DRAINAGE REPORT

For

LYNNWOOD COMMONS

DRS PROJECT NO. 25031

Prepared For

City of Lynnwood
20816 44th Ave W, Ste 230
Lynnwood, WA 98036
425-670-5400

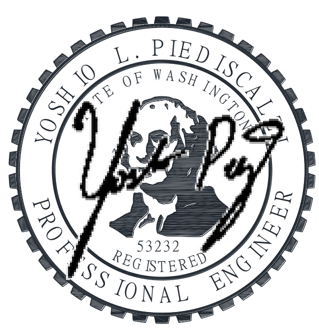
Applicant/Developer	Operator/Contractor
LAWRENCE HOUSTON ARCHITECT	TBD
10002 17TH AVE NE	-
SEATTLE, WA 98125	-
(206) 819-1279	

Project Site Location

20305 68th Ave, Lynnwood, WA 98036.

Stormwater Site Plan Prepared By

D.R. STRONG Consulting Engineers, Inc.
620 7th Avenue, Kirkland, Washington 98033
Yoshio L. Piediscalzi, P.E.



2-3-2026

Stormwater Site Plan Preparation Date: February 3, 2026

DRAINAGE REPORT

LYNNWOOD COMMONS

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1.0 PROJECT OVERVIEW

The applicant is proposing to construct a mixed-use commercial and student housing building (Project). All existing structures and improvements on the 0.794 AC property will be removed. The project is located at 20305 68th Ave, Lynnwood, Washington (Site) also known as Tax Parcel Number 00515400000902. Vicinity map showing Site location is provided as Figure 1. Project will meet the drainage requirements of the 2019 Washington State Department of Ecology (DOE) Stormwater Management Manual for Western Washington (Manual).

PREDEVELOPED SITE CONDITIONS

Site area is approximately 34,589 SF (0.794 AC). The Site is currently developed with one single-residence and shed. The remains of a second residence structure that has been demolished or collapsed are still present onsite.

Site slopes from west to east. The existing Site is contained within one Threshold Discharge Areas (TDA) with two Natural Discharge Areas (NDA), NDA 1 and NDA 2, each with one Natural Discharge Location (NDL). NDL 1 is located at the southeastern property corner, and NDL 2 is located at the northeastern property corner. Due to existing topography, runoff from surrounding properties is negligible.

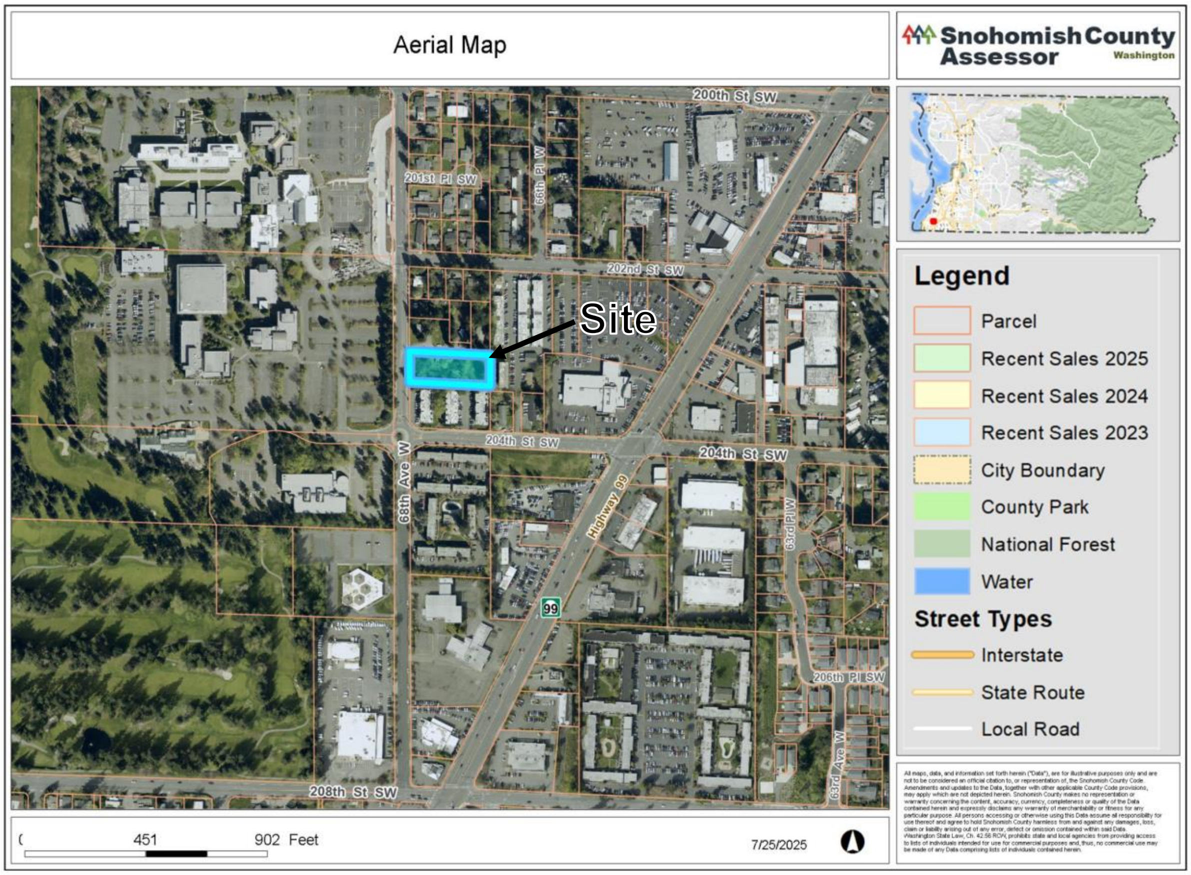
DEVELOPED SITE CONDITIONS

Applicant is seeking approval to remove all existing improvements and construct a mixed-use and student housing building. The total Project area is 35,711 SF (0.820 AC) and consists of the proposed multi-use building, asphalt driveway, and landscaping, and disturbed right-of-way area.

Site (sf)	34,589.0
Acres	0.794
Frontage (sf)	1,122.0
Acres	0.026
Total (sf)	35,711.0
Acres	0.820

The Project is subject to MR6 - Water Quality, and MR7 - Flow Control. A stormwater detention vault, and Bayfilter will be utilized to meet these requirements. The full analysis and discussion is located in Section 5 of this report.

FIGURE 1
VICINITY MAP



2.0 EXISTING CONDITIONS SUMMARY

2.1 EXISTING DRAINAGE SUMMARY

The Site is currently developed with one single-residence and shed. The remains of a second residence structure that has been demolished or collapsed are still present onsite.

Site slopes from west to east. The existing Site is contained within one Threshold Discharge Areas (TDA) with two Natural Discharge Areas (NDA), NDA 1 and NDA 2, each with one Natural Discharge Location (NDL). NDL 1 is located at the southeastern property corner, and NDL 2 is located at the northeastern property corner. Due to existing topography, runoff from surrounding properties is negligible.

Figure 2 is a map of the Site that shows the drainage basin. The full downstream analysis can be found in Section 3

2.2 SOILS

A soil survey map is provided as Figure 3. The attached Geotech report and USDS soil survey identifies Alderwood-Urban Land Complex as the primary soil type on Site. The soil type typically consists of glacial till. The Site is not conducive to the use of infiltration BMPs.

2.3 ONSITE CRITICAL AREAS

Per the attached Geotechnical Report, the Site is classified as a Slight to Moderate Risk Landslide Hazard Area. There are no known hazard areas onsite.

FIGURE 2
DRAINAGE BASINS, SUBBASINS AND SITE CHARACTERISTICS

D.R. STRONG
CONSULTING ENGINEERS
ENGINEERS PLANNERS SURVEYORS
620 - 7th AVENUE KIRKLAND, WA 98033
O 425.827.3063 F 425.827.2423

FIGURE 2

DRAINAGE BASINS, SUBBASINS, AND SITE CHARACTERISTICS

LYNNWOOD COMMONS

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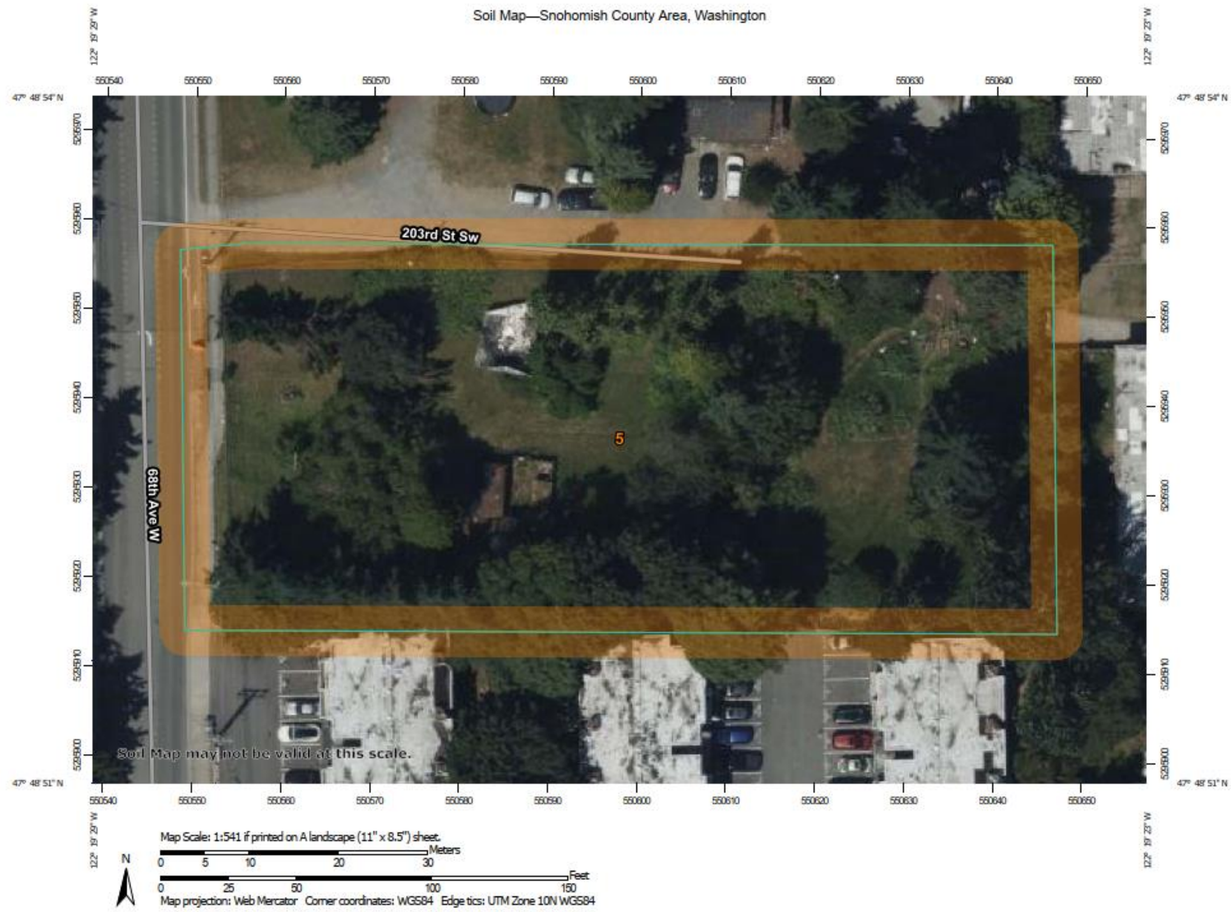
DESIGNED BY: NBM
PROJECT ENGINEER: YLP
DATE: 2.3.2026
PROJECT NO.: 25031

FIGURE: 2

FIGURE 3
SOILS MAP



Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
5	Alderwood-Urban land complex, 2 to 8 percent slopes	1.1	100.0%
Totals for Area of Interest		**1.1**	**100.0%**

Snohomish County Area, Washington

5—Alderwood-Urban land complex, 2 to 8 percent slopes
Map Unit Setting

- *National map unit symbol: 2hz9*
- *Elevation: 50 to 800 feet*
- *Mean annual precipitation: 25 to 60 inches*
- *Mean annual air temperature: 48 to 52 degrees F*
- *Frost-free period: 180 to 220 days*
- *Farmland classification: Not prime farmland*

Map Unit Composition

- *Alderwood and similar soils: 60 percent*
- *Urban land: 25 percent*
- *Minor components: 15 percent*
- *Estimates are based on observations, descriptions, and transects of the mapunit.*

Description of Alderwood

Setting

- *Landform: Till plains*
- *Parent material: Basal till*

Typical profile

- *H1 - 0 to 7 inches: gravelly ashy sandy loam*
- *H2 - 7 to 35 inches: very gravelly ashy sandy loam*
- *H3 - 35 to 60 inches: gravelly sandy loam*

Properties and qualities

- *Slope: 2 to 8 percent*
- *Depth to restrictive feature: 20 to 40 inches to densic material*
- *Drainage class: Moderately well drained*
- *Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)*
- *Depth to water table: About 18 to 36 inches*
- *Frequency of flooding: None*
- *Frequency of ponding: None*
- *Available water supply, 0 to 60 inches: Low (about 3.0 inches)*

Interpretive groups

- *Land capability classification (irrigated):*
- *Land capability classification (nonirrigated): 4s*
- *Hydrologic Soil Group: B*
- *Ecological site: F002XA004WA - Puget Lowlands Forest*
- *Forage suitability group: Limited Depth Soils (G002XN302WA)*
- *Other vegetative classification: Limited Depth Soils*
- *(G002XN302WA)*
- *Hydric soil rating: No*

Minor Components

Mckenna

- *Percent of map unit: 5 percent*
- *Landform: Depressions*
- *Other vegetative classification: Wet Soils (G002XN102WA)*
- *Hydric soil rating: Yes*

Norma, undrained

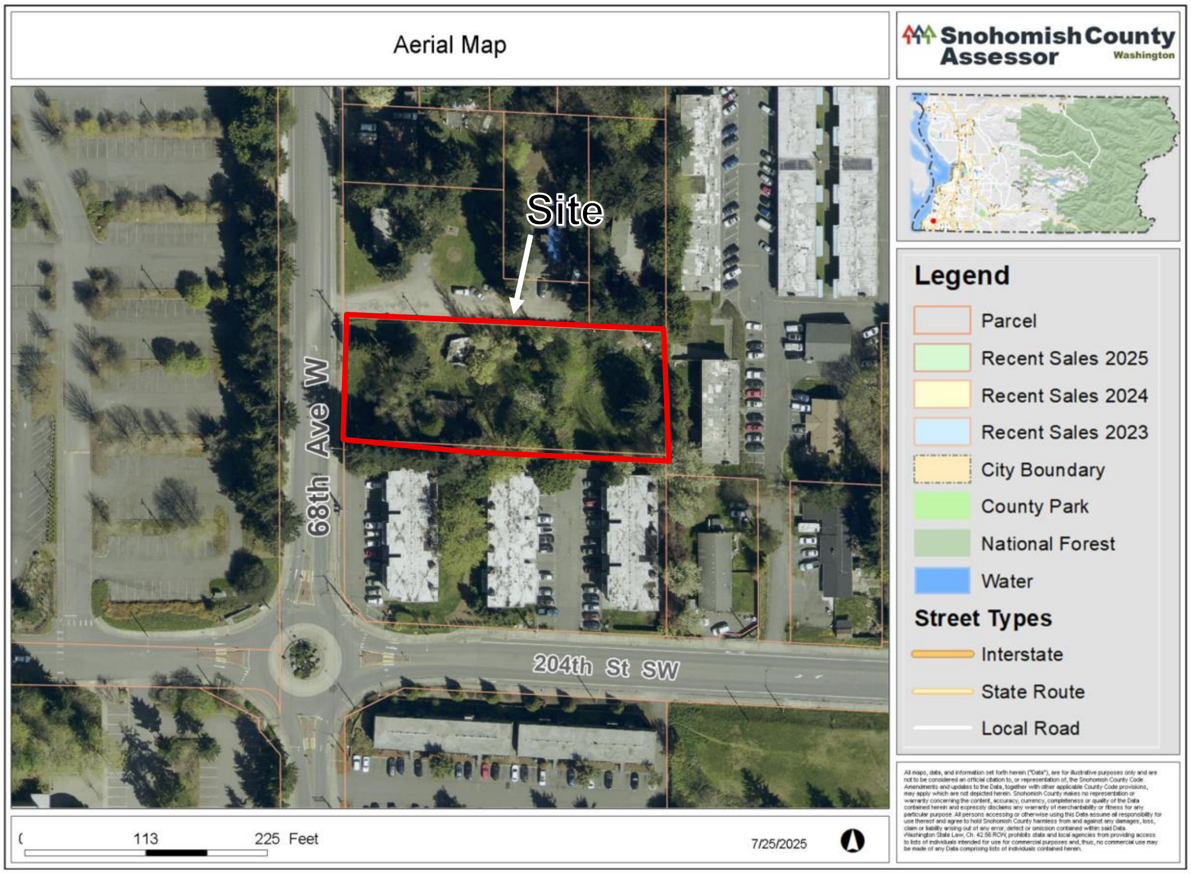
- *Percent of map unit: 5 percent*

- *Landform: Depressions*
- *Other vegetative classification: Wet Soils (G002XN102WA)*
- *Hydric soil rating: Yes*

Terric medisaprists, undrained

- *Percent of map unit: 5 percent*
- *Landform: Depressions*
- *Other vegetative classification: Wet Soils (G002XN102WA)*
- *Hydric soil rating: Yes*

FIGURE 4
AERIAL MAP



3.0 OFF-SITE ANALYSIS REPORT

Task 1: Study Area Definition

A Site investigation was conducted on July 22, 2025 on a sunny day with no recent precipitation events. The downstream system was reviewed from the Site for approximately a quarter-mile; see Figure 5-Downstream Map.

Task 2: Resource Review

The available resource information was reviewed for existing or potential problems. The following is a summary of the findings:

Basin:

The Site is located within the Hall Creek and Lake Washington drainage basins.

Drainage Complaints:

Snohomish County had no records of relevant drainage complaints in the vicinity of the Site.

Drainage Problems:

There is one area of concern approximately ¼ mile from the Site along the downstream path. Runoff from the Site is conveyed to the storm mains in Highway 99, which is then discharged to an open channel between parcels No. 00564100000606 and 00564100000500. This open channel is not maintained and is covered in dense vegetation. Standing water was observed during the field investigation, and the location corresponds with a wetland location on historic maps. The Project is not expected to adversely impact this channel, as flow from the proposed development are mitigated via a stormwater detention vault. No other visible drainage problems were observed during the Site investigation and no drainage problems are known of at this time.

Task 3: Field Investigation

<u>Off-Site Analysis</u>

Our off-site investigation included a topographic survey provided by Pacific Coast Surveys Inc., Job #25-3670, Dated May 7, 2025 and research utilizing the Interactive Maps & Data provided by the City of Lynnwood and WA DOE.

<u>Drainage Basins and Downstream Analysis</u>

As mentioned in the previous sections, the Site consists of one Threshold Discharge Area (TDA) with two Natural Discharge Areas (NDA), NDA 1 and NDA 2, each with one Natural Discharge Location (NDL). NDL 1 is located at the southeastern property corner, and NDL 2 is located at the northeastern property corner. Due to existing topography, runoff from surrounding properties is negligible.

Flow Path for NDA 1:

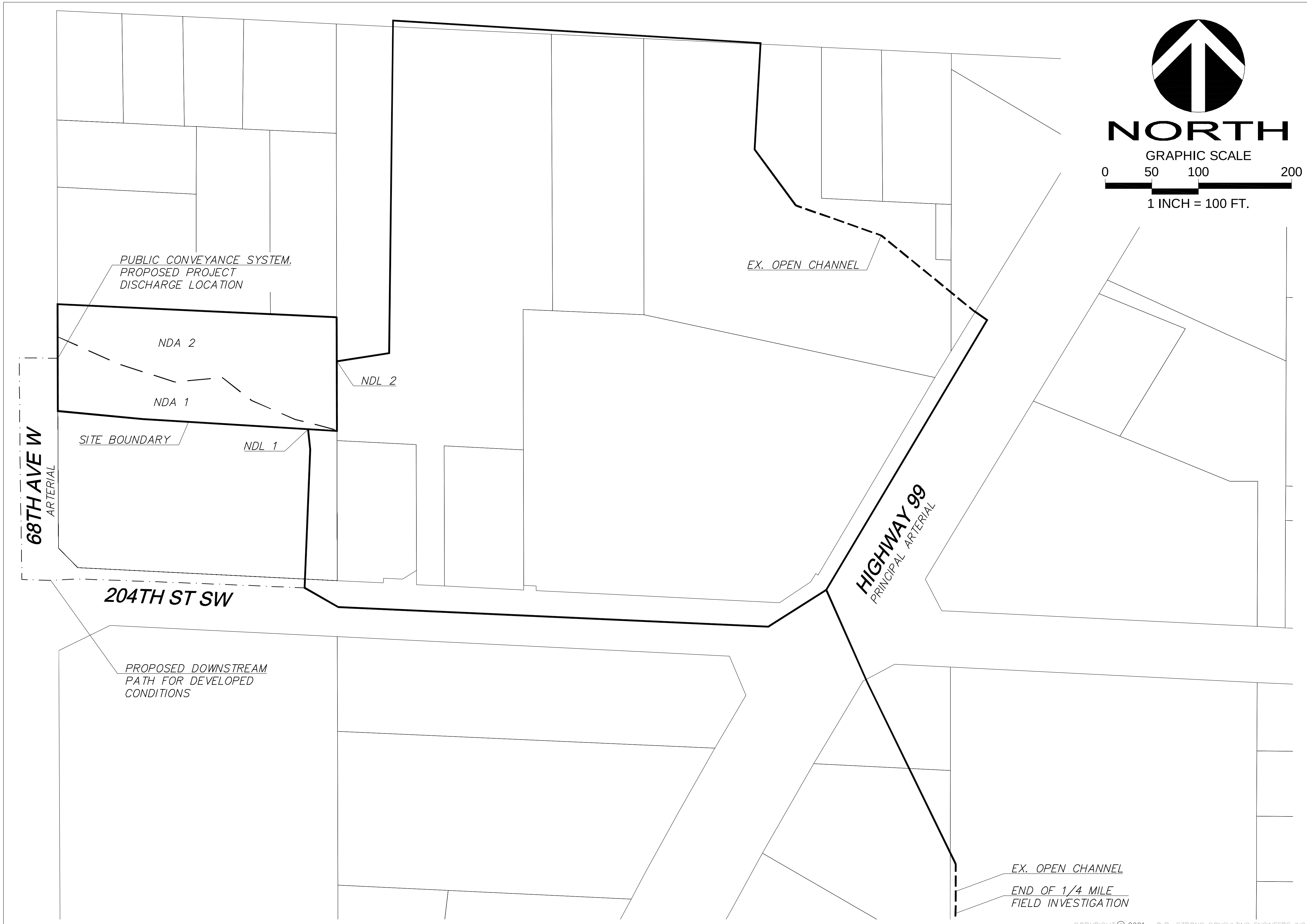
Runoff leaves the Site as sheet flow over the southeastern property corner. Some of this runoff crosses the neighboring property to the south as sheet flow, while the rest enters existing private storm systems. In both scenarios, runoff is conveyed to a Type 1 Catch

Basin (CB) on the north side of 204th St SW. Runoff is conveyed east through a series of pipes and catch basins to the intersection of 204th St SW and Highway 99, where it converges with the flow path for NDA 2. The conveyance system continues away from the ROW in a southeasterly direction before discharging to an open channel between parcels No. 00564100000606 and 00564100000500. This channel marks the end of the ¼ mile downstream analysis. Beyond this point, runoff travels south through man-made conveyance systems consisting of pipes, catch basins, and open channels, before entering Hall Creek. The downstream path meets Hall Creek approximately 1-mile from the Site.

Flow Path for NDA 2:

Runoff leaves the Site as sheet flow over the northeastern property corner. Some of this runoff crosses the neighboring property to the northeast as sheet flow, while the rest enters existing private storm systems. In both scenarios, runoff is conveyed to a Type 1 Catch Basin (CB) on the south side of 202nd St SW. Runoff is conveyed east along 202nd St SW through a series of pipes and catch basins, before turning south and entering an open channel in the Lexus dealership parking lot (parcel No. 00515400001102). Flow rejoins the conveyance in Highway 99, where it converges with the flow path for NDA 1.

FIGURE 5
DOWNSTREAM MAP



D.R. STRONG
CONSULTING ENGINEERS
ENGINEERS PLANNERS SURVEYORS
620 - 7th AVENUE KIRKLAND, WA 98033
O 425.827.3063 F 425.827.2423

FIGURE 5
DOWNSTREAM MAP
LYNNWOOD COMMONS

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DESIGNED BY: NBM
PROJECT ENGINEER: YLP
DATE: 2.3.2026
PROJECT NO.: 25031

FIGURE: 5

4.0 MINIMUM REQUIREMENTS

PROJECT MINIMUM REQUIREMENTS

The Minimum Requirements that apply to this Project were determined using the Flow Chart for New Development which is provided as Figure 6.

Per the chart, all Minimum Requirements apply to all new impervious surfaces and converted pervious surfaces. The Minimum Requirements, as identified by the 2024 DOE Manual, and a brief discussion of how they are met is outlined below:

1. **Preparation of Stormwater Site Plans**

   The Engineering Drawings and this Report constitute the Stormwater Site Plans.

2. **Construction Stormwater Pollution Prevention**

   The CSWPPP is addressed in Section 6.

3. **Source Control of Pollution**

   Source Control of Pollution is addressed in the CSWPPP.

4. **Preservation of Natural Drainage Systems and Outfalls**

   The Project proposes to maintain the existing TDA. The Project will discharge to a CB directly upstream (approximately 350 FT) from the location where NDL 1 enters the public conveyance system in 204th St SW. The conveyance system upstream of the existing drainage location consists of 12”-18” pipes. No capacity problems are anticipated.

5. **On-site Stormwater Management**

   The Project will utilize the List Approach. The 2024 SWMMWW lists On-site Stormwater Management BMPs for Projects Triggering Minimum Requirements #1 through #9:

   Lawn and landscaped areas:

   - Post-Construction Soil Quality and Depth in accordance with BMP T5.13:

     Post-Construction Soil Quality and Depth will be implemented to the maximum extent feasible.

   Roofs:

   - Full Dispersion in accordance with BMP T5.30: Full Dispersion, or Downspout Full Infiltration Systems in accordance with BMP T5.10A: Downspout Full Infiltration.

     Per the Geotech report provided by Cobalt Geosciences (dated May 5, 2025), the existing soils conditions are not suitable for infiltration.

- Bioretention facilities that have minimum horizontally projected surface area below the overflow which is at least 5% of the total surface area draining to it (BMP T5.15).

    This BMP is not feasible due to the native soils on site not being conducive to infiltration BMPs.

- Downspout Dispersion Systems in accordance with BMP T5.10B: Downspout Dispersion Systems.

    Due to the lack of space for flow paths onsite, this BMP is not feasible.

- Perforated Stub-out Connections in accordance with BMP T5.10C: Perforated Stub-out Connections.

    The Project is proposing a below-grade parking facility, immediately downslope of the connection location. Per the Geotech report, the soils onsite may conduce shallow interflow perched on denser till. Due to the risk of lateral flow entering the proposed sub-grade structure, this BMP is not recommended.

Other Hard Surfaces:

- Full Dispersion in accordance with BMP T5.30: Full Dispersion (p.939):

    Due to the lack of space for flow paths onsite, this BMP is not feasible.

- Permeable pavement in accordance with BMP T5.15:

    The Project is proposing a below-grade parking facility near the pavement surfaces. Per the Geotech report, the soils onsite may conduce shallow interflow perched on denser till. Due to the risk of lateral flow entering the proposed sub-grade structure, this BMP is not recommended.

- Bioretention BMP's (BMP T7.30: Bioretention Cells, Swales, and Planter Boxes (p.959)) that have a minimum horizontally projected surface area below the overflow which is at least 5% of the total surface area draining to it.

    This BMP is not feasible due to the native soils on site not being conducive to infiltration BMPs.

- Sheet Flow Dispersion in accordance with BMP T5.12: Sheet Flow Dispersion (p.908), or Concentrated Flow Dispersion in accordance with BMP T5.11: Concentrated Flow Dispersion (p.905)

    Due to the lack of space for flow paths onsite, this BMP is not feasible.

6. Runoff Treatment

The Project is proposing more than 5,000 SF of P.G.I.S. and requires water quality treatment. The Project will utilize a post-detention Bayfilter. See Section 5.

7. Flow Control

The Project is proposing more than 10,000 SF of new and replaced impervious surface and will require an onsite flow control facility. The Project will utilize a stormwater detention vault. See Section 5.

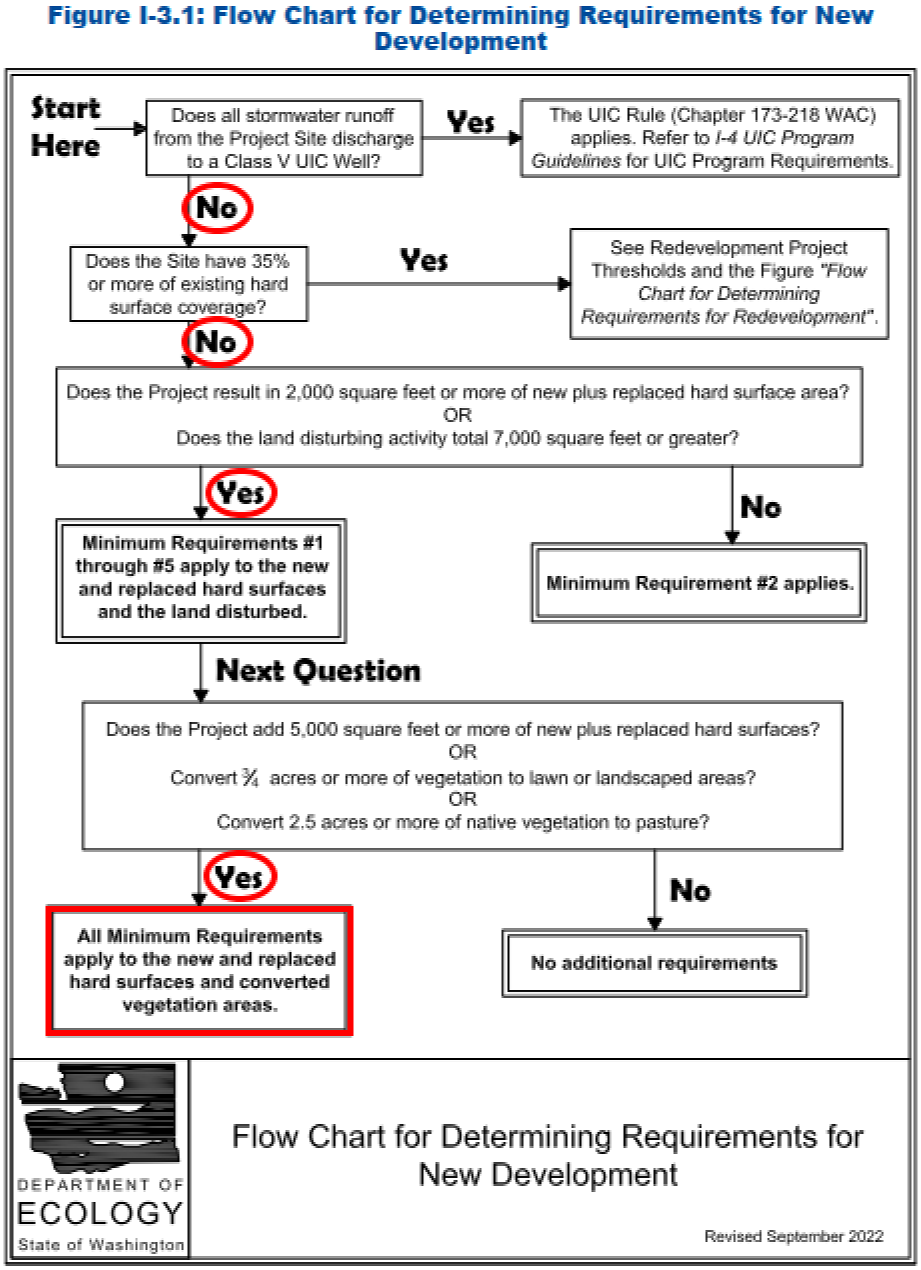
8. Wetlands Protection

The Site has no wetlands on site.

9. Operations and Maintenance

An Operation and Maintenance manual has been included in Section 9 of this report.

FIGURE 6
FLOW CHART FOR NEW DEVELOPMENT



5.0 STORMWATER CONTROL PLAN

THRESHOLD DETERMINATION

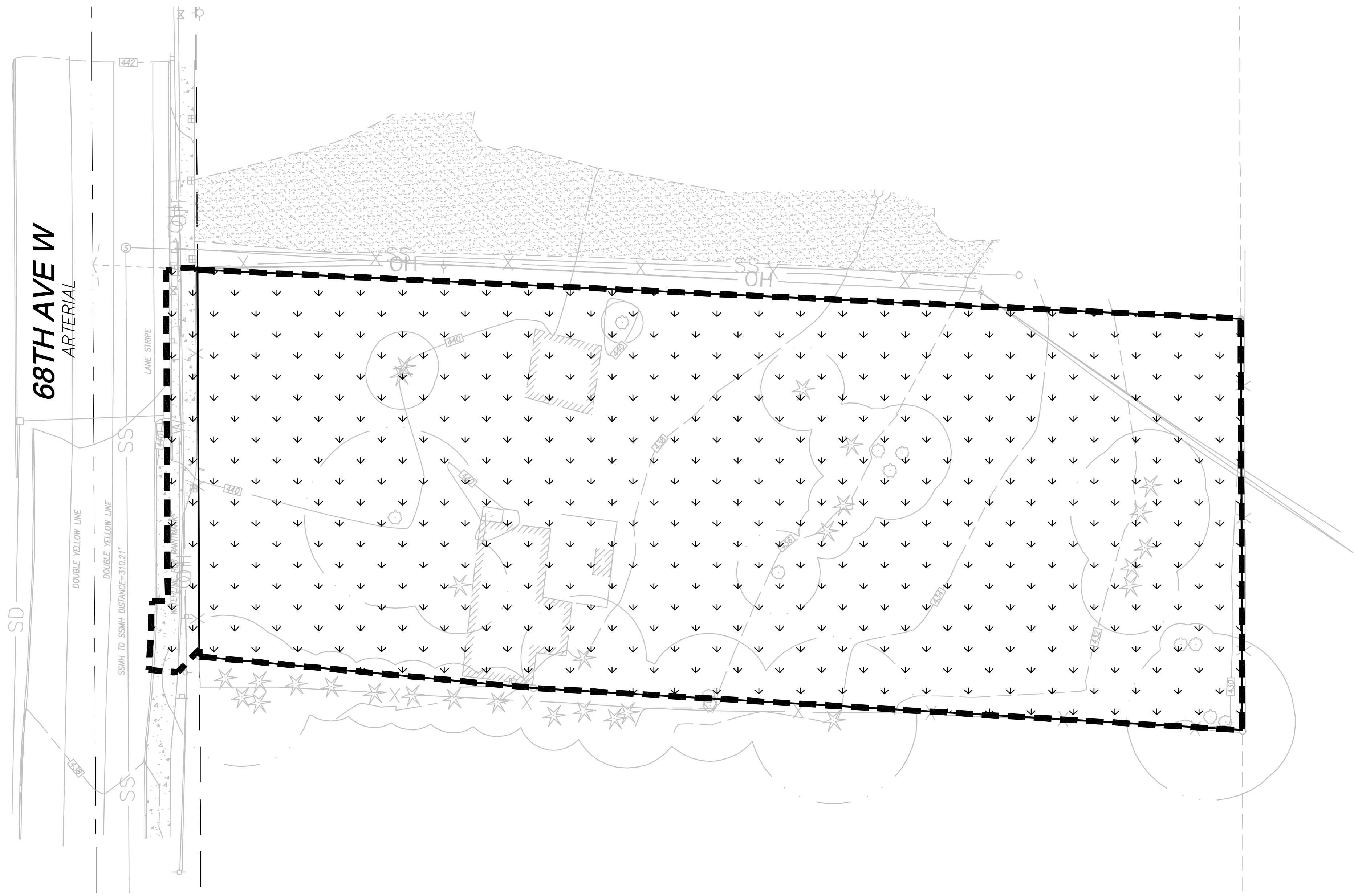
The Project is proposing more than 10,000 SF of new or replaced impervious surface and more than 5,000 of Pollutant Generating Hard Surfaces (P.G.I.S.) and must meet requirements for MR 1-9.

The Project is proposing a stormwater detention vault to meet requirements for flow control, and a post-detention Bayfilter to meet water quality requirements.

EXISTING SITE HYDROLOGY

Existing condition runoff calculations for the Site were modeled using the conditions described by the topographic survey. Due to existing topography, runoff from surrounding properties is negligible. Existing Site cover and characteristics are discussed in further detail in Sections 2 and 3. .

FIGURE 7
EXISTING CONDITIONS MAP

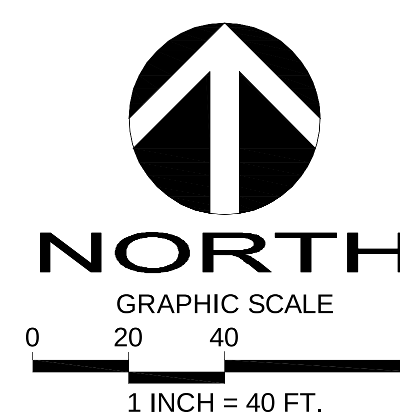


AREA BREAKDOWN:

(solid line)	SITE BOUNDARY:	34,589 SF (0.794 AC)
(dashed line)	PROJECT BOUNDARY:	35,711 SF (0.820 AC)

ONSITE AREA:

(hatch)	PROJECT AREA (HISTORIC) C, FOREST, FLAT	35,711 SF (0.820 AC)



D.R. STRONG
CONSULTING ENGINEERS
ENGINEERS PLANNERS SURVEYORS
620 - 7th AVENUE KIRKLAND, WA 98033
O 425.827.3063 F 425.827.2423

FIGURE 7
EXISTING CONDITIONS MAP
LYNNWOOD COMMONS

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DESIGNED BY: NBM
PROJECT ENGINEER: YLP
DATE: 2.3.2026
PROJECT NO.: 25031

FIGURE: 7

DEVELOPED SITE HYDROLOGY

Developed conditions runoff calculations were prepared for the developed basin per the architectural site plans. Impervious area onsite consists of the roof, driveway, and walkways. These areas are quantified in the table below. Developed Site conditions are shown in Figure 8-Developed Conditions.

The Project proposes to maintain the existing TDA. The Project will discharge to a CB directly upstream (approximately 350 FT) from the location where NDL 1 enters the public conveyance system in 204th St SW. See Section 3 and 4 for a full analysis.

Site Area Analysis

The following table represents the Project areas breakdown of existing and post developed conditions used for WWHM modeling.

Developed Site Conditions (DEV)					
	Area	**Roof**	**walk/curb**	**Road/ Driveway**	**landscape flat**
SITE	34,589.0	15,867.0	3,257.0	9,746.0	5,719.0
Acres	0.794	0.364	0.075	0.224	0.131

Frontage (BYPASS)				
	Area	**walk/curb**	**Road/ Driveway**	**LAWN FLAT**
FRONTAGE	1,122.0	647.0	310.0	165.0
Acres	0.026	0.015	0.007	0.004

WWHM Inputs:

Mitigated Land Use

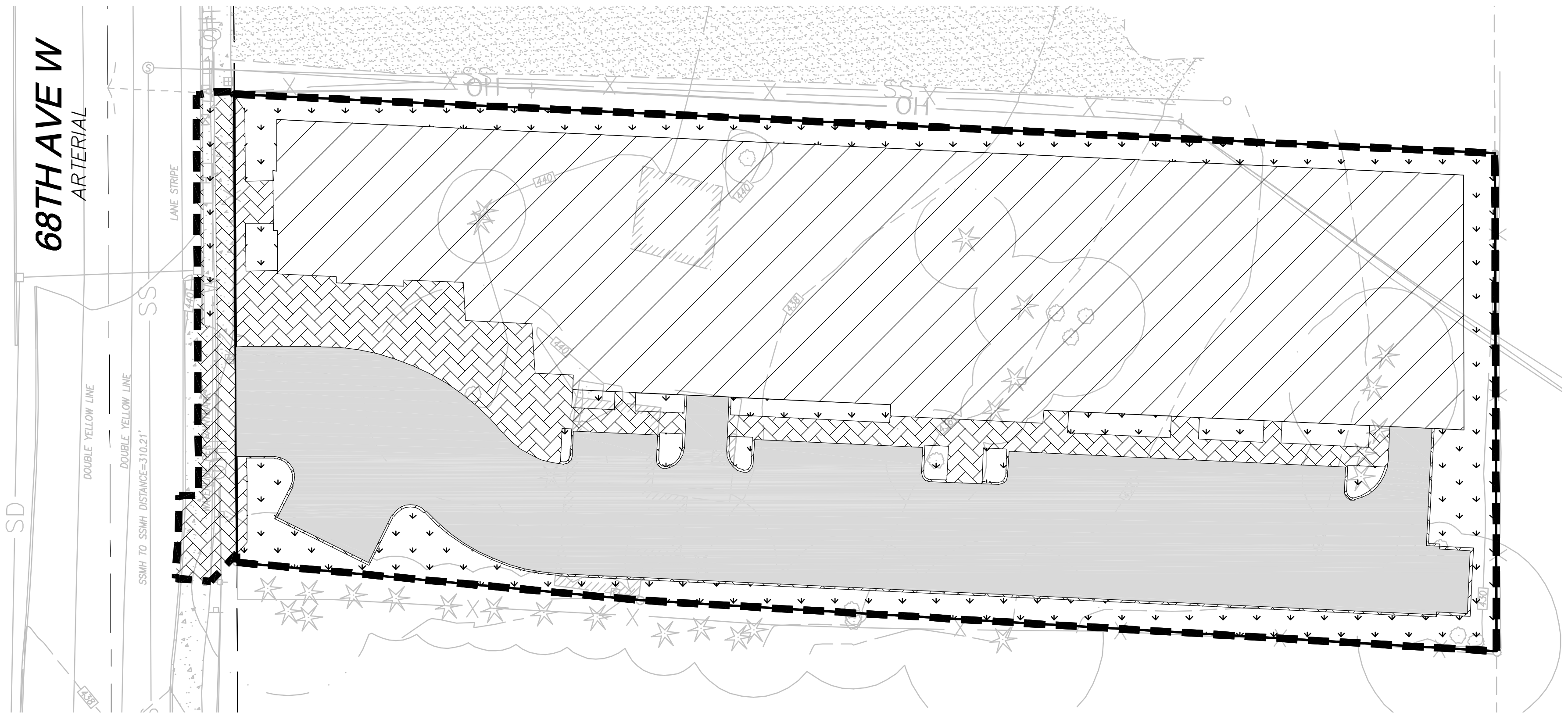
DEV

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
C, Pasture, Flat	0.131
Pervious Total	0.131
Impervious Land Use	acre
ROADS FLAT	0.224
ROOF TOPS FLAT	0.364
SIDEWALKS FLAT	0.075
Impervious Total	0.663
Basin Total	0.794

BYPASS

Bypass:	Yes
GroundWater:	No
Pervious Land Use	acre
C, Pasture, Flat	0.004
Pervious Total	0.004
Impervious Land Use	acre
SIDEWALKS FLAT	0.022
Impervious Total	0.022
Basin Total	0.026

FIGURE 8
DEVELOPED CONDITIONS MAP



AREA BREAKDOWN:

SITE BOUNDARY:	34,589 SF (0.794 AC)
PROJECT BOUNDARY:	35,711 SF (0.820 AC)

COLLECTED ONSITE AREA:

ROOF AREA	IMPERVIOUS: (ROOFTOPS, FLAT)	15,867 S.F. (0.364 AC)
ROAD AREA	IMPERVIOUS: (DRIVEWAYS, FLAT)	9,746 S.F. (0.224 AC)
SIDEWALK AREA	IMPERVIOUS: (SIDEWALKS, FLAT)	3,257 S.F. (0.075 AC)
LANDSCAPE AREA	PERVIOUS: (C, LAWN, FLAT)	5,719 S.F. (0.131 AC)

NON-COLLECTED R.O.W. "BYPASS":

SIDEWALK AREA	IMPERVIOUS: (SIDEWALKS, MOD)	957 S.F. (0.022 AC)
LANDSCAPE AREA	PERVIOUS: (C, LAWN, MOD)	165 S.F. (0.004 AC)

NORTH

GRAPHIC SCALE

0 20 40 80

1 INCH = 40 FT.

D.R. STRONG
CONSULTING ENGINEERS
ENGINEERS PLANNERS SURVEYORS
620 - 7th AVENUE KIRKLAND, WA 98033
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FIGURE 8
DEVELOPED CONDITIONS MAP
LYNNWOOD COMMONS

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DATE: 2.3.2026
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FIGURE: 8

PERFORMANCE STANDARDS AND GOALS

The City of Lynnwood has adopted the 2019 WSDOE Manual for stormwater management flow control and water quality. The Project is proposing more than 10,000 SF of impervious surface and more than 5,000 SF of P.G.I.S. and is required to meet both Flow Control and Water Quality standards.

FLOW CONTROL SYSTEM

The Project is proposing a stormwater detention vault system to mitigate Site discharge. Due to existing topography, a pump system will be required downstream of detention to convey stormwater to the existing conveyance system in 68th Ave W. The pump design and specification will be provided during final engineering.

The 100-year, pre-developed runoff flowrate resulting from this WWHM analysis was 0.051 CFS and the mitigated, developed runoff was 0.054 CFS, as shown in the results below.

Flow Frequency Return Periods for Predeveloped. POC #1

Return Period	Flow(cfs)
2 year	0.017578
5 year	0.026017
10 year	0.031796
25 year	0.039248
50 year	0.044886
100 year	0.050585

Flow Frequency Return Periods for Mitigated. POC #1

Return Period	Flow(cfs)
2 year	0.015901
5 year	0.022992
10 year	0.028796
25 year	0.037556
50 year	0.045233
100 year	0.054001

The full WWHM report used to model the scenarios has been included as Appendix A.

WATER QUALITY TREATMENT SYSTEM

Per the Manual, basic treatment is required for runoff from all basin areas when the Project is proposing more than 5,000 SF of pollution generating hard surface (PGHS). The Project is proposing a post-detention water quality facility. The final design and specifications will be provided at final engineering.

CONVEYANCE SYSTEM ANALYSIS AND DESIGN

A conveyance system consisting of pipes and existing catch basins has been designed for this Project. Onsite runoff from all target surfaces, will be collected by catch basins, surface drains, or roof gutters, and conveyed to the propopsed detention system. The conveyance system consists of PVC pipes, and type-1 catch basins. The conveyance system will be designed to convey the 100-yr design storm.

6.0 STORMWATER POLLUTION PREVENTION PLAN (SWPPP)

A complete Construction Stormwater Pollution Prevention Plan (CSWPPP) will be provided at final engineering.

7.0 SPECIAL REPORTS AND STUDIES

No special reports or studies are required for this Project.

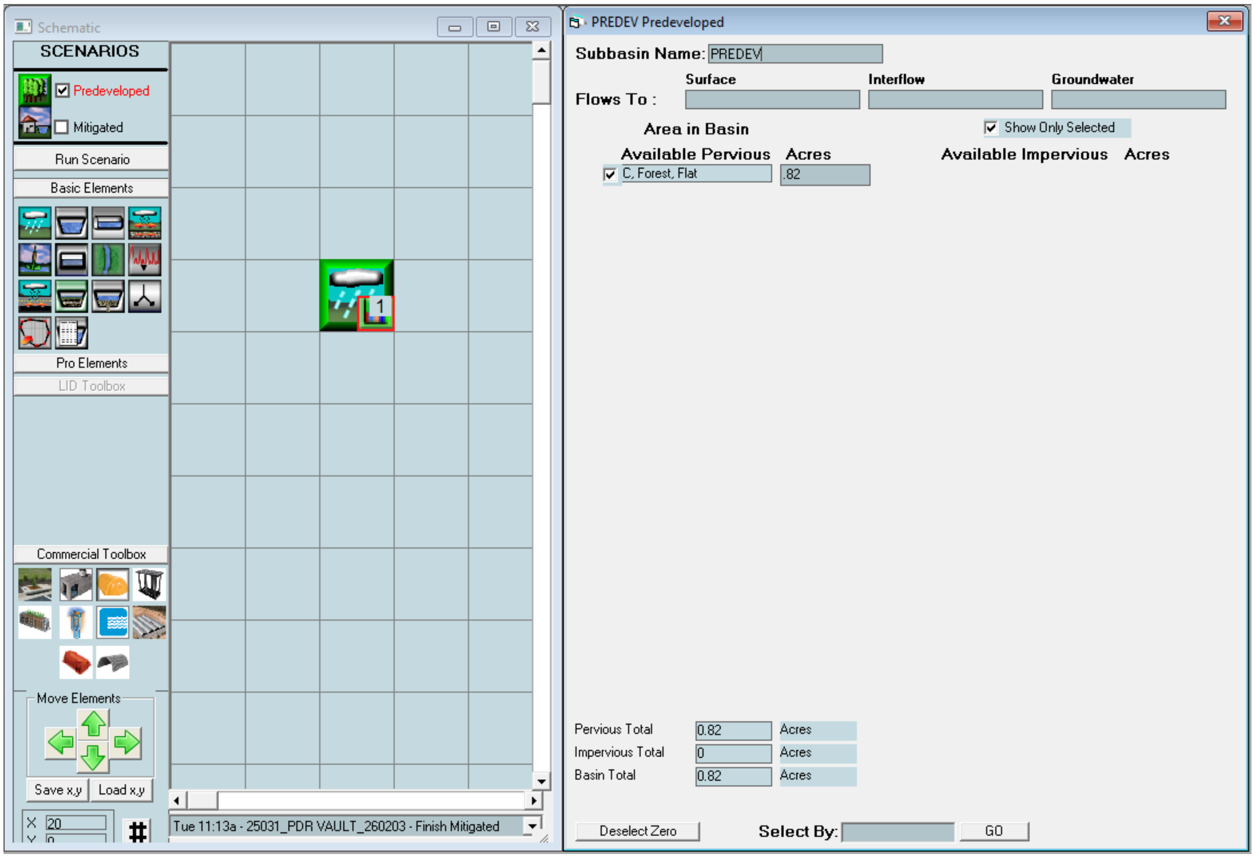
8.0 OTHER PERMITS

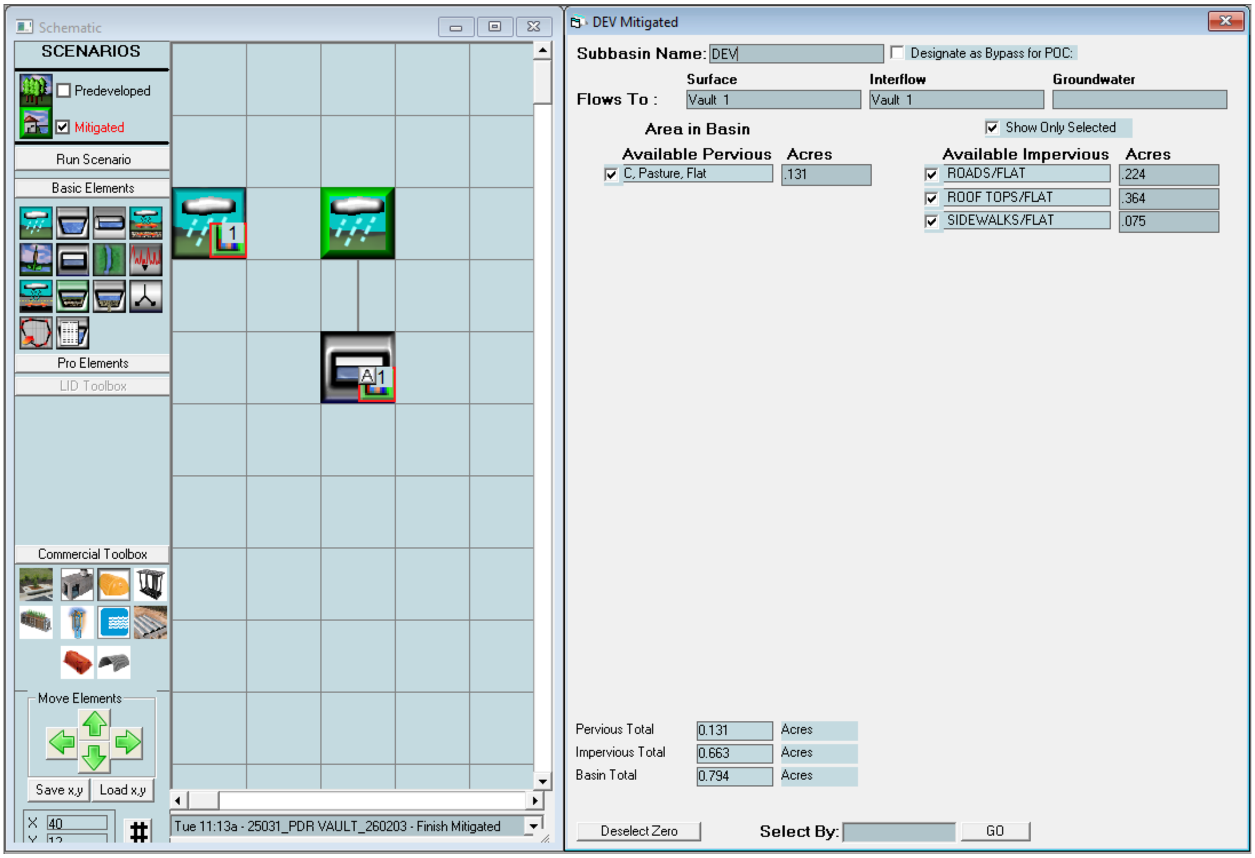
None at this time.

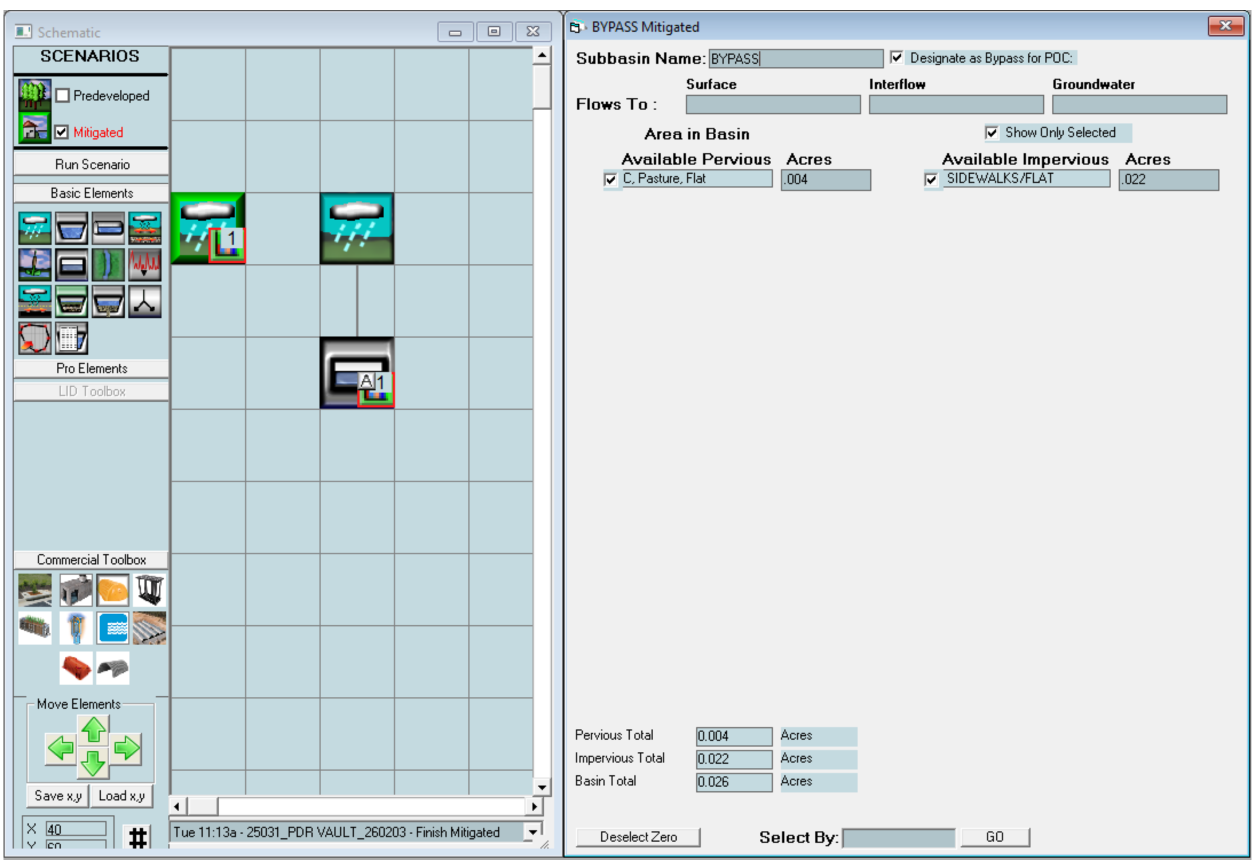
9.0 OPERATION AND MAINTENANCE MANUAL

An Operations and Maintenance Manual will be provided at final engineering.

APPENDIX A
WWHM




Schematic
SCENARIOS
Predeveloped
Mitigated
Run Scenario
Basic Elements
Pro Elements
LID Toolbox
Commercial Toolbox
Move Elements
Save x,y
Load x,y
Tue 11:13a - 25031_PDR VAULT_260203 - Finish Mitigated
DEV Mitigated
Subbasin Name: DEV
Designate as Bypass for POC:
Surface
Interflow
Groundwater
Flows To :
Vault 1
Vault 1
Area in Basin
Show Only Selected
Available Pervious
Acres
C, Pasture, Flat
.131
Available Impervious
Acres
ROADS/FLAT
.224
ROOF TOPS/FLAT
.364
SIDEWALKS/FLAT
.075
Pervious Total
0.131
Acres
Impervious Total
0.663
Acres
Basin Total
0.794
Acres
Deselect Zero
Select By:
GO


Schematic
SCENARIOS
Predeveloped
Mitigated
Run Scenario
Basic Elements
Pro Elements
LID Toolbox
Commercial Toolbox
Move Elements
Save x,y
Load x,y
Tue 11:13a - 25031_PDR VAULT_260203 - Finish Mitigated
BYPASS Mitigated
Subbasin Name: BYPASS
Designate as Bypass for POC:
Surface
Interflow
Groundwater
Flows To :
Area in Basin
Show Only Selected
Available Pervious
Acres
C, Pasture, Flat
.004
Available Impervious
Acres
SIDEWALKS/FLAT
.022
Pervious Total
0.004
Acres
Impervious Total
0.022
Acres
Basin Total
0.026
Acres
Deselect Zero
Select By:
GO

WWHM2012

PROJECT REPORT

General Model Information

WWHM2012 Project Name: 25031_PDR VAULT_260203

Site Name:	LYNNWOOD COMMONS
Site Address:	
City:	
Report Date:	2/3/2026
Gage:	Everett
Data Start:	1948/10/01
Data End:	2009/09/30
Timestep:	15 Minute
Precip Scale:	1.000
Version Date:	2024/06/28
Version:	4.3.1

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

PREDEV

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
C, Forest, Flat	0.82
Pervious Total	0.82
Impervious Land Use	acre
Impervious Total	0
Basin Total	0.82

Element Flow Componants:

Surface	Interflow	Groundwater
Componant Flows To:		
POC 1	POC 1	

Mitigated Land Use

DEV

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
C, Pasture, Flat	0.131
Pervious Total	0.131
Impervious Land Use	acre
ROADS FLAT	0.224
ROOF TOPS FLAT	0.364
SIDEWALKS FLAT	0.075
Impervious Total	0.663
Basin Total	0.794

Element Flow Componants:

Surface	Interflow	Groundwater
Componant Flows To:		
Vault 1	Vault 1	

BYPASS

Bypass:	Yes
GroundWater:	No
Pervious Land Use	acre
C, Pasture, Flat	0.004
Pervious Total	0.004
Impervious Land Use	acre
SIDEWALKS FLAT	0.022
Impervious Total	0.022
Basin Total	0.026

Element Flow Componants:

Surface	Interflow	Groundwater

Componant Flows To:

POC 1	POC 1

Routing Elements
Predeveloped Routing

Mitigated Routing

Vault 1

Width:	52 ft.	
Length:	52 ft.	
Depth:	6.5 ft.	
Discharge Structure		
Riser Height:	5.5 ft.	
Riser Diameter:	12 in.	
Orifice 1 Diameter:	0.420 in.	Elevation:0 ft.
Orifice 2 Diameter:	0.750 in.	Elevation:3.5 ft.
Orifice 3 Diameter:	1.500 in.	Elevation:4.25 ft.

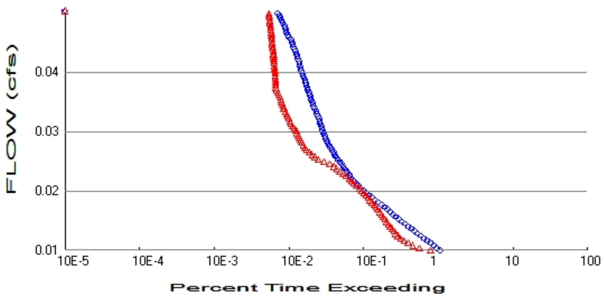
Element Outlets:
Outlet 1 Outlet 2
Outlet Flows To:

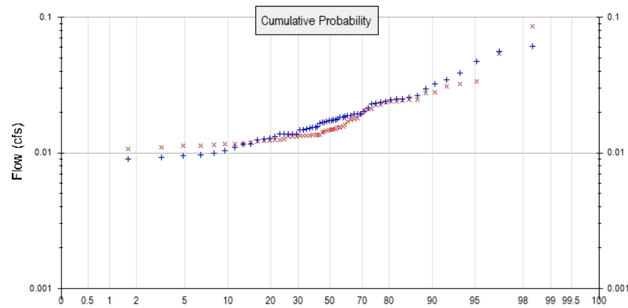
Vault Hydraulic Table

Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	Infilt(cfs)
0.0000	0.062	0.000	0.000	0.000
0.0722	0.062	0.004	0.001	0.000
0.1444	0.062	0.009	0.001	0.000
0.2167	0.062	0.013	0.002	0.000
0.2889	0.062	0.017	0.002	0.000
0.3611	0.062	0.022	0.002	0.000
0.4333	0.062	0.026	0.003	0.000
0.5056	0.062	0.031	0.003	0.000
0.5778	0.062	0.035	0.003	0.000
0.6500	0.062	0.040	0.003	0.000
0.7222	0.062	0.044	0.004	0.000
0.7944	0.062	0.049	0.004	0.000
0.8667	0.062	0.053	0.004	0.000
0.9389	0.062	0.058	0.004	0.000
1.0111	0.062	0.062	0.004	0.000
1.0833	0.062	0.067	0.005	0.000
1.1556	0.062	0.071	0.005	0.000
1.2278	0.062	0.076	0.005	0.000
1.3000	0.062	0.080	0.005	0.000
1.3722	0.062	0.085	0.005	0.000
1.4444	0.062	0.089	0.005	0.000
1.5167	0.062	0.094	0.005	0.000
1.5889	0.062	0.098	0.006	0.000
1.6611	0.062	0.103	0.006	0.000
1.7333	0.062	0.107	0.006	0.000
1.8056	0.062	0.112	0.006	0.000
1.8778	0.062	0.116	0.006	0.000
1.9500	0.062	0.121	0.006	0.000
2.0222	0.062	0.125	0.006	0.000
2.0944	0.062	0.130	0.006	0.000
2.1667	0.062	0.134	0.007	0.000
2.2389	0.062	0.139	0.007	0.000
2.3111	0.062	0.143	0.007	0.000
2.3833	0.062	0.147	0.007	0.000
2.4556	0.062	0.152	0.007	0.000
2.5278	0.062	0.156	0.007	0.000
2.6000	0.062	0.161	0.007	0.000

2.6722	0.062	0.165	0.007	0.000
2.7444	0.062	0.170	0.007	0.000
2.8167	0.062	0.174	0.008	0.000
2.8889	0.062	0.179	0.008	0.000
2.9611	0.062	0.183	0.008	0.000
3.0333	0.062	0.188	0.008	0.000
3.1056	0.062	0.192	0.008	0.000
3.1778	0.062	0.197	0.008	0.000
3.2500	0.062	0.201	0.008	0.000
3.3222	0.062	0.206	0.008	0.000
3.3944	0.062	0.210	0.008	0.000
3.4667	0.062	0.215	0.008	0.000
3.5389	0.062	0.219	0.012	0.000
3.6111	0.062	0.224	0.014	0.000
3.6833	0.062	0.228	0.015	0.000
3.7556	0.062	0.233	0.017	0.000
3.8278	0.062	0.237	0.018	0.000
3.9000	0.062	0.242	0.019	0.000
3.9722	0.062	0.246	0.020	0.000
4.0444	0.062	0.251	0.020	0.000
4.1167	0.062	0.255	0.021	0.000
4.1889	0.062	0.260	0.022	0.000
4.2611	0.062	0.264	0.029	0.000
4.3333	0.062	0.269	0.041	0.000
4.4056	0.062	0.273	0.048	0.000
4.4778	0.062	0.278	0.054	0.000
4.5500	0.062	0.282	0.059	0.000
4.6222	0.062	0.286	0.063	0.000
4.6944	0.062	0.291	0.067	0.000
4.7667	0.062	0.295	0.071	0.000
4.8389	0.062	0.300	0.075	0.000
4.9111	0.062	0.304	0.078	0.000
4.9833	0.062	0.309	0.081	0.000
5.0556	0.062	0.313	0.084	0.000
5.1278	0.062	0.318	0.087	0.000
5.2000	0.062	0.322	0.090	0.000
5.2722	0.062	0.327	0.093	0.000
5.3444	0.062	0.331	0.095	0.000
5.4167	0.062	0.336	0.098	0.000
5.4889	0.062	0.340	0.100	0.000
5.5611	0.062	0.345	0.263	0.000
5.6333	0.062	0.349	0.615	0.000
5.7056	0.062	0.354	1.050	0.000
5.7778	0.062	0.358	1.493	0.000
5.8500	0.062	0.363	1.874	0.000
5.9222	0.062	0.367	2.143	0.000
5.9944	0.062	0.372	2.309	0.000
6.0667	0.062	0.376	2.489	0.000
6.1389	0.062	0.381	2.638	0.000
6.2111	0.062	0.385	2.778	0.000
6.2833	0.062	0.390	2.912	0.000
6.3556	0.062	0.394	3.039	0.000
6.4278	0.062	0.399	3.162	0.000
6.5000	0.062	0.403	3.279	0.000
6.5722	0.062	0.408	3.393	0.000
6.6444	0.000	0.000	3.503	0.000

Analysis Results
POC 1





+ Predeveloped   x Mitigated

Predeveloped Landuse Totals for POC #1
Total Pervious Area: 0.82
Total Impervious Area: 0

Mitigated Landuse Totals for POC #1
Total Pervious Area: 0.135
Total Impervious Area: 0.685

Flow Frequency Method: Log Pearson Type III 17B

Flow Frequency Return Periods for Predeveloped. POC #1

Return Period	**Flow(cfs)**
2 year	0.017578
5 year	0.026017
10 year	0.031796
25 year	0.039248
50 year	0.044886
100 year	0.050585

Flow Frequency Return Periods for Mitigated. POC #1

Return Period	**Flow(cfs)**
2 year	0.015901
5 year	0.022992
10 year	0.028796
25 year	0.037556
50 year	0.045233
100 year	0.054001

Annual Peaks
Annual Peaks for Predeveloped and Mitigated. POC #1

Year	**Predeveloped**	**Mitigated**
1949	0.010	0.014
1950	0.019	0.017
1951	0.016	0.012
1952	0.013	0.014
1953	0.010	0.015
1954	0.039	0.020
1955	0.026	0.024
1956	0.023	0.028
1957	0.026	0.015
1958	0.017	0.025

1959	0.019	0.013
1960	0.017	0.013
1961	0.017	0.031
1962	0.015	0.013
1963	0.018	0.016
1964	0.016	0.011
1965	0.017	0.012
1966	0.010	0.011
1967	0.021	0.022
1968	0.025	0.016
1969	0.019	0.025
1970	0.014	0.014
1971	0.019	0.032
1972	0.017	0.019
1973	0.014	0.015
1974	0.024	0.017
1975	0.014	0.015
1976	0.013	0.014
1977	0.011	0.012
1978	0.014	0.012
1979	0.025	0.018
1980	0.015	0.012
1981	0.013	0.011
1982	0.017	0.013
1983	0.024	0.015
1984	0.017	0.024
1985	0.023	0.024
1986	0.056	0.054
1987	0.025	0.028
1988	0.014	0.012
1989	0.012	0.014
1990	0.018	0.013
1991	0.019	0.013
1992	0.015	0.013
1993	0.010	0.010
1994	0.009	0.013
1995	0.019	0.013
1996	0.032	0.014
1997	0.061	0.085
1998	0.012	0.015
1999	0.017	0.012
2000	0.009	0.021
2001	0.003	0.011
2002	0.018	0.023
2003	0.013	0.012
2004	0.020	0.021
2005	0.015	0.011
2006	0.035	0.024
2007	0.030	0.018
2008	0.047	0.034
2009	0.015	0.015

Ranked Annual Peaks

Ranked Annual Peaks for Predeveloped and Mitigated. POC #1

Rank	Predeveloped	Mitigated
1	0.0614	0.0853
2	0.0562	0.0541
3	0.0470	0.0336

4	0.0389	0.0323
5	0.0347	0.0309
6	0.0322	0.0279
7	0.0296	0.0276
8	0.0264	0.0246
9	0.0259	0.0245
10	0.0251	0.0242
11	0.0250	0.0239
12	0.0247	0.0238
13	0.0241	0.0237
14	0.0235	0.0225
15	0.0233	0.0225
16	0.0228	0.0210
17	0.0214	0.0210
18	0.0203	0.0204
19	0.0194	0.0193
20	0.0194	0.0179
21	0.0193	0.0179
22	0.0189	0.0175
23	0.0188	0.0170
24	0.0185	0.0162
25	0.0183	0.0157
26	0.0182	0.0154
27	0.0178	0.0154
28	0.0175	0.0150
29	0.0175	0.0150
30	0.0174	0.0147
31	0.0173	0.0147
32	0.0171	0.0146
33	0.0169	0.0145
34	0.0167	0.0142
35	0.0166	0.0136
36	0.0157	0.0136
37	0.0155	0.0135
38	0.0155	0.0135
39	0.0152	0.0134
40	0.0150	0.0134
41	0.0148	0.0134
42	0.0147	0.0133
43	0.0138	0.0133
44	0.0138	0.0132
45	0.0137	0.0131
46	0.0137	0.0126
47	0.0137	0.0125
48	0.0132	0.0124
49	0.0129	0.0122
50	0.0126	0.0122
51	0.0125	0.0122
52	0.0117	0.0120
53	0.0116	0.0117
54	0.0110	0.0116
55	0.0103	0.0116
56	0.0099	0.0115
57	0.0096	0.0113
58	0.0095	0.0112
59	0.0093	0.0110
60	0.0090	0.0106
61	0.0031	0.0101

Duration Flows
The Facility PASSED

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.0088	22629	16867	74	Pass
0.0092	20527	11939	58	Pass
0.0095	18574	9822	52	Pass
0.0099	16801	8457	50	Pass
0.0102	15182	7448	49	Pass
0.0106	13708	6699	48	Pass
0.0110	12474	6198	49	Pass
0.0113	11293	5775	51	Pass
0.0117	10254	5437	53	Pass
0.0121	9300	5135	55	Pass
0.0124	8461	4842	57	Pass
0.0128	7694	4588	59	Pass
0.0132	6945	4336	62	Pass
0.0135	6323	4100	64	Pass
0.0139	5775	3895	67	Pass
0.0143	5289	3696	69	Pass
0.0146	4851	3506	72	Pass
0.0150	4447	3290	73	Pass
0.0154	4092	3114	76	Pass
0.0157	3707	2943	79	Pass
0.0161	3375	2761	81	Pass
0.0164	3056	2605	85	Pass
0.0168	2748	2460	89	Pass
0.0172	2507	2293	91	Pass
0.0175	2308	2147	93	Pass
0.0179	2108	2010	95	Pass
0.0183	1955	1864	95	Pass
0.0186	1823	1707	93	Pass
0.0190	1699	1576	92	Pass
0.0194	1581	1468	92	Pass
0.0197	1483	1362	91	Pass
0.0201	1398	1234	88	Pass
0.0205	1329	1131	85	Pass
0.0208	1260	1025	81	Pass
0.0212	1198	938	78	Pass
0.0216	1138	849	74	Pass
0.0219	1081	749	69	Pass
0.0223	1025	633	61	Pass
0.0226	956	527	55	Pass
0.0230	915	471	51	Pass
0.0234	879	437	49	Pass
0.0237	846	397	46	Pass
0.0241	808	366	45	Pass
0.0245	767	347	45	Pass
0.0248	731	331	45	Pass
0.0252	700	316	45	Pass
0.0256	676	303	44	Pass
0.0259	655	295	45	Pass
0.0263	639	283	44	Pass
0.0267	620	274	44	Pass
0.0270	605	267	44	Pass
0.0274	588	251	42	Pass
0.0277	573	238	41	Pass

0.0281	560	227	40	Pass
0.0285	551	222	40	Pass
0.0288	539	212	39	Pass
0.0292	523	204	39	Pass
0.0296	510	200	39	Pass
0.0299	496	192	38	Pass
0.0303	473	183	38	Pass
0.0307	458	181	39	Pass
0.0310	448	173	38	Pass
0.0314	438	170	38	Pass
0.0318	428	167	39	Pass
0.0321	417	162	38	Pass
0.0325	402	156	38	Pass
0.0329	396	152	38	Pass
0.0332	385	147	38	Pass
0.0336	374	143	38	Pass
0.0339	362	142	39	Pass
0.0343	355	142	40	Pass
0.0347	349	141	40	Pass
0.0350	338	140	41	Pass
0.0354	329	140	42	Pass
0.0358	320	139	43	Pass
0.0361	310	139	44	Pass
0.0365	306	136	44	Pass
0.0369	300	136	45	Pass
0.0372	296	135	45	Pass
0.0376	288	135	46	Pass
0.0380	283	133	46	Pass
0.0383	276	133	48	Pass
0.0387	270	133	49	Pass
0.0391	260	132	50	Pass
0.0394	252	131	51	Pass
0.0398	245	129	52	Pass
0.0401	239	128	53	Pass
0.0405	234	128	54	Pass
0.0409	227	126	55	Pass
0.0412	215	126	58	Pass
0.0416	205	125	60	Pass
0.0420	200	124	62	Pass
0.0423	194	122	62	Pass
0.0427	188	121	64	Pass
0.0431	184	121	65	Pass
0.0434	176	119	67	Pass
0.0438	170	119	70	Pass
0.0442	165	117	70	Pass
0.0445	158	116	73	Pass
0.0449	152	115	75	Pass

Water Quality

Water Quality BMP Flow and Volume for POC #1

On-line facility volume:	0.0701 acre-feet
On-line facility target flow:	0.1077 cfs.
Adjusted for 15 min:	0.1077 cfs.
Off-line facility target flow:	0.061 cfs.
Adjusted for 15 min:	0.061 cfs.

Model Default Modifications

Total of 0 changes have been made.

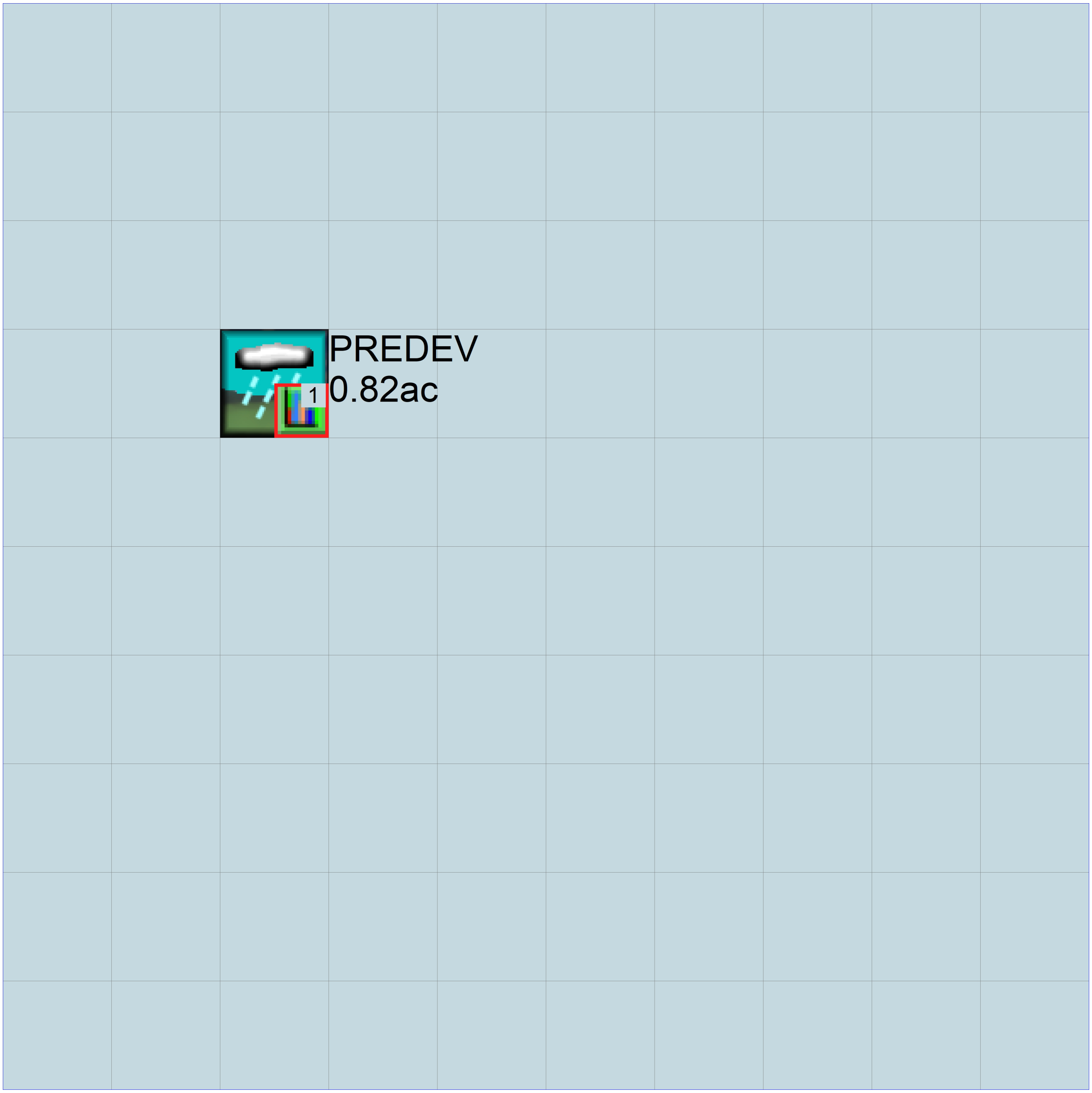
PERLND Changes

No PERLND changes have been made.

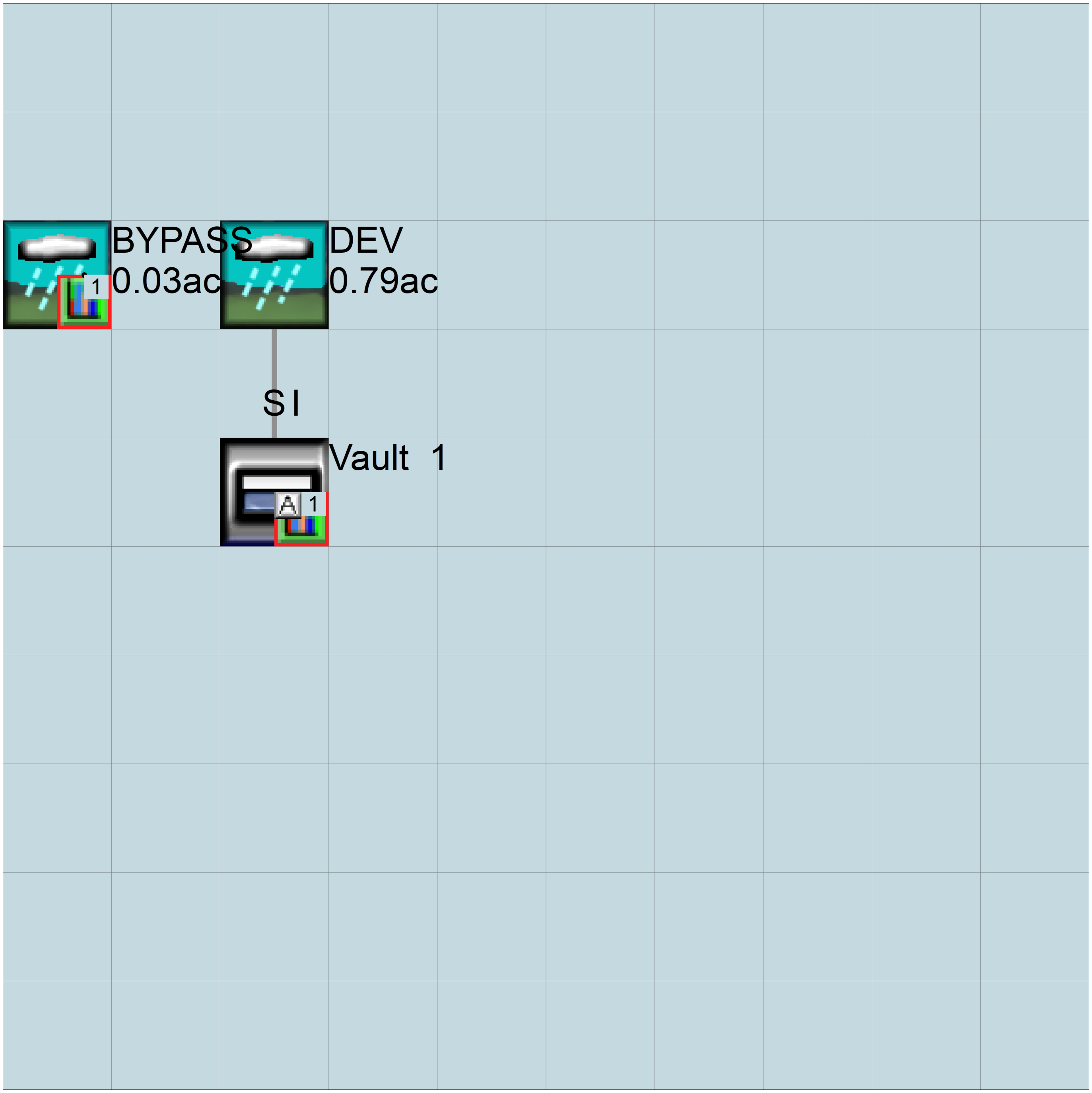
IMPLND Changes

No IMPLND changes have been made.

Appendix
Predeveloped Schematic



Mitigated Schematic



Predeveloped UCI File

```
RUN

GLOBAL
  WWHM4 model simulation
  START       1948 10 01        END    2009 09 30
  RUN INTERP OUTPUT LEVEL    3    0
  RESUME     0 RUN     1                   UNIT SYSTEM     1
END GLOBAL

FILES
<File>  <Un#>   <-----------File Name------------------------------>***
<-ID->                                                             ***
WDM        26   25031_PDR VAULT_260203.wdm
MESSU      25   Pre25031_PDR VAULT_260203.MES
           27   Pre25031_PDR VAULT_260203.L61
           28   Pre25031_PDR VAULT_260203.L62
           30   POC25031_PDR VAULT_2602031.dat
END FILES

OPN SEQUENCE
    INGRP              INDELT 00:15
      PERLND      10
      COPY       501
      DISPLY       1
    END INGRP
END OPN SEQUENCE
DISPLY
  DISPLY-INFO1
    # -  #<----------Title----------->***TRAN PIVL DIG1 FIL1  PYR DIG2 FIL2 YRND
    1        PREDEV                      MAX                      1    2   30    9
  END DISPLY-INFO1
END DISPLY
COPY
  TIMESERIES
    # -  #  NPT  NMN ***
    1         1    1
  501         1    1
  END TIMESERIES
END COPY
GENER
  OPCODE
    #    # OPCD ***
  END OPCODE
  PARM
    #    #         K ***
  END PARM
END GENER
PERLND
  GEN-INFO
    <PLS ><-------Name------->NBLKS   Unit-systems   Printer ***
    # -  #                            User  t-series Engl Metr ***
                                             in  out           ***
   10     C, Forest, Flat         1    1    1    1   27    0
  END GEN-INFO
  *** Section PWATER***

  ACTIVITY
    <PLS > ************* Active Sections *****************************
    # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC ***
   10         0    0    1    0    0    0    0    0    0    0    0    0
  END ACTIVITY

  PRINT-INFO
    <PLS > ***************** Print-flags ***************************** PIVL  PYR
    # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC  *********
   10         0    0    4    0    0    0    0    0    0    0    0    0    1    9
  END PRINT-INFO
```

```
  PWAT-PARM1
    <PLS >  PWATER variable monthly parameter value flags  ***
    # -  # CSNO RTOP UZFG  VCS  VUZ  VNN VIFW VIRC  VLE INFC  HWT ***
   10         0    0    0    0    0    0    0    0    0    0    0
  END PWAT-PARM1

  PWAT-PARM2
    <PLS >      PWATER input info: Part 2         ***
    # -  # ***FOREST      LZSN    INFILT      LSUR     SLSUR     KVARY     AGWRC
   10              0       4.5      0.08       400      0.05       0.5     0.996
  END PWAT-PARM2

  PWAT-PARM3
    <PLS >      PWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN    INFEXP    INFILD    DEEPFR    BASETP    AGWETP
   10              0         0         2         2         0         0         0
  END PWAT-PARM3
  PWAT-PARM4
    <PLS >     PWATER input info: Part 4                                     ***
    # -  #     CEPSC      UZSN      NSUR     INTFW       IRC     LZETP ***
   10            0.2       0.5      0.35         6       0.5       0.7
  END PWAT-PARM4

  PWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
              ran from 1990 to end of 1992 (pat 1-11-95) RUN 21 ***
    # -  # ***  CEPS      SURS       UZS      IFWS       LZS      AGWS      GWVS
   10              0         0         0         0       2.5         1         0
  END PWAT-STATE1

END PERLND

IMPLND
  GEN-INFO
    <PLS ><-------Name------->   Unit-systems   Printer ***
    # -  #                     User  t-series Engl Metr ***
                                      in  out           ***
  END GEN-INFO
  *** Section IWATER***

  ACTIVITY
    <PLS > ************* Active Sections ****************************
    # -  # ATMP SNOW IWAT  SLD  IWG IQAL   ***
  END ACTIVITY

  PRINT-INFO
    <ILS > ******** Print-flags ******** PIVL  PYR
    # -  # ATMP SNOW IWAT  SLD  IWG IQAL    *********
  END PRINT-INFO

  IWAT-PARM1
    <PLS >  IWATER variable monthly parameter value flags  ***
    # -  # CSNO RTOP  VRS  VNN RTLI     ***
  END IWAT-PARM1

  IWAT-PARM2
    <PLS >      IWATER input info: Part 2         ***
    # -  # ***  LSUR     SLSUR      NSUR     RETSC
  END IWAT-PARM2

  IWAT-PARM3
    <PLS >      IWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN
  END IWAT-PARM3

  IWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
    # -  # ***  RETS      SURS
  END IWAT-STATE1
```

```
END IMPLND

SCHEMATIC
<-Source->                  <--Area-->     <-Target->   MBLK   ***
<Name>   #                  <-factor->     <Name>   #   Tbl#   ***
PREDEV***
PERLND  10                        0.82     COPY   501     12
PERLND  10                        0.82     COPY   501     13

******Routing******
END SCHEMATIC

NETWORK
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   #        <Name> # #<-factor->strg <Name>   #   #        <Name> # #  ***
COPY   501 OUTPUT MEAN   1 1   48.4        DISPLY   1     INPUT  TIMSER 1



<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   #        <Name> # #<-factor->strg <Name>   #   #        <Name> # #  ***
END NETWORK

RCHRES
  GEN-INFO
    RCHRES       Name        Nexits   Unit Systems   Printer                 ***
    # -  #<------------------><---> User T-series  Engl Metr LKFG            ***
                                           in  out                           ***
  END GEN-INFO
  *** Section RCHRES***

  ACTIVITY
    <PLS > ************* Active Sections *****************************
    # -  # HYFG ADFG CNFG HTFG SDFG GQFG OXFG NUFG PKFG PHFG ***
  END ACTIVITY

  PRINT-INFO
    <PLS > ***************** Print-flags ****************** PIVL  PYR
    # -  # HYDR ADCA CONS HEAT  SED  GQL OXRX NUTR PLNK PHCB PIVL  PYR  *********
  END PRINT-INFO

  HYDR-PARM1
    RCHRES  Flags for each HYDR Section                                      ***
    # -  #  VC A1 A2 A3  ODFVFG for each *** ODGTFG for each     FUNCT  for each
            FG FG FG FG  possible  exit  *** possible  exit      possible  exit
             *  *  *  *    *  *  *  *  *       *  *  *  *  *         ***
  END HYDR-PARM1

  HYDR-PARM2
    # -  #    FTABNO       LEN     DELTH     STCOR        KS      DB50       ***
  <------><--------><--------><--------><--------><--------><-------->       ***
  END HYDR-PARM2
  HYDR-INIT
    RCHRES  Initial conditions for each HYDR section                         ***
    # -  # ***   VOL     Initial  value  of COLIND     Initial  value  of OUTDGT
         *** ac-ft     for each possible exit       for each possible exit
  <------><-------->     <---><---><---><---><---> *** <---><---><---><---><--->
  END HYDR-INIT
END RCHRES

SPEC-ACTIONS
END SPEC-ACTIONS
FTABLES
END FTABLES

EXT SOURCES
<-Volume-> <Member> SsysSgap<--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   # <Name> # tem strg<-factor->strg <Name>   #   #        <Name> # #  ***
WDM      2 PREC     ENGL    1              PERLND   1 999 EXTNL  PREC
WDM      2 PREC     ENGL    1              IMPLND   1 999 EXTNL  PREC
```

```
WDM       1 EVAP     ENGL    0.76            PERLND   1 999 EXTNL  PETINP
WDM       1 EVAP     ENGL    0.76            IMPLND   1 999 EXTNL  PETINP

END EXT SOURCES

EXT TARGETS
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Volume-> <Member> Tsys Tgap Amd ***
<Name>   #        <Name> # #<-factor->strg <Name>   # <Name>    tem strg strg***
COPY   501 OUTPUT MEAN   1 1     48.4      WDM    501 FLOW     ENGL      REPL
END EXT TARGETS

MASS-LINK
<Volume>   <-Grp> <-Member-><--Mult-->     <Target>       <-Grp> <-Member->***
<Name>            <Name> # #<-factor->     <Name>                <Name> # #***
  MASS-LINK       12
PERLND     PWATER SURO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK   12

  MASS-LINK       13
PERLND     PWATER IFWO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK   13


END MASS-LINK

END RUN
```

Mitigated UCI File

```
RUN

GLOBAL
  WWHM4 model simulation
  START       1948 10 01        END    2009 09 30
  RUN INTERP OUTPUT LEVEL    3    0
  RESUME     0 RUN     1                   UNIT SYSTEM     1
END GLOBAL

FILES
<File>  <Un#>   <-----------File Name------------------------------>***
<-ID->                                                             ***
WDM        26   25031_PDR VAULT_260203.wdm
MESSU      25   Mit25031_PDR VAULT_260203.MES
           27   Mit25031_PDR VAULT_260203.L61
           28   Mit25031_PDR VAULT_260203.L62
           30   POC25031_PDR VAULT_2602031.dat
END FILES

OPN SEQUENCE
    INGRP              INDELT 00:15
      PERLND      13
      IMPLND       1
      IMPLND       4
      IMPLND       8
      RCHRES       1
      COPY         1
      COPY       501
      COPY       601
      DISPLY       1
    END INGRP
END OPN SEQUENCE
DISPLY
  DISPLY-INFO1
    # -  #<----------Title----------->***TRAN PIVL DIG1 FIL1  PYR DIG2 FIL2 YRND
    1        Vault  1                    MAX                     1    2   30    9
  END DISPLY-INFO1
END DISPLY
COPY
  TIMESERIES
    # -  #  NPT  NMN ***
    1         1    1
  501         1    1
  601         1    1
  END TIMESERIES
END COPY
GENER
  OPCODE
    #    # OPCD ***
  END OPCODE
  PARM
    #    #         K ***
  END PARM
END GENER
PERLND
  GEN-INFO
    <PLS ><-------Name------->NBLKS   Unit-systems   Printer ***
    # -  #                          User  t-series Engl Metr ***
                                           in  out           ***
   13      C, Pasture, Flat        1    1    1    1   27    0
  END GEN-INFO
  *** Section PWATER***

  ACTIVITY
    <PLS > ************* Active Sections *****************************
    # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC ***
   13         0    0    1    0    0    0    0    0    0    0    0    0
  END ACTIVITY
```

```
  PRINT-INFO
    <PLS > ***************** Print-flags ***************************** PIVL  PYR
    # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC  *********
   13         0    0    4    0    0    0    0    0    0    0    0    0    1    9
  END PRINT-INFO

  PWAT-PARM1
    <PLS >  PWATER variable monthly parameter value flags  ***
    # -  # CSNO RTOP UZFG  VCS  VUZ  VNN VIFW VIRC  VLE INFC  HWT ***
   13         0    0    0    0    0    0    0    0    0    0    0
  END PWAT-PARM1

  PWAT-PARM2
    <PLS >      PWATER input info: Part 2         ***
    # -  # ***FOREST      LZSN    INFILT      LSUR     SLSUR     KVARY     AGWRC
   13              0       4.5      0.06       400      0.05       0.5     0.996
  END PWAT-PARM2

  PWAT-PARM3
    <PLS >      PWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN    INFEXP    INFILD    DEEPFR    BASETP    AGWETP
   13              0         0         2         2         0         0         0
  END PWAT-PARM3
  PWAT-PARM4
    <PLS >     PWATER input info: Part 4                                     ***
    # -  #     CEPSC      UZSN      NSUR     INTFW       IRC     LZETP ***
   13           0.15       0.4       0.3         6       0.5       0.4
  END PWAT-PARM4

  PWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
              ran from 1990 to end of 1992 (pat 1-11-95) RUN 21 ***
    # -  # ***  CEPS      SURS       UZS      IFWS       LZS      AGWS      GWVS
   13              0         0         0         0       2.5         1         0
  END PWAT-STATE1

END PERLND

IMPLND
  GEN-INFO
    <PLS ><-------Name------->   Unit-systems   Printer ***
    # -  #                     User  t-series Engl Metr ***
                                       in  out           ***
    1      ROADS/FLAT             1    1    1   27    0
    4      ROOF TOPS/FLAT         1    1    1   27    0
    8      SIDEWALKS/FLAT         1    1    1   27    0
  END GEN-INFO
  *** Section IWATER***

  ACTIVITY
    <PLS > ************* Active Sections *****************************
    # -  # ATMP SNOW IWAT  SLD  IWG IQAL   ***
    1         0    0    1    0    0    0
    4         0    0    1    0    0    0
    8         0    0    1    0    0    0
  END ACTIVITY

  PRINT-INFO
    <ILS > ******** Print-flags ******** PIVL  PYR
    # -  # ATMP SNOW IWAT  SLD  IWG IQAL    *********
    1         0    0    4    0    0    4    1    9
    4         0    0    4    0    0    0    1    9
    8         0    0    4    0    0    0    1    9
  END PRINT-INFO

  IWAT-PARM1
    <PLS >  IWATER variable monthly parameter value flags  ***
    # -  # CSNO RTOP  VRS  VNN RTLI     ***
    1         0    0    0    0    0
```

```
    4         0    0    0    0    0
    8         0    0    0    0    0
  END IWAT-PARM1

  IWAT-PARM2
    <PLS >      IWATER input info: Part 2         ***
    # -  # ***  LSUR     SLSUR      NSUR     RETSC
    1            400      0.01       0.1       0.1
    4            400      0.01       0.1       0.1
    8            400      0.01       0.1       0.1
  END IWAT-PARM2

  IWAT-PARM3
    <PLS >      IWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN
    1              0         0
    4              0         0
    8              0         0
  END IWAT-PARM3

  IWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
    # -  # ***  RETS      SURS
    1              0         0
    4              0         0
    8              0         0
  END IWAT-STATE1

END IMPLND

SCHEMATIC
<-Source->                  <--Area-->     <-Target->   MBLK   ***
<Name>   #                  <-factor->     <Name>   #   Tbl#   ***
DEV***
PERLND  13                       0.131     RCHRES   1      2
PERLND  13                       0.131     RCHRES   1      3
IMPLND   1                       0.224     RCHRES   1      5
IMPLND   4                       0.364     RCHRES   1      5
IMPLND   8                       0.075     RCHRES   1      5
BYPASS***
PERLND  13                       0.004     COPY   501     12
PERLND  13                       0.004     COPY   601     12
PERLND  13                       0.004     COPY   501     13
PERLND  13                       0.004     COPY   601     13
IMPLND   8                       0.022     COPY   501     15
IMPLND   8                       0.022     COPY   601     15

******Routing******
PERLND  13                       0.131     COPY     1     12
IMPLND   1                       0.224     COPY     1     15
IMPLND   4                       0.364     COPY     1     15
IMPLND   8                       0.075     COPY     1     15
PERLND  13                       0.131     COPY     1     13
RCHRES   1                           1     COPY   501     16
END SCHEMATIC

NETWORK
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   #        <Name> # #<-factor->strg <Name>   #   #        <Name> # #  ***
COPY   501 OUTPUT MEAN   1 1   48.4        DISPLY   1     INPUT  TIMSER 1



<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   #        <Name> # #<-factor->strg <Name>   #   #        <Name> # #  ***
END NETWORK

RCHRES
  GEN-INFO
    RCHRES       Name        Nexits   Unit Systems   Printer                 ***
```

```
    # -  #<------------------><---> User T-series  Engl Metr LKFG            ***
                                           in  out                           ***
    1     Vault  1                1    1    1    1   28    0    1
  END GEN-INFO
  *** Section RCHRES***

  ACTIVITY
    <PLS > ************* Active Sections *****************************
    # -  # HYFG ADFG CNFG HTFG SDFG GQFG OXFG NUFG PKFG PHFG ***
    1         1    0    0    0    0    0    0    0    0    0
  END ACTIVITY

  PRINT-INFO
    <PLS > ***************** Print-flags ****************** PIVL  PYR
    # -  # HYDR ADCA CONS HEAT  SED  GQL OXRX NUTR PLNK PHCB PIVL  PYR  *********
    1         4    0    0    0    0    0    0    0    0    0    1    9
  END PRINT-INFO

  HYDR-PARM1
    RCHRES  Flags for each HYDR Section                                      ***
    # -  #  VC A1 A2 A3  ODFVFG for each *** ODGTFG for each     FUNCT  for each
            FG FG FG FG  possible  exit  *** possible  exit      possible  exit
             *  *  *  *     *  *  *  *  *       *  *  *  *  *        ***
    1        0  1  0  0    4  0  0  0  0       0  0  0  0  0       2  2  2  2  2
  END HYDR-PARM1

  HYDR-PARM2
    # -  #    FTABNO       LEN     DELTH     STCOR        KS      DB50       ***
  <------><--------><--------><--------><--------><--------><-------->       ***
    1              1      0.01       0.0       0.0       0.5       0.0
  END HYDR-PARM2
  HYDR-INIT
    RCHRES  Initial conditions for each HYDR section                         ***
    # -  # ***   VOL     Initial  value  of COLIND     Initial  value  of OUTDGT
         *** ac-ft     for each possible exit       for each possible exit
  <------><-------->     <---><---><---><---><---> *** <---><---><---><---><--->
    1           0         4.0  0.0  0.0  0.0  0.0       0.0  0.0  0.0  0.0  0.0
  END HYDR-INIT
END RCHRES

SPEC-ACTIONS
END SPEC-ACTIONS
FTABLES
  FTABLE      1
   92    4
     Depth      Area    Volume  Outflow1 Velocity  Travel Time***
      (ft)   (acres) (acre-ft)   (cfs)   (ft/sec)    (Minutes)***
  0.000000  0.062075  0.000000  0.000000
  0.072222  0.062075  0.004483  0.001286
  0.144444  0.062075  0.008966  0.001819
  0.216667  0.062075  0.013450  0.002228
  0.288889  0.062075  0.017933  0.002573
  0.361111  0.062075  0.022416  0.002877
  0.433333  0.062075  0.026899  0.003151
  0.505556  0.062075  0.031383  0.003404
  0.577778  0.062075  0.035866  0.003639
  0.650000  0.062075  0.040349  0.003859
  0.722222  0.062075  0.044832  0.004068
  0.794444  0.062075  0.049315  0.004267
  0.866667  0.062075  0.053799  0.004456
  0.938889  0.062075  0.058282  0.004638
  1.011111  0.062075  0.062765  0.004813
  1.083333  0.062075  0.067248  0.004982
  1.155556  0.062075  0.071731  0.005146
  1.227778  0.062075  0.076215  0.005304
  1.300000  0.062075  0.080698  0.005458
  1.372222  0.062075  0.085181  0.005608
  1.444444  0.062075  0.089664  0.005753
  1.516667  0.062075  0.094148  0.005895
  1.588889  0.062075  0.098631  0.006034
```

1.661111	0.062075	0.103114	0.006170
1.733333	0.062075	0.107597	0.006302
1.805556	0.062075	0.112080	0.006432
1.877778	0.062075	0.116564	0.006560
1.950000	0.062075	0.121047	0.006685
2.022222	0.062075	0.125530	0.006807
2.094444	0.062075	0.130013	0.006928
2.166667	0.062075	0.134496	0.007046
2.238889	0.062075	0.138980	0.007163
2.311111	0.062075	0.143463	0.007277
2.383333	0.062075	0.147946	0.007390
2.455556	0.062075	0.152429	0.007501
2.527778	0.062075	0.156913	0.007611
2.600000	0.062075	0.161396	0.007719
2.672222	0.062075	0.165879	0.007825
2.744444	0.062075	0.170362	0.007930
2.816667	0.062075	0.174845	0.008034
2.888889	0.062075	0.179329	0.008136
2.961111	0.062075	0.183812	0.008237
3.033333	0.062075	0.188295	0.008337
3.105556	0.062075	0.192778	0.008436
3.177778	0.062075	0.197262	0.008533
3.250000	0.062075	0.201745	0.008630
3.322222	0.062075	0.206228	0.008725
3.394444	0.062075	0.210711	0.008819
3.466667	0.062075	0.215194	0.008913
3.538889	0.062075	0.219678	0.012015
3.611111	0.062075	0.224161	0.014185
3.683333	0.062075	0.228644	0.015723
3.755556	0.062075	0.233127	0.016993
3.827778	0.062075	0.237610	0.018105
3.900000	0.062075	0.242094	0.019108
3.972222	0.062075	0.246577	0.020030
4.044444	0.062075	0.251060	0.020890
4.116667	0.062075	0.255543	0.021699
4.188889	0.062075	0.260027	0.022467
4.261111	0.062075	0.264510	0.029634
4.333333	0.062075	0.268993	0.041525
4.405556	0.062075	0.273476	0.048655
4.477778	0.062075	0.277959	0.054364
4.550000	0.062075	0.282443	0.059295
4.622222	0.062075	0.286926	0.063713
4.694444	0.062075	0.291409	0.067760
4.766667	0.062075	0.295892	0.071519
4.838889	0.062075	0.300375	0.075048
4.911111	0.062075	0.304859	0.078386
4.983333	0.062075	0.309342	0.081564
5.055556	0.062075	0.313825	0.084602
5.127778	0.062075	0.318308	0.087520
5.200000	0.062075	0.322792	0.090330
5.272222	0.062075	0.327275	0.093045
5.344444	0.062075	0.331758	0.095673
5.416667	0.062075	0.336241	0.098224
5.488889	0.062075	0.340724	0.100703
5.561111	0.062075	0.345208	0.263114
5.633333	0.062075	0.349691	0.615132
5.705556	0.062075	0.354174	1.049989
5.777778	0.062075	0.358657	1.493565
5.850000	0.062075	0.363140	1.874287
5.922222	0.062075	0.367624	2.143751
5.994444	0.062075	0.372107	2.309375
6.066667	0.062075	0.376590	2.489497
6.138889	0.062075	0.381073	2.638089
6.211111	0.062075	0.385557	2.778570
6.283333	0.062075	0.390040	2.912146
6.355556	0.062075	0.394523	3.039750
6.427778	0.062075	0.399006	3.162122
6.500000	0.062075	0.403489	3.279860
6.572222	0.062075	0.407973	3.393456

END FTABLE 1

```
END FTABLES

EXT SOURCES
<-Volume-> <Member> SsysSgap<--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   # <Name> # tem strg<-factor->strg <Name>   #   #        <Name> # #  ***
WDM      2 PREC     ENGL    1              PERLND   1 999 EXTNL  PREC
WDM      2 PREC     ENGL    1              IMPLND   1 999 EXTNL  PREC
WDM      1 EVAP     ENGL    0.76           PERLND   1 999 EXTNL  PETINP
WDM      1 EVAP     ENGL    0.76           IMPLND   1 999 EXTNL  PETINP

END EXT SOURCES

EXT TARGETS
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Volume-> <Member> Tsys Tgap Amd ***
<Name>   #        <Name> # #<-factor->strg <Name>   # <Name>    tem strg strg***
RCHRES   1 HYDR   RO      1 1        1     WDM   1000 FLOW     ENGL      REPL
RCHRES   1 HYDR   STAGE   1 1        1     WDM   1001 STAG     ENGL      REPL
COPY     1 OUTPUT MEAN    1 1     48.4     WDM    701 FLOW     ENGL      REPL
COPY   501 OUTPUT MEAN    1 1     48.4     WDM    801 FLOW     ENGL      REPL
COPY   601 OUTPUT MEAN    1 1     48.4     WDM    901 FLOW     ENGL      REPL
END EXT TARGETS

MASS-LINK
<Volume>   <-Grp> <-Member-><--Mult-->     <Target>       <-Grp> <-Member->***
<Name>            <Name> # #<-factor->     <Name>                <Name> # #***
  MASS-LINK        2
PERLND     PWATER SURO       0.083333      RCHRES         INFLOW IVOL
  END MASS-LINK    2

  MASS-LINK        3
PERLND     PWATER IFWO       0.083333      RCHRES         INFLOW IVOL
  END MASS-LINK    3

  MASS-LINK        5
IMPLND     IWATER SURO       0.083333      RCHRES         INFLOW IVOL
  END MASS-LINK    5

  MASS-LINK       12
PERLND     PWATER SURO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK   12

  MASS-LINK       13
PERLND     PWATER IFWO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK   13

  MASS-LINK       15
IMPLND     IWATER SURO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK   15

  MASS-LINK       16
RCHRES     ROFLOW                          COPY           INPUT  MEAN
  END MASS-LINK   16


END MASS-LINK

END RUN
```

Predeveloped HSPF Message File

```
ERROR/WARNING ID:   238   1

The continuity error reported below is greater than 1 part in 1000 and is
therefore considered high.

Did you specify any "special actions"?  If so, they could account for it.

Relevant data are:
DATE/TIME: 1951/ 7/31 24: 0

RCHRES :    1

RELERR       STORS        STOR       MATIN      MATDIF
-6.013E-03     0.00000  0.0000E+00     0.00000  -1.953E-08

Where:

RELERR is the relative error (ERROR/REFVAL).
ERROR  is (STOR-STORS) - MATDIF.
REFVAL is the reference value (STORS+MATIN).
STOR   is the storage of material in the processing unit (land-segment or
reach/reservior) at the end of the present interval.
STORS  is the storage of material in the pu at the start of the present
printout reporting period.
MATIN  is the total inflow of material to the pu during the present printout
reporting period.
MATDIF is the net inflow (inflow-outflow) of material to the pu during the
present printout reporting period.
```

```
ERROR/WARNING ID:   238   1

The continuity error reported below is greater than 1 part in 1000 and is
therefore considered high.

Did you specify any "special actions"?  If so, they could account for it.

Relevant data are:
DATE/TIME: 1958/ 8/31 24: 0

RCHRES :    1

RELERR       STORS        STOR       MATIN      MATDIF
-3.313E-01     0.00000  0.0000E+00     0.00000  -2.298E-10

Where:

RELERR is the relative error (ERROR/REFVAL).
ERROR  is (STOR-STORS) - MATDIF.
REFVAL is the reference value (STORS+MATIN).
STOR   is the storage of material in the processing unit (land-segment or
reach/reservior) at the end of the present interval.
STORS  is the storage of material in the pu at the start of the present
printout reporting period.
MATIN  is the total inflow of material to the pu during the present printout
reporting period.
MATDIF is the net inflow (inflow-outflow) of material to the pu during the
present printout reporting period.
```

```
ERROR/WARNING ID:   238   1

The continuity error reported below is greater than 1 part in 1000 and is
therefore considered high.

Did you specify any "special actions"?  If so, they could account for it.

Relevant data are:
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DATE/TIME: 1967/ 8/31 24: 0

RCHRES :    1

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Where:

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ERROR  is (STOR-STORS) - MATDIF.
REFVAL is the reference value (STORS+MATIN).
STOR   is the storage of material in the processing unit (land-segment or
reach/reservior) at the end of the present interval.
STORS  is the storage of material in the pu at the start of the present
printout reporting period.
MATIN  is the total inflow of material to the pu during the present printout
reporting period.
MATDIF is the net inflow (inflow-outflow) of material to the pu during the
present printout reporting period.
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ERROR/WARNING ID:   238   1

The continuity error reported below is greater than 1 part in 1000 and is
therefore considered high.

Did you specify any "special actions"?  If so, they could account for it.

Relevant data are:
DATE/TIME: 1994/ 8/31 24: 0

RCHRES :    1

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Where:

RELERR is the relative error (ERROR/REFVAL).
ERROR  is (STOR-STORS) - MATDIF.
REFVAL is the reference value (STORS+MATIN).
STOR   is the storage of material in the processing unit (land-segment or
reach/reservior) at the end of the present interval.
STORS  is the storage of material in the pu at the start of the present
printout reporting period.
MATIN  is the total inflow of material to the pu during the present printout
reporting period.
MATDIF is the net inflow (inflow-outflow) of material to the pu during the
present printout reporting period.
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Disclaimer

Legal Notice

Clear Creek Solutions, Inc.
6200 Capitol Blvd. Ste F
Olympia, WA. 98501
Toll Free 1(866)943-0304
Local (360)943-0304

www.clearcreeksolutions.com

APPENDIX B
GEOTECH REPORT

Cobalt Geosciences, LLC
P.O. Box 1792
North Bend, WA 98045

May 5, 2025

Ajay Sikka
ajays@live.com

RE: Geotechnical Evaluation
Proposed Development
20305 68th Avenue W
Lynnwood, Washington

In accordance with your authorization, Cobalt Geosciences, LLC has prepared this report to discuss the results of our geotechnical evaluation at the referenced site.

The purpose of our evaluation was to provide recommendations for foundation design, grading, and earthwork.

Site & Project Description

The site is located at 20305 68th Avenue W in Lynnwood, Washington. The site consists of one rectangular shaped parcel (No. 00515400000902) with a total area of 0.78 acres.

The central portion of the property is developed with a residence and detached structure. The remainder of the property is vegetated with grasses, bushes, blackberry vines, ferns, ivy, other understory and trees.

The site is nearly level to slightly sloping in multiple directions with minimal relief and low magnitude. The site is bordered to the north, east, and south by residential properties, and to the west by 68th Avenue W.

The proposed development includes a new apartment building with a parking garage and retail/office space. Stormwater will include infiltration or other systems depending on feasibility.

Site grading may include cuts and fills of 3 feet or less and foundation loads are expected to be moderate to light.

We should be provided with the final plans to verify that our recommendations remain valid and do not require updating.

Area Geology

The Geologic Map of the Edmonds East and Part of the Edmonds West Quadrangles, indicates that the site is underlain by Vashon Glacial Till.

Vashon Glacial Till includes mixtures of silt, sand, clay, and gravel. These materials are usually impermeable and are typically dense to very dense below a weathered zone.

Soil & Groundwater Conditions

As part of our evaluation, we excavated two test pits within the property, where accessible.

The explorations encountered approximately 6 inches of grass and topsoil underlain by approximately 2.5 feet of loose to medium dense, silty-fine to medium grained sand trace gravel (Weathered Glacial Till). These materials were underlain by dense to very dense, silty-fine to medium grained sand trace gravel (Vashon Glacial Till), which continued to the termination depths of the explorations.

While groundwater was not observed, the soils were locally mottled between about 2 and 3 feet below grade. Minor interflow may develop within the upper glacial till soils, likely where the soils become relatively dense.

Water table elevations often fluctuate over time. The groundwater level will depend on a variety of factors that may include seasonal precipitation, irrigation, land use, climatic conditions and soil permeability. Water levels at the time of the field investigation may be different from those encountered during the construction phase of the project.

Erosion Hazard

The Natural Resources Conservation Services (NRCS) maps for Snohomish County indicate that the site is underlain by Alderwood-Urban land complex (2 to 8 percent slopes). Based on our experience, the site soils would have a slight to moderate erosion potential in a disturbed state depending on the slope magnitude.

It is our opinion that soil erosion potential at this project site can be reduced through landscaping and surface water runoff control. Typically, erosion of exposed soils will be most noticeable during periods of rainfall and may be controlled by the use of normal temporary erosion control measures, such as silt fences, hay bales, mulching, control ditches and diversion trenches. The typical wet weather season, with regard to site grading, is from October 31st to April 1st. Erosion control measures should be in place before the onset of wet weather.

Seismic Hazard

The overall subsurface profile corresponds to a Site Class *C* as defined by Table 1613.5.2 of the International Building Code (IBC). A Site Class *C* applies to an overall profile consisting of dense to very dense soils within the upper 100 feet.

We referenced the U.S. Geological Survey (USGS) Earthquake Hazards Program Website to obtain values for S_S, S_1, F_a, and F_v. The USGS website includes the most updated published data on seismic conditions. The following tables provide seismic parameters from the USGS web site referenced parameters from ASCE 7-16 and ASCE 7-22.

Seismic Design Parameters (ASCE 7-16)

Site Class	Spectral Acceleration at 0.2 sec. (g)	Spectral Acceleration at 1.0 sec. (g)	Site Coefficients		Design Spectral Response Parameters		Design PGA
			F_a	F_v	S_{DS}	S_{D1}	
C	1.294	0.456	1.21	1.5	1.035	0.456	0.553

Seismic Design Parameters (ASCE 7-22)

Site Class	Spectral Acceleration at 0.2 sec. (g)	Spectral Acceleration at 1.0 sec. (g)	Site Coefficients		Design Spectral Response Parameters		Design PGA_M
			F_a	F_v	S_{DS}	S_{D1}	
C	1.45	0.53	-	-	1.07	0.48	0.62

Additional seismic considerations include liquefaction potential and amplification of ground motions by soft/loose soil deposits. The liquefaction potential is highest for loose sand with a high groundwater table. The site has a low likelihood of liquefaction. For items listed as "Null" see Section 11.4.8 of the ASCE.

Conclusions and Recommendations

General

The site is underlain by glacial till which becomes denser with depth. The proposed residential structure may be supported on a shallow foundation system bearing on medium dense or firmer native soils or on structural fill placed on the native soils. Local overexcavation of loose weathered native soils may be necessary depending on the proposed elevations and locations of the new footings.

Widespread infiltration of runoff is not feasible based on the soil conditions and possibility of shallow interflow perched on denser till during the winter months.

We recommend utilizing direct or perforated connection of runoff collection devices to City infrastructure. Detention may be required. We can provide additional recommendations once a civil plan with planned grading and building elevations has been prepared.

Site Preparation

Trees, shrubs and other vegetation should be removed prior to stripping of surficial organic-rich soil and fill. Based on observations from the site investigation program, it is anticipated that the stripping depth will be 6 to 12 inches. Deeper excavations will be necessary in areas of existing foundation systems (where present), larger trees where roots persist, and in any areas underlain by undocumented fill.

The native soils consist of silty-sand with gravel. Most of the native soils may be used as structural fill provided they achieve compaction requirements and are within 3 percent of the optimum moisture. Some of these soils may only be suitable for use as fill during the summer months, as they will be above the optimum moisture levels in their current state. These soils are HIGHLY moisture sensitive and may degrade during periods of wet weather and under equipment traffic.

Imported structural fill should consist of a sand and gravel mixture with a maximum grain size of 3 inches and less than 5 percent fines (material passing the U.S. Standard No. 200 Sieve). Structural fill should be placed in maximum lift thicknesses of 12 inches and should be compacted to a minimum of 95 percent of the modified proctor maximum dry density, as determined by the ASTM D 1557 test method.

Temporary Excavations

Based on our understanding of the project, we anticipate that the grading could include local cuts on the order of approximately 3 feet or less for foundation and most of the utility placement. Temporary excavations should be sloped no steeper than 1.5H:1V (Horizontal:Vertical) in loose native soils and fill, 1H:1V in medium dense native soils and 3/4H:1V in dense to very dense native soils. If an excavation is subject to heavy vibration or surcharge loads, we recommend that the excavations be sloped no steeper than 2H:1V, where room permits.

Temporary cuts should be in accordance with the Washington Administrative Code (WAC) Part N, Excavation, Trenching, and Shoring. Temporary slopes should be visually inspected daily by a qualified person during construction activities and the inspections should be documented in daily reports. The contractor is responsible for maintaining the stability of the temporary cut slopes and reducing slope erosion during construction.

Temporary cut slopes should be covered with visqueen to help reduce erosion during wet weather, and the slopes should be closely monitored until the permanent retaining systems or slope configurations are complete. Materials should not be stored or equipment operated within 10 feet of the top of any temporary cut slope.

Soil conditions may not be completely known from the geotechnical investigation. In the case of temporary cuts, the existing soil conditions may not be completely revealed until the excavation work exposes the soil. Typically, as excavation work progresses the maximum inclination of temporary slopes will need to be re-evaluated by the geotechnical engineer so that supplemental recommendations can be made. Soil and groundwater conditions can be highly variable. Scheduling for soil work will need to be adjustable, to deal with unanticipated conditions, so that the project can proceed and required deadlines can be met.

If any variations or undesirable conditions are encountered during construction, we should be notified so that supplemental recommendations can be made. If room constraints or groundwater conditions do not permit temporary slopes to be cut to the maximum angles allowed by the WAC, temporary shoring systems may be required. The contractor should be responsible for developing temporary shoring systems, if needed. We recommend that Cobalt Geosciences and the project structural engineer review temporary shoring designs prior to installation, to verify the suitability of the proposed systems.

Foundation Design

The proposed structure may be supported on a shallow spread footing foundation system bearing on undisturbed medium dense or firmer native soils or on properly compacted structural fill placed on the suitable native soils. Any undocumented fill and/or loose native soils should be removed and replaced with structural fill below foundation elements.

Structural fill below footings should consist of clean angular rock 5/8 to 4 inches in size. We should verify soil conditions during foundation excavation work.

For shallow foundation support, we recommend widths of at least 16 and 24 inches, respectively, for continuous wall and isolated column footings supporting the proposed structure. Provided that the footings are supported as recommended above, a net allowable bearing pressure of 3,000 pounds per square foot (psf) may be used for design. Vaults or foundations set at least 4 feet below grade may be designed with a bearing pressure of 5,000 psf.

A 1/3 increase in the above value may be used for short duration loads, such as those imposed by wind and seismic events. Structural fill placed on bearing, native subgrade should be compacted to at least 95 percent of the maximum dry density based on ASTM Test Method D1557. Footing excavations should be inspected to verify that the foundations will bear on suitable material.

Exterior footings should have a minimum depth of 18 inches below pad subgrade (soil grade) or adjacent exterior grade, whichever is lower. Interior footings should have a minimum depth of 12 inches below pad subgrade (soil grade) or adjacent exterior grade, whichever is lower.

If constructed as recommended, the total foundation settlement is not expected to exceed 1 inch. Differential settlement, along a 25-foot exterior wall footing, or between adjoining column footings, should be less than ½ inch. This translates to an angular distortion of 0.002. Most settlement is expected to occur during construction, as the loads are applied. However, additional post-construction settlement may occur if the foundation soils are flooded or saturated. All footing excavations should be observed by a qualified geotechnical consultant.

Resistance to lateral footing displacement can be determined using an allowable friction factor of 0.35 acting between the base of foundations and the supporting subgrades. Lateral resistance for footings can also be developed using an allowable equivalent fluid passive pressure of 300 pounds per cubic foot (pcf) acting against the appropriate vertical footing faces (neglect the upper 12 inches below grade in exterior areas). The frictional and passive resistance of the soil may be combined without reduction in determining the total lateral resistance.

Care should be taken to prevent wetting or drying of the bearing materials during construction. Any extremely wet or dry materials, or any loose or disturbed materials at the bottom of the footing excavations, should be removed prior to placing concrete. The potential for wetting or drying of the bearing materials can be reduced by pouring concrete as soon as possible after completing the footing excavation and evaluating the bearing surface by the geotechnical engineer or his representative.

Concrete Retaining Walls

The following table, titled **Wall Design Criteria**, presents the recommended soil related design parameters for retaining walls with a level backslope. Contact Cobalt if an alternate retaining wall system is used. This has been included for new cast in place walls.

Wall Design Criteria	
"At-rest" Conditions (Lateral Earth Pressure – EFD⁺)	55 pcf (Equivalent Fluid Density)
"Active" Conditions (Lateral Earth Pressure – EFD⁺)	35 pcf (Equivalent Fluid Density)
Seismic Increase for "At-rest" Conditions (Lateral Earth Pressure)	14H* (Uniform Distribution)
Seismic Increase for "Active" Conditions (Lateral Earth Pressure)	7H* (Uniform Distribution)
Passive Earth Pressure on Low Side of Wall (Allowable, includes F.S. = 1.5)	Neglect upper 12 inches, then 300 pcf EFD⁺
Soil-Footing Coefficient of Sliding Friction (Allowable; includes F.S. = 1.5)	0.35

*H is the height of the wall; Increase based on one in 500 year seismic event (10 percent probability of being exceeded in 50 years),
⁺EFD – Equivalent Fluid Density

The stated lateral earth pressures do not include the effects of hydrostatic pressure generated by water accumulation behind the retaining walls. Uniform horizontal lateral active and at-rest pressures on the retaining walls from vertical surcharges behind the wall may be calculated using active and at-rest lateral earth pressure coefficients of 0.3 and 0.5, respectively. A soil unit weight of 125 pcf may be used to calculate vertical earth surcharges.

To reduce the potential for the buildup of water pressure against the walls, continuous footing drains (with cleanouts) should be provided at the bases of the walls. The footing drains should consist of a minimum 4-inch diameter perforated pipe, sloped to drain, with perforations placed down and enveloped by a minimum 6 inches of pea gravel in all directions.

The backfill adjacent to and extending a lateral distance behind the walls at least 2 feet should consist of free-draining granular material. All free draining backfill should contain less than 3 percent fines (passing the U.S. Standard No. 200 Sieve) based upon the fraction passing the U.S. Standard No. 4 Sieve with at least 30 percent of the material being retained on the U.S. Standard No. 4 Sieve. The primary purpose of the free-draining material is the reduction of hydrostatic pressure. Some potential for the moisture to contact the back face of the wall may exist, even with treatment, which may require that more extensive waterproofing be specified for walls, which require interior moisture sensitive finishes.

We recommend that the backfill be compacted to at least 90 percent of the maximum dry density based on ASTM Test Method D1557. In place density tests should be performed to verify adequate compaction. Soil compactors place transient surcharges on the backfill. Consequently, only light hand operated equipment is recommended within 3 feet of walls so that excessive stress is not imposed on the walls.

Stormwater Management Feasibility

The site is underlain by fill and at depth by relatively dense glacial till. The unweathered till was cemented and acts as a restrictive layer. We performed a small scale pilot infiltration test (PIT) in TP-1. The test was performed in general accordance with the Washington State Department of Ecology stormwater manual.

The area was excavated to a testing depth of approximately 4 feet below the ground surface, just below a layer of fill. During testing, we reduced the flow rate into the hole to the minimum available with the equipment and water source being used and continued to observe a rising water level. Since a steady state rate was not achieved, we performed a falling head test until the testing water was fully infiltrated.

The design infiltration rate was determined by applying correction factors to the measured infiltration rate as prescribed in Volume III, Section 3.3.6 of the DOE. The measured rate must be reduced through appropriate correction factors for site variability (CF_V), uncertainty of test method (CF_T), and degree of influent control (CF_M) to prevent siltation and bio-buildup.

It should be noted that construction traffic or other disturbance to the target infiltration area could compact the soil, which may decrease the effective infiltration rates. The correction factors and resulting design infiltration rate are also shown in the table below.

Test Number	Test Depth (ft)	Measured Infiltration Rate (in/hr)	Correction Factors			Design Infiltration Rate (in/hr)
			CF_V	CF_T	CF_M	
TP-1	4.0	0.3	0.7	0.5	0.9	0.09

Widespread infiltration of runoff is not feasible based on the soil conditions and possibility of shallow interflow perched on denser till during the winter months.

We recommend utilizing direct or perforated connection of runoff collection devices to City infrastructure. Dispersion devices are generally feasible if there is adequate space. Detention may be required.

We can provide additional recommendations once a civil plan with planned grading and building elevations has been prepared. We should be provided with final plans for review to determine if the intent of our recommendations has been incorporated or if additional modifications are needed.

Slab-on-Grade

We recommend that the upper 12 inches of the native soils within slab areas be re-compacted to at least 95 percent of the modified proctor (ASTM D1557 Test Method).

Often, a vapor barrier is considered below concrete slab areas. However, the usage of a vapor barrier could result in curling of the concrete slab at joints. Floor covers sensitive to moisture typically requires the usage of a vapor barrier. A materials or structural engineer should be consulted regarding the detailing of the vapor barrier below concrete slabs. Exterior slabs typically do not utilize vapor barriers.

The American Concrete Institutes ACI 360R-06 Design of Slabs on Grade and ACI 302.1R-04 Guide for Concrete Floor and Slab Construction are recommended references for vapor barrier selection and floor slab detailing.

Slabs on grade may be designed using a coefficient of subgrade reaction of 180 pounds per cubic inch (pci) assuming the slab-on-grade base course is underlain by structural fill placed and compacted as outlined above. A 4- to 6-inch-thick capillary break layer should be placed over the prepared subgrade. This material should consist of pea gravel or 5/8 inch clean angular rock.

A perimeter drainage system is recommended unless interior slab areas are elevated a minimum of 12 inches above adjacent exterior grades. If installed, a perimeter drainage system should consist of a 4-inch diameter perforated drain pipe surrounded by a minimum 6 inches of drain rock wrapped in a non-woven geosynthetic filter fabric to reduce migration of soil particles into the drainage system. The perimeter drainage system should discharge by gravity flow to a suitable stormwater system.

Exterior grades surrounding buildings should be sloped at a minimum of one percent to facilitate surface water flow away from the building and preferably with a relatively impermeable surface cover immediately adjacent to the building.

Erosion and Sediment Control

Erosion and sediment control (ESC) is used to reduce the transportation of eroded sediment to wetlands, streams, lakes, drainage systems, and adjacent properties. Erosion and sediment control measures should be implemented, and these measures should be in general accordance with local regulations. At a minimum, the following basic recommendations should be incorporated into the design of the erosion and sediment control features for the site:

- Schedule the soil, foundation, utility, and other work requiring excavation or the disturbance of the site soils, to take place during the dry season (generally May through September). However, provided precautions are taken using Best Management Practices (BMP's), grading activities can be completed during the wet season (generally October through April).
- All site work should be completed and stabilized as quickly as possible.
- Additional perimeter erosion and sediment control features may be required to reduce the possibility of sediment entering the surface water. This may include additional silt fences, silt fences with a higher Apparent Opening Size (AOS), construction of a berm, or other filtration systems.
- Any runoff generated by dewatering discharge should be treated through construction of a sediment trap if there is sufficient space. If space is limited other filtration methods will need to be incorporated.

Utilities

Utility trenches should be excavated according to accepted engineering practices following OSHA (Occupational Safety and Health Administration) standards, by a contractor experienced in such work. The contractor is responsible for the safety of open trenches. Traffic and vibration adjacent to trench walls should be reduced; cyclic wetting and drying of excavation side slopes should be avoided. Depending upon the location and depth of some utility trenches, groundwater flow into open excavations could be experienced, especially during or shortly following periods of precipitation.

In general, silty and sandy soils were encountered at shallow depths in the explorations at this site. These soils have low cohesion and density and will have a tendency to cave or slough in excavations. Shoring or sloping back trench sidewalls is required within these soils in excavations greater than 4 feet deep.

All utility trench backfill should consist of imported structural fill or suitable on site soils. Utility trench backfill placed in or adjacent to buildings and exterior slabs should be compacted to at least 95 percent of the maximum dry density based on ASTM Test Method D1557. The upper 5 feet of utility trench backfill placed in pavement areas should be compacted to at least 95 percent of the maximum dry density based on ASTM Test Method D1557. Below 5 feet, utility trench backfill in pavement areas should be compacted to at least 90 percent of the maximum dry density based on ASTM Test Method D1557. Pipe bedding should be in accordance with the pipe manufacturer's recommendations.

The contractor is responsible for removing all water-sensitive soils from the trenches regardless of the backfill location and compaction requirements. Depending on the depth and location of the proposed utilities, we anticipate the need to re-compact existing fill soils below the utility structures and pipes. The contractor should use appropriate equipment and methods to avoid damage to the utilities and/or structures during fill placement and compaction procedures.

CONSTRUCTION FIELD REVIEWS

Cobalt Geosciences should be retained to provide part time field review during construction in order to verify that the soil conditions encountered are consistent with our design assumptions and that the intent of our recommendations is being met. This will require field and engineering review to:

- Monitor and test structural fill placement and soil compaction
- Observe bearing capacity at foundation locations
- Observe slab-on-grade preparation
- Observe soil conditions at stormwater system locations (if utilized)
- Monitor foundation drainage placement
- Observe excavation stability

Geotechnical design services should also be anticipated during the subsequent final design phase to support the structural design and address specific issues arising during this phase. Field and engineering review services will also be required during the construction phase in order to provide a Final Letter for the project.

CLOSURE

This report was prepared for the exclusive use of Ajay Sikka and his appointed consultants. Any use of this report or the material contained herein by third parties, or for other than the intended purpose, should first be approved in writing by Cobalt Geosciences, LLC.

The recommendations contained in this report are based on assumed continuity of soils with those of our test holes and assumed structural loads. Cobalt Geosciences should be provided with final architectural and civil drawings when they become available in order that we may review our design recommendations and advise of any revisions, if necessary.

Use of this report is subject to the Statement of General Conditions provided in Appendix A. It is the responsibility of Ajay Sikka who is identified as “the Client” within the Statement of General Conditions, and its agents to review the conditions and to notify Cobalt Geosciences should any of these not be satisfied.

Sincerely,

Cobalt Geosciences, LLC

5/5/2025
Phil Haberman, PE, LG, LEG
Principal

Statement of General Conditions

USE OF THIS REPORT: This report has been prepared for the sole benefit of the Client or its agent and may not be used by any third party without the express written consent of Cobalt Geosciences and the Client. Any use which a third party makes of this report is the responsibility of such third party.

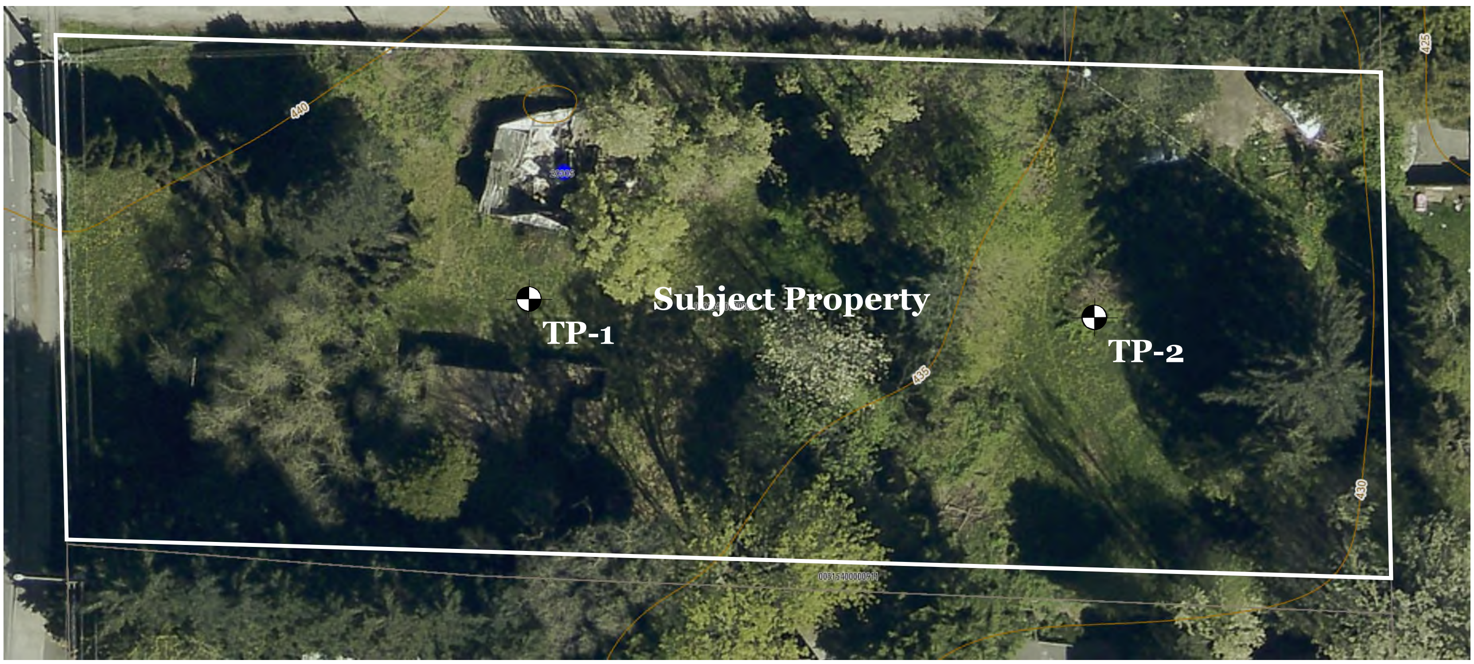
BASIS OF THE REPORT: The information, opinions, and/or recommendations made in this report are in accordance with Cobalt Geosciences present understanding of the site specific project as described by the Client. The applicability of these is restricted to the site conditions encountered at the time of the investigation or study. If the proposed site specific project differs or is modified from what is described in this report or if the site conditions are altered, this report is no longer valid unless Cobalt Geosciences is requested by the Client to review and revise the report to reflect the differing or modified project specifics and/or the altered site conditions.

STANDARD OF CARE: Preparation of this report, and all associated work, was carried out in accordance with the normally accepted standard of care in the state of execution for the specific professional service provided to the Client. No other warranty is made.

INTERPRETATION OF SITE CONDITIONS: Soil, rock, or other material descriptions, and statements regarding their condition, made in this report are based on site conditions encountered by Cobalt Geosciences at the time of the work and at the specific testing and/or sampling locations. Classifications and statements of condition have been made in accordance with normally accepted practices which are judgmental in nature; no specific description should be considered exact, but rather reflective of the anticipated material behavior. Extrapolation of in situ conditions can only be made to some limited extent beyond the sampling or test points. The extent depends on variability of the soil, rock and groundwater conditions as influenced by geological processes, construction activity, and site use.

VARYING OR UNEXPECTED CONDITIONS: Should any site or subsurface conditions be encountered that are different from those described in this report or encountered at the test locations, Cobalt Geosciences must be notified immediately to assess if the varying or unexpected conditions are substantial and if reassessments of the report conclusions or recommendations are required. Cobalt Geosciences will not be responsible to any party for damages incurred as a result of failing to notify Cobalt Geosciences that differing site or sub-surface conditions are present upon becoming aware of such conditions.

PLANNING, DESIGN, OR CONSTRUCTION: Development or design plans and specifications should be reviewed by Cobalt Geosciences, sufficiently ahead of initiating the next project stage (property acquisition, tender, construction, etc), to confirm that this report completely addresses the elaborated project specifics and that the contents of this report have been properly interpreted. Specialty quality assurance services (field observations and testing) during construction are a necessary part of the evaluation of sub-subsurface conditions and site preparation works. Site work relating to the recommendations included in this report should only be carried out in the presence of a qualified geotechnical engineer; Cobalt Geosciences cannot be responsible for site work carried out without being present.



Approximate Test Pit Location

TP-1

Snohomish County PDS Image

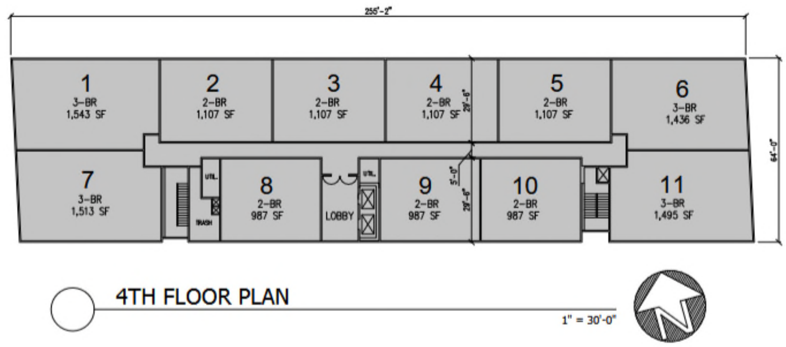
N

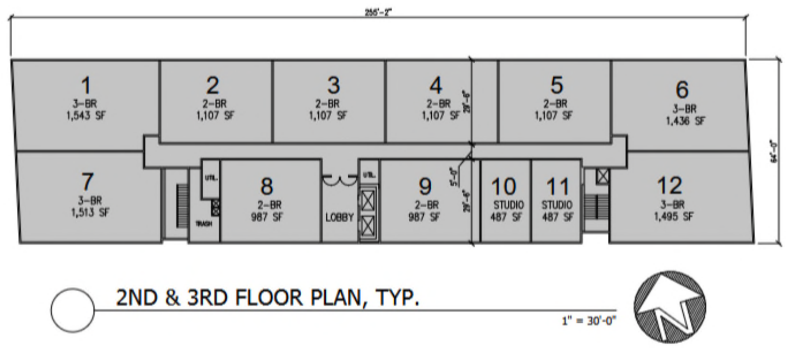
Proposed Development
20305 68th Ave W
Lynnwood, Washington

Site Image

Figure 1

Cobalt Geosciences, LLC
P.O. Box 82243
Kenmore, WA 98028
(206) 331-1097
www.cobaltgeo.com
cobaltgeo@gmail.com





NO. OF APARTMENT UNITS:

(12) 3-BR
(19) 2-BR
(4) STUDIOS
(35) APARTMENT UNITS

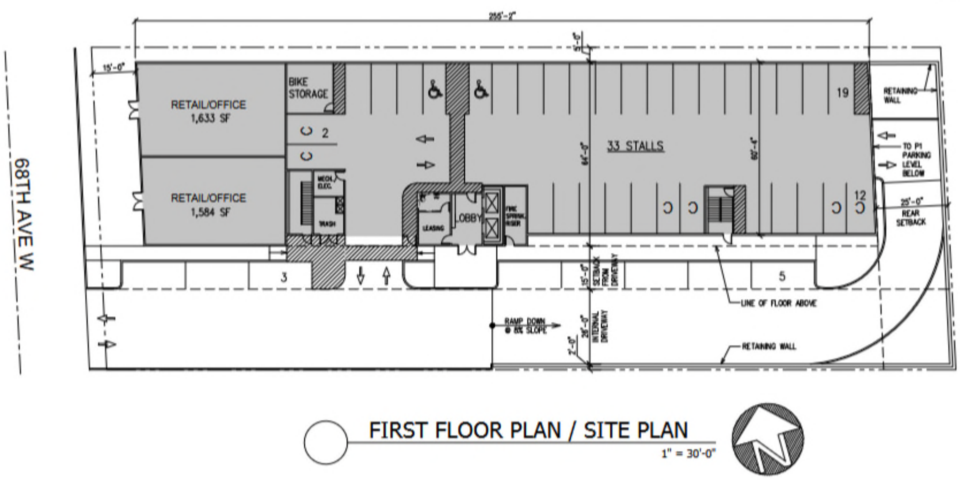
PARKING CALCULATIONS:

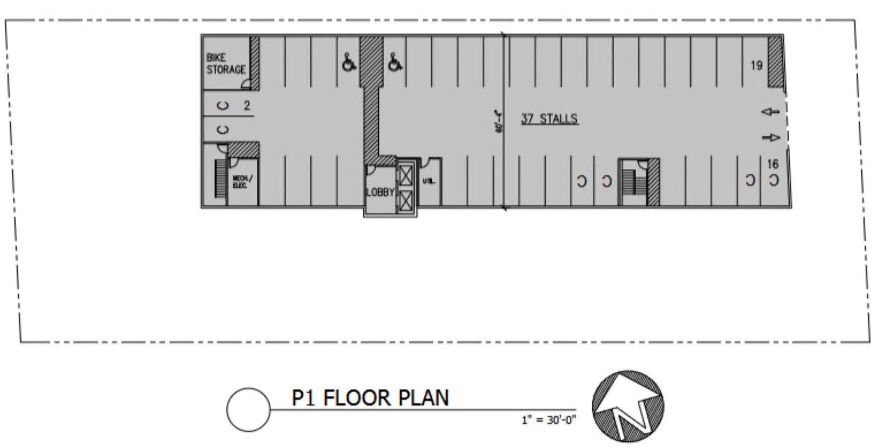
RESIDENTIAL
(35) X 2 = 70 STALLS

COMMERCIAL
3,217 SF / 300 = 10.72 STALLS
WITH 50% REDUCTION
= 5.36 STALLS ~~ 6 STALLS

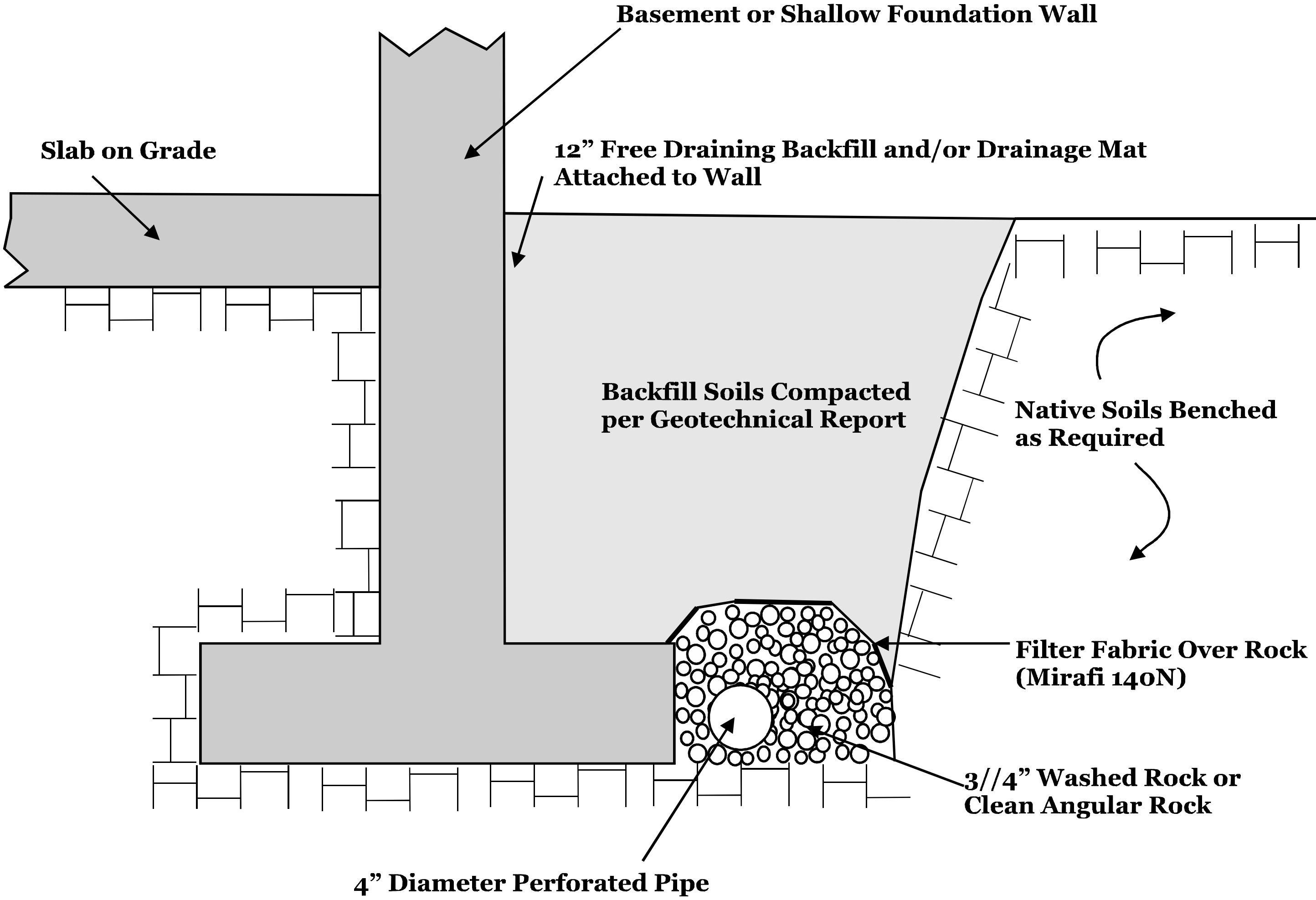
TOTAL STALLS REQUIRED: 76 STALLS

PARKING PROVIDED: 78 STALLS





COBALT GEOSCIENCES	Proposed Development 20305 68th Ave W Lynnwood, Washington	**Site Plan** **Figure 2**	Cobalt Geosciences, LLC P.O. Box 82243 Kenmore, WA 98028 (206) 331-1097 www.cobaltgeo.com cobaltgeo@gmail.com



Not to Scale

COBALT GEOSCIENCES	**Typical Foundation Drain Detail**	**Attachment**	Cobalt Geosciences, LLC PO Box 1792 North Bend, WA 98045 (206) 331-1097 www.cobaltgeo.com phil@cobaltgeo.com

Unified Soil Classification System (USCS)

MAJOR DIVISIONS			SYMBOL	TYPICAL DESCRIPTION
COARSE GRAINED SOILS (more than 50% retained on No. 200 sieve)	Gravels (more than 50% of coarse fraction retained on No. 4 sieve)	Clean Gravels (less than 5% fines)	GW	Well-graded gravels, gravels, gravel-sand mixtures, little or no fines
			GP	Poorly graded gravels, gravel-sand mixtures, little or no fines
		Gravels with Fines (more than 12% fines)	GM	Silty gravels, gravel-sand-silt mixtures
			GC	Clayey gravels, gravel-sand-clay mixtures
	Sands (50% or more of coarse fraction passes the No. 4 sieve)	Clean Sands (less than 5% fines)	SW	Well-graded sands, gravelly sands, little or no fines
			SP	Poorly graded sand, gravelly sands, little or no fines
		Sands with Fines (more than 12% fines)	SM	Silty sands, sand-silt mixtures
			SC	Clayey sands, sand-clay mixtures
FINE GRAINED SOILS (50% or more passes the No. 200 sieve)	Silts and Clays (liquid limit less than 50)	Inorganic	ML	Inorganic silts of low to medium plasticity, sandy silts, gravelly silts, or clayey silts with slight plasticity
			CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays silty clays, lean clays
		Organic	OL	Organic silts and organic silty clays of low plasticity
	Silts and Clays (liquid limit 50 or more)	Inorganic	MH	Inorganic silts, micaceous or diatomaceous fine sands or silty soils, elastic silt
			CH	Inorganic clays of medium to high plasticity, sandy fat clay, or gravelly fat clay
		Organic	OH	Organic clays of medium to high plasticity, organic silts
HIGHLY ORGANIC SOILS	Primarily organic matter, dark in color, and organic odor		PT	Peat, humus, swamp soils with high organic content (ASTM D4427)

Classification of Soil Constituents

MAJOR constituents compose more than 50 percent, by weight, of the soil. Major constituents are capitalized (i.e., SAND).

Minor constituents compose 12 to 50 percent of the soil and precede the major constituents (i.e., silty SAND). Minor constituents preceded by "slightly" compose 5 to 12 percent of the soil (i.e., slightly silty SAND).

Trace constituents compose 0 to 5 percent of the soil (i.e., slightly silty SAND, trace gravel).

Relative Density (Coarse Grained Soils)

N, SPT, Blows/FT	Relative Density
0 - 4	Very loose
4 - 10	Loose
10 - 30	Medium dense
30 - 50	Dense
Over 50	Very dense

Consistency (Fine Grained Soils)

N, SPT, Blows/FT	Relative Consistency
Under 2	Very soft
2 - 4	Soft
4 - 8	Medium stiff
8 - 15	Stiff
15 - 30	Very stiff
Over 30	Hard

Grain Size Definitions

Description	Sieve Number and/or Size
Fines	<#200 (0.08 mm)
Sand	
-Fine	#200 to #40 (0.08 to 0.4 mm)
-Medium	#40 to #10 (0.4 to 2 mm)
-Coarse	#10 to #4 (2 to 5 mm)
Gravel	
-Fine	#4 to 3/4 inch (5 to 19 mm)
-Coarse	3/4 to 3 inches (19 to 76 mm)
Cobbles	3 to 12 inches (75 to 305 mm)
Boulders	>12 inches (305 mm)

Moisture Content Definitions

Dry	Absence of moisture, dusty, dry to the touch
Moist	Damp but no visible water
Wet	Visible free water, from below water table

COBALT GEOSCIENCES
Cobalt Geosciences, LLC
P.O. Box 82243
Kenmore, WA 98028
(206) 331-1097
www.cobaltgeo.com
cobaltgeo@gmail.com

Soil Classification Chart

Figure C1

Test Pit TP-1

Date: April 2025	Depth: 6’	Groundwater: None
Contractor: Cobalt	Elevation:	Logged By: PH Checked By: SC

Depth (Feet)	Interval	Graphic Log	USCS Symbol	Material Description	Groundwater	Moisture Content (%) Plastic Limit — Liquid Limit / DCP Equivalent N-Value 0 10 20 30 40 50
				Topsoil/Vegetation		
1–3			SM	Loose to medium dense, silty-fine to medium grained sand with gravel dark yellowish brown to grayish brown, moist. (Weathered Glacial Till) Locally mottled		
3–6			SM	Dense to very dense, silty-fine to medium grained sand with gravel grayish brown, moist. (Glacial Till)		
6				End of Test Pit 6’		
7						
8						
9						
10						

COBALT GEOSCIENCES	Proposed Development 20305 68th Ave W Lynnwood, Washington	**Exploration Logs**	Cobalt Geosciences, LLC P.O. Box 82243 Kenmore, WA 98028 (206) 331-1097 www.cobaltgeo.com cobaltgeo@gmail.com

Test Pit TP-2

Date: April 2025	Depth: 6'	Groundwater: None
Contractor: Cobalt	Elevation:	Logged By: PH Checked By: SC

Depth (Feet)	Interval	Graphic Log	USCS Symbol	Material Description	Groundwater	Moisture Content (%) / DCP Equivalent N-Value (0 10 20 30 40 50)
				Topsoil/Vegetation		
1–3			SM	Loose to medium dense, silty-fine to medium grained sand with gravel dark yellowish brown to grayish brown, moist. (Weathered Glacial Till) Locally mottled		
3–6	■ (about 3.5 ft) ■ (about 5 ft)		SM	Dense to very dense, silty-fine to medium grained sand with gravel grayish brown, moist. (Glacial Till)		
6				End of Test Pit 6'		
7, 8, 9, 10						

Plastic Limit — Liquid Limit

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Lynnwood, Washington

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