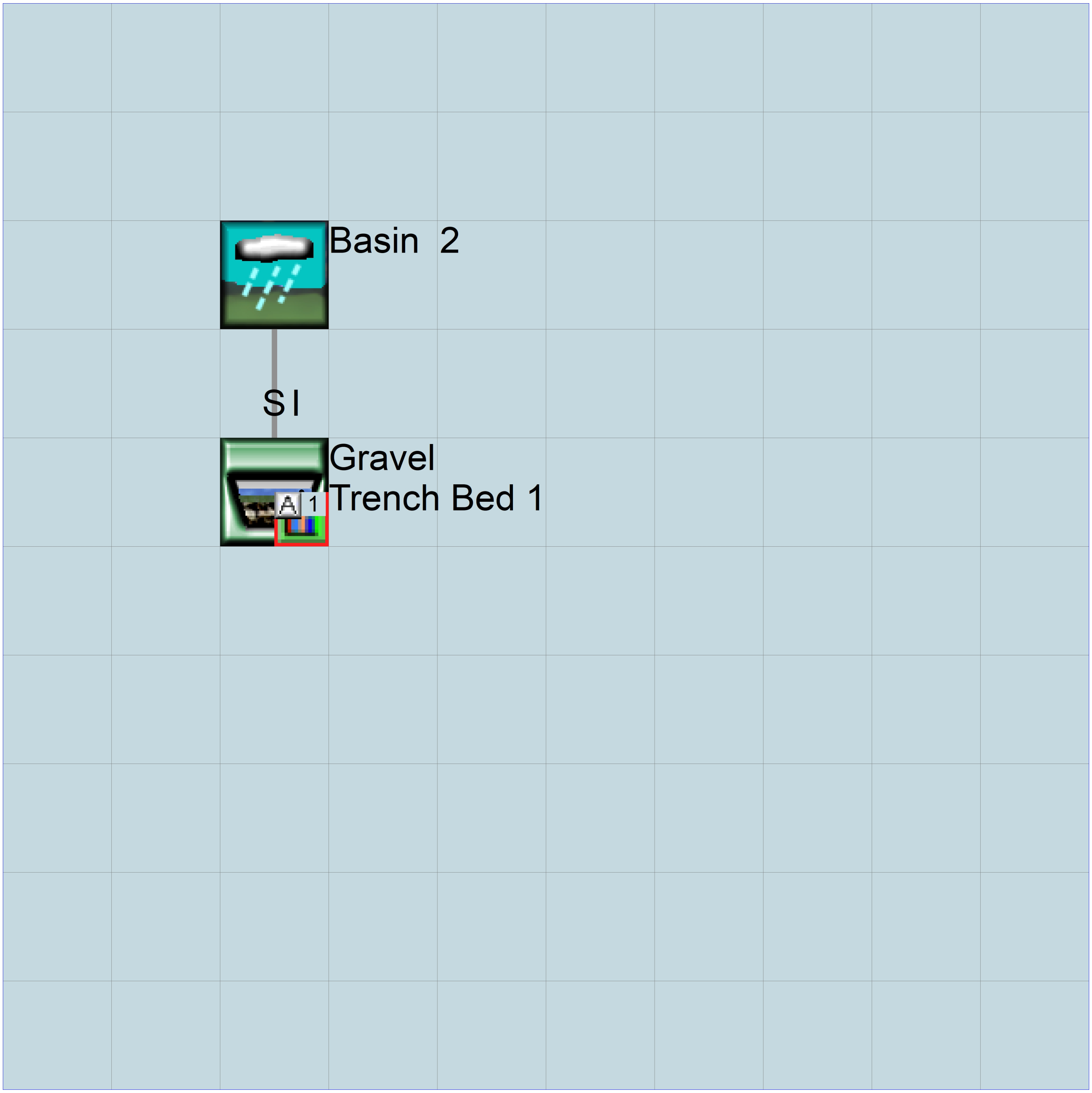
LID Technique	Used for Treatment ?	Total Volume Needs Treatment (ac-ft)	Volume Through Facility (ac-ft)	Infiltration Volume (ac-ft)	Cumulative Volume Infiltration Credit	Percent Volume Infiltrated	Water Quality	Percent Water Quality Treated	Comment
Gravel Trench Bed 1 POC	☐	181.60			☐	100.00			
Total Volume Infiltrated		181.60	0.00	0.00		100.00	0.00	0%	No Treat. Credit
Compliance with LID Standard 8% of 2-yr to 50% of 2-yr									Duration Analysis Result = Passed

Appendix

Predeveloped Schematic



Mitigated Schematic



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WWHM2012

PROJECT REPORT

FLOW CONTROL TRENCH #3 AFFINITY BUILDING

General Model Information

WWHM2012 Project Name: C24-124 Building 3

Site Name: Affinity at Dupont
Site Address:
City:
Report Date: 6/4/2024
Gage: 42 IN WEST
Data Start: 10/01/1901
Data End: 09/30/2059
Timestep: 15 Minute
Precip Scale: 1.000
Version Date: 2023/01/27
Version: 4.2.19

POC Thresholds

Low Flow Threshold for POC1: 50 Percent of the 2 Year
High Flow Threshold for POC1: 50 Year

Landuse Basin Data

Predeveloped Land Use

Basin 3

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
A B, Forest, Flat	0.4
Pervious Total	0.4
Impervious Land Use	acre
Impervious Total	0
Basin Total	0.4

Mitigated Land Use

Basin 3

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
Pervious Total	0
Impervious Land Use	acre
ROOF TOPS FLAT	0.4
Impervious Total	0.4
Basin Total	0.4

Mitigated Routing

Gravel Trench Bed 1

Bottom Length:	56.00 ft.
Bottom Width:	11.00 ft.
Trench bottom slope 1:	0 To 1
Trench Left side slope 0:	0 To 1
Trench right side slope 2:	0 To 1
Material thickness of first layer:	5
Pour Space of material for first layer:	0.33
Material thickness of second layer:	0
Pour Space of material for second layer:	0
Material thickness of third layer:	0
Pour Space of material for third layer:	0
Infiltration On	
Infiltration rate:	20
Infiltration safety factor:	0.5
Wetted surface area On	
Total Volume Infiltrated (ac-ft.):	181.362
Total Volume Through Riser (ac-ft.):	0
Total Volume Through Facility (ac-ft.):	181.362
Percent Infiltrated:	100
Total Precip Applied to Facility:	0
Total Evap From Facility:	0

Discharge Structure

Riser Height:	4 ft.
Riser Diameter:	10 in.

Element Flows To:

Outlet 1 Outlet 2

Gravel Trench Bed Hydraulic Table

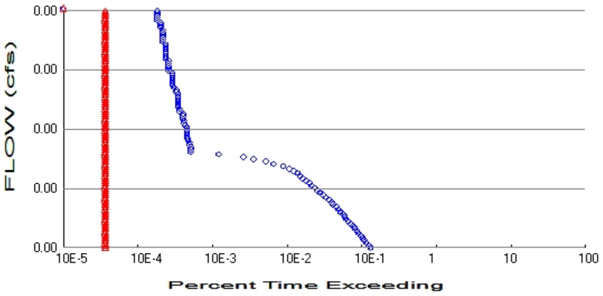
Stage(feet)	**Area(ac.)**	**Volume(ac-ft.)**	**Discharge(cfs)**	**Infilt(cfs)**
0.0000	0.014	0.000	0.000	0.000
0.0556	0.014	0.000	0.000	0.142
0.1111	0.014	0.000	0.000	0.142
0.1667	0.014	0.000	0.000	0.142
0.2222	0.014	0.001	0.000	0.142
0.2778	0.014	0.001	0.000	0.142
0.3333	0.014	0.001	0.000	0.142
0.3889	0.014	0.001	0.000	0.142
0.4444	0.014	0.002	0.000	0.142
0.5000	0.014	0.002	0.000	0.142
0.5556	0.014	0.002	0.000	0.142
0.6111	0.014	0.002	0.000	0.142
0.6667	0.014	0.003	0.000	0.142
0.7222	0.014	0.003	0.000	0.142
0.7778	0.014	0.003	0.000	0.142
0.8333	0.014	0.003	0.000	0.142
0.8889	0.014	0.004	0.000	0.142
0.9444	0.014	0.004	0.000	0.142
1.0000	0.014	0.004	0.000	0.142
1.0556	0.014	0.004	0.000	0.142
1.1111	0.014	0.005	0.000	0.142
1.1667	0.014	0.005	0.000	0.142
1.2222	0.014	0.005	0.000	0.142

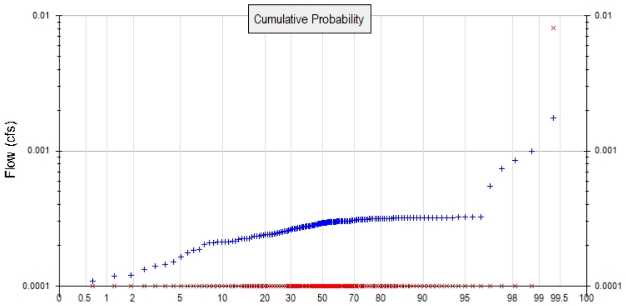
1.2778	0.014	0.006	0.000	0.142
1.3333	0.014	0.006	0.000	0.142
1.3889	0.014	0.006	0.000	0.142
1.4444	0.014	0.006	0.000	0.142
1.5000	0.014	0.007	0.000	0.142
1.5556	0.014	0.007	0.000	0.142
1.6111	0.014	0.007	0.000	0.142
1.6667	0.014	0.007	0.000	0.142
1.7222	0.014	0.008	0.000	0.142
1.7778	0.014	0.008	0.000	0.142
1.8333	0.014	0.008	0.000	0.142
1.8889	0.014	0.008	0.000	0.142
1.9444	0.014	0.009	0.000	0.142
2.0000	0.014	0.009	0.000	0.142
2.0556	0.014	0.009	0.000	0.142
2.1111	0.014	0.009	0.000	0.142
2.1667	0.014	0.010	0.000	0.142
2.2222	0.014	0.010	0.000	0.142
2.2778	0.014	0.010	0.000	0.142
2.3333	0.014	0.010	0.000	0.142
2.3889	0.014	0.011	0.000	0.142
2.4444	0.014	0.011	0.000	0.142
2.5000	0.014	0.011	0.000	0.142
2.5556	0.014	0.011	0.000	0.142
2.6111	0.014	0.012	0.000	0.142
2.6667	0.014	0.012	0.000	0.142
2.7222	0.014	0.012	0.000	0.142
2.7778	0.014	0.013	0.000	0.142
2.8333	0.014	0.013	0.000	0.142
2.8889	0.014	0.013	0.000	0.142
2.9444	0.014	0.013	0.000	0.142
3.0000	0.014	0.014	0.000	0.142
3.0556	0.014	0.014	0.000	0.142
3.1111	0.014	0.014	0.000	0.142
3.1667	0.014	0.014	0.000	0.142
3.2222	0.014	0.015	0.000	0.142
3.2778	0.014	0.015	0.000	0.142
3.3333	0.014	0.015	0.000	0.142
3.3889	0.014	0.015	0.000	0.142
3.4444	0.014	0.016	0.000	0.142
3.5000	0.014	0.016	0.000	0.142
3.5556	0.014	0.016	0.000	0.142
3.6111	0.014	0.016	0.000	0.142
3.6667	0.014	0.017	0.000	0.142
3.7222	0.014	0.017	0.000	0.142
3.7778	0.014	0.017	0.000	0.142
3.8333	0.014	0.017	0.000	0.142
3.8889	0.014	0.018	0.000	0.142
3.9444	0.014	0.018	0.000	0.142
4.0000	0.014	0.018	0.000	0.142
4.0556	0.014	0.018	0.115	0.142
4.1111	0.014	0.019	0.323	0.142
4.1667	0.014	0.019	0.575	0.142
4.2222	0.014	0.019	0.835	0.142
4.2778	0.014	0.020	1.067	0.142
4.3333	0.014	0.020	1.242	0.142
4.3889	0.014	0.020	1.355	0.142
4.4444	0.014	0.020	1.458	0.142

4.5000	0.014	0.021	1.546	0.142
4.5556	0.014	0.021	1.630	0.142
4.6111	0.014	0.021	1.709	0.142
4.6667	0.014	0.021	1.785	0.142
4.7222	0.014	0.022	1.858	0.142
4.7778	0.014	0.022	1.929	0.142
4.8333	0.014	0.022	1.996	0.142
4.8889	0.014	0.022	2.062	0.142
4.9444	0.014	0.023	2.125	0.142
5.0000	0.014	0.023	2.187	0.142

Analysis Results

POC 1





+ Predeveloped x Mitigated

Predeveloped Landuse Totals for POC #1

Total Pervious Area:	0.4
Total Impervious Area:	0

Mitigated Landuse Totals for POC #1

Total Pervious Area:	0
Total Impervious Area:	0.4

Flow Frequency Method: Log Pearson Type III 17B

Flow Frequency Return Periods for Predeveloped. POC #1

Return Period	**Flow(cfs)**
2 year	0.000264
5 year	0.000353
10 year	0.000423
25 year	0.000525
50 year	0.000611
100 year	0.000708

Flow Frequency Return Periods for Mitigated. POC #1

Return Period	**Flow(cfs)**
2 year	0
5 year	0
10 year	0
25 year	0
50 year	0
100 year	0

Annual Peaks

Annual Peaks for Predeveloped and Mitigated. POC #1

Year	**Predeveloped**	**Mitigated**
1902	0.000	0.000
1903	0.000	0.000
1904	0.000	0.000
1905	0.000	0.000
1906	0.000	0.000
1907	0.000	0.000
1908	0.000	0.000
1909	0.000	0.000
1910	0.000	0.000
1911	0.000	0.000

1912	0.001	0.000
1913	0.000	0.000
1914	0.000	0.000
1915	0.000	0.000
1916	0.000	0.000
1917	0.000	0.000
1918	0.000	0.000
1919	0.000	0.000
1920	0.000	0.000
1921	0.000	0.000
1922	0.000	0.000
1923	0.000	0.000
1924	0.000	0.000
1925	0.000	0.000
1926	0.000	0.000
1927	0.000	0.000
1928	0.000	0.000
1929	0.000	0.000
1930	0.000	0.000
1931	0.000	0.000
1932	0.000	0.000
1933	0.000	0.000
1934	0.001	0.000
1935	0.000	0.000
1936	0.000	0.000
1937	0.000	0.000
1938	0.000	0.000
1939	0.000	0.000
1940	0.000	0.000
1941	0.000	0.000
1942	0.000	0.000
1943	0.000	0.000
1944	0.000	0.000
1945	0.000	0.000
1946	0.000	0.000
1947	0.000	0.000
1948	0.000	0.000
1949	0.000	0.000
1950	0.000	0.000
1951	0.000	0.000
1952	0.000	0.000
1953	0.000	0.000
1954	0.000	0.000
1955	0.000	0.000
1956	0.000	0.000
1957	0.000	0.000
1958	0.001	0.000
1959	0.000	0.000
1960	0.000	0.000
1961	0.000	0.000
1962	0.000	0.000
1963	0.000	0.000
1964	0.000	0.000
1965	0.000	0.000
1966	0.000	0.000
1967	0.000	0.000
1968	0.000	0.000
1969	0.000	0.000

1970	0.000	0.000
1971	0.000	0.000
1972	0.000	0.008
1973	0.000	0.000
1974	0.000	0.000
1975	0.000	0.000
1976	0.000	0.000
1977	0.000	0.000
1978	0.000	0.000
1979	0.000	0.000
1980	0.000	0.000
1981	0.000	0.000
1982	0.000	0.000
1983	0.000	0.000
1984	0.000	0.000
1985	0.000	0.000
1986	0.000	0.000
1987	0.000	0.000
1988	0.000	0.000
1989	0.000	0.000
1990	0.000	0.000
1991	0.000	0.000
1992	0.000	0.000
1993	0.000	0.000
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1996	0.000	0.000
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1999	0.000	0.000
2000	0.000	0.000
2001	0.000	0.000
2002	0.000	0.000
2003	0.000	0.000
2004	0.000	0.000
2005	0.000	0.000
2006	0.000	0.000
2007	0.000	0.000
2008	0.000	0.000
2009	0.000	0.000
2010	0.000	0.000
2011	0.000	0.000
2012	0.000	0.000
2013	0.000	0.000
2014	0.000	0.000
2015	0.000	0.000
2016	0.000	0.000
2017	0.000	0.000
2018	0.001	0.000
2019	0.000	0.000
2020	0.000	0.000
2021	0.000	0.000
2022	0.000	0.000
2023	0.000	0.000
2024	0.000	0.000
2025	0.000	0.000
2026	0.000	0.000
2027	0.000	0.000

2028	0.000	0.000
2029	0.000	0.000
2030	0.000	0.000
2031	0.000	0.000
2032	0.000	0.000
2033	0.000	0.000
2034	0.000	0.000
2035	0.000	0.000
2036	0.000	0.000
2037	0.000	0.000
2038	0.000	0.000
2039	0.000	0.000
2040	0.000	0.000
2041	0.000	0.000
2042	0.000	0.000
2043	0.000	0.000
2044	0.000	0.000
2045	0.000	0.000
2046	0.000	0.000
2047	0.000	0.000
2048	0.000	0.000
2049	0.000	0.000
2050	0.000	0.000
2051	0.000	0.000
2052	0.000	0.000
2053	0.000	0.000
2054	0.000	0.000
2055	0.000	0.000
2056	0.000	0.000
2057	0.000	0.000
2058	0.000	0.000
2059	0.002	0.000

Ranked Annual Peaks

Ranked Annual Peaks for Predeveloped and Mitigated. POC #1

Rank	Predeveloped	Mitigated
1	0.0018	0.0081
2	0.0010	0.0000
3	0.0008	0.0000
4	0.0007	0.0000
5	0.0005	0.0000
6	0.0003	0.0000
7	0.0003	0.0000
8	0.0003	0.0000
9	0.0003	0.0000
10	0.0003	0.0000
11	0.0003	0.0000
12	0.0003	0.0000
13	0.0003	0.0000
14	0.0003	0.0000
15	0.0003	0.0000
16	0.0003	0.0000
17	0.0003	0.0000
18	0.0003	0.0000
19	0.0003	0.0000
20	0.0003	0.0000
21	0.0003	0.0000
22	0.0003	0.0000

23	0.0003	0.0000
24	0.0003	0.0000
25	0.0003	0.0000
26	0.0003	0.0000
27	0.0003	0.0000
28	0.0003	0.0000
29	0.0003	0.0000
30	0.0003	0.0000
31	0.0003	0.0000
32	0.0003	0.0000
33	0.0003	0.0000
34	0.0003	0.0000
35	0.0003	0.0000
36	0.0003	0.0000
37	0.0003	0.0000
38	0.0003	0.0000
39	0.0003	0.0000
40	0.0003	0.0000
41	0.0003	0.0000
42	0.0003	0.0000
43	0.0003	0.0000
44	0.0003	0.0000
45	0.0003	0.0000
46	0.0003	0.0000
47	0.0003	0.0000
48	0.0003	0.0000
49	0.0003	0.0000
50	0.0003	0.0000
51	0.0003	0.0000
52	0.0003	0.0000
53	0.0003	0.0000
54	0.0003	0.0000
55	0.0003	0.0000
56	0.0003	0.0000
57	0.0003	0.0000
58	0.0003	0.0000
59	0.0003	0.0000
60	0.0003	0.0000
61	0.0003	0.0000
62	0.0003	0.0000
63	0.0003	0.0000
64	0.0003	0.0000
65	0.0003	0.0000
66	0.0003	0.0000
67	0.0003	0.0000
68	0.0003	0.0000
69	0.0003	0.0000
70	0.0003	0.0000
71	0.0003	0.0000
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151	0.0002	0.0000
152	0.0001	0.0000
153	0.0001	0.0000
154	0.0001	0.0000
155	0.0001	0.0000
156	0.0001	0.0000
157	0.0001	0.0000
158	0.0001	0.0000

Duration Flows

The Facility PASSED

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.0001	7224	2	0	Pass
0.0001	6836	2	0	Pass
0.0001	6382	2	0	Pass
0.0001	6028	2	0	Pass
0.0002	5640	2	0	Pass
0.0002	5348	2	0	Pass
0.0002	5060	2	0	Pass
0.0002	4779	2	0	Pass
0.0002	4477	2	0	Pass
0.0002	4193	2	0	Pass
0.0002	3907	2	0	Pass
0.0002	3627	2	0	Pass
0.0002	3406	2	0	Pass
0.0002	3255	2	0	Pass
0.0002	3073	2	0	Pass
0.0002	2856	2	0	Pass
0.0002	2690	2	0	Pass
0.0002	2498	2	0	Pass
0.0002	2293	2	0	Pass
0.0002	2173	2	0	Pass
0.0002	2010	2	0	Pass
0.0002	1837	2	0	Pass
0.0002	1652	2	0	Pass
0.0002	1527	2	0	Pass
0.0002	1398	2	0	Pass
0.0003	1312	2	0	Pass
0.0003	1173	2	0	Pass
0.0003	1089	2	0	Pass
0.0003	989	2	0	Pass
0.0003	892	2	0	Pass
0.0003	817	2	0	Pass
0.0003	763	2	0	Pass
0.0003	670	2	0	Pass
0.0003	595	2	0	Pass
0.0003	489	2	0	Pass
0.0003	365	2	0	Pass
0.0003	288	2	0	Pass
0.0003	196	2	1	Pass
0.0003	144	2	1	Pass
0.0003	67	2	2	Pass
0.0003	28	2	7	Pass
0.0003	28	2	7	Pass
0.0003	28	2	7	Pass
0.0003	27	2	7	Pass
0.0003	27	2	7	Pass
0.0003	26	2	7	Pass
0.0004	25	2	8	Pass
0.0004	25	2	8	Pass
0.0004	25	2	8	Pass
0.0004	25	2	8	Pass
0.0004	25	2	8	Pass
0.0004	24	2	8	Pass
0.0004	23	2	8	Pass

0.0004	23	2	8	Pass
0.0004	22	2	9	Pass
0.0004	22	2	9	Pass
0.0004	22	2	9	Pass
0.0004	20	2	10	Pass
0.0004	20	2	10	Pass
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0.0004	19	2	10	Pass
0.0004	19	2	10	Pass
0.0004	19	2	10	Pass
0.0004	18	2	11	Pass
0.0005	18	2	11	Pass
0.0005	17	2	11	Pass
0.0005	16	2	12	Pass
0.0005	16	2	12	Pass
0.0005	16	2	12	Pass
0.0005	16	2	12	Pass
0.0005	16	2	12	Pass
0.0005	16	2	12	Pass
0.0005	14	2	14	Pass
0.0005	14	2	14	Pass
0.0005	14	2	14	Pass
0.0005	14	2	14	Pass
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0.0005	12	2	16	Pass
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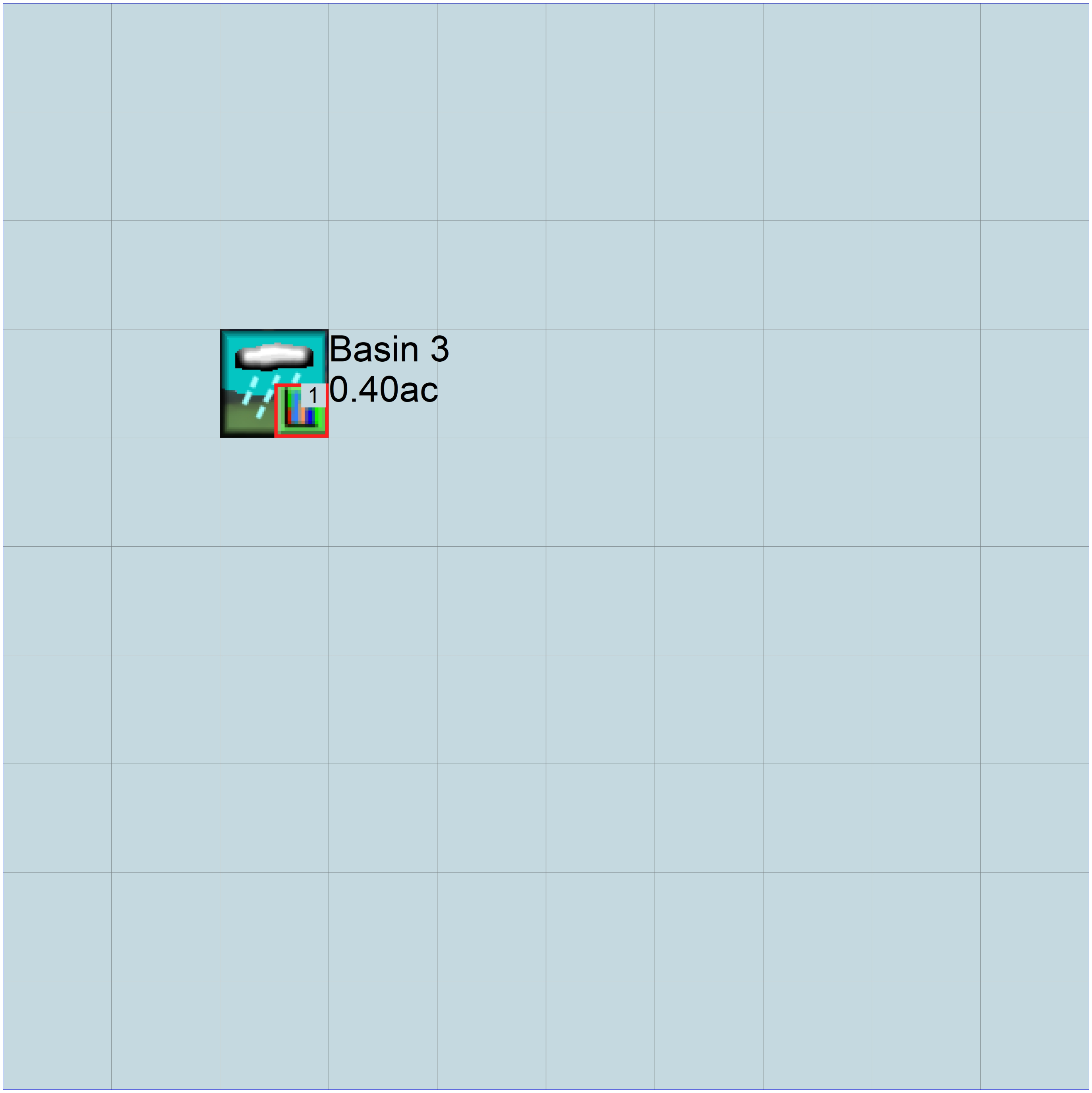
0.0006	12	2	16	Pass
0.0006	11	2	18	Pass
0.0006	11	2	18	Pass
0.0006	11	2	18	Pass
0.0006	10	2	20	Pass
0.0006	10	2	20	Pass
0.0006	10	2	20	Pass
0.0006	10	2	20	Pass
0.0006	10	2	20	Pass

LID Report

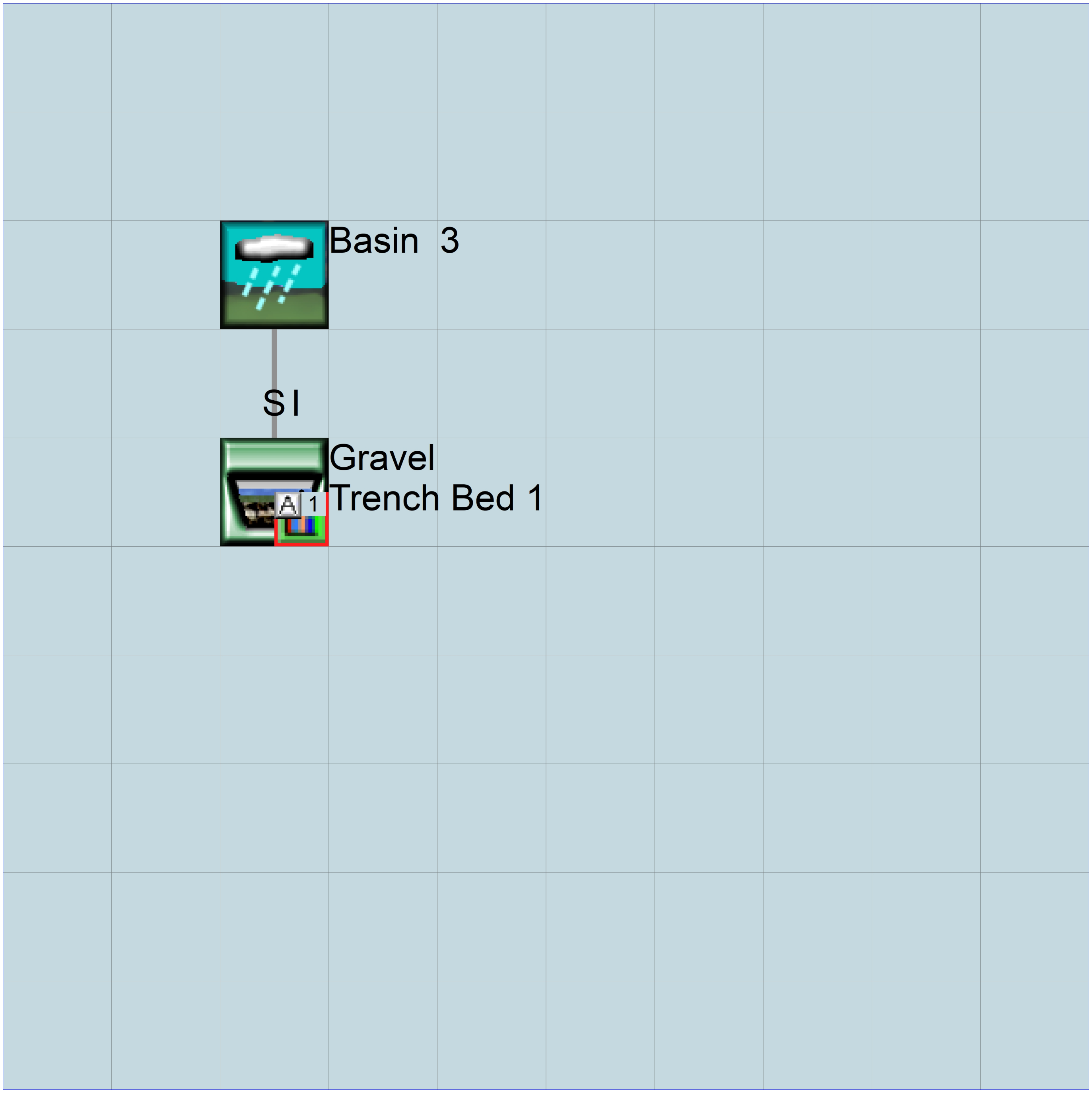
LID Technique	Used for Treatment ?	Total Volume Needs Treatment (ac-ft)	Volume Through Facility (ac-ft)	Infiltration Volume (ac-ft)	Cumulative Volume Infiltration Credit	Percent Volume Infiltrated	Water Quality	Percent Water Quality Treated	Comment
Gravel Trench Bed 1 POC	☐	165.04			☐	100.00			
Total Volume Infiltrated		165.04	0.00	0.00		100.00	0.00	0%	No Treat. Credit
Compliance with LID Standard 8% of 2-yr to 50% of 2-yr									Duration Analysis Result = Passed

Appendix

Predeveloped Schematic



Mitigated Schematic



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Olympia, WA. 98501
Toll Free 1(866)943-0304
Local (360)943-0304

www.clearcreeksolutions.com

WWHM2012

PROJECT REPORT

FLOW CONTROL

TRENCH #5
CLUBHOUSE

General Model Information

WWHM2012 Project Name: C24-124 Clubhouse

Site Name: Affinity at Dupont
Site Address:
City:
Report Date: 6/4/2024
Gage: 42 IN WEST
Data Start: 10/01/1901
Data End: 09/30/2059
Timestep: 15 Minute
Precip Scale: 1.000
Version Date: 2023/01/27
Version: 4.2.19

POC Thresholds

Low Flow Threshold for POC1: 50 Percent of the 2 Year
High Flow Threshold for POC1: 50 Year

Landuse Basin Data

Predeveloped Land Use

Basin 1

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
A B, Forest, Flat	0.14
Pervious Total	0.14
Impervious Land Use	acre
Impervious Total	0
Basin Total	0.14

Mitigated Land Use

Basin 1

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
Pervious Total	0
Impervious Land Use	acre
ROOF TOPS FLAT	0.14
Impervious Total	0.14
Basin Total	0.14

Mitigated Routing

Gravel Trench Bed 1

Bottom Length:	22.00 ft.
Bottom Width:	10.00 ft.
Trench bottom slope 1:	0 To 1
Trench Left side slope 0:	0 To 1
Trench right side slope 2:	0 To 1
Material thickness of first layer:	5
Pour Space of material for first layer:	0.33
Material thickness of second layer:	0
Pour Space of material for second layer:	0
Material thickness of third layer:	0
Pour Space of material for third layer:	0
Infiltration On	
Infiltration rate:	20
Infiltration safety factor:	0.5
Wetted surface area On	
Total Volume Infiltrated (ac-ft.):	63.066
Total Volume Through Riser (ac-ft.):	0
Total Volume Through Facility (ac-ft.):	63.066
Percent Infiltrated:	100
Total Precip Applied to Facility:	0
Total Evap From Facility:	0

Discharge Structure

Riser Height:	4 ft.
Riser Diameter:	10 in.

Element Flows To:

Outlet 1	Outlet 2

Gravel Trench Bed Hydraulic Table

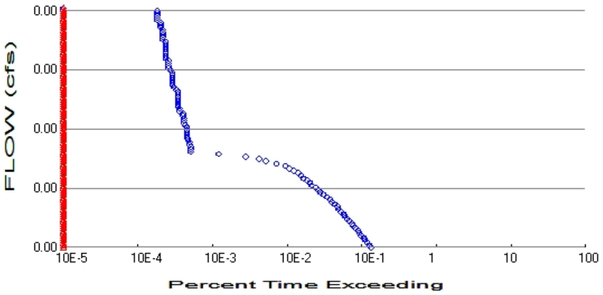
Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	Infilt(cfs)
0.0000	0.005	0.000	0.000	0.000
0.0556	0.005	0.000	0.000	0.050
0.1111	0.005	0.000	0.000	0.050
0.1667	0.005	0.000	0.000	0.050
0.2222	0.005	0.000	0.000	0.050
0.2778	0.005	0.000	0.000	0.050
0.3333	0.005	0.000	0.000	0.050
0.3889	0.005	0.000	0.000	0.050
0.4444	0.005	0.000	0.000	0.050
0.5000	0.005	0.000	0.000	0.050
0.5556	0.005	0.000	0.000	0.050
0.6111	0.005	0.001	0.000	0.050
0.6667	0.005	0.001	0.000	0.050
0.7222	0.005	0.001	0.000	0.050
0.7778	0.005	0.001	0.000	0.050
0.8333	0.005	0.001	0.000	0.050
0.8889	0.005	0.001	0.000	0.050
0.9444	0.005	0.001	0.000	0.050
1.0000	0.005	0.001	0.000	0.050
1.0556	0.005	0.001	0.000	0.050
1.1111	0.005	0.001	0.000	0.050
1.1667	0.005	0.001	0.000	0.050
1.2222	0.005	0.002	0.000	0.050

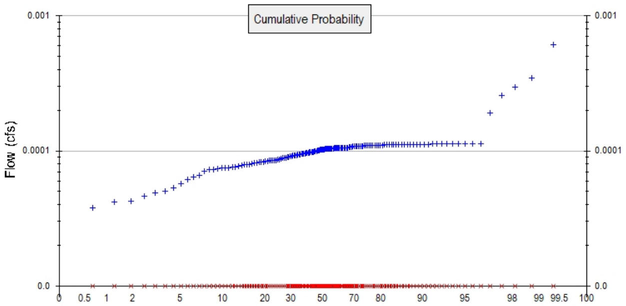
1.2778	0.005	0.002	0.000	0.050
1.3333	0.005	0.002	0.000	0.050
1.3889	0.005	0.002	0.000	0.050
1.4444	0.005	0.002	0.000	0.050
1.5000	0.005	0.002	0.000	0.050
1.5556	0.005	0.002	0.000	0.050
1.6111	0.005	0.002	0.000	0.050
1.6667	0.005	0.002	0.000	0.050
1.7222	0.005	0.002	0.000	0.050
1.7778	0.005	0.003	0.000	0.050
1.8333	0.005	0.003	0.000	0.050
1.8889	0.005	0.003	0.000	0.050
1.9444	0.005	0.003	0.000	0.050
2.0000	0.005	0.003	0.000	0.050
2.0556	0.005	0.003	0.000	0.050
2.1111	0.005	0.003	0.000	0.050
2.1667	0.005	0.003	0.000	0.050
2.2222	0.005	0.003	0.000	0.050
2.2778	0.005	0.003	0.000	0.050
2.3333	0.005	0.003	0.000	0.050
2.3889	0.005	0.004	0.000	0.050
2.4444	0.005	0.004	0.000	0.050
2.5000	0.005	0.004	0.000	0.050
2.5556	0.005	0.004	0.000	0.050
2.6111	0.005	0.004	0.000	0.050
2.6667	0.005	0.004	0.000	0.050
2.7222	0.005	0.004	0.000	0.050
2.7778	0.005	0.004	0.000	0.050
2.8333	0.005	0.004	0.000	0.050
2.8889	0.005	0.004	0.000	0.050
2.9444	0.005	0.004	0.000	0.050
3.0000	0.005	0.005	0.000	0.050
3.0556	0.005	0.005	0.000	0.050
3.1111	0.005	0.005	0.000	0.050
3.1667	0.005	0.005	0.000	0.050
3.2222	0.005	0.005	0.000	0.050
3.2778	0.005	0.005	0.000	0.050
3.3333	0.005	0.005	0.000	0.050
3.3889	0.005	0.005	0.000	0.050
3.4444	0.005	0.005	0.000	0.050
3.5000	0.005	0.005	0.000	0.050
3.5556	0.005	0.005	0.000	0.050
3.6111	0.005	0.006	0.000	0.050
3.6667	0.005	0.006	0.000	0.050
3.7222	0.005	0.006	0.000	0.050
3.7778	0.005	0.006	0.000	0.050
3.8333	0.005	0.006	0.000	0.050
3.8889	0.005	0.006	0.000	0.050
3.9444	0.005	0.006	0.000	0.050
4.0000	0.005	0.006	0.000	0.050
4.0556	0.005	0.006	0.115	0.050
4.1111	0.005	0.006	0.323	0.050
4.1667	0.005	0.006	0.575	0.050
4.2222	0.005	0.007	0.835	0.050
4.2778	0.005	0.007	1.067	0.050
4.3333	0.005	0.007	1.242	0.050
4.3889	0.005	0.007	1.355	0.050
4.4444	0.005	0.007	1.458	0.050

4.5000	0.005	0.007	1.546	0.050
4.5556	0.005	0.007	1.630	0.050
4.6111	0.005	0.007	1.709	0.050
4.6667	0.005	0.007	1.785	0.050
4.7222	0.005	0.007	1.858	0.050
4.7778	0.005	0.008	1.929	0.050
4.8333	0.005	0.008	1.996	0.050
4.8889	0.005	0.008	2.062	0.050
4.9444	0.005	0.008	2.125	0.050
5.0000	0.005	0.008	2.187	0.050

Analysis Results

POC 1





+ Predeveloped x Mitigated

Predeveloped Landuse Totals for POC #1
Total Pervious Area: 0.14
Total Impervious Area: 0

Mitigated Landuse Totals for POC #1
Total Pervious Area: 0
Total Impervious Area: 0.14

Flow Frequency Method: Log Pearson Type III 17B

Flow Frequency Return Periods for Predeveloped. POC #1

Return Period	**Flow(cfs)**
2 year	0.000092
5 year	0.000123
10 year	0.000148
25 year	0.000184
50 year	0.000214
100 year	0.000248

Flow Frequency Return Periods for Mitigated. POC #1

Return Period	**Flow(cfs)**
2 year	0
5 year	0
10 year	0
25 year	0
50 year	0
100 year	0

Annual Peaks

Annual Peaks for Predeveloped and Mitigated. POC #1

Year	**Predeveloped**	**Mitigated**
1902	0.000	0.000
1903	0.000	0.000
1904	0.000	0.000
1905	0.000	0.000
1906	0.000	0.000
1907	0.000	0.000
1908	0.000	0.000
1909	0.000	0.000
1910	0.000	0.000
1911	0.000	0.000

1912	0.000	0.000
1913	0.000	0.000
1914	0.000	0.000
1915	0.000	0.000
1916	0.000	0.000
1917	0.000	0.000
1918	0.000	0.000
1919	0.000	0.000
1920	0.000	0.000
1921	0.000	0.000
1922	0.000	0.000
1923	0.000	0.000
1924	0.000	0.000
1925	0.000	0.000
1926	0.000	0.000
1927	0.000	0.000
1928	0.000	0.000
1929	0.000	0.000
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2008	0.000	0.000
2009	0.000	0.000
2010	0.000	0.000
2011	0.000	0.000
2012	0.000	0.000
2013	0.000	0.000
2014	0.000	0.000
2015	0.000	0.000
2016	0.000	0.000
2017	0.000	0.000
2018	0.000	0.000
2019	0.000	0.000
2020	0.000	0.000
2021	0.000	0.000
2022	0.000	0.000
2023	0.000	0.000
2024	0.000	0.000
2025	0.000	0.000
2026	0.000	0.000
2027	0.000	0.000

2028	0.000	0.000
2029	0.000	0.000
2030	0.000	0.000
2031	0.000	0.000
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2034	0.000	0.000
2035	0.000	0.000
2036	0.000	0.000
2037	0.000	0.000
2038	0.000	0.000
2039	0.000	0.000
2040	0.000	0.000
2041	0.000	0.000
2042	0.000	0.000
2043	0.000	0.000
2044	0.000	0.000
2045	0.000	0.000
2046	0.000	0.000
2047	0.000	0.000
2048	0.000	0.000
2049	0.000	0.000
2050	0.000	0.000
2051	0.000	0.000
2052	0.000	0.000
2053	0.000	0.000
2054	0.000	0.000
2055	0.000	0.000
2056	0.000	0.000
2057	0.000	0.000
2058	0.000	0.000
2059	0.001	0.000

Ranked Annual Peaks

Ranked Annual Peaks for Predeveloped and Mitigated. POC #1

Rank	Predeveloped	Mitigated
1	0.0006	0.0000
2	0.0003	0.0000
3	0.0003	0.0000
4	0.0003	0.0000
5	0.0002	0.0000
6	0.0001	0.0000
7	0.0001	0.0000
8	0.0001	0.0000
9	0.0001	0.0000
10	0.0001	0.0000
11	0.0001	0.0000
12	0.0001	0.0000
13	0.0001	0.0000
14	0.0001	0.0000
15	0.0001	0.0000
16	0.0001	0.0000
17	0.0001	0.0000
18	0.0001	0.0000
19	0.0001	0.0000
20	0.0001	0.0000
21	0.0001	0.0000
22	0.0001	0.0000

23	0.0001	0.0000
24	0.0001	0.0000
25	0.0001	0.0000
26	0.0001	0.0000
27	0.0001	0.0000
28	0.0001	0.0000
29	0.0001	0.0000
30	0.0001	0.0000
31	0.0001	0.0000
32	0.0001	0.0000
33	0.0001	0.0000
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153	0.0000	0.0000
154	0.0000	0.0000
155	0.0000	0.0000
156	0.0000	0.0000
157	0.0000	0.0000
158	0.0000	0.0000

Duration Flows

The Facility PASSED

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.0000	7296	0	0	Pass
0.0000	7008	0	0	Pass
0.0000	6493	0	0	Pass
0.0001	6050	0	0	Pass
0.0001	5856	0	0	Pass
0.0001	5441	0	0	Pass
0.0001	5125	0	0	Pass
0.0001	4927	0	0	Pass
0.0001	4561	0	0	Pass
0.0001	4239	0	0	Pass
0.0001	4074	0	0	Pass
0.0001	3742	0	0	Pass
0.0001	3490	0	0	Pass
0.0001	3248	0	0	Pass
0.0001	3151	0	0	Pass
0.0001	2914	0	0	Pass
0.0001	2704	0	0	Pass
0.0001	2588	0	0	Pass
0.0001	2396	0	0	Pass
0.0001	2181	0	0	Pass
0.0001	2082	0	0	Pass
0.0001	1892	0	0	Pass
0.0001	1693	0	0	Pass
0.0001	1530	0	0	Pass
0.0001	1454	0	0	Pass
0.0001	1324	0	0	Pass
0.0001	1171	0	0	Pass
0.0001	1120	0	0	Pass
0.0001	1017	0	0	Pass
0.0001	907	0	0	Pass
0.0001	846	0	0	Pass
0.0001	779	0	0	Pass
0.0001	672	0	0	Pass
0.0001	593	0	0	Pass
0.0001	522	0	0	Pass
0.0001	397	0	0	Pass
0.0001	289	0	0	Pass
0.0001	233	0	0	Pass
0.0001	155	0	0	Pass
0.0001	67	0	0	Pass
0.0001	28	0	0	Pass
0.0001	28	0	0	Pass
0.0001	28	0	0	Pass
0.0001	27	0	0	Pass
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0.0002	17	0	0	Pass
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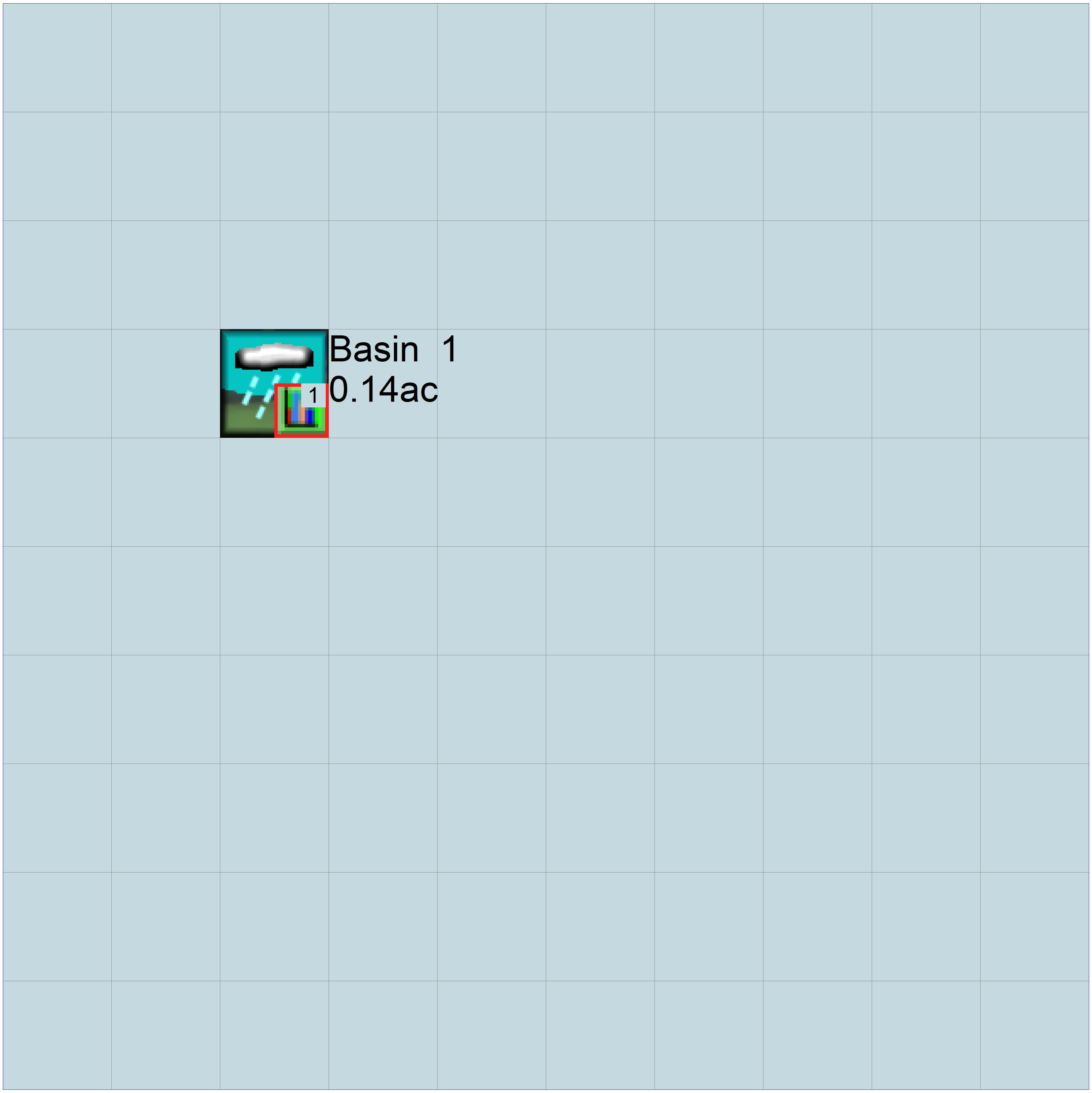
0.0002	10	0	0	Pass
0.0002	10	0	0	Pass
0.0002	10	0	0	Pass
0.0002	10	0	0	Pass
0.0002	10	0	0	Pass

LID Report

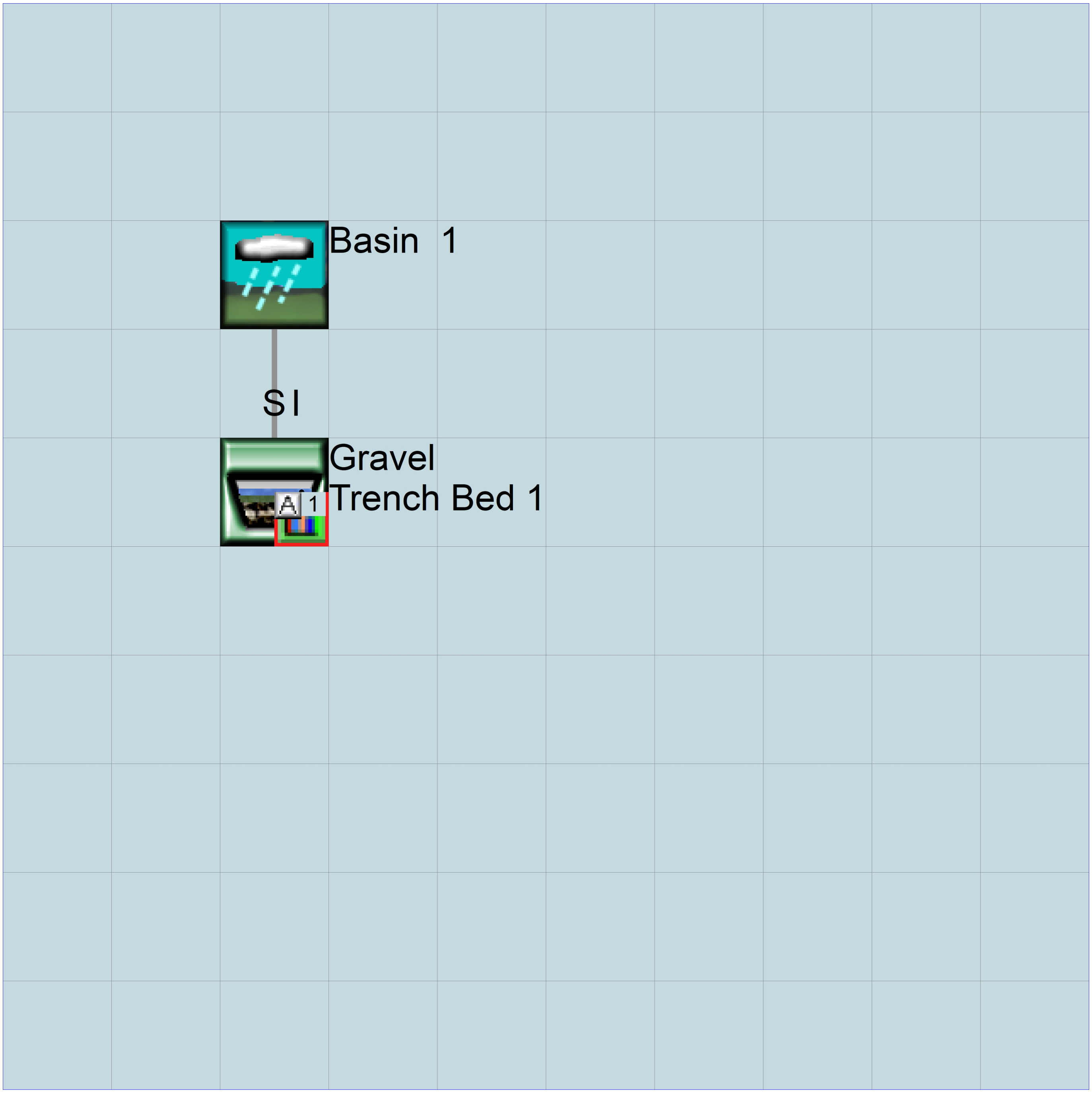
LID Technique	Used for Treatment ?	Total Volume Needs Treatment (ac-ft)	Volume Through Facility (ac-ft)	Infiltration Volume (ac-ft)	Cumulative Volume Infiltration Credit	Percent Volume Infiltrated	Water Quality	Percent Water Quality Treated	Comment
Gravel Trench Bed 1 POC	☐	57.39			☐	100.00			
Total Volume Infiltrated		57.39	0.00	0.00		100.00	0.00	0%	No Treat. Credit
Compliance with LID Standard 8% of 2-yr to 50% of 2-yr									Duration Analysis Result = Passed

Appendix

Predeveloped Schematic



Mitigated Schematic



Disclaimer

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Olympia, WA. 98501
Toll Free 1(866)943-0304
Local (360)943-0304

www.clearcreeksolutions.com

WWHM2012

PROJECT REPORT

FLOW CONTROL

TRENCH #6
2 CARPORTS + 1 GARAGE

General Model Information

WWHM2012 Project Name: C24-124 Garage-Carports-2

Site Name:	Affinity at Dupont
Site Address:	
City:	
Report Date:	6/4/2024
Gage:	42 IN WEST
Data Start:	10/01/1901
Data End:	09/30/2059
Timestep:	15 Minute
Precip Scale:	1.000
Version Date:	2023/01/27
Version:	4.2.19

POC Thresholds

Low Flow Threshold for POC1:	50 Percent of the 2 Year
High Flow Threshold for POC1:	50 Year

Landuse Basin Data

Predeveloped Land Use

Basin 6

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
A B, Forest, Flat	0.1
Pervious Total	0.1
Impervious Land Use	acre
Impervious Total	0
Basin Total	0.1

Mitigated Land Use

Basin 1

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
Pervious Total	0
Impervious Land Use	acre
ROOF TOPS FLAT	0.1
Impervious Total	0.1
Basin Total	0.1

Mitigated Routing

Gravel Trench Bed 1

Bottom Length: 22.00 ft.
Bottom Width: 7.00 ft.
Trench bottom slope 1: 0 To 1
Trench Left side slope 0: 0 To 1
Trench right side slope 2: 0 To 1
Material thickness of first layer: 5
Pour Space of material for first layer: 0.33
Material thickness of second layer: 0
Pour Space of material for second layer: 0
Material thickness of third layer: 0
Pour Space of material for third layer: 0
Infiltration On
Infiltration rate: 20
Infiltration safety factor: 0.5
Wetted surface area On
Total Volume Infiltrated (ac-ft.): 44.874
Total Volume Through Riser (ac-ft.): 0
Total Volume Through Facility (ac-ft.): 44.875
Percent Infiltrated: 100
Total Precip Applied to Facility: 0
Total Evap From Facility: 0
Discharge Structure
Riser Height: 4 ft.
Riser Diameter: 10 in.
Element Flows To:
Outlet 1 Outlet 2

Gravel Trench Bed Hydraulic Table

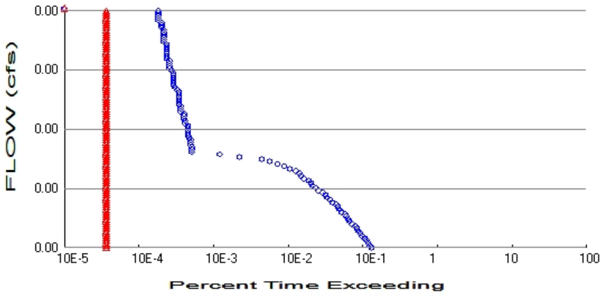
Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	Infilt(cfs)
0.0000	0.003	0.000	0.000	0.000
0.0556	0.003	0.000	0.000	0.035
0.1111	0.003	0.000	0.000	0.035
0.1667	0.003	0.000	0.000	0.035
0.2222	0.003	0.000	0.000	0.035
0.2778	0.003	0.000	0.000	0.035
0.3333	0.003	0.000	0.000	0.035
0.3889	0.003	0.000	0.000	0.035
0.4444	0.003	0.000	0.000	0.035
0.5000	0.003	0.000	0.000	0.035
0.5556	0.003	0.000	0.000	0.035
0.6111	0.003	0.000	0.000	0.035
0.6667	0.003	0.000	0.000	0.035
0.7222	0.003	0.000	0.000	0.035
0.7778	0.003	0.000	0.000	0.035
0.8333	0.003	0.001	0.000	0.035
0.8889	0.003	0.001	0.000	0.035
0.9444	0.003	0.001	0.000	0.035
1.0000	0.003	0.001	0.000	0.035
1.0556	0.003	0.001	0.000	0.035
1.1111	0.003	0.001	0.000	0.035
1.1667	0.003	0.001	0.000	0.035
1.2222	0.003	0.001	0.000	0.035

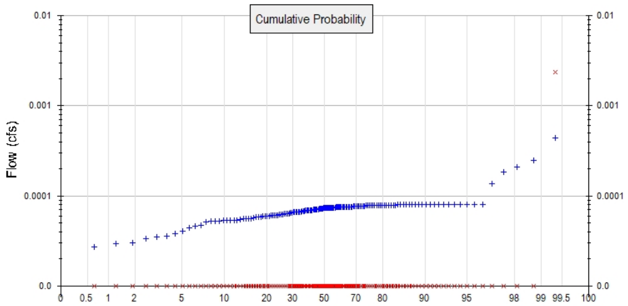
1.2778	0.003	0.001	0.000	0.035
1.3333	0.003	0.001	0.000	0.035
1.3889	0.003	0.001	0.000	0.035
1.4444	0.003	0.001	0.000	0.035
1.5000	0.003	0.001	0.000	0.035
1.5556	0.003	0.001	0.000	0.035
1.6111	0.003	0.001	0.000	0.035
1.6667	0.003	0.001	0.000	0.035
1.7222	0.003	0.002	0.000	0.035
1.7778	0.003	0.002	0.000	0.035
1.8333	0.003	0.002	0.000	0.035
1.8889	0.003	0.002	0.000	0.035
1.9444	0.003	0.002	0.000	0.035
2.0000	0.003	0.002	0.000	0.035
2.0556	0.003	0.002	0.000	0.035
2.1111	0.003	0.002	0.000	0.035
2.1667	0.003	0.002	0.000	0.035
2.2222	0.003	0.002	0.000	0.035
2.2778	0.003	0.002	0.000	0.035
2.3333	0.003	0.002	0.000	0.035
2.3889	0.003	0.002	0.000	0.035
2.4444	0.003	0.002	0.000	0.035
2.5000	0.003	0.002	0.000	0.035
2.5556	0.003	0.003	0.000	0.035
2.6111	0.003	0.003	0.000	0.035
2.6667	0.003	0.003	0.000	0.035
2.7222	0.003	0.003	0.000	0.035
2.7778	0.003	0.003	0.000	0.035
2.8333	0.003	0.003	0.000	0.035
2.8889	0.003	0.003	0.000	0.035
2.9444	0.003	0.003	0.000	0.035
3.0000	0.003	0.003	0.000	0.035
3.0556	0.003	0.003	0.000	0.035
3.1111	0.003	0.003	0.000	0.035
3.1667	0.003	0.003	0.000	0.035
3.2222	0.003	0.003	0.000	0.035
3.2778	0.003	0.003	0.000	0.035
3.3333	0.003	0.003	0.000	0.035
3.3889	0.003	0.004	0.000	0.035
3.4444	0.003	0.004	0.000	0.035
3.5000	0.003	0.004	0.000	0.035
3.5556	0.003	0.004	0.000	0.035
3.6111	0.003	0.004	0.000	0.035
3.6667	0.003	0.004	0.000	0.035
3.7222	0.003	0.004	0.000	0.035
3.7778	0.003	0.004	0.000	0.035
3.8333	0.003	0.004	0.000	0.035
3.8889	0.003	0.004	0.000	0.035
3.9444	0.003	0.004	0.000	0.035
4.0000	0.003	0.004	0.000	0.035
4.0556	0.003	0.004	0.115	0.035
4.1111	0.003	0.004	0.323	0.035
4.1667	0.003	0.004	0.575	0.035
4.2222	0.003	0.004	0.835	0.035
4.2778	0.003	0.005	1.067	0.035
4.3333	0.003	0.005	1.242	0.035
4.3889	0.003	0.005	1.355	0.035
4.4444	0.003	0.005	1.458	0.035

4.5000	0.003	0.005	1.546	0.035
4.5556	0.003	0.005	1.630	0.035
4.6111	0.003	0.005	1.709	0.035
4.6667	0.003	0.005	1.785	0.035
4.7222	0.003	0.005	1.858	0.035
4.7778	0.003	0.005	1.929	0.035
4.8333	0.003	0.005	1.996	0.035
4.8889	0.003	0.005	2.062	0.035
4.9444	0.003	0.005	2.125	0.035
5.0000	0.003	0.005	2.187	0.035

Analysis Results

POC 1





+ Predeveloped x Mitigated

Predeveloped Landuse Totals for POC #1

Total Pervious Area:	0.1
Total Impervious Area:	0

Mitigated Landuse Totals for POC #1

Total Pervious Area:	0
Total Impervious Area:	0.1

Flow Frequency Method: Log Pearson Type III 17B

Flow Frequency Return Periods for Predeveloped. POC #1

Return Period	**Flow(cfs)**
2 year	0.000066
5 year	0.000088
10 year	0.000106
25 year	0.000131
50 year	0.000153
100 year	0.000177

Flow Frequency Return Periods for Mitigated. POC #1

Return Period	**Flow(cfs)**
2 year	0
5 year	0
10 year	0
25 year	0
50 year	0
100 year	0

Annual Peaks

Annual Peaks for Predeveloped and Mitigated. POC #1

Year	**Predeveloped**	**Mitigated**
1902	0.000	0.000
1903	0.000	0.000
1904	0.000	0.000
1905	0.000	0.000
1906	0.000	0.000
1907	0.000	0.000
1908	0.000	0.000
1909	0.000	0.000
1910	0.000	0.000
1911	0.000	0.000

1912	0.000	0.000
1913	0.000	0.000
1914	0.000	0.000
1915	0.000	0.000
1916	0.000	0.000
1917	0.000	0.000
1918	0.000	0.000
1919	0.000	0.000
1920	0.000	0.000
1921	0.000	0.000
1922	0.000	0.000
1923	0.000	0.000
1924	0.000	0.000
1925	0.000	0.000
1926	0.000	0.000
1927	0.000	0.000
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1929	0.000	0.000
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2025	0.000	0.000
2026	0.000	0.000
2027	0.000	0.000

2028	0.000	0.000
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2038	0.000	0.000
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2053	0.000	0.000
2054	0.000	0.000
2055	0.000	0.000
2056	0.000	0.000
2057	0.000	0.000
2058	0.000	0.000
2059	0.000	0.000

Ranked Annual Peaks

Ranked Annual Peaks for Predeveloped and Mitigated. POC #1

Rank	Predeveloped	Mitigated
1	0.0004	0.0023
2	0.0002	0.0000
3	0.0002	0.0000
4	0.0002	0.0000
5	0.0001	0.0000
6	0.0001	0.0000
7	0.0001	0.0000
8	0.0001	0.0000
9	0.0001	0.0000
10	0.0001	0.0000
11	0.0001	0.0000
12	0.0001	0.0000
13	0.0001	0.0000
14	0.0001	0.0000
15	0.0001	0.0000
16	0.0001	0.0000
17	0.0001	0.0000
18	0.0001	0.0000
19	0.0001	0.0000
20	0.0001	0.0000
21	0.0001	0.0000
22	0.0001	0.0000

23	0.0001	0.0000
24	0.0001	0.0000
25	0.0001	0.0000
26	0.0001	0.0000
27	0.0001	0.0000
28	0.0001	0.0000
29	0.0001	0.0000
30	0.0001	0.0000
31	0.0001	0.0000
32	0.0001	0.0000
33	0.0001	0.0000
34	0.0001	0.0000
35	0.0001	0.0000
36	0.0001	0.0000
37	0.0001	0.0000
38	0.0001	0.0000
39	0.0001	0.0000
40	0.0001	0.0000
41	0.0001	0.0000
42	0.0001	0.0000
43	0.0001	0.0000
44	0.0001	0.0000
45	0.0001	0.0000
46	0.0001	0.0000
47	0.0001	0.0000
48	0.0001	0.0000
49	0.0001	0.0000
50	0.0001	0.0000
51	0.0001	0.0000
52	0.0001	0.0000
53	0.0001	0.0000
54	0.0001	0.0000
55	0.0001	0.0000
56	0.0001	0.0000
57	0.0001	0.0000
58	0.0001	0.0000
59	0.0001	0.0000
60	0.0001	0.0000
61	0.0001	0.0000
62	0.0001	0.0000
63	0.0001	0.0000
64	0.0001	0.0000
65	0.0001	0.0000
66	0.0001	0.0000
67	0.0001	0.0000
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70	0.0001	0.0000
71	0.0001	0.0000
72	0.0001	0.0000
73	0.0001	0.0000
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75	0.0001	0.0000
76	0.0001	0.0000
77	0.0001	0.0000
78	0.0001	0.0000
79	0.0001	0.0000
80	0.0001	0.0000

81	0.0001	0.0000
82	0.0001	0.0000
83	0.0001	0.0000
84	0.0001	0.0000
85	0.0001	0.0000
86	0.0001	0.0000
87	0.0001	0.0000
88	0.0001	0.0000
89	0.0001	0.0000
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109	0.0001	0.0000
110	0.0001	0.0000
111	0.0001	0.0000
112	0.0001	0.0000
113	0.0001	0.0000
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139	0.0001	0.0000
140	0.0001	0.0000
141	0.0001	0.0000
142	0.0001	0.0000
143	0.0001	0.0000
144	0.0001	0.0000
145	0.0001	0.0000
146	0.0001	0.0000
147	0.0000	0.0000
148	0.0000	0.0000
149	0.0000	0.0000
150	0.0000	0.0000
151	0.0000	0.0000
152	0.0000	0.0000
153	0.0000	0.0000
154	0.0000	0.0000
155	0.0000	0.0000
156	0.0000	0.0000
157	0.0000	0.0000
158	0.0000	0.0000

Duration Flows

The Facility PASSED

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.0000	7224	2	0	Pass
0.0000	6836	2	0	Pass
0.0000	6493	2	0	Pass
0.0000	6127	2	0	Pass
0.0000	5889	2	0	Pass
0.0000	5348	2	0	Pass
0.0000	5125	2	0	Pass
0.0000	4836	2	0	Pass
0.0000	4588	2	0	Pass
0.0000	4349	2	0	Pass
0.0000	3907	2	0	Pass
0.0000	3686	2	0	Pass
0.0000	3518	2	0	Pass
0.0000	3322	2	0	Pass
0.0000	3195	2	0	Pass
0.0001	2857	2	0	Pass
0.0001	2712	2	0	Pass
0.0001	2558	2	0	Pass
0.0001	2445	2	0	Pass
0.0001	2148	2	0	Pass
0.0001	2010	2	0	Pass
0.0001	1861	2	0	Pass
0.0001	1748	2	0	Pass
0.0001	1613	2	0	Pass
0.0001	1398	2	0	Pass
0.0001	1312	2	0	Pass
0.0001	1190	2	0	Pass
0.0001	1120	2	0	Pass
0.0001	1044	2	0	Pass
0.0001	892	2	0	Pass
0.0001	824	2	0	Pass
0.0001	779	2	0	Pass
0.0001	699	2	0	Pass
0.0001	581	2	0	Pass
0.0001	489	2	0	Pass
0.0001	397	2	0	Pass
0.0001	312	2	0	Pass
0.0001	244	2	0	Pass
0.0001	123	2	1	Pass
0.0001	67	2	2	Pass
0.0001	28	2	7	Pass
0.0001	28	2	7	Pass
0.0001	28	2	7	Pass
0.0001	27	2	7	Pass
0.0001	27	2	7	Pass
0.0001	27	2	7	Pass
0.0001	26	2	7	Pass
0.0001	25	2	8	Pass
0.0001	25	2	8	Pass
0.0001	25	2	8	Pass
0.0001	25	2	8	Pass
0.0001	25	2	8	Pass
0.0001	23	2	8	Pass

0.0001	23	2	8	Pass
0.0001	22	2	9	Pass
0.0001	22	2	9	Pass
0.0001	22	2	9	Pass
0.0001	20	2	10	Pass
0.0001	20	2	10	Pass
0.0001	20	2	10	Pass
0.0001	19	2	10	Pass
0.0001	19	2	10	Pass
0.0001	19	2	10	Pass
0.0001	19	2	10	Pass
0.0001	19	2	10	Pass
0.0001	19	2	10	Pass
0.0001	18	2	11	Pass
0.0001	17	2	11	Pass
0.0001	16	2	12	Pass
0.0001	16	2	12	Pass
0.0001	16	2	12	Pass
0.0001	16	2	12	Pass
0.0001	16	2	12	Pass
0.0001	16	2	12	Pass
0.0001	15	2	13	Pass
0.0001	14	2	14	Pass
0.0001	14	2	14	Pass
0.0001	14	2	14	Pass
0.0001	14	2	14	Pass
0.0001	13	2	15	Pass
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0.0001	13	2	15	Pass
0.0001	12	2	16	Pass
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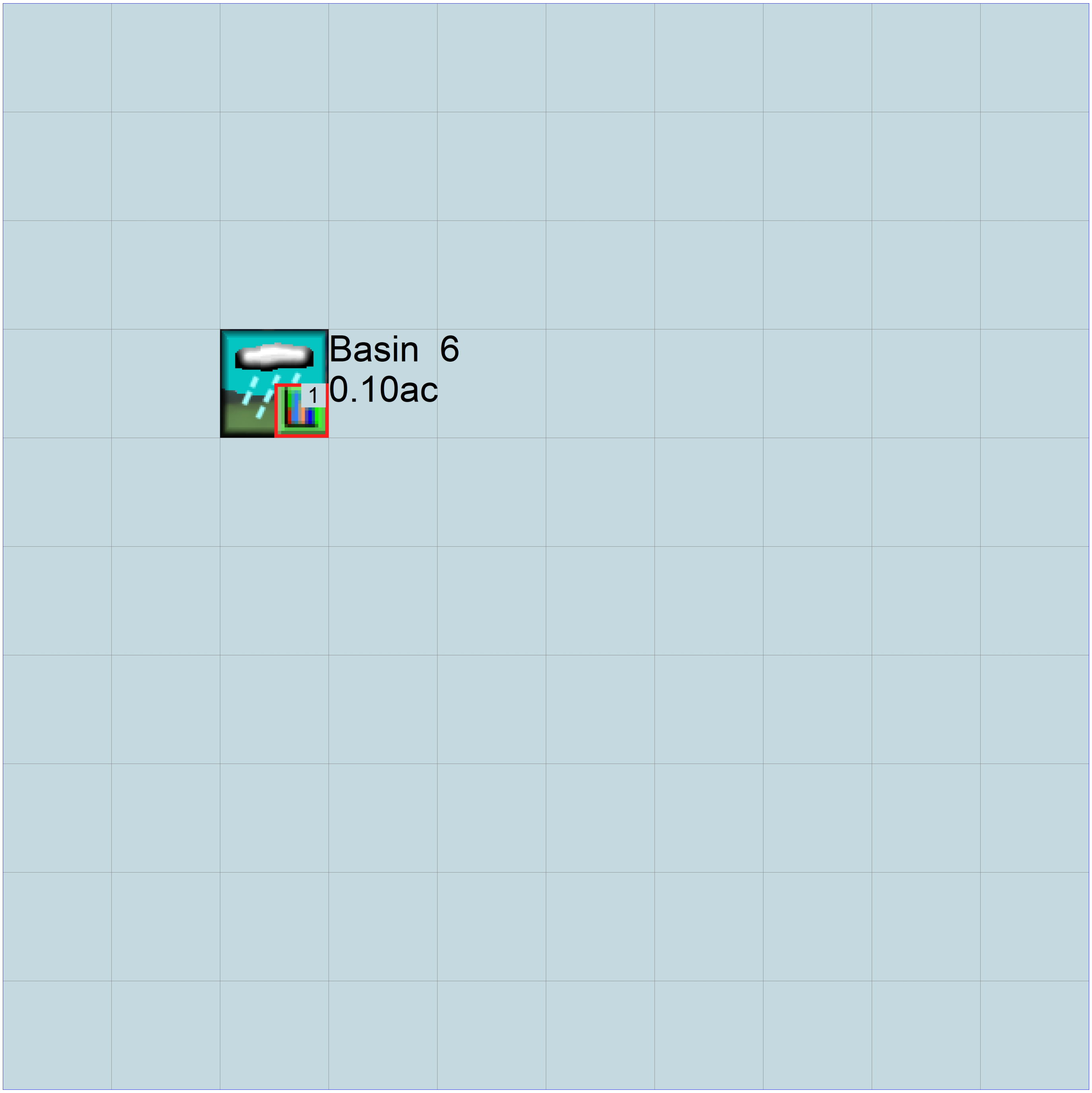
0.0001	11	2	18	Pass
0.0001	11	2	18	Pass
0.0001	11	2	18	Pass
0.0001	10	2	20	Pass
0.0001	10	2	20	Pass
0.0002	10	2	20	Pass
0.0002	10	2	20	Pass
0.0002	10	2	20	Pass

LID Report

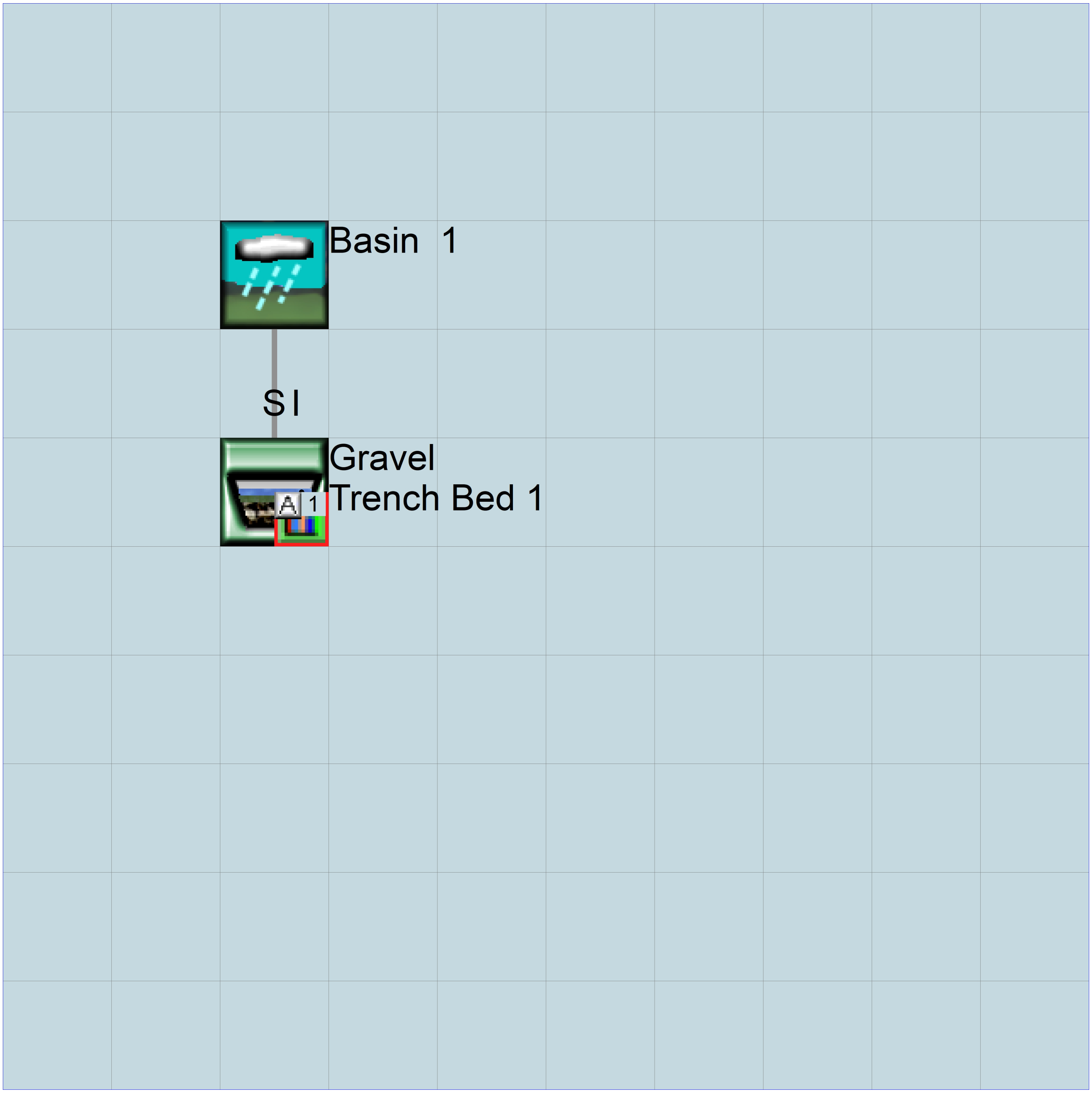
LID Technique	Used for Treatment ?	Total Volume Needs Treatment (ac-ft)	Volume Through Facility (ac-ft)	Infiltration Volume (ac-ft)	Cumulative Volume Infiltration Credit	Percent Volume Infiltrated	Water Quality	Percent Water Quality Treated	Comment
Gravel Trench Bed 1 POC	☐	40.84			☐	100.00			
Total Volume Infiltrated		40.84	0.00	0.00		100.00	0.00	0%	No Treat. Credit
Compliance with LID Standard 8% of 2-yr to 50% of 2-yr									Duration Analysis Result = Passed

Appendix

Predeveloped Schematic



Mitigated Schematic



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Olympia, WA. 98501
Toll Free 1(866)943-0304
Local (360)943-0304

www.clearcreeksolutions.com

WWHM2012

PROJECT REPORT

FLOW CONTROL

TRENCH #7
1 CARPORT + 4 GARAGES

General Model Information

WWHM2012 Project Name: C24-124 Garages-4-Carport

Site Name:	Affinity at Dupont
Site Address:	
City:	
Report Date:	6/4/2024
Gage:	42 IN WEST
Data Start:	10/01/1901
Data End:	09/30/2059
Timestep:	15 Minute
Precip Scale:	1.000
Version Date:	2023/01/27
Version:	4.2.19

POC Thresholds

Low Flow Threshold for POC1:	50 Percent of the 2 Year
High Flow Threshold for POC1:	50 Year

Landuse Basin Data

Predeveloped Land Use

Basin 7

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
A B, Forest, Flat	0.22
Pervious Total	0.22
Impervious Land Use	acre
Impervious Total	0
Basin Total	0.22

Mitigated Land Use

Basin 7

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
Pervious Total	0
Impervious Land Use	acre
ROOF TOPS FLAT	0.22
Impervious Total	0.22
Basin Total	0.22

Mitigated Routing

Gravel Trench Bed 1

Bottom Length: 56.00 ft.
Bottom Width: 6.00 ft.
Trench bottom slope 1: 0 To 1
Trench Left side slope 0: 0 To 1
Trench right side slope 2: 0 To 1
Material thickness of first layer: 5
Pour Space of material for first layer: 0.33
Material thickness of second layer: 0
Pour Space of material for second layer: 0
Material thickness of third layer: 0
Pour Space of material for third layer: 0
Infiltration On
Infiltration rate: 20
Infiltration safety factor: 0.5
Wetted surface area On
Total Volume Infiltrated (ac-ft.): 99.447
Total Volume Through Riser (ac-ft.): 0
Total Volume Through Facility (ac-ft.): 99.447
Percent Infiltrated: 100
Total Precip Applied to Facility: 0
Total Evap From Facility: 0
Discharge Structure
Riser Height: 4 ft.
Riser Diameter: 10 in.
Element Flows To:
Outlet 1 Outlet 2

Gravel Trench Bed Hydraulic Table

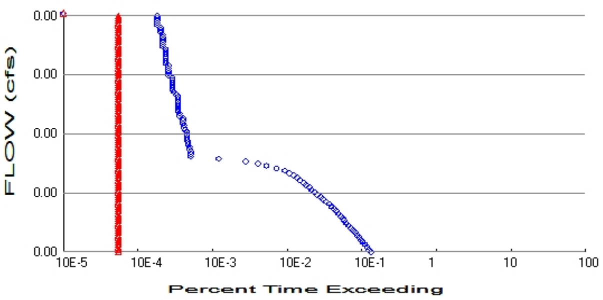
Stage(feet)	**Area(ac.)**	**Volume(ac-ft.)**	**Discharge(cfs)**	**Infilt(cfs)**
0.0000	0.007	0.000	0.000	0.000
0.0556	0.007	0.000	0.000	0.077
0.1111	0.007	0.000	0.000	0.077
0.1667	0.007	0.000	0.000	0.077
0.2222	0.007	0.000	0.000	0.077
0.2778	0.007	0.000	0.000	0.077
0.3333	0.007	0.000	0.000	0.077
0.3889	0.007	0.001	0.000	0.077
0.4444	0.007	0.001	0.000	0.077
0.5000	0.007	0.001	0.000	0.077
0.5556	0.007	0.001	0.000	0.077
0.6111	0.007	0.001	0.000	0.077
0.6667	0.007	0.001	0.000	0.077
0.7222	0.007	0.001	0.000	0.077
0.7778	0.007	0.002	0.000	0.077
0.8333	0.007	0.002	0.000	0.077
0.8889	0.007	0.002	0.000	0.077
0.9444	0.007	0.002	0.000	0.077
1.0000	0.007	0.002	0.000	0.077
1.0556	0.007	0.002	0.000	0.077
1.1111	0.007	0.002	0.000	0.077
1.1667	0.007	0.003	0.000	0.077
1.2222	0.007	0.003	0.000	0.077

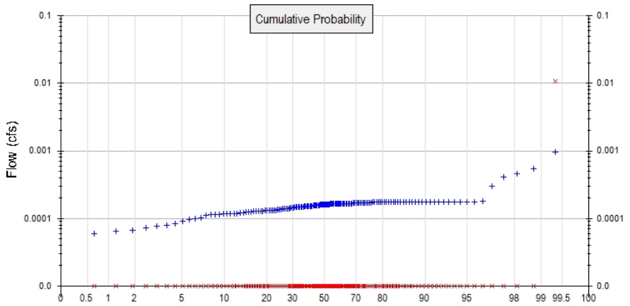
1.2778	0.007	0.003	0.000	0.077
1.3333	0.007	0.003	0.000	0.077
1.3889	0.007	0.003	0.000	0.077
1.4444	0.007	0.003	0.000	0.077
1.5000	0.007	0.003	0.000	0.077
1.5556	0.007	0.004	0.000	0.077
1.6111	0.007	0.004	0.000	0.077
1.6667	0.007	0.004	0.000	0.077
1.7222	0.007	0.004	0.000	0.077
1.7778	0.007	0.004	0.000	0.077
1.8333	0.007	0.004	0.000	0.077
1.8889	0.007	0.004	0.000	0.077
1.9444	0.007	0.004	0.000	0.077
2.0000	0.007	0.005	0.000	0.077
2.0556	0.007	0.005	0.000	0.077
2.1111	0.007	0.005	0.000	0.077
2.1667	0.007	0.005	0.000	0.077
2.2222	0.007	0.005	0.000	0.077
2.2778	0.007	0.005	0.000	0.077
2.3333	0.007	0.005	0.000	0.077
2.3889	0.007	0.006	0.000	0.077
2.4444	0.007	0.006	0.000	0.077
2.5000	0.007	0.006	0.000	0.077
2.5556	0.007	0.006	0.000	0.077
2.6111	0.007	0.006	0.000	0.077
2.6667	0.007	0.006	0.000	0.077
2.7222	0.007	0.006	0.000	0.077
2.7778	0.007	0.007	0.000	0.077
2.8333	0.007	0.007	0.000	0.077
2.8889	0.007	0.007	0.000	0.077
2.9444	0.007	0.007	0.000	0.077
3.0000	0.007	0.007	0.000	0.077
3.0556	0.007	0.007	0.000	0.077
3.1111	0.007	0.007	0.000	0.077
3.1667	0.007	0.008	0.000	0.077
3.2222	0.007	0.008	0.000	0.077
3.2778	0.007	0.008	0.000	0.077
3.3333	0.007	0.008	0.000	0.077
3.3889	0.007	0.008	0.000	0.077
3.4444	0.007	0.008	0.000	0.077
3.5000	0.007	0.008	0.000	0.077
3.5556	0.007	0.009	0.000	0.077
3.6111	0.007	0.009	0.000	0.077
3.6667	0.007	0.009	0.000	0.077
3.7222	0.007	0.009	0.000	0.077
3.7778	0.007	0.009	0.000	0.077
3.8333	0.007	0.009	0.000	0.077
3.8889	0.007	0.009	0.000	0.077
3.9444	0.007	0.010	0.000	0.077
4.0000	0.007	0.010	0.000	0.077
4.0556	0.007	0.010	0.115	0.077
4.1111	0.007	0.010	0.323	0.077
4.1667	0.007	0.010	0.575	0.077
4.2222	0.007	0.010	0.835	0.077
4.2778	0.007	0.010	1.067	0.077
4.3333	0.007	0.011	1.242	0.077
4.3889	0.007	0.011	1.355	0.077
4.4444	0.007	0.011	1.458	0.077

4.5000	0.007	0.011	1.546	0.077
4.5556	0.007	0.011	1.630	0.077
4.6111	0.007	0.011	1.709	0.077
4.6667	0.007	0.011	1.785	0.077
4.7222	0.007	0.012	1.858	0.077
4.7778	0.007	0.012	1.929	0.077
4.8333	0.007	0.012	1.996	0.077
4.8889	0.007	0.012	2.062	0.077
4.9444	0.007	0.012	2.125	0.077
5.0000	0.007	0.012	2.187	0.077

Analysis Results

POC 1





+ Predeveloped x Mitigated

Predeveloped Landuse Totals for POC #1

Total Pervious Area:	0.22
Total Impervious Area:	0

Mitigated Landuse Totals for POC #1

Total Pervious Area:	0
Total Impervious Area:	0.22

Flow Frequency Method: Log Pearson Type III 17B

Flow Frequency Return Periods for Predeveloped. POC #1

Return Period	**Flow(cfs)**
2 year	0.000145
5 year	0.000194
10 year	0.000233
25 year	0.000289
50 year	0.000336
100 year	0.000389

Flow Frequency Return Periods for Mitigated. POC #1

Return Period	**Flow(cfs)**
2 year	0
5 year	0
10 year	0
25 year	0
50 year	0
100 year	0

Annual Peaks

Annual Peaks for Predeveloped and Mitigated. POC #1

Year	**Predeveloped**	**Mitigated**
1902	0.000	0.000
1903	0.000	0.000
1904	0.000	0.000
1905	0.000	0.000
1906	0.000	0.000
1907	0.000	0.000
1908	0.000	0.000
1909	0.000	0.000
1910	0.000	0.000
1911	0.000	0.000

1912	0.001	0.000
1913	0.000	0.000
1914	0.000	0.000
1915	0.000	0.000
1916	0.000	0.000
1917	0.000	0.000
1918	0.000	0.000
1919	0.000	0.000
1920	0.000	0.000
1921	0.000	0.000
1922	0.000	0.000
1923	0.000	0.000
1924	0.000	0.000
1925	0.000	0.000
1926	0.000	0.000
1927	0.000	0.000
1928	0.000	0.000
1929	0.000	0.000
1930	0.000	0.000
1931	0.000	0.000
1932	0.000	0.000
1933	0.000	0.000
1934	0.000	0.000
1935	0.000	0.000
1936	0.000	0.000
1937	0.000	0.000
1938	0.000	0.000
1939	0.000	0.000
1940	0.000	0.000
1941	0.000	0.000
1942	0.000	0.000
1943	0.000	0.000
1944	0.000	0.000
1945	0.000	0.000
1946	0.000	0.000
1947	0.000	0.000
1948	0.000	0.000
1949	0.000	0.000
1950	0.000	0.000
1951	0.000	0.000
1952	0.000	0.000
1953	0.000	0.000
1954	0.000	0.000
1955	0.000	0.000
1956	0.000	0.000
1957	0.000	0.000
1958	0.000	0.000
1959	0.000	0.000
1960	0.000	0.000
1961	0.000	0.000
1962	0.000	0.000
1963	0.000	0.000
1964	0.000	0.000
1965	0.000	0.000
1966	0.000	0.000
1967	0.000	0.000
1968	0.000	0.000
1969	0.000	0.000

1970	0.000	0.000
1971	0.000	0.000
1972	0.000	0.011
1973	0.000	0.000
1974	0.000	0.000
1975	0.000	0.000
1976	0.000	0.000
1977	0.000	0.000
1978	0.000	0.000
1979	0.000	0.000
1980	0.000	0.000
1981	0.000	0.000
1982	0.000	0.000
1983	0.000	0.000
1984	0.000	0.000
1985	0.000	0.000
1986	0.000	0.000
1987	0.000	0.000
1988	0.000	0.000
1989	0.000	0.000
1990	0.000	0.000
1991	0.000	0.000
1992	0.000	0.000
1993	0.000	0.000
1994	0.000	0.000
1995	0.000	0.000
1996	0.000	0.000
1997	0.000	0.000
1998	0.000	0.000
1999	0.000	0.000
2000	0.000	0.000
2001	0.000	0.000
2002	0.000	0.000
2003	0.000	0.000
2004	0.000	0.000
2005	0.000	0.000
2006	0.000	0.000
2007	0.000	0.000
2008	0.000	0.000
2009	0.000	0.000
2010	0.000	0.000
2011	0.000	0.000
2012	0.000	0.000
2013	0.000	0.000
2014	0.000	0.000
2015	0.000	0.000
2016	0.000	0.000
2017	0.000	0.000
2018	0.000	0.000
2019	0.000	0.000
2020	0.000	0.000
2021	0.000	0.000
2022	0.000	0.000
2023	0.000	0.000
2024	0.000	0.000
2025	0.000	0.000
2026	0.000	0.000
2027	0.000	0.000

2028	0.000	0.000
2029	0.000	0.000
2030	0.000	0.000
2031	0.000	0.000
2032	0.000	0.000
2033	0.000	0.000
2034	0.000	0.000
2035	0.000	0.000
2036	0.000	0.000
2037	0.000	0.000
2038	0.000	0.000
2039	0.000	0.000
2040	0.000	0.000
2041	0.000	0.000
2042	0.000	0.000
2043	0.000	0.000
2044	0.000	0.000
2045	0.000	0.000
2046	0.000	0.000
2047	0.000	0.000
2048	0.000	0.000
2049	0.000	0.000
2050	0.000	0.000
2051	0.000	0.000
2052	0.000	0.000
2053	0.000	0.000
2054	0.000	0.000
2055	0.000	0.000
2056	0.000	0.000
2057	0.000	0.000
2058	0.000	0.000
2059	0.001	0.000

Ranked Annual Peaks

Ranked Annual Peaks for Predeveloped and Mitigated. POC #1

Rank	Predeveloped	Mitigated
1	0.0010	0.0107
2	0.0005	0.0000
3	0.0005	0.0000
4	0.0004	0.0000
5	0.0003	0.0000
6	0.0002	0.0000
7	0.0002	0.0000
8	0.0002	0.0000
9	0.0002	0.0000
10	0.0002	0.0000
11	0.0002	0.0000
12	0.0002	0.0000
13	0.0002	0.0000
14	0.0002	0.0000
15	0.0002	0.0000
16	0.0002	0.0000
17	0.0002	0.0000
18	0.0002	0.0000
19	0.0002	0.0000
20	0.0002	0.0000
21	0.0002	0.0000
22	0.0002	0.0000

23	0.0002	0.0000
24	0.0002	0.0000
25	0.0002	0.0000
26	0.0002	0.0000
27	0.0002	0.0000
28	0.0002	0.0000
29	0.0002	0.0000
30	0.0002	0.0000
31	0.0002	0.0000
32	0.0002	0.0000
33	0.0002	0.0000
34	0.0002	0.0000
35	0.0002	0.0000
36	0.0002	0.0000
37	0.0002	0.0000
38	0.0002	0.0000
39	0.0002	0.0000
40	0.0002	0.0000
41	0.0002	0.0000
42	0.0002	0.0000
43	0.0002	0.0000
44	0.0002	0.0000
45	0.0002	0.0000
46	0.0002	0.0000
47	0.0002	0.0000
48	0.0002	0.0000
49	0.0002	0.0000
50	0.0002	0.0000
51	0.0002	0.0000
52	0.0002	0.0000
53	0.0002	0.0000
54	0.0002	0.0000
55	0.0002	0.0000
56	0.0002	0.0000
57	0.0002	0.0000
58	0.0002	0.0000
59	0.0002	0.0000
60	0.0002	0.0000
61	0.0002	0.0000
62	0.0002	0.0000
63	0.0002	0.0000
64	0.0002	0.0000
65	0.0002	0.0000
66	0.0002	0.0000
67	0.0002	0.0000
68	0.0002	0.0000
69	0.0002	0.0000
70	0.0002	0.0000
71	0.0002	0.0000
72	0.0002	0.0000
73	0.0002	0.0000
74	0.0002	0.0000
75	0.0002	0.0000
76	0.0002	0.0000
77	0.0002	0.0000
78	0.0002	0.0000
79	0.0002	0.0000
80	0.0002	0.0000

81	0.0002	0.0000
82	0.0002	0.0000
83	0.0002	0.0000
84	0.0002	0.0000
85	0.0002	0.0000
86	0.0002	0.0000
87	0.0002	0.0000
88	0.0002	0.0000
89	0.0002	0.0000
90	0.0002	0.0000
91	0.0002	0.0000
92	0.0002	0.0000
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99	0.0002	0.0000
100	0.0002	0.0000
101	0.0002	0.0000
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103	0.0001	0.0000
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114	0.0001	0.0000
115	0.0001	0.0000
116	0.0001	0.0000
117	0.0001	0.0000
118	0.0001	0.0000
119	0.0001	0.0000
120	0.0001	0.0000
121	0.0001	0.0000
122	0.0001	0.0000
123	0.0001	0.0000
124	0.0001	0.0000
125	0.0001	0.0000
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127	0.0001	0.0000
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129	0.0001	0.0000
130	0.0001	0.0000
131	0.0001	0.0000
132	0.0001	0.0000
133	0.0001	0.0000
134	0.0001	0.0000
135	0.0001	0.0000
136	0.0001	0.0000
137	0.0001	0.0000
138	0.0001	0.0000

139	0.0001	0.0000
140	0.0001	0.0000
141	0.0001	0.0000
142	0.0001	0.0000
143	0.0001	0.0000
144	0.0001	0.0000
145	0.0001	0.0000
146	0.0001	0.0000
147	0.0001	0.0000
148	0.0001	0.0000
149	0.0001	0.0000
150	0.0001	0.0000
151	0.0001	0.0000
152	0.0001	0.0000
153	0.0001	0.0000
154	0.0001	0.0000
155	0.0001	0.0000
156	0.0001	0.0000
157	0.0001	0.0000
158	0.0001	0.0000

Duration Flows

The Facility PASSED

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.0001	7363	3	0	Pass
0.0001	6803	3	0	Pass
0.0001	6493	3	0	Pass
0.0001	6055	3	0	Pass
0.0001	5656	3	0	Pass
0.0001	5422	3	0	Pass
0.0001	5125	3	0	Pass
0.0001	4755	3	0	Pass
0.0001	4524	3	0	Pass
0.0001	4222	3	0	Pass
0.0001	3907	3	0	Pass
0.0001	3711	3	0	Pass
0.0001	3458	3	0	Pass
0.0001	3238	3	0	Pass
0.0001	3110	3	0	Pass
0.0001	2872	3	0	Pass
0.0001	2685	3	0	Pass
0.0001	2532	3	0	Pass
0.0001	2349	3	0	Pass
0.0001	2161	3	0	Pass
0.0001	2040	3	0	Pass
0.0001	1839	3	0	Pass
0.0001	1647	3	0	Pass
0.0001	1555	3	0	Pass
0.0001	1411	3	0	Pass
0.0001	1288	3	0	Pass
0.0001	1184	3	0	Pass
0.0001	1091	3	0	Pass
0.0001	988	3	0	Pass
0.0001	917	3	0	Pass
0.0002	821	3	0	Pass
0.0002	749	3	0	Pass
0.0002	676	3	0	Pass
0.0002	597	3	0	Pass
0.0002	514	3	0	Pass
0.0002	397	3	0	Pass
0.0002	292	3	1	Pass
0.0002	223	3	1	Pass
0.0002	152	3	1	Pass
0.0002	67	3	4	Pass
0.0002	28	3	10	Pass
0.0002	28	3	10	Pass
0.0002	28	3	10	Pass
0.0002	27	3	11	Pass
0.0002	27	3	11	Pass
0.0002	26	3	11	Pass
0.0002	26	3	11	Pass
0.0002	25	3	12	Pass
0.0002	25	3	12	Pass
0.0002	25	3	12	Pass
0.0002	25	3	12	Pass
0.0002	24	3	12	Pass
0.0002	23	3	13	Pass

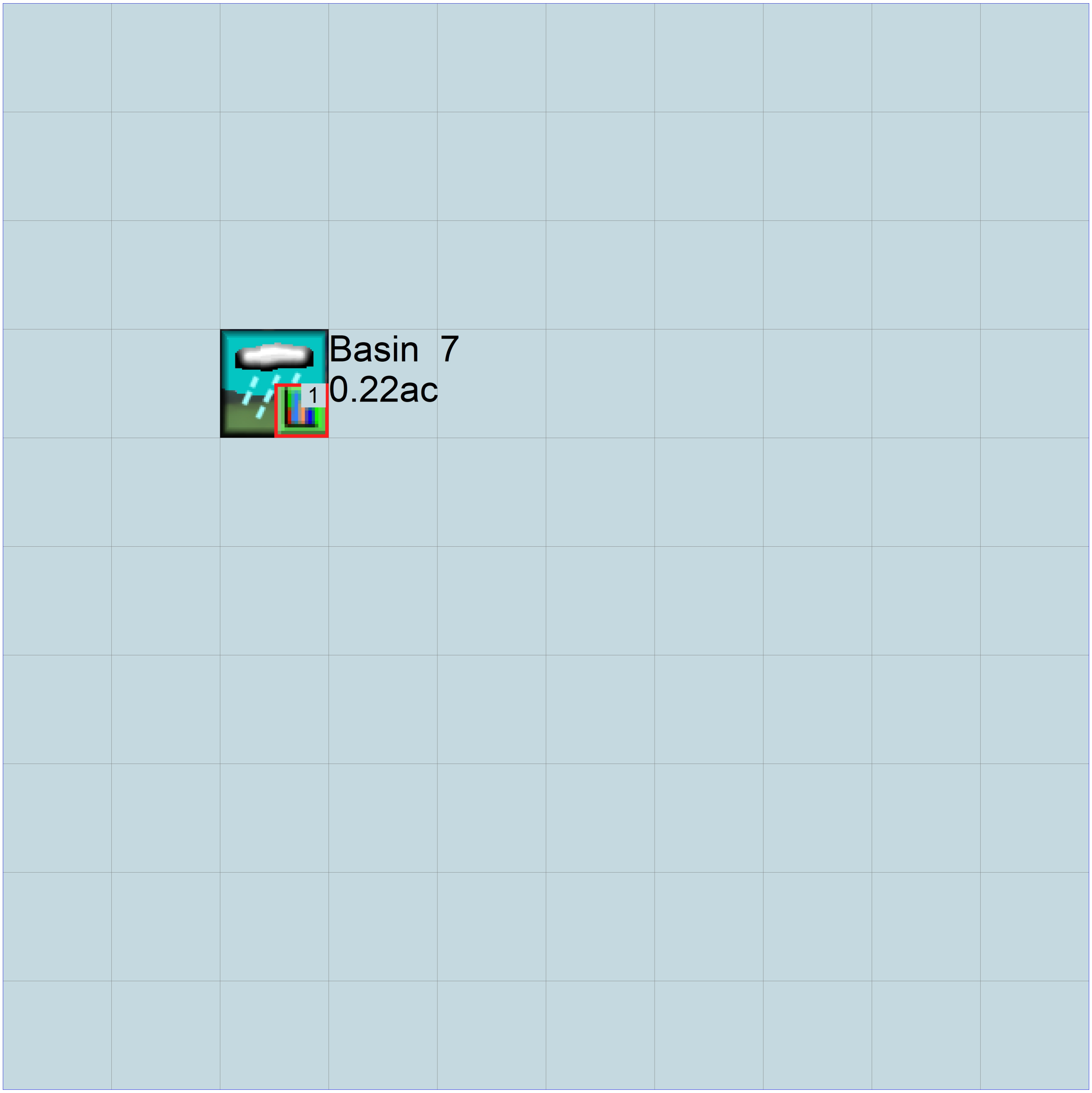
0.0002	23	3	13	Pass
0.0002	22	3	13	Pass
0.0002	22	3	13	Pass
0.0002	22	3	13	Pass
0.0002	20	3	15	Pass
0.0002	20	3	15	Pass
0.0002	19	3	15	Pass
0.0002	19	3	15	Pass
0.0002	19	3	15	Pass
0.0002	19	3	15	Pass
0.0002	19	3	15	Pass
0.0002	19	3	15	Pass
0.0002	19	3	15	Pass
0.0002	18	3	16	Pass
0.0003	17	3	17	Pass
0.0003	16	3	18	Pass
0.0003	16	3	18	Pass
0.0003	16	3	18	Pass
0.0003	16	3	18	Pass
0.0003	16	3	18	Pass
0.0003	16	3	18	Pass
0.0003	14	3	21	Pass
0.0003	14	3	21	Pass
0.0003	14	3	21	Pass
0.0003	14	3	21	Pass
0.0003	14	3	21	Pass
0.0003	13	3	23	Pass
0.0003	13	3	23	Pass
0.0003	13	3	23	Pass
0.0003	13	3	23	Pass
0.0003	13	3	23	Pass
0.0003	13	3	23	Pass
0.0003	13	3	23	Pass
0.0003	12	3	25	Pass
0.0003	12	3	25	Pass
0.0003	12	3	25	Pass
0.0003	12	3	25	Pass
0.0003	12	3	25	Pass
0.0003	12	3	25	Pass
0.0003	11	3	27	Pass
0.0003	11	3	27	Pass
0.0003	11	3	27	Pass
0.0003	10	3	30	Pass
0.0003	10	3	30	Pass
0.0003	10	3	30	Pass
0.0003	10	3	30	Pass
0.0003	10	3	30	Pass

LID Report

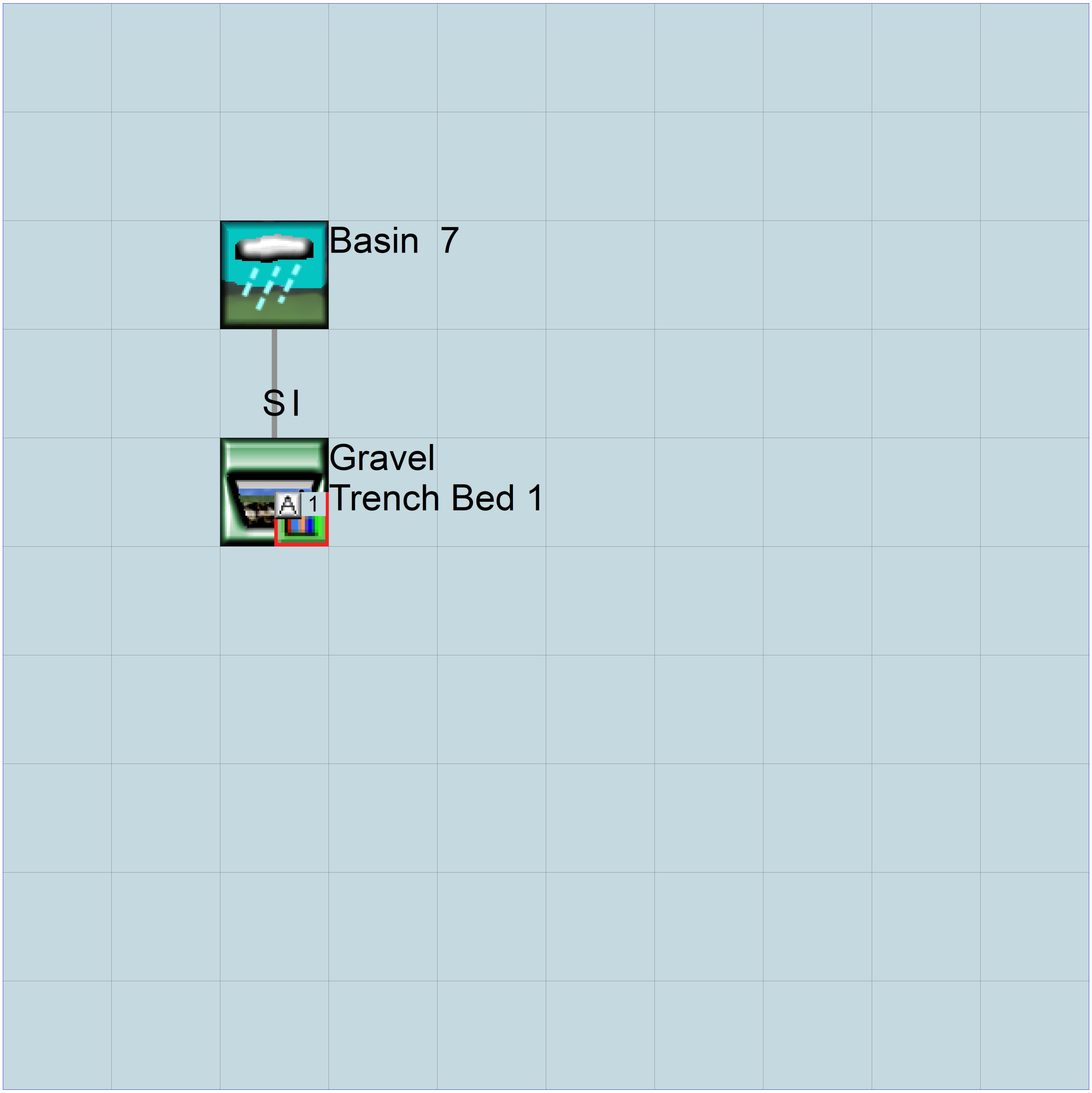
LID Technique	Used for Treatment ?	Total Volume Needs Treatment (ac-ft)	Volume Through Facility (ac-ft)	Infiltration Volume (ac-ft)	Cumulative Volume Infiltration Credit	Percent Volume Infiltrated	Water Quality	Percent Water Quality Treated	Comment
Gravel Trench Bed 1 POC	☐	90.50			☐	100.00			
Total Volume Infiltrated		90.50	0.00	0.00		100.00	0.00	0%	No Treat. Credit
Compliance with LID Standard 8% of 2-yr to 50% of 2-yr									Duration Analysis Result = Passed

Appendix

Predeveloped Schematic



Mitigated Schematic



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Olympia, WA. 98501
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Local (360)943-0304

www.clearcreeksolutions.com

WWHM2012

PROJECT REPORT

FLOW CONTROL

TRENCH #8
2 CARPORTS

General Model Information

WWHM2012 Project Name: C24-124 Carports-2

Site Name:	Affinity at Dupont
Site Address:	
City:	
Report Date:	6/4/2024
Gage:	42 IN WEST
Data Start:	10/01/1901
Data End:	09/30/2059
Timestep:	15 Minute
Precip Scale:	1.000
Version Date:	2023/01/27
Version:	4.2.19

POC Thresholds

Low Flow Threshold for POC1:	50 Percent of the 2 Year
High Flow Threshold for POC1:	50 Year

Landuse Basin Data

Predeveloped Land Use

Basin 8

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
A B, Forest, Flat	0.05
Pervious Total	0.05
Impervious Land Use	acre
Impervious Total	0
Basin Total	0.05

Mitigated Land Use

Basin 8

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
Pervious Total	0
Impervious Land Use	acre
ROOF TOPS FLAT	0.05
Impervious Total	0.05
Basin Total	0.05

Mitigated Routing

Gravel Trench Bed 1

Bottom Length: 15.00 ft.
Bottom Width: 5.00 ft.
Trench bottom slope 1: 0 To 1
Trench Left side slope 0: 0 To 1
Trench right side slope 2: 0 To 1
Material thickness of first layer: 5
Pour Space of material for first layer: 0.33
Material thickness of second layer: 0
Pour Space of material for second layer: 0
Material thickness of third layer: 0
Pour Space of material for third layer: 0
Infiltration On
Infiltration rate: 20
Infiltration safety factor: 0.5
Wetted surface area On
Total Volume Infiltrated (ac-ft.): 22.154
Total Volume Through Riser (ac-ft.): 0
Total Volume Through Facility (ac-ft.): 22.154
Percent Infiltrated: 100
Total Precip Applied to Facility: 0
Total Evap From Facility: 0
Discharge Structure
Riser Height: 4 ft.
Riser Diameter: 10 in.
Element Flows To:
Outlet 1 Outlet 2

Gravel Trench Bed Hydraulic Table

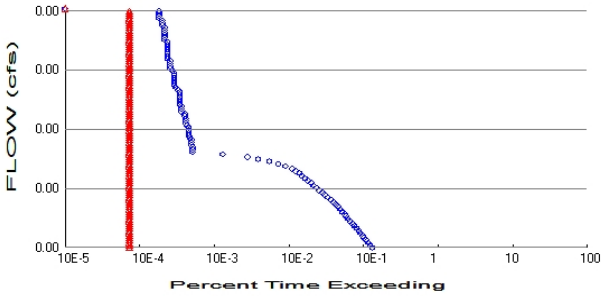
Stage(feet)	**Area(ac.)**	**Volume(ac-ft.)**	**Discharge(cfs)**	**Infilt(cfs)**
0.0000	0.001722	0.000000	0.000	0.000
0.0556	0.001722	0.000032	0.000	0.017
0.1111	0.001722	0.000063	0.000	0.017
0.1667	0.001722	0.000095	0.000	0.017
0.2222	0.001722	0.000126	0.000	0.017
0.2778	0.001722	0.000158	0.000	0.017
0.3333	0.001722	0.000189	0.000	0.017
0.3889	0.001722	0.000221	0.000	0.017
0.4444	0.001722	0.000253	0.000	0.017
0.5000	0.001722	0.000284	0.000	0.017
0.5556	0.001722	0.000316	0.000	0.017
0.6111	0.001722	0.000347	0.000	0.017
0.6667	0.001722	0.000379	0.000	0.017
0.7222	0.001722	0.000410	0.000	0.017
0.7778	0.001722	0.000442	0.000	0.017
0.8333	0.001722	0.000473	0.000	0.017
0.8889	0.001722	0.000505	0.000	0.017
0.9444	0.001722	0.000537	0.000	0.017
1.0000	0.001722	0.000568	0.000	0.017
1.0556	0.001722	0.000600	0.000	0.017
1.1111	0.001722	0.000631	0.000	0.017
1.1667	0.001722	0.000663	0.000	0.017
1.2222	0.001722	0.000694	0.000	0.017

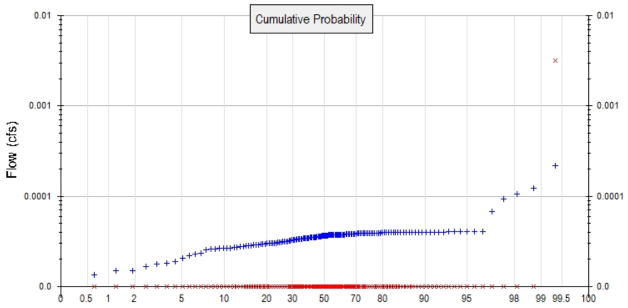
1.2778	0.001722	0.000726	0.000	0.017
1.3333	0.001722	0.000758	0.000	0.017
1.3889	0.001722	0.000789	0.000	0.017
1.4444	0.001722	0.000821	0.000	0.017
1.5000	0.001722	0.000852	0.000	0.017
1.5556	0.001722	0.000884	0.000	0.017
1.6111	0.001722	0.000915	0.000	0.017
1.6667	0.001722	0.000947	0.000	0.017
1.7222	0.001722	0.000979	0.000	0.017
1.7778	0.001722	0.001010	0.000	0.017
1.8333	0.001722	0.001042	0.000	0.017
1.8889	0.001722	0.001073	0.000	0.017
1.9444	0.001722	0.001105	0.000	0.017
2.0000	0.001722	0.001136	0.000	0.017
2.0556	0.001722	0.001168	0.000	0.017
2.1111	0.001722	0.001199	0.000	0.017
2.1667	0.001722	0.001231	0.000	0.017
2.2222	0.001722	0.001263	0.000	0.017
2.2778	0.001722	0.001294	0.000	0.017
2.3333	0.001722	0.001326	0.000	0.017
2.3889	0.001722	0.001357	0.000	0.017
2.4444	0.001722	0.001389	0.000	0.017
2.5000	0.001722	0.001420	0.000	0.017
2.5556	0.001722	0.001452	0.000	0.017
2.6111	0.001722	0.001484	0.000	0.017
2.6667	0.001722	0.001515	0.000	0.017
2.7222	0.001722	0.001547	0.000	0.017
2.7778	0.001722	0.001578	0.000	0.017
2.8333	0.001722	0.001610	0.000	0.017
2.8889	0.001722	0.001641	0.000	0.017
2.9444	0.001722	0.001673	0.000	0.017
3.0000	0.001722	0.001705	0.000	0.017
3.0556	0.001722	0.001736	0.000	0.017
3.1111	0.001722	0.001768	0.000	0.017
3.1667	0.001722	0.001799	0.000	0.017
3.2222	0.001722	0.001831	0.000	0.017
3.2778	0.001722	0.001862	0.000	0.017
3.3333	0.001722	0.001894	0.000	0.017
3.3889	0.001722	0.001926	0.000	0.017
3.4444	0.001722	0.001957	0.000	0.017
3.5000	0.001722	0.001989	0.000	0.017
3.5556	0.001722	0.002020	0.000	0.017
3.6111	0.001722	0.002052	0.000	0.017
3.6667	0.001722	0.002083	0.000	0.017
3.7222	0.001722	0.002115	0.000	0.017
3.7778	0.001722	0.002146	0.000	0.017
3.8333	0.001722	0.002178	0.000	0.017
3.8889	0.001722	0.002210	0.000	0.017
3.9444	0.001722	0.002241	0.000	0.017
4.0000	0.001722	0.002273	0.000	0.017
4.0556	0.001722	0.002304	0.115	0.017
4.1111	0.001722	0.002336	0.323	0.017
4.1667	0.001722	0.002367	0.575	0.017
4.2222	0.001722	0.002399	0.835	0.017
4.2778	0.001722	0.002431	1.067	0.017
4.3333	0.001722	0.002462	1.242	0.017
4.3889	0.001722	0.002494	1.355	0.017
4.4444	0.001722	0.002525	1.458	0.017

4.5000	0.001722	0.002557	1.546	0.017
4.5556	0.001722	0.002588	1.630	0.017
4.6111	0.001722	0.002620	1.709	0.017
4.6667	0.001722	0.002652	1.785	0.017
4.7222	0.001722	0.002683	1.858	0.017
4.7778	0.001722	0.002715	1.929	0.017
4.8333	0.001722	0.002746	1.996	0.017
4.8889	0.001722	0.002778	2.062	0.017
4.9444	0.001722	0.002809	2.125	0.017
5.0000	0.001722	0.002841	2.187	0.017

Analysis Results

POC 1





+ Predeveloped x Mitigated

Predeveloped Landuse Totals for POC #1
Total Pervious Area: 0.05
Total Impervious Area: 0

Mitigated Landuse Totals for POC #1
Total Pervious Area: 0
Total Impervious Area: 0.05

Flow Frequency Method: Log Pearson Type III 17B

Flow Frequency Return Periods for Predeveloped. POC #1

Return Period	**Flow(cfs)**
2 year	0.000033
5 year	0.000044
10 year	0.000053
25 year	0.000066
50 year	0.000076
100 year	0.000088

Flow Frequency Return Periods for Mitigated. POC #1

Return Period	**Flow(cfs)**
2 year	0
5 year	0
10 year	0
25 year	0
50 year	0
100 year	0

Annual Peaks

Annual Peaks for Predeveloped and Mitigated. POC #1

Year	**Predeveloped**	**Mitigated**
1902	0.000	0.000
1903	0.000	0.000
1904	0.000	0.000
1905	0.000	0.000
1906	0.000	0.000
1907	0.000	0.000
1908	0.000	0.000
1909	0.000	0.000
1910	0.000	0.000
1911	0.000	0.000

1912	0.000	0.000
1913	0.000	0.000
1914	0.000	0.000
1915	0.000	0.000
1916	0.000	0.000
1917	0.000	0.000
1918	0.000	0.000
1919	0.000	0.000
1920	0.000	0.000
1921	0.000	0.000
1922	0.000	0.000
1923	0.000	0.000
1924	0.000	0.000
1925	0.000	0.000
1926	0.000	0.000
1927	0.000	0.000
1928	0.000	0.000
1929	0.000	0.000
1930	0.000	0.000
1931	0.000	0.000
1932	0.000	0.000
1933	0.000	0.000
1934	0.000	0.000
1935	0.000	0.000
1936	0.000	0.000
1937	0.000	0.000
1938	0.000	0.000
1939	0.000	0.000
1940	0.000	0.000
1941	0.000	0.000
1942	0.000	0.000
1943	0.000	0.000
1944	0.000	0.000
1945	0.000	0.000
1946	0.000	0.000
1947	0.000	0.000
1948	0.000	0.000
1949	0.000	0.000
1950	0.000	0.000
1951	0.000	0.000
1952	0.000	0.000
1953	0.000	0.000
1954	0.000	0.000
1955	0.000	0.000
1956	0.000	0.000
1957	0.000	0.000
1958	0.000	0.000
1959	0.000	0.000
1960	0.000	0.000
1961	0.000	0.000
1962	0.000	0.000
1963	0.000	0.000
1964	0.000	0.000
1965	0.000	0.000
1966	0.000	0.000
1967	0.000	0.000
1968	0.000	0.000
1969	0.000	0.000

1970	0.000	0.000
1971	0.000	0.000
1972	0.000	0.003
1973	0.000	0.000
1974	0.000	0.000
1975	0.000	0.000
1976	0.000	0.000
1977	0.000	0.000
1978	0.000	0.000
1979	0.000	0.000
1980	0.000	0.000
1981	0.000	0.000
1982	0.000	0.000
1983	0.000	0.000
1984	0.000	0.000
1985	0.000	0.000
1986	0.000	0.000
1987	0.000	0.000
1988	0.000	0.000
1989	0.000	0.000
1990	0.000	0.000
1991	0.000	0.000
1992	0.000	0.000
1993	0.000	0.000
1994	0.000	0.000
1995	0.000	0.000
1996	0.000	0.000
1997	0.000	0.000
1998	0.000	0.000
1999	0.000	0.000
2000	0.000	0.000
2001	0.000	0.000
2002	0.000	0.000
2003	0.000	0.000
2004	0.000	0.000
2005	0.000	0.000
2006	0.000	0.000
2007	0.000	0.000
2008	0.000	0.000
2009	0.000	0.000
2010	0.000	0.000
2011	0.000	0.000
2012	0.000	0.000
2013	0.000	0.000
2014	0.000	0.000
2015	0.000	0.000
2016	0.000	0.000
2017	0.000	0.000
2018	0.000	0.000
2019	0.000	0.000
2020	0.000	0.000
2021	0.000	0.000
2022	0.000	0.000
2023	0.000	0.000
2024	0.000	0.000
2025	0.000	0.000
2026	0.000	0.000
2027	0.000	0.000

2028	0.000	0.000
2029	0.000	0.000
2030	0.000	0.000
2031	0.000	0.000
2032	0.000	0.000
2033	0.000	0.000
2034	0.000	0.000
2035	0.000	0.000
2036	0.000	0.000
2037	0.000	0.000
2038	0.000	0.000
2039	0.000	0.000
2040	0.000	0.000
2041	0.000	0.000
2042	0.000	0.000
2043	0.000	0.000
2044	0.000	0.000
2045	0.000	0.000
2046	0.000	0.000
2047	0.000	0.000
2048	0.000	0.000
2049	0.000	0.000
2050	0.000	0.000
2051	0.000	0.000
2052	0.000	0.000
2053	0.000	0.000
2054	0.000	0.000
2055	0.000	0.000
2056	0.000	0.000
2057	0.000	0.000
2058	0.000	0.000
2059	0.000	0.000

Ranked Annual Peaks

Ranked Annual Peaks for Predeveloped and Mitigated. POC #1

Rank	**Predeveloped**	**Mitigated**
1	0.0002	0.0032
2	0.0001	0.0000
3	0.0001	0.0000
4	0.0001	0.0000
5	0.0001	0.0000
6	0.0000	0.0000
7	0.0000	0.0000
8	0.0000	0.0000
9	0.0000	0.0000
10	0.0000	0.0000
11	0.0000	0.0000
12	0.0000	0.0000
13	0.0000	0.0000
14	0.0000	0.0000
15	0.0000	0.0000
16	0.0000	0.0000
17	0.0000	0.0000
18	0.0000	0.0000
19	0.0000	0.0000
20	0.0000	0.0000
21	0.0000	0.0000
22	0.0000	0.0000

23	0.0000	0.0000
24	0.0000	0.0000
25	0.0000	0.0000
26	0.0000	0.0000
27	0.0000	0.0000
28	0.0000	0.0000
29	0.0000	0.0000
30	0.0000	0.0000
31	0.0000	0.0000
32	0.0000	0.0000
33	0.0000	0.0000
34	0.0000	0.0000
35	0.0000	0.0000
36	0.0000	0.0000
37	0.0000	0.0000
38	0.0000	0.0000
39	0.0000	0.0000
40	0.0000	0.0000
41	0.0000	0.0000
42	0.0000	0.0000
43	0.0000	0.0000
44	0.0000	0.0000
45	0.0000	0.0000
46	0.0000	0.0000
47	0.0000	0.0000
48	0.0000	0.0000
49	0.0000	0.0000
50	0.0000	0.0000
51	0.0000	0.0000
52	0.0000	0.0000
53	0.0000	0.0000
54	0.0000	0.0000
55	0.0000	0.0000
56	0.0000	0.0000
57	0.0000	0.0000
58	0.0000	0.0000
59	0.0000	0.0000
60	0.0000	0.0000
61	0.0000	0.0000
62	0.0000	0.0000
63	0.0000	0.0000
64	0.0000	0.0000
65	0.0000	0.0000
66	0.0000	0.0000
67	0.0000	0.0000
68	0.0000	0.0000
69	0.0000	0.0000
70	0.0000	0.0000
71	0.0000	0.0000
72	0.0000	0.0000
73	0.0000	0.0000
74	0.0000	0.0000
75	0.0000	0.0000
76	0.0000	0.0000
77	0.0000	0.0000
78	0.0000	0.0000
79	0.0000	0.0000
80	0.0000	0.0000

81	0.0000	0.0000
82	0.0000	0.0000
83	0.0000	0.0000
84	0.0000	0.0000
85	0.0000	0.0000
86	0.0000	0.0000
87	0.0000	0.0000
88	0.0000	0.0000
89	0.0000	0.0000
90	0.0000	0.0000
91	0.0000	0.0000
92	0.0000	0.0000
93	0.0000	0.0000
94	0.0000	0.0000
95	0.0000	0.0000
96	0.0000	0.0000
97	0.0000	0.0000
98	0.0000	0.0000
99	0.0000	0.0000
100	0.0000	0.0000
101	0.0000	0.0000
102	0.0000	0.0000
103	0.0000	0.0000
104	0.0000	0.0000
105	0.0000	0.0000
106	0.0000	0.0000
107	0.0000	0.0000
108	0.0000	0.0000
109	0.0000	0.0000
110	0.0000	0.0000
111	0.0000	0.0000
112	0.0000	0.0000
113	0.0000	0.0000
114	0.0000	0.0000
115	0.0000	0.0000
116	0.0000	0.0000
117	0.0000	0.0000
118	0.0000	0.0000
119	0.0000	0.0000
120	0.0000	0.0000
121	0.0000	0.0000
122	0.0000	0.0000
123	0.0000	0.0000
124	0.0000	0.0000
125	0.0000	0.0000
126	0.0000	0.0000
127	0.0000	0.0000
128	0.0000	0.0000
129	0.0000	0.0000
130	0.0000	0.0000
131	0.0000	0.0000
132	0.0000	0.0000
133	0.0000	0.0000
134	0.0000	0.0000
135	0.0000	0.0000
136	0.0000	0.0000
137	0.0000	0.0000
138	0.0000	0.0000

139	0.0000	0.0000
140	0.0000	0.0000
141	0.0000	0.0000
142	0.0000	0.0000
143	0.0000	0.0000
144	0.0000	0.0000
145	0.0000	0.0000
146	0.0000	0.0000
147	0.0000	0.0000
148	0.0000	0.0000
149	0.0000	0.0000
150	0.0000	0.0000
151	0.0000	0.0000
152	0.0000	0.0000
153	0.0000	0.0000
154	0.0000	0.0000
155	0.0000	0.0000
156	0.0000	0.0000
157	0.0000	0.0000
158	0.0000	0.0000

Duration Flows

The Facility PASSED

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.0000	7224	4	0	Pass
0.0000	6775	4	0	Pass
0.0000	6343	4	0	Pass
0.0000	6005	4	0	Pass
0.0000	5618	4	0	Pass
0.0000	5348	4	0	Pass
0.0000	5075	4	0	Pass
0.0000	4746	4	0	Pass
0.0000	4462	4	0	Pass
0.0000	4162	4	0	Pass
0.0000	3907	4	0	Pass
0.0000	3638	4	0	Pass
0.0000	3432	4	0	Pass
0.0000	3240	4	0	Pass
0.0000	3071	4	0	Pass
0.0000	2857	4	0	Pass
0.0000	2699	4	0	Pass
0.0000	2503	4	0	Pass
0.0000	2332	4	0	Pass
0.0000	2169	4	0	Pass
0.0000	2009	4	0	Pass
0.0000	1838	4	0	Pass
0.0000	1668	4	0	Pass
0.0000	1545	4	0	Pass
0.0000	1413	4	0	Pass
0.0000	1312	4	0	Pass
0.0000	1178	4	0	Pass
0.0000	1094	4	0	Pass
0.0000	1002	4	0	Pass
0.0000	911	4	0	Pass
0.0000	824	4	0	Pass
0.0000	767	4	0	Pass
0.0000	674	4	0	Pass
0.0000	604	4	0	Pass
0.0000	502	4	0	Pass
0.0000	398	4	1	Pass
0.0000	302	4	1	Pass
0.0000	214	4	1	Pass
0.0000	155	4	2	Pass
0.0000	71	4	5	Pass
0.0000	28	4	14	Pass
0.0000	28	4	14	Pass
0.0000	28	4	14	Pass
0.0000	27	4	14	Pass
0.0000	27	4	14	Pass
0.0000	27	4	14	Pass
0.0000	26	4	15	Pass
0.0000	25	4	16	Pass
0.0000	25	4	16	Pass
0.0000	25	4	16	Pass
0.0000	25	4	16	Pass
0.0000	24	4	16	Pass
0.0000	23	4	17	Pass

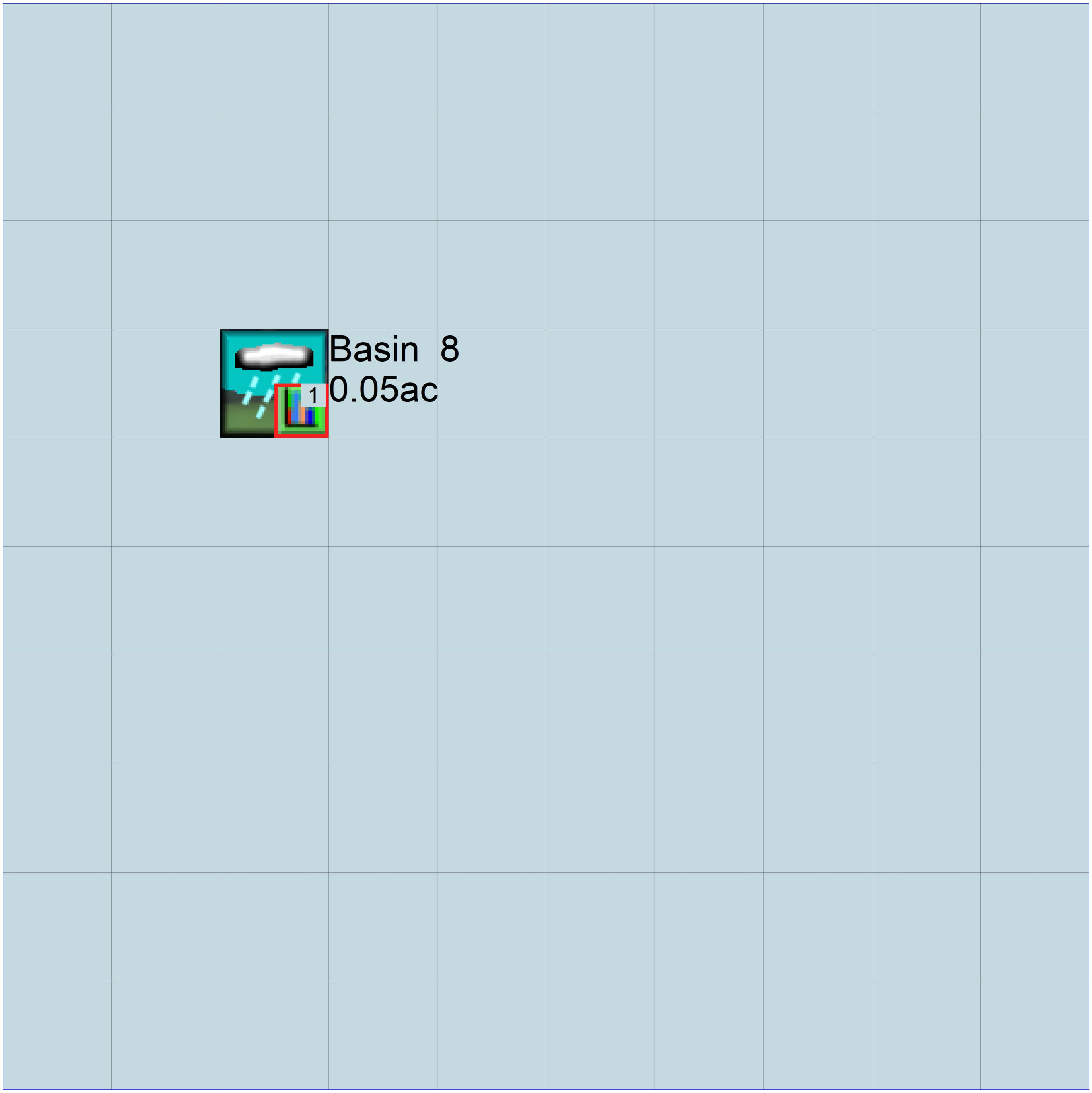
0.0000	23	4	17	Pass
0.0000	23	4	17	Pass
0.0000	22	4	18	Pass
0.0001	22	4	18	Pass
0.0001	20	4	20	Pass
0.0001	20	4	20	Pass
0.0001	20	4	20	Pass
0.0001	19	4	21	Pass
0.0001	19	4	21	Pass
0.0001	19	4	21	Pass
0.0001	19	4	21	Pass
0.0001	19	4	21	Pass
0.0001	19	4	21	Pass
0.0001	18	4	22	Pass
0.0001	17	4	23	Pass
0.0001	16	4	25	Pass
0.0001	16	4	25	Pass
0.0001	16	4	25	Pass
0.0001	16	4	25	Pass
0.0001	16	4	25	Pass
0.0001	16	4	25	Pass
0.0001	15	4	26	Pass
0.0001	14	4	28	Pass
0.0001	14	4	28	Pass
0.0001	14	4	28	Pass
0.0001	14	4	28	Pass
0.0001	13	4	30	Pass
0.0001	13	4	30	Pass
0.0001	13	4	30	Pass
0.0001	13	4	30	Pass
0.0001	13	4	30	Pass
0.0001	13	4	30	Pass
0.0001	13	4	30	Pass
0.0001	13	4	30	Pass
0.0001	12	4	33	Pass
0.0001	12	4	33	Pass
0.0001	12	4	33	Pass
0.0001	12	4	33	Pass
0.0001	12	4	33	Pass
0.0001	12	4	33	Pass
0.0001	11	4	36	Pass
0.0001	11	4	36	Pass
0.0001	11	4	36	Pass
0.0001	10	4	40	Pass
0.0001	10	4	40	Pass
0.0001	10	4	40	Pass
0.0001	10	4	40	Pass

LID Report

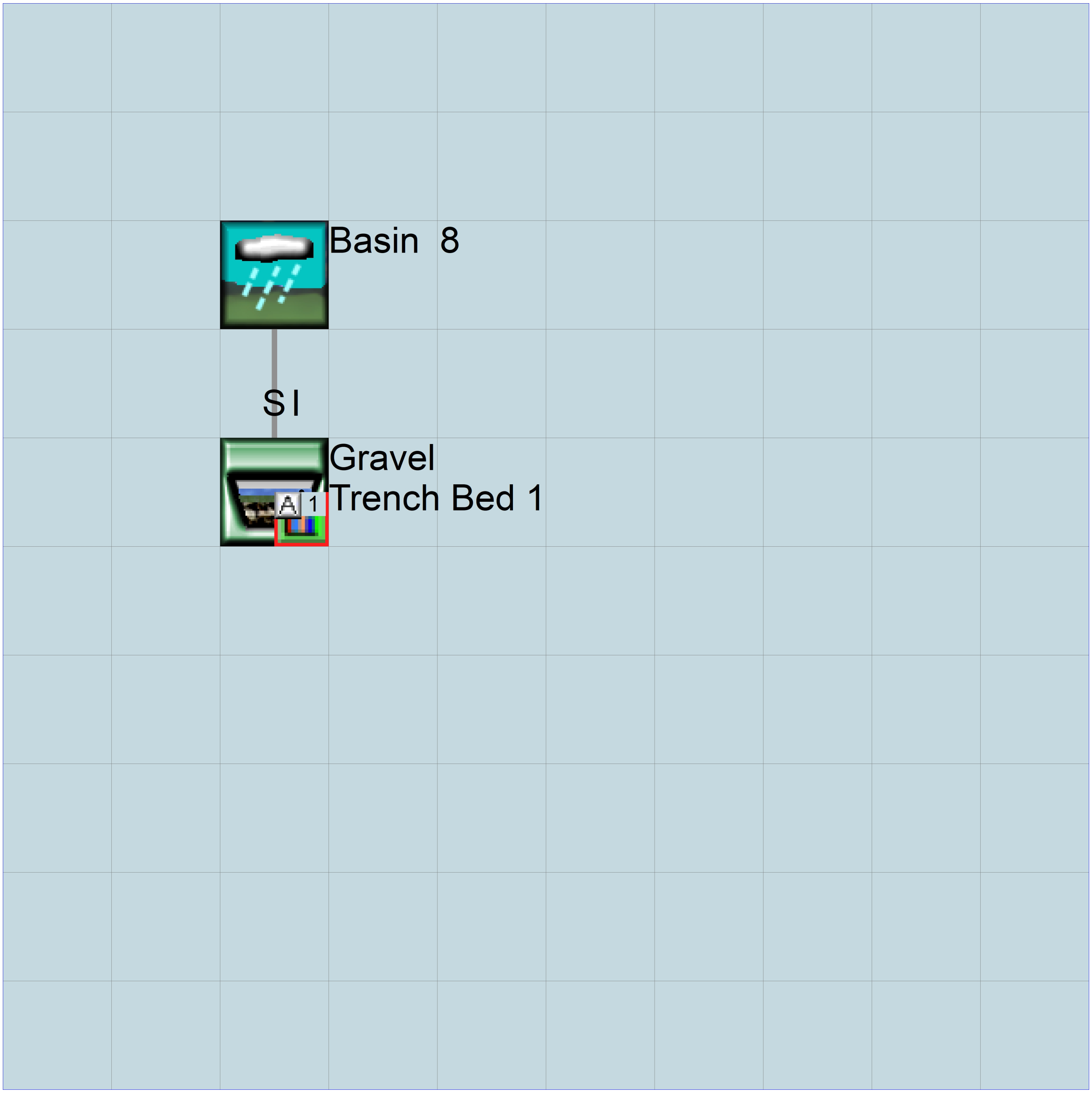
LID Technique	Used for Treatment ?	Total Volume Needs Treatment (ac-ft)	Volume Through Facility (ac-ft)	Infiltration Volume (ac-ft)	Cumulative Volume Infiltration Credit	Percent Volume Infiltrated	Water Quality	Percent Water Quality Treated	Comment
Gravel Trench Bed 1 POC	☐	20.16			☐	100.00			
Total Volume Infiltrated		20.16	0.00	0.00		100.00	0.00	0%	No Treat. Credit
Compliance with LID Standard 8% of 2-yr to 50% of 2-yr									Duration Analysis Result = Passed

Appendix

Predeveloped Schematic



Mitigated Schematic



Disclaimer

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Olympia, WA. 98501
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Local (360)943-0304

www.clearcreeksolutions.com

WWHM2012

PROJECT REPORT

WATER QUALITY

LOT 1 & LOT 4
AFFINITY & SCHOOL

General Model Information

WWHM2012 Project Name: C24-124 WQ_Affinity_School
Site Name: Affinity at Dupont
Site Address:
City:
Report Date: 6/20/2024
Gage: 42 IN WEST
Data Start: 10/01/1901
Data End: 09/30/2059
Timestep: 15 Minute
Precip Scale: 1.000
Version Date: 2023/01/27
Version: 4.2.19

POC Thresholds

Low Flow Threshold for POC1: 50 Percent of the 2 Year
High Flow Threshold for POC1: 50 Year

Landuse Basin Data

Predeveloped Land Use

Basin 1

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
A B, Forest, Mod	14.69
Pervious Total	14.69
Impervious Land Use	acre
Impervious Total	0
Basin Total	14.69

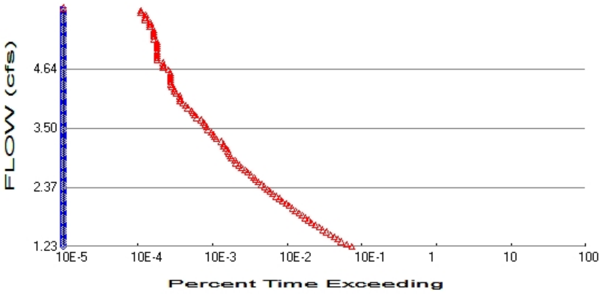
Mitigated Land Use

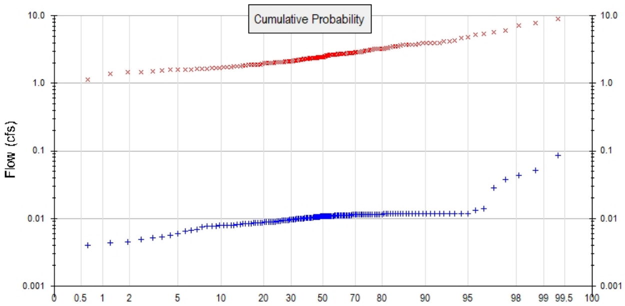
Basin 1

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
A B, Pasture, Mod	8.86
Pervious Total	8.86
Impervious Land Use	acre
ROADS MOD	5.83
Impervious Total	5.83
Basin Total	14.69

Analysis Results

POC 1





+ Predeveloped   x Mitigated

Predeveloped Landuse Totals for POC #1	
Total Pervious Area:	14.69
Total Impervious Area:	0

Mitigated Landuse Totals for POC #1	
Total Pervious Area:	8.86
Total Impervious Area:	5.83

Flow Frequency Method: Log Pearson Type III 17B

Flow Frequency Return Periods for Predeveloped. POC #1

Return Period	**Flow(cfs)**
2 year	0.009627
5 year	0.013432
10 year	0.016644
25 year	0.021606
50 year	0.026046
100 year	0.031203

Flow Frequency Return Periods for Mitigated. POC #1

Return Period	**Flow(cfs)**
2 year	2.468926
5 year	3.367243
10 year	4.041845
25 year	4.989959
50 year	5.769177
100 year	6.613858

Annual Peaks

Annual Peaks for Predeveloped and Mitigated. POC #1

Year	**Predeveloped**	**Mitigated**
1902	0.011	2.811
1903	0.004	3.056
1904	0.011	3.476
1905	0.011	1.715
1906	0.009	1.909
1907	0.011	2.230
1908	0.012	1.887
1909	0.010	2.380
1910	0.011	2.299
1911	0.011	2.556

1912	0.051	4.659
1913	0.011	2.379
1914	0.007	8.991
1915	0.011	1.599
1916	0.008	3.137
1917	0.006	1.393
1918	0.011	2.364
1919	0.009	1.565
1920	0.011	2.189
1921	0.010	1.635
1922	0.011	2.686
1923	0.012	1.784
1924	0.009	3.330
1925	0.009	1.454
1926	0.012	2.682
1927	0.008	2.444
1928	0.011	1.642
1929	0.012	3.277
1930	0.011	3.688
1931	0.012	1.786
1932	0.009	1.964
1933	0.011	1.834
1934	0.028	2.821
1935	0.007	1.590
1936	0.012	2.260
1937	0.011	3.399
1938	0.011	1.696
1939	0.008	2.002
1940	0.011	3.989
1941	0.009	3.976
1942	0.010	2.563
1943	0.010	2.465
1944	0.012	3.801
1945	0.012	2.673
1946	0.011	2.470
1947	0.009	1.714
1948	0.011	2.289
1949	0.011	3.512
1950	0.009	2.308
1951	0.009	4.196
1952	0.012	3.675
1953	0.014	3.032
1954	0.011	1.866
1955	0.005	2.623
1956	0.004	2.049
1957	0.011	1.903
1958	0.043	2.727
1959	0.011	2.695
1960	0.010	2.086
1961	0.012	5.716
1962	0.012	2.510
1963	0.008	1.727
1964	0.008	6.116
1965	0.013	2.686
1966	0.009	1.803
1967	0.011	2.717
1968	0.010	2.405
1969	0.010	1.904

1970	0.011	2.383
1971	0.012	2.116
1972	0.012	7.819
1973	0.012	4.156
1974	0.011	2.919
1975	0.012	2.928
1976	0.012	3.207
1977	0.007	1.605
1978	0.012	2.446
1979	0.010	2.680
1980	0.011	2.769
1981	0.009	2.795
1982	0.008	2.028
1983	0.011	2.566
1984	0.011	2.478
1985	0.009	3.279
1986	0.010	1.691
1987	0.010	2.764
1988	0.010	1.507
1989	0.010	2.108
1990	0.011	2.055
1991	0.010	3.725
1992	0.012	3.699
1993	0.010	2.911
1994	0.011	2.176
1995	0.006	1.657
1996	0.012	2.311
1997	0.011	2.082
1998	0.009	2.297
1999	0.008	3.136
2000	0.011	2.135
2001	0.006	2.396
2002	0.012	3.248
2003	0.010	2.712
2004	0.011	2.886
2005	0.011	7.083
2006	0.011	2.591
2007	0.008	2.908
2008	0.011	2.457
2009	0.010	1.990
2010	0.010	2.350
2011	0.009	2.650
2012	0.009	2.124
2013	0.012	2.227
2014	0.009	2.356
2015	0.011	3.695
2016	0.010	2.668
2017	0.012	3.241
2018	0.038	2.649
2019	0.012	3.080
2020	0.011	2.386
2021	0.012	2.008
2022	0.008	3.474
2023	0.012	4.772
2024	0.010	5.180
2025	0.008	2.691
2026	0.011	4.264
2027	0.011	2.926

2028	0.004	1.101
2029	0.012	1.706
2030	0.012	3.933
2031	0.004	1.144
2032	0.008	2.061
2033	0.005	2.450
2034	0.008	1.831
2035	0.012	2.235
2036	0.008	2.045
2037	0.009	3.209
2038	0.012	2.327
2039	0.011	5.432
2040	0.009	1.973
2041	0.010	2.357
2042	0.011	2.748
2043	0.010	2.986
2044	0.011	2.111
2045	0.010	1.610
2046	0.011	2.015
2047	0.012	2.160
2048	0.010	1.911
2049	0.009	2.796
2050	0.011	2.153
2051	0.010	2.831
2052	0.011	2.756
2053	0.010	1.983
2054	0.012	3.926
2055	0.008	2.416
2056	0.005	3.346
2057	0.010	1.472
2058	0.009	3.622
2059	0.087	3.956

Ranked Annual Peaks

Ranked Annual Peaks for Predeveloped and Mitigated. POC #1

Rank	**Predeveloped**	**Mitigated**
1	0.0868	8.9910
2	0.0507	7.8186
3	0.0433	7.0834
4	0.0379	6.1158
5	0.0281	5.7155
6	0.0140	5.4319
7	0.0132	5.1795
8	0.0118	4.7721
9	0.0118	4.6592
10	0.0118	4.2640
11	0.0118	4.1956
12	0.0118	4.1556
13	0.0118	3.9892
14	0.0118	3.9759
15	0.0118	3.9560
16	0.0118	3.9332
17	0.0117	3.9262
18	0.0117	3.8009
19	0.0117	3.7251
20	0.0117	3.6985
21	0.0117	3.6950
22	0.0117	3.6879

23	0.0117	3.6747
24	0.0117	3.6224
25	0.0117	3.5118
26	0.0117	3.4761
27	0.0116	3.4740
28	0.0116	3.3988
29	0.0116	3.3460
30	0.0116	3.3305
31	0.0116	3.2793
32	0.0116	3.2773
33	0.0116	3.2476
34	0.0116	3.2412
35	0.0115	3.2085
36	0.0115	3.2072
37	0.0115	3.1370
38	0.0115	3.1358
39	0.0115	3.0797
40	0.0115	3.0559
41	0.0115	3.0323
42	0.0114	2.9857
43	0.0114	2.9282
44	0.0114	2.9258
45	0.0114	2.9194
46	0.0114	2.9110
47	0.0113	2.9082
48	0.0113	2.8856
49	0.0113	2.8305
50	0.0113	2.8212
51	0.0112	2.8114
52	0.0112	2.7960
53	0.0111	2.7954
54	0.0111	2.7693
55	0.0111	2.7635
56	0.0111	2.7561
57	0.0111	2.7475
58	0.0111	2.7270
59	0.0110	2.7174
60	0.0110	2.7118
61	0.0110	2.6954
62	0.0110	2.6911
63	0.0110	2.6861
64	0.0110	2.6861
65	0.0110	2.6824
66	0.0110	2.6798
67	0.0109	2.6730
68	0.0109	2.6682
69	0.0109	2.6497
70	0.0109	2.6489
71	0.0109	2.6229
72	0.0109	2.5912
73	0.0109	2.5664
74	0.0108	2.5633
75	0.0108	2.5560
76	0.0108	2.5105
77	0.0108	2.4777
78	0.0108	2.4699
79	0.0107	2.4654
80	0.0107	2.4572

81	0.0107	2.4504
82	0.0107	2.4456
83	0.0106	2.4444
84	0.0106	2.4157
85	0.0105	2.4049
86	0.0105	2.3961
87	0.0105	2.3863
88	0.0104	2.3833
89	0.0104	2.3800
90	0.0104	2.3790
91	0.0103	2.3639
92	0.0103	2.3565
93	0.0102	2.3557
94	0.0102	2.3498
95	0.0102	2.3269
96	0.0102	2.3112
97	0.0101	2.3083
98	0.0101	2.2993
99	0.0101	2.2972
100	0.0100	2.2887
101	0.0100	2.2597
102	0.0100	2.2352
103	0.0099	2.2298
104	0.0098	2.2273
105	0.0098	2.1892
106	0.0098	2.1762
107	0.0098	2.1601
108	0.0097	2.1527
109	0.0097	2.1348
110	0.0096	2.1240
111	0.0096	2.1163
112	0.0095	2.1111
113	0.0094	2.1079
114	0.0093	2.0861
115	0.0093	2.0825
116	0.0093	2.0610
117	0.0092	2.0555
118	0.0091	2.0490
119	0.0090	2.0453
120	0.0090	2.0277
121	0.0089	2.0145
122	0.0089	2.0081
123	0.0089	2.0021
124	0.0089	1.9904
125	0.0088	1.9830
126	0.0088	1.9730
127	0.0087	1.9641
128	0.0087	1.9111
129	0.0086	1.9091
130	0.0086	1.9039
131	0.0085	1.9030
132	0.0084	1.8874
133	0.0083	1.8664
134	0.0083	1.8344
135	0.0083	1.8306
136	0.0082	1.8027
137	0.0081	1.7858
138	0.0079	1.7844

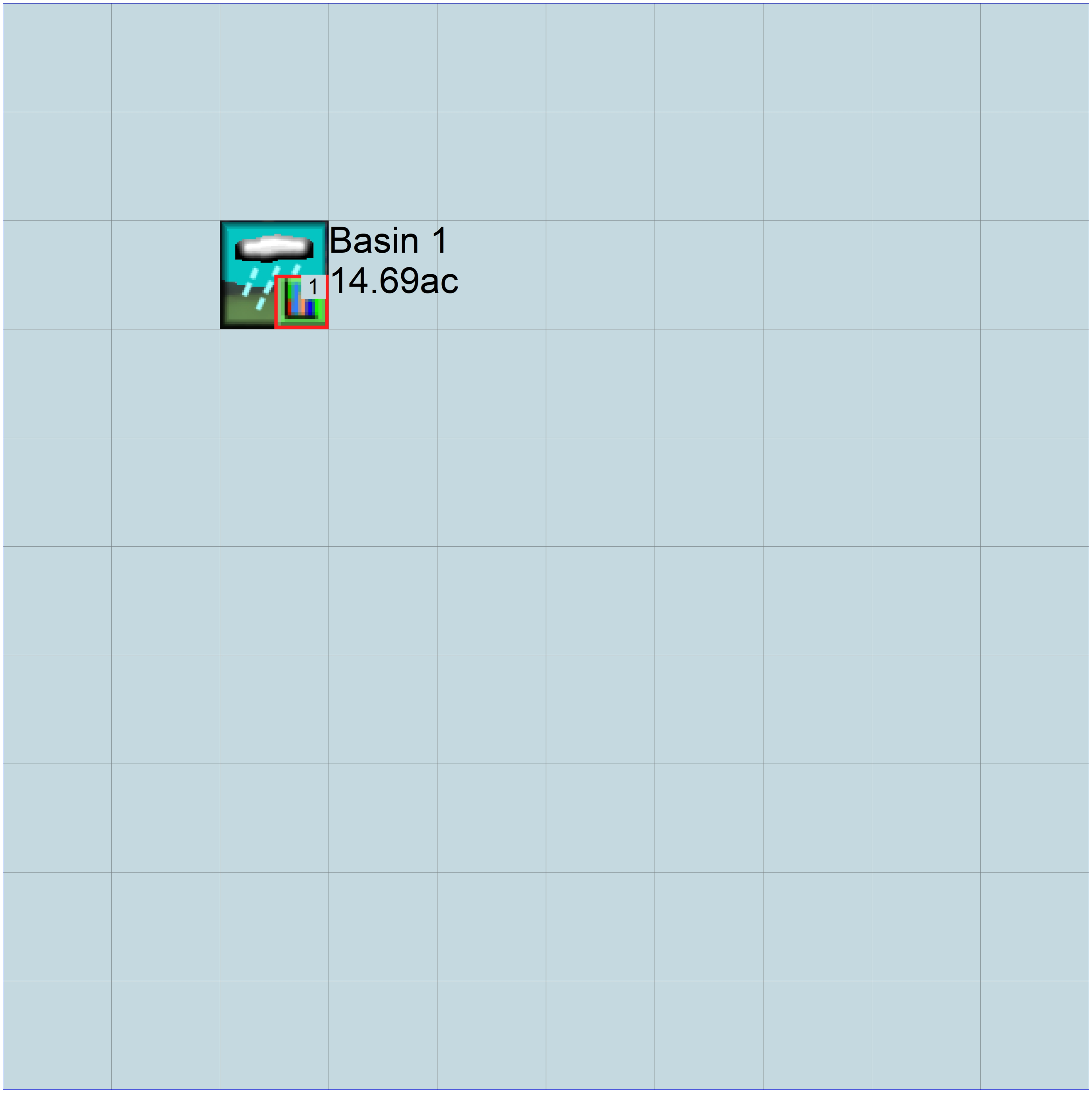
139	0.0079	1.7272
140	0.0078	1.7146
141	0.0078	1.7142
142	0.0078	1.7061
143	0.0077	1.6960
144	0.0076	1.6913
145	0.0076	1.6569
146	0.0075	1.6417
147	0.0069	1.6351
148	0.0067	1.6098
149	0.0064	1.6049
150	0.0060	1.5993
151	0.0056	1.5896
152	0.0053	1.5652
153	0.0052	1.5067
154	0.0049	1.4724
155	0.0044	1.4537
156	0.0044	1.3933
157	0.0040	1.1445
158	0.0037	1.1006

Water Quality

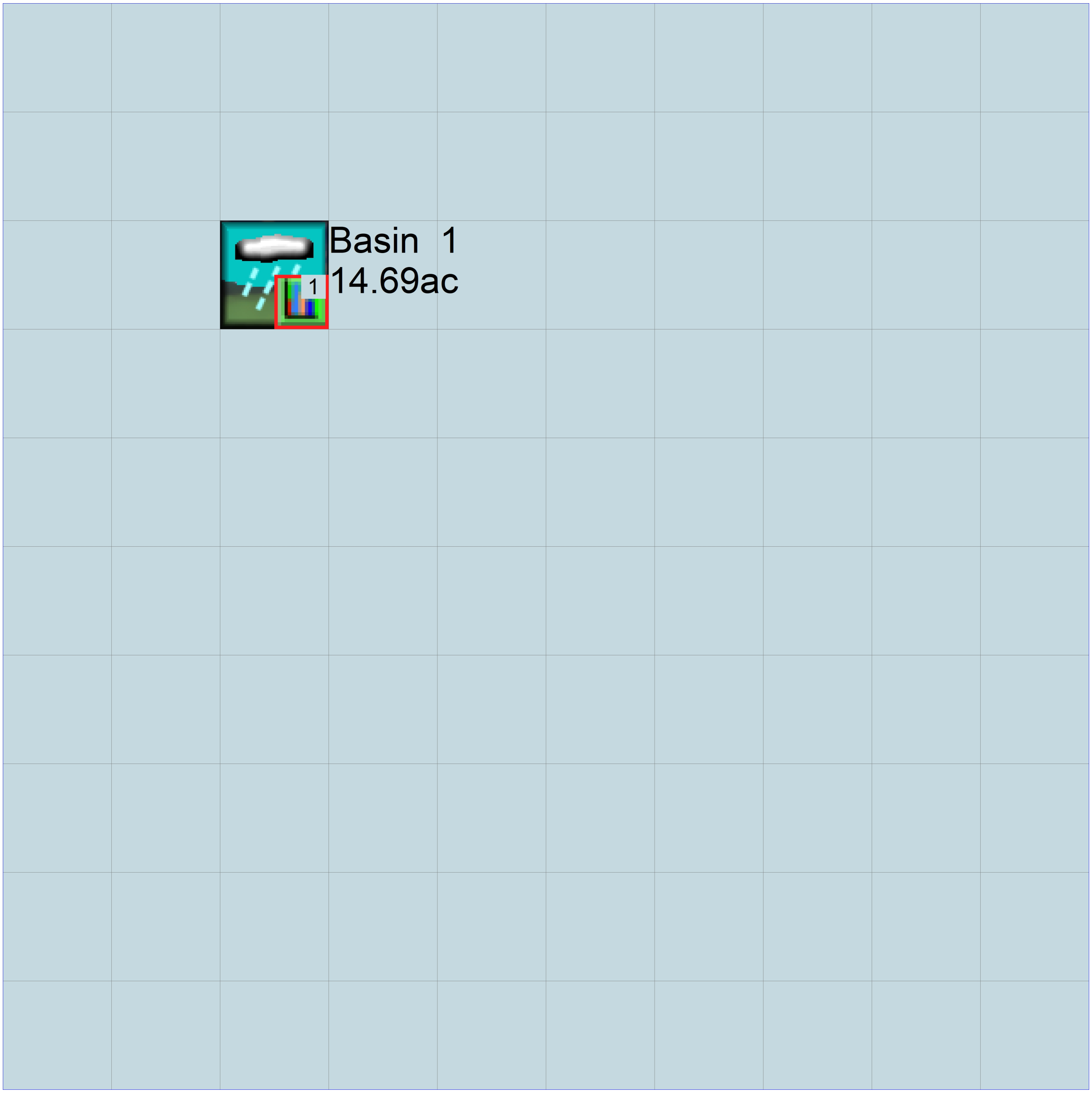
Water Quality BMP Flow and Volume for POC #1
On-line facility volume: 0.7086 acre-feet
On-line facility target flow: 1.0106 cfs.
Adjusted for 15 min: 1.0106 cfs.
Off-line facility target flow: 0.5916 cfs.
Adjusted for 15 min: 0.5916 cfs.

Appendix

Predeveloped Schematic



Mitigated Schematic



Disclaimer

Legal Notice

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Olympia, WA. 98501
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Local (360)943-0304

www.clearcreeksolutions.com

APPENDIX 10

ADDITIONAL INFORMATION

Earth Solutions NW LLC

Earth Solutions NW LLC
Geotechnical Engineering, Construction
Observation/Testing and Environmental Services

April 19, 2022
ES-8427

Careage Construction, Inc.
4411 Point Fosdick Drive, Suite 203
Gig Harbor, Washington 98335

Attention: Mr. Mike Campeau

Subject: Limited Phase II Environmental Site Assessment
Tacoma Smelter Plume
DuPont MP
South of McNeil Street and Bobs Hollow Lane
DuPont, Washington

Reference: Washington State Department of Ecology
Tacoma Smelter Plume Model Remedies Guidance,
dated July 2019

Dear Mr. Campaeu:

This letter presents the results of the Limited Phase II Environmental Site Assessment (ESA) performed by Earth Solutions NW, LLC (ESNW) at the above-referenced DuPont MP property (subject site) at the request of Careage Construction, Inc. (Client). The Limited Phase II ESA soil sampling activities were performed at the subject site to assess potential shallow soil contamination associated with airborne arsenic and lead fallout from the historical Asarco Smelter, formerly located in Tacoma, Washington (area referred to as the Tacoma Smelter Plume). It should be noted that Tacoma Smelter Plume (TSP) characterization soil sampling completed during this investigation was completed in accordance with the referenced Washington State Department of Ecology (Ecology) TSP Model Remedies Guidance document for sampling and cleanup of arsenic and lead contaminated soils (dated July 2019).

Based on the analytical laboratory results of this Limited Phase II ESA, one soil sample collected from depths of zero to six inches below the existing ground surface (bgs) contained concentrations of lead exceeding double the Model Toxics Control Act (MTCA) Method A lead soil cleanup level for unrestricted land-use (CUL) of 250 milligrams per kilogram (mg/kg). Average concentrations of arsenic in site soil ranging from 0 to 6 inches bgs and 6 to 12 inches bgs are below the MTCA Method A soil CUL of 20 mg/kg. However, one soil sample collected from depths of zero to six inches bgs and one duff sample contained concentrations of arsenic exceeding double the MTCA Method A arsenic CUL.

According to Ecology’s TSP Model Remedies Guidance (July 2019), elevated concentrations of arsenic identified in shallow site soil during this investigation will require remediation as part of or prior to planned residential redevelopment activities at the subject site.

The body of this letter should be referenced for further details regarding the field activities and findings of this Limited Phase II ESA.

Site Description

The subject site is located directly south of the intersection between McNeil Street and Bobs Hollow Lane, in DuPont, Washington (see Plate 1 – Vicinity Map). The site consists of one tax parcel (Pierce County Parcel No. 011934-1004), comprising a total of approximately 24.6 acres of land. The site is currently undeveloped and lightly to moderately vegetated with trees and undergrowth. Portions of the central and northeastern areas of the site are cleared of vegetation.

The subject site is located within Ecology’s designated TSP area; an area known for possible shallow arsenic and lead soil contamination associated with airborne fallout from the historical Asarco Smelter formerly located in Tacoma, Washington. Specifically, the site is located in a portion of the TSP with average concentrations of arsenic in soil that range from 40 mg/kg to 100 mg/kg, above the applicable cleanup level (20 mg/kg) set by MTCA and Ecology.

Decision Units

A “Decision Unit” is an “area of a property expected to have a different pattern of soil contamination than other areas. Some properties will only have one decision unit. Factors include current and past land uses and development history…[and]…Future use can also define decision units” (page 11 of Ecology’s TSP Model Remedies Guidance document). Based on the understanding of future development, the subject site assessed herein was treated as one Decision Unit for the purposes of this TSP characterization shallow soil sampling assessment.

See Plate 2 to reference site dimensions and boundaries.

Based on Table 1 (page 13) and Table 1a (page 16) of the referenced TSP Model Remedies Guidance, ESNW calculated the minimum number of soil samples and forest duff composite samples that would need to be collected in accordance with the TSP Model Remedies Guidance. See attached “Form 1 – Characterization Sampling” for reference. Based on these calculations, the following numbers of soil and forest duff samples were determined to be collected across the subject site: 70 soil samples at a depth of zero to six inches bgs, 18 soil samples at a depth of 6 to 12 inches bgs, and 18 forest duff composite samples.

See below for discussion of on-site soil sampling activities.

Field Activities

Field activities involved with completing this Limited Phase II ESA were performed on February 10, 11, and 14, 2022.

ESNW used site plans to identify evenly spaced and accurately plotted sampling locations in an approximate grid pattern throughout the property. As discussed in the previous section of this letter, 70 discrete soil samples were collected at a depth of zero to six inches bgs. 18 soil samples were collected from depths of 6 to 12 inches bgs. Additionally, 18 forest duff composite samples (each consisting of six evenly spaced forest duff subsamples) were also collected across the subject site. A handheld post-hole digger was used to manually collect each soil and/or forest duff composite sample. See Plate 3 to review sampling locations.

Soil conditions were observed to be dry during soil sampling. No wetland areas, standing bodies of water, or steep slopes were observed in areas addressed by ESNW during Limited Phase II ESA soil sampling activities.

Soil Sampling Methods

Each soil (and forest duff) sample was transferred from the post-hole digger into a stainless-steel bowl before being transferred to a pre-cleaned 8-oz glass sampling jar and sealed with a Teflon-lined plastic lid. All tools and equipment used during soil sampling activities were cleaned in separate wash and rinse buckets prior to and between the collection of each sample. Additionally, nitrile gloves were worn during sampling activities and replaced with a clean pair between compositing and collection of each soil (and forest duff) sample.

The jars containing the soil (and forest duff) samples were labeled and stored on ice in a 5°C cooler, and delivered to OnSite Environmental Laboratories, Inc., OnSite, (a Washington State-certified laboratory), located in Redmond, Washington, to be analyzed for the following constituents:

- Total Arsenic by Environmental Protection Agency (EPA) Analytical Method 6010D.
- Total Lead by EPA Analytical Method 6010D.

Applicable Regulatory Standards – Soil

The rules that guide the cleanup process at sites within Washington State are incorporated into MTCA, as administered by Ecology and defined in WAC 173-340. For this letter, average values for total arsenic and lead concentrations (reported in the OnSite analytical report) were compared to MTCA Method A CULs for soil. The Method A CULs are conservative and are for sites with relatively few hazardous substances, which may not be appropriate for all sites. The regulations state that Method A should not be automatically used to define cleanup levels that must be met for financial, real estate, insurance coverage, or similar purposes. Additionally, test results above Method A cleanup levels do not necessarily mandate a cleanup action for a site. The referenced TSP Model Remedies Guidance document uses MTCA Method A CULs.

Copies of the laboratory analytical reports are attached to this letter. Applicable MTCA Method A CULs used during this Limited Phase II ESA include the following:

- The MTCA Method A arsenic CUL for soil is 20 mg/kg.

- The MTCA Method A lead CUL for soil is 250 mg/kg.

It should be noted that, according to Ecology's 2019 TSP Model Remedies Guidance, "elevated concentrations" of arsenic and lead are defined as follows: average concentrations of total arsenic in soil exceeding Ecology's MTCA Method A arsenic CUL, 20 mg/kg; average concentrations of total lead in soil exceeding the lead MTCA Method A CUL, 250 mg/kg; or any concentrations of arsenic or lead exceeding double the above-identified MTCA Method A CULs.

Analytical Results

It should be noted that the OnSite laboratory analytical report identifies lower limit concentrations that can be detectable using the analytical methods discussed in the *Soil Sampling Methods* section of this report. These lower limit detectable concentrations are referred to as practical quantitation limits (PQLs). If concentrations are not identified at or above the PQLs for any analysis, then the results are identified as not detected, or "ND". Where results are reported as ND, the reported PQL was used to calculate average values for concentrations of arsenic or lead in soil.

Arsenic

Analytical results indicate that the average concentrations of arsenic in site soil are as follows:

- Depth of zero to six inches bgs: 13.6 mg/kg (below the MTCA Method A arsenic CUL of 20 mg/kg); and,

- Depth of 6 to 12 inches bgs: 12.9 mg/kg (below the MTCA Method A arsenic CUL).

Analytical results indicate the concentrations of arsenic in site duff are as follows:

- 1 of 18 composite forest duff samples contained detectable levels of arsenic: 51 mg/kg (above the MTCA Method A arsenic CUL).

One soil sample collected from depths of zero to six inches bgs (SS-11:6") and one duff sample (Duff-10) contained concentrations of arsenic exceeding double the MTCA Method A arsenic CUL. No elevated concentrations of arsenic were identified in site soil below 6 inches in depth across areas of the subject site. In conclusion, elevated concentrations of arsenic were identified in site soil or forest duff between 0 to 6 inches bgs at two locations across the property.

Lead

Analytical results indicate that the average concentrations of lead in site soil are as follows:

- Depth of zero to six inches bgs: 29.5 mg/kg (below the MTCA Method A lead CUL of 250 mg/kg); and,
- Depth of 6 to 12 inches bgs: 11 mg/kg (below the MTCA Method A lead CUL).

Analytical results indicate that the concentrations of lead in duff are as follows:

- 1 of 18 composite forest duff samples contained detectable levels of lead: 190 mg/kg (below the MTCA Method A lead CUL).

One soil sample (SS-18:6") collected from depths of zero to six inches contained concentrations of lead exceeding double the MTCA Method A lead CUL. No single forest duff sample contained concentrations at or exceeding double the MTCA Method A lead CUL. Average concentrations of lead in soil and forest duff were also all below the MTCA Method A lead CUL. In conclusion, elevated concentrations of lead were identified one location on the subject site.

The laboratory analytical report is attached to this letter for review. Also, see the attached "Form 2 – Characterization Sampling Results" document that separately summarizes the above-discussed results as required in Ecology's TSP Model Remedies Guidance document.

Summary and Conclusions

Consistent with the Client's request, ESNW completed a Limited Phase II ESA at the subject site. This investigation included: (1) collecting 104 discrete soil (and forest duff) samples across the subject site in accordance with the referenced TSP Model Remedies Guidance document (Ecology, July 2019); (2) submitting the soil (and forest duff) samples to a Washington State-certified laboratory to be analyzed for the presence of total arsenic and lead; and (3) completion of this letter.

In conclusion, laboratory analytical results identified elevated concentrations (as defined in the "Applicable Regulatory Standards – Soil" section of this letter) of arsenic and lead in soil ranging from zero to six inches bgs and in forest duff at three separate locations on the subject site. The three elevated locations (depicted on Plate – 3) are soil/duff sample locations SS-11:6",SS-18:6", and Duff-10. This letter presents evidence that the site has been impacted by elevated concentrations of arsenic from historical operation of the Asarco Smelter.

Recommendations

Based on the findings of this assessment, soil remediation will be necessary at the subject site in connection with elevated concentrations of arsenic in soil associated with the positioning of the site in the TSP.

1. ESNW recommends dilution, or soil mixing, of elevated concentrations of arsenic in soil ranging from zero to six inches bgs across areas planned for residential redevelopment.

   Soil mixing can be completed by several different methods described in further detail in the TSP Model Remedies Guidance document (Ecology, July 2019), which include the two following options: (1) segregate the upper six inches of soil and topsoil/forest duff into stockpiles to be mixed with deeper native soil or clean imported soil; or (2) till the upper 18 inches of soil to stir lower, cleaner soil with shallower arsenic-impacted soil. If forest duff and topsoil are to be reused on-site, mixing of clean sand, soil, or imported clean topsoil will need to be completed to dilute concentrations of arsenic in forest duff before reuse. It should be noted that ESNW can provide a separate cleanup action plan discussing further detail and requirements involved with necessary soil mixing activities, including worker health and safety.

2. During soil mixing activities, ESNW recommends sufficient wetting of soil and forest duff to prevent possible inhalation of airborne arsenic from the upper six inches of site soil. Additionally, anyone handling soil within the upper six inches of the site prior to or during soil mixing activities should practice adequate handwashing (with water and soap) prior to meals or touching one’s face. These recommendations should be discussed in further detail with a site-specific health and safety plan to be used during initial development activities prior to successful arsenic remediation.

3. Confirmation soil sampling will need to be completed at the subject site redevelopment areas after soil mixing and/or within all stockpiles of diluted soil to verify that soil mixing activities and remediation of arsenic and lead impacts were successful.

4. ESNW recommends applying for a no further action (NFA) determination from Ecology for the planned redevelopment areas once the final plat is recorded for the subject site.

Limitations

The work described herein was performed upon request by the Client after discussions relating to the potential for TSP-related arsenic and lead soil impacts at the subject property. The findings and recommendations in this letter are made based upon the analytical results, field observations, and our best professional judgement. It is possible that unforeseen events could occur that may limit the effectiveness of the assessment. Although risk can never be eliminated, more detailed and extensive sampling and testing would yield better management of site risks. Since such extensive services involve greater expense, we ask our clients to participate in identifying the level of service that will provide them with an acceptable level of risk. Please contact the signatories of this letter if you would like to discuss this issue of risk further.

The scope of work on this project was presented in our February 4, 2022 Phase II Environmental Site Assessment proposal (Proposal No. PES-8427) and subsequently approved by Careage Construction, Inc. as our client. Please be aware our scope of work was limited to those items specifically identified in the proposal. Other activities not specifically included in the presented scope of work (in the proposal, correspondence, or this letter) are excluded and should not be considered part of our scope of services.

Land use, site conditions (both on-site and off-site), and other factors will change over time. Since site activities and regulations beyond our control could change at any time after the completion of this letter, our observations, findings, and opinions can be considered valid only as of the date of the site visit (February 14, 2022).

This letter may be used by the Client and only for the purposes stated within a reasonable time from its issuance, but in no event later than one year from the date of this letter.

Any party other than the Client who would like to use this letter shall notify ESNW of such intended use. Based on the intended use of this letter, ESNW may require that additional work be performed and that a revised letter be issued. Non-compliance with any of these requirements by the client or anyone else will release ESNW from any liability resulting from the use of this letter by any unauthorized party. No warranty, either expressed or implied, is made.

Closing

We trust this letter meets your current needs and appreciate the opportunity to provide our consulting services to you. Please contact the undersigned at (425) 449-4704 if you have any questions or require additional information.

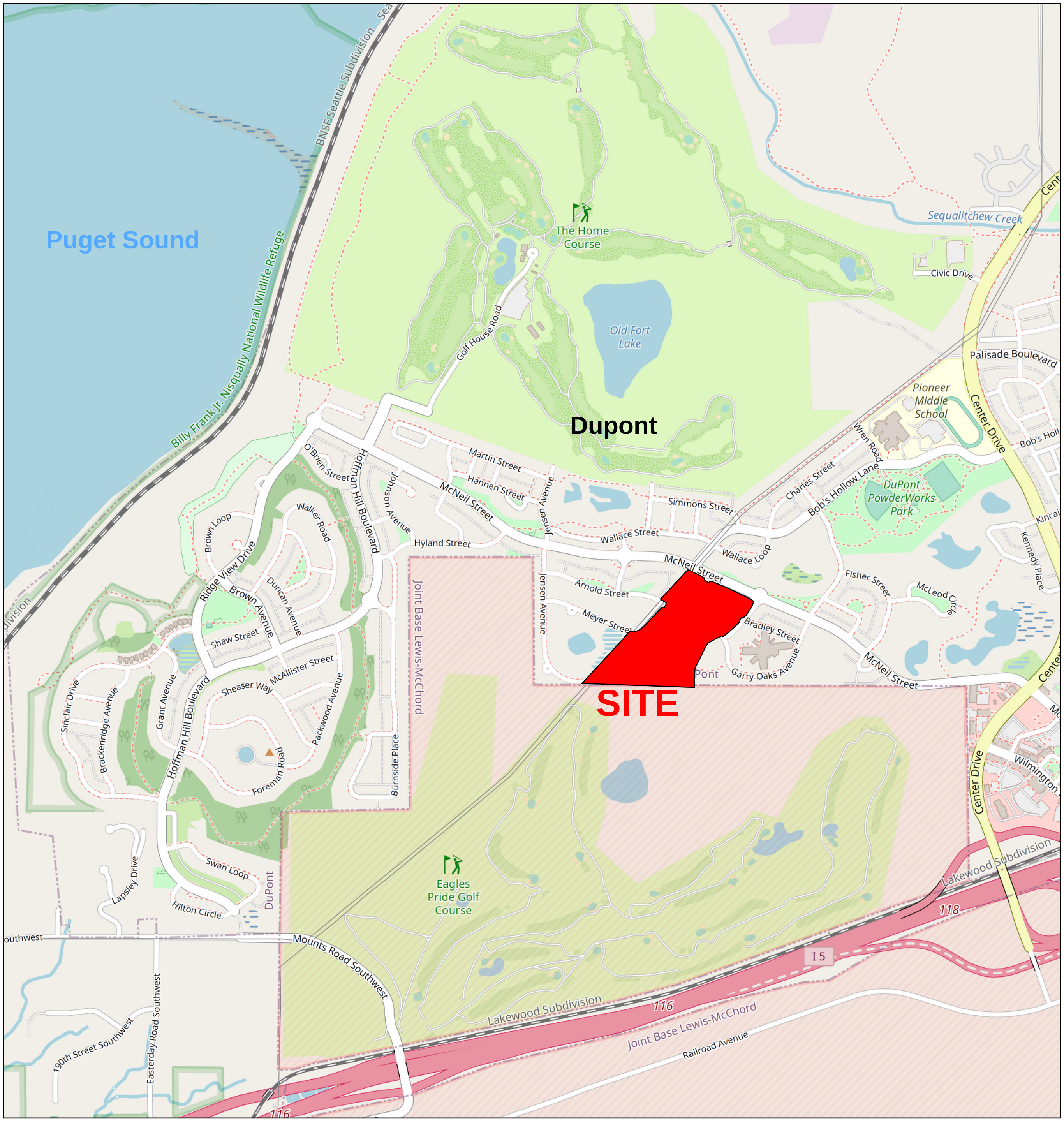
Sincerely,

EARTH SOLUTIONS NW, LLC

Kyler T. Kelly, L.G.
Project Geologist

Kyle R. Campbell, P.E.
Principal Engineer

Attachments: Plate 1 – Vicinity Map
Plate 2 – Decision Units
Plate 3 – Soil Sampling Location Plan
Form 1 – Characterization Sampling
Form 2 – Characterization Sampling Results
OnSite Environmental Analytical Laboratory Report



Reference:
Pierce County, Washington
OpenStreetMap.org

NORTH

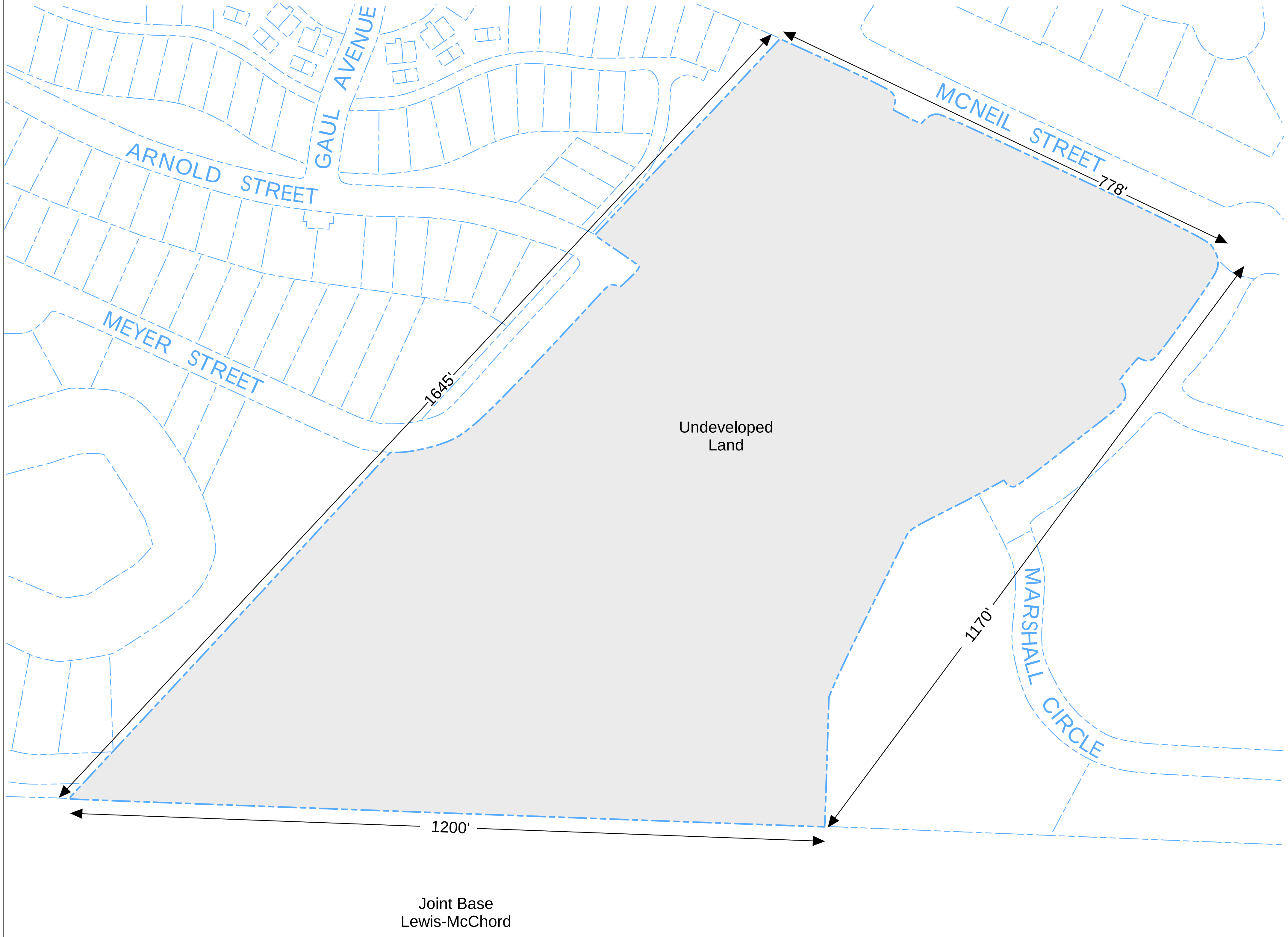
NOTE: This plate may contain areas of color. ESNW cannot be responsible for any subsequent misinterpretation of the information resulting from black & white reproductions of this plate.

Earth Solutions NW LLC

Geotechnical Engineering, Construction Observation/Testing and Environmental Services

Vicinity Map
Dupont MP
Dupont, Washington

Drwn. CAM	Date 04/12/2022	Proj. No. 8427
Checked KTK	Date April 2022	Plate 1



LEGEND

▨ Subject Site

NORTH

NOT - TO - SCALE

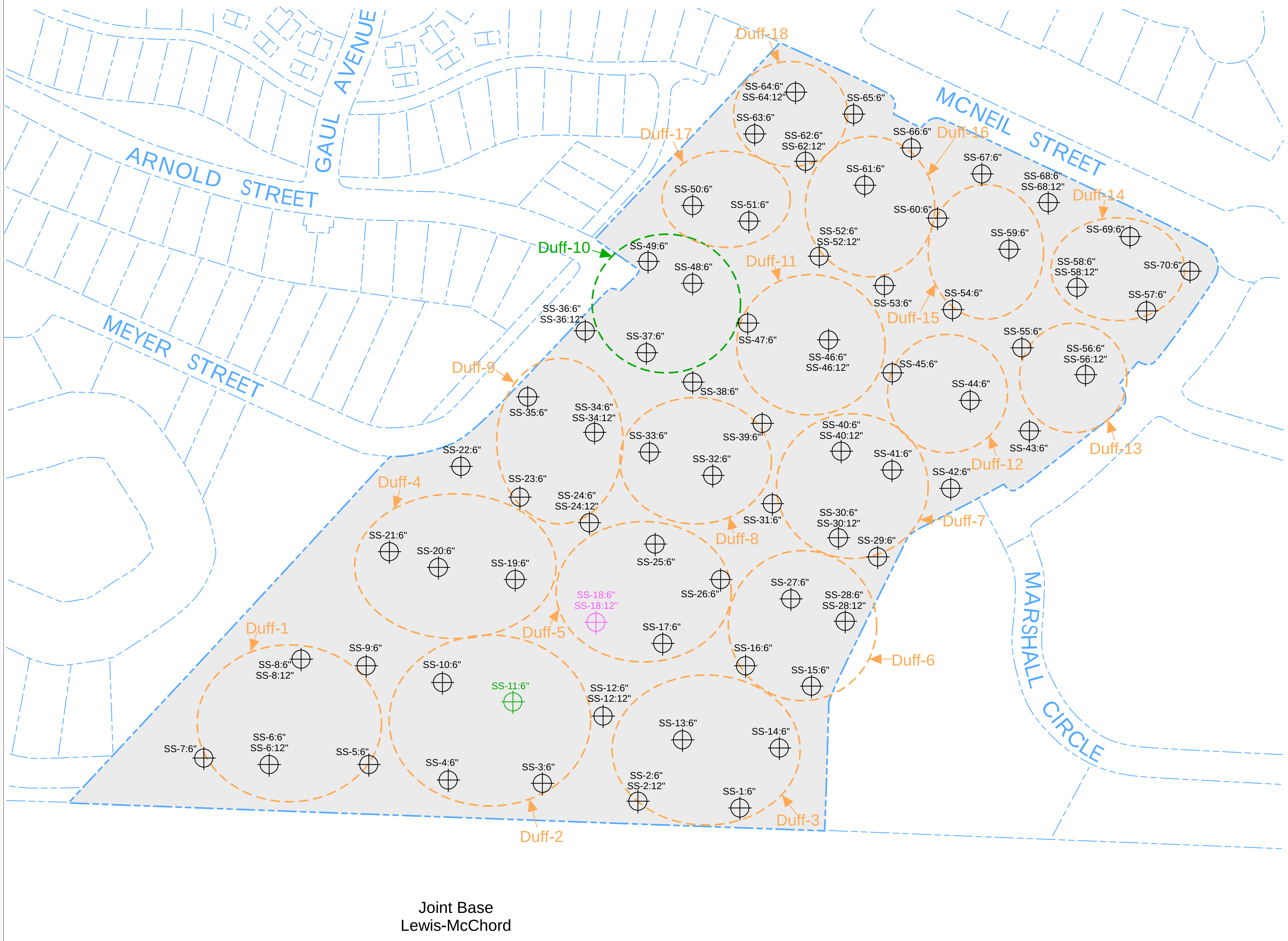
NOTE: The graphics shown on this plate are not intended for design purposes or precise scale measurements, but only to illustrate the approximate test locations relative to the approximate locations of existing and / or proposed site features. The information illustrated is largely based on data provided by the client at the time of our study. ESNW cannot be responsible for subsequent design changes or interpretation of the data by others.

NOTE: This plate may contain areas of color. ESNW cannot be responsible for any subsequent misinterpretation of the information resulting from black & white reproductions of this plate.

Decision Units
Dupont MP
Dupont, Washington

Earth Solutions NWLLC
Geotechnical Engineering, Construction
Observation/Testing and Environmental Services

Drwn. By	CAM
Checked By	KTK
Date	04/18/2022
Proj. No.	8427
Plate	2



LEGEND

SS-20:6" ⊕ Approximate Location of ESNW Soil Sample

▨ Subject Site

⊕ Elevated Lead Location

◌ ⊕ Elevated Arsenic Location

NORTH

NOT - TO - SCALE

NOTE: The graphics shown on this plate are not intended for design purposes or precise scale measurements, but only to illustrate the approximate test locations relative to the approximate locations of existing and / or proposed site features. The information illustrated is largely based on data provided by the client at the time of our study. ESNW cannot be responsible for subsequent design changes or interpretation of the data by others.

NOTE: This plate may contain areas of color. ESNW cannot be responsible for any subsequent misinterpretation of the information resulting from black & white reproductions of this plate.

Soil Sampling Location Plan
Dupont MP
Dupont, Washington

Earth Solutions NW LLC
Geotechnical Engineering, Construction
Observation/Testing and Environmental Services

Drwn. By	CAM
Checked By	KTK
Date	04/19/2022
Proj. No.	8427
Plate	3

Form 1 Characterization Sampling

Reminder: Keep a copy of the filled out forms to pass on to future property owners.

Part 1: Determine your decision units

1. Total property size: 24.60 acres

2. In an area of arsenic >100 ppm (see map on inside cover): yes [✓ no]

3. Check all that apply and identify decision units in any of these cases:

- ☑ Property is larger than 0.25 acres
- ☐ Property currently or historically had a mix of forested and developed land.
- ☐ More than one type of land use is planned for the development
- ☐ Parts of the property will be play areas, gardens, or other high use areas
- ☐ Property has geographic features, such as steep slopes or wetlands
- ☑ Areas have forest duff that needs separate sampling

4. On the next page, list the decision units on your property and their size in Table 1. Use Table 2 to determine the number of samples needed for each decision unit.

Part 2: Soil sample depth in upland areas

5. Fill in Table 1 on the following page with the sample depths.

- **At every location:** Take samples from the top 0-6 inches of soil, after clearing away grass, leaves, gravel, or debris on the surface (Figure 3)
- **At every fourth location (25% of the samples):** Also take a sample from the 6-12 inch depth
- **If you are sampling in natural areas:** Take soil samples from 0-6 inches below ground surface (bgs), 6-12 inches bgs, 12-24 inches bgs, 24-36 inches bgs from every location
- **Areas where fill dirt or topsoil was added in the past:** At every fourth location, take a sample from the top 0-6 inches of the original land surface, if it is deeper than 12 inches
- **If using mixing as a remedy:** At every fourth sample location, take a sample from the depth you to which you will mix
- **For forest duff:** Take six subsamples throughout the decision unit and combine into one sample. If your decision unit is larger than 0.25 acres,

calculate how many composite duff samples to take using Table 1a in Chapter 1 of this guidance

Part 2A: Soil sample depth in wetlands

- **At every location:** Take samples from the top 0-4 inches of sediment
- **At every location:** Take samples from the top 4-8 inches of sediment

Part 3: Overlay a sampling grid for each decision unit

6. Attach a diagram showing property dimensions and locations of decision units.

7. Attach a separate diagram for each decision unit, including dimensions, existing structures, and which structures will remain after development.

Table 1. Characterization sampling plan

Decision unit description (past use, planned use)	**Acres/ft^2**	**# of samples**	**Sample depth/duff layer**
1. Undeveloped, Residential	24.60 acres	70	0-6"
		18	6-12"
		18	Duff
2.			
3.			
4.			

Table 2. Number of sample locations per decision unit by planned use and estimated arsenic level.

Sampling area	Residential, parks, commercial **(# samples needed)**		Forest and open land **(# samples needed)**	
Acres	Arsenic >100 ppm	Arsenic <100 ppm	Arsenic >100 ppm	Arsenic 20-100 ppm
0.25*	**10**	**8**	**8**	**8**
1	**20**	**16**	**16**	**12**
5	**40**	**32**	**30**	**24**
10	**60**	**48**	**40**	**32**
20	**80**	**64**	**50**	**40**
100	**120**	**90**	**70**	**60**
>100	**120 +1 per 5 acres**	**90 + 1 per 5 acres**	**70 + 1 per 5 acres**	**60 + 1 per 5 acres**

*0.25 acres ~11,000 square feet

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Form 2 Characterization Sampling Results

Reminder: Keep a copy of the filled out forms to pass on to future property owners.

Filling in the sample inventory

List the samples by decision unit in the inventory on the back of this page. Enter the depth of each sample. When sampling multiple depths at a single location, mark each depth as a separate sample number.

Optional: If you have duff, remember to sample and analyze that separately from the soil.

Next, fill in the date and time. Note any unusual observations (high soil disturbance, heavy rain, etc.) in the "Comments" column.

Complete the rest of the columns when you get the sampling results.

Determining if arsenic or lead is elevated

1. Calculate average arsenic and lead levels **for each sampling depth** and **each decision unit** and enter them on the inventory sheet. For each decision unit circle the arsenic average that exceeds 20 ppm, or average lead that exceeds 250 ppm. For decision units in natural areas, calculate average arsenic and lead for **each sampling location** in addition to calculating the averages for **each sampling depth**.
2. Circle every value where maximum **arsenic exceeds 40 ppm** and where maximum **lead exceeds 500 ppm**.
3. Attach a copy of your lab results and chain of custody.
4. For decision units with a circled value (maximum or average), note in the "Comment" column that cleanup is needed for that entire decision unit. Turn to Chapter 2 to review options for cleaning up those decision units.

   If no decision units have elevated arsenic or lead, no cleanup is necessary. Because no cleanup is being done, you do not need to take any compliance samples. The characterization samples demonstrate that your soils meet state standards. Treat these results as "compliance" sampling results and read Chapter 7 for next steps.

See Attached Table for Results

Soil Characterization Sampling Inventory Sheet

Property address:

Phone:

Sampled by:

						Testing Parameters (ppm)			
DU	Sample no.	Soil Depth/Duff	Date	Time	Notes	Arsenic	Avg. arsenic	Lead	Avg lead

Property Address: No address available. Located South of McNeil St and Bobs Hollow Lane, in DuPont, WA
Phone: 425.449.4704
Sampled By: Kyler Kelly

						Testing Parameters (ppm)			
DU	Sample No.	Soil Depth/Duff	Date	Time	Notes	Arsenic	Avg. Arsenic	Lead	Avg. Lead
1	SS-1:6"	0-6"	2/10/2022	8:15	Grab Sample	ND	13.6	16	29.5
1	SS-2:6"	0-6"	2/10/2022	8:30	Grab Sample	ND	13.6	21	29.5
1	SS-2:12"	6-12"	2/10/2022	8:35	Grab Sample	ND	12.9	18	11
1	SS-3:6"	0-6"	2/10/2022	8:45	Grab Sample	ND	13.6	20	29.5
1	SS-4:6"	0-6"	2/10/2022	8:55	Grab Sample	12	13.6	13	29.5
1	SS-5:6"	0-6"	2/10/2022	9:05	Grab Sample	ND	13.6	31	29.5
1	SS-6:6"	0-6"	2/10/2022	9:15	Grab Sample	14	13.6	20	29.5
1	SS-6:12"	6-12"	2/10/2022	9:20	Grab Sample	ND	12.9	20	11
1	SS-7:6"	0-6"	2/10/2022	9:30	Grab Sample	ND	13.6	19	29.5
1	SS-8:6"	0-6"	2/10/2022	9:40	Grab Sample	17	13.6	26	29.5
1	SS-8:12"	6-12"	2/10/2022	9:45	Grab Sample	ND	12.9	26	11
1	SS-9:6"	0-6"	2/10/2022	9:55	Grab Sample	19	13.6	39	29.5
1	SS-10:6"	0-6"	2/10/2022	10:05	Grab Sample	21	13.6	39	29.5
1	SS-11:6"	0-6"	2/10/2022	10:15	Grab Sample	60	13.6	130	29.5
1	SS-12:6"	0-6"	2/10/2022	10:25	Grab Sample	14	13.6	15	29.5
1	SS-12:12"	6-12"	2/10/2022	10:30	Grab Sample	22	12.9	35	11
1	SS-13:6"	0-6"	2/10/2022	10:50	Grab Sample	27	13.6	33	29.5
1	SS-14:6"	0-6"	2/10/2022	11:00	Grab Sample	31	13.6	310	29.5
1	SS-15:6"	0-6"	2/10/2022	11:10	Grab Sample	ND	13.6	ND	29.5
1	SS-16:6"	0-6"	2/10/2022	11:20	Grab Sample	ND	13.6	ND	29.5
1	SS-17:6"	0-6"	2/10/2022	12:00	Grab Sample	ND	13.6	ND	29.5
1	SS-18:6"	0-6"	2/10/2022	12:10	Grab Sample	34	13.6	790	29.5
1	SS-18:12"	6-12"	2/10/2022	12:15	Grab Sample	16	12.9	15	11
1	SS-19:6"	0-6"	2/10/2022	12:25	Grab Sample	22	13.6	61	29.5
1	SS-20:6"	0-6"	2/10/2022	12:35	Grab Sample	31	13.6	86	29.5
1	SS-21:6"	0-6"	2/10/2022	12:45	Grab Sample	31	13.6	87	29.5
1	SS-22:6"	0-6"	2/10/2022	12:55	Grab Sample	18	13.6	20	29.5
1	SS-23:6"	0-6"	2/10/2022	1:00	Grab Sample	21	13.6	25	29.5
1	SS-24:6"	0-6"	2/10/2022	1:15	Grab Sample	ND	13.6	ND	29.5
1	SS-24:12"	6-12"	2/10/2022	1:20	Grab Sample	22	12.9	23	11

1	SS-25:6"	0-6"	2/10/2022	1:30	Grab Sample	ND	13.6	ND	29.5
1	SS-26:6"	0-6"	2/10/2022	1:40	Grab Sample	ND	13.6	ND	29.5
1	SS-27:6"	0-6"	2/10/2022	1:50	Grab Sample	ND	13.6	ND	29.5
1	SS-28:6"	0-6"	2/10/2022	2:00	Grab Sample	ND	13.6	ND	29.5
1	SS-28:12"	6-12"	2/10/2022	2:05	Grab Sample	ND	12.9	ND	11
1	SS-29:6"	0-6"	2/10/2022	2:15	Grab Sample	ND	13.6	ND	29.5
1	SS-30:6"	0-6"	2/10/2022	2:30	Grab Sample	ND	13.6	ND	29.5
1	SS-30:12"	6-12"	2/10/2022	2:35	Grab Sample	ND	12.9	ND	11
1	SS-31:6"	0-6"	2/11/2022	8:00	Grab Sample	ND	13.6	ND	29.5
1	SS-32:6"	0-6"	2/11/2022	8:10	Grab Sample	ND	13.6	ND	29.5
1	SS-33:6"	0-6"	2/11/2022	8:20	Grab Sample	ND	13.6	ND	29.5
1	SS-34:6"	0-6"	2/11/2022	8:30	Grab Sample	ND	13.6	ND	29.5
1	SS-34:12"	6-12"	2/11/2022	8:35	Grab Sample	ND	12.9	ND	11
1	SS-35:6"	0-6"	2/11/2022	8:45	Grab Sample	ND	13.6	ND	29.5
1	SS-36:6"	0-6"	2/11/2022	9:00	Grab Sample	ND	13.6	ND	29.5
1	SS-36:12"	6-12"	2/11/2022	9:05	Grab Sample	ND	12.9	ND	11
1	SS-37:6"	0-6"	2/11/2022	9:15	Grab Sample	ND	13.6	ND	29.5
1	SS-38:6"	0-6"	2/11/2022	9:25	Grab Sample	ND	13.6	ND	29.5
1	SS-39:6"	0-6"	2/11/2022	9:35	Grab Sample	ND	13.6	ND	29.5
1	SS-40:6"	0-6"	2/11/2022	9:50	Grab Sample	ND	13.6	ND	29.5
1	SS-40:12"	6-12"	2/11/2022	9:55	Grab Sample	ND	12.9	ND	11
1	SS-41:6"	0-6"	2/11/2022	10:05	Grab Sample	ND	13.6	ND	29.5
1	SS-42:6"	0-6"	2/11/2022	10:15	Grab Sample	ND	13.6	ND	29.5
1	SS-43:6"	0-6"	2/11/2022	10:30	Grab Sample	ND	13.6	ND	29.5
1	SS-44:6"	0-6"	2/11/2022	10:40	Grab Sample	ND	13.6	ND	29.5
1	SS-45:6"	0-6"	2/11/2022	10:50	Grab Sample	ND	13.6	ND	29.5
1	SS-46:6"	0-6"	2/11/2022	11:00	Grab Sample	ND	13.6	ND	29.5
1	SS-46:12"	6-12"	2/11/2022	11:05	Grab Sample	ND	12.9	ND	11
1	SS-47:6"	0-6"	2/11/2022	11:20	Grab Sample	ND	13.6	ND	29.5
1	SS-48:6"	0-6"	2/11/2022	11:30	Grab Sample	ND	13.6	ND	29.5
1	SS-49:6"	0-6"	2/11/2022	11:40	Grab Sample	ND	13.6	ND	29.5
1	SS-50:6"	0-6"	2/11/2022	12:20	Grab Sample	ND	13.6	ND	29.5
1	SS-51:6"	0-6"	2/11/2022	12:30	Grab Sample	ND	13.6	ND	29.5
1	SS-52:6"	0-6"	2/11/2022	12:40	Grab Sample	ND	13.6	ND	29.5

1	SS-52:12"	6-12"	2/11/2022	12:45	Grab Sample	ND	12.9	20	11
1	SS-53:6"	0-6"	2/11/2022	12:55	Grab Sample	ND	13.6	ND	29.5
1	SS-54:6"	0-6"	2/11/2022	1:10	Grab Sample	ND	13.6	ND	29.5
1	SS-55:6"	0-6"	2/11/2022	1:25	Grab Sample	ND	13.6	ND	29.5
1	SS-56:6"	0-6"	2/11/2022	1:35	Grab Sample	ND	13.6	ND	29.5
1	SS-56:12"	6-12"	2/11/2022	1:40	Grab Sample	ND	12.9	ND	11
1	SS-57:6"	0-6"	2/11/2022	1:50	Grab Sample	ND	13.6	ND	29.5
1	SS-58:6"	0-6"	2/11/2022	2:00	Grab Sample	ND	13.6	ND	29.5
1	SS-58:12"	6-12"	2/11/2022	2:05	Grab Sample	ND	12.9	ND	11
1	SS-58:6"	0-6"	2/11/2022	2:15	Grab Sample	ND	13.6	ND	29.5
1	SS-60:6"	0-6"	2/11/2022	2:30	Grab Sample	ND	13.6	ND	29.5
1	SS-61:6"	0-6"	2/14/2022	8:00	Grab Sample	ND	13.6	ND	29.5
1	SS-62:6"	0-6"	2/14/2022	8:15	Grab Sample	ND	13.6	ND	29.5
1	SS-62:12"	6-12"	2/14/2022	8:20	Grab Sample	ND	12.9	ND	11
1	SS-63:6"	0-6"	2/14/2022	8:30	Grab Sample	ND	13.6	ND	29.5
1	SS-64:6"	0-6"	2/14/2022	8:45	Grab Sample	ND	13.6	ND	29.5
1	SS-64:12"	6-12"	2/14/2022	8:50	Grab Sample	ND	12.9	ND	11
1	SS-65:6"	0-6"	2/14/2022	9:00	Grab Sample	ND	13.6	ND	29.5
1	SS-66:6"	0-6"	2/14/2022	9:15	Grab Sample	ND	13.6	ND	29.5
1	SS-67:6"	0-6"	2/14/2022	9:30	Grab Sample	ND	13.6	ND	29.5
1	SS-68:6"	0-6"	2/14/2022	9:40	Grab Sample	ND	13.6	ND	29.5
1	SS-68:12"	6-12"	2/14/2022	9:45	Grab Sample	ND	12.9	ND	11
1	SS-69:6"	0-6"	2/14/2022	10:00	Grab Sample	ND	13.6	ND	29.5
1	SS-70:6"	0-6"	2/14/2022	10:10	Grab Sample	ND	13.6	ND	29.5
1	Duff-1	Duff	2/14/2022	10:30	Grab Sample	ND		11	
1	Duff-2	Duff	2/14/2022	10:40	Grab Sample	NF		27	
1	Duff-3	Duff	2/14/2022	10:50	Grab Sample	19		58	
1	Duff-4	Duff	2/14/2022	11:00	Grab Sample	ND		11	
1	Duff-5	Duff	2/14/2022	11:10	Grab Sample	ND		ND	
1	Duff-6	Duff	2/14/2022	11:20	Grab Sample	ND		ND	
1	Duff-7	Duff	2/14/2022	11:30	Grab Sample	ND		ND	
1	Duff-8	Duff	2/14/2022	11:40	Grab Sample	ND		ND	
1	Duff-9	Duff	2/14/2022	11:50	Grab Sample	ND		89	
1	Duff-10	Duff	2/14/2022	12:00	Grab Sample	51		190	

1	Duff-11	Duff	2/14/2022	12:10	Grab Sample	ND		ND
1	Duff-12	Duff	2/14/2022	12:20	Grab Sample	ND		ND
1	Duff-13	Duff	2/14/2022	12:30	Grab Sample	ND		ND
1	Duff-14	Duff	2/14/2022	12:40	Grab Sample	ND		ND
1	Duff-15	Duff	2/14/2022	12:50	Grab Sample	ND		ND
1	Duff-16	Duff	2/14/2022	1:00	Grab Sample	ND		ND
1	Duff-17	Duff	2/14/2022	1:10	Grab Sample	ND		ND
1	Duff-18	Duff	2/14/2022	1:20	Grab Sample	ND		ND

OnSite
Environmental Inc.
14648 NE 95th Street, Redmond, WA 98052 • (425) 883-3881

February 23, 2022

Kyler Kelly
Earth Solutions NW, LLC
15365 NE 90th Street, Suite 100
Redmond, WA 98052

Re: Analytical Data for Project ES-8427
Laboratory Reference No. 2202-148

Dear Kyler:

Enclosed are the analytical results and associated quality control data for samples submitted on February 14, 2022.

The standard policy of OnSite Environmental, Inc. is to store your samples for 30 days from the date of receipt. If you require longer storage, please contact the laboratory.

We appreciate the opportunity to be of service to you on this project. If you have any questions concerning the data, or need additional information, please feel free to call me.

Sincerely,

David Baumeister
Project Manager

Enclosures

Date of Report: February 23, 2022
Samples Submitted: February 14, 2022
Laboratory Reference: 2202-148
Project: ES-8427

Case Narrative

Samples were collected on February 10, 11, and 14, 2022 and received by the laboratory on February 14, 2022. They were maintained at the laboratory at a temperature of 2°C to 6°C.

Please note that any and all soil sample results are reported on a dry-weight basis, unless otherwise noted below.

General QA/QC issues associated with the analytical data enclosed in this laboratory report will be indicated with a reference to a comment or explanation on the Data Qualifier page. More complex and involved QA/QC issues will be discussed in detail below.

Date of Report: February 23, 2022
Samples Submitted: February 14, 2022
Laboratory Reference: 2202-148
Project: ES-8427

TOTAL METALS
EPA 6010D

Matrix: Soil
Units: mg/Kg (ppm)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**SS-1:6"**					
Laboratory ID:	02-148-01					
Arsenic	**ND**	12	EPA 6010D	2-15-22	2-15-22	
Lead	**16**	6.2	EPA 6010D	2-15-22	2-15-22	
Client ID:	**SS-2:6"**					
Laboratory ID:	02-148-02					
Arsenic	**ND**	13	EPA 6010D	2-15-22	2-15-22	
Lead	**21**	6.4	EPA 6010D	2-15-22	2-15-22	
Client ID:	**SS-2:12"**					
Laboratory ID:	02-148-03					
Arsenic	**ND**	12	EPA 6010D	2-15-22	2-15-22	
Lead	**18**	6.0	EPA 6010D	2-15-22	2-15-22	
Client ID:	**SS-3:6"**					
Laboratory ID:	02-148-04					
Arsenic	**ND**	13	EPA 6010D	2-15-22	2-15-22	
Lead	**20**	6.5	EPA 6010D	2-15-22	2-15-22	
Client ID:	**SS-4:6"**					
Laboratory ID:	02-148-05					
Arsenic	**12**	12	EPA 6010D	2-15-22	2-16-22	
Lead	**13**	6.1	EPA 6010D	2-15-22	2-16-22	
Client ID:	**SS-5:6"**					
Laboratory ID:	02-148-06					
Arsenic	**ND**	13	EPA 6010D	2-15-22	2-16-22	
Lead	**31**	6.6	EPA 6010D	2-15-22	2-16-22	
Client ID:	**SS-6:6"**					
Laboratory ID:	02-148-07					
Arsenic	**14**	13	EPA 6010D	2-15-22	2-16-22	
Lead	**20**	6.3	EPA 6010D	2-15-22	2-16-22	

Date of Report: February 23, 2022
Samples Submitted: February 14, 2022
Laboratory Reference: 2202-148
Project: ES-8427

TOTAL METALS
EPA 6010D

Matrix: Soil
Units: mg/Kg (ppm)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**SS-6:12"**					
Laboratory ID:	02-148-08					
Arsenic	**ND**	13	EPA 6010D	2-15-22	2-16-22	
Lead	**20**	6.4	EPA 6010D	2-15-22	2-16-22	
Client ID:	**SS-7:6"**					
Laboratory ID:	02-148-09					
Arsenic	**ND**	14	EPA 6010D	2-15-22	2-16-22	
Lead	**19**	6.9	EPA 6010D	2-15-22	2-16-22	
Client ID:	**SS-8:6"**					
Laboratory ID:	02-148-10					
Arsenic	**17**	11	EPA 6010D	2-15-22	2-16-22	
Lead	**26**	5.7	EPA 6010D	2-15-22	2-16-22	
Client ID:	**SS-8:12"**					
Laboratory ID:	02-148-11					
Arsenic	**ND**	13	EPA 6010D	2-15-22	2-16-22	
Lead	**26**	6.3	EPA 6010D	2-15-22	2-16-22	
Client ID:	**SS-9:6"**					
Laboratory ID:	02-148-12					
Arsenic	**19**	14	EPA 6010D	2-15-22	2-16-22	
Lead	**39**	6.9	EPA 6010D	2-15-22	2-16-22	
Client ID:	**SS-10:6"**					
Laboratory ID:	02-148-13					
Arsenic	**21**	14	EPA 6010D	2-15-22	2-16-22	
Lead	**39**	6.9	EPA 6010D	2-15-22	2-16-22	
Client ID:	**SS-11:6"**					
Laboratory ID:	02-148-14					
Arsenic	**60**	18	EPA 6010D	2-15-22	2-16-22	
Lead	**130**	9.1	EPA 6010D	2-15-22	2-16-22	

Date of Report: February 23, 2022
Samples Submitted: February 14, 2022
Laboratory Reference: 2202-148
Project: ES-8427

TOTAL METALS
EPA 6010D

Matrix: Soil
Units: mg/Kg (ppm)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**SS-12:6"**					
Laboratory ID:	02-148-15					
Arsenic	**14**	13	EPA 6010D	2-15-22	2-16-22	
Lead	**15**	6.3	EPA 6010D	2-15-22	2-16-22	
Client ID:	**SS-12:12"**					
Laboratory ID:	02-148-16					
Arsenic	**22**	13	EPA 6010D	2-15-22	2-16-22	
Lead	**35**	6.5	EPA 6010D	2-15-22	2-16-22	
Client ID:	**SS-13:6"**					
Laboratory ID:	02-148-17					
Arsenic	**27**	14	EPA 6010D	2-15-22	2-16-22	
Lead	**33**	6.8	EPA 6010D	2-15-22	2-16-22	
Client ID:	**SS-14:6"**					
Laboratory ID:	02-148-18					
Arsenic	**31**	15	EPA 6010D	2-15-22	2-16-22	
Lead	**310**	7.5	EPA 6010D	2-15-22	2-16-22	
Client ID:	**SS-15:6"**					
Laboratory ID:	02-148-19					
Arsenic	**ND**	10	EPA 6010D	2-15-22	2-16-22	
Lead	**ND**	5.2	EPA 6010D	2-15-22	2-16-22	
Client ID:	**SS-16:6"**					
Laboratory ID:	02-148-20					
Arsenic	**ND**	11	EPA 6010D	2-15-22	2-16-22	
Lead	**ND**	5.3	EPA 6010D	2-15-22	2-16-22	
Client ID:	**SS-17:6"**					
Laboratory ID:	02-148-21					
Arsenic	**ND**	11	EPA 6010D	2-15-22	2-16-22	
Lead	**ND**	5.3	EPA 6010D	2-15-22	2-16-22	

Date of Report: February 23, 2022
Samples Submitted: February 14, 2022
Laboratory Reference: 2202-148
Project: ES-8427

TOTAL METALS
EPA 6010D

Matrix: Soil
Units: mg/Kg (ppm)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**SS-18:6"**					
Laboratory ID:	02-148-22					
Arsenic	**34**	13	EPA 6010D	2-15-22	2-16-22	
Lead	**790**	6.6	EPA 6010D	2-15-22	2-16-22	
Client ID:	**SS-18:12"**					
Laboratory ID:	02-148-23					
Arsenic	**16**	13	EPA 6010D	2-15-22	2-16-22	
Lead	**15**	6.3	EPA 6010D	2-15-22	2-16-22	
Client ID:	**SS-19:6"**					
Laboratory ID:	02-148-24					
Arsenic	**22**	15	EPA 6010D	2-15-22	2-16-22	
Lead	**61**	7.4	EPA 6010D	2-15-22	2-16-22	
Client ID:	**SS-20:6"**					
Laboratory ID:	02-148-25					
Arsenic	**31**	14	EPA 6010D	2-15-22	2-16-22	
Lead	**86**	7.2	EPA 6010D	2-15-22	2-16-22	
Client ID:	**SS-21:6"**					
Laboratory ID:	02-148-26					
Arsenic	**31**	14	EPA 6010D	2-15-22	2-16-22	
Lead	**87**	7.0	EPA 6010D	2-15-22	2-16-22	
Client ID:	**SS-22:6"**					
Laboratory ID:	02-148-27					
Arsenic	**18**	13	EPA 6010D	2-15-22	2-16-22	
Lead	**20**	6.4	EPA 6010D	2-15-22	2-16-22	
Client ID:	**SS-23:6"**					
Laboratory ID:	02-148-28					
Arsenic	**21**	13	EPA 6010D	2-15-22	2-16-22	
Lead	**25**	6.3	EPA 6010D	2-15-22	2-16-22	

Date of Report: February 23, 2022
Samples Submitted: February 14, 2022
Laboratory Reference: 2202-148
Project: ES-8427

TOTAL METALS
EPA 6010D

Matrix: Soil
Units: mg/Kg (ppm)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**SS-24:6"**					
Laboratory ID:	02-148-29					
Arsenic	**ND**	10	EPA 6010D	2-15-22	2-16-22	
Lead	**ND**	5.2	EPA 6010D	2-15-22	2-16-22	
Client ID:	**SS-24:12"**					
Laboratory ID:	02-148-30					
Arsenic	**23**	12	EPA 6010D	2-15-22	2-16-22	
Lead	**22**	6.1	EPA 6010D	2-15-22	2-16-22	
Client ID:	**SS-25:6"**					
Laboratory ID:	02-148-31					
Arsenic	**ND**	10	EPA 6010D	2-15-22	2-16-22	
Lead	**ND**	5.2	EPA 6010D	2-15-22	2-16-22	
Client ID:	**SS-26:6"**					
Laboratory ID:	02-148-32					
Arsenic	**ND**	10	EPA 6010D	2-15-22	2-16-22	
Lead	**ND**	5.2	EPA 6010D	2-15-22	2-16-22	
Client ID:	**SS-27:6"**					
Laboratory ID:	02-148-33					
Arsenic	**ND**	10	EPA 6010D	2-15-22	2-16-22	
Lead	**ND**	5.2	EPA 6010D	2-15-22	2-16-22	
Client ID:	**SS-28:6"**					
Laboratory ID:	02-148-34					
Arsenic	**ND**	10	EPA 6010D	2-15-22	2-16-22	
Lead	**ND**	5.2	EPA 6010D	2-15-22	2-16-22	
Client ID:	**SS-28:12"**					
Laboratory ID:	02-148-35					
Arsenic	**ND**	11	EPA 6010D	2-15-22	2-16-22	
Lead	**ND**	5.3	EPA 6010D	2-15-22	2-16-22	

Date of Report: February 23, 2022
Samples Submitted: February 14, 2022
Laboratory Reference: 2202-148
Project: ES-8427

TOTAL METALS
EPA 6010D

Matrix: Soil
Units: mg/Kg (ppm)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**SS-29:6"**					
Laboratory ID:	02-148-36					
Arsenic	**ND**	10	EPA 6010D	2-15-22	2-16-22	
Lead	**ND**	5.2	EPA 6010D	2-15-22	2-16-22	
Client ID:	**SS-30:6"**					
Laboratory ID:	02-148-37					
Arsenic	**ND**	11	EPA 6010D	2-17-22	2-17-22	
Lead	**ND**	5.3	EPA 6010D	2-17-22	2-17-22	
Client ID:	**SS-30:12"**					
Laboratory ID:	02-148-38					
Arsenic	**ND**	10	EPA 6010D	2-17-22	2-17-22	
Lead	**ND**	5.2	EPA 6010D	2-17-22	2-17-22	
Client ID:	**SS-31:6"**					
Laboratory ID:	02-148-39					
Arsenic	**ND**	10	EPA 6010D	2-17-22	2-17-22	
Lead	**ND**	5.2	EPA 6010D	2-17-22	2-17-22	
Client ID:	**SS-32:6"**					
Laboratory ID:	02-148-40					
Arsenic	**ND**	10	EPA 6010D	2-17-22	2-17-22	
Lead	**ND**	5.2	EPA 6010D	2-17-22	2-17-22	
Client ID:	**SS-33:6"**					
Laboratory ID:	02-148-41					
Arsenic	**ND**	10	EPA 6010D	2-17-22	2-17-22	
Lead	**ND**	5.2	EPA 6010D	2-17-22	2-17-22	
Client ID:	**SS-34:6"**					
Laboratory ID:	02-148-42					
Arsenic	**ND**	10	EPA 6010D	2-17-22	2-17-22	
Lead	**ND**	5.2	EPA 6010D	2-17-22	2-17-22	

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TOTAL METALS
EPA 6010D

Matrix: Soil
Units: mg/Kg (ppm)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**SS-34:12"**					
Laboratory ID:	02-148-43					
Arsenic	**ND**	10	EPA 6010D	2-17-22	2-17-22	
Lead	**ND**	5.2	EPA 6010D	2-17-22	2-17-22	
Client ID:	**SS-35:6"**					
Laboratory ID:	02-148-44					
Arsenic	**ND**	11	EPA 6010D	2-17-22	2-17-22	
Lead	**ND**	5.3	EPA 6010D	2-17-22	2-17-22	
Client ID:	**SS-36:6"**					
Laboratory ID:	02-148-45					
Arsenic	**ND**	11	EPA 6010D	2-17-22	2-17-22	
Lead	**ND**	5.3	EPA 6010D	2-17-22	2-17-22	
Client ID:	**SS-36:12"**					
Laboratory ID:	02-148-46					
Arsenic	**ND**	11	EPA 6010D	2-17-22	2-17-22	
Lead	**ND**	5.3	EPA 6010D	2-17-22	2-17-22	
Client ID:	**SS-37:6"**					
Laboratory ID:	02-148-47					
Arsenic	**ND**	10	EPA 6010D	2-17-22	2-17-22	
Lead	**ND**	5.2	EPA 6010D	2-17-22	2-17-22	
Client ID:	**SS-38:6"**					
Laboratory ID:	02-148-48					
Arsenic	**ND**	11	EPA 6010D	2-17-22	2-17-22	
Lead	**ND**	5.3	EPA 6010D	2-17-22	2-17-22	
Client ID:	**SS-39:6"**					
Laboratory ID:	02-148-49					
Arsenic	**ND**	10	EPA 6010D	2-17-22	2-17-22	
Lead	**ND**	5.2	EPA 6010D	2-17-22	2-17-22	

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TOTAL METALS
EPA 6010D

Matrix: Soil
Units: mg/Kg (ppm)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**SS-40:6"**					
Laboratory ID:	02-148-50					
Arsenic	**ND**	10	EPA 6010D	2-17-22	2-17-22	
Lead	**ND**	5.2	EPA 6010D	2-17-22	2-17-22	
Client ID:	**SS-40:12"**					
Laboratory ID:	02-148-51					
Arsenic	**ND**	10	EPA 6010D	2-17-22	2-17-22	
Lead	**ND**	5.2	EPA 6010D	2-17-22	2-17-22	
Client ID:	**SS-41:6"**					
Laboratory ID:	02-148-52					
Arsenic	**ND**	11	EPA 6010D	2-17-22	2-17-22	
Lead	**ND**	5.3	EPA 6010D	2-17-22	2-17-22	
Client ID:	**SS-42:6"**					
Laboratory ID:	02-148-53					
Arsenic	**ND**	11	EPA 6010D	2-17-22	2-17-22	
Lead	**ND**	5.3	EPA 6010D	2-17-22	2-17-22	
Client ID:	**SS-43:6"**					
Laboratory ID:	02-148-54					
Arsenic	**ND**	11	EPA 6010D	2-17-22	2-17-22	
Lead	**ND**	5.3	EPA 6010D	2-17-22	2-17-22	
Client ID:	**SS-44:6"**					
Laboratory ID:	02-148-55					
Arsenic	**ND**	11	EPA 6010D	2-17-22	2-17-22	
Lead	**ND**	5.3	EPA 6010D	2-17-22	2-17-22	
Client ID:	**SS-45:6"**					
Laboratory ID:	02-148-56					
Arsenic	**ND**	10	EPA 6010D	2-22-22	2-22-22	
Lead	**ND**	5.2	EPA 6010D	2-22-22	2-22-22	

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TOTAL METALS
EPA 6010D

Matrix: Soil
Units: mg/Kg (ppm)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**SS-46:6"**					
Laboratory ID:	02-148-57					
Arsenic	**ND**	10	EPA 6010D	2-22-22	2-22-22	
Lead	**ND**	5.2	EPA 6010D	2-22-22	2-22-22	
Client ID:	**SS-46:12"**					
Laboratory ID:	02-148-58					
Arsenic	**ND**	11	EPA 6010D	2-22-22	2-22-22	
Lead	**ND**	5.3	EPA 6010D	2-22-22	2-22-22	
Client ID:	**SS-47:6"**					
Laboratory ID:	02-148-59					
Arsenic	**ND**	10	EPA 6010D	2-22-22	2-22-22	
Lead	**ND**	5.2	EPA 6010D	2-22-22	2-22-22	
Client ID:	**SS-48:6"**					
Laboratory ID:	02-148-60					
Arsenic	**ND**	11	EPA 6010D	2-22-22	2-22-22	
Lead	**ND**	5.3	EPA 6010D	2-22-22	2-22-22	
Client ID:	**SS-49:6"**					
Laboratory ID:	02-148-61					
Arsenic	**ND**	11	EPA 6010D	2-22-22	2-22-22	
Lead	**ND**	5.3	EPA 6010D	2-22-22	2-22-22	
Client ID:	**SS-50:6"**					
Laboratory ID:	02-148-62					
Arsenic	**ND**	11	EPA 6010D	2-22-22	2-22-22	
Lead	**ND**	5.3	EPA 6010D	2-22-22	2-22-22	
Client ID:	**SS-51:6"**					
Laboratory ID:	02-148-63					
Arsenic	**ND**	11	EPA 6010D	2-22-22	2-22-22	
Lead	**ND**	5.3	EPA 6010D	2-22-22	2-22-22	

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TOTAL METALS
EPA 6010D

Matrix: Soil
Units: mg/Kg (ppm)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**SS-52:6"**					
Laboratory ID:	02-148-64					
Arsenic	**ND**	11	EPA 6010D	2-22-22	2-22-22	
Lead	**ND**	5.3	EPA 6010D	2-22-22	2-22-22	
Client ID:	**SS-52:12"**					
Laboratory ID:	02-148-65					
Arsenic	**20**	11	EPA 6010D	2-22-22	2-22-22	
Lead	**ND**	5.3	EPA 6010D	2-22-22	2-22-22	
Client ID:	**SS-53:6"**					
Laboratory ID:	02-148-66					
Arsenic	**ND**	11	EPA 6010D	2-22-22	2-22-22	
Lead	**ND**	5.3	EPA 6010D	2-22-22	2-22-22	
Client ID:	**SS-54:6"**					
Laboratory ID:	02-148-67					
Arsenic	**ND**	10	EPA 6010D	2-22-22	2-22-22	
Lead	**ND**	5.2	EPA 6010D	2-22-22	2-22-22	
Client ID:	**SS-55:6"**					
Laboratory ID:	02-148-68					
Arsenic	**ND**	10	EPA 6010D	2-22-22	2-22-22	
Lead	**ND**	5.2	EPA 6010D	2-22-22	2-22-22	
Client ID:	**SS-56:6"**					
Laboratory ID:	02-148-69					
Arsenic	**ND**	10	EPA 6010D	2-22-22	2-22-22	
Lead	**ND**	5.2	EPA 6010D	2-22-22	2-22-22	
Client ID:	**SS-56:12"**					
Laboratory ID:	02-148-70					
Arsenic	**ND**	10	EPA 6010D	2-22-22	2-22-22	
Lead	**ND**	5.2	EPA 6010D	2-22-22	2-22-22	

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TOTAL METALS
EPA 6010D

Matrix: Soil
Units: mg/Kg (ppm)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**SS-57:6"**					
Laboratory ID:	02-148-71					
Arsenic	**ND**	10	EPA 6010D	2-22-22	2-22-22	
Lead	**ND**	5.2	EPA 6010D	2-22-22	2-22-22	
Client ID:	**SS-58:6"**					
Laboratory ID:	02-148-72					
Arsenic	**ND**	10	EPA 6010D	2-22-22	2-22-22	
Lead	**ND**	5.2	EPA 6010D	2-22-22	2-22-22	
Client ID:	**SS-58:12"**					
Laboratory ID:	02-148-73					
Arsenic	**ND**	10	EPA 6010D	2-22-22	2-22-22	
Lead	**ND**	5.2	EPA 6010D	2-22-22	2-22-22	
Client ID:	**SS-59:6"**					
Laboratory ID:	02-148-74					
Arsenic	**ND**	10	EPA 6010D	2-22-22	2-22-22	
Lead	**ND**	5.2	EPA 6010D	2-22-22	2-22-22	
Client ID:	**SS-60:6"**					
Laboratory ID:	02-148-75					
Arsenic	**ND**	10	EPA 6010D	2-22-22	2-22-22	
Lead	**ND**	5.2	EPA 6010D	2-22-22	2-22-22	
Client ID:	**SS-61:6"**					
Laboratory ID:	02-148-76					
Arsenic	**ND**	10	EPA 6010D	2-22-22	2-22-22	
Lead	**ND**	5.2	EPA 6010D	2-22-22	2-22-22	
Client ID:	**SS-62:6"**					
Laboratory ID:	02-148-77					
Arsenic	**ND**	10	EPA 6010D	2-22-22	2-22-22	
Lead	**ND**	5.2	EPA 6010D	2-22-22	2-22-22	

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TOTAL METALS
EPA 6010D

Matrix: Soil
Units: mg/Kg (ppm)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**SS-62:12"**					
Laboratory ID:	02-148-78					
Arsenic	**ND**	10	EPA 6010D	2-22-22	2-22-22	
Lead	**ND**	5.2	EPA 6010D	2-22-22	2-22-22	
Client ID:	**SS-63:6"**					
Laboratory ID:	02-148-79					
Arsenic	**ND**	10	EPA 6010D	2-22-22	2-22-22	
Lead	**ND**	5.2	EPA 6010D	2-22-22	2-22-22	
Client ID:	**SS-64:6"**					
Laboratory ID:	02-148-80					
Arsenic	**ND**	10	EPA 6010D	2-22-22	2-22-22	
Lead	**ND**	5.2	EPA 6010D	2-22-22	2-22-22	
Client ID:	**SS-64:12"**					
Laboratory ID:	02-148-81					
Arsenic	**ND**	10	EPA 6010D	2-22-22	2-22-22	
Lead	**ND**	5.2	EPA 6010D	2-22-22	2-22-22	
Client ID:	**SS-65:6"**					
Laboratory ID:	02-148-82					
Arsenic	**ND**	10	EPA 6010D	2-22-22	2-22-22	
Lead	**ND**	5.2	EPA 6010D	2-22-22	2-22-22	
Client ID:	**SS-66:6"**					
Laboratory ID:	02-148-83					
Arsenic	**ND**	10	EPA 6010D	2-22-22	2-22-22	
Lead	**ND**	5.2	EPA 6010D	2-22-22	2-22-22	
Client ID:	**SS-67:6"**					
Laboratory ID:	02-148-84					
Arsenic	**ND**	10	EPA 6010D	2-22-22	2-22-22	
Lead	**ND**	5.2	EPA 6010D	2-22-22	2-22-22	

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TOTAL METALS
EPA 6010D

Matrix: Soil
Units: mg/Kg (ppm)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**SS-68:6"**					
Laboratory ID:	02-148-85					
Arsenic	**ND**	10	EPA 6010D	2-22-22	2-22-22	
Lead	**ND**	5.2	EPA 6010D	2-22-22	2-22-22	
Client ID:	**SS-68:12"**					
Laboratory ID:	02-148-86					
Arsenic	**ND**	10	EPA 6010D	2-22-22	2-22-22	
Lead	**ND**	5.2	EPA 6010D	2-22-22	2-22-22	
Client ID:	**SS-69:6"**					
Laboratory ID:	02-148-87					
Arsenic	**ND**	11	EPA 6010D	2-22-22	2-22-22	
Lead	**ND**	5.3	EPA 6010D	2-22-22	2-22-22	
Client ID:	**SS-70:6"**					
Laboratory ID:	02-148-88					
Arsenic	**ND**	10	EPA 6010D	2-22-22	2-22-22	
Lead	**ND**	5.2	EPA 6010D	2-22-22	2-22-22	
Client ID:	**Duff-1**					
Laboratory ID:	02-148-89					
Arsenic	**ND**	16	EPA 6010D	2-22-22	2-22-22	
Lead	**11**	7.9	EPA 6010D	2-22-22	2-22-22	
Client ID:	**Duff-2**					
Laboratory ID:	02-148-90					
Arsenic	**ND**	17	EPA 6010D	2-22-22	2-22-22	
Lead	**27**	8.3	EPA 6010D	2-22-22	2-22-22	
Client ID:	**Duff-3**					
Laboratory ID:	02-148-91					
Arsenic	**19**	14	EPA 6010D	2-22-22	2-22-22	
Lead	**58**	14	EPA 6010D	2-22-22	2-22-22	

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TOTAL METALS
EPA 6010D

Matrix: Soil
Units: mg/Kg (ppm)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**Duff-4**					
Laboratory ID:	02-148-92					
Arsenic	**ND**	15	EPA 6010D	2-22-22	2-22-22	
Lead	**11**	7.7	EPA 6010D	2-22-22	2-22-22	
Client ID:	**Duff-5**					
Laboratory ID:	02-148-93					
Arsenic	**ND**	12	EPA 6010D	2-22-22	2-22-22	
Lead	**ND**	6.1	EPA 6010D	2-22-22	2-22-22	
Client ID:	**Duff-6**					
Laboratory ID:	02-148-94					
Arsenic	**ND**	17	EPA 6010D	2-22-22	2-22-22	
Lead	**ND**	8.3	EPA 6010D	2-22-22	2-22-22	
Client ID:	**Duff-7**					
Laboratory ID:	02-148-95					
Arsenic	**ND**	13	EPA 6010D	2-22-22	2-22-22	
Lead	**ND**	6.4	EPA 6010D	2-22-22	2-22-22	
Client ID:	**Duff-8**					
Laboratory ID:	02-148-96					
Arsenic	**ND**	12	EPA 6010D	2-22-22	2-22-22	
Lead	**ND**	5.9	EPA 6010D	2-22-22	2-22-22	
Client ID:	**Duff-9**					
Laboratory ID:	02-148-97					
Arsenic	**ND**	13	EPA 6010D	2-22-22	2-22-22	
Lead	**89**	13	EPA 6010D	2-22-22	2-22-22	
Client ID:	**Duff-10**					
Laboratory ID:	02-148-98					
Arsenic	**51**	11	EPA 6010D	2-22-22	2-22-22	
Lead	**190**	11	EPA 6010D	2-22-22	2-22-22	

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TOTAL METALS
EPA 6010D

Matrix: Soil
Units: mg/Kg (ppm)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**Duff-11**					
Laboratory ID:	02-148-99					
Arsenic	**ND**	11	EPA 6010D	2-22-22	2-22-22	
Lead	**ND**	5.7	EPA 6010D	2-22-22	2-22-22	
Client ID:	**Duff-12**					
Laboratory ID:	02-148-100					
Arsenic	**ND**	11	EPA 6010D	2-22-22	2-22-22	
Lead	**ND**	5.7	EPA 6010D	2-22-22	2-22-22	
Client ID:	**Duff-13**					
Laboratory ID:	02-148-101					
Arsenic	**ND**	11	EPA 6010D	2-22-22	2-22-22	
Lead	**ND**	5.6	EPA 6010D	2-22-22	2-22-22	
Client ID:	**Duff-14**					
Laboratory ID:	02-148-102					
Arsenic	**ND**	11	EPA 6010D	2-22-22	2-22-22	
Lead	**ND**	5.4	EPA 6010D	2-22-22	2-22-22	
Client ID:	**Duff-15**					
Laboratory ID:	02-148-103					
Arsenic	**ND**	12	EPA 6010D	2-22-22	2-22-22	
Lead	**ND**	5.8	EPA 6010D	2-22-22	2-22-22	
Client ID:	**Duff-16**					
Laboratory ID:	02-148-104					
Arsenic	**ND**	11	EPA 6010D	2-22-22	2-22-22	
Lead	**ND**	5.4	EPA 6010D	2-22-22	2-22-22	
Client ID:	**Duff-17**					
Laboratory ID:	02-148-105					
Arsenic	**ND**	12	EPA 6010D	2-22-22	2-22-22	
Lead	**ND**	5.9	EPA 6010D	2-22-22	2-22-22	

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TOTAL METALS
EPA 6010D

Matrix: Soil
Units: mg/Kg (ppm)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**Duff-18**					
Laboratory ID:	02-148-106					
Arsenic	**ND**	11	EPA 6010D	2-22-22	2-22-22	
Lead	**ND**	5.3	EPA 6010D	2-22-22	2-22-22	

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TOTAL METALS
EPA 6010D
QUALITY CONTROL

Matrix: Soil
Units: mg/Kg (ppm)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
METHOD BLANK						
Laboratory ID:	MB0215SM3					
Arsenic	**ND**	10	EPA 6010D	2-15-22	2-15-22	
Lead	**ND**	5.0	EPA 6010D	2-15-22	2-15-22	
Laboratory ID:	MB0215SM4					
Arsenic	**ND**	10	EPA 6010D	2-15-22	2-16-22	
Lead	**ND**	5.0	EPA 6010D	2-15-22	2-16-22	
Laboratory ID:	MB0217SM4					
Arsenic	**ND**	10	EPA 6010D	2-17-22	2-17-22	
Lead	**ND**	5.0	EPA 6010D	2-17-22	2-17-22	
Laboratory ID:	MB0222SM3					
Arsenic	**ND**	10	EPA 6010D	2-22-22	2-22-22	
Lead	**ND**	5.0	EPA 6010D	2-22-22	2-22-22	
Laboratory ID:	MB0222SM4					
Arsenic	**ND**	5.0	EPA 6010D	2-22-22	2-22-22	
Lead	**ND**	5.0	EPA 6010D	2-22-22	2-22-22	
Laboratory ID:	MB0222SM5					
Arsenic	**ND**	5.0	EPA 6010D	2-22-22	2-22-22	
Lead	**ND**	5.0	EPA 6010D	2-22-22	2-22-22	

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TOTAL METALS
EPA 6010D
QUALITY CONTROL

Matrix: Soil
Units: mg/Kg (ppm)

Analyte	Result		Spike Level		Source Result	Percent Recovery	Recovery Limits	RPD	RPD Limit	Flags
DUPLICATE										
Laboratory ID:	02-140-04									
	ORIG	DUP								
Arsenic	**ND**	**ND**	NA	NA		NA	NA	NA	20	
Lead	**ND**	**ND**	NA	NA		NA	NA	NA	20	
Laboratory ID:	02-148-37									
	ORIG	DUP								
Arsenic	**ND**	**ND**	NA	NA		NA	NA	NA	20	
Lead	**ND**	**ND**	NA	NA		NA	NA	NA	20	
Laboratory ID:	02-148-56									
	ORIG	DUP								
Arsenic	**ND**	**ND**	NA	NA		NA	NA	NA	20	
Lead	**ND**	**ND**	NA	NA		NA	NA	NA	20	
Laboratory ID:	02-148-75									
	ORIG	DUP								
Arsenic	**ND**	**ND**	NA	NA		NA	NA	NA	20	
Lead	**ND**	**ND**	NA	NA		NA	NA	NA	20	
Laboratory ID:	02-148-93									
	ORIG	DUP								
Arsenic	**ND**	**ND**	NA	NA		NA	NA	NA	20	
Lead	**ND**	**ND**	NA	NA		NA	NA	NA	20	
Laboratory ID:	02-150-07									
	ORIG	DUP								
Arsenic	**ND**	**ND**	NA	NA		NA	NA	NA	20	
Lead	**ND**	**ND**	NA	NA		NA	NA	NA	20	

Date of Report: February 23, 2022
Samples Submitted: February 14, 2022
Laboratory Reference: 2202-148
Project: ES-8427

TOTAL METALS
EPA 6010D
QUALITY CONTROL

Matrix: Soil
Units: mg/Kg (ppm)

Analyte	Result		Spike Level		Source Result	Percent Recovery		Recovery Limits	RPD	RPD Limit	Flags
MATRIX SPIKES											
Laboratory ID:	02-140-04										
	MS	MSD	MS	MSD		MS	MSD				
Arsenic	**84.3**	**79.0**	100	100	ND	**84**	**79**	75-125	6	20	
Lead	**241**	**234**	250	250	ND	**96**	**94**	75-125	3	20	
Laboratory ID:	02-148-37										
	MS	MSD	MS	MSD		MS	MSD				
Arsenic	**90.9**	**93.6**	100	100	ND	**91**	**94**	75-125	3	20	
Lead	**238**	**242**	250	250	ND	**95**	**97**	75-125	2	20	
Laboratory ID:	02-148-56										
	MS	MSD	MS	MSD		MS	MSD				
Arsenic	**86.8**	**87.8**	100	100	ND	**87**	**88**	75-125	1	20	
Lead	**246**	**245**	250	250	ND	**98**	**98**	75-125	1	20	
Laboratory ID:	02-148-75										
	MS	MSD	MS	MSD		MS	MSD				
Arsenic	**89.3**	**87.9**	100	100	ND	**89**	**88**	75-125	2	20	
Lead	**260**	**258**	250	250	ND	**104**	**103**	75-125	1	20	
Laboratory ID:	02-148-93										
	MS	MSD	MS	MSD		MS	MSD				
Arsenic	**86.3**	**88.0**	100	100	ND	**86**	**88**	75-125	2	20	
Lead	**257**	**260**	250	250	ND	**103**	**104**	75-125	1	20	
Laboratory ID:	02-150-07										
	MS	MSD	MS	MSD		MS	MSD				
Arsenic	**90.5**	**88.7**	100	100	ND	**91**	**89**	75-125	2	20	
Lead	**222**	**221**	250	250	ND	**89**	**89**	75-125	0	20	

Date of Report: February 23, 2022
Samples Submitted: February 14, 2022
Laboratory Reference: 2202-148
Project: ES-8427

% MOISTURE

Client ID	Lab ID	% Moisture	Date Analyzed
SS-1:6"	02-148-01	**19**	2-15-22
SS-2:6"	02-148-02	**21**	2-15-22
SS-2:12"	02-148-03	**17**	2-15-22
SS-3:6"	02-148-04	**24**	2-15-22
SS-4:6"	02-148-05	**18**	2-15-22
SS-5:6"	02-148-06	**25**	2-15-22
SS-6:6"	02-148-07	**20**	2-15-22
SS-6:12"	02-148-08	**22**	2-15-22
SS-7:6"	02-148-09	**28**	2-15-22
SS-8:6"	02-148-10	**12**	2-15-22
SS-8:12"	02-148-11	**20**	2-15-22
SS-9:6"	02-148-12	**28**	2-15-22
SS-10:6"	02-148-13	**27**	2-15-22
SS-11:6"	02-148-14	**45**	2-15-22
SS-12:6"	02-148-15	**20**	2-15-22
SS-12:12"	02-148-16	**23**	2-15-22
SS-13:6"	02-148-17	**27**	2-15-22
SS-14:6"	02-148-18	**33**	2-15-22
SS-15:6"	02-148-19	**4**	2-15-22
SS-16:6"	02-148-20	**5**	2-15-22
SS-17:6"	02-148-21	**5**	2-15-22
SS-18:6"	02-148-22	**25**	2-15-22
SS-18:12"	02-148-23	**21**	2-15-22
SS-19:6"	02-148-24	**32**	2-15-22
SS-20:6"	02-148-25	**30**	2-15-22
SS-21:6"	02-148-26	**28**	2-15-22
SS-22:6"	02-148-27	**22**	2-15-22

Date of Report: February 23, 2022
Samples Submitted: February 14, 2022
Laboratory Reference: 2202-148
Project: ES-8427

% MOISTURE

Client ID	Lab ID	% Moisture	Date Analyzed
SS-23:6"	02-148-28	**21**	2-15-22
SS-24:6"	02-148-29	**3**	2-15-22
SS-24:12"	02-148-30	**18**	2-15-22
SS-25:6"	02-148-31	**4**	2-15-22
SS-26:6"	02-148-32	**4**	2-15-22
SS-27:6"	02-148-33	**4**	2-15-22
SS-28:6"	02-148-34	**4**	2-15-22
SS-28:12"	02-148-35	**5**	2-15-22
SS-29:6"	02-148-36	**4**	2-15-22
SS-30:6"	02-148-37	**5**	2-16-22
SS-30:12"	02-148-38	**5**	2-16-22
SS-31:6"	02-148-39	**4**	2-16-22
SS-32:6"	02-148-40	**4**	2-16-22
SS-33:6"	02-148-41	**4**	2-16-22
SS-34:6"	02-148-42	**4**	2-16-22
SS-34:12"	02-148-43	**4**	2-16-22
SS-35:6"	02-148-44	**6**	2-16-22
SS-36:6"	02-148-45	**6**	2-16-22
SS-36:12"	02-148-46	**5**	2-16-22
SS-37:6"	02-148-47	**5**	2-16-22
SS-38:6"	02-148-48	**5**	2-16-22
SS-39:6"	02-148-49	**4**	2-17-22
SS-40:6"	02-148-50	**4**	2-17-22
SS-40:12"	02-148-51	**4**	2-17-22
SS-41:6"	02-148-52	**5**	2-17-22
SS-42:6"	02-148-53	**5**	2-17-22
SS-43:6"	02-148-54	**5**	2-17-22

Date of Report: February 23, 2022
Samples Submitted: February 14, 2022
Laboratory Reference: 2202-148
Project: ES-8427

% MOISTURE

Client ID	Lab ID	% Moisture	Date Analyzed
SS-44:6"	02-148-55	**5**	2-17-22
SS-45:6"	02-148-56	**4**	2-17-22
SS-46:6"	02-148-57	**5**	2-17-22
SS-46:12"	02-148-58	**5**	2-17-22
SS-47:6"	02-148-59	**4**	2-17-22
SS-48:6"	02-148-60	**5**	2-17-22
SS-49:6"	02-148-61	**5**	2-17-22
SS-50:6"	02-148-62	**5**	2-17-22
SS-51:6"	02-148-63	**5**	2-17-22
SS-52:6"	02-148-64	**6**	2-17-22
SS-52:12"	02-148-65	**5**	2-17-22
SS-53:6"	02-148-66	**5**	2-17-22
SS-54:6"	02-148-67	**4**	2-17-22
SS-55:6"	02-148-68	**4**	2-17-22
SS-56:6"	02-148-69	**5**	2-17-22
SS-56:12"	02-148-70	**4**	2-17-22
SS-57:6"	02-148-71	**4**	2-17-22
SS-58:6"	02-148-72	**4**	2-17-22
SS-58:12"	02-148-73	**4**	2-18-22
SS-59:6"	02-148-74	**4**	2-18-22
SS-60:6"	02-148-75	**4**	2-18-22
SS-61:6"	02-148-76	**4**	2-18-22
SS-62:6"	02-148-77	**4**	2-18-22
SS-62:12"	02-148-78	**4**	2-18-22
SS-63:6"	02-148-79	**5**	2-18-22
SS-64:6"	02-148-80	**4**	2-18-22
SS-64:12"	02-148-81	**4**	2-18-22

Date of Report: February 23, 2022
Samples Submitted: February 14, 2022
Laboratory Reference: 2202-148
Project: ES-8427

% MOISTURE

Client ID	Lab ID	% Moisture	Date Analyzed
SS-65:6"	02-148-82	**4**	2-18-22
SS-66:6"	02-148-83	**4**	2-18-22
SS-67:6"	02-148-84	**4**	2-18-22
SS-68:6"	02-148-85	**4**	2-18-22
SS-68:12"	02-148-86	**4**	2-18-22
SS-69:6"	02-148-87	**5**	2-18-22
SS-70:6"	02-148-88	**4**	2-18-22
Duff-1	02-148-89	**37**	2-22-22
Duff-2	02-148-90	**40**	2-22-22
Duff-3	02-148-91	**64**	2-22-22
Duff-4	02-148-92	**35**	2-22-22
Duff-5	02-148-93	**18**	2-22-22
Duff-6	02-148-94	**40**	2-22-22
Duff-7	02-148-95	**22**	2-22-22
Duff-8	02-148-96	**15**	2-22-22
Duff-9	02-148-97	**63**	2-22-22
Duff-10	02-148-98	**53**	2-22-22
Duff-11	02-148-99	**12**	2-22-22
Duff-12	02-148-100	**13**	2-22-22
Duff-13	02-148-101	**10**	2-22-22
Duff-14	02-148-102	**8**	2-22-22
Duff-15	02-148-103	**14**	2-22-22
Duff-16	02-148-104	**8**	2-22-22
Duff-17	02-148-105	**15**	2-22-22
Duff-18	02-148-106	**5**	2-22-22

Data Qualifiers and Abbreviations

A - Due to a high sample concentration, the amount spiked is insufficient for meaningful MS/MSD recovery data.

B - The analyte indicated was also found in the blank sample.

C - The duplicate RPD is outside control limits due to high result variability when analyte concentrations are within five times the quantitation limit.

E - The value reported exceeds the quantitation range and is an estimate.

F - Surrogate recovery data is not available due to the high concentration of coeluting target compounds.

H - The analyte indicated is a common laboratory solvent and may have been introduced during sample preparation, and be impacting the sample result.

I - Compound recovery is outside of the control limits.

J - The value reported was below the practical quantitation limit. The value is an estimate.

K - Sample duplicate RPD is outside control limits due to sample inhomogeneity. The sample was re-extracted and re-analyzed with similar results.

L - The RPD is outside of the control limits.

M - Hydrocarbons in the gasoline range are impacting the diesel range result.

M1 - Hydrocarbons in the gasoline range (toluene-naphthalene) are present in the sample.

N - Hydrocarbons in the lube oil range are impacting the diesel range result.

N1 - Hydrocarbons in diesel range are impacting lube oil range results.

O - Hydrocarbons indicative of heavier fuels are present in the sample and are impacting the gasoline result.

P - The RPD of the detected concentrations between the two columns is greater than 40.

Q - Surrogate recovery is outside of the control limits.

S - Surrogate recovery data is not available due to the necessary dilution of the sample.

T - The sample chromatogram is not similar to a typical ____________.

U - The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

U1 - The practical quantitation limit is elevated due to interferences present in the sample.

V - Matrix Spike/Matrix Spike Duplicate recoveries are outside control limits due to matrix effects.

W - Matrix Spike/Matrix Spike Duplicate RPD are outside control limits due to matrix effects.

X - Sample extract treated with a mercury cleanup procedure.

X1- Sample extract treated with a sulfuric acid/silica gel cleanup procedure.

Y - The calibration verification for this analyte exceeded the 20% drift specified in methods 8260 & 8270, and therefore the reported result should be considered an estimate. The overall performance of the calibration verification standard met the acceptance criteria of the method.

Y1 - Negative effects of the matrix from this sample on the instrument caused values for this analyte in the bracketing continuing calibration verification standard (CCVs) to be outside of 20% acceptance criteria. Because of this, quantitation limits and sample concentrations should be considered estimates.

Z -

ND - Not Detected at PQL
PQL - Practical Quantitation Limit
RPD - Relative Percent Difference

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Chain of Custody

Page 1 of 11

Company: Earth Solutions NW, LLC
Project Number: ES-8427
Project Name: DuPont MP
Project Manager: Kyle Kolb
Sampled by: "

Turnaround Request (in working days)
(Check One)
☐ Same Day ☐ 1 Day
☐ 2 Days ☐ 3 Days
☑ Standard (7 Days)
☐ ______ (other)

Laboratory Number: 02-148

Lab ID	Sample Identification	Date Sampled	Time Sampled	Matrix	Number of Containers	NWTPH-HCID	NWTPH-Gx/BTEX (8021☐ 8260☐)	NWTPH-Gx	NWTPH-Dx (Acid / SG Clean-up☐)	Volatiles 8260	Halogenated Volatiles 8260	EDB EPA 8011 (Waters Only)	Semivolatiles 8270/SIM (with low-level PAHs)	PAHs 8270/SIM (low-level)	PCBs 8082	Organochlorine Pesticides 8081	Organophosphorus Pesticides 8270/SIM	Chlorinated Acid Herbicides 8151	Total RCRA Metals	Total MTCA Metals	TCLP Metals	HEM (oil and grease) 1664	Total Lead	Total Arsenic			% Moisture
1	SS-1:6"	2/10/22	8:15	Soil	1																		X	X			X
2	SS-2:6"		8:30		1																		X	X			
3	SS-2:12"		8:35		1																		X	X			
4	SS-3:6"		8:45		1																		X	X			
5	SS-4:6"		8:55		1																		X	X			
6	SS-5:6"		9:05		1																		X	X			
7	SS-6:6"		9:15		1																		X	X			
8	SS-6:12"		9:20		1																		X	X			
9	SS-7:6"		9:30		1																		X	X			
10	SS-8:6"		9:40		1																		X	X			

	Signature	Company	Date	Time
Relinquished		ESNW	2/14/22	15:43
Received	Nicolle Bellin	OSE	2/14/22	1543
Relinquished				
Received				
Relinquished				
Received				
Reviewed/Date		Reviewed/Date		

Comments/Special Instructions

Data Package: Standard ☐ Level III ☐ Level IV ☐

Chromatograms with final report ☐ Electronic Data Deliverables (EDDs) ☐

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Chain of Custody

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Laboratory Number: 02-148

Company: ESNW
Project Number: ES-8427
Project Name: DuPont MP
Project Manager: Kyle Kolb
Sampled by: "

Turnaround Request (in working days)
(Check One)
☐ Same Day ☐ 1 Day
☐ 2 Days ☐ 3 Days
☑ Standard (7 Days)
☐ ______ (other)

Lab ID	Sample Identification	Date Sampled	Time Sampled	Matrix	Number of Containers	NWTPH-HCID	NWTPH-Gx/BTEX (8021☐ 8260☐)	NWTPH-Gx	NWTPH-Dx (Acid / SG Clean-up☐)	Volatiles 8260	Halogenated Volatiles 8260	EDB EPA 8011 (Waters Only)	Semivolatiles 8270/SIM (with low-level PAHs)	PAHs 8270/SIM (low-level)	PCBs 8082	Organochlorine Pesticides 8081	Organophosphorus Pesticides 8270/SIM	Chlorinated Acid Herbicides 8151	Total RCRA Metals	Total MTCA Metals	TCLP Metals	HEM (oil and grease) 1664	Total Lead	Total Arsenic			% Moisture
11	SS-8:12"	2/10/22	9:45	Soil	1																		X	X			X
12	SS-9:6"		9:55		1																		X	X			
13	SS-10:6"		10:05		1																		X	X			
14	SS-11:6"		10:15		1																		X	X			
15	SS-12:6"		10:25		1																		X	X			
16	SS-12:12"		10:30		1																		X	X			
17	SS-13:6"		10:50		1																		X	X			
18	SS-14:6"		11:00		1																		X	X			
19	SS-15:6"		11:10		1																		X	X			
20	SS-16:6"		11:20		1																		X	X			

	Signature	Company	Date	Time
Relinquished		ESNW	2/14/22	15:43
Received	Nicolle	OSE	2/14/22	1543
Relinquished				
Received				
Relinquished				
Received				
Reviewed/Date		Reviewed/Date		

Comments/Special Instructions

Data Package: Standard ☐ Level III ☐ Level IV ☐

Chromatograms with final report ☐ Electronic Data Deliverables (EDDs) ☐

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Chain of Custody

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Laboratory Number: 02-148

Company: ESNW
Project Number: ES-8427
Project Name: DuPont MP
Project Manager: Kyle Kelly
Sampled by: ''

Turnaround Request (in working days)
(Check One)
☐ Same Day ☐ 1 Day
☐ 2 Days ☐ 3 Days
☒ Standard (7 Days)
☐ ______ (other)

Lab ID	Sample Identification	Date Sampled	Time Sampled	Matrix	Number of Containers	NWTPH-HCID	NWTPH-Gx/BTEX (8021☐ 8260☐)	NWTPH-Gx	NWTPH-Dx (Acid / SG Clean-up☐)	Volatiles 8260	Halogenated Volatiles 8260	EDB EPA 8011 (Waters Only)	Semivolatiles 8270/SIM (with low-level PAHs)	PAHs 8270/SIM (low-level)	PCBs 8082	Organochlorine Pesticides 8081	Organophosphorus Pesticides 8270/SIM	Chlorinated Acid Herbicides 8151	Total RCRA Metals	Total MTCA Metals	TCLP Metals	HEM (oil and grease) 1664	Total Lead	Total Arsenic			% Moisture
21	SS-17:6"	2/10/22	12:00	Soil	1																		X	X			
22	SS-18:6"		12:10		1																		X	X			
23	SS-18:12"		12:15		1																		X	X			
24	SS-19:6"		12:25		1																		X	X			
25	SS-20:6"		12:35		1																		X	X			
26	SS-21:6"		12:45		1																		X	X			
27	SS-22:6"		12:55		1																		X	X			
28	SS-23:6"		1:05		1																		X	X			
29	SS-24:6"		1:15		1																		X	X			
30	SS-24:12"		1:20		1																		X	X			

	Signature	Company	Date	Time
Relinquished		ESNW	2/14/22	15:43
Received	Nichelle	OSE	2/14/22	1543
Relinquished				
Received				
Relinquished				
Received				

Reviewed/Date

Reviewed/Date

Comments/Special Instructions

Data Package: Standard ☐ Level III ☐ Level IV ☐

Chromatograms with final report ☐ Electronic Data Deliverables (EDDs) ☐

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Chain of Custody

Page 4 of 11

Company: FSNW
Project Number: ES-8427
Project Name: DuPont MP
Project Manager: Kyle Kelly
Sampled by: "

Turnaround Request (in working days)

(Check One)

☐ Same Day ☐ 1 Day
☐ 2 Days ☐ 3 Days
☑ Standard (7 Days)
☐ ______ (other)

Laboratory Number: 02-148

Lab ID	Sample Identification	Date Sampled	Time Sampled	Matrix	Number of Containers	NWTPH-HCID	NWTPH-Gx/BTEX (8021☐ 8260☐)	NWTPH-Gx	NWTPH-Dx (Acid / SG Clean-up☐)	Volatiles 8260	Halogenated Volatiles 8260	EDB EPA 8011 (Waters Only)	Semivolatiles 8270/SIM (with low-level PAHs)	PAHs 8270/SIM (low-level)	PCBs 8082	Organochlorine Pesticides 8081	Organophosphorus Pesticides 8270/SIM	Chlorinated Acid Herbicides 8151	Total RCRA Metals	Total MTCA Metals	TCLP Metals	HEM (oil and grease) 1664	Total Lead	Total Arsenic			% Moisture
31	SS-25:6"	2/10/22	1:30	Soil	1																		X	X			X
32	SS-26:6"		1:40		1																		X	X			
33	SS-27:6"		1:50		1																		X	X			
34	SS-28:6"		2:00		1																		X	X			
35	SS-28:12"		2:05		1																		X	X			
36	SS-29:6"		2:15		1																		X	X			
37	SS-30:6"		2:30		1																		X	X			
38	SS-30:12"		2:35		1																		X	X			
39	SS-31:6"	2/11/22	8:00		1																		X	X			
40	SS-32:6"		8:10		1																		X	X			↓

	Signature	Company	Date	Time
Relinquished		FSNW	2/14/22	15:43
Received	Nichelle B	OSE	2/14/22	1543
Relinquished				
Received				
Relinquished				
Received				

Reviewed/Date

Reviewed/Date

Comments/Special Instructions

Data Package: Standard ☐ Level III ☐ Level IV ☐

Chromatograms with final report ☐ Electronic Data Deliverables (EDDs) ☐

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Chain of Custody

Page 5 of N

Laboratory Number: 02-148

Company: ESNW
Project Number: ES-8427
Project Name: Dupont MP
Project Manager: Kyler Kolk
Sampled by: "

Turnaround Request (in working days)
(Check One)
☐ Same Day ☐ 1 Day
☐ 2 Days ☐ 3 Days
☑ Standard (7 Days)
☐ ____ (other)

Lab ID	Sample Identification	Date Sampled	Time Sampled	Matrix	Number of Containers	NWTPH-HCID	NWTPH-Gx/BTEX (8021☐ 8260☐)	NWTPH-Gx	NWTPH-Dx (Acid / SG Clean-up☐)	Volatiles 8260	Halogenated Volatiles 8260	EDB EPA 8011 (Waters Only)	Semivolatiles 8270/SIM (with low-level PAHs)	PAHs 8270/SIM (low-level)	PCBs 8082	Organochlorine Pesticides 8081	Organophosphorus Pesticides 8270/SIM	Chlorinated Acid Herbicides 8151	Total RCRA Metals	Total MTCA Metals	TCLP Metals	HEM (oil and grease) 1664	Total Lead	Total Arsenic			% Moisture
41	SS-33:6"	2/11/22	8:20	Soil	1																		X	X			X
42	SS-34:6"	|	8:30	|	1																		X	X			|
43	SS-34:12"	|	8:35	|	1																		X	X			|
44	SS-35:6"	|	8:45	|	1																		X	X			|
45	SS-36:6"	|	9:00	|	1																		X	X			|
46	SS-36:12"	|	9:05	|	1																		X	X			|
47	SS-37:6"	|	9:15	|	1																		X	X			|
48	SS-38:6"	|	9:25	|	1																		X	X			|
49	SS-39:6"	|	9:35	|	1																		X	X			|
50	SS-40:6"	|	9:50		1																		X	X			↓

	Signature	Company	Date	Time
Relinquished		ESNW	2/14/22	15:43
Received	Nichelle Blair	OSE	2/14/22	1543
Relinquished				
Received				
Relinquished				
Received				
Reviewed/Date		Reviewed/Date		

Comments/Special Instructions

Data Package: Standard ☐ Level III ☐ Level IV ☐

Chromatograms with final report ☐ Electronic Data Deliverables (EDDs) ☐

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Chain of Custody

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Laboratory Number: 02-148

Company: ESNW
Project Number: ES-8427
Project Name: Dupont MP
Project Manager: Kyler Kolb
Sampled by: "

Turnaround Request (in working days)

(Check One)

☐ Same Day ☐ 1 Day
☐ 2 Days ☐ 3 Days
☑ Standard (7 Days)
☐ ______ (other)

Lab ID	Sample Identification	Date Sampled	Time Sampled	Matrix	Number of Containers	NWTPH-HCID	NWTPH-Gx/BTEX (8021☐ 8260☐)	NWTPH-Gx	NWTPH-Dx (Acid / SG Clean-up☐)	Volatiles 8260	Halogenated Volatiles 8260	EDB EPA 8011 (Waters Only)	Semivolatiles 8270/SIM (with low-level PAHs)	PAHs 8270/SIM (low-level)	PCBs 8082	Organochlorine Pesticides 8081	Organophosphorus Pesticides 8270/SIM	Chlorinated Acid Herbicides 8151	Total RCRA Metals	Total MTCA Metals	TCLP Metals	HEM (oil and grease) 1664	Total Lead	Total Arsenic			% Moisture
51	SS-40:12"	2/11/22	9:55	Soil	1																		X	X			X
52	SS-41:6"		10:05		1																		X	X			↓
53	SS-42:6"		10:15		1																		X	X			↓
54	SS-43:6"		10:30		1																		X	X			↓
55	SS-44:6"		10:40		1																		X	X			↓
56	SS-45:6"		10:50		1																		X	X			↓
57	SS-46:6"		11:00		1																		X	X			↓
58	SS-46:12"		11:05		1																		X	X			↓
59	SS-47:6"		11:20		1																		X	X			↓
60	SS-48:6"		11:30		1																		X	X			↓

	Signature	Company	Date	Time
Relinquished		ESNW	2/14/22	15:43
Received	Nicolle Blair	OSE	2/14/22	1543
Relinquished				
Received				
Relinquished				
Received				

Reviewed/Date

Reviewed/Date

Comments/Special Instructions

Data Package: Standard ☐ Level III ☐ Level IV ☐

Chromatograms with final report ☐ Electronic Data Deliverables (EDDs) ☐

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Laboratory Number: 02-148

Company: ESNW
Project Number: ES-8427
Project Name: DuPont MP
Project Manager: Kyle Kelly
Sampled by: "

Turnaround Request (in working days)

(Check One)

☐ Same Day ☐ 1 Day
☐ 2 Days ☐ 3 Days
☑ Standard (7 Days)
☐ ________ (other)

Lab ID	Sample Identification	Date Sampled	Time Sampled	Matrix	Number of Containers
61	SS-49:6"	2/11/22	11:40	Soil	1
62	SS-50:6"		12:20		1
63	SS-51:6"		12:30		1
64	SS-52:6"		12:40		1
65	SS-52:12"		12:45		1
66	SS-53:6"		12:55		1
67	SS-54:6"		1:10		1
68	SS-55:6"		1:25		1
69	SS-56:6"		1:35		1
70	SS-56:12"		1:40		1

Lab ID	NWTPH-HCID	NWTPH-Gx/BTEX (8021☐ 8260☐)	NWTPH-Gx	NWTPH-Dx (Acid / SG Clean-up☐)	Volatiles 8260	Halogenated Volatiles 8260	EDB EPA 8011 (Waters Only)	Semivolatiles 8270/SIM (with low-level PAHs)	PAHs 8270/SIM (low-level)	PCBs 8082	Organochlorine Pesticides 8081	Organophosphorus Pesticides 8270/SIM	Chlorinated Acid Herbicides 8151	Total RCRA Metals	Total MTCA Metals	TCLP Metals	HEM (oil and grease) 1664	Total Lead	Total Arsenic			% Moisture
61																		X	X			X
62																		X	X			
63																		X	X			
64																		X	X			
65																		X	X			
66																		X	X			
67																		X	X			
68																		X	X			
69																		X	X			
70																		X	X			

	Signature	Company	Date	Time
Relinquished		ESNW	2/14/22	15:43
Received		OSE	2/14/22	1543
Relinquished				
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Relinquished				
Received				

Reviewed/Date

Reviewed/Date

Comments/Special Instructions

Data Package: Standard ☐ Level III ☐ Level IV ☐

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Laboratory Number: 02-148

Company: ESNW
Project Number: ES-8427
Project Name: DuPont MP
Project Manager: Kyle Kelly
Sampled by: ..

Turnaround Request (in working days)
(Check One)
☐ Same Day ☐ 1 Day
☐ 2 Days ☐ 3 Days
☑ Standard (7 Days)
☐ ______ (other)

Lab ID	Sample Identification	Date Sampled	Time Sampled	Matrix	Number of Containers	NWTPH-HCID	NWTPH-Gx/BTEX (8021☐ 8260☐)	NWTPH-Gx	NWTPH-Dx (Acid / SG Clean-up☐)	Volatiles 8260	Halogenated Volatiles 8260	EDB EPA 8011 (Waters Only)	Semivolatiles 8270/SIM (with low-level PAHs)	PAHs 8270/SIM (low-level)	PCBs 8082	Organochlorine Pesticides 8081	Organophosphorus Pesticides 8270/SIM	Chlorinated Acid Herbicides 8151	Total RCRA Metals	Total MTCA Metals	TCLP Metals	HEM (oil and grease) 1664	Total Lead	Total Arsenic			% Moisture
71	SS-57:6"	2/14/22	1:50	Soil	1																		X	X			X
72	SS-58:6"		2:00		1																		X	X			
73	SS-58:12"		2:05		1																		X	X			
74	SS-59:6"		2:15		1																		X	X			
75	SS-60:6"		2:30		1																		X	X			
76	SS-61:6"	2/14/22	8:00		1																		X	X			
77	SS-62:6"		8:15		1																		X	X			
78	SS-62:12"		8:20		1																		X	X			
79	SS-63:6"		8:30		1																		X	X			
80	SS-64:6"		8:45		1																		X	X			↓

	Signature	Company	Date	Time
Relinquished		ESNW	2/14/22	15:43
Received	Nichelle Blim	OSE	2/14/22	1543
Relinquished				
Received				
Relinquished				
Received				
Reviewed/Date		Reviewed/Date		

Comments/Special Instructions

Data Package: Standard ☐ Level III ☐ Level IV ☐

Chromatograms with final report ☐ Electronic Data Deliverables (EDDs) ☐

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Laboratory Number: 02-148

Company: ESNW
Project Number: ES-8427
Project Name: DuPont MP
Project Manager: Kyle Kelly
Sampled by:

Turnaround Request (in working days)
(Check One)
☐ Same Day ☐ 1 Day
☐ 2 Days ☐ 3 Days
☑ Standard (7 Days)
☐ ____ (other)

Lab ID	Sample Identification	Date Sampled	Time Sampled	Matrix	Number of Containers	NWTPH-HCID	NWTPH-Gx/BTEX (8021☐ 8260☐)	NWTPH-Gx	NWTPH-Dx (Acid / SG Clean-up☐)	Volatiles 8260	Halogenated Volatiles 8260	EDB EPA 8011 (Waters Only)	Semivolatiles 8270/SIM (with low-level PAHs)	PAHs 8270/SIM (low-level)	PCBs 8082	Organochlorine Pesticides 8081	Organophosphorus Pesticides 8270/SIM	Chlorinated Acid Herbicides 8151	Total RCRA Metals	Total MTCA Metals	TCLP Metals	HEM (oil and grease) 1664	Total Lead	Total Arsenic			% Moisture
81	SS-64:12"	2/14/22	8:50	Soil	1																		X	X			X
82	SS-65:6"		9:00		1																		X	X			
83	SS-66:6"		9:15		1																		X	X			
84	SS-67:6"		9:30		1																		X	X			
85	SS-68:6		9:40		1																		X	X			
86	SS-68:12"		9:45		1																		X	X			
87	SS-69:6"		10:00		1																		X	X			
88	SS-70:6"		10:10		1																		X	X			
89	Duff-1		10:30		1																		X	X			
90	Duff-2		10:40		1																		X	X			

	Signature	Company	Date	Time
Relinquished		ESNW	2/14/22	15:43
Received		OSE	2/14/22	1543
Relinquished				
Received				
Relinquished				
Received				
Reviewed/Date		Reviewed/Date		

Comments/Special Instructions

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Laboratory Number: 02-148

Company: ESNW
Project Number: ES-8427
Project Name: DuPont MP
Project Manager: Kyle Kells
Sampled by:

Turnaround Request (in working days)
(Check One)
☐ Same Day ☐ 1 Day
☐ 2 Days ☐ 3 Days
☑ Standard (7 Days)
☐ ______ (other)

Lab ID	Sample Identification	Date Sampled	Time Sampled	Matrix	Number of Containers	NWTPH-HCID	NWTPH-Gx/BTEX (8021☐ 8260☐)	NWTPH-Gx	NWTPH-Dx (Acid / SG Clean-up☐)	Volatiles 8260	Halogenated Volatiles 8260	EDB EPA 8011 (Waters Only)	Semivolatiles 8270/SIM (with low-level PAHs)	PAHs 8270/SIM (low-level)	PCBs 8082	Organochlorine Pesticides 8081	Organophosphorus Pesticides 8270/SIM	Chlorinated Acid Herbicides 8151	Total RCRA Metals	Total MTCA Metals	TCLP Metals	HEM (oil and grease) 1664	Total Lead	Total Arsenic			% Moisture
91	Duff-3	2/14/22	10:50	Soil	1																		X	X			X
92	Duff-4		11:00		1																		X	X			
93	Duff-5		11:10		1																		X	X			
94	Duff-6		11:20		1																		X	X			
95	Duff-7		11:30		1																		X	X			
96	Duff-8		11:40		1																		X	X			
97	Duff-9		11:50		1																		X	X			
98	Duff-10		12:00		1																		X	X			
99	Duff-11		12:10		1																		X	X			
100	Duff-12		12:20		1																		X	X			

	Signature	Company	Date	Time
Relinquished		ESNW	2/14/22	15:43
Received		OSE	2/14/22	1543
Relinquished				
Received				
Relinquished				
Received				
Reviewed/Date		Reviewed/Date		

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Laboratory Number: 02-148

Company: ESNW
Project Number: ES-8427
Project Name: DuPont MP
Project Manager: Kyle Kelly
Sampled by: "

Turnaround Request (in working days)
(Check One)
☐ Same Day ☐ 1 Day
☐ 2 Days ☐ 3 Days
☑ Standard (7 Days)
☐ ____ (other)

Lab ID	Sample Identification	Date Sampled	Time Sampled	Matrix	Number of Containers	NWTPH-HCID	NWTPH-Gx/BTEX (8021☐ 8260☐)	NWTPH-Gx	NWTPH-Dx (Acid / SG Clean-up☐)	Volatiles 8260	Halogenated Volatiles 8260	EDB EPA 8011 (Waters Only)	Semivolatiles 8270/SIM (with low-level PAHs)	PAHs 8270/SIM (low-level)	PCBs 8082	Organochlorine Pesticides 8081	Organophosphorus Pesticides 8270/SIM	Chlorinated Acid Herbicides 8151	Total RCRA Metals	Total MTCA Metals	TCLP Metals	HEM (oil and grease) 1664	Total Lead	Total Arsenic			% Moisture
101	Duff-13	2/14/22	12:30	Soil	1																		X	X			X
102	Duff-14	|	12:40	|	1																		X	X			|
103	Duff-15	|	12:50	|	1																		X	X			|
104	Duff-16	|	1:00	|	1																		X	X			|
105	Duff-17	|	1:10	|	1																		X	X			|
106	Duff-18	|	1:20	|	1																		X	X			↓

	Signature	Company	Date	Time
Relinquished		ESNW	2/14/22	15:43
Received		OSE	2/14/22	1543
Relinquished				
Received				
Relinquished				
Received				

Reviewed/Date

Reviewed/Date

Comments/Special Instructions

Data Package: Standard ☐ Level III ☐ Level IV ☐

Chromatograms with final report ☐ Electronic Data Deliverables (EDDs) ☐

Critical Areas Report – Existing Conditions

Careage Property

DuPont, Washington

14 March 2022

PREPARED FOR:
Careage Construction

PREPARED BY:
Wet.land, LLC
206-309-8100
Wet.land

PROFESSIONAL WETLAND SCIENTIST
JENNIFER M. MARRIOTT
001891

PROFESSIONAL WETLAND SCIENTIST
KRISTEN NUMATA
3412 PWS

wet.land

CONTENTS

TABLE OF TABLES

APPENDICES

DISCLAIMER

This consulting report has been prepared by Wet.land, LLC based on our best professional judgment. Any delineations, wetland ratings, stream typings, or general characterizations were completed in accordance with the applicable regulations at the time field work was completed. Where information was provided by Others and not collected directly by Wet.land, LLC, such is stated within the report. Conclusions presented within this report are based on the information available at the time of report preparation, and are accurate and true to the best of our knowledge. The opinions and conclusions contained within this report are a reflection of our interpretation of applicable regulations and are not final until concurrence is provided by the appropriate agencies.

1. Report Purpose

1.1 Project Name and Purpose

The Careage Property is a 24.74-acre parcel assemblage that is proposed for a boundary line adjustment in DuPont. There are no existing structures on the properties. No wetlands or streams occur on the Careage Property, however, two wetlands are located within the vicinity offsite. Oak trees do occur in the northwest and southeast corners of the property.

1.2 Property Owner

The property owner for the Careage Property is Patriots Landing Investment II, LLC.

Site Owner Representative:
Mike Campeau
President of Construction & Development
mcampeau@careage.com

1.3 Report Purpose

This report has been prepared to outline the existing conditions of the property and the constraints on the parcel as a result of critical areas.

This parcel is located within the limits of the City of DuPont. This report has been prepared in accordance with the requirements of the DuPont Municipal Code (DMC) Chapter 25.105 *Critical Areas*. This report has also been prepared in light of applicable State and Federal regulations.

1.4 Preparer Qualifications

Field investigations and reporting were completed by Jennifer Marriott, PWS and Kristen Numata, PWS (**Appendix A**).

Jennifer Marriott has a Bachelor's Degree and a Master's Degree in Biology from University of Central Florida, and a second Master's Degree in Soil and Environmental Science from the University of Florida. She has over 18 years of experience in wetland delineations and environmental permitting.

Kristen Numata has two Bachelor's Degrees in Biology and Environmental Science from Santa Clara University, and she has over six years of experience in environmental consulting.

2. Project Site

2.1 Project Location

The Project Site is comprised of two (2) parcels that total 24.74 acres. The Project Site is located south and west of the intersection of McNeil Street and Marshall Circle in DuPont, Washington (**Figure 1, Appendix B**). The latitude/longitude coordinate for the center of the site is 47.095053, -122.658297. The Public Land Survey System location is the northeast quadrant, Section 34, Township 19 North, Range 1 East, Willamette Meridian (W.M).

2.2 Project History

The Site has been disturbed since at least 1955, based on an evaluation of aerial imagery. Active grading was completed as recently as 1998 per Pierce County aerial imagery. Since then, the site has been utilized as a parking area but has never been developed.

2.3 Project Site Description

The Project Site is bound to the north by McNeil Street, to the west by Meyer Street and a powerline easement, to the south by Joint Base Lewis-McChord (JBLM), and to the east by Marshall Circle. Elevations at the property range from 200 to 245 feet above sea level. The site generally slopes from north to south, but there is a large manmade hill in the lower third of the project. Slopes adjacent to the manmade hill were estimated at 56%.

More detail on the existing conditions of these parcels is provided below in **Chapter 3** and in **Table 1**.

3. Existing Site Conditions

In-depth analysis of existing conditions within the Project Site is described below.

3.1 Methodology

Prior to field investigations of the Site, a thorough review of existing publicly available databases was completed to determine what has been previously mapped over the Site. These findings are outlined in Section 3.2 below. During field investigations, the routine approach described in the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Western Mountains, Valleys, and Coast Region* (U.S. Army Corps of Engineers, 2010) was used as a baseline for evaluating the Site for the presence of wetlands. This supplement is in addition to the 1987 Corps of Engineers Wetlands Delineation Manual, which serves as the baseline on which the regional supplements build. Wetlands were rated using the Washington State Wetland Rating System for Western Washington (Hruby 2014). The presence of streams onsite was determined using the methodology described in *Determining the Ordinary High Water Mark on Streams in Washington State* (Olson and Stockdale, 2010).

3.2 Database Review Summary

An in-depth review of Agency database results for this Project Site follows in **Table 1**, below. Databases were reviewed for features on the site and within 200 feet of the site. Copies of database results are provided in **Appendix C**. A Photodocument of existing site conditions is provided as **Appendix D**.

Databases referenced include:

- Natural Resource Conservation Service (NRCS), Websoils Survey (NRCS) (**Figure 2**)
- US Fish and Wildlife (USFWS), Wetlands Online Mapper (National Wetlands Inventory, NWI) (USFWS) (**Figure 3**)
- Washington State Department of Ecology (ECY) Water Quality Atlas
- Washington State Department of Fish and Wildlife (WDFW) Priority Species and Habitats
- Washington State Department of Natural Resources (WDNR) Forest Practices Application Mapping Tool (FPAMT)
- Statewide Integrated Fish Distribution (SWIFD) Web Map
- Salmonscape
- StreamNet
- Fish Passage Culverts Map
- Google Earth
- Historic Aerials, www.historicaerials.com
- City of DuPont Oak Management Mapping Units (**Figure 4**)

__Table 1.__ Summary of Background Review of Publicly Available Databases (all accessed on 3 March 2022).

Database	Agency (Database Manager)	Data Checked
Township, Range, Section Map	WSDOT	NE quadrant, Section 34, Township 19 North, Range 1 East, Willamette Meridian (W.M).
Watershed Boundaries	ArcGIS	North half: HUC 8 (12) – 17110019(0304), WRIA 12 – Chambers – Clover watershed South half: HUC 8 (12) – 17110015(0307), WRIA 11 – Nisqually watershed
NRCS Websoils	NRCS	**Figure 2.** No hydric soils.
National Wetlands Inventory	USFWS	**Figure 3.** Two wetlands mapped within the vicinity of the Site. PEM1/UBF: palustrine emergent persistent/unconsolidated bottom semi-permanently flooded.
Washington State Water Quality Atlas	ECY	No 303(d) listed waters onsite, or downstream. The Site is not within a TMDL.
Priority Habitats and Species (PHS)	WDFW	Two wetlands mapped similar to the NWI Mapper. Townships mapped for big brown bat, little brown bat, and Yuma myotis.
Forest Practices Application Mapping Tool	WDNR	No streams are mapped on the Site or within the vicinity.
Statewide Integrated Fish Distribution (SWIFD) Web Map	NWIFC	No streams are mapped on the Site or within the vicinity.
SalmonScape	WDFW	
StreamNet Mapper	The Pacific States Marine Fisheries Mapper	
Washington State Fish Passage	WDFW	No culverts are mapped on the Site or within the vicinity.
Oak Management Mapping Units	City of DuPont	**Figure 4.** No oak mapping units occur onsite. Several map units are located within the vicinity of the Site, but are not called out in the municipal code for preservation.

3.3 Field Investigation Results

The Site was evaluated for critical areas on 23 February 2022. A summary of these findings is provided below.

3.3.1 Weather

Precipitation data for the three months prior to field work were collected and analysed from the Tacoma weather station (Table 2). It was determined that this period fell within wetter than normal rainfall and any wetland hydrology would accurately reflect wetland conditions.

Table 2. *WETS Data 1991 – 2020, Tacoma No. 1, WA Weather Station*

Month	**30% Chance Will Have**		**Monthly Total Precipitation**	**Condition**	**Value**	**Weight**	**Total**
	Less Than	**More Than**					
November	4.40	7.53	10.78	Wet	3	1	3
December	4.53	7.10	5.76	Wet	3	2	6
January	4.65	7.01	9.39	Wet	3	3	9
Feb 1-18	2.47	4.85	0.19				
Sum							**18**

[1] Dry = 6 – 9 points; Normal = 10 – 14 points; Wet = 15 – 18 points

In addition, the growing season (50% probability of 28 degrees F or higher) for Tacoma occurs between February 1 and December 2 for a total of 304 days. The field work was conducted during the growing season.

3.3.2 Wetlands

No wetlands were delineated within the Site. Two wetlands (Wetlands A and B) were identified offsite to the south and southwest that occurred at least partially within the 200-foot study area.

Wetland A is a depressional wetland associated with Hodge Lake located south of the Site within the Eagle's Pride Golf Course (within JBLM). This wetland was evaluated based on a review of aerial imagery and what was visible from the Site. Approximately a third of the wetland is open water, and the remaining wetland is dominated by emergent species such as reed canarygrass (*Phalaris arundinacea*), slough sedge (*Carex obnupta*), and soft rush (*Juncus effusus*). Hydrology is provided by groundwater, precipitation, and assumed irrigation from the golf course.

Wetland B is a depressional wetland located southwest of the Site within a residential development. Vegetation is dominated by emergent species and hydrology is provided by groundwater, precipitation, and stormwater. No wetland outlet was observed.

Table 3. *Wetland Rating Summary*

Critical Area	Water Quality	Hydrologic	Habitat	Total	Wetland Rating
Wetland A	5	6	6	17	III
Wetland B	6	7	4	17	III

3.3.3 Streams

No streams occur on or in the vicinity of the Site.

3.3.4 Native Vegetation

The Site is generally disturbed due to grading completed around 1998. Much of the northern half of the site is dominated by Scots broom (*Cytisus scoparius*), grasses and moss. The western and southern property lines are dominated with native vegetation, including Douglas fir (*Pseudotsuga menziesii*), Oregon white oak (*Quercus garryana*), bigleaf maple (*Acer macrophyllum*), black cottonwood (*Populus balsamifera*), Pacific madrone (*Arbutus menziesii*), Oregongrape (*Mahonia aquifolium*), oso-berry (*Oemleria cerasiformis*), salal (*Gaultheria shallon*), ocean spray (*Holodiscus discolor*), beaked hazelnut (*Corylus cornuta*), sword fern (*Polystichum munitum*), bracken fern (*Pteridium aquilinum*), and trailing blackberry (*Rubus ursinus*). Invasive species on the site included Himalayan blackberry (*Rubus armeniacus*) and cutleaf blackberry (*Rubus laciniatus*).

3.4 Wildlife

General observations on expected and observed wildlife usage is below.

3.4.1 General Wildlife Usage

Common urban wildlife such as small to medium mammals and birds are expected to use the Site. There is the possibility of larger mammals moving through the area given this relatively large area of undeveloped land, though offsite connectivity is restricted due to the fence along the southern parcel boundary.

3.4.2 Federally Listed Species

No federally listed species were observed or are expected to occur onsite.

3.4.3 State Listed Species

State priority habitats on the Site include Oregon white oak habitat, as well as snags and logs. It is expected that wildlife and state listed species that typically use these habitats have the potential to use the Site. Wildlife that could use the offsite wetlands may also use the uplands on the Site.

The Site is located in a township which is mapped for big brown bat (*Eptesicus fuscus*), little brown bat (*Myotis lucifugus*), and Yuma myotis (*Myotis yumanensis*). The Site is not appropriate for bat hibernation, but the Site could be used for forage.

3.4.4 Local Species

Common urban wildlife are expected to use the Site, though the City does not have its own list of local species of importance.

4. Regulatory Review

The Site falls under the jurisdiction of the City of DuPont and State of Washington. No features occur onsite that would extend jurisdiction to the US Army Corps of Engineers. A summary of the relevant regulations follows.

4.1 Federal Regulations

No Waters of the US occur on or adjacent to the Site.

4.2 State Regulations

No wetlands or streams occur on the Site that would be subject to applicable State regulations. Water quality concerns relative to any stormwater for future developments would need to be addressed consistent with local and state regulations.

4.3 Local Regulations

The Site falls within the City of DuPont limits and is subject to the regulations of the DuPont Municipal Code (DMC).

4.3.1 Shoreline Jurisdiction

The Site does not occur within Shoreline jurisdiction.

4.3.2 Non-Shoreline Jurisdiction

Critical areas on the Site are subject to the regulations of DMC Chapter 25.105 *Critical Areas*.

Wetlands and Streams (DMC 25.105.050)

No onsite wetlands or streams were identified. Wetlands A and B were both rated as Category III wetlands, which require a 75-foot standard buffer. Neither buffer extends onto the Site.

4.3.3 Oregon White Oak Tree Retention

DMC Chapter 25.120 *Tree Retention* outlines the City's requirements regarding tree retention, which includes specific requirements for Oregon white oak. Landmark trees which meet the characteristics of **Table 4** below shall be retained.

Oak trees, as well as larger conifers, occur on the site that may fall within the local parameters for tree protection. A tree survey will need to be completed to further address Oregon white oak and other landmark tree issues on the site. This was beyond the scope of this existing conditions analysis. An arborist will need to assess any trees for health condition to complete the tree analysis for this Site.

__Table 4.__ Landmark Tree Table (DMC 25.10.120.005)

	Species	
Trunk type	Oregon white oak, Pacific yew, or madrona	Douglas fir, western red cedar, western hemlock, or big leaf maple
Single trunk	24 inches	30 inches
Multi-trunk[1]	30 inches	45 inches

1. Sum of diameters

4.3.4 Flood Hazard Area

No 100-year floodplains are mapped on or adjacent to the Site.

5. Summary

The Careage Property is a 24.74-acre parcel assemblage in DuPont. The property is undeveloped. No wetlands or streams occur on the Careage Property. Two wetlands (Wetlands A and B) are located offsite to the south and southwest. Both wetlands have 75-foot standard buffers that do not extend onto the Site. A tree survey is needed to identify the areas of white oaks onsite that may require additional protections.

6. References

1. Anderson, P. S., Meyer, S., Olsen, P., & Stockdale, E. (2016). *Determining the Ordinary High Water Mark for Shoreline Management Act Compliance in Washington State*. Lacey, WA: Washington Department of Ecology, Shorelines & Environmental Assistance Program.
2. Cowardin, L. M., Carter, V., Golet, F. C., & LaRoe, E. T. (1979). *Classification of Wetlands and Deepwater Habitats of the United States*. Washington, DC: U.S. Department of the Interior, Fish and Wildlife Service.
3. DuPont Municipal Code (DMC) Title 25 Land Use Code (accessed 7 March 2022).
4. Environmental Laboratory. (1987). "*Corps of Engineers Wetlands Delineation Manual*," Technical Report Y-87-1, U.S. Army Engineer Waterways Experiment Station, Vicksburg, MS.
5. Hruby, T. (2014). *Washington State Wetland Rating System for Western Washington*: 2014 Update (Publication #14-06-029). Olympia, WA: Washington Department of Ecology.
6. U.S. Army Corps of Engineers. (2018). National Wetland Plant List, version 3.4. https://wetland-plants.usace.army.mil/ , U.S. Army Corps of Engineers, Engineer Research and Development Center, Cold Regions Research and Engineering Laboratory, Hanover, NH.
7. U.S. Army Corps of Engineers. (2010, May). Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Western Mountains, Valleys, and Coast Region (Version 2.0). U. S. Army Corps of Engineers. Vicksburg, MS: U.S. Army Engineer Research and Development Center.

APPENDIX A

Jennifer Marriott, PWS – Resume

Kristen Numata, PWS - Resume

Jennifer M. Marriott, PWS

8201 164th Avenue Northeast, Suite 200, PMB 141, Redmond, WA 98052
jen@wet.land
Work: 206-309-8100 | Cell: 813-846-1684

QUALIFICATIONS

- Master of Science, Soil Science, University of Florida, Gainesville, FL, 2010
- Master of Science, Biology (Ecology), University of Central Florida, Orlando, FL, 2003
- Bachelor of Science, Biology, University of Central Florida, Orlando, FL, 2001
- Professional Wetland Scientist (No. 1891)

FOCUS AND EXPERTISE

- Project Management
- Project Summaries and Rapid Environmental Due Diligence Reports
- Wetland and Stream Delineations/Habitat Evaluation
- Wetland (Critical Areas) Permitting
- Mitigation Planning
- Wetland Functional Assessment
- Hydric Soil Determinations
- Training and mentoring of Junior staff.

EXPERIENCE

- Senior Ecologist/Owner; Wet.land, LLC; March 2020 - Present
- Senior Ecologist/Project Manager; Talasaea Consultants, Inc.; June 2015 – March 2020
- Senior Project Scientist; BL Companies, Inc.; July 2012 – July 2014
- Environmental Scientist 3; RETTEW Associates, Inc.; March 2011 – February 2012
- Ecologist; Cardno-ENTRIX, Inc. (formerly known as ENTRIX, Inc., fka Biological Research Associates); July 2003 – March 2011

SKILLS, TRAINING & PROFESSIONAL MEMBERSHIPS

- Washington (Coastal Training Program Workshops)
    - Revised Washington State Wetland Rating System, 2014 (April 2015)
    - Using the Credit-Debit Method for Estimating Mitigation Needs (October 2015)
    - Using Field Indicators for Hydric Soils (November 2015)
    - Grass, Sedge, and Rush Identification for Western WA Puget Lowland Habitats (March 2016)
    - How to Determine the Ordinary High Water Mark (September 2016)
- Other Technical Training
    - Soil Workshop, PAPSS, 2011
    - Hydric Soils Workshops, 2004, 2008, 2009
    - FAESS Florida State Certification Short Course, March 12-13, 2009

Kristen Numata, PWS

8201 164th Avenue Northeast, Suite 200, PMB 141, Redmond, WA 98052
kristen@wet.land
Work: 206-309-8100 | Cell: 206-930-4845

QUALIFICATIONS

- Wetland Science and Management Certificate, University of Washington Professional Continuing Education, Seattle, WA, 2016
- Bachelor of Science, Biology, Santa Clara University, Santa Clara, CA, 2014
- Bachelor of Science, Environmental Science, Santa Clara University, Santa Clara, CA, 2014
- Professional Wetland Scientist (No. 3412)
- Certified Erosion and Sediment Control Lead (No. 70592)

FOCUS AND EXPERTISE

- Critical Areas Delineations and Site Assessments
- Wetland Functional Assessment
- Geographic Information Systems
- Critical Area Permitting
- Mitigation Planning and Performance Monitoring
- Environmental Compliance and Construction Oversight

EXPERIENCE

- Ecologist/Owner; Wet.land, LLC; January 2022 – Present
- Project Biologist; PBS Engineering and Environmental, Inc.; July 2019 – December 2021
- Biologist/Environmental Scientist; David Evans and Associates, Inc.; July 2018 – July 2019
- Ecologist; Talasaea Consultants, Inc.; July 2015 – July 2018

SKILLS, TRAINING & PROFESSIONAL MEMBERSHIPS

- Washington (Coastal Training Program Workshops)
    - Revised Washington State Wetland Rating System, 2014 (March 2016)
    - Using the Credit-Debit Method for Estimating Mitigation Needs (April 2017)
    - How to Determine Ordinary High Water Mark (June 2017)
    - Grass, Sedge, and Rush Identification for Western WA Puget Lowland Habitats (February 2018)
    - Winter Tree and Shrub Identification for Western WA Puget Lowland Habitats (February 2019)
    - Navigating SEPA (March 2019)
- Other Technical Training
    - Junior Author, Washington State Department of Transportation (WSDOT) Biological Assessment Preparation for Transportation Projects Training (March 2020)
    - Fish Passage: Inventory and Assessment, Washington Department of Fish and Wildlife, (WDFW) (August 2020)
    - Fish Passage: Habitat Survey, WDFW (August 2020)

APPENDIX B

Figures

SOURCE: ESRI TOPOGRAPHY AND HILLSHADE

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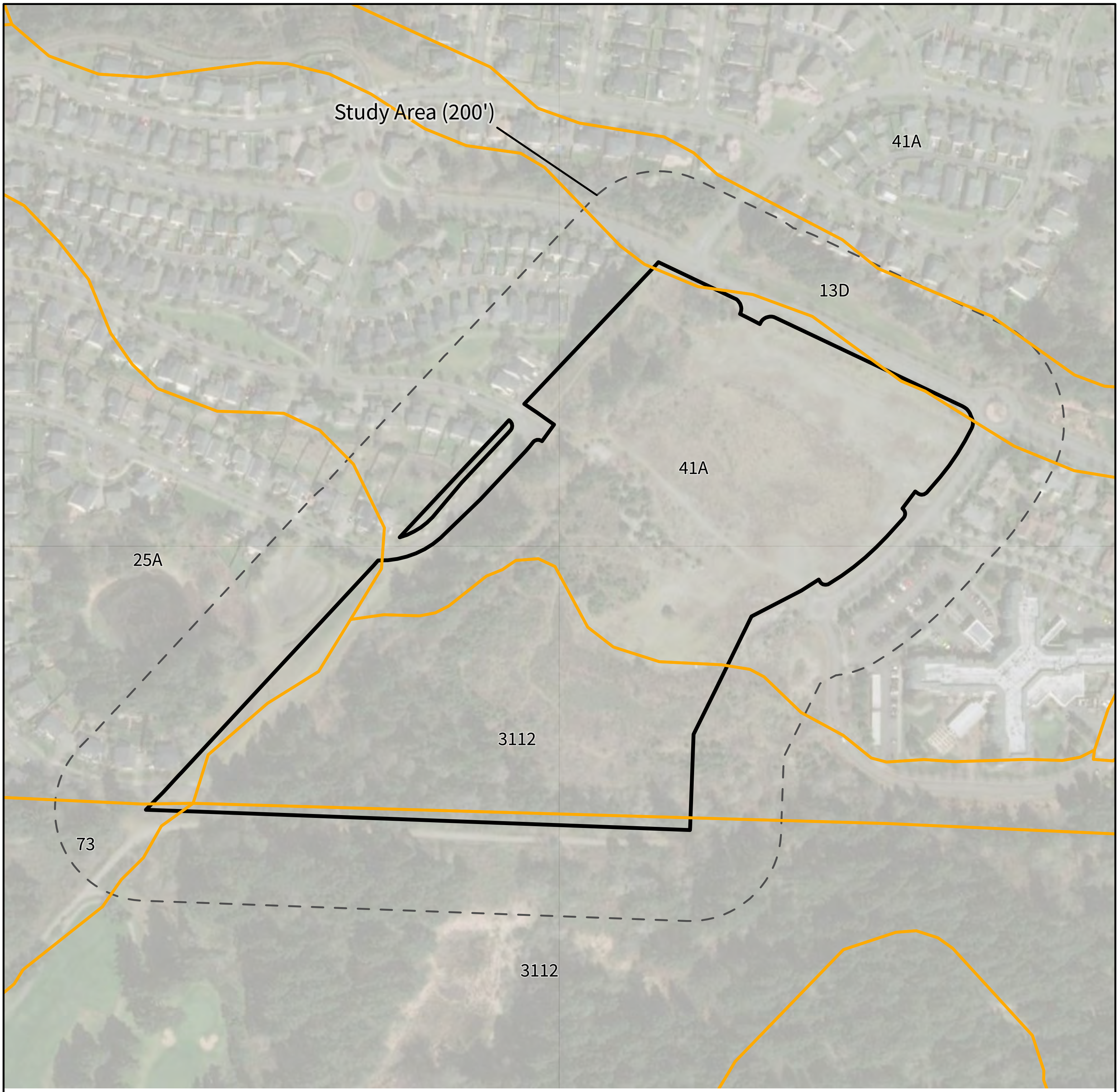
VICINITY MAP
Careage Property (Parcels 0119341004 & 0119341005)
Existing Conditions Report
McNeil Street, DuPont, Washington

0071
MAR 2022

FIGURE 1



Soil Map Units Within Study Area - All not hydric
13D - Everett very gravelly sandy loam, 15 - 30% slopes
25A - Nisqually loamy sand
41A - Spanaway gravelly sandy loam
73 - Nisqually loamy fine sand, 0 - 3% slopes
3112 - Everett-Spanaway-Spana complex, 0 - 30% slopes

SOURCE: ESRI AERIAL IMAGERY

wet.land

WEBSOIL SURVEY MAP
Careage Property (Parcels 0119341004 & 0119341005)
Existing Conditions Report
McNeil Street, DuPont, Washington

0071
MAR 2022

FIGURE 2

NWI Mapped Wetlands Within Study Area
PEM1/UBF - Palustrine emergent persistent/unconsolidated bottom, permanently flooded

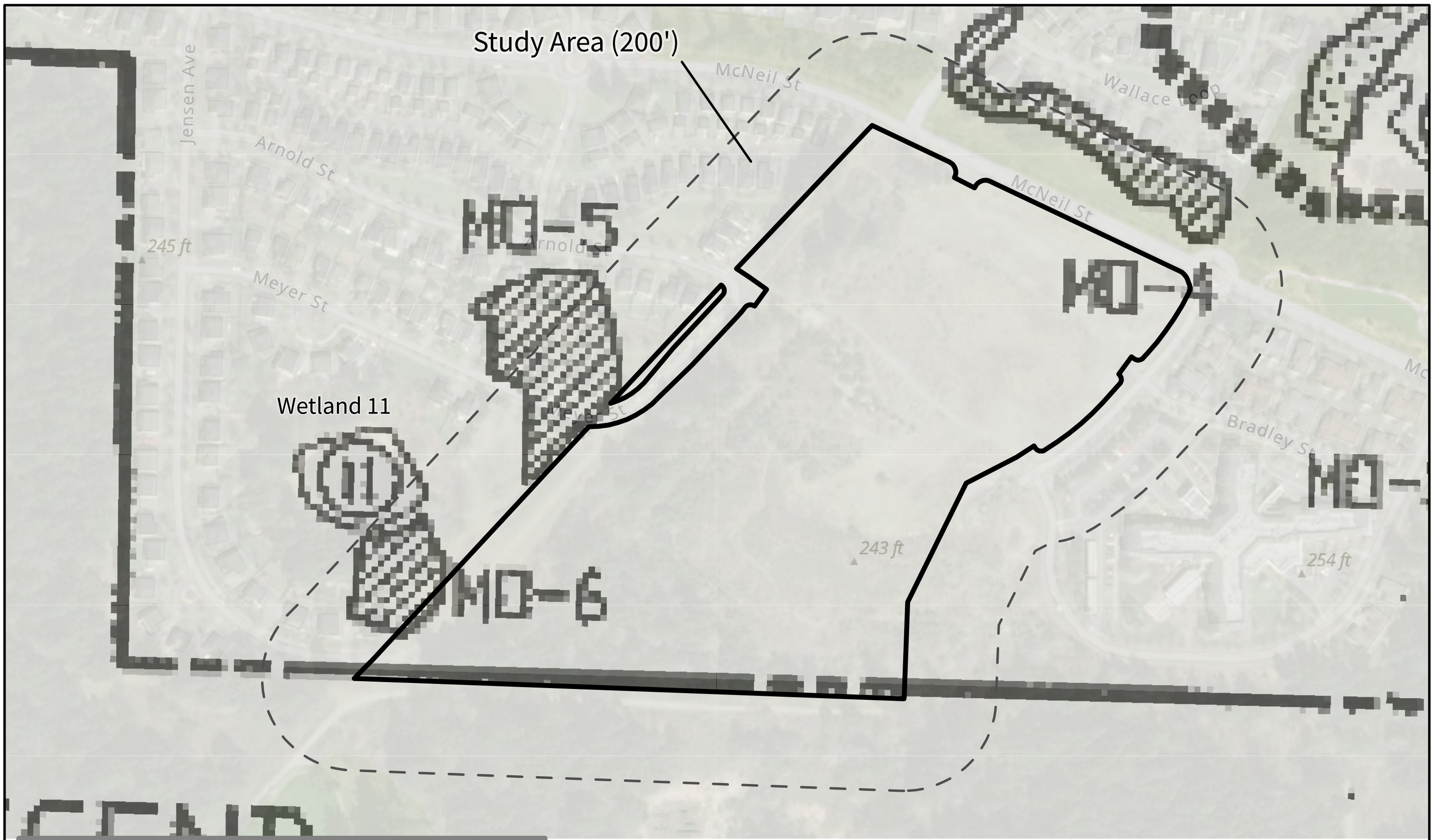
SOURCE: ESRI AERIAL IMAGERY

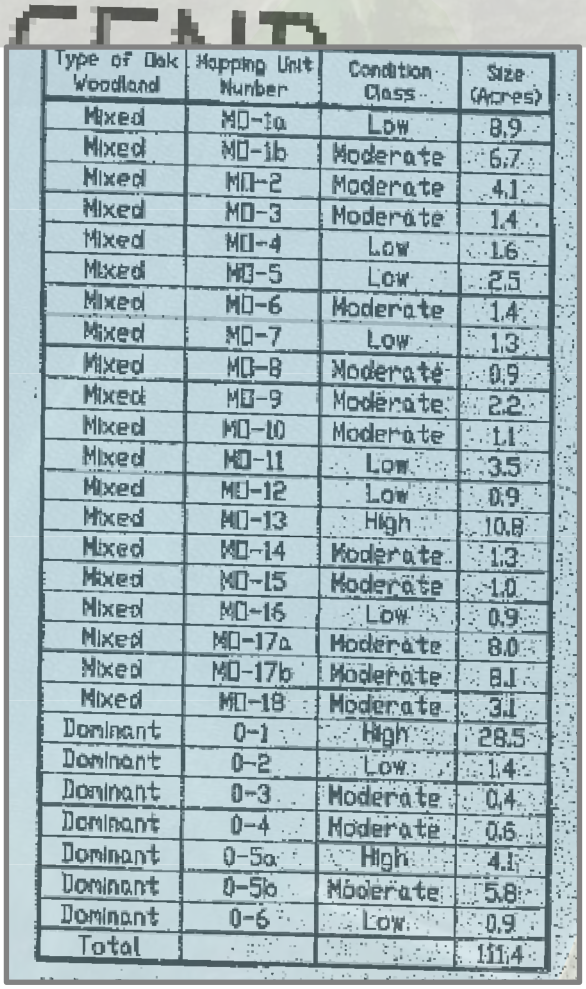
wet.land

NATIONAL WETLAND INVENTORY MAP
Careage Property (Parcels 0119341004 & 0119341005)
Existing Conditions Report
McNeil Street, DuPont, Washington

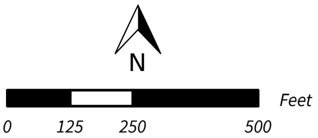
0071
MAR 2022

FIGURE 3





Type of Oak Woodland	Mapping Unit Number	Condition Class	Size (Acres)
Mixed	MD-1a	Low	8.9
Mixed	MD-1b	Moderate	6.7
Mixed	MD-2	Moderate	4.1
Mixed	MD-3	Moderate	1.4
Mixed	MD-4	Low	1.6
Mixed	MD-5	Low	2.5
Mixed	MD-6	Moderate	1.4
Mixed	MD-7	Low	1.3
Mixed	MD-8	Moderate	0.9
Mixed	MD-9	Moderate	2.2
Mixed	MD-10	Moderate	1.1
Mixed	MD-11	Low	3.5
Mixed	MD-12	Low	0.9
Mixed	MD-13	High	10.8
Mixed	MD-14	Moderate	1.3
Mixed	MD-15	Moderate	1.0
Mixed	MD-16	Low	0.9
Mixed	MD-17a	Moderate	8.0
Mixed	MD-17b	Moderate	8.1
Mixed	MD-18	Moderate	3.1
Dominant	0-1	High	28.5
Dominant	0-2	Low	1.4
Dominant	0-3	Moderate	0.4
Dominant	0-4	Moderate	0.6
Dominant	0-5a	High	4.1
Dominant	0-5b	Moderate	5.8
Dominant	0-6	Low	0.9
Total			111.4



SOURCE: JONES AND STOKES ASSOCIATES, EXHIBIT A OAK TREE MAP

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OAK MANAGEMENT MAPPING UNITS

Careage Property (Parcels 0119341004 & 0119341005)
Existing Conditions Report
McNeil Street, DuPont, Washington

0071
MAR 2022
FIGURE 4

LEGEND

Study Area (200')	🟩 Wetlands
Careage Property	Wetland Buffers (75')
0.5-ft Contours	Oak Trees Observed (Not Surveyed)

N

0 100 200 400 Feet

SOURCE: ESRI AERIAL IMAGERY

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EXISTING CONDITIONS MAP

Careage Property (Parcels 0119341004 & 0119341005)
Existing Conditions Report
McNeil Street, DuPont, Washington

0071
MAR 2022

FIGURE 5

APPENDIX C

Agency Database Results

Agency Database Websites

Database	Agency (Database Manager)	Website
Township, Range, Section Map	WSDOT	https://www.arcgis.com/home/webmap/viewer.html?useExisting=1&layers=97a5ae98d8d04458860f64e201d155c4
Watershed Boundaries	ECY	https://www.arcgis.com/home/webmap/viewer.html?url=https%3A%2F%2Fhydro.nationalmap.gov%2Farcgis%2Frest%2Fservices%2Fwbd%2FMapServer&source=sd
Websoils	NRCS	https://websoilsurvey.sc.egov.usda.gov/App/WebSoilSurvey.aspx
National Wetlands Inventory	USFWS	https://www.fws.gov/wetlands/data/Mapper.html
Washington State Water Quality Atlas	ECY	https://apps.ecology.wa.gov/waterqualityatlas/wqa/map
Priority Habitats and Species (PHS)	WDFW	https://geodataservices.wdfw.wa.gov/hp/phs/
Forest Practices Application Mapping Tool	WDNR	https://fpamt.dnr.wa.gov/default.aspx
Statewide Integrated Fish Distribution (SWIFD) Web Map	NWIFC	https://geo.nwifc.org/swifd/
SalmonScape	WDFW	https://apps.wdfw.wa.gov/salmonscape/map.html
Washington State Fish Passage	WDFW	https://geodataservices.wdfw.wa.gov/hp/fishpassage/index.html
StreamNet Mapper	The Pacific States Marine Fisheries Mapper	https://psmfc.maps.arcgis.com/apps/webappviewer/index.html?id=3be91b0a32a9488a901c3885bbfc2b0b

Priority Habitats and Species on the Web

Buffer radius: 200 Feet

Report Date: 03/03/2022

PHS Species/Habitats Overview:

Occurence Name	Federal Status	State Status	Sensitive Location
Wetlands	N/A	N/A	No
Waterfowl Concentrations	N/A	N/A	No
Freshwater Emergent Wetland	N/A	N/A	No
Big brown bat	N/A	N/A	Yes
Little Brown Bat	N/A	N/A	Yes
Yuma myotis	N/A	N/A	Yes

PHS Species/Habitats Details:

Wetlands	
Priority Area	Aquatic Habitat
Site Name	SEQUALICHEW CREEK WETLANDS
Accuracy	1/4 mile (Quarter Section)
Notes	WETLANDS ASSOCIATED WITH SEQUALICHEW CREEK DRAINAGE WHICH PROVIDE SIGNIFICANT WINTERING WATERFOWL HABITAT AND GENERAL WILDLIFE HABITAT.
Source Record	902594
Source Dataset	PHSREGION
Source Name	NAUER, DON, WDW
Source Entity	WA Dept. of Fish and Wildlife
Federal Status	N/A
State Status	N/A
PHS Listing Status	PHS Listed Occurrence
Sensitive	N
SGCN	N
Display Resolution	AS MAPPED
ManagementRecommendations	http://www.ecy.wa.gov/programs/sea/wetlands/bas/index.html
Geometry Type	Polygons

Waterfowl Concentrations	
Priority Area	Regular Concentration
Site Name	PIERCE COUNTY - NON-AGRICULTURAL
Accuracy	1/4 mile (Quarter Section)
Notes	LARGE REGULAR WATERFOWL CONCENTRATION AREAS, NON AGRICULTURAL IN PIERCE COUNTY.
Source Record	902562
Source Dataset	PHSREGION
Source Name	NAUER, DON
Source Entity	WA Dept. of Fish and Wildlife
Federal Status	N/A
State Status	N/A
PHS Listing Status	PHS LISTED OCCURRENCE
Sensitive	N
SGCN	N
Display Resolution	AS MAPPED
ManagementRecommendations	http://wdfw.wa.gov/publications/pub.php?id=00026
Geometry Type	Polygons

Freshwater Emergent Wetland	
Priority Area	Aquatic Habitat
Site Name	N/A
Accuracy	NA
Notes	Wetland System: Freshwater Emergent Wetland - NWI Code: PEM1/UBF
Source Dataset	NWIWetlands
Source Name	Not Given
Source Entity	US Fish and Wildlife Service
Federal Status	N/A
State Status	N/A
PHS Listing Status	PHS Listed Occurrence
Sensitive	N
SGCN	N
Display Resolution	AS MAPPED
ManagementRecommendations	http://www.ecy.wa.gov/programs/sea/wetlands/bas/index.html
Geometry Type	Polygons

Freshwater Emergent Wetland	
Priority Area	Aquatic Habitat
Site Name	N/A
Accuracy	NA
Notes	Wetland System: Freshwater Emergent Wetland - NWI Code: PEM1/UBF
Source Dataset	NWIWetlands
Source Name	Not Given
Source Entity	US Fish and Wildlife Service
Federal Status	N/A
State Status	N/A
PHS Listing Status	PHS Listed Occurrence
Sensitive	N
SGCN	N
Display Resolution	AS MAPPED
ManagementRecommendations	http://www.ecy.wa.gov/programs/sea/wetlands/bas/index.html
Geometry Type	Polygons

Big brown bat	
Scientific Name	*Eptesicus fuscus*
Notes	This polygon mask represents one or more records of the above species or habitat occurrence. Contact PHS Data Release (360-902-2543) for obtaining information about masked sensitive species and habitats.
Federal Status	N/A
State Status	N/A
PHS Listing Status	PHS Listed Occurrence
Sensitive	Y
SGCN	N
Display Resolution	TOWNSHIP
ManagementRecommendations	http://wdfw.wa.gov/publications/pub.php?id=00605

Little Brown Bat	
Scientific Name	*Myotis lucifugus*
Notes	This polygon mask represents one or more records of the above species or habitat occurrence. Contact PHS Data Release (360-902-2543) for obtaining information about masked sensitive species and habitats.
Federal Status	N/A
State Status	N/A
PHS Listing Status	PHS Listed Occurrence
Sensitive	Y
SGCN	N
Display Resolution	TOWNSHIP
ManagementRecommendations	http://wdfw.wa.gov/publications/pub.php?id=00605

Yuma myotis	
Scientific Name	*Myotis yumanensis*
Notes	This polygon mask represents one or more records of the above species or habitat occurrence. Contact PHS Data Release (360-902-2543) for obtaining information about masked sensitive species and habitats.
Federal Status	N/A
State Status	N/A
PHS Listing Status	PHS Listed Occurrence
Sensitive	Y
SGCN	N
Display Resolution	TOWNSHIP
ManagementRecommendations	http://wdfw.wa.gov/publications/pub.php?id=00605

RATING SUMMARY – Western Washington

Name of wetland (or ID #): Wetland A Date of site visit: 2/23/2022

Rated by JM/KN Trained by Ecology? ☑ Yes ☐ No Date of training Mar-16

HGM Class used for rating Depressional Wetland has multiple HGM classes? ☐ Yes ☑ No

NOTE: Form is not complete with out the figures requested (*figures can be combined*).

Source of base aerial photo/map ESRI aerial imagery

OVERALL WETLAND CATEGORY III (based on functions ☑ or special characteristics ☐)

1. Category of wetland based on FUNCTIONS

___ **Category** I - Total score = 23 - 27
___ **Category** II - Total score = 20 - 22
X **Category** III - Total score = 16 - 19
___ **Category** IV - Total score = 9 - 15

FUNCTION	**Improving Water Quality**	**Hydrologic**	**Habitat**	
List appropriate rating (H, M, L)				
Site Potential	M	M	M	
Landscape Potential	M	M	L	
Value	L	M	H	**Total**
Score Based on Ratings	5	6	6	**17**

Score for each function based on three ratings
(*order of ratings is not important*)

9 = H, H, H
8 = H, H, M
7 = H, H, L
7 = H, M, M
6 = H, M, L
6 = M, M, M
5 = H, L, L
5 = M, M, L
4 = M, L, L
3 = L, L, L

2. Category based on SPECIAL CHARACTERISTICS of wetland

CHARACTERISTIC	**Category**
Estuarine	
Wetland of High Conservation Value	
Bog	
Mature Forest	
Old Growth Forest	
Coastal Lagoon	
Interdunal	
None of the above	

Maps and Figures required to answer questions correctly for Western Washington

Depressional Wetlands

Map of:	To answer questions:	Figure #
Cowardin plant classes	D 1.3, H 1.1, H 1.4	
Hydroperiods	D 1.4, H 1.2	
Location of outlet (*can be added to map of hydroperiods*)	D 1.1, D 4.1	
Boundary of area within 150 ft of the wetland (*can be added to another figure*)	D 2.2, D 5.2	
Map of the contributing basin	D 4.3, D 5.3	
1 km Polygon: Area that extends 1 km from entire wetland edge - including polygons for accessible habitat and undisturbed habitat	H 2.1, H 2.2, H 2.3	
Screen capture of map of 303(d) listed waters in basin (from Ecology website)	D 3.1, D 3.2	
Screen capture of list of TMDLs for WRIA in which unit is found (from web)	D 3.3	

Riverine Wetlands

Map of:	To answer questions:	Figure #
Cowardin plant classes	H 1.1, H 1.4	
Hydroperiods	H 1.2	
Ponded depressions	R 1.1	
Boundary of area within 150 ft of the wetland (*can be added to another figure*)	R 2.4	
Plant cover of trees, shrubs, and herbaceous plants	R 1.2, R 4.2	
Width of unit vs. width of stream (*can be added to another figure*)	R 4.1	
Map of the contributing basin	R 2.2, R 2.3, R 5.2	
1 km Polygon: Area that extends 1 km from entire wetland edge - including polygons for accessible habitat and undisturbed habitat	H 2.1, H 2.2, H 2.3	
Screen capture of map of 303(d) listed waters in basin (from Ecology website)	R 3.1	
Screen capture of list of TMDLs for WRIA in which unit is found (from web)	R 3.2, R 3.3	

Lake Fringe Wetlands

Map of:	To answer questions:	Figure #
Cowardin plant classes	L 1.1, L 4.1, H 1.1, H 1.4	
Plant cover of trees, shrubs, and herbaceous plants	L 1.2	
Boundary of area within 150 ft of the wetland (*can be added to another figure*)	L 2.2	
1 km Polygon: Area that extends 1 km from entire wetland edge - including polygons for accessible habitat and undisturbed habitat	H 2.1, H 2.2, H 2.3	
Screen capture of map of 303(d) listed waters in basin (from Ecology website)	L 3.1, L 3.2	
Screen capture of list of TMDLs for WRIA in which unit is found (from web)	L 3.3	

Slope Wetlands

Map of:	To answer questions:	Figure #
Cowardin plant classes	H 1.1, H 1.4	
Hydroperiods	H 1.2	
Plant cover of **dense** trees, shrubs, and herbaceous plants	S 1.3	
Plant cover of **dense, rigid** trees, shrubs, and herbaceous plants (*can be added to another figure*)	S 4.1	
Boundary of area within 150 ft of the wetland (*can be added to another figure*)	S 2.1, S 5.1	
1 km Polygon: Area that extends 1 km from entire wetland edge - including polygons for accessible habitat and undisturbed habitat	H 2.1, H 2.2, H 2.3	
Screen capture of map of 303(d) listed waters in basin (from Ecology website)	S 3.1, S 3.2	
Screen capture of list of TMDLs for WRIA in which unit is found (from web)	S 3.3	

HGM Classification of Wetland in Western Washington

For questions 1 -7, the criteria described must apply to the entire unit being rated.
If hydrologic criteria listed in each question do not apply to the entire unit being rated, you probably have a unit with multiple HGM classes. In this case, identify which hydrologic criteria in questions 1 - 7 apply, and go to Question 8.

1. Are the water levels in the entire unit usually controlled by tides except during floods?

☑ NO - go to 2 ☐ **YES** - the wetland class is **Tidal Fringe** - go to 1.1

1.1 Is the salinity of the water during periods of annual low flow below 0.5 ppt (parts per thousand)?

☐ **NO - Saltwater Tidal Fringe (Estuarine)** ☐ **YES - Freshwater Tidal Fringe**

If your wetland can be classified as a Freshwater Tidal Fringe use the forms for ***Riverine*** *wetlands. If it is Saltwater Tidal Fringe it is an* ***Estuarine*** *wetland and is not scored. This method* ***cannot*** *be used to score functions for estuarine wetlands.*

2. The entire wetland unit is flat and precipitation is the only source (>90%) of water to it.
Groundwater and surface water runoff are NOT sources of water to the unit.

☑ NO - go to 3 ☐ **YES** - The wetland class is **Flats**

If your wetland can be classified as a Flats wetland, use the form for ***Depressional*** *wetlands.*

3. Does the entire wetland unit **meet all** of the following criteria?

☐ The vegetated part of the wetland is on the shores of a body of permanent open water (without any plants on the surface at any time of the year) at least 20 ac (8 ha) in size;

☐ At least 30% of the open water area is deeper than 6.6 ft (2 m).

☑ NO - go to 4 ☐ **YES** - The wetland class is **Lake Fringe** (Lacustrine Fringe)

4. Does the entire wetland unit **meet all** of the following criteria?

☐ The wetland is on a slope (*slope can be very gradual*),

☐ The water flows through the wetland in one direction (unidirectional) and usually comes from seeps. It may flow subsurface, as sheetflow, or in a swale without distinct banks.

☐ The water leaves the wetland **without being impounded.**

☑ NO - go to 5 ☐ **YES** - The wetland class is **Slope**

NOTE: Surface water does not pond in these type of wetlands except occasionally in very small and shallow depressions or behind hummocks (depressions are usually <3 ft diameter and less than 1 ft deep).

5. Does the entire wetland unit **meet all** of the following criteria?

☐ The unit is in a valley, or stream channel, where it gets inundated by overbank flooding from that stream or river,

☐ The overbank flooding occurs at least once every 2 years.

☑ NO - go to 6 ☐ **YES** - The wetland class is **Riverine**

NOTE: The Riverine unit can contain depressions that are filled with water when the river is not flooding.

6. Is the entire wetland unit in a topographic depression in which water ponds, or is saturated to the surface, at some time during the year? *This means that any outlet, if present, is higher than the interior of the wetland.*

☐ NO - go to 7 ☑ **YES** - The wetland class is **Depressional**

7. Is the entire wetland unit located in a very flat area with no obvious depression and no overbank flooding? The unit does not pond surface water more than a few inches. The unit seems to be maintained by high groundwater in the area. The wetland may be ditched, but has no obvious natural outlet.

☐ NO - go to 8 ☐ **YES** - The wetland class is **Depressional**

8. Your wetland unit seems to be difficult to classify and probably contains several different HGM classes. For example, seeps at the base of a slope may grade into a riverine floodplain, or a small stream within a Depressional wetland has a zone of flooding along its sides. GO BACK AND IDENTIFY WHICH OF THE HYDROLOGIC REGIMES DESCRIBED IN QUESTIONS 1-7 APPLY TO DIFFERENT AREAS IN THE UNIT (make a rough sketch to help you decide). Use the following table to identify the appropriate class to use for the rating system if you have several HGM classes present within the wetland unit being scored.

NOTE: Use this table only if the class that is recommended in the second column represents 10% or more of the total area of the wetland unit being rated. If the area of the HGM class listed in column 2 is less than 10% of the unit; classify the wetland using the class that represents more than 90% of the total area.

HGM classes within the wetland unit being rated	HGM class to use in rating
Slope + Riverine	Riverine
Slope + Depressional	Depressional
Slope + Lake Fringe	Lake Fringe
Depressional + Riverine along stream within boundary of depression	Depressional
Depressional + Lake Fringe	Depressional
Riverine + Lake Fringe	Riverine
Salt Water Tidal Fringe and any other class of freshwater wetland	Treat as ESTUARINE

If you are still unable to determine which of the above criteria apply to your wetland, or if you have ***more than 2 HGM classes*** *within a wetland boundary, classify the wetland as Depressional for the rating.*

NOTES and FIELD OBSERVATIONS:

DEPRESSIONAL AND FLATS WETLANDS

Water Quality Functions - Indicators that the site functions to improve water quality

D 1.0. Does the site have the potential to improve water quality?	
D 1.1. Characteristics of surface water outflows from the wetland: Wetland is a depression or flat depression (QUESTION 7 on key) with no surface water leaving it (no outlet). points = 3 Wetland has an intermittently flowing stream or ditch, OR highly constricted permanently flowing outlet. points = 2 ☑ Wetland has an unconstricted, or slightly constricted, surface outlet that is permanently flowing points = 1 ☐ Wetland is a flat depression (QUESTION 7 on key), whose outlet is a permanently flowing ditch. points = 1	1
D 1.2. The soil 2 in below the surface (or duff layer) is true clay or true organic (*use NRCS definitions*). Yes = 4 No = 0	0
D 1.3. Characteristics and distribution of persistent plants (Emergent, Scrub-shrub, and/or Forested Cowardin classes): Wetland has persistent, ungrazed, plants > 95% of area points = 5 Wetland has persistent, ungrazed, plants > ½ of area points = 3 Wetland has persistent, ungrazed plants > $^1/_{10}$ of area points = 1 Wetland has persistent, ungrazed plants < $^1/_{10}$ of area points = 0	3
D 1.4. Characteristics of seasonal ponding or inundation: *This is the area that is ponded for at least 2 months. See description in manual.* Area seasonally ponded is > ½ total area of wetland points = 4 Area seasonally ponded is > ¼ total area of wetland points = 2 Area seasonally ponded is < ¼ total area of wetland points = 0	4
Total for D 1 Add the points in the boxes above	**8**

Rating of Site Potential If score is: ☐ **12 - 16 = H** ☑ **6 - 11 = M** ☐ **0 - 5 = L** *Record the rating on the first page*

D 2.0. Does the landscape have the potential to support the water quality function of the site?	
D 2.1. Does the wetland unit receive stormwater discharges? Yes = 1 No = 0	0
D 2.2. Is > 10% of the area within 150 ft of the wetland in land uses that generate pollutants? Yes = 1 No = 0	1
D 2.3. Are there septic systems within 250 ft of the wetland? Yes = 1 No = 0	0
D 2.4. Are there other sources of pollutants coming into the wetland that are not listed in questions D 2.1 - D 2.3? Source Yes = 1 No = 0	0
Total for D 2 Add the points in the boxes above	**1**

Rating of Landscape Potential If score is:☐ **3 or 4 = H** ☑ **1 or 2 = M**☐ **0 = L** *Record the rating on the first page*

D 3.0. Is the water quality improvement provided by the site valuable to society?	
D 3.1. Does the wetland discharge directly (i.e., within 1 mi) to a stream, river, lake, or marine water that is on the 303(d) list? Yes = 1 No = 0	0
D 3.2. Is the wetland in a basin or sub-basin where an aquatic resource is on the 303(d) list? Yes = 1 No = 0	0
D 3.3. Has the site been identified in a watershed or local plan as important for maintaining water quality (*answer YES if there is a TMDL for the basin in which the unit is found*)? Yes = 2 No = 0	0
Total for D 3 Add the points in the boxes above	**0**

Rating of Value If score is:☐ **2 - 4 = H** ☐ **1 = M** ☑ **0 = L** *Record the rating on the first page*

Wetland name or number _A_

DEPRESSIONAL AND FLATS WETLANDS

Hydrologic Functions - Indicators that the site functions to reduce flooding and stream degradation

D 4.0. Does the site have the potential to reduce flooding and erosion?	
D 4.1. Characteristics of surface water outflows from the wetland: Wetland is a depression or flat depression with no surface water leaving it (no outlet) points = 4 Wetland has an intermittently flowing stream or ditch, OR highly constricted permanently flowing outlet points = 2 Wetland is a flat depression (QUESTION 7 on key), whose outlet is a permanently flowing ditch points = 1 Wetland has an unconstricted, or slightly constricted, surface outlet that is permanently flowing points = 0	1
D 4.2. Depth of storage during wet periods: *Estimate the height of ponding above the bottom of the outlet. For wetlands with no outlet, measure from the surface of permanent water or if dry, the deepest part.* Marks of ponding are 3 ft or more above the surface or bottom of outlet points = 7 Marks of ponding between 2 ft to < 3 ft from surface or bottom of outlet points = 5 ☐ Marks are at least 0.5 ft to < 2 ft from surface or bottom of outlet points = 3 ☐ The wetland is a “headwater” wetland points = 3 Wetland is flat but has small depressions on the surface that trap water points = 1 Marks of ponding less than 0.5 ft (6 in) points = 0	7
D 4.3. Contribution of the wetland to storage in the watershed: *Estimate the ratio of the area of upstream basin contributing surface water to the wetland to the area of the wetland unit itself.* ☐ The area of the basin is less than 10 times the area of the unit points = 5 The area of the basin is 10 to 100 times the area of the unit points = 3 The area of the basin is more than 100 times the area of the unit points = 0 ☐ Entire wetland is in the Flats class points = 5	3
Total for D 4 Add the points in the boxes above	**11**

Rating of Site Potential If score is: ☐ **12 - 16 = H** ☑ **6 - 11 = M** ☐ **0 - 5 = L** *Record the rating on the first page*

D 5.0. Does the landscape have the potential to support hydrologic function of the site?	
D 5.1. Does the wetland unit receive stormwater discharges? Yes = 1 No = 0	0
D 5.2. Is > 10% of the area within 150 ft of the wetland in land uses that generate excess runoff? Yes = 1 No = 0	0
D 5.3. Is more than 25% of the contributing basin of the wetland covered with intensive human land uses (residential at >1 residence/ac, urban, commercial, agriculture, etc.)? Yes = 1 No = 0	1
Total for D 5 Add the points in the boxes above	**1**

Rating of Landscape Potential If score is: ☐ **3 = H** ☑ **1 or 2 = M** ☐ **0 = L** *Record the rating on the first page*

D 6.0. Are the hydrologic functions provided by the site valuable to society?	
D 6.1. The unit is in a landscape that has flooding problems. *Choose the description that best matches conditions around the wetland unit being rated. Do not add points. <u>Choose the highest score if more than one condition is met.</u>* The wetland captures surface water that would otherwise flow down-gradient into areas where flooding has damaged human or natural resources (e.g., houses or salmon redds): • Flooding occurs in a sub-basin that is immediately down-gradient of unit. points = 2 ☐ • Surface flooding problems are in a sub-basin farther down-gradient. points = 1 ☐ Flooding from groundwater is an issue in the sub-basin. points = 1 ☐ The existing or potential outflow from the wetland is so constrained by human or natural conditions that the water stored by the wetland cannot reach areas that flood. Explain why points = 0 ☐ There are no problems with flooding downstream of the wetland. points = 0	1
D 6.2. Has the site been identified as important for flood storage or flood conveyance in a regional flood control plan? Yes = 2 No = 0	0
Total for D 6 Add the points in the boxes above	**1**

Rating of Value If score is: ☐ **2 - 4 = H** ☑ **1 = M** ☐ **0 = L** *Record the rating on the first page*

These questions apply to wetlands of all HGM classes.

HABITAT FUNCTIONS - Indicators that site functions to provide important habitat

H 1.0. Does the site have the potential to provide habitat?

H 1.1. Structure of plant community: *Indicators are Cowardin classes and strata within the Forested class.* Check the Cowardin plant classes in the wetland. *Up to 10 patches may be combined for each class to meet the threshold of ¼ ac or more than 10% of the unit if it is smaller than 2.5 ac. Add the number of structures checked.*

- ☑ Aquatic bed
- ☑ Emergent
- ☐ Scrub-shrub (areas where shrubs have > 30% cover)
- ☐ Forested (areas where trees have > 30% cover)

If the unit has a Forested class, check if:

- ☐ The Forested class has 3 out of 5 strata (canopy, sub-canopy, shrubs, herbaceous, moss/ground-cover) that each cover 20% within the Forested polygon

4 structures or more: points = 4
3 structures: points = 2
2 structures: points - 1
1 structure: points = 0

1

H 1.2. Hydroperiods
Check the types of water regimes (hydroperiods) present within the wetland. The water regime has to cover more than 10% of the wetland or ¼ ac to count (*see text for descriptions of hydroperiods*).

- ☑ Permanently flooded or inundated
- ☑ Seasonally flooded or inundated
- ☑ Occasionally flooded or inundated
- ☑ Saturated only
- ☐ Permanently flowing stream or river in, or adjacent to, the wetland
- ☐ Seasonally flowing stream in, or adjacent to, the wetland
- ☐ **Lake Fringe wetland** **2 points**
- ☐ **Freshwater tidal wetland** **2 points**

4 or more types present: points = 3
3 types present: points = 2
2 types present: points = 1
1 types present: points = 0

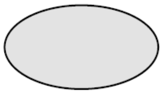
3

H 1.3. Richness of plant species
Count the number of plant species in the wetland that cover at least 10 ft^2.
Different patches of the same species can be combined to meet the size threshold and you do not have to name the species. ***Do not include Eurasian milfoil, reed canarygrass, purple loosestrife, Canadian thistle***

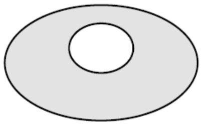
If you counted:	> 19 species	points = 2
	5 - 19 species	points = 1
	< 5 species	points = 0

1

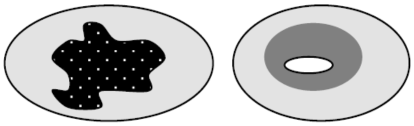
H 1.4. Interspersion of habitats
Decide from the diagrams below whether interspersion among Cowardin plants classes (described in H 1.1), or the classes and unvegetated areas (can include open water or mudflats) is high, moderate, low, or none. *If you have four or more plant classes or three classes and open water, the rating is always high.*



None = 0 points

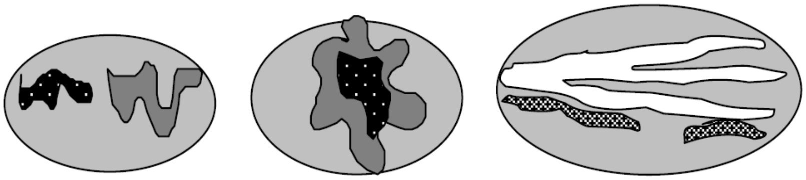


Low = 1 point



Moderate = 2 points

All three diagrams in this row are **HIGH** = 3 points



1

H 1.5. Special habitat features: Check the habitat features that are present in the wetland. *The number of checks is the number of points.* ☐ Large, downed, woody debris within the wetland (> 4 in diameter and 6 ft long) ☐ Standing snags (dbh > 4 in) within the wetland ☐ Undercut banks are present for at least 6.6 ft (2 m) **and/or** overhanging plants extends at least 3.3 ft (1 m) over a stream (or ditch) in, or contiguous with the wetland, for at least 33 ft (10 m) ☐ Stable steep banks of fine material that might be used by beaver or muskrat for denning (> 30 degree slope) OR signs of recent beaver activity are present (*cut shrubs or trees that have not yet weathered where wood is exposed*) ☑ At least ¼ ac of thin-stemmed persistent plants or woody branches are present in areas that are permanently or seasonally inundated (*structures for egg-laying by amphibians*) ☐ Invasive plants cover less than 25% of the wetland area in every stratum of plants (*see H 1.1 for list of strata*)	1
Total for H 1 Add the points in the boxes above	**7**

Rating of Site Potential If Score is: ☐ **15 - 18 = H** ☑ **7 - 14 = M** ☐ **0 - 6 = L** *Record the rating on the first page*

H 2.0. Does the landscape have the potential to support the habitat function of the site?	
H 2.1 Accessible habitat (include *only habitat that directly abuts wetland unit*). *Calculate:* 5.4 % undisturbed habitat + (2.8 % moderate & low intensity land uses / 2) = 6.8% If total accessible habitat is: > $^1/_3$ (33.3%) of 1 km Polygon points = 3 20 - 33% of 1 km Polygon points = 2 10 - 19% of 1 km Polygon points = 1 < 10 % of 1 km Polygon points = 0	0
H 2.2. Undisturbed habitat in 1 km Polygon around the wetland. *Calculate:* 15 % undisturbed habitat + (10.7 % moderate & low intensity land uses / 2) = 20.35% Undisturbed habitat > 50% of Polygon points = 3 Undisturbed habitat 10 - 50% and in 1-3 patches points = 2 Undisturbed habitat 10 - 50% and > 3 patches points = 1 Undisturbed habitat < 10% of 1 km Polygon points = 0	1
H 2.3 Land use intensity in 1 km Polygon: If > 50% of 1 km Polygon is high intensity land use points = (-2) ≤ 50% of 1km Polygon is high intensity points = 0	-2
Total for H 2 Add the points in the boxes above	**-1**

Rating of Landscape Potential If Score is: ☐ **4 - 6 = H** ☐ **1 - 3 = M** ☑ **< 1 = L** *Record the rating on the first page*

H 3.0. Is the habitat provided by the site valuable to society?	
H 3.1. Does the site provide habitat for species valued in laws, regulations, or policies? *Choose only the highest score that applies to the wetland being rated*. Site meets ANY of the following criteria: points = 2 ☐ It has 3 or more priority habitats within 100 m (see next page) ☐ It provides habitat for Threatened or Endangered species (any plant or animal on the state or federal lists) ☑ It is mapped as a location for an individual WDFW priority species ☐ It is a Wetland of High Conservation Value as determined by the Department of Natural Resources ☐ It has been categorized as an important habitat site in a local or regional comprehensive plan, in a Shoreline Master Plan, or in a watershed plan Site has 1 or 2 priority habitats (listed on next page) with in 100m points = 1 Site does not meet any of the criteria above points = 0	2

Rating of Value If Score is: ☑ **2 = H** ☐ **1 = M** ☐ **0 = L** *Record the rating on the first page*

WDFW Priority Habitats

Priority habitats listed by WDFW (see complete descriptions of WDFW priority habitats, and the counties in which they can be found, in: Washington Department of Fish and Wildlife. 2008. Priority Habitat and Species List. Olympia, Washington. 177 pp. http://wdfw.wa.gov/publications/00165/wdfw00165.pdf or access the list from here: http://wdfw.wa.gov/conservation/phs/list/

Count how many of the following priority habitats are within 330 ft (100 m) of the wetland unit: ***NOTE****: This question is independent of the land use between the wetland unit and the priority habitat.*

☐ **Aspen Stands**: Pure or mixed stands of aspen greater than 1 ac (0.4 ha).

☐ **Biodiversity Areas and Corridors**: Areas of habitat that are relatively important to various species of native fish and wildlife (*full descriptions in WDFW PHS report*).

☐ **Herbaceous Balds**: Variable size patches of grass and forbs on shallow soils over bedrock.

☐ **Old-growth/Mature forests**: Old-growth west of Cascade crest – Stands of at least 2 tree species, forming a multi-layered canopy with occasional small openings; with at least 8 trees/ac (20 trees/ha) > 32 in (81 cm) dbh or > 200 years of age. Mature forests – Stands with average diameters exceeding 21 in (53 cm) dbh; crown cover may be less than 100%; decay, decadence, numbers of snags, and quantity of large downed material is generally less than that found in old-growth; 80-200 years old west of the Cascade crest.

☑ **Oregon White Oak**: Woodland stands of pure oak or oak/conifer associations where canopy coverage of the oak component is important (*full descriptions in WDFW PHS report p. 158 – see web link above*).

☐ **Riparian**: The area adjacent to aquatic systems with flowing water that contains elements of both aquatic and terrestrial ecosystems which mutually influence each other.

☐ **Westside Prairies**: Herbaceous, non-forested plant communities that can either take the form of a dry prairie or a wet prairie (*full descriptions in WDFW PHS report p. 161 – see web link above*).

☐ **Instream**: The combination of physical, biological, and chemical processes and conditions that interact to provide functional life history requirements for instream fish and wildlife resources.

☐ **Nearshore**: Relatively undisturbed nearshore habitats. These include Coastal Nearshore, Open Coast Nearshore, and Puget Sound Nearshore. (*full descriptions of habitats and the definition of relatively undisturbed are in WDFW report – see web link on previous page*).

☐ **Caves**: A naturally occurring cavity, recess, void, or system of interconnected passages under the earth in soils, rock, ice, or other geological formations and is large enough to contain a human.

☐ **Cliffs**: Greater than 25 ft (7.6 m) high and occurring below 5000 ft elevation.

☐ **Talus**: Homogenous areas of rock rubble ranging in average size 0.5 - 6.5 ft (0.15 - 2.0 m), composed of basalt, andesite, and/or sedimentary rock, including riprap slides and mine tailings. May be associated with cliffs.

☐ **Snags and Logs**: Trees are considered snags if they are dead or dying and exhibit sufficient decay characteristics to enable cavity excavation/use by wildlife. Priority snags have a diameter at breast height of > 20 in (51 cm) in western Washington and are > 6.5 ft (2 m) in height. Priority logs are > 12 in (30 cm) in diameter at the largest end, and > 20 ft (6 m) long.

Note: All vegetated wetlands are by definition a priority habitat but are not included in this list because they are addressed elsewhere.

Wetland name or number A

CATEGORIZATION BASED ON SPECIAL CHARACTERISTICS

Wetland Type | **Category**

Check off any criteria that apply to the wetland. List the category when the appropriate criteria are met.

SC 1.0. Estuarine Wetlands

Does the wetland meet the following criteria for Estuarine wetlands?

☐ The dominant water regime is tidal,
☐ Vegetated, and
☐ With a salinity greater than 0.5 ppt

☐ Yes - Go to **SC 1.1** ☑ No = **Not an estuarine wetland**

SC 1.1. Is the wetland within a National Wildlife Refuge, National Park, National Estuary Reserve, Natural Area Preserve, State Park or Educational, Environmental, or Scientific Reserve designated under WAC 332-30-151?

☐ Yes = **Category** I ☐ No - Go to **SC 1.2**

SC 1.2. Is the wetland unit at least 1 ac in size and meets at least two of the following three conditions?

☐ The wetland is relatively undisturbed (has no diking, ditching, filling, cultivation, grazing, and has less than 10% cover of non-native plant species. (If non-native species are *Spartina* , see page 25)
☐ At least ¾ of the landward edge of the wetland has a 100 ft buffer of shrub, forest, or un-grazed or un-mowed grassland.
☐ The wetland has at least two of the following features: tidal channels, depressions with open water, or contiguous freshwater wetlands.

☐ Yes = **Category** I ☐ No = **Category** II

SC 2.0. Wetlands of High Conservation Value (WHCV)

SC 2.1. Has the WA Department of Natural Resources updated their website to include the list of Wetlands of High Conservation Value?

☐ Yes - Go to **SC 2.2** ☑ No - Go to **SC 2.3**

SC 2.2. Is the wetland listed on the WDNR database as a Wetland of High Conservation Value?

☐ Yes = **Category** I ☐ No = **Not WHCV**

SC 2.3. Is the wetland in a Section/Township/Range that contains a Natural Heritage wetland?
http://www1.dnr.wa.gov/nhp/refdesk/datasearch/wnhpwetlands.pdf

☐ Yes - **Contact WNHP/WDNR and to SC 2.4** ☑ No = **Not WHCV**

SC 2.4. Has WDNR identified the wetland within the S/T/R as a Wetland of High Conservation Value and listed it on their website?

☐ Yes = **Category** I ☐ No = **Not WHCV**

SC 3.0. Bogs

Does the wetland (or any part of the unit) meet both the criteria for soils and vegetation in bogs? *Use the key below.* ***If you answer YES you will still need to rate the wetland based on its functions***.

SC 3.1. Does an area within the wetland unit have organic soil horizons, either peats or mucks, that compose 16 in or more of the first 32 in of the soil profile?

☐ Yes - Go to **SC 3.3** ☑ No - Go to **SC 3.2**

SC 3.2. Does an area within the wetland unit have organic soils, either peats or mucks, that are less than 16 in deep over bedrock, or an impermeable hardpan such as clay or volcanic ash, or that are floating on top of a lake or pond?

☐ Yes - Go to **SC 3.3** ☑ No = **Is not a bog**

SC 3.3. Does an area with peats or mucks have more than 70% cover of mosses at ground level, AND at least a 30% cover of plant species listed in Table 4?

☐ Yes = **Is a Category** I **bog** ☐ No - Go to **SC 3.4**

NOTE: If you are uncertain about the extent of mosses in the understory, you may substitute that criterion by measuring the pH of the water that seeps into a hole dug at least 16 in deep. If the pH is less than 5.0 and the plant species in Table 4 are present, the wetland is a bog.

SC 3.4. Is an area with peats or mucks forested (> 30% cover) with Sitka spruce, subalpine fir, western red cedar, western hemlock, lodgepole pine, quaking aspen, Engelmann spruce, or western white pine, AND any of the species (or combination of species) listed in Table 4 provide more than 30% of the cover under the canopy?

☐ Yes = **Is a Category** I **bog** ☐ No = **Is not a bog**

SC 4.0. Forested Wetlands

Does the wetland have at least 1 contiguous acre of forest that meets one of these criteria for the WA Department of Fish and Wildlife's forests as priority habitats? ***If you answer YES you will still need to rate the wetland based on its functions.***

☐ **Old-growth forests** (west of Cascade crest): Stands of at least two tree species, forming a multi-layered canopy with occasional small openings; with at least 8 trees/ac (20 trees/ha) that are at least 200 years of age OR have a diameter at breast height (dbh) of 32 in (81 cm) or more.

☐ **Mature forests** (west of the Cascade Crest): Stands where the largest trees are 80-200 years old OR the species that make up the canopy have an average diameter (dbh) exceeding 21 in (53 cm).

☐ Yes = **Category** I ☑ No = **Not a forested wetland for this section**

SC 5.0. Wetlands in Coastal Lagoons

Does the wetland meet all of the following criteria of a wetland in a coastal lagoon?

☐ The wetland lies in a depression adjacent to marine waters that is wholly or partially separated from marine waters by sandbanks, gravel banks, shingle, or, less frequently, rocks

☐ The lagoon in which the wetland is located contains ponded water that is saline or brackish (> 0.5 ppt) during most of the year in at least a portion of the lagoon (*needs to be measured near the bottom*)

☐ Yes - Go to **SC 5.1** ☑ No = **Not a wetland in a coastal lagoon**

SC 5.1. Does the wetland meet all of the following three conditions?

☐ The wetland is relatively undisturbed (has no diking, ditching, filling, cultivation, grazing), and has less than 20% cover of aggressive, opportunistic plant species (see list of species on p. 100).

☐ At least ¾ of the landward edge of the wetland has a 100 ft buffer of shrub, forest, or un-grazed or un-mowed grassland.

☐ The wetland is larger than $^1/_{10}$ ac (4350 ft^2)

☐ Yes = **Category** I ☐ No = **Category** II

SC 6.0. Interdunal Wetlands

Is the wetland west of the 1889 line (also called the Western Boundary of Upland Ownership or WBUO)? ***If you answer yes you will still need to rate the wetland based on its habitat functions.***

In practical terms that means the following geographic areas:

☐ Long Beach Peninsula: Lands west of SR 103

☐ Grayland-Westport: Lands west of SR 105

☐ Ocean Shores-Copalis: Lands west of SR 115 and SR 109

☐ Yes - Go to **SC 6.1** ☑ No = **Not an interdunal wetland for rating**

SC 6.1. Is the wetland 1 ac or larger and scores an 8 or 9 for the habitat functions on the form (rates H,H,H or H,H,M for the three aspects of function)?

☐ Yes = **Category** I ☐ No - Go to **SC 6.2**

SC 6.2. Is the wetland 1 ac or larger, or is it in a mosaic of wetlands that is 1 ac or larger?

☐ Yes = **Category** II ☐ No - Go to **SC 6.3**

SC 6.3. Is the unit between 0.1 and 1 ac, or is it in a mosaic of wetlands that is between 0.1 and 1 ac?

☐ Yes = **Category** III ☐ No = **Category** IV

Category of wetland based on Special Characteristics

If you answered No for all types, enter "Not Applicable" on Summary Form

NA

RATING SUMMARY – Western Washington

Name of wetland (or ID #): Wetland B Date of site visit: 2/23/2022

Rated by JM/KN Trained by Ecology? ☑ Yes ☐ No Date of training Mar-16

HGM Class used for rating Depressional Wetland has multiple HGM classes? ☐ Yes ☑ No

NOTE: Form is not complete with out the figures requested (*figures can be combined*).

Source of base aerial photo/map ESRI aerial imagery

OVERALL WETLAND CATEGORY III (based on functions ☑ or special characteristics ☐)

1. Category of wetland based on FUNCTIONS

____ **Category** I - Total score = 23 - 27

____ **Category** II - Total score = 20 - 22

X **Category** III - Total score = 16 - 19

____ **Category** IV - Total score = 9 - 15

FUNCTION	Improving Water Quality	Hydrologic	Habitat	
List appropriate rating (H, M, L)				
Site Potential	H	H	L	
Landscape Potential	M	H	L	
Value	L	L	H	**Total**
Score Based on Ratings	6	7	4	**17**

Score for each function based on three ratings (*order of ratings is not important*)

9 = H, H, H
8 = H, H, M
7 = H, H, L
7 = H, M, M
6 = H, M, L
6 = M, M, M
5 = H, L, L
5 = M, M, L
4 = M, L, L
3 = L, L, L

2. Category based on SPECIAL CHARACTERISTICS of wetland

CHARACTERISTIC	Category
Estuarine	
Wetland of High Conservation Value	
Bog	
Mature Forest	
Old Growth Forest	
Coastal Lagoon	
Interdunal	
None of the above	

Maps and Figures required to answer questions correctly for Western Washington

Depressional Wetlands

Map of:	**To answer questions:**	**Figure #**
Cowardin plant classes	D 1.3, H 1.1, H 1.4	
Hydroperiods	D 1.4, H 1.2	
Location of outlet (*can be added to map of hydroperiods*)	D 1.1, D 4.1	
Boundary of area within 150 ft of the wetland (*can be added to another figure*)	D 2.2, D 5.2	
Map of the contributing basin	D 4.3, D 5.3	
1 km Polygon: Area that extends 1 km from entire wetland edge - including polygons for accessible habitat and undisturbed habitat	H 2.1, H 2.2, H 2.3	
Screen capture of map of 303(d) listed waters in basin (from Ecology website)	D 3.1, D 3.2	
Screen capture of list of TMDLs for WRIA in which unit is found (from web)	D 3.3	

Riverine Wetlands

Map of:	**To answer questions:**	**Figure #**
Cowardin plant classes	H 1.1, H 1.4	
Hydroperiods	H 1.2	
Ponded depressions	R 1.1	
Boundary of area within 150 ft of the wetland (*can be added to another figure*)	R 2.4	
Plant cover of trees, shrubs, and herbaceous plants	R 1.2, R 4.2	
Width of unit vs. width of stream (*can be added to another figure*)	R 4.1	
Map of the contributing basin	R 2.2, R 2.3, R 5.2	
1 km Polygon: Area that extends 1 km from entire wetland edge - including polygons for accessible habitat and undisturbed habitat	H 2.1, H 2.2, H 2.3	
Screen capture of map of 303(d) listed waters in basin (from Ecology website)	R 3.1	
Screen capture of list of TMDLs for WRIA in which unit is found (from web)	R 3.2, R 3.3	

Lake Fringe Wetlands

Map of:	**To answer questions:**	**Figure #**
Cowardin plant classes	L 1.1, L 4.1, H 1.1, H 1.4	
Plant cover of trees, shrubs, and herbaceous plants	L 1.2	
Boundary of area within 150 ft of the wetland (*can be added to another figure*)	L 2.2	
1 km Polygon: Area that extends 1 km from entire wetland edge - including polygons for accessible habitat and undisturbed habitat	H 2.1, H 2.2, H 2.3	
Screen capture of map of 303(d) listed waters in basin (from Ecology website)	L 3.1, L 3.2	
Screen capture of list of TMDLs for WRIA in which unit is found (from web)	L 3.3	

Slope Wetlands

Map of:	**To answer questions:**	**Figure #**
Cowardin plant classes	H 1.1, H 1.4	
Hydroperiods	H 1.2	
Plant cover of **dense** trees, shrubs, and herbaceous plants	S 1.3	
Plant cover of **dense, rigid** trees, shrubs, and herbaceous plants (*can be added to another figure*)	S 4.1	
Boundary of area within 150 ft of the wetland (*can be added to another figure*)	S 2.1, S 5.1	
1 km Polygon: Area that extends 1 km from entire wetland edge - including polygons for accessible habitat and undisturbed habitat	H 2.1, H 2.2, H 2.3	
Screen capture of map of 303(d) listed waters in basin (from Ecology website)	S 3.1, S 3.2	
Screen capture of list of TMDLs for WRIA in which unit is found (from web)	S 3.3	

HGM Classification of Wetland in Western Washington

For questions 1 -7, the criteria described must apply to the entire unit being rated.
If hydrologic criteria listed in each question do not apply to the entire unit being rated, you probably have a unit with multiple HGM classes. In this case, identify which hydrologic criteria in questions 1 - 7 apply, and go to Question 8.

1. Are the water levels in the entire unit usually controlled by tides except during floods?

☑ NO - go to 2 ☐ **YES** - the wetland class is **Tidal Fringe** - go to 1.1

1.1 Is the salinity of the water during periods of annual low flow below 0.5 ppt (parts per thousand)?

☐ **NO - Saltwater Tidal Fringe (Estuarine)** ☐ **YES - Freshwater Tidal Fringe**
If your wetland can be classified as a Freshwater Tidal Fringe use the forms for ***Riverine*** *wetlands. If it is Saltwater Tidal Fringe it is an* ***Estuarine*** *wetland and is not scored. This method* ***cannot*** *be used to score functions for estuarine wetlands.*

2. The entire wetland unit is flat and precipitation is the only source (>90%) of water to it.
Groundwater and surface water runoff are NOT sources of water to the unit.

☑ NO - go to 3 ☐ **YES** - The wetland class is **Flats**
If your wetland can be classified as a Flats wetland, use the form for ***Depressional*** *wetlands.*

3. Does the entire wetland unit **meet all** of the following criteria?
☐ The vegetated part of the wetland is on the shores of a body of permanent open water (without any plants on the surface at any time of the year) at least 20 ac (8 ha) in size;
☐ At least 30% of the open water area is deeper than 6.6 ft (2 m).

☑ NO - go to 4 ☐ **YES** - The wetland class is **Lake Fringe** (Lacustrine Fringe)

4. Does the entire wetland unit **meet all** of the following criteria?
☐ The wetland is on a slope (*slope can be very gradual*),
☐ The water flows through the wetland in one direction (unidirectional) and usually comes from seeps. It may flow subsurface, as sheetflow, or in a swale without distinct banks.
☐ The water leaves the wetland **without being impounded.**

☑ NO - go to 5 ☐ **YES** - The wetland class is **Slope**

NOTE: Surface water does not pond in these type of wetlands except occasionally in very small and shallow depressions or behind hummocks (depressions are usually <3 ft diameter and less than 1 ft deep).

5. Does the entire wetland unit **meet all** of the following criteria?
☐ The unit is in a valley, or stream channel, where it gets inundated by overbank flooding from that stream or river,
☐ The overbank flooding occurs at least once every 2 years.

☑ NO - go to 6 ☐ **YES** - The wetland class is **Riverine**

NOTE: The Riverine unit can contain depressions that are filled with water when the river is not flooding.

6. Is the entire wetland unit in a topographic depression in which water ponds, or is saturated to the surface, at some time during the year? *This means that any outlet, if present, is higher than the interior of the wetland.*

☐ NO - go to 7 ☑ **YES** - The wetland class is **Depressional**

7. Is the entire wetland unit located in a very flat area with no obvious depression and no overbank flooding? The unit does not pond surface water more than a few inches. The unit seems to be maintained by high groundwater in the area. The wetland may be ditched, but has no obvious natural outlet.

☐ NO - go to 8 ☐ **YES** - The wetland class is **Depressional**

8. Your wetland unit seems to be difficult to classify and probably contains several different HGM classes. For example, seeps at the base of a slope may grade into a riverine floodplain, or a small stream within a Depressional wetland has a zone of flooding along its sides. GO BACK AND IDENTIFY WHICH OF THE HYDROLOGIC REGIMES DESCRIBED IN QUESTIONS 1-7 APPLY TO DIFFERENT AREAS IN THE UNIT (make a rough sketch to help you decide). Use the following table to identify the appropriate class to use for the rating system if you have several HGM classes present within the wetland unit being scored.

NOTE: Use this table only if the class that is recommended in the second column represents 10% or more of the total area of the wetland unit being rated. If the area of the HGM class listed in column 2 is less than 10% of the unit; classify the wetland using the class that represents more than 90% of the total area.

HGM classes within the wetland unit being rated	HGM class to use in rating
Slope + Riverine	Riverine
Slope + Depressional	Depressional
Slope + Lake Fringe	Lake Fringe
Depressional + Riverine along stream within boundary of depression	Depressional
Depressional + Lake Fringe	Depressional
Riverine + Lake Fringe	Riverine
Salt Water Tidal Fringe and any other class of freshwater wetland	Treat as ESTUARINE

*If you are still unable to determine which of the above criteria apply to your wetland, or if you have **more than 2 HGM classes** within a wetland boundary, classify the wetland as Depressional for the rating.*

NOTES and FIELD OBSERVATIONS:

DEPRESSIONAL AND FLATS WETLANDS

Water Quality Functions - Indicators that the site functions to improve water quality

D 1.0. Does the site have the potential to improve water quality?	
D 1.1. Characteristics of surface water outflows from the wetland: Wetland is a depression or flat depression (QUESTION 7 on key) with no surface water leaving it (no outlet). points = 3 Wetland has an intermittently flowing stream or ditch, OR highly constricted permanently flowing outlet. points = 2 ☐ Wetland has an unconstricted, or slightly constricted, surface outlet that is permanently flowing points = 1 ☐ Wetland is a flat depression (QUESTION 7 on key), whose outlet is a permanently flowing ditch. points = 1	3
D 1.2. The soil 2 in below the surface (or duff layer) is true clay or true organic (*use NRCS definitions*). Yes = 4 No = 0	0
D 1.3. Characteristics and distribution of persistent plants (Emergent, Scrub-shrub, and/or Forested Cowardin classes): Wetland has persistent, ungrazed, plants > 95% of area points = 5 Wetland has persistent, ungrazed, plants > ½ of area points = 3 Wetland has persistent, ungrazed plants > $^{1}/_{10}$ of area points = 1 Wetland has persistent, ungrazed plants < $^{1}/_{10}$ of area points = 0	5
D 1.4. Characteristics of seasonal ponding or inundation: *This is the area that is ponded for at least 2 months. See description in manual.* Area seasonally ponded is > ½ total area of wetland points = 4 Area seasonally ponded is > ¼ total area of wetland points = 2 Area seasonally ponded is < ¼ total area of wetland points = 0	4
Total for D 1 Add the points in the boxes above	**12**

Rating of Site Potential If score is: ☑ **12 - 16 = H** ☐ **6 - 11 = M** ☐ **0 - 5 = L** *Record the rating on the first page*

D 2.0. Does the landscape have the potential to support the water quality function of the site?	
D 2.1. Does the wetland unit receive stormwater discharges? Yes = 1 No = 0	1
D 2.2. Is > 10% of the area within 150 ft of the wetland in land uses that generate pollutants? Yes = 1 No = 0	1
D 2.3. Are there septic systems within 250 ft of the wetland? Yes = 1 No = 0	0
D 2.4. Are there other sources of pollutants coming into the wetland that are not listed in questions D 2.1 - D 2.3? Source Yes = 1 No = 0	0
Total for D 2 Add the points in the boxes above	**2**

Rating of Landscape Potential If score is:☐ **3 or 4 = H** ☑ **1 or 2 = M**☐ **0 = L** *Record the rating on the first page*

D 3.0. Is the water quality improvement provided by the site valuable to society?	
D 3.1. Does the wetland discharge directly (i.e., within 1 mi) to a stream, river, lake, or marine water that is on the 303(d) list? Yes = 1 No = 0	0
D 3.2. Is the wetland in a basin or sub-basin where an aquatic resource is on the 303(d) list? Yes = 1 No = 0	0
D 3.3. Has the site been identified in a watershed or local plan as important for maintaining water quality (*answer YES if there is a TMDL for the basin in which the unit is found*)? Yes = 2 No = 0	0
Total for D 3 Add the points in the boxes above	**0**

Rating of Value If score is:☐ **2 - 4 = H** ☐ **1 = M** ☑ **0 = L** *Record the rating on the first page*

Wetland name or number B

DEPRESSIONAL AND FLATS WETLANDS

Hydrologic Functions - Indicators that the site functions to reduce flooding and stream degradation

D 4.0. Does the site have the potential to reduce flooding and erosion?	
D 4.1. Characteristics of surface water outflows from the wetland: Wetland is a depression or flat depression with no surface water leaving it (no outlet) points = 4 Wetland has an intermittently flowing stream or ditch, OR highly constricted permanently flowing outlet points = 2 Wetland is a flat depression (QUESTION 7 on key), whose outlet is a permanently flowing ditch points = 1 Wetland has an unconstricted, or slightly constricted, surface outlet that is permanently flowing points = 0	4
D 4.2. Depth of storage during wet periods: *Estimate the height of ponding above the bottom of the outlet. For wetlands with no outlet, measure from the surface of permanent water or if dry, the deepest part.* Marks of ponding are 3 ft or more above the surface or bottom of outlet points = 7 Marks of ponding between 2 ft to < 3 ft from surface or bottom of outlet points = 5 ☐ Marks are at least 0.5 ft to < 2 ft from surface or bottom of outlet points = 3 ☐ The wetland is a "headwater" wetland points = 3 Wetland is flat but has small depressions on the surface that trap water points = 1 Marks of ponding less than 0.5 ft (6 in) points = 0	5
D 4.3. Contribution of the wetland to storage in the watershed: *Estimate the ratio of the area of upstream basin contributing surface water to the wetland to the area of the wetland unit itself.* ☐ The area of the basin is less than 10 times the area of the unit points = 5 The area of the basin is 10 to 100 times the area of the unit points = 3 The area of the basin is more than 100 times the area of the unit points = 0 ☐ Entire wetland is in the Flats class points = 5	3
Total for D 4 Add the points in the boxes above	**12**

Rating of Site Potential If score is: ☑ **12 - 16 = H** ☐ **6 - 11 = M** ☐ **0 - 5 = L** *Record the rating on the first page*

D 5.0. Does the landscape have the potential to support hydrologic function of the site?	
D 5.1. Does the wetland unit receive stormwater discharges? Yes = 1 No = 0	1
D 5.2. Is > 10% of the area within 150 ft of the wetland in land uses that generate excess runoff? Yes = 1 No = 0	1
D 5.3. Is more than 25% of the contributing basin of the wetland covered with intensive human land uses (residential at >1 residence/ac, urban, commercial, agriculture, etc.)? Yes = 1 No = 0	1
Total for D 5 Add the points in the boxes above	**3**

Rating of Landscape Potential If score is: ☑ **3 = H** ☐ **1 or 2 = M** ☐ **0 = L** *Record the rating on the first page*

D 6.0. Are the hydrologic functions provided by the site valuable to society?	
D 6.1. The unit is in a landscape that has flooding problems. *Choose the description that best matches conditions around the wetland unit being rated. Do not add points. <u>Choose the highest score if more than one condition is met.</u>* The wetland captures surface water that would otherwise flow down-gradient into areas where flooding has damaged human or natural resources (e.g., houses or salmon redds): • Flooding occurs in a sub-basin that is immediately down-gradient of unit. points = 2 ☐ • Surface flooding problems are in a sub-basin farther down-gradient. points = 1 ☐ Flooding from groundwater is an issue in the sub-basin. points = 1 ☐ The existing or potential outflow from the wetland is so constrained by human or natural conditions that the water stored by the wetland cannot reach areas that flood. Explain why points = 0 ☑ There are no problems with flooding downstream of the wetland. points = 0	0
D 6.2. Has the site been identified as important for flood storage or flood conveyance in a regional flood control plan? Yes = 2 No = 0	0
Total for D 6 Add the points in the boxes above	**0**

Rating of Value If score is: ☐ **2 - 4 = H** ☐ **1 = M** ☑ **0 = L** *Record the rating on the first page*

These questions apply to wetlands of all HGM classes.

HABITAT FUNCTIONS - Indicators that site functions to provide important habitat

H 1.0. Does the site have the potential to provide habitat?

H 1.1. Structure of plant community: *Indicators are Cowardin classes and strata within the Forested class.* Check the Cowardin plant classes in the wetland. *Up to 10 patches may be combined for each class to meet the threshold of ¼ ac or more than 10% of the unit if it is smaller than 2.5 ac. Add the number of structures checked.*

☐ Aquatic bed	4 structures or more: points = 4
☑ Emergent	3 structures: points = 2
☐ Scrub-shrub (areas where shrubs have > 30% cover)	2 structures: points - 1
☐ Forested (areas where trees have > 30% cover)	1 structure: points = 0

If the unit has a Forested class, check if:

☐ The Forested class has 3 out of 5 strata (canopy, sub-canopy, shrubs, herbaceous, moss/ground-cover) that each cover 20% within the Forested polygon

0

H 1.2. Hydroperiods

Check the types of water regimes (hydroperiods) present within the wetland. The water regime has to cover more than 10% of the wetland or ¼ ac to count (*see text for descriptions of hydroperiods*).

☐ Permanently flooded or inundated	4 or more types present: points = 3
☑ Seasonally flooded or inundated	3 types present: points = 2
☑ Occasionally flooded or inundated	2 types present: points = 1
☐ Saturated only	1 types present: points = 0
☐ Permanently flowing stream or river in, or adjacent to, the wetland	
☐ Seasonally flowing stream in, or adjacent to, the wetland	
☐ **Lake Fringe wetland**	**2 points**
☐ **Freshwater tidal wetland**	**2 points**

1

H 1.3. Richness of plant species

Count the number of plant species in the wetland that cover at least 10 ft^2.

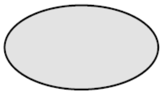
Different patches of the same species can be combined to meet the size threshold and you do not have to name the species. ***Do not include Eurasian milfoil, reed canarygrass, purple loosestrife, Canadian thistle***

If you counted:	> 19 species	points = 2
	5 - 19 species	points = 1
	< 5 species	points = 0

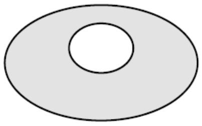
1

H 1.4. Interspersion of habitats

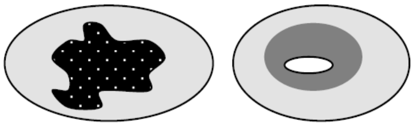
Decide from the diagrams below whether interspersion among Cowardin plants classes (described in H 1.1), or the classes and unvegetated areas (can include open water or mudflats) is high, moderate, low, or none. *If you have four or more plant classes or three classes and open water, the rating is always high.*



None = 0 points

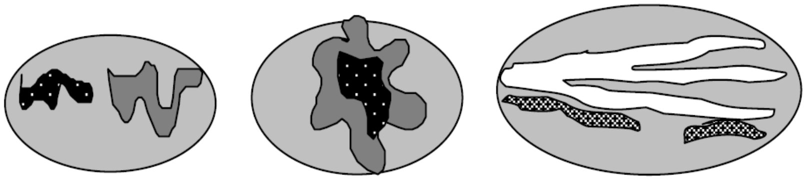


Low = 1 point



Moderate = 2 points

All three diagrams in this row are **HIGH** = 3 points



0

H 1.5. Special habitat features: Check the habitat features that are present in the wetland. *The number of checks is the number of points.* ☐ Large, downed, woody debris within the wetland (> 4 in diameter and 6 ft long) ☐ Standing snags (dbh > 4 in) within the wetland ☐ Undercut banks are present for at least 6.6 ft (2 m) **and/or** overhanging plants extends at least 3.3 ft (1 m) over a stream (or ditch) in, or contiguous with the wetland, for at least 33 ft (10 m) ☐ Stable steep banks of fine material that might be used by beaver or muskrat for denning (> 30 degree slope) OR signs of recent beaver activity are present (*cut shrubs or trees that have not yet weathered where wood is exposed*) ☑ At least ¼ ac of thin-stemmed persistent plants or woody branches are present in areas that are permanently or seasonally inundated (*structures for egg-laying by amphibians*) ☐ Invasive plants cover less than 25% of the wetland area in every stratum of plants (*see H 1.1 for list of strata*)	1
Total for H 1 Add the points in the boxes above	**3**

Rating of Site Potential If Score is: ☐ **15 - 18 = H** ☐ **7 - 14 = M** ☑ **0 - 6 = L** *Record the rating on the first page*

H 2.0. Does the landscape have the potential to support the habitat function of the site?	
H 2.1 Accessible habitat (include *only habitat that directly abuts wetland unit*). *Calculate:* 0 % undisturbed habitat + (0.3 % moderate & low intensity land uses / 2) = 0.15% If total accessible habitat is: > $^1/_3$ (33.3%) of 1 km Polygon points = 3 20 - 33% of 1 km Polygon points = 2 10 - 19% of 1 km Polygon points = 1 < 10 % of 1 km Polygon points = 0	0
H 2.2. Undisturbed habitat in 1 km Polygon around the wetland. *Calculate:* 15 % undisturbed habitat + (10.7 % moderate & low intensity land uses / 2) = 20.35% Undisturbed habitat > 50% of Polygon points = 3 Undisturbed habitat 10 - 50% and in 1-3 patches points = 2 Undisturbed habitat 10 - 50% and > 3 patches points = 1 Undisturbed habitat < 10% of 1 km Polygon points = 0	1
H 2.3 Land use intensity in 1 km Polygon: If > 50% of 1 km Polygon is high intensity land use points = (-2) ≤ 50% of 1km Polygon is high intensity points = 0	-2
Total for H 2 Add the points in the boxes above	**-1**

Rating of Landscape Potential If Score is: ☐ **4 - 6 = H** ☐ **1 - 3 = M** ☑ **< 1 = L** *Record the rating on the first page*

H 3.0. Is the habitat provided by the site valuable to society?	
H 3.1. Does the site provide habitat for species valued in laws, regulations, or policies? *Choose only the highest score that applies to the wetland being rated*. Site meets ANY of the following criteria: points = 2 ☐ It has 3 or more priority habitats within 100 m (see next page) ☐ It provides habitat for Threatened or Endangered species (any plant or animal on the state or federal lists) ☑ It is mapped as a location for an individual WDFW priority species ☐ It is a Wetland of High Conservation Value as determined by the Department of Natural Resources ☐ It has been categorized as an important habitat site in a local or regional comprehensive plan, in a Shoreline Master Plan, or in a watershed plan Site has 1 or 2 priority habitats (listed on next page) with in 100m points = 1 Site does not meet any of the criteria above points = 0	2

Rating of Value If Score is: ☑ **2 = H** ☐ **1 = M** ☐ **0 = L** *Record the rating on the first page*

Wetland name or number __B______

WDFW Priority Habitats

Priority habitats listed by WDFW (see complete descriptions of WDFW priority habitats, and the counties in which they can be found, in: Washington Department of Fish and Wildlife. 2008. Priority Habitat and Species List. Olympia, Washington. 177 pp.
http://wdfw.wa.gov/publications/00165/wdfw00165.pdf or access the list from here:
http://wdfw.wa.gov/conservation/phs/list/

Count how many of the following priority habitats are within 330 ft (100 m) of the wetland unit: ***NOTE** : This question is independent of the land use between the wetland unit and the priority habitat.*

☐ **Aspen Stands**: Pure or mixed stands of aspen greater than 1 ac (0.4 ha).

☐ **Biodiversity Areas and Corridors**: Areas of habitat that are relatively important to various species of native fish and wildlife (*full descriptions in WDFW PHS report*).

☐ **Herbaceous Balds**: Variable size patches of grass and forbs on shallow soils over bedrock.

☐ **Old-growth/Mature forests**: Old-growth west of Cascade crest – Stands of at least 2 tree species, forming a multi-layered canopy with occasional small openings; with at least 8 trees/ac (20 trees/ha) > 32 in (81 cm) dbh or > 200 years of age. Mature forests – Stands with average diameters exceeding 21 in (53 cm) dbh; crown cover may be less than 100%; decay, decadence, numbers of snags, and quantity of large downed material is generally less than that found in old-growth; 80-200 years old west of the Cascade crest.

☑ **Oregon White Oak**: Woodland stands of pure oak or oak/conifer associations where canopy coverage of the oak component is important (*full descriptions in WDFW PHS report p. 158 – see web link above*).

☐ **Riparian**: The area adjacent to aquatic systems with flowing water that contains elements of both aquatic and terrestrial ecosystems which mutually influence each other.

☐ **Westside Prairies**: Herbaceous, non-forested plant communities that can either take the form of a dry prairie or a wet prairie (*full descriptions in WDFW PHS report p. 161 – see web link above*).

☐ **Instream**: The combination of physical, biological, and chemical processes and conditions that interact to provide functional life history requirements for instream fish and wildlife resources.

☐ **Nearshore**: Relatively undisturbed nearshore habitats. These include Coastal Nearshore, Open Coast Nearshore, and Puget Sound Nearshore. (*full descriptions of habitats and the definition of relatively undisturbed are in WDFW report – see web link on previous page*).

☐ **Caves**: A naturally occurring cavity, recess, void, or system of interconnected passages under the earth in soils, rock, ice, or other geological formations and is large enough to contain a human.

☐ **Cliffs**: Greater than 25 ft (7.6 m) high and occurring below 5000 ft elevation.

☐ **Talus**: Homogenous areas of rock rubble ranging in average size 0.5 - 6.5 ft (0.15 - 2.0 m), composed of basalt, andesite, and/or sedimentary rock, including riprap slides and mine tailings. May be associated with cliffs.

☐ **Snags and Logs**: Trees are considered snags if they are dead or dying and exhibit sufficient decay characteristics to enable cavity excavation/use by wildlife. Priority snags have a diameter at breast height of > 20 in (51 cm) in western Washington and are > 6.5 ft (2 m) in height. Priority logs are > 12 in (30 cm) in diameter at the largest end, and > 20 ft (6 m) long.

Note: All vegetated wetlands are by definition a priority habitat but are not included in this list because they are addressed elsewhere.

CATEGORIZATION BASED ON SPECIAL CHARACTERISTICS

Wetland Type | **Category**

Check off any criteria that apply to the wetland. List the category when the appropriate criteria are met.

SC 1.0. Estuarine Wetlands

Does the wetland meet the following criteria for Estuarine wetlands?

☐ The dominant water regime is tidal,
☐ Vegetated, and
☐ With a salinity greater than 0.5 ppt

☐ Yes - Go to **SC 1.1** ☑ No = **Not an estuarine wetland**

SC 1.1. Is the wetland within a National Wildlife Refuge, National Park, National Estuary Reserve, Natural Area Preserve, State Park or Educational, Environmental, or Scientific Reserve designated under WAC 332-30-151?

☐ Yes = **Category** I ☐ No - Go to **SC 1.2**

SC 1.2. Is the wetland unit at least 1 ac in size and meets at least two of the following three conditions?

☐ The wetland is relatively undisturbed (has no diking, ditching, filling, cultivation, grazing, and has less than 10% cover of non-native plant species. (If non-native species are *Spartina* , see page 25)
☐ At least ¾ of the landward edge of the wetland has a 100 ft buffer of shrub, forest, or un-grazed or un-mowed grassland.
☐ The wetland has at least two of the following features: tidal channels, depressions with open water, or contiguous freshwater wetlands.

☐ Yes = **Category** I ☐ No = **Category** II

SC 2.0. Wetlands of High Conservation Value (WHCV)

SC 2.1. Has the WA Department of Natural Resources updated their website to include the list of Wetlands of High Conservation Value?

☐ Yes - Go to **SC 2.2** ☑ No - Go to **SC 2.3**

SC 2.2. Is the wetland listed on the WDNR database as a Wetland of High Conservation Value?

☐ Yes = **Category** I ☐ No = **Not WHCV**

SC 2.3. Is the wetland in a Section/Township/Range that contains a Natural Heritage wetland?
http://www1.dnr.wa.gov/nhp/refdesk/datasearch/wnhpwetlands.pdf

☐ Yes - **Contact WNHP/WDNR and to SC 2.4** ☑ No = **Not WHCV**

SC 2.4. Has WDNR identified the wetland within the S/T/R as a Wetland of High Conservation Value and listed it on their website?

☐ Yes = **Category** I ☐ No = **Not WHCV**

SC 3.0. Bogs

Does the wetland (or any part of the unit) meet both the criteria for soils and vegetation in bogs? *Use the key below.* ***If you answer YES you will still need to rate the wetland based on its functions*** *.*

SC 3.1. Does an area within the wetland unit have organic soil horizons, either peats or mucks, that compose 16 in or more of the first 32 in of the soil profile?

☐ Yes - Go to **SC 3.3** ☑ No - Go to **SC 3.2**

SC 3.2. Does an area within the wetland unit have organic soils, either peats or mucks, that are less than 16 in deep over bedrock, or an impermeable hardpan such as clay or volcanic ash, or that are floating on top of a lake or pond?

☐ Yes - Go to **SC 3.3** ☑ No = **Is not a bog**

SC 3.3. Does an area with peats or mucks have more than 70% cover of mosses at ground level, AND at least a 30% cover of plant species listed in Table 4?

☐ Yes = **Is a Category** I **bog** ☐ No - Go to **SC 3.4**

NOTE: If you are uncertain about the extent of mosses in the understory, you may substitute that criterion by measuring the pH of the water that seeps into a hole dug at least 16 in deep. If the pH is less than 5.0 and the plant species in Table 4 are present, the wetland is a bog.

SC 3.4. Is an area with peats or mucks forested (> 30% cover) with Sitka spruce, subalpine fir, western red cedar, western hemlock, lodgepole pine, quaking aspen, Engelmann spruce, or western white pine, AND any of the species (or combination of species) listed in Table 4 provide more than 30% of the cover under the canopy?

☐ Yes = **Is a Category** I **bog** ☐ No = **Is not a bog**

SC 4.0. Forested Wetlands

Does the wetland have at least 1 contiguous acre of forest that meets one of these criteria for the WA Department of Fish and Wildlife's forests as priority habitats? ***If you answer YES you will still need to rate the wetland based on its functions.***

☐ **Old-growth forests** (west of Cascade crest): Stands of at least two tree species, forming a multi-layered canopy with occasional small openings; with at least 8 trees/ac (20 trees/ha) that are at least 200 years of age OR have a diameter at breast height (dbh) of 32 in (81 cm) or more.

☐ **Mature forests** (west of the Cascade Crest): Stands where the largest trees are 80-200 years old OR the species that make up the canopy have an average diameter (dbh) exceeding 21 in (53 cm).

☐ Yes = **Category** I ☑ No = **Not a forested wetland for this section**

SC 5.0. Wetlands in Coastal Lagoons

Does the wetland meet all of the following criteria of a wetland in a coastal lagoon?

☐ The wetland lies in a depression adjacent to marine waters that is wholly or partially separated from marine waters by sandbanks, gravel banks, shingle, or, less frequently, rocks

☐ The lagoon in which the wetland is located contains ponded water that is saline or brackish (> 0.5 ppt) during most of the year in at least a portion of the lagoon (*needs to be measured near the bottom*)

☐ Yes - Go to **SC 5.1** ☑ No = **Not a wetland in a coastal lagoon**

SC 5.1. Does the wetland meet all of the following three conditions?

☐ The wetland is relatively undisturbed (has no diking, ditching, filling, cultivation, grazing), and has less than 20% cover of aggressive, opportunistic plant species (see list of species on p. 100).

☐ At least ¾ of the landward edge of the wetland has a 100 ft buffer of shrub, forest, or un-grazed or un-mowed grassland.

☐ The wetland is larger than $^{1}/_{10}$ ac (4350 ft^2)

☐ Yes = **Category** I ☐ No = **Category** II

SC 6.0. Interdunal Wetlands

Is the wetland west of the 1889 line (also called the Western Boundary of Upland Ownership or WBUO)? ***If you answer yes you will still need to rate the wetland based on its habitat functions.***

In practical terms that means the following geographic areas:

☐ Long Beach Peninsula: Lands west of SR 103

☐ Grayland-Westport: Lands west of SR 105

☐ Ocean Shores-Copalis: Lands west of SR 115 and SR 109

☐ Yes - Go to **SC 6.1** ☑ No = **Not an interdunal wetland for rating**

SC 6.1. Is the wetland 1 ac or larger and scores an 8 or 9 for the habitat functions on the form (rates H,H,H or H,H,M for the three aspects of function)?

☐ Yes = **Category** I ☐ No - Go to **SC 6.2**

SC 6.2. Is the wetland 1 ac or larger, or is it in a mosaic of wetlands that is 1 ac or larger?

☐ Yes = **Category** II ☐ No - Go to **SC 6.3**

SC 6.3. Is the unit between 0.1 and 1 ac, or is it in a mosaic of wetlands that is between 0.1 and 1 ac?

☐ Yes = **Category** III ☐ No = **Category** IV

Category of wetland based on Special Characteristics

If you answered No for all types, enter "Not Applicable" on Summary Form

NA

LEGEND

Cowardin Classification

🟨 Aquatic Bed

🟩 Emergent

🟦 Open Water

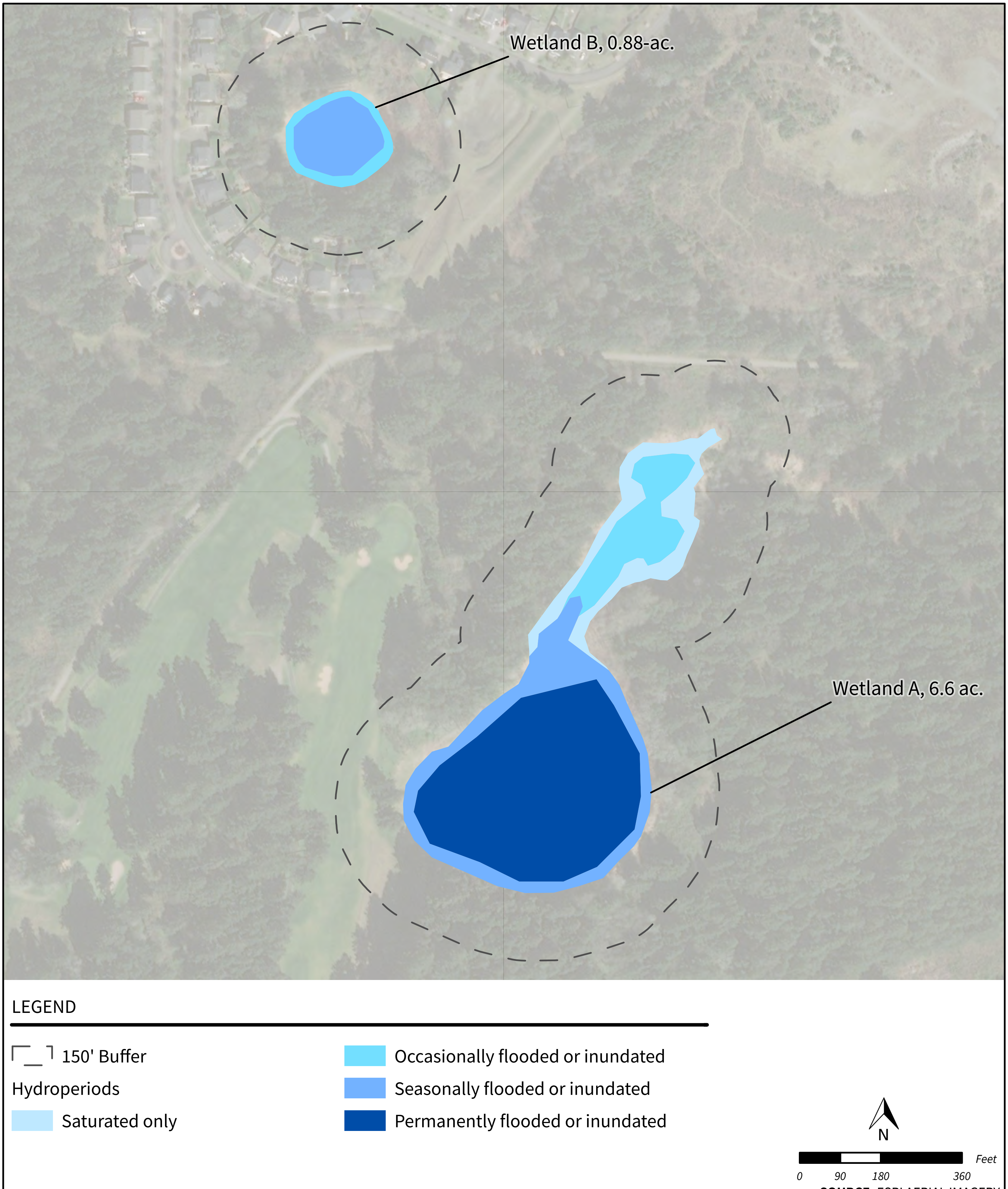
SOURCE: ESRI AERIAL IMAGERY

WETLAND RATING FIGURE

Careage Property (Parcels 0119341004 & 0119341005)
Existing Conditions Report
McNeil Street, DuPont, Washington

0071
MAR 2022

FIGURE A



SOURCE: ESRI AERIAL IMAGERY

wet.land

WETLAND RATING FIGURE

Careage Property (Parcels 0119341004 & 0119341005)
Existing Conditions Report
McNeil Street, DuPont, Washington

0071

MAR 2022

FIGURE B

LEGEND

Land Use Intensity

🟥 High Land Use Intensity

🟫 Moderate/Low Land Use Intensity

🟩 Relatively Undisturbed

▭ Accessible Habitat

N

Feet

0 385 770 1,540

SOURCE: ESRI AERIAL IMAGERY

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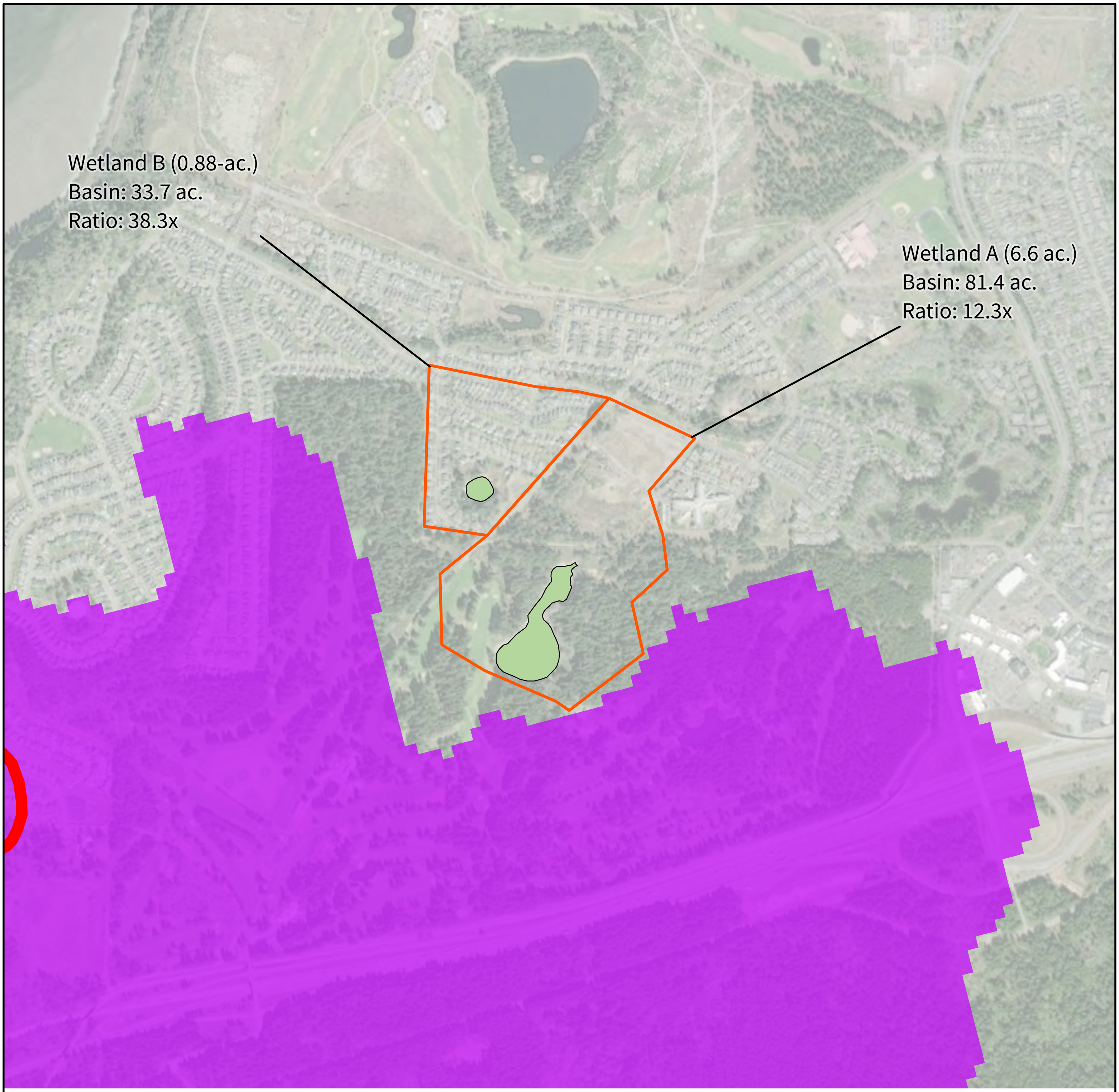
WETLAND RATING FIGURE

Careage Property (Parcels 0119341004 & 0119341005)
Existing Conditions Report
McNeil Street, DuPont, Washington

0071

MAR 2022

FIGURE C



LEGEND

🟩 Wetlands

🟪 Nisqually Watershed Bacteria and DO TMDL

🟥 303(d) List

☐ Contributing Basin

N

Feet

0 *400* *800* *1,600*

SOURCE: ESRI AERIAL IMAGERY

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WETLAND RATING FIGURE

Careage Property (Parcels 0119341004 & 0119341005)
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0071
MAR 2022

FIGURE D

APPENDIX D

Photodocument

Disturbed open areas with gravel fill and Scots broom.

Disturbed open areas with gravel fill and Scots broom.

Careage property along McNeil Street, looking east.

Oregon white oak in northwest corner of Site.

Trail along western property line.

Utility easement along the west property line.

Native forest in southwest corner of Site.

Wetland A south of Site within JBLM.

South end of parcel, south of manmade hill.

Manmade hill.

Trail along south side of Site.

Native forest along south side of Site.