

Appendix B

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Mitigated Schematic



Pit Pond
Basin -
Includes
Gravel
Mining Area
50.00ac

SI



Infiltration
Pond - 2.83"
per Day

2.1250	4.017	8.537	3.126	0.478
2.1500	4.017	8.637	4.109	0.478
2.1750	4.017	8.737	5.177	0.478
2.2000	4.017	8.838	6.324	0.478
2.2250	4.017	8.938	7.545	0.478
2.2500	4.017	9.039	8.836	0.478
2.2750	4.017	9.139	10.19	0.478

0.6750	4.017	2.711	0.000	0.478
0.7000	4.017	2.812	0.000	0.478
0.7250	4.017	2.912	0.000	0.478
0.7500	4.017	3.013	0.000	0.478
0.7750	4.017	3.113	0.000	0.478
0.8000	4.017	3.214	0.000	0.478
0.8250	4.017	3.314	0.000	0.478
0.8500	4.017	3.414	0.000	0.478
0.8750	4.017	3.515	0.000	0.478
0.9000	4.017	3.615	0.000	0.478
0.9250	4.017	3.716	0.000	0.478
0.9500	4.017	3.816	0.000	0.478
0.9750	4.017	3.917	0.000	0.478
1.0000	4.017	4.017	0.000	0.478
1.0250	4.017	4.117	0.000	0.478
1.0500	4.017	4.218	0.000	0.478
1.0750	4.017	4.318	0.000	0.478
1.1000	4.017	4.419	0.000	0.478
1.1250	4.017	4.519	0.000	0.478
1.1500	4.017	4.620	0.000	0.478
1.1750	4.017	4.720	0.000	0.478
1.2000	4.017	4.820	0.000	0.478
1.2250	4.017	4.921	0.000	0.478
1.2500	4.017	5.021	0.000	0.478
1.2750	4.017	5.122	0.000	0.478
1.3000	4.017	5.222	0.000	0.478
1.3250	4.017	5.323	0.000	0.478
1.3500	4.017	5.423	0.000	0.478
1.3750	4.017	5.524	0.000	0.478
1.4000	4.017	5.624	0.000	0.478
1.4250	4.017	5.724	0.000	0.478
1.4500	4.017	5.825	0.000	0.478
1.4750	4.017	5.925	0.000	0.478
1.5000	4.017	6.026	0.000	0.478
1.5250	4.017	6.126	0.000	0.478
1.5500	4.017	6.227	0.000	0.478
1.5750	4.017	6.327	0.000	0.478
1.6000	4.017	6.427	0.000	0.478
1.6250	4.017	6.528	0.000	0.478
1.6500	4.017	6.628	0.000	0.478
1.6750	4.017	6.729	0.000	0.478
1.7000	4.017	6.829	0.000	0.478
1.7250	4.017	6.930	0.000	0.478
1.7500	4.017	7.030	0.000	0.478
1.7750	4.017	7.131	0.000	0.478
1.8000	4.017	7.231	0.000	0.478
1.8250	4.017	7.331	0.000	0.478
1.8500	4.017	7.432	0.000	0.478
1.8750	4.017	7.532	0.000	0.478
1.9000	4.017	7.633	0.000	0.478
1.9250	4.017	7.733	0.000	0.478
1.9500	4.017	7.834	0.000	0.478
1.9750	4.017	7.934	0.000	0.478
2.0000	4.017	8.034	0.000	0.478
2.0250	4.017	8.135	0.279	0.478
2.0500	4.017	8.235	0.791	0.478
2.0750	4.017	8.336	1.453	0.478
2.1000	4.017	8.436	2.237	0.478

Mitigated Routing

Infiltration Pond - 2.83" per Day

Bottom Length: 250.00 ft.
 Bottom Width: 700.00 ft.
 Depth: 2.25 ft.
 Volume at riser head: 8.0349 acre-feet.
 Infiltration On
 Infiltration rate: 0.118
 Infiltration safety factor: 1
 Total Volume Infiltrated (ac-ft.): 3031.51
 Total Volume Through Riser (ac-ft.): 0
 Total Volume Through Facility (ac-ft.): 3031.51
 Percent Infiltrated: 100
 Total Precip Applied to Facility: 0
 Total Evap From Facility: 0
 Side slope 1: 0 To 1
 Side slope 2: 0 To 1
 Side slope 3: 0 To 1
 Side slope 4: 0 To 1
 Discharge Structure
 Riser Height: 2 ft.
 Riser Diameter: 80 in.
 Element Flows To:
 Outlet 1 Outlet 2

Pond Hydraulic Table

Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	Infilt(cfs)
0.0000	4.017	0.000	0.000	0.000
0.0250	4.017	0.100	0.000	0.478
0.0500	4.017	0.200	0.000	0.478
0.0750	4.017	0.301	0.000	0.478
0.1000	4.017	0.401	0.000	0.478
0.1250	4.017	0.502	0.000	0.478
0.1500	4.017	0.602	0.000	0.478
0.1750	4.017	0.703	0.000	0.478
0.2000	4.017	0.803	0.000	0.478
0.2250	4.017	0.903	0.000	0.478
0.2500	4.017	1.004	0.000	0.478
0.2750	4.017	1.104	0.000	0.478
0.3000	4.017	1.205	0.000	0.478
0.3250	4.017	1.305	0.000	0.478
0.3500	4.017	1.406	0.000	0.478
0.3750	4.017	1.506	0.000	0.478
0.4000	4.017	1.607	0.000	0.478
0.4250	4.017	1.707	0.000	0.478
0.4500	4.017	1.807	0.000	0.478
0.4750	4.017	1.908	0.000	0.478
0.5000	4.017	2.008	0.000	0.478
0.5250	4.017	2.109	0.000	0.478
0.5500	4.017	2.209	0.000	0.478
0.5750	4.017	2.310	0.000	0.478
0.6000	4.017	2.410	0.000	0.478
0.6250	4.017	2.510	0.000	0.478
0.6500	4.017	2.611	0.000	0.478

Routing Elements
Predeveloped Routing

Mitigated Land Use

Pit Pond Basin - Includes Gravel Mining Area

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
A B, Forest, Flat	10
A B, Pasture, Flat	24
A B, Pasture, Mod	5
Pervious Total	39
Impervious Land Use	acre
ROADS FLAT	7
POND	4
Impervious Total	11
Basin Total	50

Element Flows To:

Surface	Interflow	Groundwater
Infiltration Pond - 2.83" per Day	Infiltration Pond - 2.83" per Day	Infiltration Pond - 2.83" per Day

Landuse Basin Data
Predeveloped Land Use

General Model Information

Project Name: franklinridge
Site Name: Franklin Ridge - Infiltration Sizing
Site Address:
City:
Report Date: 10/12/2018
Gage: Landsburg
Data Start: 1948/10/01
Data End: 2009/09/30
Timestep: 15 Minute
Precip Scale: 0.000 (adjusted)
Version Date: 2018/07/12
Version: 4.2.15

POC Thresholds

WWHM2012

PROJECT REPORT

Appendix A

5. Conveyance System Analysis and Design

Onsite Conveyance System:

This has been completed as part of the Permit, no further documentation is needed.

6. Special Reports and Studies

No reports or studies were needed for this report. All relevant information regarding compliance with Core Requirement No. 3 has been included in Section 3, Section 4, and the appendix of this report.

7. Other Permits

The following documents are included in Appendix B of this report:

- Sand and Gravel General Permit, issued February 17, 2016, by the Washington State Dept. of Ecology

8. ESC Analysis and Design (Not Applicable)

This section of the TIR is not applicable to this project.

9. Bond Quantities, Facility Summaries, and Declaration of Covenant (Not Applicable)

This section of the TIR is not applicable to this project.

10. Operations and Maintenance (Not Applicable)

This section of the TIR is not applicable to this project.

Franklin Ridge Pit Pond Measured Infiltration Rate

	Date	Pit Pond Water Elev. (feet)	Pit Pond Water Level Change (feet)	Total Rainfall (inches)*	Total Evaporation (inches)**	Rainfall minus Evaporation	Total Infiltration (inches)	Infiltration Rate (inches/day)
Start	2/27/2018	696.473						
Stop	6/4/2018	692.230	4.243	17.9	9.07	8.830	59.746	0.622
		* Weather Underground, Black Diamond, WA	March 2018	3.87	1.76	**US Dept of Commerce, Weather Bureau, Tech Paper No. 13		
			April 2018	12.31	2.91			
			May 2018	1.72	4.4			

Table 4.2 - Infiltration Rate Calculations

Description	Quantity	Units	Source
Total combined parcel area	50.0	Acres	Estimated in CAD
Total combined parcel area	2,178,000.00	Sq Ft	Calc'd
Total Rainfall	17.9	Inches	Franklin Ridge Pit Pond Measured Infiltration Rate data sheet (following this page)
Total Rainfall	1.49	Feet	Calc'd
Net Rainfall	8.83	inches	Franklin Ridge Pit Pond Measured Infiltration Rate data sheet
Net Rainfall	0.736	feet	Calc'd
Total Volume of Rainfall	1,602,645.00	Cu Ft	= Net Rainfall * Total combined parcel area
Total Volume of Rainfall	36.792	Ac Ft	Calc'd
Total Pond Area	4.00	Acres	From CAD
Effective Rainfall Depth on Pond Area	9.198	Feet	= Total Volume of Rainfall / Total Silica Pit Pond Area
Pit Pond Water Level Change	4.243	Feet	Franklin Ridge Pit Pond Measured Infiltration Rate data sheet
Total Height/Depth of Water Infiltrated into Pit Pond	13.441	Feet	= Silica Pit Pond Water Level Change + Effective Rainfall Depth on Pond Area
Total Height/Depth of Water Infiltrated into Pit Pond	161.29	Inches	Calc'd
Test Period	97	Days	Franklin Ridge Pit Pond Measured Infiltration Rate data sheet
Infiltration Rate	2.83	Inches per Day	Calc'd
Infiltration Rate	0.118	Inches Per Hour	

Part D: Flow Control System

For the purpose of stormwater analysis in this section of the report, the existing site is considered to be the developed conditions. To estimate if the site's stormwater can infiltrate in a conventional manner, any in-place infiltration that may occur throughout the site has not been considered and a drainage basin surrounding the silica pit pond has been established which includes the active mining area. All areas within that basin are assumed to drain to the silica pit pond to infiltrate.

The onsite flow control system has been modeled as a pond that has an infiltration rate sufficient to percolate all tributary runoff with the live storage available above the water surface of the silica pit pond. Since it is difficult to define the exact shape of storage around the edges of the silica pit pond, the storage volume and infiltration area provided by the area surrounding the silica pit pond have not been included in the infiltration model. Instead, the silica pit pond's surface area (approximately 4.0 acres) was chosen to be the modeled infiltration pond's bottom area (250 x 700 feet) with a live storage depth of 2.0 feet for a total storage of 8.03 ac-ft of detention volume without accounting for the detention volume available around the edges of the silica pit pond. A report generated from the stormwater model that was used to validate the infiltration design has been included in Appendix A of this report.

The silica pit pond has filled with water over a number of years but it has not yet overtopped and caused the site to discharge. In the event of overtopping, the silica pit pond would discharge via sheetflow across vegetated outwash soils to the northeast into a heavily vegetated and unmaintained existing pit for storage and eventual infiltration.

The infiltration rate for the model was estimated by taking the water level fluctuation of the existing silica pit pond over the course of three months and dividing by the number of days that had elapsed. Also factored in to that calculation was the total amount of rainfall runoff that the pond would have received from the delineated tributary basin within the existing site, which increased the net infiltration rate proportionately to the size of the total basin. That computation is included, in tabular format following this section of the report, and converts a change in water surface elevation over a period of three months with a known rainfall quantity and tributary basin area into an average infiltration rate of 0.118 inches per hour.

The soils onsite are outwash, as indicated by the soils map in Section 3 of this report, and have been modeled as Type A/B. All land cover in the stormwater model has been assumed to be what is shown in the publicly available aerial photographs from 2017, which generally reflects the condition of the site as of the Level 1 Downstream Analysis in Section 3 of this report. All of the gravel areas have been allowed to regrow (by inspection of the aerial photos of the site) and have been modeled as pasture. The access roads generally appear to be dirt or gravel and have been modeled as impervious. The existing pond has been modeled as pond surface (impervious). All of the logged area of the existing site that is tributary to the existing pond has been modeled as pasture. Table 4.1 in this section of the report has a summary of the Land Use Areas that were used in the stormwater model for this analysis.

Since the stormwater model demonstrates that the site fully infiltrates, the site is in compliance with the Low Impact Development Performance Standard per Section 1.2.9.1.B of the SWDM; therefore, no Flow Control BMPs are required.

The hydrology model files used for this analysis will be included on digital storage media with the submittal of the final report. The automatic report output from WWHM is included in Appendix A of this report.

Part E: Water Quality System

This has been designed and implemented in accordance with the requirements specified by the Permit.

4. Flow Control & Water Quality Facility Analysis and Design

Part A: Existing Site Hydrology

Stormwater from the site, in its existing condition, percolates in-place. Following landfall onsite, all stormwater remains onsite and infiltrates due to the local topography and available infiltration capacity of the existing soils and exposed groundcover in the mining area.

Part B: Developed Site Hydrology

For the purpose of stormwater analysis in this section of the report, the existing site is considered to be the developed conditions; hence, there is no change in the way stormwater is conveyed, treated, detained, and infiltrated.

Part C: Performance Standards

Hydrology Model

The approved hydrology model used for this analysis is the 2012 Western Washington Hydrology Model (WWHM) software, which incorporates all the methods required for determining compliance with the flow control and water quality standards specified below.

Flow Control

Per the Flow Control Map, the existing site is required to release stormwater at rates compliant with Conservation Flow Control (Level 2) standards. According to Section 3.2.2.2: *Durations and Peaks for Flow Control Standards* of the SWDM, those standards specify that the mitigated peak flow rates match the predeveloped 2-year and 10-year peak flow rates. Additionally, the standard specifies that the developed discharge durations must be strictly below the predeveloped discharge durations from 50% of the 2-year peak flow to the 2-year peak flow and continue approximating discharge durations to the full 50-year peak flow without a duration increase greater than 10%. The Log Pearson Type III extreme value analysis (specified in Bulletin 17B) is typically used to determine the peak flows due to the skew of the rainfall data and the 100-year peak flow being beyond the length of the available data record within the Landsburg rain gauge.

The site complies with this requirement because there is no discharge due to full infiltration of stormwater runoff onsite.

Water Quality

Designed in accordance with the requirements specified by the Permit.

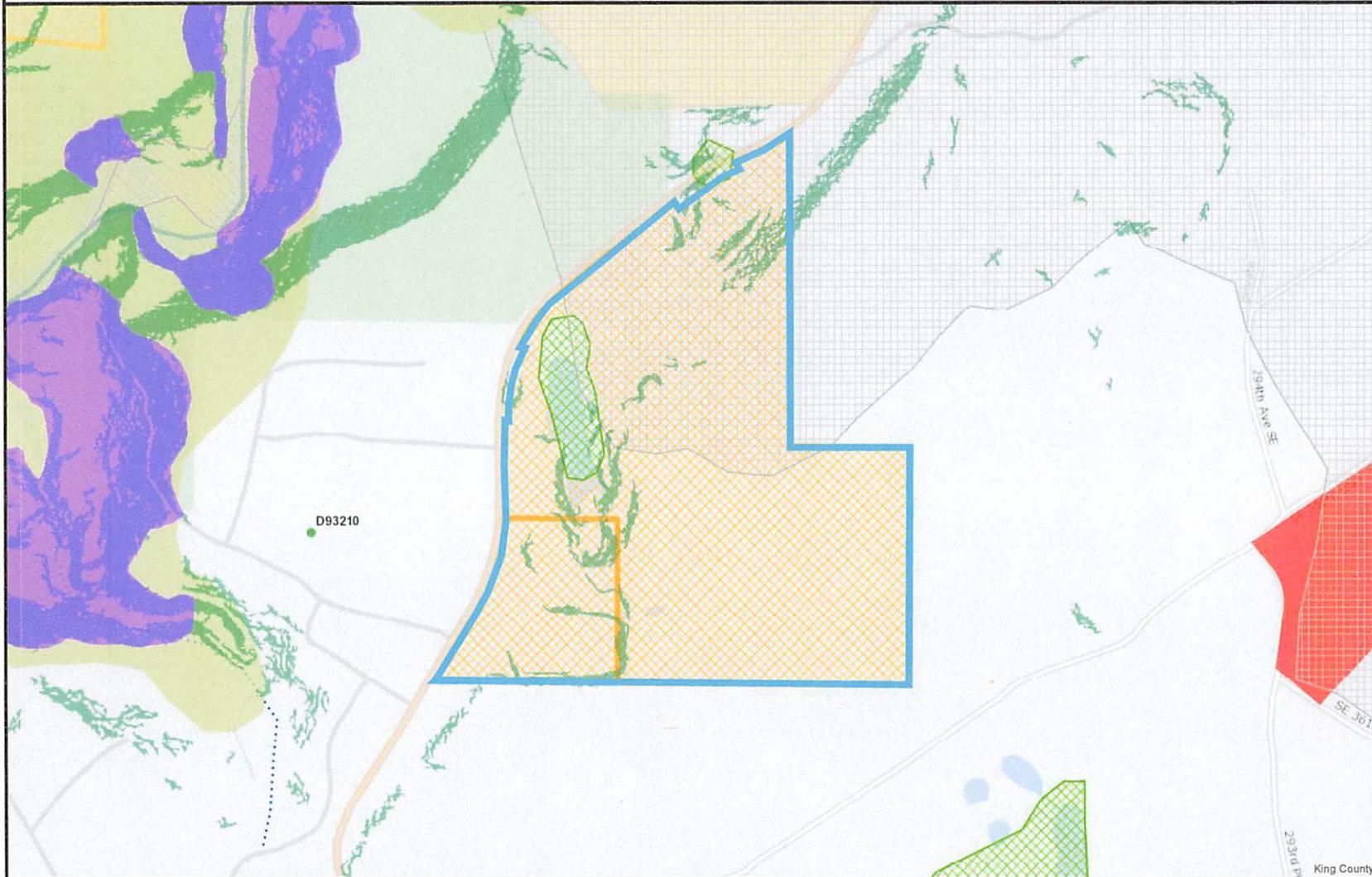
Conveyance

Designed in accordance with the requirements specified by the Permit.

Table 4.1 - Land Use Summary

Land Cover	Steepness		Total [Acres]
	Flat	Moderate	
Forest	10		10
Pasture	24	5	29
Roads	7		7
Pond	4		4
Total	-	-	50

Figure 3.1 - Environmental Hazards & Drainage Complaints

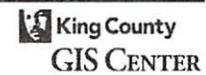


- Legend**
- Potential landslide hazard areas (2016, see explanation-->)
 - Potential steep slope hazard areas (2016, see explanation-->)
 - Erosion hazard (1990 SAO)
 - Seismic hazard (1990 SAO)
 - Coal mine hazard (1990 SAO)
 - Stream (1990 SAO)**
 - class 1
 - class 2 perennial
 - class 2 salmonid
 - class 3
 - unclassified
 - Wetland (1990 SAO)
 - Sensitive area notice on title
 - Stormwater facilities**
 - Bonded
 - Commercial-MF
 - Commercial-SF
 - Construction
 - DOT
 - FMD
 - Regional
 - Residential
 - Drainage complaints

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Date: 10/31/2018

Notes:





King County Districts and Development Conditions for parcel 3021079042



Parcel number	3021079042	Drainage Basin	Middle Green River
Address	Not Available	Watershed	Duwamish - Green River
Jurisdiction	King County	WRIA	Duwamish-Green (9)
Zipcode	98022	PLSS	SW - 30 - 21 - 7
Kroll Map page	B32	Latitude	47.27713
Thomas Guide page	778	Longitude	-121.96738

King County Electoral districts

Voting district	CUMBERLAND
King County Council district	District 9, Reagan Dunn (206) 477-1009



King County Districts and Development Conditions for parcel 3021079025



Parcel number	3021079025	Drainage Basin	Coal Creek (Green) and Middle Green River
Address	Not Available		
Jurisdiction	King County	Watershed	Duwamish - Green River
Zipcode	98022	WRIA	Duwamish-Green (9)
Kroll Map page	B32	PLSS	SE - 30 - 21 - 7
Thomas Guide page	778	Latitude	47.27939
		Longitude	-121.96373

King County Electoral districts

Voting district	CUMBERLAND
King County Council district	District 9, Reagan Dunn (206) 477-1009



Stormwater runoff in the active mining area collects in the adjacent lower areas and percolates. (Photo provided by the client and dated August 30, 2018)



At the northeast tip of the silica pit pond looking west along the access road toward an existing berm to prevent overflow into an adjacent culvert along Enumclaw Franklin Road SE.

The lowest point around the edge of the silica pit pond is the gravel access road shown here. (Photo taken by ESM on October 29, 2018)



At the estimated location of an existing culvert near the northerly portion of the silica pit pond in the Enumclaw Franklin Road SE Right-of-Way looking east toward an existing culvert.

Due to the dense vegetation in the area, the culvert could not be located during the site visit. (Photo taken by ESM on October 29, 2018)



At the overflow detention & infiltration area as seen from the Enumclaw Franklin Road SE Right-of-Way, looking southeast toward an existing culvert.

No standing water was observed in the overflow detention & infiltration area, and the existing culvert could not be located during the site visit. (Photo taken by ESM on October 29, 2018)

Downstream Drainage Complaints

According to iMap, there are no relevant downstream drainage complaints within the scope of this study. There are several closed drainage complaints on the existing site itself, but none are relevant in the context of this report. Refer to Figure 3.1.

Critical Area Overview

According to publicly available Critical Areas maps and studies:

Wetlands / Streams / Lakes:	The existing pond onsite is identified as a wetland.
Erosion & Landslide Hazards:	None Mapped
Steep Slope Hazards	There are potential steep slope hazard areas mapped in various locations throughout the existing site.
100-Year Flood Plain:	None Mapped
Aquifer Recharge:	None Mapped
Seismic Hazard:	None Mapped
Coal Mine Hazard:	The northern portion of the -9025 parcel is mapped in a coal mine hazard area.

See Figure 3.1 for more information regarding the environmental hazards near the existing site.

Task 3: Field Inspection (Level 1 Inspection)

A Level 1 Downstream Analysis was completed by ESM Consulting Engineers in the morning on October 29, 2018, when it was partly cloudy and 52°F (after days of intermittent rain showers). During the inspection it was found that the existing site has no upstream run-on due to the local topography and natural barriers. There were no indications of overland flow or flooding onsite. Runoff from Enumclaw Franklin Road SE that sheds toward the site is collected in area adjacent to the roadway and either infiltrated in place or conveyed through one of the two culverts indicated in the King County drainage system records. Neither culvert could be located during the field inspection due to groundcover and vegetation; however, there were no signs of roadway overtopping from stormwater flows.

Task 4: Drainage Description and Problem Descriptions

Not applicable.

Task 5: Mitigation of Existing or Potential Problems

Not required for this level of downstream analysis.

3. Off-Site Analysis

The following is a Level 1 Downstream Analysis for the existing site per Core Requirement #2, Section 1.2.2 of the SWDM. The analysis is a qualitative survey to identify and evaluate offsite flooding, erosion, and water quality problems that may be created or aggravated by the existing site. The primary component of this offsite analysis is the downstream corridor. The second component is to evaluate the upstream drainage system to verify any offsite run-on that may impact the existing site.

This Level 1 downstream analysis is composed of the following 4 tasks:

- Task 1 - Define and map the study area
- Task 2 - Downstream Resource Review for 1-mile downstream
- Task 3 - Field Inspection
- Task 4 - Drainage System Description and Problem Descriptions
- Task 5 - Mitigation of Existing or Potential Problems

Task 1: Study Area Definition and Maps

The existing site is in the Duwamish - Green River Watershed within the Duwamish-Green Water Resource Inventory Area (WRIA #9). The drainage study area is the perimeter of the mining area and the parcel boundary along Enumclaw Franklin Road SE. Since the existing site infiltrates all runoff, the drainage study area is sufficient and is not required to extend any further. See Figure 1.3 for a map of the basic study area.

Task 2: Resource Review

Flow Control Map

According to the King County Flow Control Map, the existing site is required to meet Conservation Flow Control (Level 2) standards per the SWDM.

Site Soils

A preliminary study of the soils in and around the existing site has been completed with the online resources available via Web Soil Survey. The soils onsite are predominantly outwash (as indicated by the Everett and Indianola soils with a rating of "A") with favorable infiltration characteristics.

See Figure 1.4 for the Soils Map provided by Web Soil Survey.

Road Drainage Problems

None noted.

Wetlands Inventory

According to the 1990 King County Wetlands Inventory Notebooks, there is one recorded wetland within the parcel boundary. See Figure 1.3 for Site Conditions.

Migrating River Study

None noted.

Special Requirement No. 1 Other Adopted Area-Specific Requirements

There are no master drainage plans, basin plans, salmon conservation plans, stormwater compliance plans, flood hazard reduction plan updates, or shared facility drainage plans for the existing site. Special Requirement No. 1 does not apply.

Special Requirement No. 2 Flood Hazard Area Delineation

The developed existing site location is not in a 100-year floodplain. Special Requirement No. 2 does not apply.

Special Requirement No. 3 Flood Protection Facilities

The existing site is not protected by an existing flood protection facility. The existing site activities will not modify an existing flood protection facility. Special Requirement No. 3 does not apply.

Special Requirement No. 4 Source Control

This is not applicable for this report and has been included as part of the Permit. Special Requirement No. 4 does not apply.

Special Requirement No. 5 Oil Control

This is not applicable for this report and has been included as part of the Permit. Special Requirement No. 5 does not apply.

2. Conditions and Requirements Summary

Review of the 9 Core Requirements and 5 Special Requirements

This section describes how the existing site will meet the SWDM Core and Special Requirements; however, only flow control compliance is required to be documented per the request of the county review staff. All other Core and Special Requirements are completed as part of the Permit and are documented in this report to the extent needed to satisfy Core Requirement No. 3.

Core Requirement No. 1 Discharge at the Natural Location

In the existing conditions, the site infiltrates all stormwater runoff which is the natural discharge location for the existing site.

Core Requirement No. 2 Off-site Analysis

A Level 1 Downstream Analysis was performed by ESM on October 29, 2018 where no discharge (or evidence of discharge) was observed at the anticipated site discharge locations after several rain showers prior to the site visit. See Section 3 for the full offsite analysis.

Core Requirement No. 3 Flow Control

According to the King County Flow Control Applications Map, the existing site is required to comply with the Conservation Flow Control (Level 2) Standards. The existing site currently infiltrates all onsite runoff in place due to the in-situ soils onsite. See Sections 3 & 4 for supporting documentation and analysis.

Core Requirement No. 4 Conveyance System

This requirement is not applicable for this report.

Core Requirement No. 5 Erosion and Sediment Control

This requirement is not applicable for this report and has already been completed included as part of the Permit.

Core Requirement No. 6 Maintenance and Operations

This requirement is not applicable for this report and has already been completed included as part of the Permit.

Core Requirement No. 7 Financial Guarantees and Liability

This requirement is not applicable for this report and has already been completed included as part of the Permit.

Core Requirement No. 8 Water Quality

According to the King County Water Quality Applications Map, the existing site requires Basic Water Quality treatment; however, water quality treatment has been included as part of the Permit. See Section 4 of this report for details.

Core Requirement No. 9 Flow Control BMPs

Flow control BMPs are not required due to full infiltration onsite.

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
AgC	Alderwood gravelly sandy loam, 8 to 15 percent slopes	B	39.6	3.2%
AkF	Alderwood and Kitsap soils, very steep	B	84.2	6.8%
BeD	Beausite gravelly sandy loam, 15 to 30 percent slopes	C	0.5	0.0%
BeF	Beausite gravelly sandy loam, 40 to 75 percent slopes	C	68.5	5.5%
EvC	Everett very gravelly sandy loam, 8 to 15 percent slopes	A	421.8	33.8%
EvD	Everett very gravelly sandy loam, 15 to 30 percent slopes	A	159.6	12.8%
InC	Indianola loamy sand, 5 to 15 percent slopes	A	6.0	0.5%
Pc	Pilchuck loamy fine sand	A	5.0	0.4%
PITS	Pits		15.1	1.2%
Sk	Seattle muck	B/D	3.5	0.3%
W	Water		18.3	1.5%
Subtotals for Soil Survey Area			822.1	65.9%
Totals for Area of Interest			1,246.9	100.0%

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
10	Barneston gravelly ashy coarse sandy loam, 0 to 8 percent slopes	A	154.4	12.4%
11	Barneston gravelly ashy coarse sandy loam, 8 to 15 percent slopes	A	221.0	17.7%
42	Chuckanut gravelly ashy sandy loam, 15 to 30 percent slopes	B	43.2	3.5%
285	Water		6.2	0.5%
Subtotals for Soil Survey Area			424.8	34.1%
Totals for Area of Interest			1,246.9	100.0%

MAP LEGEND

Area of Interest (AOI)		 C	C
Area of Interest (AOI)		 C/D	C/D
Soils		 D	D
Soil Rating Polygons		 Not rated or not available	Not rated or not available
 A	A	Water Features	
 A/D	A/D	 Streams and Canals	Streams and Canals
 B	B	Transportation	
 B/D	B/D	 Rails	Rails
 C	C	 Interstate Highways	Interstate Highways
 C/D	C/D	 US Routes	US Routes
 D	D	 Major Roads	Major Roads
 Not rated or not available	Not rated or not available	 Local Roads	Local Roads
Soil Rating Lines		Background	
 A	A	 Aerial Photography	Aerial Photography
 A/D	A/D		
 B	B		
 B/D	B/D		
 C	C		
 C/D	C/D		
 D	D		
 Not rated or not available	Not rated or not available		
Soil Rating Points			
 A	A		
 A/D	A/D		
 B	B		
 B/D	B/D		

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
 Web Soil Survey URL:
 Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: King County Area, Washington
 Survey Area Data: Version 14, Sep 10, 2018

Soil Survey Area: Snoqualmie Pass Area, Washington (Parts of King and Pierce Counties)
 Survey Area Data: Version 20, Sep 10, 2018

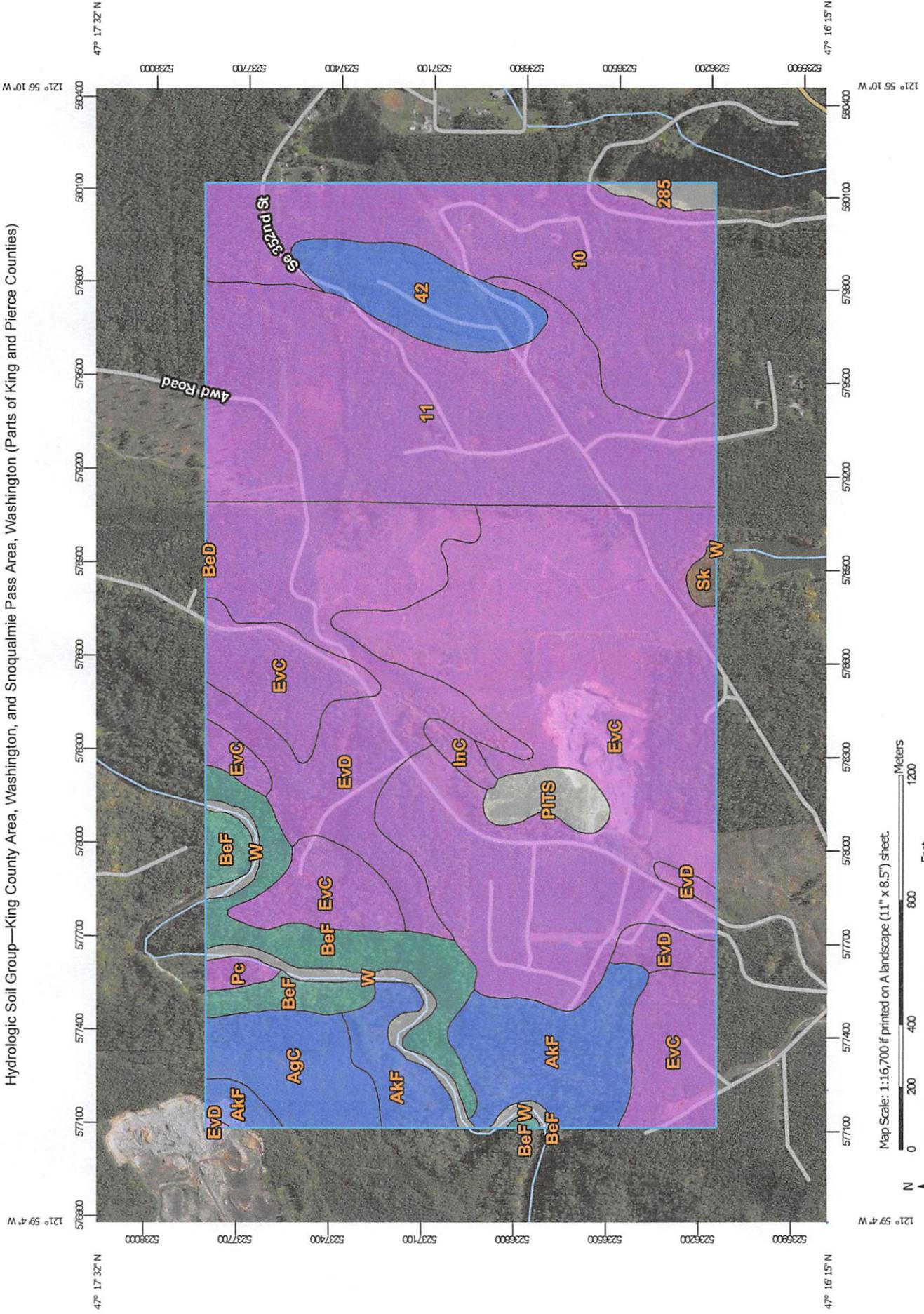
Your area of interest (AOI) includes more than one soil survey area. These survey areas may have been mapped at different scales, with a different land use in mind, at different times, or at different levels of detail. This may result in map unit symbols, soil properties, and interpretations that do not completely agree across soil survey area boundaries.

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

Date(s) aerial images were photographed: Mar 29, 2016—Oct 10, 2016

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

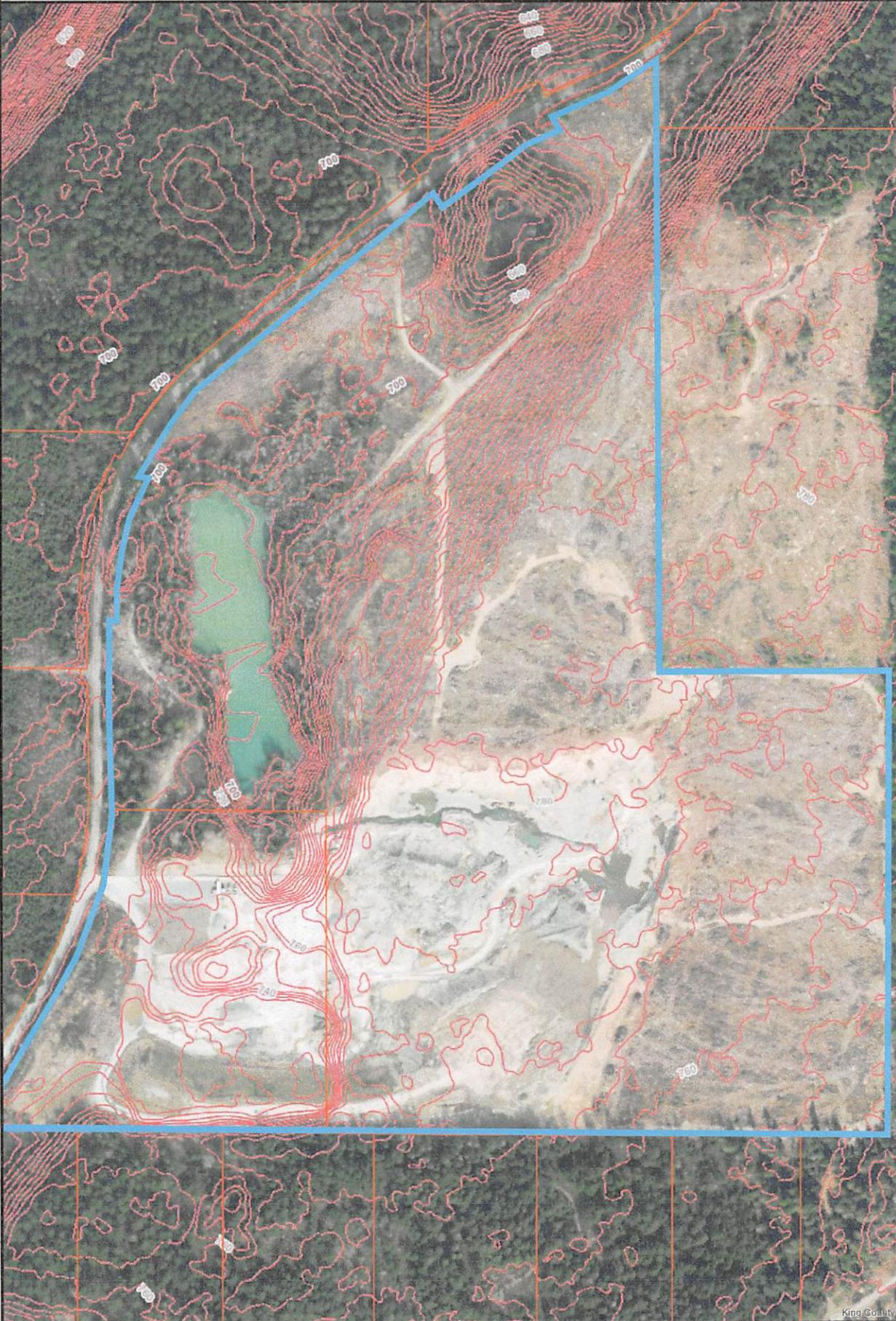
Hydrologic Soil Group—King County Area, Washington, and Snoqualmie Pass Area, Washington (Parts of King and Pierce Counties)



Map Scale: 1:16,700 if printed on A landscape (11" x 8.5") sheet.

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 10N WGS84

King County iMap



The information included on this map has been compiled by King County staff from a variety of sources and is subject to change without notice. King County makes no representations or warranties, express or implied, as to accuracy, completeness, timeliness, or rights to the use of such information. This document is not intended for use as a survey product. King County shall not be liable for any general, special, indirect, incidental, or consequential damages including, but not limited to, lost revenues or lost profits resulting from the use or misuse of the information contained on this map. Any sale of this map or information on this map is prohibited except by written permission of King County.

Date: 10/12/2018

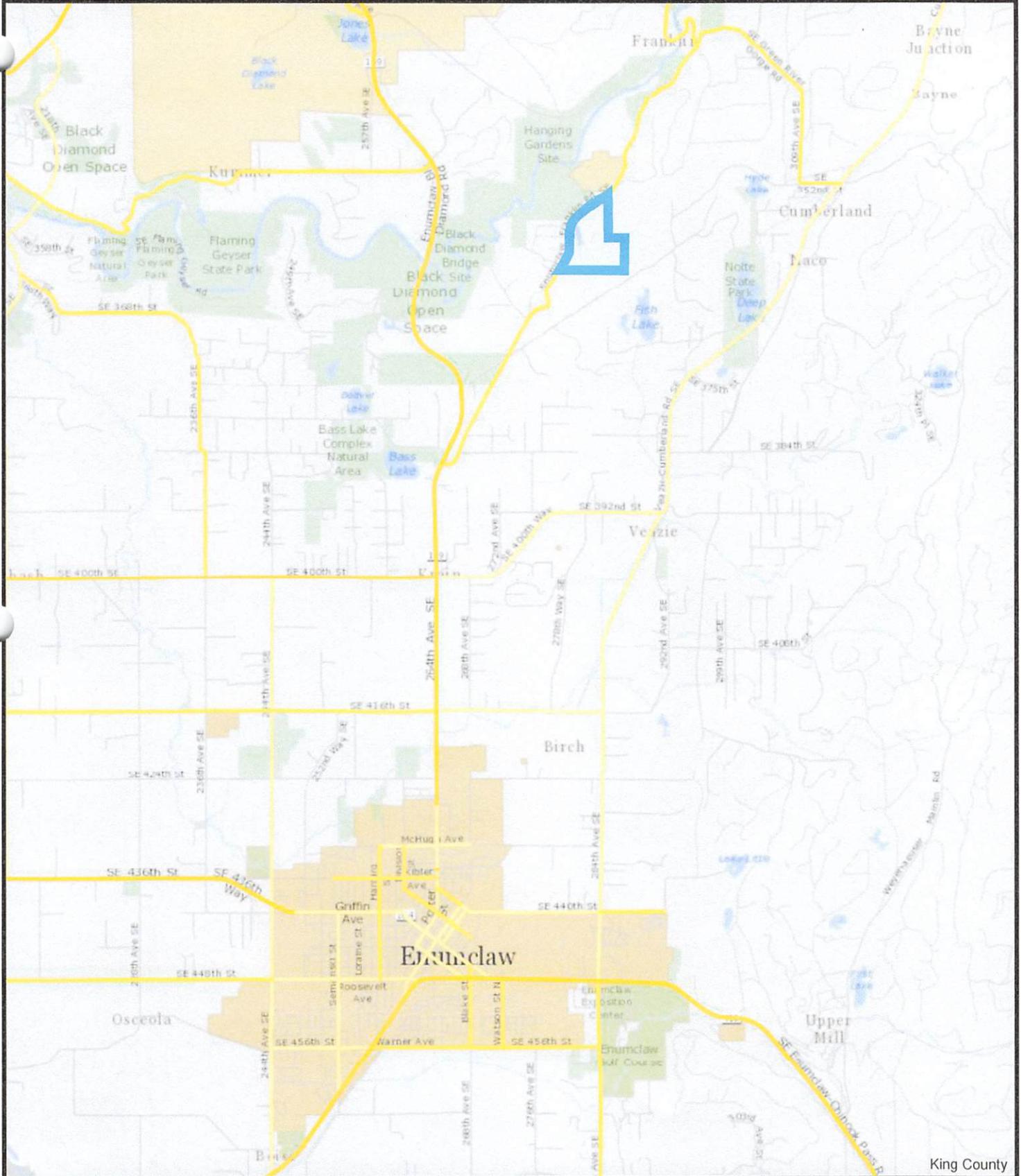
Notes:



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Figure 1.2 - Vicinity Map



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Date: 10/31/2018

Notes:



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Figure 1.1 - TIR Worksheet

TIR Worksheet is not required because this site is not a new development.

1. Project Overview

The Franklin Ridge Sand and Gravel site is a sand and gravel mine operation with associated utilities, access roads, and material processing & stormwater infrastructure. This site is located in Section 30, Township 21 North, Range 07 East, W.M. at 35000 Enumclaw Franklin Road SE in Enumclaw. The site includes the parcels numbered 302107-9025 and -9042.

The purpose of this report is to encapsulate the documents and analysis required by the Drainage Review in the 2016 King County Surface Water Design Manual (SWDM).

According to Section 1.1.2.4 of the SWDM, the existing site is subject to a Directed Drainage Review because the existing site is an active gravel mine that needs to show compliance with current flow control standards. A Drainage Review consists of reviewing Core Requirements #1-9 and Special Requirements #1-5 as outlined in Table 1.1.2.A of the SWDM. A discussion of these requirements can be found in Section 2 of this report.

In this report, only flow control compliance is required to be documented per the request of the County review staff. All other Core and Special Requirements are completed as part of the reissued Sand and Gravel General Permit #WAG503365 (hereafter referred to as "the Permit") and are documented in this report to the extent needed to satisfy Core Requirement No. 3 - Flow Control.

Site Conditions

The existing site is an established and active gravel mine with stock piles, access roads, processing structures, a job-trailer and scales. The site has been logged within the last 10 years and is currently re-growing. There are some steep slopes onsite due to the nature of pit mining, the remainder of the site is relatively flat. Soils onsite include Everett Loams which are outwash-type soils with good infiltration characteristics. Refer to Figure 1.4 for soils information.

The site is in the Middle Green River and Coal Creek (Green) drainage basins (WRIA number: 9) and is zoned M. See Figures 1.2 and 1.3 for a vicinity map and the existing site conditions.

The existing site does not receive upstream run-on from adjacent parcels. Stormwater that collects on the site appears to infiltrate in place as there is no apparent runoff from the site. The existing silica pit pond (immediately north of the active mine operations onsite) has not overflowed since the mine has been established. Refer to Section 3 of this report for more information.

Critical Areas

Steep Slopes:

The existing site contains several steep slope locations throughout the parcel due to the mining operations.

Table of Contents

1.	Project Overview	1
2.	Conditions and Requirements Summary	3
3.	Off-Site Analysis.....	5
4.	Flow Control & Water Quality Facility Analysis and Design	8
5.	Conveyance System Analysis and Design	11
6.	Special Reports and Studies	11
7.	Other Permits.....	11
8.	ESC Analysis and Design (Not Applicable)	11
9.	Bond Quantities, Facility Summaries, and Declaration of Covenant (Not Applicable)	11
10.	Operations and Maintenance (Not Applicable)	11

List of Figures

- 1.1 TIR Worksheet
- 1.2 Vicinity Map
- 1.3 Site Conditions, Basin, and Downstream Analysis Map
- 1.4 Soils Map
- 3.1 Environmental Hazards
- 3.2 Drainage Complaint Map

List of Tables

- 4.1 Land Use Summary
- 4.2 Infiltration Rate Calculations

Appendix

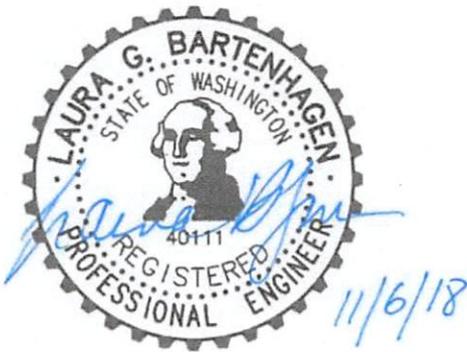
- A Hydrology Model Output
- B Sand and Gravel General Permit

Franklin Ridge Sand and Gravel

Technical Information Report

November 6, 2018

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