TECHNICAL INFORMATION REPORT

FOR

RAGING RIVER ROCK QUARRY

KING COUNTY, WASHINGTON

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Date:	**August 2016**
Core No.:	**10001R**

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GRDE15-0166

RAGING RIVER

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SECTION 1: PROJECT OVERVIEW

The Raging River Rock Quarry project site is located off of Preston-Fall City Road along the north side of the Raging River. The subject parcel numbers are 2224079011, -9033, and -9035 and have a total area of 50.23 acres, located off Preston-Fall City Road. The site is bordered by single family residents or undeveloped lots. See Figure 1. 1 at the end of this section for a vicinity map. The King County tax parcel ID number for the parcel involved is included in Table 1. 1 below. (Refer to the King County parcel report included in Appendix A).

Table 1. 1 King County Parcel ID

KC Parcel #	Parcel Area (AC)
2224079011	20.21
2224079033	25.02
2224079035	5.00

The project site has identified two wetlands, one stream, associated buffers and is bounded by the Raging River, which flows northeast across the project boundary. The site slopes in a general easterly direction toward the river between 6% and 140%. The mined area is bowl-shaped and any runoff sheet flows northeasterly and is intercepted by a series of infiltration ponds. The soils present on-site are Alderwood and Kitsap, Ovall gravelly loam, mixed alluvial, and Pilchuck loamy fine sand, all classified as "till" with a hydrologic class of "C" (see NRCS Soils Map in Appendix B).

The project site is currently a mining operation, and has been since the 1930s. A portion of the grading permit area has been excavated under previous mining operations. This study is to examine the current needs for water quality, as well as to project the water quality needs for future operations.

The project will be designed using the guidelines and requirements established in the 2009 King County Surface Water Design Manual (2009 KCSWDM). The project will result in the addition of more than 7,000 sf of pervious surface, and as such, a Full Drainage Review is required, per Table 1.1.2.A of the 2009 KCSWDM.

The drainage analysis for infiltration pond sizing was modeled using the King County Runoff Time Series (KCRTS) software. The water quality facility sizing calculations are based on methods described in Chapter 6 of the 2009 KCSWDM.

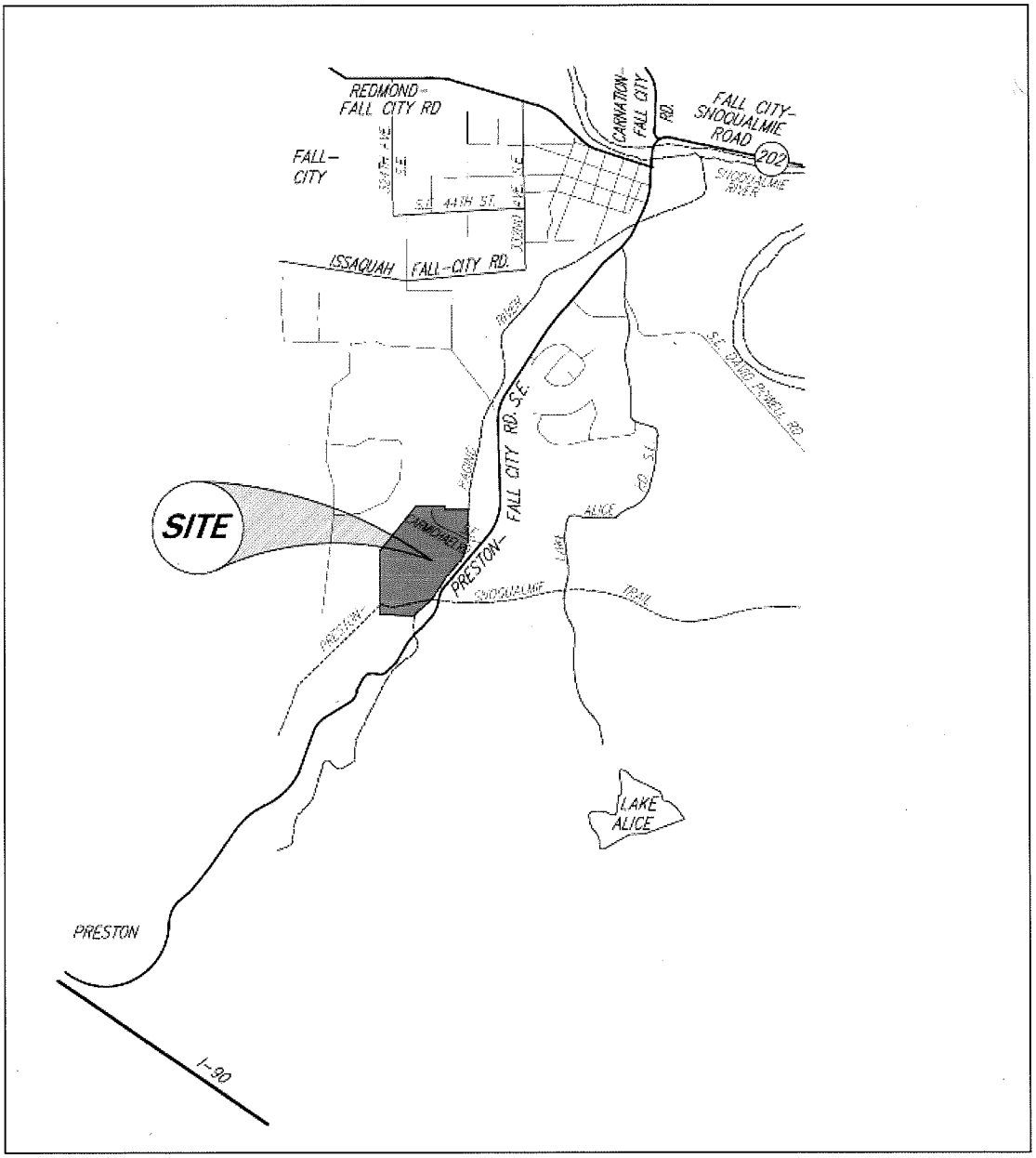


Figure 1. 1 Vicinity Map

SECTION 2: CONDITIONS AND REQUIREMENTS SUMMARY

Following the flow chart on Figure 1.1.2.A of the 2009 Surface Water Design Manual, it is determined that the proposed onsite project will result in the addition of more than 7,000 sf of pervious surface. Therefore, a Full Drainage Review is required, which triggers the analysis of each of the Core Requirement #1-#8 and all five Special Requirements #1-#5. For the purpose of this report, ensuring that the analysis is comprehensive and thorough, each Core Requirement and all Special Requirements are addressed below per Section 1.1 of the 2009 KCSWDM.

2.1 Core Requirements

2.1.1 Core Requirement #1: Discharge at the Natural Location

This project will match the natural discharge location. Subsurface infiltration will quantify all stormwater with any possible overflows directed towards the northeast. Stormwater will be conveyed using interceptor swales with check dams, directed towards a train of sediment traps, settling ponds, and infiltration ponds to reduce the concentrated flows and encourage infiltration. The topography slopes southeasterly towards the Raging River.

2.1.2 Core Requirement #2: Offsite Analysis

This core requirement is addressed in Section 3 of this report. The Offsite Analysis of this project is determined to require a Level 2 (Tasks #1-#5) Offsite Analysis with a Conveyance System Nuisance Problem Type 1.

2.1.3 Core Requirement #3: Flow Control

The onsite infiltration ponds are designed for Conservation Flow Control (Level 2). The Conservation Flow Control Standard requires maintaining the durations of high flows at their pre-development levels for all flows greater than one-half of the 2-year peak flow through the 50-year peak flow. The pre-development peak flow rates for the 2-year and 10-year runoff events must also be maintained under this requirement. We have assumed historic site conditions as the predeveloped conditions.

2.1.4 Core Requirement #4: Conveyance System

The proposed conveyance system provides sufficient capacity for the 2-year, 15-minute storm event and the 10-year, 15-minute storm event for the sediment traps used to collect and store sediment from site. The conveyance calculations for the sediment traps are discussed in Section 5 and are included in Appendix D.

2.1.5 Core Requirement #5: Erosion and Sediment Control

The proposed erosion and sedimentation control BMPs have been designed to meet the requirements and design standards in Appendix D of the 2009 KCSWDM. See Section 8 – ESC Analysis and Design.

2.1.6 Core Requirement #6: Maintenance and Operations

The Raging River Quarry will be responsible for the onsite maintenance and operations of the stormwater management systems.

2.1.7 Core Requirement #7: Financial Guarantees and Liability

This is a private operation with no proposed public improvements. A bond quantities worksheet is not applicable for this project.

2.1.8 Core Requirement #8: Water Quality

This project is outside the drainage basin of the sensitive lakes or sphagnum bog wetlands, therefor the Basic Water Quality menu is applied. The Basic Water Quality Menu standards are found in the 2009 KCSWDM. See Section 4 for further discussion.

2.2 Special Requirements

2.2.1 Special Requirement #1: Other Adopted Requirements

This is not applicable for this project. This project is not part of a CDA, MDP, BP, SCP, SWCP, FHRP, LMP, nor a SFDP.

2.2.2 Special Requirement #2: Flood Hazard Area Delineation

This is not applicable for this project. This project respects a 200-setback from the Raging River. The 200-foot setback protects any anticipated the flood area hazards associated with the river. Please see the FEMA Firm map in the Appendix.

2.2.3 Special Requirement #3: Flood Protection Facilities

This is not applicable for this project. There are no flood protection facilities associated with the project's river frontage.

2.2.4 Special Requirement #4: Source Control

This is not applicable for this project. This project will not connect to any public storm systems.

2.2.5 Special Requirement #5: Oil Control

This is not applicable for this project. This project does not meet the thresholds as defined for a high-use site.

SECTION 3: OFFSITE ANALYSIS

The Snoqualmie Watershed Water Quality Synthesis Report, dated January 2009, describes the Raging River as: "a very dynamic river with a very active channel during high-flow events. The gradient is relatively steep and the slopes of the river valley are prone to landslides... The channel condition of the Raging River may have been influences by a legacy of timber harvest practices with impacts to stream temperature. Landslides and bank erosion due to road building and other activities can alter the width and shaper of the river channel..."

For the reasons explained above, with great detail outlined in the report, the project is determined to require a Level 2 Offsite Analysis (Tasks #1-#5) with a Conveyance System Nuisance Problem Type 1.

TASK 1 Study Area Definition and Maps

The proposed project contains parcel numbers 224079011, 224079033 & 224079035.

TASK 2 Resource Review

Basin Reconnaissance Summary Reports

In 2009, King County prepared a report to synthesize information about the water quality in the Snoqualmie Watershed. The Raging River Sub-basin has been identified as being impaired for high temperatures, fecal coliform, and high pH levels.

FEMA Maps

A FEMA map dated May 20, 1996 number 53033C0717G was reviewed. The developable site is not located within a floodplain as it is covered by "Zone X – Outside of 500-year floodplain". The FEMA Map is included in Appendix B.

USDA Natural Resources Conservation Service Soil Survey

The USDA Natural Resources Conservation Service (NRCS) Web Soil Survey covers the project site area and states that the area of interest is comprised of Alderwood and Kitsap, Ovall gravelly loam, mixed alluvial, and Pilchuck loamy fine sand, all classified as "till" with a hydrologic class of "C." The Soils Map exhibit is included in Appendix B.

Environmentally Sensitive Areas

King County lists this property within the erosion hazard, seismic hazard, and landslide hazard zones. The King County iMap exhibit is included in Appendix B.

Downstream Drainage Complaints

Drainage complaints were researched within the study area. King County lists nine complaints located within a quarter mile radius of the project site. However, each complaint has been closed within the

County's reporting system. There are no current documented downstream problems associated with this project site. See Drainage Complaint Exhibit in Appendix B.

TASK 3 Field Investigation

A field investigation was completed on July 22, 2016.

Tributary Area

The Raging River Rock Quarry is 50.2 acres of the 20,000 acres of the Raging River Basin located in the Snoqualmie Watershed. The Rock Quarry contributes to 0.25% of the overall basin. The Rock Quarry slopes in the northeasterly direction, conveying most flows via subsurface infiltration from the ridge beyond the quarry down to the Raging River.

Upstream Tributary Analysis

The project site does not have a significant upstream tributary area. The extent of the basin is just beyond the property line to the northwest.

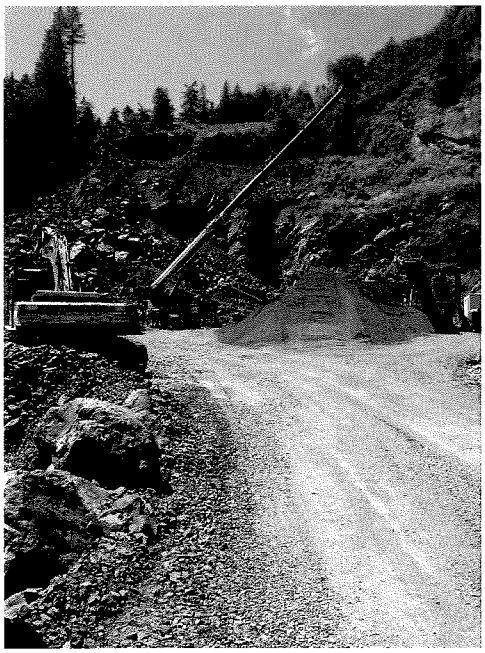
Field Investigation

The site is comprised of varying surface types and boundary conditions. The mine itself is bowl-shaped, situated in the north central region of the project site. There is a service road and vehicular bridge connecting the mining operation to Preston-Fall City Road, over the Raging River. The Raging River creates the easterly border of the site. The central and south central areas are predominately forested regions, yet to be mined. Along the northern boundary, the site contains reclaimed, or reforested, lands from previous mining operations. Nestled along the northwesterly border there are two wetlands that have been identified, flagged, and mapped. There is one identified stream (seasonal, non-fish bearing) on King County's iMap in the southern parcel. The stream course bisects the southern parcel, flowing easterly towards the Raging River. The topography generally slopes from the west to the east, consistent with the overall stormwater conveyance.

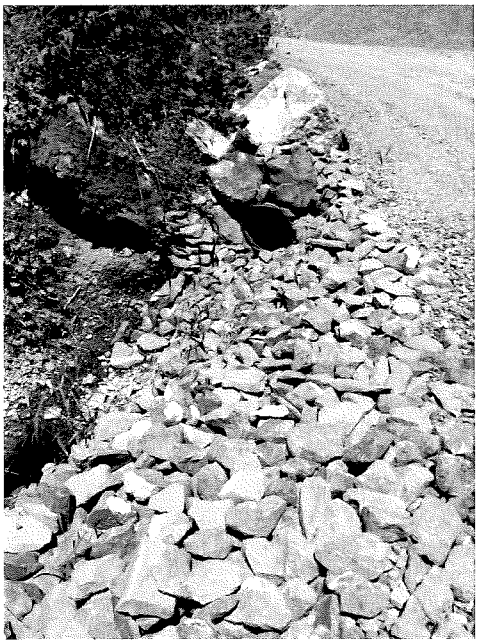
Downstream Tributary Analysis

Onsite the tributaries can be listed as: storm events, the two identified wetlands, and the seasonal stream. These tributaries extend across the property from the east to the west, conveying flows in a sub-surface manner towards the Raging River. The project site occupies 0.25% (less than 15%) of the Raging River Sub-Basin, therefore an assessment of a quarter-mile flowpath beyond the project site is required.

The following pages show photos of the upstream/downstream path.



Raging River Rock Quarry: The mining operation, looking at the bowl-like shape.

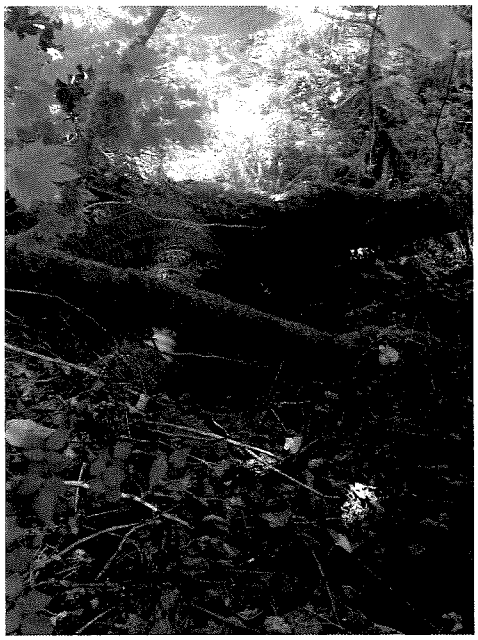


Culvert Conveyance: The mining operation conveying storm waters towards the settling/detention ponds.

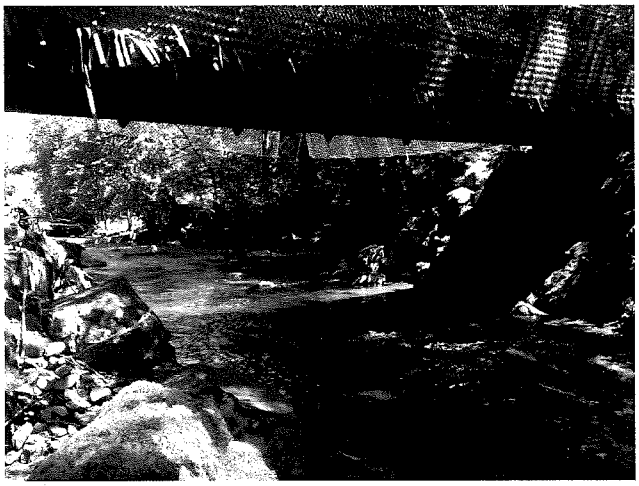
Ponds A-C: Stormwater settling in the first of three ponds that parallel the drive aisle.

Pond D: Storm water settling in Pond D.

Pond E: Storm water detention Pond E.



Discharge after Pond H: Culvert discharge after the series of settling/detention ponds, directed towards the 200-foot river setback.



Raging River: A view looking north under the vehicle bridge along the Raging River, stabilized bank.

Raging River: A view looking south under the vehicle bridge along the Raging River, stabilized bank.

TASK 4 Drainage System Description and Problem Description

See the Resource Review & Offsite Analysis Documentation in Appendix B, and further explanation in Task 5, below.

TASK 5 Mitigation of Existing and Potential Problems

Downstream Drainage Problems Requiring Special Attention

Type 1 – Conveyance System Nuisance Problems

There is a conveyance system nuisance problem along the Raging River. As indicated in the Snoqualmie Watershed Water Quality Synthesis Report, "the Raging River is a very dynamic river with an active channel during high-flow events. The gradient is relatively steep and the slopes of the river are prone to landslides... Landslides and bank erosion due to road building and other activities can alter the width and shape of the river channel, resulting in a wider, shallower channel..."

Type 2 – Severe Erosion Problems

There are no known, reported or observed current downstream severe erosion problems. The Snoqualmie Watershed Water Quality Synthesis Report does indicate that the Raging River suffers from bank erosion due to road building and other activities, as discussed in Type 1.

Type 3 – Severe Flooding Problems

There are no known, reported or observed current downstream severe flooding problems.

Downstream Water Quality Problems Requiring Special Attention

The current EPA approved Water Quality Assessment 303(d) list for Washington State and the Snoqualmie Watershed Water Quality Synthesis Report (dated January 2009) were reviewed for each of the seven downstream water quality problem types to a distance of one mile downstream of the project site. The following discussion includes reference to the updated 303(d) list of impaired water bodies.

Type 1 – Bacteria Problems

The project site drains to Raging River, which is a category 4A for bacteria on the 303(d) list. A category 4A indicates that the water body has an approved total maximum daily load (TMDL) that is actively being implemented. The Synthesis Report listed fecal coliform in the Raging River as a basin of concern with minor failure to meet standards, in some cases localized problem only.

Listing ID: 16693

Main Listing Information

Listing ID: 16693
Waterbody Name: RAGING RIVER
Medium: Water
Parameter: Bacteria
WQI Project: Snoqualmie River Watershed Multiparameter TMDL
Designated Use: None Assigned

2014 Category: 4A
2012 Category: 1
2008 Category: 1
2004 Category: 1
On 1998 303(d) List?: N
On 1996 303(d) List?: N

Assessment Unit

Assessment Unit ID: 17110010000209

Location Identification

Counties: King
WRIA: 7 - Snohomish
Waterbody ID (WBID): None Assigned
Waterbody Class: RA
Town/Range/Section (Legacy): 24N-7E-15

Basis

Location ID: [T36200], [FCityXRR], [07Q070] – In water year 2005, 0 of 15 sample values (0%) showed an excursion of the % criterion for this waterbody (200 cfu/100mL). The geometric mean of 27.7 does not exceed the geometric mean criterion (100 cfu/100mL).

Location ID: [T36200], [FCityXRR], [07Q070] – In water year 2004, 2 of 26 sample values (8%) showed an excursion of the % criterion for this waterbody (200 cfu/100mL). The geometric mean of 15 does not exceed the geometric mean criterion (100 cfu/100mL).

Hallock (2004), Dept. of Ecology ambient station 07Q070 meets tested standards for fecal coliform.

Location ID: [T36200], [FCityXRR], [07Q070] – In water year 2003, 1 of 9 sample values (11%) showed an excursion of the % criterion for this waterbody (200 cfu/100mL). The geometric mean of 68.4 does not exceed the geometric mean criterion (100 cfu/100mL).

Location ID: [T36200], [FCityXRR], [07Q070] – In water year 2001, 1 of 9 sample values (11%) showed an excursion of the % criterion for this waterbody (200 cfu/100mL). The geometric mean of 23.3 does not exceed the geometric mean criterion (100 cfu/100mL).

Hallock (2001) Dept. of Ecology Ambient Monitoring Station 07Q070 (Raging River at Fall City) shows a geometric mean of 23 does not exceed the criterion and that 10% of the samples does not exceed the percentile criterion from 10 samples collected during 2001.

Hallock (2001) Dept. of Ecology Ambient Monitoring Station 07Q070 (Raging River at Fall City) shows a geometric mean of 10 does not exceed the criterion and that 0% of the samples does not exceed the percentile criterion from 3 samples collected during 2000.

Remarks

Remark	Modified By	Modified On	Visibility
Combined Listing: Listing ID 45245 was rolled into this listing	Chad Brown	9/24/2015	Public
The TMDL set a load allocation downstream of the subject segment and requires implementation of the entire area to produce measured reductions that will allow the most downstream segment	Susan Braley	12/23/2014	Private

to meet the allocation. Therefore, this segment is associated with the TMDL load allocations and can be moved to Category 4A.			
This listing is part of the Snoqualmie River Watershed Multiparameter TMDL.	Susan Braley	12/23/2014	Public
Policy 1-11 was revised in July 2012 to specify that bacteria is assessed according to water year (Oct-Sept 30) from the previous assessment period of calendar year. the water water assessment is only applied to newly assessed data, Therefore, this listing contains data assessed by both water year and calendar year.	Jessica Archer	10/1/2014	Public
This listing contains E.coli data. E. coli is a subset of Fecal coliform bacteria therefore E.coli levels above the Fecal coliform standard can be used to infer an exceedance of this water quality standard.	Jessica Archer	10/1/2014	Public
Impairment was determined by exceedance of the percent criterion in water year(s) 2003 and 2001.	Jessica Archer	10/1/2014	Public

EIM

User Study ID:	User Location ID:
AMS001E	07Q070
GONW0001	T36200
GONW0001	FCityXRR

Figure 3-3: Current Water Quality Conditions (Fecal Coliform Bacteria Levels)

Type 2 – Dissolved Oxygen (DO) Problems

Raging River is listed as a Category 2 on the impaired water body list for dissolved oxygen, not enough to require production of a water quality improvement (WQI) project at this time. The Synthesis Report does not list dissolve oxygen as an impairment nor a concern.

Listing ID: 10608

Main Listing Information

Listing ID: 10608	**2014 Category:** 2
Waterbody Name: RAGING RIVER	**2012 Category:** 3
Medium: Water	**2008 Category:** 3
Parameter: Dissolved Oxygen	**2004 Category:** 1
WQI Project: None Assigned	**On 1998 303(d) List?:** N
Designated Use: None Assigned	**On 1996 303(d) List?:** N

Assessment Unit

Assessment Unit ID: 17110010000209

Location Identification

Counties: King **WRIA:** 7 - Snohomish
Waterbody ID (WBID): None Assigned **Waterbody Class:** RA
Town/Range/Section (Legacy): 24N-7E-15

Basis

Location ID: [T36200] – In 2005, 0 of 2 sample values (0%) showed an excursion of the criterion (9.5 mg/L) for this waterbody;

Location ID: [T36200] – In 2004, 1 of 6 sample values (17%) showed an excursion of the criterion (9.5 mg/L) for this waterbody;

Location ID: [T36200] – In 2003, 1 of 7 sample values (14%) showed an excursion of the criterion (9.5 mg/L) for this waterbody;

Location ID: [07Q070] – In 2001, 0 of 9 sample values (0%) showed an excursion of the criterion (9.5 mg/L) for this waterbody;

Hallock (2001) Dept. of Ecology Ambient Monitoring Station 07Q070 (Raging R @ Fall City) shows 0 excursions beyond the criterion out of 6 samples collected between 1993 - 2001 .

Remarks

Remark	Modified By	Modified On	Visibility
Fewer than three excursions exist from all data considered.	Jessica Archer	10/3/2014	Public
Historic Remarks: Critical temporal period not adequately captured to conclude non-impairment based on WQP Policy 1-11 (Sept 2006). -mh	Jessica Archer	10/3/2014	Public

EIM

User Study ID:	User Location ID:
AMS001E	07Q070
GONW0001	T36200

Figure 3-4: Current Water Quality Conditions (Dissolved Oxygen Levels)

Type 3 – Temperature Problems

Raging River is listed as a Category 5 or on the impaired water body list for temperature. A category 5 indicates that the waters require a TMDL, known as the 303(d) list. The Synthesis Report listed high temperatures in the Raging River as an impaired violation of state standards or failure to meet TMDL guidelines, as applicable.

Listing ID: 10607

Main Listing Information

Listing ID: 10607	**2014 Category:** 5
Waterbody Name: RAGING RIVER	**2012 Category:** 3
Medium: Water	**2008 Category:** 3
Parameter: Temperature	**2004 Category:** 1
WQI Project: Snoqualmie River Watershed Temperature TMDL	**On 1998 303(d) List?:** N
Designated Use: None Assigned	**On 1996 303(d) List?:** N

Assessment Unit

Assessment Unit ID: 17110010000209

Location Identification

Counties: King **WRIA:** 7 - Snohomish
Waterbody ID (WBID): None Assigned **Waterbody Class:** RA
Town/Range/Section (Legacy): 24N-7E-15

Basis

Location ID: 07RAG02.6 – In 2006, between 6/16/2006 and 9/14/2006, the 7-day mean of daily maximum values (7DADmax) exceeded the criterion for this waterbody (16°C) on 81 of 91 days (89%); The maximum exceedance during this period was 22.67°C for the 7-day period centered on 7/24/2006 ;
{Supplemental Spawning Period}: Location ID: 07RAG02.6 – In 2006, during the supplemental criteria period, the 7-day mean of daily maximum values (7DADmax) exceeded the criterion for this waterbody (13°C) on 17 of 41 days (41%); The maximum exceedance during this period was 14.81°C for the 7-day period centered on 9/26/2006 ;

Hallock (2001) Dept. of Ecology Ambient Monitoring Station 07Q070 (Raging R @ Fall City) shows 0 excursions beyond the criterion out of 6 samples collected between 1993 - 2001 .

Remarks

Remark	Modified By	Modified On	Visibility
Historical Remarks: There is insufficient data to meet minimum requirements according to Policy 1-11. Unknown if critical temporal period adequately captured to conclude non-impairment based on WQP Policy 1-11. -mh	Nicholas Groebner	4/24/2014	Public
Supplemental Criteria apply from Sep 15 - Jun 15	Nicholas Groebner	4/24/2014	Public
There is insufficient data to meet minimum requirements according to Policy 1-11.	Ken Koch	6/22/2011	Public
Unknown if critical temporal period adequately captured to conclude non-impairment based on WQP Policy 1-11. -mh	Mike Herold	9/24/2007	Public

EIM

User Study ID:	User Location ID:
AMS001E	07Q070
GONW0001	FCityXRR
GONW0001	T36200
NCRI0001	07RAG02.6

Figure 3-5: Current Water Quality Conditions (Temperature Levels)

Type 4 – Metals Problems

There are no known or reported downstream metals problems.

Type 5 – Phosphorous Problems

There are no known or reported downstream phosphorous problems.

Type 6 – Turbidity Problems

There are no known or reported downstream turbidity problems.

Type 7 – High pH Problems

Raging River is listed as a Category 5 on the impaired water body list for pH problems. A Category 5 indicates that the waters require a TMDL, known as the 303(d) list. The Synthesis Report listed high pH in the Raging River as an impaired violation of state standards or failure to meet TMDL guidelines, as applicable.

Listing ID: 10609

Main Listing Information

Listing ID: 10609	**2014 Category:** 5
Waterbody Name: RAGING RIVER	**2012 Category:** 2
Medium: Water	**2008 Category:** 2
Parameter: pH	**2004 Category:** 2
WQI Project: None Assigned	**On 1998 303(d) List?:** Y
Designated Use: None Assigned	**On 1996 303(d) List?:** Y

Assessment Unit

Assessment Unit ID: 17110010000209

Location Identification

Counties: King **WRIA:** 7 - Snohomish
Waterbody ID (WBID): WA-07-1104 **Waterbody Class:** RA
Town/Range/Section (Legacy): 24N-7E-15

Basis

Location ID [T36200] – In 2005, 2 of 4 sample values (50%) showed an excursion of the criteria for this waterbody;

Location ID [T36200] – In 2004, 3 of 13 sample values (23%) showed an excursion of the criteria for this waterbody;

Location ID [T36200] – In 2003, 5 of 10 sample values (50%) showed an excursion of the criteria for this waterbody;

Location ID [07Q070] – In 2001, 1 of 9 sample values (11%) showed an excursion of the criteria for this waterbody;

Hallock (2004), Dept. of Ecology ambient station 07Q070 shows that of 1 sample none exceeded the criterion.

Hallock (2001) Dept. of Ecology Ambient Monitoring Station 07Q070 (Raging R @ Fall City) shows 1 excursions beyond the criterion out of 21 samples collected between 1992 - 2001.

Hallock (2001) Dept. of Ecology Ambient Monitoring Station 07Q070 (Raging R @ Fall City) shows 0 excursions beyond the criterion out of 6 samples collected between 1993 - 2001.

Remarks

Remark	Modified By	Modified On	Visibility
High pH Excursions	Jessica Archer	7/23/2014	Public
At least 10 percent of samples were excursion of the criteria in at least one year and at least 3 excursions exist from all data considered.	Jessica Archer	7/23/2014	Public

EIM

User Study ID:	User Location ID:
AMS001E	07Q070
GONW0001	T36200

Figure 3-6: Current Water Quality Conditions (pH Levels)

SECTION 4: FLOW CONTROL AND WATER QUALITY DESIGN

4.1 Performance Standards

All stormwater facilities will be designed in accordance with the 2009 King County Surface Water Design Manual (KCSWDM) with Conservation Flow Control Standards.

Flow Control: Conservation Flow Control Standard

The Conservation Flow Control Standard requires maintaining the durations of high flows at their pre-development levels for all flows greater than one-half of the 2-year peak flow through the 50-year peak flow. The pre-development peak flow rates for the 2-year and 10-year runoff events must also be maintained under this requirement. We have assumed historic site conditions as the predeveloped conditions.

Flow Control

Presettling facilities and infiltration ponds are proposed for all target surfaces on site to meet the conservation flow control standard. Presettling calculations are included in Section 4.4.

KCRTS input and output documentation is included in Section 4.3.

Water Quality

The Basic Water Quality menu is applied, in our case, outside the drainage basin of the sensitive lakes or sphagnum bog wetlands. The Basic Water Quality Menu includes one pollutant removal targets:

- Total Suspended Solids = 80% reduction

The Basic Water Quality Menu, described in detail in Section 6.1.1 of the 2009 KCSWDM (page 6-4), provides eight (8) options to meet the pollutant removal targets listed above.

- Option 1: Biofiltration Swale
- Option 2: Filter Strip
- Option 3: Wetpond
- Option 4: Wetvault
- Option 5: Stormwater Wetland
- Option 6: Combined Detention and Wetpool Facilities
- Option 7: Sand Filter
- Option 8: Stormfilter

4.2 Basin Modeling

4.2.1 Existing Conditions

The project site is currently a mining operation, and has been since the 1930s. The entire property consists of 50.23 acres and a portion of the site has been cleared and excavated under previous mining

operations. Since the project proposes to fully infiltrate all the runoff up to the 100-year storm event, matching the predeveloped peaks and durations is not necessary.

4.2.2 Developed Conditions

The developed site area will change overtime depending on the clearing and excavation required for mining. Therefore, the existing infiltration ponds in the northeast corner of the site have been modeled to determine the maximum area of clearing that can be fully infiltrated up to the 100-year storm event. The stormwater runoff from the site will be directed to pre-settling cells before entering the infiltration ponds per Section 5.4.1 of the 2009 KCSWDM. Sizing for the pre-settling ponds can be found later in this section. A maximum area of 32 acres was found to fully infiltrate up to the 100-year storm event and was used as the developed area. The corresponding infiltration pond calculations are included in the next section.

MAXIMUM BASIN SIZE (10001_Dev.tsf)	Total Area = 32.0 acres
GROUND COVER	AREA(acres)
Outwash-Pasture	32.0

SEC. 22, TWP. 24 N., RGE. 7 E., W.M.

FOUND 4"X4" CONCRETE MONUMENT W/COPPER NAIL

FOUND 1/2" REBAR W/ YELLOW PLASTIC CAP STAMPED "RFM 7172" 0.1'E. OF CORNER

PLAT 1286053 REC. NO. 8909280267

FOUND 1/2" REBAR W/ YELLOW PLASTIC CAP STAMPED "RFM 7172" 0.25'S. x 0.24' E. OF CORNER

ZONE: RA-10

LOT 3

N 89°55'41" E 654.41

E. END OF FENCE 0.4' N. OF PROP. LINE

FENCE CORNER IS 0.8' S.X 1.0'E. OF PROP CORNER

50' SETBACK

N 01°03'11" E 150.32

N 89°56'02" W 512.68

FENCE 0.4' SE OF PROP LINE

KING COUNTY SHORT PLAT 1185038 REC. NO. 8611170922

LOT 1

ZONE: RA-10

N 00°48'50" E

662.43

897.73

N 42°23'45" E

APPROX. LOCATION OF EXISTING ROAD (GRAVEL)

509.00

PARCEL A: 224079035 5.00 ACRES ZONE:RA-10

LOT 2

ZONE: RA-10

FENCE 1.5' SE OF PROP LINE

N 00°03'59" E 660.87

PARCEL B: 224079011 20.21 ACRES ZONE:M

IE 12"CMP=212.91

IE 12"CMP=212.88

IE 12"D.I.=222.99

IE 8"CMP=209.22

IE 12"D.I.=224.52

IE 8"CMP=207.99

SETBACK LINE

200' SETBACK

APPROX. LOCATION WEST BANK OF THE RAGING RIVER

FOUND 1/2" REBAR W/ YELLOW PLASTIC CAP STAMPED "ESM. INC. LS 15661" 0.4'E. OF PROP. LINE NOV. 1994

WETLAND 'A' = 83,750 SQFT

80' WETLAND BUFFER (TYP.)

WETLAND 'A'

(2649.67 MEA.)

FENCE CORNER IS 1.1' S.X 0.9'E. OF PROP CORNER

N 89°47'20"E 58.53

594.53

553.07

N 89°47'20" E 1306.13

APPROX. LOCATION A.R. CARMICHAEL RD. (ASPHALT)

RIVER

N 89°47'20" E 1306.13

FOUND 1/2" REBAR W/ YELLOW PLASTIC CAP STAMPED "RFM. LS 7172" 0.2'S. X0.3'E. OF CORNER NOV. 1994

2649.74

WETLAND 'B' = 53,600 SQFT

WETLAND 'B'

80' WETLAND BUFFER (TYP.)

75.00

N89°47'20"E 254.78

A.R. CARMICHAEL ROAD

S. END OF FENCE 2.5' E OF PROP LINE

FENCE CORNER IS 1.0' S.X 1.8'E. OF PROP CORNER

FOUND 1/2" REBAR W/ YELLOW PLASTIC CAP STAMPED "ESM. INC. LS 15661" 0.3'S. X0.3'E. OF CORNER

N78°44'03"E 1335.17

SETBACK LINE

200' SETBACK

RAGING

PRESTON-FALL CITY ROAD

N 01°17'40" E

1324.87

FOUND 1/2" REBAR W/ ORANGE PLASTIC CAP STAMPED "KITZ 16915" 0.8'E. OF PROP. LINE

PARCEL C: 224079033 25.02 ACRES ZONE:M

1318.63

N 01°03'11" E

1312.41

KING COUNTY SHORT PLAT S90S0173 REC. NO. 9701229021

ZONE: RA-10

N 00°48'50" E

50' SETBACK

65' STREAM BUFFER

65' STREAM BUFFER

APPROX. LOCATION WEST BANK OF THE RAGING RIVER

SETBACK LINE

200' SETBACK

100' NORTHERN PACIFIC RAILWAY RIGHT-OF-WAY CONVEYED BY DEED REC. NO. 8008110313

APPROXIMATE LOCATION OF NON FISH BEARING STREAM, PER KING COUNTY IMAP

PRESTON-FALL CITY ROAD

N 65°59'50" E

FOUND 2" IRON PIPE W/ 3" ALUM. DISC STAMPED " "DNR 1998 T24N R7E"

S 21 S 22

S 28 S 27

200.00

50' SETBACK

576.99

672.33

N 89°30'33"E

(597.00 REF. 2672.33 CALC

Δ=11°12'31" L=149.89

Δ=04°55'38" L=61.59

Δ=07°51'29" L=98.20

R=716.20 L=69.79

Δ=5°47'00"

ASBUILT CENTERLINE EX. RAILROAD GRADE N 53°12'50" E

723.76

N 89°30'33" E 2601.51

1300.75

22

27

28

NOTES

1. ON-SITE CLEARING, GRADING, OR EXCAVATION, EXCLUDING THAT NECESSARY FOR REQUIRED ACCESS ROADWAY OR STORM DRAINAGE FACILITY CONSTRUCTION OR ACTIVITIES IN ACCORDANCE WITH AN APPROVED RECLAMATION PLAN, SHALL NOT BE PERMITTED WITHIN 50 FEET OF ANY OTHER PROPERTY LINE EXCEPT ALONG ANY PORTION OF THE PERIMETER ADJACENT TO ANOTHER MINERAL EXTRACTION OR MATERIAL PROCESSING OPERATION OR M OR F ZONED PROPERTY. IF NATIVE VEGETATION IS RESTORED, TEMPORARY DISTURBANCE RESULTING FROM CONSTRUCTION OF NOISE ATTENUATION FEATURES LOCATED CLOSER THAN 50 FEET SHALL BE PERMITTED (PER KCC 21A.22.060.F).

BASIS OF BEARING:
N 00°48'50"E BETWEEN THE MONUMENTS FOUND IN PLACE AT THE WEST QUARTER CORNER AND THE SOUTHWEST CORNER OF SECTION 22, TOWNSHIP 24N., RANGE 7E., W.M.

SCALE 1" = 100'

0 50 100 200

NO.	REVISIONS	DATE
1	COUNTY COMMENTS, REVISIONS TO PLAN SET	9/2/16

09-02-2016

CORE DESIGN
ENGINEERING - PLANNING - SURVEYING
14711 NE 29th Place Suite 101
Bellevue, Washington 98007
425.885.7877 Fax 425.885.7963

EXISTING CONDITIONS
RAGING RIVER QUARRY

RAGING RIVER QUARRY, LLC
3132 NE HARRISON ST
ISSAQUAH, WA 98029

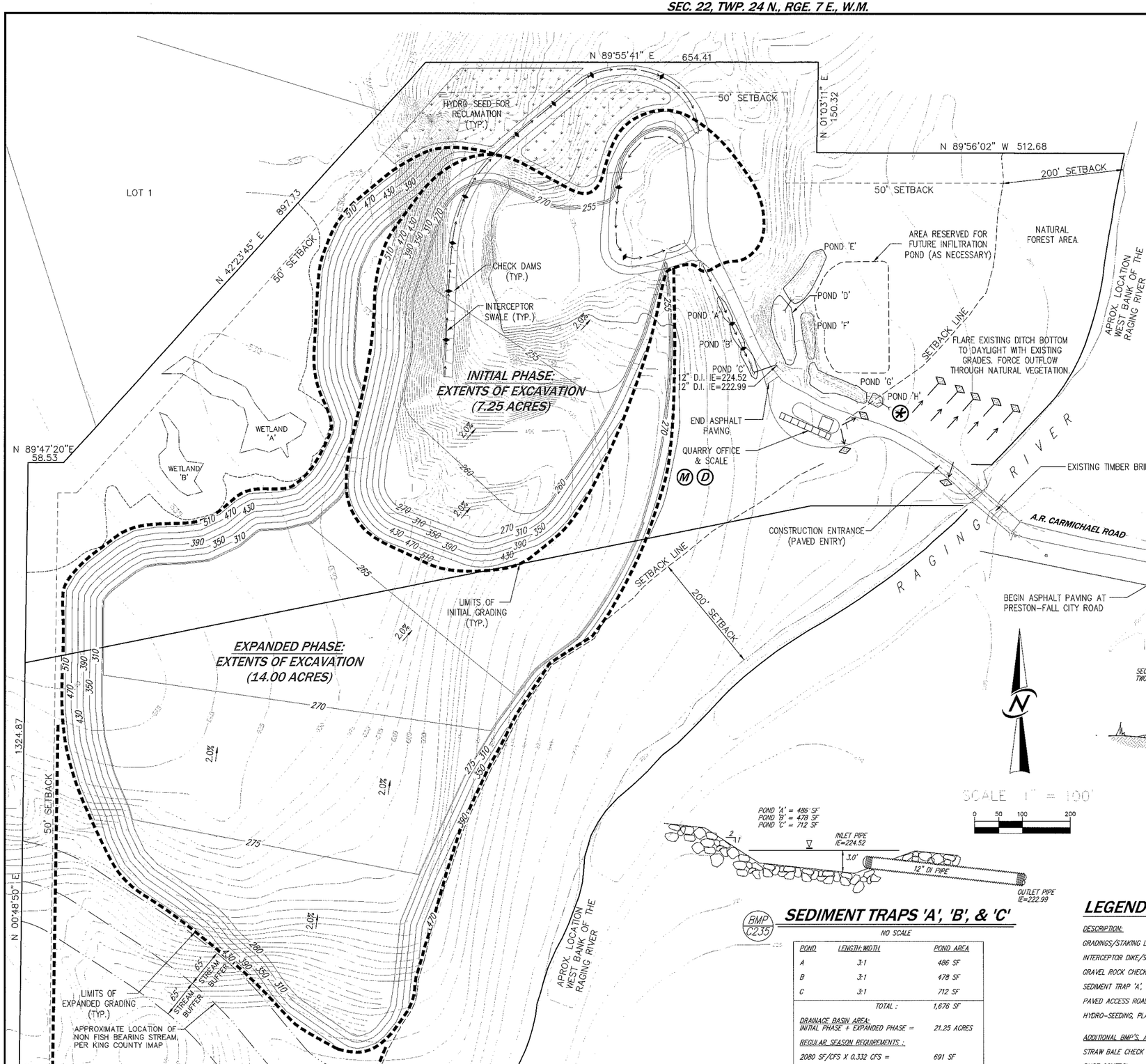
DATE	JULY 2015
DESIGNED	SLB
DRAWN	SLB
APPROVED	SLB
PROJECT MANAGER	KEVIN J. VANDERZANDEN

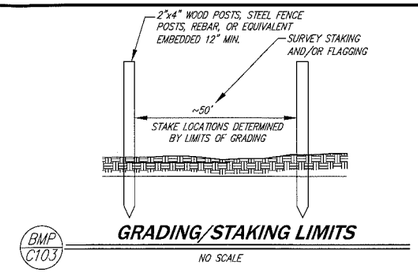
SHEET	OF
C1.02	5

PROJECT NUMBER 10001

J:\2010\10001R\ENGINEERING\FINAL\SHEETS\10001 C102.DWG 9/2/2016 10:31 AM

SEC. 22, TWP. 24 N., RGE. 7 E., W.M.

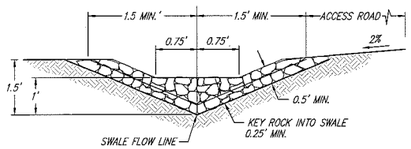




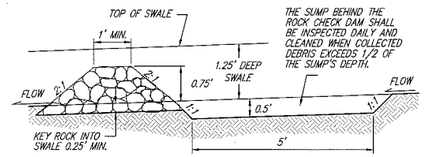
BMP C103

GRADING/STAKING LIMITS

NO SCALE

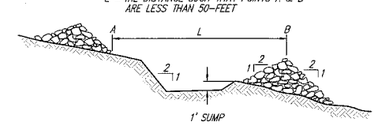


INTERCEPTOR SWALE CROSS-SECTION & ROCK CHECK DAM



NOTE: ROCK SHALL BE 4" MINUS QUARRY ROCK.

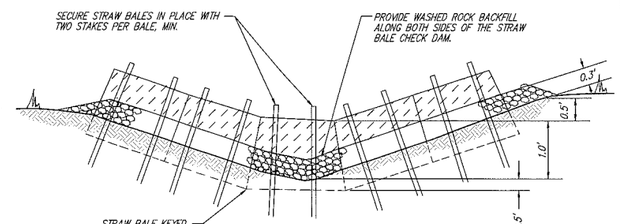
ROCK CHECK DAM CROSS-SECTION



BMP C207

ROCK CHECK DAM

NO SCALE



BMP C230

STRAW BALE CHECK DAM

NO SCALE

BMP C235

SEDIMENT TRAPS 'A', 'B', & 'C'

NO SCALE

POND	LENGTH:WIDTH	POND AREA
A	3:1	486 SF
B	3:1	478 SF
C	3:1	712 SF
	TOTAL :	1,676 SF
DRAINAGE BASIN AREA: INITIAL PHASE + EXPANDED PHASE =		21.25 ACRES
REGULAR SEASON REQUIREMENTS :		
2080 SF/CFS X 0.332 CFS =		691 SF
WET WEATHER SEASON REQUIREMENTS:		
2080 SF/CFS X 0.598 CFS =		1,244 SF

LEGEND

DESCRIPTION:	INTENDED PURPOSE:	STD. DETAIL:
GRADINGS/STAKING LIMITS	RESTRICTS GRADING TO APPROVED LIMITS	C103
INTERCEPTOR DIKE/SWALE	INTERCEPT RUNOFF FROM UNPROTECTED AREAS	C200
GRAVEL ROCK CHECK DAMS	REDUCES VELOCITY OF CONCENTRATED FLOWS	C207
SEDIMENT TRAP 'A', 'B' & 'C'	REMOVES SEDIMENT FROM SEDIMENT-LADEN WATERS	C240
PAVED ACCESS ROAD	REDUCES EROSION BY STABILIZING SOILS	
HYDRO-SEEDING, PLANTING	REDUCES EROSION BY STABILIZING SOILS	C120
ADDITIONAL BMP'S, AS NECESSARY:		
STRAW BALE CHECK DAMS	DECREASE THE VELOCITY OF SHEET FLOWS	C230
DUST CONTROL (D)	PREVENTS WIND TRANSPORT OF DUST	C140
MAINTAIN BMP'S (M)		
SAMPLING LOCATIONS (*)	NOTE: STD. DWG. DETAIL PER 2012 STORMWATER MANAGEMENT MANUAL FOR WESTERN WASHINGTON	

NO.	REVISIONS:	DATE:
1	COUNTY COMMENTS, REVISIONS TO PLAN SET	9/2/16

09-02-2016

CORE DESIGN
ENGINEERING - PLANNING - SURVEYING
14711 NE 29th Place Suite 101
Bellevue, Washington 98007
425.885.7877 Fax 425.885.7963

EROSION CONTROL PLAN
RAGING RIVER QUARRY
RAGING RIVER QUARRY, LLC
3132 NE HARRISON ST
ISSAQUAH, WA 98029

DATE	JULY 2015
DESIGNED	SLB
DRAWN	SLB
APPROVED	SLB

KEVIN J. VANDERZANDEN
PROJECT MANAGER

SHEET	OF
C2.01	5

PROJECT NUMBER
10001

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4.3 Flow Control Modeling

Using KCRTS as the continuous runoff model the site was designed to fully infiltrate all runoff up to the 100-year storm event. *Note: Proposed flow control is 100% infiltration of developed runoff, so that there are no developed surface flows leaving the site, and matching release rates are moot in such case.* The existing infiltration ponds were surveyed in order to get the volumes for modeling. A 10 percent factor of safety was added to the measured pond in the field for modeling. The table below summarizes the infiltration ponds. Refer to the developed conditions exhibit above for the location and naming convention of the ponds.

Infiltration Pond	Measured Volume (CF)	Modeled Volume (CF)
Pond D	2,376	2,133
Pond E	8,208	7,331
Pond F	3,429	3,042
Pond G-H	4,995	4,405
Total	**19,008**	**16,911**

The sites infiltration rates and sub surface conditions were documented by The Riley Group. The following calculations and assumptions have been summarized from the geotechnical report. Refer to Appendix E for the full geotechnical report calculations and infiltration rate testing. The infiltration rates were measured over three infiltration tests near the existing infiltration ponds. An average infiltration rate was determined to be 80 inches/hour for the site. In order to conservatively model the infiltration ponds, correction factors were applied to the field measure infiltration rate. Using the "Simplified method" in section 5.4.1 of the 2009 KCSWDM, a long term design infiltration rate was determined.

$$I_{design} = I_{measured} \times F_{testing} \times F_{geometry} \times F_{plugging}$$

Where:
I_{design} = design infiltration rate
$I_{measured}$ = field measured infiltration rate (80 in/hr)
$F_{testing}$ = accounts for uncertainties in testing methods (0.5)
$F_{geometry}$ = accounts for facility geometry and ground water influences (0.25)
$F_{plugging}$ = based on soil type, accounts for reduction in infiltration rate over time (1.0)

$$I_{design} = 10 \text{ in/hr}$$

The following table displays the infiltration rates used for modeling in KCRTS. Ground water was not encountered up to a depth of 8 feet from the bottom of the infiltration ponds.

Infiltration Type	Long Term Infiltration Rate(in/hr)	Modeled Infiltration Rate(min/in)
Infiltration Pond	10	6

The KCRTS outputs (developed flow frequency analysis and infiltration pond files) are included below. The outflow time series from the ponds are routed to the next downstream pond (rdout.pks). The infiltration pond outflow (Pond_G-H_rdout.tsf) for the last infiltration pond G-H, shows all the flows up to the 100-year storm event are fully infiltrated; the full KCRTS input files are included in Appendix D.

```
C:\KC_SWDM\KC_DATA\
[C] CREATE a new Time Series
LA
       0.00        0.00        0.000000  Till Forest
       0.00        0.00        0.000000  Till Pasture
       0.00        0.00        0.000000  Till Grass
       0.00        0.00        0.000000  Outwash Forest
      32.00        0.00        0.000000  Outwash Pasture
       0.00        0.00        0.000000  Outwash Grass
       0.00        0.00        0.000000  Wetland
       0.00        0.00        0.000000  Impervious
10001_Dev.tsf
 T
    1.20000
```

```
Flow Frequency Analysis
  Time Series File:10001_dev.tsf
  Project Location:Landsburg

  ---Annual Peak Flow Rates---      -----Flow Frequency Analysis-------
 Flow Rate  Rank  Time of Peak       - - Peaks - -  Rank  Return  Prob
   (CFS)                              (CFS)              Period
    1.35      2   2/09/01  2:00        2.87          1  100.00  0.990
   0.008      7   1/13/02 16:00        1.35          2   25.00  0.960
   0.639      3   3/06/03  1:00       0.639          3   10.00  0.900
   0.008      8   2/10/04 15:00       0.411          4    5.00  0.800
   0.411      4   1/27/05  9:00       0.231          5    3.00  0.667
   0.231      5   2/25/06  2:00       0.151          6    2.00  0.500
   0.151      6  11/23/06 21:00       0.008          7    1.30  0.231
    2.87      1   1/09/08  7:00       0.008          8    1.10  0.091
Computed Peaks                         2.37              50.00  0.980
```

Infiltration Pond D

```
Retention/Detention Facility

         Type of Facility: Infiltration Pond D
              Side Slope:        2.00  H:1V
      Pond Bottom Length:       60.00  ft
       Pond Bottom Width:        8.00  ft
        Pond Bottom Area:      480.     sq. ft
    Top Area at 1 ft. FB:     1628.     sq. ft
                                 0.037 acres
 Effective Storage Depth:        2.50  ft
       Stage 0 Elevation:        0.00  ft
          Storage Volume:     2133.     cu. ft
                                 0.049 ac-ft
   Vertical Permeability:        6.00  min/in
      Permeable Surfaces: Bottom
              Riser Head:        2.50  ft
          Riser Diameter:       18.00  inches
          Top Notch Weir: None
    Outflow Rating Curve: None
```

Stage	Elevation	Storage		Discharge	Percolation	Surf Area
(ft)	(ft)	(cu. ft)	(ac-ft)	(cfs)	(cfs)	(sq. ft)
0.00	0.00	0.	0.000	0.000	0.00	480.
0.10	0.10	49.	0.001	0.000	0.11	507.
0.20	0.20	102.	0.002	0.000	0.11	535.
0.30	0.30	156.	0.004	0.000	0.11	563.
0.40	0.40	214.	0.005	0.000	0.11	591.
0.50	0.50	275.	0.006	0.000	0.11	620.
0.60	0.60	338.	0.008	0.000	0.11	649.
0.70	0.70	405.	0.009	0.000	0.11	678.
0.80	0.80	474.	0.011	0.000	0.11	708.
0.90	0.90	546.	0.013	0.000	0.11	738.
1.00	1.00	621.	0.014	0.000	0.11	768.
1.10	1.10	700.	0.016	0.000	0.11	799.
1.20	1.20	781.	0.018	0.000	0.11	829.
1.30	1.30	866.	0.020	0.000	0.11	861.
1.40	1.40	953.	0.022	0.000	0.11	892.
1.50	1.50	1044.	0.024	0.000	0.11	924.
1.60	1.60	1138.	0.026	0.000	0.11	956.
1.70	1.70	1235.	0.028	0.000	0.11	989.
1.80	1.80	1336.	0.031	0.000	0.11	1021.
1.90	1.90	1440.	0.033	0.000	0.11	1055.
2.00	2.00	1547.	0.036	0.000	0.11	1088.
2.10	2.10	1657.	0.038	0.000	0.11	1122.
2.20	2.20	1771.	0.041	0.000	0.11	1156.
2.30	2.30	1888.	0.043	0.000	0.11	1190.
2.40	2.40	2009.	0.046	0.000	0.11	1225.
2.50	2.50	2133.	0.049	0.000	0.11	1260.
2.60	2.60	2261.	0.052	0.462	0.11	1295.
2.70	2.70	2392.	0.055	1.310	0.11	1331.
2.80	2.80	2527.	0.058	2.400	0.11	1367.
2.90	2.90	2666.	0.061	3.700	0.11	1403.
3.00	3.00	2808.	0.064	5.160	0.11	1440.
3.10	3.10	2954.	0.068	6.590	0.11	1477.
3.20	3.20	3103.	0.071	7.120	0.11	1514.
3.30	3.30	3257.	0.075	7.610	0.11	1552.
3.40	3.40	3414.	0.078	8.070	0.11	1590.
3.50	3.50	3575.	0.082	8.510	0.11	1628.
3.60	3.60	3739.	0.086	8.920	0.11	1667.
3.70	3.70	3908.	0.090	9.320	0.11	1705.
3.80	3.80	4081.	0.094	9.700	0.11	1745.
3.90	3.90	4257.	0.098	10.070	0.11	1784.
4.00	4.00	4437.	0.102	10.420	0.11	1824.
4.10	4.10	4622.	0.106	10.760	0.11	1864.
4.20	4.20	4810.	0.110	11.100	0.11	1905.
4.30	4.30	5003.	0.115	11.420	0.11	1945.
4.40	4.40	5199.	0.119	11.730	0.11	1987.
4.50	4.50	5400.	0.124	12.030	0.11	2028.

Hyd	Inflow	Outflow		Peak		Storage	
		Target	Calc	Stage	Elev	(Cu-Ft)	(Ac-Ft)
1	0.67	*******	0.50	2.60	2.60	2266.	0.052
2	0.32	*******	0.00	1.93	1.93	1475.	0.034
3	0.15	*******	0.00	0.24	0.24	126.	0.003
4	0.10	*******	0.00	0.07	0.07	36.	0.001
5	0.04	*******	0.00	0.03	0.03	13.	0.000

```
  6     0.05 *******     0.00  0.02     0.02         12.       0.000
  7     0.00 *******     0.00  0.00     0.00          1.       0.000
  8     0.00 *******     0.00  0.00     0.00          1.       0.000

---------------------------------
Route Time Series through Facility
  Inflow Time Series File:10001_dev.tsf
 Outflow Time Series File:Pond_D_rdout

Inflow/Outflow Analysis
   Peak Inflow Discharge:        2.87 CFS at  7:00 on Jan  9 in Year 8
  Peak Outflow Discharge:        2.39 CFS at  8:00 on Jan  9 in Year 8
    Peak Reservoir Stage:        2.80  Ft
     Peak Reservoir Elev:        2.80  Ft
  Peak Reservoir Storage:     2526.    Cu-Ft
                         :        0.058 Ac-Ft

  Flow Frequency Analysis
  Time Series File:pond_d_rdout.tsf
  Project Location:Landsburg

  ---Annual Peak Flow Rates---      -----Flow Frequency Analysis-------
 Flow Rate  Rank  Time of Peak       - - Peaks - -  Rank  Return  Prob
   (CFS)                            (CFS)    (ft)        Period
    1.04      2   2/09/01  3:00      2.39     2.80     1  100.00  0.990
   0.000      8   2/25/02 12:00      1.04     2.67     2   25.00  0.960
   0.000      3   3/06/03  2:00     0.000     2.31     3   10.00  0.900
   0.000      7   8/23/04 17:00     0.000     2.11     4    5.00  0.800
   0.000      4   1/27/05 11:00     0.000     0.67     5    3.00  0.667
   0.000      5   2/25/06  3:00     0.000     0.27     6    2.00  0.500
   0.000      6  11/23/06 22:00     0.000     0.01     7    1.30  0.231
    2.39      1   1/09/08  8:00     0.000     0.01     8    1.10  0.091
Computed Peaks                       1.94     2.76          50.00  0.980
```

Infiltration Pond E

```
Retention/Detention Facility

         Type of Facility: Infiltration Pond E
              Side Slope:        2.00  H:1V
      Pond Bottom Length:       80.00  ft
       Pond Bottom Width:        9.00  ft
        Pond Bottom Area:      720.     sq. ft
    Top Area at 1 ft. FB:     3162.     sq. ft
                              0.073 acres
 Effective Storage Depth:        4.50  ft
       Stage 0 Elevation:        0.00  ft
          Storage Volume:     7331.     cu. ft
                              0.168 ac-ft
   Vertical Permeability:        6.00  min/in
      Permeable Surfaces: Bottom & Sides
              Riser Head:        4.50  ft
          Riser Diameter:       18.00  inches
          Top Notch Weir: None
    Outflow Rating Curve: None
```

Stage	Elevation	Storage		Discharge	Percolation	Surf Area
(ft)	(ft)	(cu. ft)	(ac-ft)	(cfs)	(cfs)	(sq. ft)
0.00	0.00	0.	0.000	0.000	0.00	720.
0.10	0.10	74.	0.002	0.000	0.17	756.
0.20	0.20	151.	0.003	0.000	0.18	792.
0.30	0.30	232.	0.005	0.000	0.19	828.
0.40	0.40	317.	0.007	0.000	0.20	865.
0.50	0.50	405.	0.009	0.000	0.21	902.
0.60	0.60	497.	0.011	0.000	0.22	939.
0.70	0.70	593.	0.014	0.000	0.23	977.
0.80	0.80	693.	0.016	0.000	0.23	1015.
0.90	0.90	796.	0.018	0.000	0.24	1053.
1.00	1.00	903.	0.021	0.000	0.25	1092.
1.10	1.10	1015.	0.023	0.000	0.26	1131.
1.20	1.20	1130.	0.026	0.000	0.27	1170.
1.30	1.30	1249.	0.029	0.000	0.28	1210.
1.40	1.40	1372.	0.031	0.000	0.29	1250.
1.50	1.50	1499.	0.034	0.000	0.30	1290.
1.60	1.60	1630.	0.037	0.000	0.31	1331.
1.70	1.70	1765.	0.041	0.000	0.32	1371.
1.80	1.80	1904.	0.044	0.000	0.33	1413.
1.90	1.90	2047.	0.047	0.000	0.34	1454.
2.00	2.00	2195.	0.050	0.000	0.35	1496.
2.10	2.10	2346.	0.054	0.000	0.36	1538.
2.20	2.20	2502.	0.057	0.000	0.37	1581.
2.30	2.30	2663.	0.061	0.000	0.38	1623.
2.40	2.40	2827.	0.065	0.000	0.39	1667.
2.50	2.50	2996.	0.069	0.000	0.40	1710.
2.60	2.60	3169.	0.073	0.000	0.41	1754.
2.70	2.70	3347.	0.077	0.000	0.42	1798.
2.80	2.80	3529.	0.081	0.000	0.43	1842.
2.90	2.90	3715.	0.085	0.000	0.44	1887.
3.00	3.00	3906.	0.090	0.000	0.45	1932.
3.10	3.10	4102.	0.094	0.000	0.46	1977.
3.20	3.20	4302.	0.099	0.000	0.47	2023.
3.30	3.30	4506.	0.103	0.000	0.48	2069.
3.40	3.40	4715.	0.108	0.000	0.49	2115.
3.50	3.50	4929.	0.113	0.000	0.50	2162.
3.60	3.60	5148.	0.118	0.000	0.51	2209.
3.70	3.70	5371.	0.123	0.000	0.52	2256.
3.80	3.80	5599.	0.129	0.000	0.53	2304.
3.90	3.90	5832.	0.134	0.000	0.54	2352.
4.00	4.00	6069.	0.139	0.000	0.56	2400.
4.10	4.10	6312.	0.145	0.000	0.57	2449.
4.20	4.20	6559.	0.151	0.000	0.58	2497.
4.30	4.30	6811.	0.156	0.000	0.59	2547.
4.40	4.40	7068.	0.162	0.000	0.60	2596.
4.50	4.50	7331.	0.168	0.000	0.61	2646.
4.60	4.60	7598.	0.174	0.462	0.62	2696.
4.70	4.70	7870.	0.181	1.310	0.64	2747.
4.80	4.80	8147.	0.187	2.400	0.65	2797.
4.90	4.90	8429.	0.194	3.700	0.66	2849.
5.00	5.00	8717.	0.200	5.160	0.67	2900.
5.10	5.10	9009.	0.207	6.590	0.68	2952.
5.20	5.20	9307.	0.214	7.120	0.70	3004.
5.30	5.30	9610.	0.221	7.610	0.71	3056.

5.40	5.40	9918.	0.228	8.070	0.72	3109.
5.50	5.50	10232.	0.235	8.510	0.73	3162.
5.60	5.60	10551.	0.242	8.920	0.74	3215.
5.70	5.70	10875.	0.250	9.320	0.76	3269.
5.80	5.80	11205.	0.257	9.700	0.77	3323.
5.90	5.90	11540.	0.265	10.070	0.78	3377.
6.00	6.00	11880.	0.273	10.420	0.79	3432.
6.10	6.10	12226.	0.281	10.760	0.81	3487.
6.20	6.20	12577.	0.289	11.100	0.82	3542.
6.30	6.30	12934.	0.297	11.420	0.83	3598.
6.40	6.40	13297.	0.305	11.730	0.85	3654.
6.50	6.50	13665.	0.314	12.030	0.86	3710.

Hyd	Inflow	Outflow		Peak		Storage	
		Target	Calc	Stage	Elev	(Cu-Ft)	(Ac-Ft)
1	0.50	*******	0.00	1.54	1.54	1546.	0.035
2	0.00	*******	0.00	0.00	0.00	0.	0.000
3	0.00	*******	0.00	0.00	0.00	0.	0.000
4	0.00	*******	0.00	0.00	0.00	0.	0.000
5	0.00	*******	0.00	0.00	0.00	0.	0.000
6	0.00	*******	0.00	0.00	0.00	0.	0.000
7	0.00	*******	0.00	0.00	0.00	0.	0.000
8	0.00	*******	0.00	0.00	0.00	0.	0.000

Route Time Series through Facility
Inflow Time Series File:**pond_d_rdout.tsf**
Outflow Time Series File:**Pond_E_rdout**
Inflow/Outflow Analysis

Peak Inflow Discharge:	2.39	CFS at	8:00	on Jan	9	in Year 8
Peak Outflow Discharge:	1.68	CFS at	8:00	on Jan	9	in Year 8
Peak Reservoir Stage:	4.73	Ft				
Peak Reservoir Elev:	4.73	Ft				
Peak Reservoir Storage:	7965.	Cu-Ft				
:	0.183	Ac-Ft				

Flow Frequency Analysis
Time Series File:**pond_e_rdout.tsf**
Project Location:Landsburg

---Annual Peak Flow Rates---				-----Flow Frequency Analysis-------				
Flow Rate (CFS)	Rank	Time of Peak		- - Peaks - - (CFS)	(ft)	Rank	Return Period	Prob
0.000	2	2/09/01	5:00	**1.68**	**4.73**	**1**	**100.00**	**0.990**
0.000	3	10/01/01	0:00	0.000	3.92	2	25.00	0.960
0.000	4	10/01/02	0:00	0.000	0.00	3	10.00	0.900
0.000	5	10/01/03	0:00	0.000	0.00	4	5.00	0.800
0.000	6	10/01/04	0:00	0.000	0.00	5	3.00	0.667
0.000	7	10/01/05	0:00	0.000	0.00	6	2.00	0.500
0.000	8	10/01/06	0:00	0.000	0.00	7	1.30	0.231
1.68	1	1/09/08	8:00	0.000	0.00	8	1.10	0.091
Computed Peaks				1.12	4.68		50.00	0.980

Infiltration Pond F

Retention/Detention Facility

Type of Facility:	Infiltration Pond F	
Side Slope:	2.00	H:1V
Pond Bottom Length:	50.00	ft
Pond Bottom Width:	2.00	ft
Pond Bottom Area:	100.	sq. ft
Top Area at 1 ft. FB:	1728.	sq. ft
	0.040	acres
Effective Storage Depth:	4.50	ft
Stage 0 Elevation:	0.00	ft
Storage Volume:	3042.	cu. ft
	0.070	ac-ft
Vertical Permeability:	6.00	min/in
Permeable Surfaces:	Bottom & Sides	
Riser Head:	4.50	ft
Riser Diameter:	18.00	inches
Top Notch Weir:	None	
Outflow Rating Curve:	None	

Stage (ft)	Elevation (ft)	Storage (cu. ft)	(ac-ft)	Discharge (cfs)	Percolation (cfs)	Surf Area (sq. ft)
0.00	0.00	0.	0.000	0.000	0.00	100.
0.10	0.10	11.	0.000	0.000	0.03	121.
0.20	0.20	24.	0.001	0.000	0.03	142.
0.30	0.30	40.	0.001	0.000	0.04	164.
0.40	0.40	57.	0.001	0.000	0.04	186.
0.50	0.50	77.	0.002	0.000	0.05	208.
0.60	0.60	99.	0.002	0.000	0.05	231.
0.70	0.70	123.	0.003	0.000	0.06	253.
0.80	0.80	149.	0.003	0.000	0.06	277.
0.90	0.90	178.	0.004	0.000	0.07	300.
1.00	1.00	209.	0.005	0.000	0.07	324.
1.10	1.10	243.	0.006	0.000	0.08	348.
1.20	1.20	279.	0.006	0.000	0.09	373.
1.30	1.30	318.	0.007	0.000	0.09	397.
1.40	1.40	359.	0.008	0.000	0.10	423.
1.50	1.50	402.	0.009	0.000	0.10	448.
1.60	1.60	448.	0.010	0.000	0.11	474.
1.70	1.70	497.	0.011	0.000	0.12	500.
1.80	1.80	548.	0.013	0.000	0.12	526.
1.90	1.90	602.	0.014	0.000	0.13	553.
2.00	2.00	659.	0.015	0.000	0.13	580.
2.10	2.10	718.	0.016	0.000	0.14	607.
2.20	2.20	780.	0.018	0.000	0.15	635.
2.30	2.30	845.	0.019	0.000	0.15	663.
2.40	2.40	913.	0.021	0.000	0.16	691.
2.50	2.50	983.	0.023	0.000	0.17	720.
2.60	2.60	1057.	0.024	0.000	0.17	749.
2.70	2.70	1133.	0.026	0.000	0.18	778.
2.80	2.80	1212.	0.028	0.000	0.19	808.
2.90	2.90	1295.	0.030	0.000	0.19	838.
3.00	3.00	1380.	0.032	0.000	0.20	868.
3.10	3.10	1468.	0.034	0.000	0.21	899.

3.20	3.20	1560.	0.036	0.000	0.22	929.
3.30	3.30	1654.	0.038	0.000	0.22	961.
3.40	3.40	1752.	0.040	0.000	0.23	992.
3.50	3.50	1853.	0.043	0.000	0.24	1024.
3.60	3.60	1957.	0.045	0.000	0.24	1056.
3.70	3.70	2064.	0.047	0.000	0.25	1089.
3.80	3.80	2174.	0.050	0.000	0.26	1121.
3.90	3.90	2288.	0.053	0.000	0.27	1155.
4.00	4.00	2405.	0.055	0.000	0.28	1188.
4.10	4.10	2526.	0.058	0.000	0.28	1222.
4.20	4.20	2650.	0.061	0.000	0.29	1256.
4.30	4.30	2777.	0.064	0.000	0.30	1290.
4.40	4.40	2908.	0.067	0.000	0.31	1325.
4.50	4.50	3042.	0.070	0.000	0.31	1360.
4.60	4.60	3180.	0.073	0.462	0.32	1395.
4.70	4.70	3321.	0.076	1.310	0.33	1431.
4.80	4.80	3466.	0.080	2.400	0.34	1467.
4.90	4.90	3615.	0.083	3.700	0.35	1503.
5.00	5.00	3767.	0.086	5.160	0.36	1540.
5.10	5.10	3923.	0.090	6.590	0.37	1577.
5.20	5.20	4082.	0.094	7.120	0.37	1614.
5.30	5.30	4245.	0.097	7.610	0.38	1652.
5.40	5.40	4412.	0.101	8.070	0.39	1690.
5.50	5.50	4583.	0.105	8.510	0.40	1728.
5.60	5.60	4758.	0.109	8.920	0.41	1767.
5.70	5.70	4937.	0.113	9.320	0.42	1805.
5.80	5.80	5119.	0.118	9.700	0.43	1845.
5.90	5.90	5306.	0.122	10.070	0.44	1884.
6.00	6.00	5496.	0.126	10.420	0.45	1924.
6.10	6.10	5690.	0.131	10.760	0.45	1964.
6.20	6.20	5889.	0.135	11.100	0.46	2005.
6.30	6.30	6091.	0.140	11.420	0.47	2045.
6.40	6.40	6298.	0.145	11.730	0.48	2087.
6.50	6.50	6509.	0.149	12.030	0.49	2128.

Hyd	Inflow	Outflow		Peak		Storage	
		Target	Calc	Stage	Elev	(Cu-Ft)	(Ac-Ft)
1	0.00	*******	0.00	0.00	0.00	0.	0.000
2	0.00	*******	0.00	0.00	0.00	0.	0.000
3	0.00	*******	0.00	0.00	0.00	0.	0.000
4	0.00	*******	0.00	0.00	0.00	0.	0.000
5	0.00	*******	0.00	0.00	0.00	0.	0.000
6	0.00	*******	0.00	0.00	0.00	0.	0.000
7	0.00	*******	0.00	0.00	0.00	0.	0.000
8	0.00	*******	0.00	0.00	0.00	0.	0.000

Route Time Series through Facility
Inflow Time Series File:**pond_e_rdout.tsf**
Outflow Time Series File:**Pond_F_rdout**

Inflow/Outflow Analysis
Peak Inflow Discharge: 1.68 CFS at 8:00 on Jan 9 in Year 8
Peak Outflow Discharge: 1.25 CFS at 9:00 on Jan 9 in Year 8
Peak Reservoir Stage: 4.69 Ft
Peak Reservoir Elev: 4.69 Ft
Peak Reservoir Storage: 3311. Cu-Ft
: 0.076 Ac-Ft

Flow Frequency Analysis
Time Series File:**pond_f_rdout.tsf**
Project Location:Landsburg

---Annual Peak Flow Rates---				-----Flow Frequency Analysis-------				
Flow Rate (CFS)	Rank	Time of Peak		- - Peaks - - (CFS)	(ft)	Rank	Return Period	Prob
0.000	2	10/01/00	0:00	**1.25**	**4.69**	**1**	**100.00**	**0.990**
0.000	3	10/01/01	0:00	0.000	0.00	2	25.00	0.960
0.000	4	10/01/02	0:00	0.000	0.00	3	10.00	0.900
0.000	5	10/01/03	0:00	0.000	0.00	4	5.00	0.800
0.000	6	10/01/04	0:00	0.000	0.00	5	3.00	0.667
0.000	7	10/01/05	0:00	0.000	0.00	6	2.00	0.500
0.000	8	10/01/06	0:00	0.000	0.00	7	1.30	0.231
1.25	1	1/09/08	9:00	0.000	0.00	8	1.10	0.091
Computed Peaks				0.832	4.64		50.00	0.980

Infiltration Pond G-H

Retention/Detention Facility

Type of Facility:	Infiltration Pond G-H	
Side Slope:	2.00	H:1V
Pond Bottom Length:	82.00	ft
Pond Bottom Width:	4.00	ft
Pond Bottom Area:	328.	sq. ft
Top Area at 1 ft. FB:	2448.	sq. ft
	0.056	acres
Effective Storage Depth:	4.00	ft
Stage 0 Elevation:	0.00	ft
Storage Volume:	4405.	cu. ft
	0.101	ac-ft
Vertical Permeability:	6.00	min/in
Permeable Surfaces:	Bottom & Sides	
Riser Head:	4.00	ft
Riser Diameter:	18.00	inches
Top Notch Weir:	None	
Outflow Rating Curve:	None	

Stage	Elevation	Storage		Discharge	Percolation	Surf Area
(ft)	(ft)	(cu. ft)	(ac-ft)	(cfs)	(cfs)	(sq. ft)
0.00	0.00	0.	0.000	0.000	0.00	328.
0.10	0.10	35.	0.001	0.000	0.08	363.
0.20	0.20	73.	0.002	0.000	0.09	397.
0.30	0.30	114.	0.003	0.000	0.10	433.
0.40	0.40	159.	0.004	0.000	0.11	468.
0.50	0.50	208.	0.005	0.000	0.12	504.
0.60	0.60	260.	0.006	0.000	0.13	540.
0.70	0.70	316.	0.007	0.000	0.13	577.
0.80	0.80	375.	0.009	0.000	0.14	613.
0.90	0.90	438.	0.010	0.000	0.15	651.
1.00	1.00	505.	0.012	0.000	0.16	688.
1.10	1.10	576.	0.013	0.000	0.17	726.
1.20	1.20	651.	0.015	0.000	0.18	764.

1.30	1.30	729.	0.017	0.000	0.19	802.
1.40	1.40	811.	0.019	0.000	0.19	841.
1.50	1.50	897.	0.021	0.000	0.20	880.
1.60	1.60	987.	0.023	0.000	0.21	919.
1.70	1.70	1081.	0.025	0.000	0.22	959.
1.80	1.80	1179.	0.027	0.000	0.23	999.
1.90	1.90	1281.	0.029	0.000	0.24	1039.
2.00	2.00	1387.	0.032	0.000	0.25	1080.
2.10	2.10	1497.	0.034	0.000	0.26	1121.
2.20	2.20	1611.	0.037	0.000	0.27	1162.
2.30	2.30	1729.	0.040	0.000	0.28	1204.
2.40	2.40	1852.	0.043	0.000	0.29	1246.
2.50	2.50	1978.	0.045	0.000	0.30	1288.
2.60	2.60	2109.	0.048	0.000	0.31	1331.
2.70	2.70	2245.	0.052	0.000	0.32	1373.
2.80	2.80	2384.	0.055	0.000	0.33	1417.
2.90	2.90	2528.	0.058	0.000	0.34	1460.
3.00	3.00	2676.	0.061	0.000	0.35	1504.
3.10	3.10	2829.	0.065	0.000	0.36	1548.
3.20	3.20	2986.	0.069	0.000	0.37	1593.
3.30	3.30	3147.	0.072	0.000	0.38	1637.
3.40	3.40	3313.	0.076	0.000	0.39	1683.
3.50	3.50	3484.	0.080	0.000	0.40	1728.
3.60	3.60	3659.	0.084	0.000	0.41	1774.
3.70	3.70	3838.	0.088	0.000	0.42	1820.
3.80	3.80	4023.	0.092	0.000	0.43	1866.
3.90	3.90	4212.	0.097	0.000	0.44	1913.
4.00	4.00	4405.	0.101	0.000	0.45	1960.
4.10	4.10	4604.	0.106	0.462	0.46	2007.
4.20	4.20	4807.	0.110	1.310	0.48	2055.
4.30	4.30	5015.	0.115	2.400	0.49	2103.
4.40	4.40	5227.	0.120	3.700	0.50	2151.
4.50	4.50	5445.	0.125	5.160	0.51	2200.
4.60	4.60	5667.	0.130	6.590	0.52	2249.
4.70	4.70	5895.	0.135	7.120	0.53	2298.
4.80	4.80	6127.	0.141	7.610	0.54	2348.
4.90	4.90	6364.	0.146	8.070	0.56	2398.
5.00	5.00	6607.	0.152	8.510	0.57	2448.
5.10	5.10	6854.	0.157	8.920	0.58	2499.
5.20	5.20	7106.	0.163	9.320	0.59	2549.
5.30	5.30	7364.	0.169	9.700	0.60	2601.
5.40	5.40	7627.	0.175	10.070	0.61	2652.
5.50	5.50	7894.	0.181	10.420	0.63	2704.
5.60	5.60	8167.	0.187	10.760	0.64	2756.
5.70	5.70	8446.	0.194	11.100	0.65	2809.
5.80	5.80	8729.	0.200	11.420	0.66	2861.
5.90	5.90	9018.	0.207	11.730	0.67	2915.
6.00	6.00	9312.	0.214	12.030	0.69	2968.

Hyd	Inflow	Outflow		Peak		Storage	
		Target	Calc	Stage	Elev	(Cu-Ft)	(Ac-Ft)
1	0.00	*******	0.00	0.00	0.00	0.	0.000
2	0.00	*******	0.00	0.00	0.00	0.	0.000
3	0.00	*******	0.00	0.00	0.00	0.	0.000
4	0.00	*******	0.00	0.00	0.00	0.	0.000
5	0.00	*******	0.00	0.00	0.00	0.	0.000
6	0.00	*******	0.00	0.00	0.00	0.	0.000

```
  7    0.00 *******    0.00  0.00    0.00          0.      0.000
  8    0.00 *******    0.00  0.00    0.00          0.      0.000


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Route Time Series through Facility
  Inflow Time Series File:pond_f_rdout.tsf
 Outflow Time Series File:Pond_G-H_rdout

Inflow/Outflow Analysis
   Peak Inflow Discharge:       1.25 CFS at  9:00 on Jan  9 in Year 8
  Peak Outflow Discharge:      0.000 CFS at 10:00 on Jan  9 in Year 8
    Peak Reservoir Stage:       3.46  Ft
     Peak Reservoir Elev:       3.46  Ft
  Peak Reservoir Storage:    3408.    Cu-Ft
                         :       0.078 Ac-Ft

  Flow Frequency Analysis
  Time Series File:pond_g-h_rdout.tsf
  Project Location:Landsburg

  ---Annual Peak Flow Rates---      -----Flow Frequency Analysis-------
 Flow Rate  Rank  Time of Peak       - - Peaks - -  Rank  Return  Prob
   (CFS)                           (CFS)     (ft)        Period
   0.000      2  10/01/00  0:00    0.000     3.46     1  100.00  0.990
   0.000      3  10/01/01  0:00    0.000     0.00     2   25.00  0.960
   0.000      4  10/01/02  0:00    0.000     0.00     3   10.00  0.900
   0.000      5  10/01/03  0:00    0.000     0.00     4    5.00  0.800
   0.000      6  10/01/04  0:00    0.000     0.00     5    3.00  0.667
   0.000      7  10/01/05  0:00    0.000     0.00     6    2.00  0.500
   0.000      8  10/01/06  0:00    0.000     0.00     7    1.30  0.231
   0.000      1   1/09/08 10:00    0.000     0.00     8    1.10  0.091
Computed Peaks                     0.000     2.30        50.00  0.980
```

4.4 Water Quality Calculations

Presettling Ponds

Step 1: Identify required wetpond volume factor (*f*)

A basic wetpond requires a volume factor of **3**.

Step 2: Determine rainfall (*R*) for the mean annual storm

The rainfall for the mean annual storm R is obtained by locating the project site on Figure 6.4.1.A and interpolating between isopluvials. Converted to feet. ***R* = 0.054'**

Step 3: Calculate runoff form the mean annual storm (V_r) for the developed site

The land cover types and associated areas for each in the developed project site are used to calculate the amount of rainfall, in cubic feet, that runs off each land cover type. Coefficients specific to the four U.S. Department of Agriculture soil survey cover categories are weighted by the drainage areas and then multiplied by the rainfall, R, from Step 2.

Equation 6-13 $V_r = (0.9A_i + 0.25A_{tg} + 0.10A_{tf} + 0.01A_o)x(R)$

where V_r = calculated volume of runoff from mean annual storm

A_i = area of impervious surface (0 sf)

A_{tg} = area of till soil covered with grass (0 sf)

A_{tf} = area of till soil covered with forest (0 sf)

A_o = area of outwash soil covered with grass or forest (1,393,920 sf)

R = rainfall from mean annual storm (0.054 ft)

Using Equation 6-13 above and the land cover areas in the developed basin calculations, the volume of runoff from the mean annual storm is **752 cubic feet.**

Step 4: Calculate wetpond volume (V_b)

The numbers / results from the previous steps are used in Equation 6-14 (shown below) to calculate the required wetpond volume.

Equation 6-14 $V_b = fV_r$

where V_b = calculated required minimum wetpond volume

f = volume factor from Step 1 (3)

V_r = volume of runoff from mean annual storm (2,152 cf)

Using Equation 6-14 above and the results from the previous steps, the required minimum wepond volume, V_b **is 2,258 cubic feet.**

The **provided wetpond volume** is **5,028 cubic feet**, with a minimum depth of **3 feet.**

SECTION 5: CONVEYANCE SYSTEM ANALYSIS AND DESIGN

Sediment traps are small temporary ponding areas with an outlet used to collect and store sediment from sites cleared and/or graded during ongoing construction. The Rock Quarry is an ongoing construction site susceptible to the degradation of soil banks. Ponds 'A', 'B', and 'C' and designed to convey sediment laden stormwaters through the ponds, trapping the sediment, before conveying stormwaters to the infiltration ponds.

The conveyance calculations for the sediment ponds are included in Appendix D.

SECTION 6: SPECIAL REPORTS AND STUDIES

The geotechnical report by Riley Group is included in Appendix E.

SECTION 7: OTHER PERMITS

A copy of the Grading Permit issued by King County is include in Appendix F.

SECTION 8: ESC ANALYSIS AND DESIGN

The site will utilize Appendix D of the 2009 KCSWDM and the standard design details from the 2012 Stormwater Management Manual for Western Washington for the erosion and sedimentation control design. Below is a breakdown of how each require element is addressed:

1) Mark Clearing Limits
   a. High Visibility Staking: BMP C103. To establish the clearing limits, plastic, fabric, or metal fence may be used:
      i. At the boundary of sensitive areas, their buffers and other areas required to be left uncleared, and/or as necessary to control vehicle access onto the site.
2) Establish Construction Access
   a. Stabilized Construction Entrance: BMP 105 (modified). To reduce the amount of sediment transported onto paved roads by vehicles or equipment. Paved construction entrance shall be stabilized and swept on a regular basis where traffic will be entering or leaving a construction site.
3) Control Flow Rates
   a. Sediment Trap: BMP C240. A sediment trap is a small temporary ponding area with a gravel outlet (or culvert pipe) used to collect and store sediment from sites cleared and/or graded during construction.
4) Install Sediment Controls
   a. Wattles: BMP C235. Wattles are temporary erosion and sediment control barriers consisting of straw, compost, or other material that is wrapped in biodegradable tubular plastic or similar encasing material. They reduce the velocity and can spread the flow of rill and sheet runoff, and can capture and retain sediment.
5) Stabilize Soils
   a. Temporary and Permanent Seeding: BMP C120. Seeding reduces erosion by stabilizing exposed soils. Well-established vegetative cover is one of the most effective methods of reducing erosion.
6) Protects Slopes
   a. Temporary and Permanent Seeding: BMP C120. Seeding reduces erosion by stabilizing exposed soils. Well-established vegetative cover is one of the most effective methods of reducing erosion.
7) Protects Drain Inlets
   a. Not applicable to this project.
8) Stabilize Channels and Outlets
   a. Not applicable to this project.
9) Concrete Pollutants
   a. Not applicable to this project.
10) Control Dewatering
   a. Not applicable to this project.
11) Maintain BMPs
   a. All BMPs will be maintained and repaired in accordance with BMP specifications.

ON LIMITS

7.25 ACRES	1,240,700 CY
14.00 ACRES	4,092,500 CY
5.75 ACRES	TO BE DETERMINED
27.00 ACRES	TO BE DETERMINED

POTE
FOR
A
MITIG

ION PONDS- SIZING CALCULATIONS

HASE AREAS ARE APPROXIMATELY 7.25 AND 14.00 ACRES, RESPECTIVELY. THESE AREAS
ES OF PRESETTLING PONDS (POND 'A' – POND 'C') AND INFILTRATION PONDS (POND 'D' –
N SIZED FOR PRESETTLING AND TOTAL INFILTRATION. THE RESETTLING PONDS AND
ACCOMMODATE 32.00 ACRES OF AN OPEN MINING AREA. LIMITS OF THE OPEN MINING AREA
ACRES WITHOUT ONE OF THE FOLLOWING:

MINING AREAS ON A 1:1 RATIO (ACRE:ACRE) TO LIMIT THE OPEN MINING AREA TO A TOTAL
ID/OR

ON OF INFILTRATION PONDS TO ACCOMMODATE THE INCREASE IN OPEN MINING AREA

ND STOCKPILES REQUIRE MORE INFILTRATION PONDS, AN ALTERNATIVE LOCATION HAS BEEN
TRATION RATES HAVE ALREADY BEEN TESTED.

LENGTH:WIDTH	MODELED VOLUME (CF)
3:1	1,458
3:1	1,434
3:1	2,136
TOTAL :	5,028

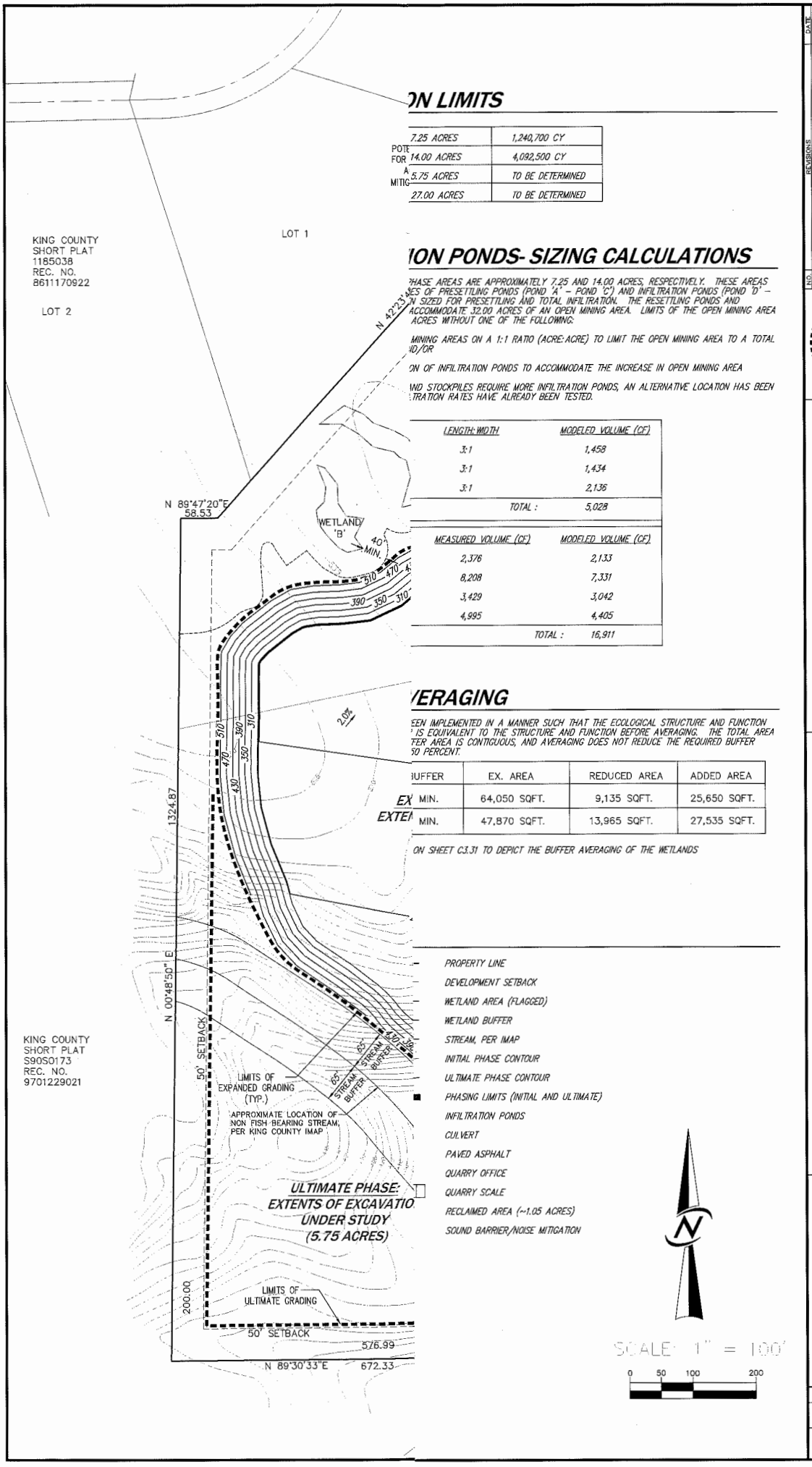
MEASURED VOLUME (CF)	MODELED VOLUME (CF)
2,376	2,133
8,208	7,331
3,429	3,042
4,995	4,405
TOTAL :	16,911

VERAGING

EEN IMPLEMENTED IN A MANNER SUCH THAT THE ECOLOGICAL STRUCTURE AND FUNCTION
IS EQUIVALENT TO THE STRUCTURE AND FUNCTION BEFORE AVERAGING. THE TOTAL AREA
FER AREA IS CONTIGUOUS, AND AVERAGING DOES NOT REDUCE THE REQUIRED BUFFER
50 PERCENT.

UFFER	EX. AREA	REDUCED AREA	ADDED AREA
EX MIN.	64,050 SQFT.	9,135 SQFT.	25,650 SQFT.
EXTE MIN.	47,870 SQFT.	13,965 SQFT.	27,535 SQFT.

ON SHEET C3.31 TO DEPICT THE BUFFER AVERAGING OF THE WETLANDS



PROPERTY LINE
DEVELOPMENT SETBACK
WETLAND AREA (FLAGGED)
WETLAND BUFFER
STREAM, PER IMAP
INITIAL PHASE CONTOUR
ULTIMATE PHASE CONTOUR
PHASING LIMITS (INITIAL AND ULTIMATE)
INFILTRATION PONDS
CULVERT
PAVED ASPHALT
QUARRY OFFICE
QUARRY SCALE
RECLAIMED AREA (~1.05 ACRES)
SOUND BARRIER/NOISE MITIGATION

SCALE: 1" = 100'
0 50 100 200

NO.	REVISIONS	DATE
1	COUNTY COMMENTS, REVISIONS TO PLAN SET	9/2/16

09-02-2016

CORE DESIGN
ENGINEERING · PLANNING · SURVEYING
14711 NE 29th Place Suite 101
Bellevue, Washington 98007
425.885.7877 Fax 425.885.7963

EXCAVATION PLAN
RAGING RIVER QUARRY
JOHN PRIEBE ET AL.
3132 NE HARRISON ST
ISSAQUAH, WA 98029

DATE	JULY 2015
DESIGNED	SLB
DRAWN	SLB
APPROVED	SLB

KEVIN J. VANDERZANDEN
PROJECT MANAGER

SHEET C3.01 OF 5

PROJECT NUMBER 10001

J:\2010\10001R\ENGINEERING\FINAL\SHEETS\10001 C301.DWG 9/14/2016 3:06 PM

SECTION 9: BOND QUANTITIES, FACILITY SUMMARIES, AND DECLARATION OF COVENANT

This is a private operation with no proposed public improvements. A bond quantities worksheet is not applicable for this project.

SECTION 10: OPERATIONS AND MAINTENANCE

The Raging River Quarry will be responsible for the onsite maintenance and operations of the stormwater management systems.

Appendix A

Parcel & Basin Information

King County Parcel Report

Department of Assessments

500 Fourth Avenue, Suite ADM-AS-0708, Seattle, WA 98104

Office Hours: Mon - Fri 8:30 a.m. to 4:30 p.m.

TEL: 206-296-7300
FAX: 206-296-5107
TTY: 206-296-7888

Send us mail

New Search | Property Tax Bill | Map This Property | Glossary of Terms | Area Report | Property Detail

PARCEL

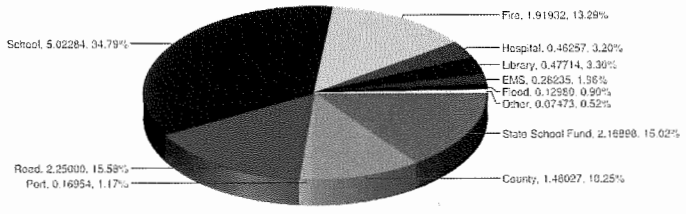
Parcel Number	222407-9011
Name	RAGING RIVER QUARRY LLC
Site Address	
Legal	SE 1/4 OF NW 1/4 OF SW 1/4 TGW POR OF S 1/2 OF SW 1/4 LY W OF RAGING RIVER & N OF LN BEG 331.05 FT S OF NW COR TH N 77-06-00 E 1334.70 FT TO E LN OF SW 1/4 OF SW 1/4 75 FT S OF NE COR TH E 150 FT TO C/L OF RIVER TGW POR OF NW 1/4 OF SW 1/4 BEG ON S LN OF SUBD 58.56 FT E OF SW COR TH N 42-22-27 E 897.83 FT TO NW COR OF SE 1/4 OF NW 1/4 OF SW 1/4 TH S 00-55-06 W 660.99 FT TO S LN OF SD SUBD TH S 89-46-17 W ALG SD S LN 594.53 FT TO BEG LESS CO RD PER KC LOT LN ADJ NO 582025

BUILDING 1

Year Built	
Total Square Footage	
Number Of Bedrooms	
Number Of Baths	
Grade	
Condition	
Lot Size	885574
Views	No
Waterfront	

TOTAL LEVY RATE DISTRIBUTION

Tax Year: 2016 **Levy Code:** 6694 **Total Levy Rate:** $14.43755 **Total Senior Rate:** $8.77176



42.82% Voter Approved

Click here to see levy distribution comparison by year.

TAX ROLL HISTORY

Valued Year	Tax Year	Appraised Land Value ($)	Appraised Imps Value ($)	Appraised Total ($)	Taxable Land Value ($)	Taxable Imps Value ($)	Taxable Total ($)
2015	2016	226,000	0	226,000	226,000	0	226,000
2014	2015	208,000	0	208,000	208,000	0	208,000
2013	2014	230,000	0	230,000	230,000	0	230,000
2012	2013	236,000	0	236,000	236,000	0	236,000
2011	2012	242,000	0	242,000	242,000	0	242,000
2010	2011	255,000	0	255,000	255,000	0	255,000
2009	2010	255,000	0	255,000	255,000	0	255,000
2008	2009	300,000	0	300,000	300,000	0	300,000
2007	2008	307,000	0	307,000	307,000	0	307,000
2006	2007	283,000	0	283,000	283,000	0	283,000
2005	2006	274,000	0	274,000	274,000	0	274,000
2004	2005	265,000	0	265,000	265,000	0	265,000
2003	2004	253,000	0	253,000	253,000	0	253,000
2002	2003	253,000	0	253,000	253,000	0	253,000
2001	2002	220,000	0	220,000	220,000	0	220,000
2000	2001	311,000	0	311,000	311,000	0	311,000
1999	2000	271,000	0	271,000	271,000	0	271,000
1998	1999	250,000	0	250,000	250,000	0	250,000
1997	1998	0	0	0	220,000	0	220,000

Reference Links:

- King County Taxing Districts Codes and Levies (.PDF)
- King County Tax Links
- Property Tax Advisor
- Washington State Department of Revenue (External link)
- Washington State Board of Tax Appeals (External link)
- Board of Appeals/Equalization
- Districts Report
- iMap
- Recorder's Office

  Scanned images of surveys and other map documents

1996	1997	0	0	0	220,000	0	220,000
1994	1995	0	0	0	220,000	0	220,000
1992	1993	0	0	0	209,900	0	209,900
1990	1991	0	0	0	160,200	0	160,200
1988	1989	0	0	0	74,800	0	74,800
1986	1987	0	0	0	74,800	0	74,800
1984	1985	0	0	0	67,000	0	67,000
1983	1984	0	0	0	67,000	0	67,000
1982	1983	0	0	0	76,000	0	76,000

Updated: March 17, 2016

Information for... **Do more online**
Contact us

Department of Assessments

500 Fourth Avenue, Suite ADM-AS-0708, Seattle, WA 98104

Office Hours: Mon - Fri 8:30 a.m. to 4:30 p.m.

TEL: 206-296-7300
FAX: 206-296-5107
TTY: 206-296-7888

Send us mail

New Search | Property Tax Bill | Map This Property | Glossary of Terms | Area Report | Property Detail

PARCEL

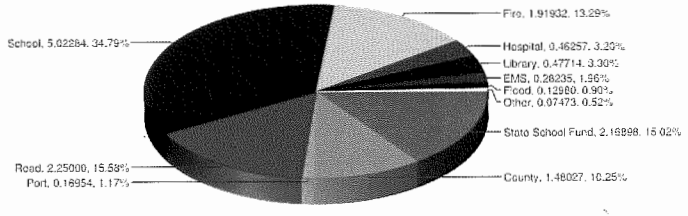
Parcel Number	222407-9033
Name	RAGING RIVER QUARRY LLC
Site Address	
Legal	POR OF S 1/2 OF SW 1/4 LY W OF CENTER OF RAGING RIVER & S OF FOLG LN BEG 331.05 FT S OF NW COR OF SW 1/4 OF SW 1/4 TH N 77-06-00 E 1334.70 FT TO E LN SD SUB DIV 75 FT S OF NE COR THOF E 150 FT M/L TO CENTER OF RAGING RIVER LESS CO RD

BUILDING 1

Year Built	
Total Square Footage	
Number Of Bedrooms	
Number Of Baths	
Grade	
Condition	
Lot Size	1125154
Views	No
Waterfront	RIVER/SLOUGH

TOTAL LEVY RATE DISTRIBUTION

Tax Year: 2016 **Levy Code:** 6694 **Total Levy Rate:** $14.43755 **Total Senior Rate:** $8.77176



42.82% Voter Approved

Click here to see levy distribution comparison by year.

TAX ROLL HISTORY

Valued Year	Tax Year	Appraised Land Value ($)	Appraised Imps Value ($)	Appraised Total ($)	Taxable Land Value ($)	Taxable Imps Value ($)	Taxable Total ($)
2015	2016	260,000	0	260,000	260,000	0	260,000
2014	2015	239,000	0	239,000	239,000	0	239,000
2013	2014	287,000	0	287,000	287,000	0	287,000
2012	2013	294,000	0	294,000	294,000	0	294,000
2011	2012	302,000	0	302,000	302,000	0	302,000
2010	2011	318,000	0	318,000	318,000	0	318,000
2009	2010	318,000	0	318,000	318,000	0	318,000
2008	2009	375,000	0	375,000	375,000	0	375,000
2007	2008	368,000	0	368,000	368,000	0	368,000
2006	2007	340,000	0	340,000	340,000	0	340,000
2005	2006	329,000	0	329,000	329,000	0	329,000
2004	2005	318,000	0	318,000	318,000	0	318,000
2003	2004	303,000	0	303,000	303,000	0	303,000
2002	2003	303,000	0	303,000	303,000	0	303,000
2001	2002	264,000	0	264,000	264,000	0	264,000
2000	2001	319,000	0	319,000	319,000	0	319,000
1999	2000	278,000	0	278,000	278,000	0	278,000
1998	1999	256,000	0	256,000	256,000	0	256,000
1997	1998	0	0	0	225,000	0	225,000
1996	1997	0	0	0	225,000	0	225,000
1994	1995	0	0	0	225,000	0	225,000

Reference Links:

- King County Taxing Districts Codes and Levies (.PDF)
- King County Tax Links
- Property Tax Advisor
- Washington State Department of Revenue (External link)
- Washington State Board of Tax Appeals (External link)
- Board of Appeals/Equalization
- Districts Report
- iMap
- Recorder's Office

Scanned images of surveys and other map documents

1992	1993	0	0	0	221,400	0	221,400
1990	1991	0	0	0	169,000	0	169,000
1988	1989	0	0	0	87,400	0	87,400
1986	1987	0	0	0	87,400	0	87,400
1984	1985	0	0	0	78,200	0	78,200
1982	1983	0	0	0	78,200	0	78,200

Updated: March 17, 2016

Information for... **Do more online**
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FAX: 206-296-5107
TTY: 206-296-7888

Send us mail

New Search | Property Tax Bill | Map This Property | Glossary of Terms | Area Report | Property Detail

PARCEL

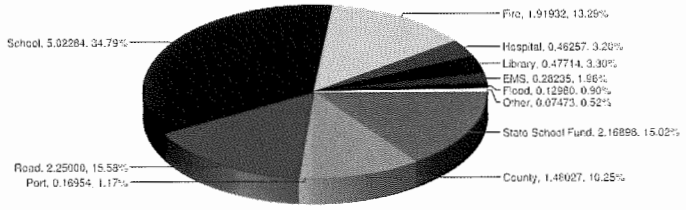
Parcel Number	222407-9035
Name	RAGING RIVER QUARRY LLC
Site Address	
Legal	LOT 4 KC SHORT PLAT NO 880098 REC NO 8202050393 SD PLAT DAF - POR OF NE 1/4 OF SW 1/4 & S 163 FT OF SE 1/4 OF NW 1/4 LY WLY OF RAGING RIVER LESS CO RD

BUILDING 1

Year Built	
Total Square Footage	
Number Of Bedrooms	
Number Of Baths	
Grade	
Condition	
Lot Size	219978
Views	No
Waterfront	RIVER/SLOUGH

TOTAL LEVY RATE DISTRIBUTION

Tax Year: 2016 Levy Code: 6694 Total Levy Rate: $14.43755 Total Senior Rate: $8.77176



42.82% Voter Approved

Click here to see levy distribution comparison by year.

TAX ROLL HISTORY

Valued Year	Tax Year	Appraised Land Value ($)	Appraised Imps Value ($)	Appraised Total ($)	Taxable Land Value ($)	Taxable Imps Value ($)	Taxable Total ($)
2015	2016	190,000	0	190,000	190,000	0	190,000
2014	2015	175,000	0	175,000	175,000	0	175,000
2013	2014	139,000	0	139,000	139,000	0	139,000
2012	2013	143,000	0	143,000	143,000	0	143,000
2011	2012	147,000	0	147,000	147,000	0	147,000
2010	2011	155,000	0	155,000	155,000	0	155,000
2009	2010	155,000	0	155,000	155,000	0	155,000
2008	2009	183,000	0	183,000	183,000	0	183,000
2007	2008	186,000	0	186,000	186,000	0	186,000
2006	2007	172,000	0	172,000	172,000	0	172,000
2005	2006	167,000	0	167,000	167,000	0	167,000
2004	2005	162,000	0	162,000	162,000	0	162,000
2003	2004	155,000	0	155,000	155,000	0	155,000
2002	2003	201,000	0	201,000	201,000	0	201,000
2001	2002	175,000	0	175,000	175,000	0	175,000
2000	2001	223,000	0	223,000	223,000	0	223,000
1999	2000	194,000	0	194,000	194,000	0	194,000
1998	1999	179,000	0	179,000	179,000	0	179,000
1997	1998	0	0	0	157,600	0	157,600
1996	1997	0	0	0	157,600	0	157,600
1994	1995	0	0	0	157,600	0	157,600
1992	1993	0	0	0	128,500	0	128,500

Reference Links:

- King County Taxing Districts Codes and Levies (.PDF)
- King County Tax Links
- Property Tax Advisor
- Washington State Department of Revenue (External link)
- Washington State Board of Tax Appeals (External link)
- Board of Appeals/Equalization
- Districts Report
- iMap
- Recorder's Office

  Scanned images of surveys and other map documents

1990	1991	0	0	0	98,100	0	98,100
1988	1989	0	0	0	44,500	0	44,500
1986	1987	0	0	0	44,500	0	44,500
1984	1985	0	0	0	25,000	0	25,000
1983	1984	0	0	0	25,000	0	25,000
1982	1983	0	0	0	18,600	0	18,600

Updated: March 17, 2016

Information for... **Do more online**
Contact us

Appendix B

Resource Review & Off-site Analysis Documentation

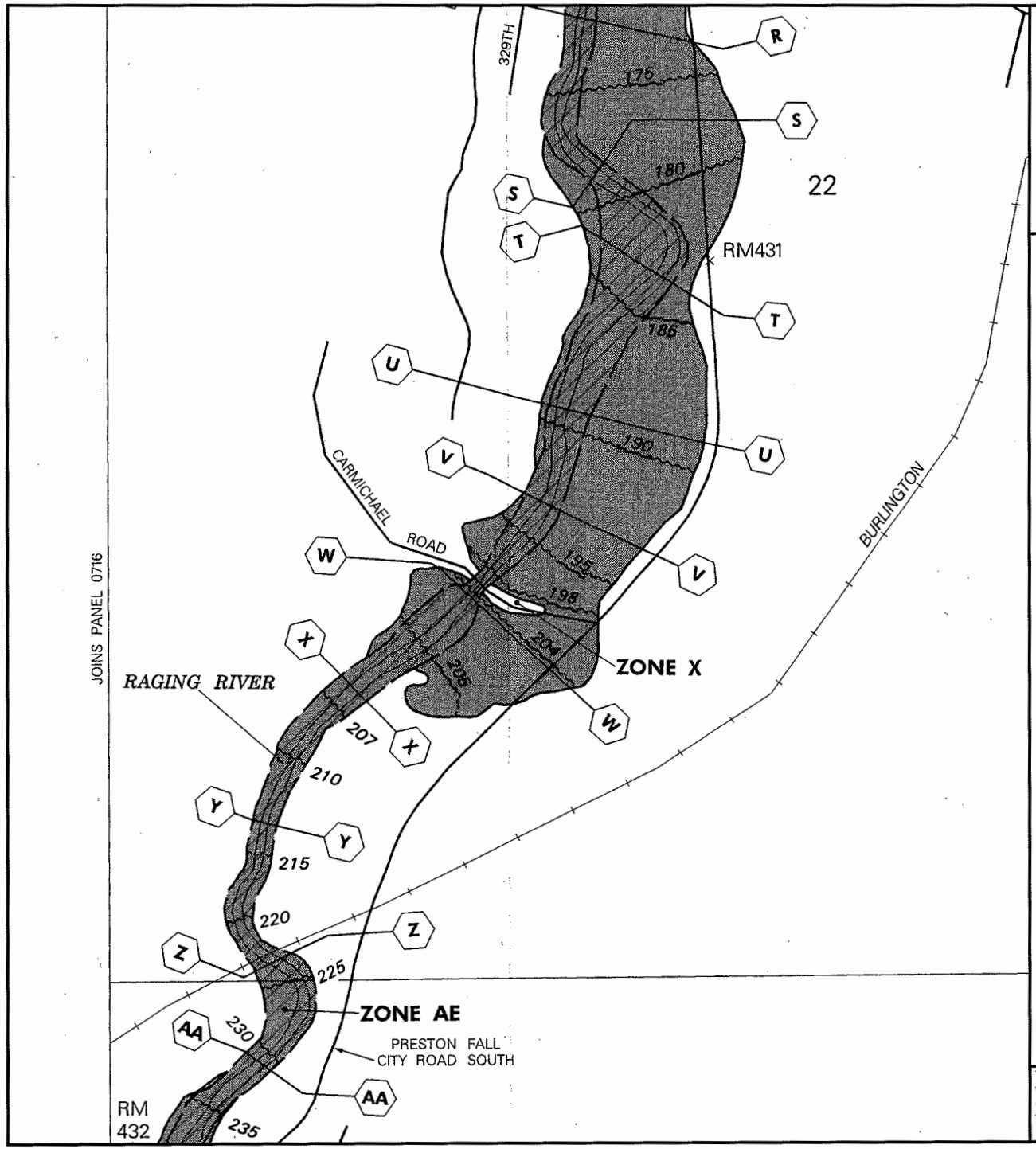
FEMA Map (53033C0717 G)

USDA NRCS Site Soils Map

Sensitive Areas Map – King County iMap

Drainage Complaint Table

Raging River Impairments



APPROXIMATE SCALE IN FEET

500 0 500

NATIONAL FLOOD INSURANCE PROGRAM

FIRM

FLOOD INSURANCE RATE MAP

KING COUNTY, WASHINGTON AND INCORPORATED AREAS

PANEL 717 OF 1725

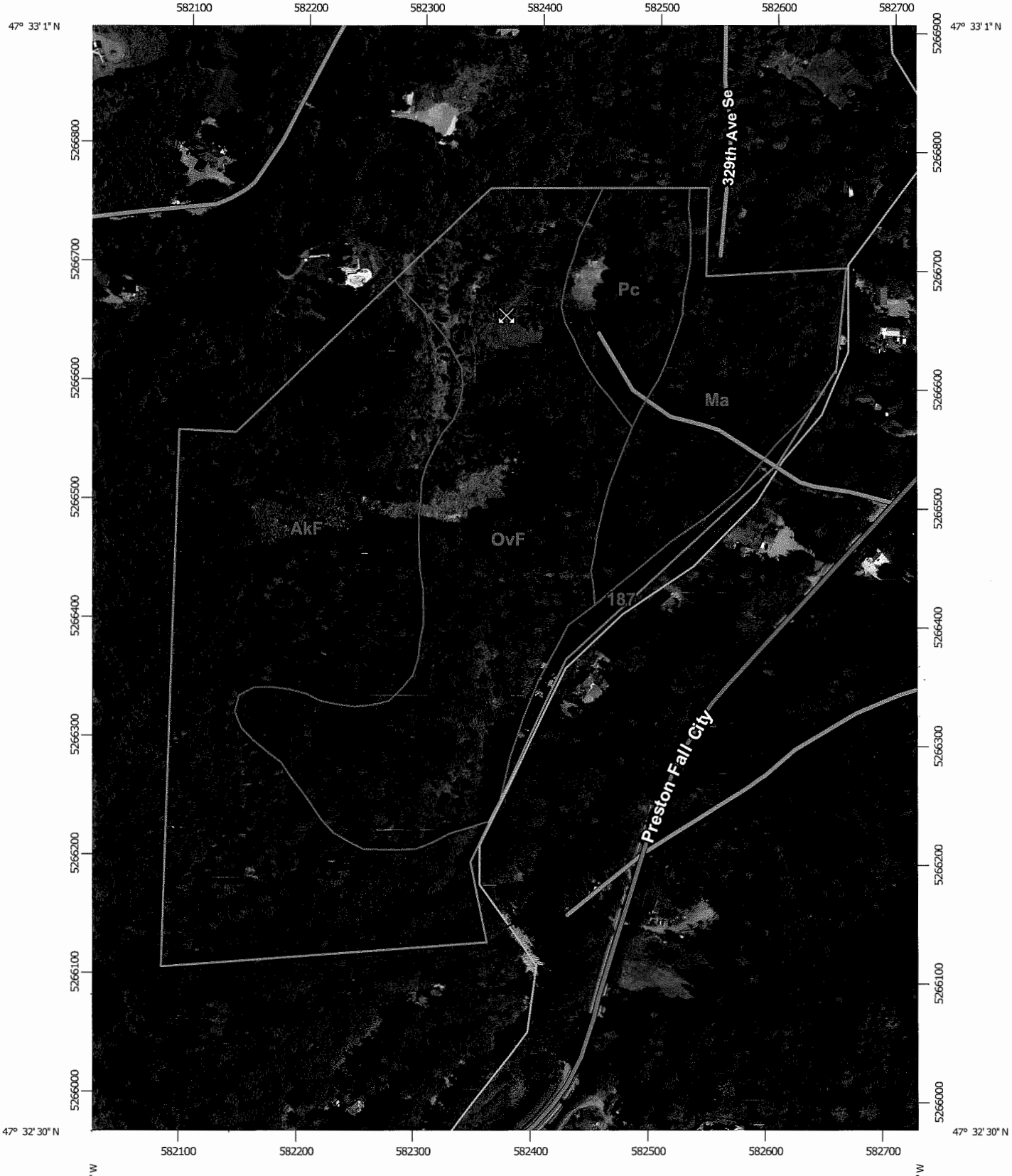
(SEE MAP INDEX FOR PANELS NOT PRINTED)

CONTAINS: COMMUNITY	NUMBER	PANEL	SUFFIX
KING COUNTY, UNINCORPORATED AREAS	530071	0717	G
SNOQUALMIE, CITY OF	530090	0717	G

MAP NUMBER 53033C0717 G

MAP REVISED: MAY 20, 1996

Federal Emergency Management Agency



Map Scale: 1:4,530 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 50 100 200 300

Feet: 0 200 400 800 1200

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

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

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

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

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

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
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 10, Sep 30, 2014

Soil Survey Area: Snoqualmie Pass Area, Washington (Parts of King and Pierce Counties)
Survey Area Data: Version 13, Mar 3, 2015

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: Aug 1, 2011—Aug 20, 2011

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.

Map Unit Legend

King County Area, Washington (WA633)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
AkF	Alderwood and Kitsap soils, very steep	24.4	42.7%
Ma	Mixed alluvial land	7.9	13.7%
OvF	Ovall gravelly loam, 40 to 75 percent slopes	19.8	34.7%
Pc	Pilchuck loamy fine sand	3.8	6.7%
Subtotals for Soil Survey Area		**55.9**	**97.9%**
Totals for Area of Interest		**57.1**	**100.0%**

Snoqualmie Pass Area, Washington (Parts of King and Pierce Counties) (WA634)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
187	Pilchuck loamy fine sand, 0 to 3 percent slopes	1.2	2.1%
Subtotals for Soil Survey Area		**1.2**	**2.1%**
Totals for Area of Interest		**57.1**	**100.0%**


King County iMap
iMap home
224079011
D92543
200m
600ft
-13,571,067.18946 6,030,783.86095 Meters
Legend
Parcels
Environmentally Sensitive Areas
Erosion hazard (1990 SAO)
Seismic hazard (1990 SAO)
Landslide 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 Services
Stormwater facilities
Bonded
Commercial-MF
Commercial-SF
Construction
DOT
Regional
Residential
Drainage complaints

King County iMap

Date: 8/26/2016 Notes:

King County
GIS Center

DRAINAGE COMPLAINT

Complaint: #2009-1108

Problem Type: FCR, Facilty Complaint – Residential

Problem: MNM, Needs Maintenance

Date Closed: 2/11/2010

This complaint was a maintenace complaint on a residential lot. Complaint was addressed and closed.

DRAINAGE COMPLAINT

Complaint: #2006-0743

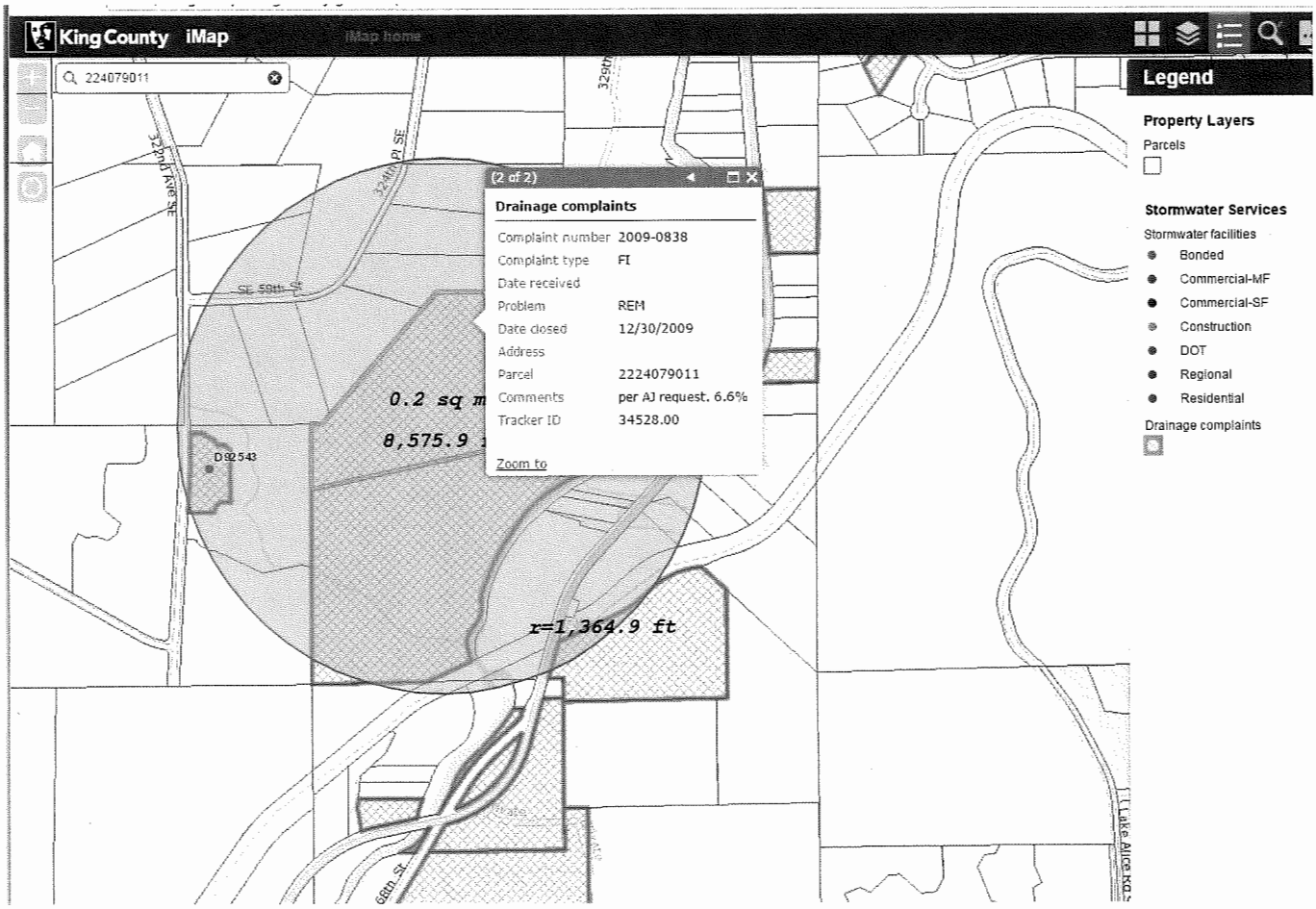
Problem Type: FCR, Facilty Complaint – Residential

Problem: MNM, Needs Maintenance

Date Closed: 12/06/2006

This complaint was a maintenace complaint on a residential lot. Complaint was addressed and closed.

DRAINAGE COMPLAINT



Complaint: #2009-0838

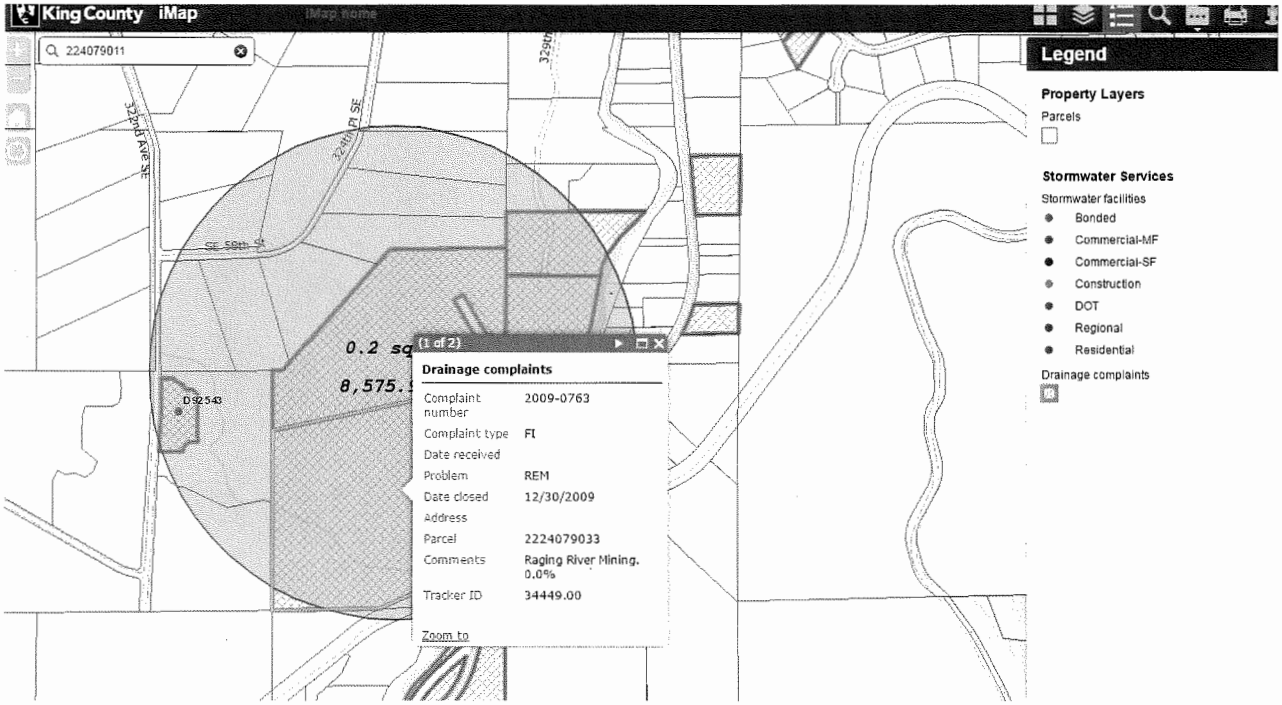
Problem Type: FI, Stormwater Maintenance Fee Investigation

Problem: REM, Remeassure

Date Closed: 12/30/2009

This complaint was a fee complaint. Complaint was addressed by a remeausurement and closed.

DRAINAGE COMPLAINT



Complaint: #2009-0763

Problem Type: FI, Stormwater Maintenance Fee Investigation

Problem: REM, Remeassure

Date Closed: 12/30/2009

This complaint was a fee complaint. Complaint was addressed by a remeausurement and closed.

DRAINAGE COMPLAINT

Complaint: #2009-0839

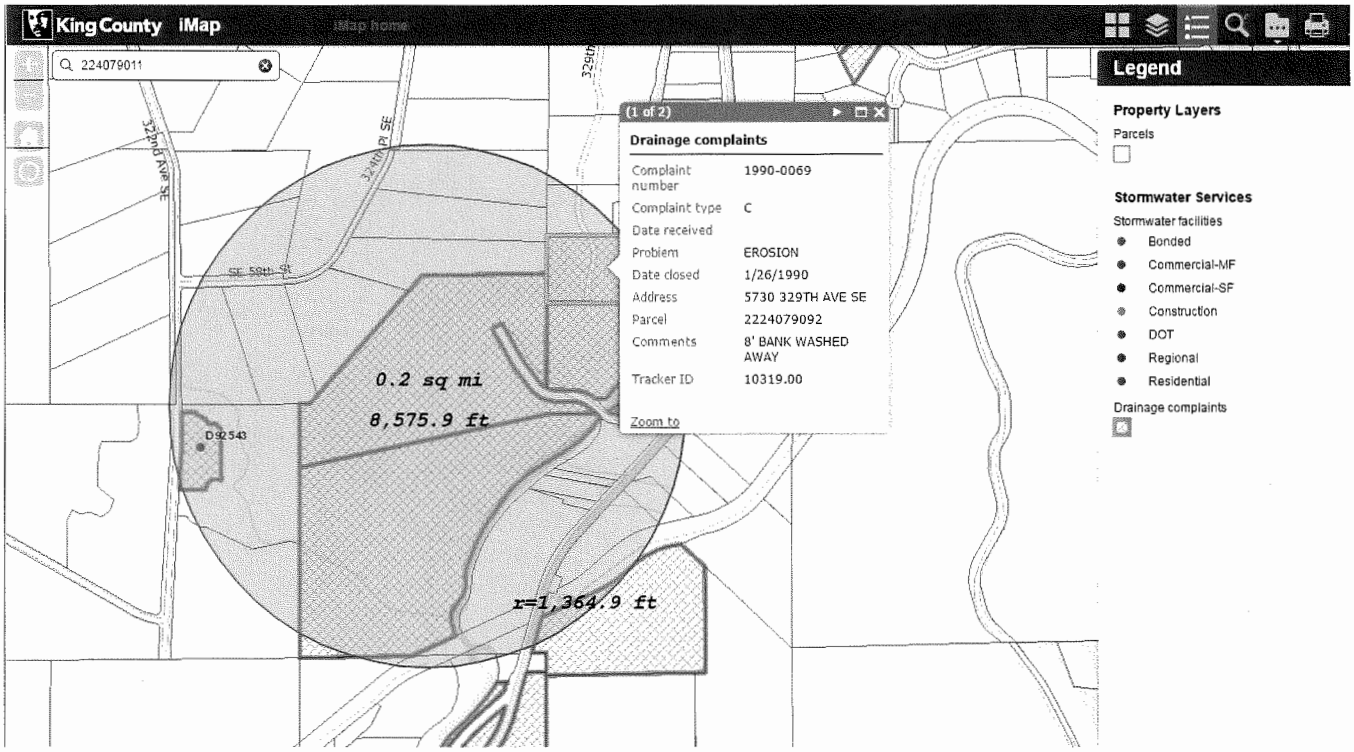
Problem Type: FI, Stormwater Maintenance Fee Investigation

Problem: REM, Remeassure

Date Closed: 12/30/2009

This complaint was a fee complaint. Complaint was addressed by a remeausurement and closed.

DRAINAGE COMPLAINT



Complaint: #1990-0069

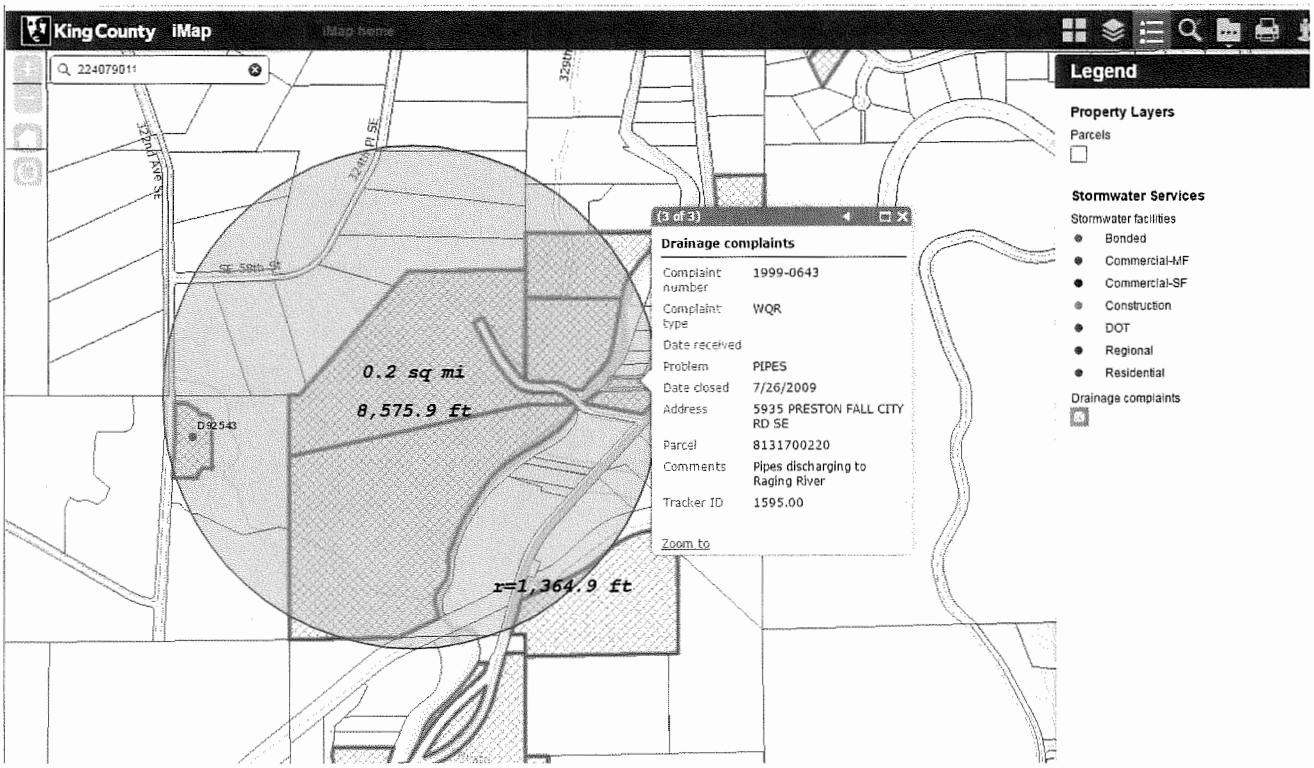
Problem Type: C, Action Request

Problem: Erosion

Date Closed: 1/26/1990

This complaint was an erosion complaint. Complaint was addressed and closed. This complaint shows that there is an erosion potential.

DRAINAGE COMPLAINT



Complaint: #1999-0643

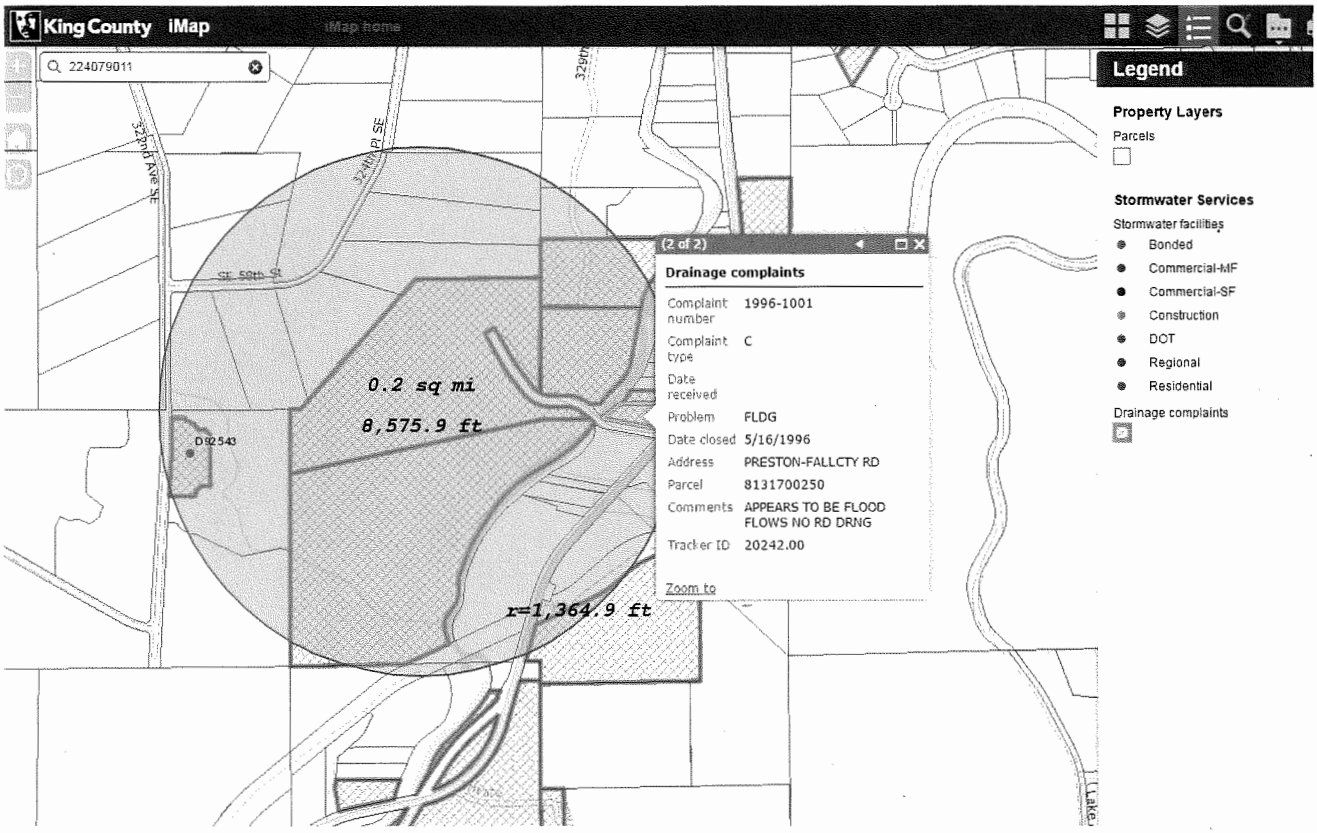
Problem Type: WQR, Water Quality Engineering Review

Problem: Pipes

Date Closed: 7/26/2009

This complaint was a water quality complaint. This complaint indicates that pipes were discharging to Raging River. Complaint was addressed and closed.

DRAINAGE COMPLAINT



Complaint: #1996-1001

Problem Type: C, Action Request

Problem: FLDG, Flooding (?)

Date Closed: 5/16/1996

This complaint appears to be flood related. Complaint was addressed and closed.

DRAINAGE COMPLAINT

Complaint: #2011-0820

Problem Type: FIR, Stormwater Fee Investigation Review

Problem: SFTD, 65/10 Discount

Date Closed: 5/10/2012

This complaint appears to be related to the fees. Complaint indicates that an inquiry was made, recipient was/is eligible for a dicsount, but no response was received. Complaint was addressed and closed.

Sub-basin	Snoqualmie RM	Trib RM	Temp.	DO	FC	pH	Nutr.
Cherry Creek	6.7						
Tuck Creek	10.3						
Ames Lake Creek	17.5						
Harris Creek	21.3						
Lower Tolt River	24.9						
North Fork Tolt	24.9	8.8					
South Fork Tolt	24.9	8.8					
Griffin Creek	27.2						
Patterson Creek	31.2						
Raging River	36.2					High	
Tokul Creek	39.6						
Kimball Creek	41.1						

	Impaired. Violation of state standards or failure to meet TMDL guidelines, as applicable.
	Basin of concern. Minor failure to meet standards. In some cases, localized problem only
	No evidence of impairment. NOTE: Data not available for many smaller tributaries.

Appendix C

Vault Sizing

KCRTS Hydrologic Soils Group Table (Table 3.2.2.B)

Rainfall Region & Regional Scale Factor (Figure 3.2.2.A)

Mean Annual Storm Precipitation (Figure 6.4.1.A)

KCRTS Input File

KCRTS Output Files

TABLE 3.2.2.B EQUIVALENCE BETWEEN SCS SOIL TYPES AND KCRTS SOIL TYPES

SCS Soil Type	SCS Hydrologic Soil Group	KCRTS Soil Group	Notes
Alderwood (AgB, AgC, AgD)	C	Till	
Arents, Alderwood Material (AmB, AmC)	C	Till	
Arents, Everett Material (An)	B	Outwash	1
Beausite (BeC, BeD, BeF)	C	Till	2
Bellingham (Bh)	D	Till	3
Briscot (Br)	D	Till	3
Buckley (Bu)	D	Till	4
Earlmont (Ea)	D	Till	3
Edgewick (Ed)	C	Till	3
Everett (EvB, EvC, EvD, EwC)	A/B	Outwash	1
Indianola (InC, InA, InD)	A	Outwash	1
Kitsap (KpB, KpC, KpD)	C	Till	
Klaus (KsC)	C	Outwash	1
Neilton (NeC)	A	Outwash	1
Newberg (Ng)	B	Till	3
Nooksack (Nk)	C	Till	3
Norma (No)	D	Till	3
Orcas (Or)	D	Wetland	
Oridia (Os)	D	Till	3
Ovall (OvC, OvD, OvF)	C	Till	2
Pilchuck (Pc)	C	Till	3
Puget (Pu)	D	Till	3
Puyallup (Py)	B	Till	3
Ragnar (RaC, RaD, RaC, RaE)	B	Outwash	1
Renton (Re)	D	Till	3
Salal (Sa)	C	Till	3
Sammamish (Sh)	D	Till	3
Seattle (Sk)	D	Wetland	
Shalcar (Sm)	D	Till	3
Si (Sn)	C	Till	3
Snohomish (So, Sr)	D	Till	3
Sultan (Su)	C	Till	3
Tukwila (Tu)	D	Till	3
Woodinville (Wo)	D	Till	3

Notes:

1. Where outwash soils are saturated or underlain at shallow depth (<5 feet) by glacial till, they should be treated as till soils.
2. These are bedrock soils, but calibration of HSPF by King County DNRP shows bedrock soils to have similar hydrologic response to till soils.
3. These are alluvial soils, some of which are underlain by glacial till or have a seasonally high water table. In the absence of detailed study, these soils should be treated as till soils.
4. Buckley soils are formed on the low-permeability Osceola mudflow. Hydrologic response is assumed to be similar to that of till soils.

FIGURE 3.2.2.A RAINFALL REGIONS AND REGIONAL SCALE FACTORS

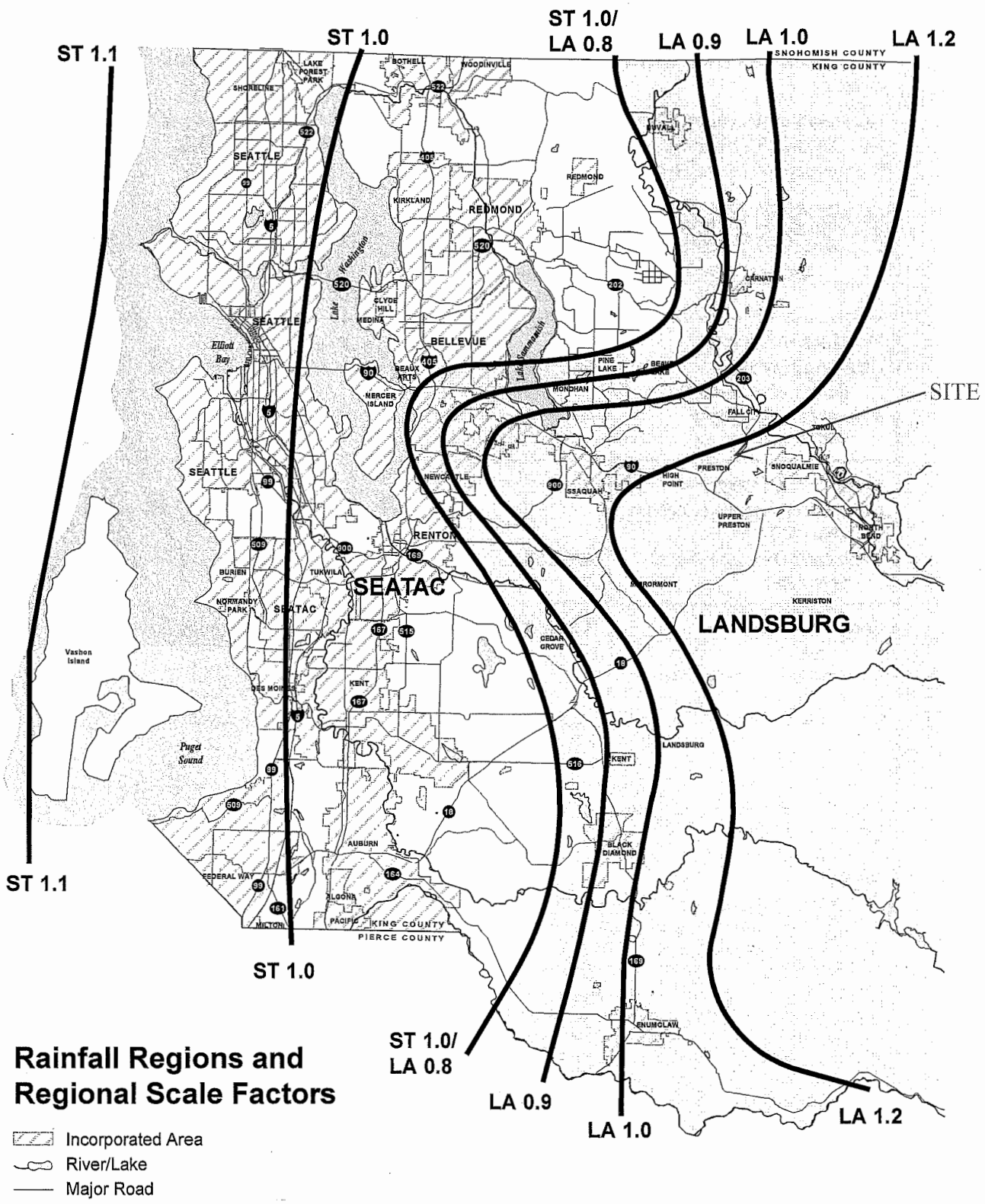
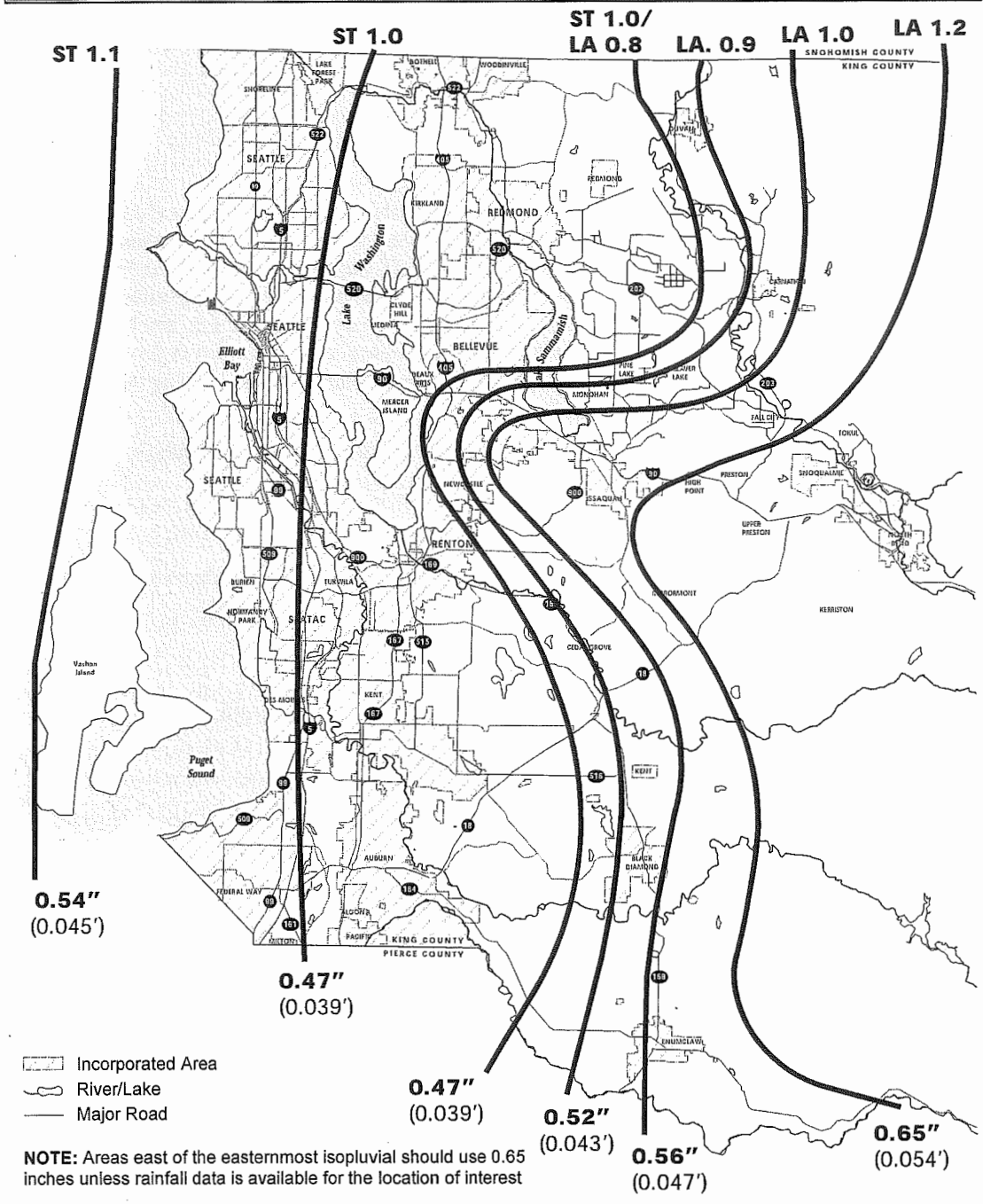


FIGURE 6.4.1.A PRECIPITATION FOR MEAN ANNUAL STORM IN INCHES (FEET)



result, generates large amounts of runoff. For this application, till soil types include Buckley and bedrock soils, and alluvial and outwash soils that have a seasonally high water table or are underlain at a shallow depth (less than 5 feet) by glacial till. U.S. Soil Conservation Service (SCS) hydrologic soil groups that are classified as till soils include a few B, most C, and all D soils. See Chapter 3 for classification of specific SCS soil types.

KCRTS INPUTS

```
KCRTS Program...File Directory:
C:\KC_SWDM\KC_DATA\
[C] CREATE a new Time Series
LA
       0.00       0.00       0.000000  Till Forest
       0.00       0.00       0.000000  Till Pasture
       0.00       0.00       0.000000  Till Grass
      32.00       0.00       0.000000  Outwash Forest
       0.00       0.00       0.000000  Outwash Pasture
       0.00       0.00       0.000000  Outwash Grass
       0.00       0.00       0.000000  Wetland
       0.00       0.00       0.000000  Impervious
10001_Predev.tsf
 T
    1.20000
 T
[T] Enter the Analysis TOOLS Module
[P] Compute PEAKS and Flow Frequencies
10001_predev.tsf
10001_Predev.pks
[R] RETURN to Previous Menu
[C] CREATE a new Time Series
LA
       0.00       0.00       0.000000  Till Forest
       0.00       0.00       0.000000  Till Pasture
       0.00       0.00       0.000000  Till Grass
       0.00       0.00       0.000000  Outwash Forest
      32.00       0.00       0.000000  Outwash Pasture
       0.00       0.00       0.000000  Outwash Grass
       0.00       0.00       0.000000  Wetland
       0.00       0.00       0.000000  Impervious
10001_Dev.tsf
 T
    1.20000
 T
[T] Enter the Analysis TOOLS Module
[P] Compute PEAKS and Flow Frequencies
10001_dev.tsf
10001_Dev.pks
```

Appendix D

Conveyance Calculations

Appendix D: Conveyance Calculations: TESC

For the purpose of the sediment ponds, the site contains two drainage management areas, the initial phase and the expanded phase, totaling 21.25 acres. These areas both convey flows towards the sediment ponds (Pond 'A', Pond 'B' and Pond 'C'). The ponds are designed as a settling mechanism, removing sediment, and settling sediment laden waters before discharging.

The calculations for the sizing of the proposed sediment ponds are included below. The ponds will be utilized as a retention facility with an emergency outfall directed towards the infiltration ponds. The soils located on-site effectively infiltrate stormwater.

Flow Frequency Analysis
Time Series File:10001_dev.tsf
Project Location:Landsburg

---Annual Peak Flow Rates---			-----Flow Frequency Analysis-------			
Flow Rate (CFS)	Rank	Time of Peak	- - Peaks - - (CFS)	Rank	Return Period	Prob
1.21	4	2/08/01 19:00	4.78	1	100.00	0.990
0.031	7	1/02/02 22:45	2.72	2	25.00	0.960
1.63	3	2/28/03 15:15	1.63	3	10.00	0.900
0.030	8	9/20/04 9:45	1.21	4	5.00	0.800
2.72	2	1/27/05 8:15	0.332	5	3.00	0.667
0.327	6	2/25/06 2:30	0.327	6	2.00	0.500
0.332	5	11/23/06 19:45	0.031	7	1.30	0.231
4.78	1	1/09/08 7:30	0.030	8	1.10	0.091
Computed Peaks			4.09		50.00	0.980

For the purpose of this report, the volumetric flows for a 32.00 acre development were analyzed. To reduce the volumetric to size the sediment ponds for the initial phase plus the expanded phase (21.25 acres), the following reduction is applied:

21.25 / 32.00 = 0.664 (reduction factor)

Sizing Formula Dry Season:
SA = 2 x Q_{2year} / 0.00096 *or* *2080 square feet per cfs of inflow*

(2080 square feet per cfs of inflow) x (0.500 cfs) x (0.664) = 691 square feet required

Sizing Formula Wet Season:
SA = 2 x Q_{10year} / 0.00096 *or* *2080 square feet per cfs of inflow*

(2080 square feet per cfs of inflow) x (0.900 cfs) x (0664) = 1,244 square feet required

***Three basins, totaling* = 1,676 square feet achieved**

Appendix E

Special Reports and Studies

Geotechnical report by Riley Group

RILEYGROUP

STORMWATER INFILTRATION EVALUATION

PREPARED BY:

THE RILEY GROUP, INC.
17522 BOTHELL WAY NORTHEAST
BOTHELL, WASHINGTON 98011

PREPARED FOR:

RAGING RIVER QUARRY
C/O MR. JOHN PRIEBE
3123 NORTHEAST HARRISON STREET
ISSAQUAH, WASHINGTON 98029

RGI PROJECT NO. 2016-088A

STORMWATER INFILTRATION EVALUATION
RAGING RIVER QUARRY
KING COUNTY TAX PARCELS 2224079011, 2224079033, AND 2224079035
FALL CITY, WASHINGTON

AUGUST 15, 2016

Corporate Office
17522 Bothell Way Northeast
Bothell, Washington 98011
Phone 425.415.0551 ♦ Fax 425.415.0311

www.riley-group.com

RILEYGROUP

August 15, 2016

John Priebe
Raging River Quarry
3123 Northeast Harrison Street
Issaquah, Washington 98029

Subject: **Stormwater Infiltration Assessment**
Raging River Quarry
King County Tax Parcels 2224079011, 2224079033, and 2224079035
Fall City, Washington
RGI Project No. 2016-088A

Dear Mr. Priebe:

As requested, The Riley Group, Inc. (RGI) has performed a Stormwater Infiltration Assessment regarding the existing stormwater ponds at the Raging River Quarry site in Fall City, Washington (herein referred to as the Site). The location of the Site is shown on Figure 1. Our services were completed in accordance with our workplan dated June 28, 2016 and authorized by Mr. John Priebe on July 13, 2016.

If you have any questions or require additional information, please contact us.

Respectfully submitted,

THE RILEY GROUP, INC.

State of Washington
Hydrogeologist
1079
Licensed Geologist
David J. Baumgarten
8/15/16

David J. Baumgarten, L.H.G.
Senior Hydrogeologist

Ricky R. Wang, PhD, PE
Principal Engineer

Corporate Office
17522 Bothell Way Northeast
Bothell, Washington 98011
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www.riley-group.com

1.0 Introduction

The purpose of this evaluation was to assess infiltration rates and subsurface conditions in the existing Site stormwater ponds and a stormwater pond reserve area as designated by Core Design. Our infiltration assessment focused on the area of nested and connected stormwater ponds northeast of the Site access road and scale house. This area includes Pond D, Pond E, Pond F, Pond G, and Pond H, as well as the area reserved for future ponds, as necessary, as shown on Figure 2.

RGI understands the Site stormwater ponds have existed for decades and have functioned well in managing/infiltrating Site stormwater runoff. We also understand that the Site stormwater ponds in this area have an outfall from Pond H into the 200 foot buffer between mining operations and the Raging River. The current Site owner indicated there has not been any stormwater outfall from Pond H to the river buffer during the history of Site operations with all of the stormwater infiltrating in the stormwater pond system.

As part of an application to King County regarding continued quarrying at the site, the County requested a study to document infiltration rates in the existing stormwater ponds.

2.0 Site Description

The Site is comprised of three King County Tax Parcels 2224079011, 2224079033, and 2224079035 accessed from Preston-Fall City Road, near Fall City, Washington. The three tax parcels comprise an area of 51.2 acres. The Site is currently occupied by an active rock quarry.

3.0 Site Conditions

3.1 SURFACE

The Site is a rock quarry, located on the north side of the Raging River between Preston and Fall City, Washington. Access to the Site is from Preston-Fall City Road with a paved access road to a wooden bridge which spans the Raging River, followed by additional paved road to the scale house located on the lower portion of the quarry. Site slopes are generally to the east toward the Raging River between 6% and 140%. Runoff from the upper active quarrying area sheet flows across the quarry area and is then intercepted by a series of ditches which ultimately discharge to the stormwater ponds (Ponds E through H).

3.2 GEOLOGY

Review of the *Geologic Map of the Fall City 7.5-Minute Quadrangle, King County, Washington* by Joe Dragovich, et. al. (2007) indicates the bedrock at the quarry is Tukwila Formation, tuff (Evt_t), which generally consists of andesitic tuff breccia. Unconsolidated geologic units mapped in the area of the stormwater ponds include alluvial fan deposits (Qaf) and landslide deposits (Qls).

3.3 SOILS

In general, subsurface conditions in the stormwater pond area consists of a layer of brown fine to medium sand, approximately 8 to 10 feet thick, underlain by brown fine to coarse sand with gravel and cobbles. Both the fine to medium sand and the underlying coarse sand with gravel and cobbles are interpreted to be alluvial fan deposits.

Silty sand with a gravel was encountered in the infiltration test IT-2 excavation, completed in Pond F. The coarser grained faction (gravel/cobbles) of the sediment appeared similar to the sediments described above, however the silt content of the finer grained faction (sand) was much higher. This could be a depositional anomaly. It might also be an accumulation of silt in the upper end of Pond F as the IT-1 excavation was in the north end of Pond F immediately down gradient of the inflow from Pond E.

3.4 GROUNDWATER

Groundwater was not encountered in any of the subsurface explorations completed in the stormwater pond area to the maximum depths of the excavations. Test pits completed in Pond E, F, and G extended to a depth of approximately eight feet below the bottom of the ponds. No signs of mottling, which could indicate seasonal high groundwater levels, were observed in the test pits completed in the pond bottoms.

4.0 Field Explorations

On July 20 and August 2, 2016, RGI oversaw the completion of three infiltration tests (IT-1, IT-2, and IT-3) in the bottoms of Pond E (IT-1), Pond F (IT-2), and Pond G (IT-3), as shown on Figure 2. RGI also observed the completion of test pits TP-1 and TP-2. Test pit TP-1 was completed in the reserve area for a future sediment/infiltration pond. Test pit TP-2 was completed in the bottom of Pond G. Soil logs of subsurface conditions encountered in infiltration test pits (IT-1, IT-2, and IT-3) and test pits TP-1 and TP-2 are included in Attachment A.

Infiltration test were conducted using a modified pilot infiltration test (PIT) methodology. An excavation as made at the infiltration test locations in the bottom of Pond E and Pond F and then water was introduced into the infiltration test pit. A water level between 0.5 and 1 foot was maintained in the infiltration test pit to presoak the subsurface. The infiltration rates were measured under falling head conditions after the presoaking period.

Infiltration Test IT-1

Infiltration test IT-1 was completed in the bottom of Pond E (Figure 2). Subsurface conditions at the IT-1 location consist of brown fine to coarse sand with gravel and cobbles.

Infiltration test IT-1 was conducted at a depth of approximately 2 feet below the bottom of Pond E. The infiltration pit measured approximately four by four feet. A staff gauge

was placed in the base of the infiltration test pit to monitor water levels and water was introduced into the infiltration test pit. A water level of at least 0.5 feet was maintained in the IT-1 during the soaking period. Approximately 3,600 gallons of water were introduced into IT-1. The field infiltration rate measured in IT-1 was approximately 85 inches/hour in the coarse sand and gravel in the bottom of Pond E.

The infiltration test IT-1 pit was overexcavated at the end of the infiltration test. Subsurface conditions included brown fine to coarse sand and gravel with cobbles to the depth excavated, approximately 8 feet below the bottom of Pond E. Groundwater was not encountered in the IT-1 overexcavation and no signs of seasonal high groundwater (mottling) were observed.

Infiltration Test IT-2

Infiltration test IT-2 was completed in the bottom of Pond F (Figure 2). Subsurface conditions at the IT-2 location consist of brown silty fine to coarse sand with gravel and cobbles.

Infiltration test IT-2 was conducted at a depth of approximately 2 feet below the bottom of Pond F. The infiltration pit measured approximately three by four feet. A staff gauge was placed in the base of the infiltration test pit to monitor water levels and water was introduced into the infiltration test pit. A water level of at least 0.5 feet was maintained in the IT-2 pit during the soaking period. Approximately 500 gallons of water were introduced into IT-1. The field infiltration rate measured in IT-2 was approximately 4 inches/hour.

The infiltration test IT-2 pit was overexcavated at the end of the infiltration test. Subsurface conditions included brown silty fine to coarse sand and gravel with cobbles to the depth excavated, approximately 7 feet below the bottom of Pond F. Groundwater was not encountered in the IT-2 overexcavation and no signs of seasonal high groundwater (mottling) were observed.

Infiltration Test IT-3

Infiltration test IT-3 was completed in the bottom of Pond G (Figure 2). Subsurface conditions at the IT-3 location consist of brown silty fine to coarse sand with gravel and cobbles.

Infiltration test IT-3 was conducted at a depth of approximately 3 feet below the bottom of Pond G. The infiltration pit measured approximately three by four feet. A staff gauge was placed in the base of the infiltration test pit to monitor water levels and water was introduced into the infiltration test pit. A water level of at least 0.5 feet was maintained in the IT-3 pit during the soaking period. Approximately 3,600 gallons of water were introduced into IT-3. The field infiltration rate measured in IT-3 was approximately 150 inches/hour.

The infiltration test IT-3 pit was overexcavated at the end of the infiltration test. Subsurface conditions included brown silty fine to coarse sand and gravel with cobbles to the depth excavated, approximately 8 feet below the bottom of Pond G. Groundwater was not encountered in the IT-3 overexcavation and no signs of seasonal high groundwater (mottling) was observed.

5.0 Laboratory Testing

Samples of the infiltration receptor sediments from Ponds E, F and G, and from TP-1 in the reserve area were transported to our laboratory for grain size analysis. The results and descriptions of the laboratory tests are enclosed in Appendix B.

Grain size analyses show good correlation with field measured infiltration rates.

- The highest field measured infiltration rate of approximately 150 inches/hour in infiltration test IT-3 corresponds to a grain size analysis which determined the infiltration receptor sediment is a sandy gravel, with less than 3 percent fines (minus 200).
- The next highest field measured infiltration rate of approximately 85 inches/hour in infiltration test IT-1 corresponds to a grain size analysis which determined the infiltration receptor sediment is a gravely sand with less than 5 percent fines (minus 200).
- The lowest field measured infiltration rate of approximately 3.6 inches/hour in infiltration test IT-2 corresponds to a grain size analysis which determined the infiltration receptor sediment is a silty sand with 25 percent fines (minus 200).
- The grain-size analysis for the sediment sample from TP-1, in the future reserve area, shows a similar grain size distribution to the grain size analyses from IT-1 and IT-3. Grain-size analysis for the stormwater receptor sediments indicates a gravelly sand for IT-1 and a sandy gravel for IT-3. The grain-size analysis for the stormwater receptor sediment in TP-1 indicates a well graded gravel with some sand with less than two percent fines.

6.0 Design Infiltration Rate

The "simplified method" described in Section 5.4.1 (KCSWDM, 2009) was used to evaluate a long-term design infiltration rate from the field measured rates using the modified PIT methodology. The simplified methodology includes correction factors for uncertainties in testing, depth to groundwater or impervious layer, infiltration facility geometry, and potential reductions in permeability from biological activity or plugging with fines. The simplified method estimates the maximum design infiltration rate.

Simplified Method I_{design}

$I_{design} = I_{measured} \times F_{testing} \times F_{geometry} \times F_{plugging}$

Where:

I_{design} = design infiltration rate

$I_{measured}$ = field measured infiltration rate

$F_{testing}$: $F_{testing}$ accounts for uncertainties in the testing method

$F_{geometry}$: $F_{geometry}$ accounts for the influence of the infiltration facility geometry and depth to ground water or an impervious layer on the infiltration rate.

$F_{plugging}$: $F_{plugging}$ accounts for potential reductions in infiltration rates over time due to the plugging of the pond surfaces.

$I_{measured}$

I measured was an average of the three infiltration test completed in Pond E (IT-1), Pond F (IT-2) and Pond G (IT-3).

Infiltration Test	Field Measured Rate
IT-1	85 inches/hour
IT-2	3.6 inches/hour
IT-3	150 inches/hour

An $I_{measured}$ = 80 inches/hour was used in the simplified method calculation

$F_{testing}$

$F_{testing}$ per the KCSWDM 2009 dictates an F testing value of 0.30 for small scale (EPA method tests) and an $F_{testing}$ of 0.50 for large-scale modified PIT testing. An $F_{testing}$ value of 0.50 was used in the simplified method calculation.

$F_{geometry}$

$F_{geometry}$ is determined by:

$F_{geometry} = 4\ D/W + 0.05$

Where:

D = depth from the bottom of the proposed facility to the maximum wet-season water table or nearest impervious layer, whichever is less.

W = width of facility

Because the stormwater facilities are not a single facility but a series of elongated ponds separated by check dams with overflow and the fact neither groundwater or an impervious layer were encountered, estimating $F_{geometry}$ was difficult. Therefore, we applied a conservative $F_{geometry}$ factor of 0.25.

$F_{plugging}$

$F_{plugging}$ values are presented in the 2009 KCSWDM (pg 5-59) based on soil types. A value of 1.0 was chosen for the coarse sands and cobbles in the pond bottoms and the fact the infiltration ponds are preceded by a water quality facility (settling pond).

Simplified Method I_{design}

$I_{design} = I_{measured} \times F_{testing} \times F_{geometry} \times F_{plugging}$

I_{design} = (80 inches/hour) x (0.50) x (0.25) x (1.0)

I_{design} = 10 inches/hour

Based on the Site infiltration testing results and application of the KCSWDM simplified method a maximum design infiltration rate of 10 inches/hour was calculated for the coarse sand and gravel with cobbles stormwater receptor sediments in the stormwater pond area.

7.0 Discussion

RGI conducted three modified Pilot infiltration tests in the bottom of ponds E, F, and G. Based on our review of the field measured rates and application of the simplified method for evaluation field measured infiltration rates, we calculated a maximum long-term design infiltration rate of 10-inches/hour.

Subsurface conditions observed in the field indicate the stormwater infiltration receptor sediments at the Site are a coarse sand and gravel with cobbles, interpreted to be alluvial fan deposits. The grain-size analysis indicates the stormwater receptor sediment in the future reserve area is similar in composition to the stormwater receptor sediments in the bottom of Ponds E and G, as such we would expect similar infiltration rates.

Indications of seasonal high groundwater were not observed in the subsurface explorations below the bottom of ponds E, F, and G and the exploration in the future reserve stormwater management area. Explorations in ponds E, F, and G extended to the maximum depth possible the excavator could reach, approximately 8 feet below the pond bottoms. Site specific survey data indicate the pond bottom elevations of the existing stormwater ponds

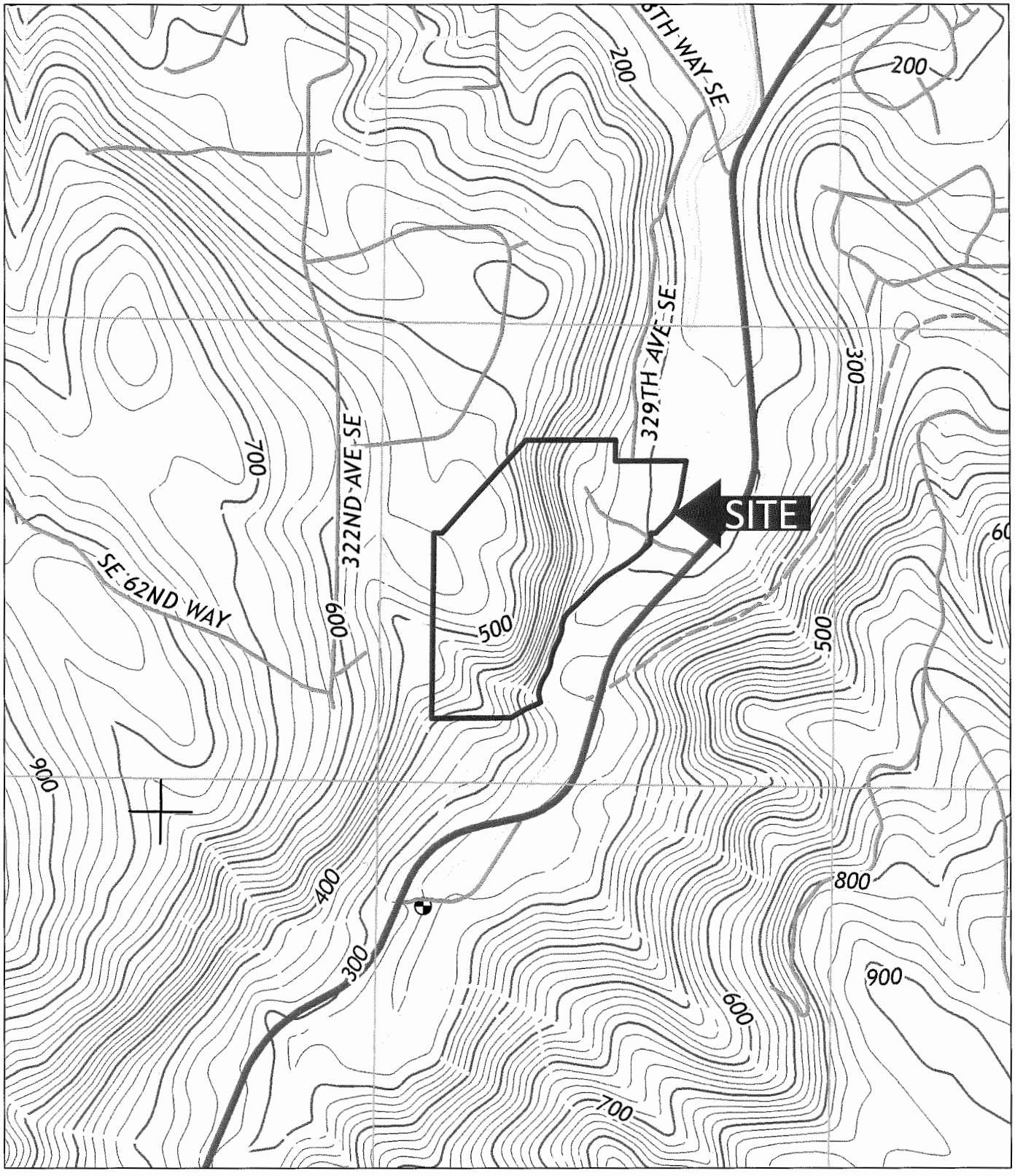
are approximately 18 to 11 feet above the ordinary high water mark for the Raging River where it flows under the access bridge into the quarry.

8.0 PROJECT LIMITATIONS

This report is the property of Mr. John Priebe, the Raging River Quarry, and their authorized representatives or affiliates and was prepared in a manner consistent with the level of skill and care ordinarily exercised by members of the profession currently practicing in the same locality and under similar conditions. This report is intended for specific application to the Raging River Quarry located near Fall City, Washington. No other warranty, expressed or implied, is made.

The analyses and recommendations presented in this report are based upon data obtained from our review of available information at the time of preparing this report, our observations of the infiltration testing and subsurface explorations in the stormwater pond area, as well as, laboratory analysis of the stormwater receptor sediments. Conditional changes may occur through time by natural or human-made process on this or adjacent properties. Additional changes may occur in legislative standards, which may or may not be applicable to this report. These changes, beyond RGI's control, may render this report invalid, partially or wholly. If variations appear evident, RGI should be requested to reevaluate the recommendations in this report.
Please contact the undersigned at (425) 415-0551 should you have any questions or need additional information.

Attachments: Figure 1, Site Vicinity Map
Figure 2, Site Map
Figure 3, Site Representation with Cross Section A-A'
Attachment A, Infiltration Test/Test Pits Logs
Attachment B, Grain-size Analyses



USGS, 2014, Fall City, Washington
7.5-Minute Quadrangle

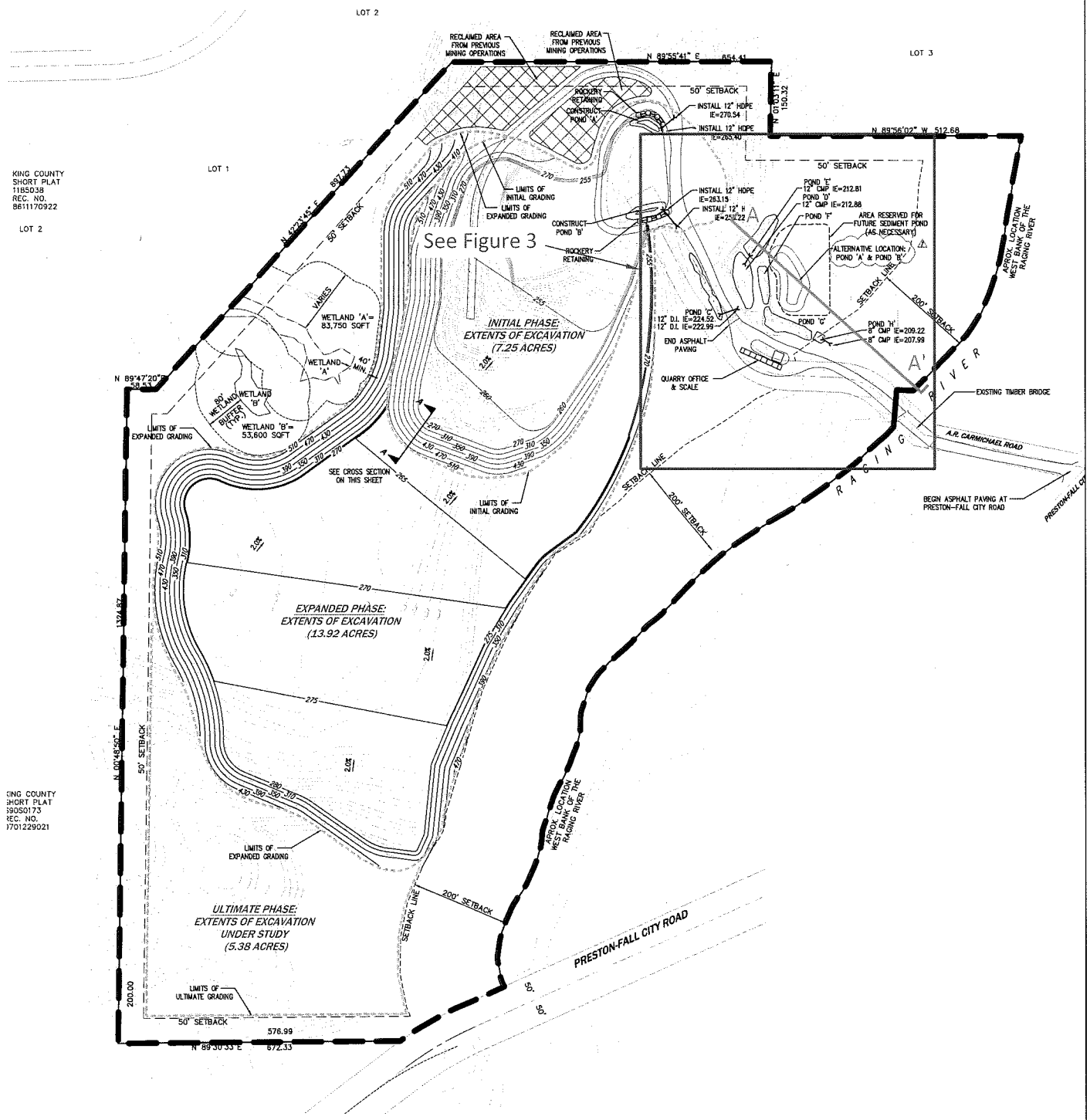
Approximate Scale: 1"=1000'

0 500 1000 2000

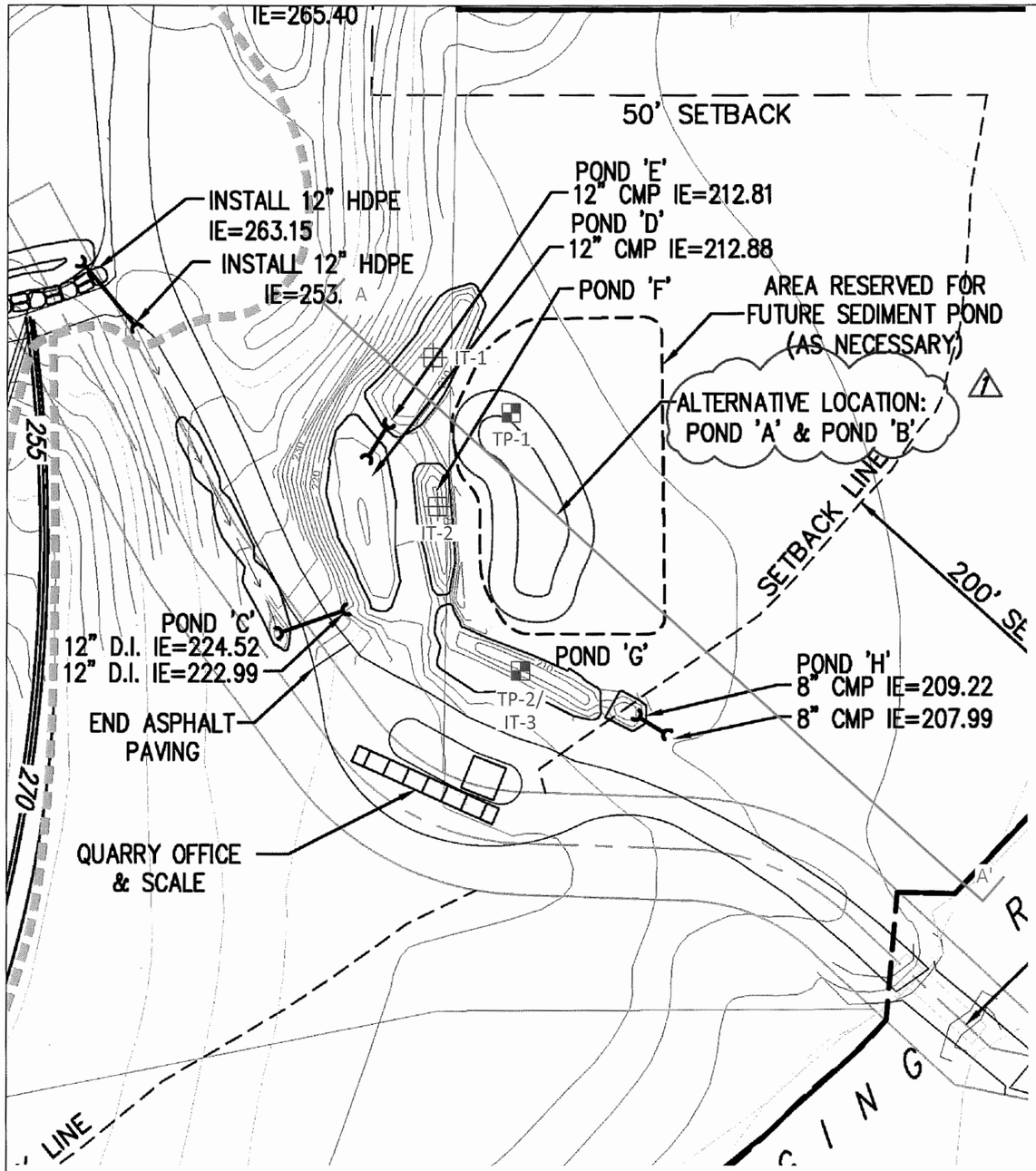
N

RILEYGROUP
Corporate Office
17522 Bothell Way Northeast
Bothell, Washington 98011
Phone: 425.415.0551
Fax: 425.415.0311

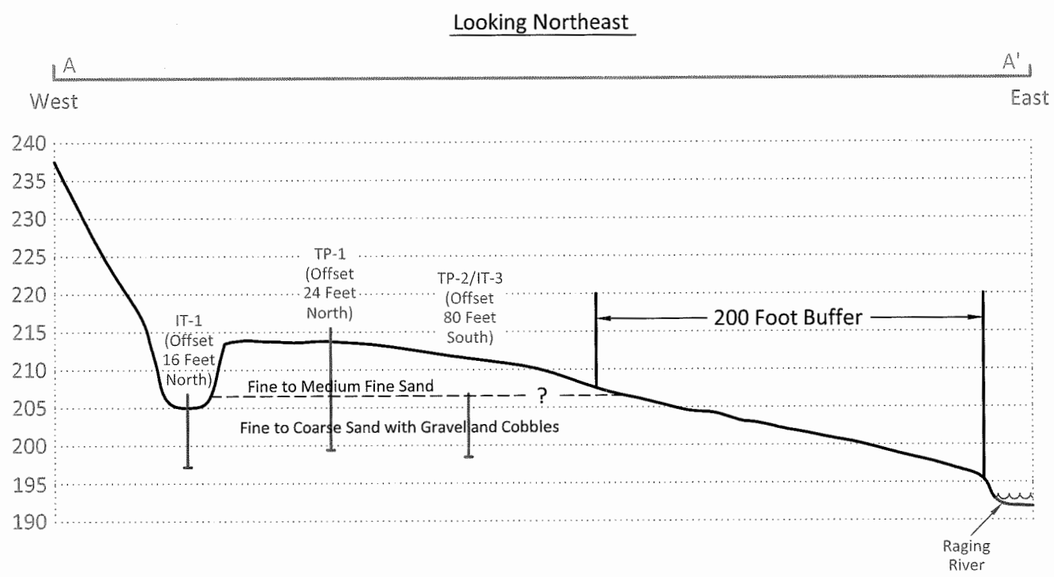
Raging River Quarry		Figure 1
RGI Project Number 2016-088A	Site Vicinity Map	Date Drawn: 08/2016
Address: 32715 William Carmichael Road, Fall City, Washington 98024		



Corporate Office 17522 Bothell Way Northeast Bothell, Washington 98011 Phone: 425.415.0551 Fax: 425.415.0311	Raging River Quarry	Figure 2
RILEYGROUP	RGI Project Number 2016-088A	Site Map	Date Drawn: 08/2016
	Address: 32715 William Carmichael Road, Fall City, Washington 98024	



Looking Northeast



N

Approximate Scale: 1"=80'

0 40 80 160

A A' = Cross section location A - A'

= Infiltration Test Location by RGI, July 2016

= Test Pit Location by RGI, July 2016

= Site Boundary

Horizontal Scale: 1"=80'

0 40 80 160

Vertical Scale: 1"=20'

0 10 20 40

N

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Fax: 425.415.0311

Raging River Quarry	Figure 3
RGI Project Number 2016-088A	Site Representation with Cross Section A - A'
	Date Drawn: 08/2016
Address: 32715 William Carmichael Road, Fall City, Washington 98024	

Project Name: **Raging River Quarry** Project Number: **2016-088A** Client: **Raging River Quarry**	RILEYGROUP Test Pit No.: IT-1 **Sheet 1 of 1**

Date(s) Excavated: **07/20/16**	Logged By **DB**	Surface Conditions: **Sand and Gravel (Pond Bottom)**
Excavation Method: **Excavator**	Bucket Size: **4 Feet**	Total Depth of Excavation: **8 feet bgs**
Excavator Type: **Track-Mounted**	Excavating Contractor: **RGI**	Approximate Surface Elevation **n/a**
Groundwater Level: **Not Encountered**	Sampling Method(s) **n/a**	Compaction Method **Bucket Tamp**
Test Pit Backfill: **Native Soils**	Location **32715 William Carmichael Road, Fall City, Washington 98024**	

Elevation (feet)	Depth (feet)	Sample Type	Sample Number	USCS Symbol	Graphic Log	MATERIAL DESCRIPTION	REMARKS AND OTHER TESTS
	0			SW		Brown, fine to coarse SAND with gravel, large cobbles, and trace silt	
						Infiltration test run at 2 feet below the bottom of Pond E	
	5						
						Test pit completed at 8 feet below the bottom of Pond E	
	10						
	15						
	20						

Project Name: **Raging River Quarry**	Test Pit No.: IT-2
Project Number: **2016-088A**	**Sheet 1 of 1**
Client: **Raging River Quarry**	RILEYGROUP

Date(s) Excavated: **07/20/16**	Logged By **DB**	Surface Conditions: **Sand and Gravel (Pond Bottom)**
Excavation Method: **Excavator**	Bucket Size: **4 Feet**	Total Depth of Excavation: **8 feet bgs**
Excavator Type: **Track-Mounted**	Excavating Contractor: **RGI**	Approximate Surface Elevation **n/a**
Groundwater Level: **Not Encountered**	Sampling Method(s) **n/a**	Compaction Method **Bucket Tamp**
Test Pit Backfill: **Native Soils**	Location **32715 William Carmichael Road, Fall City, Washington 98024**	

Elevation (feet)	Depth (feet)	Sample Type	Sample Number	USCS Symbol	Graphic Log	MATERIAL DESCRIPTION	REMARKS AND OTHER TESTS
	0			SM		Brown, silty, fine to coarse SAND with gravel and large cobbles	
						Infiltration test run at 3 feet below the bottom of Pond F	
	5						
						Test pit completed at 8 feet below the bottom of Pond F	
	10						
	15						
	20						

Project Name: **Raging River Quarry**
Project Number: **2016-088A**
Client: **Raging River Quarry**

RILEYGROUP

Test Pit No.: TP-1

Sheet 1 of 1

Date(s) Excavated: **07/20/16**	Logged By **DB**	Surface Conditions: **Forest Duff**
Excavation Method: **Excavator**	Bucket Size: **4 Feet**	Total Depth of Excavation: **14 feet bgs**
Excavator Type: **Track-Mounted**	Excavating Contractor: **RGI**	Approximate Surface Elevation **n/a**
Groundwater Level: **Not Encountered**	Sampling Method(s) **n/a**	Compaction Method **Bucket Tamp**
Test Pit Backfill: **Native Soils**	Location **32715 William Carmichael Road, Fall City, Washington 98024**	

Elevation (feet)	Depth (feet)	Sample Type	Sample Number	USCS Symbol	Graphic Log	MATERIAL DESCRIPTION	REMARKS AND OTHER TESTS
	0			Topsoil			
				SP		Brown, fine to medium SAND with silt	
	5						
				SW		Brown, fine to coarse SAND with gravel and cobbles	
	10						
						Test pit completed at 14 feet bgs	
	15						
	20						

The Riley Group, Inc.
17522 Bothell Way NE, Bothell, WA 98011

Project Name: **Raging River Quarry**
Project Number: **2016-088A**
Client: **Raging River Quarry**

RILEYGROUP

Test Pit No.: TP-2/IT-3

Sheet 1 of 1

Date(s) Excavated: **07/20/16**	Logged By **DB**	Surface Conditions: **Sand and Gravel (Pond Bottom)**
Excavation Method: **Excavator**	Bucket Size: **4 Feet**	Total Depth of Excavation: **8 feet bgs**
Excavator Type: **Track-Mounted**	Excavating Contractor: **RGI**	Approximate Surface Elevation **n/a**
Groundwater Level: **Not Encountered**	Sampling Method(s) **n/a**	Compaction Method **Bucket Tamp**
Test Pit Backfill: **Native Soils**	Location **32715 William Carmichael Road, Fall City, Washington 98024**	

Elevation (feet)	Depth (feet)	Sample Type	Sample Number	USCS Symbol	Graphic Log	MATERIAL DESCRIPTION	REMARKS AND OTHER TESTS
	0			SP-SM		Brown, fine to coarse SAND with gravel and silt	
				SW		Brown, fine to coarse SAND with gravel, cobbles	
						Infiltration test run at 3 feet below the bottom of Pond G	
	5						
						Test pit completed at 8 feet below the bottom of Pond G	
	10						
	15						
	20						

Project Name: **Raging River Quarry**
Project Number: **2016-088A**
Client: **Raging River Quarry**

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Key to Logs

Sheet 1 of 1

Elevation (feet)	Depth (feet)	Sample Type	Sample Number	USCS Symbol	Graphic Log	MATERIAL DESCRIPTION	REMARKS AND OTHER TESTS
1	2	3	4	5	6	7	8

COLUMN DESCRIPTIONS

1. Elevation (feet): Elevation (MSL, feet).
2. Depth (feet): Depth in feet below the ground surface.
3. Sample Type: Type of soil sample collected at the depth interval shown.
4. Sample Number: Sample identification number.
5. USCS Symbol: USCS symbol of the subsurface material.
6. Graphic Log: Graphic depiction of the subsurface material encountered.
7. MATERIAL DESCRIPTION: Description of material encountered. May include consistency, moisture, color, and other descriptive text.
8. REMARKS AND OTHER TESTS: Comments and observations regarding drilling or sampling made by driller or field personnel.

FIELD AND LABORATORY TEST ABBREVIATIONS

CHEM: Chemical tests to assess corrosivity
COMP: Compaction test
CONS: One-dimensional consolidation test
LL: Liquid Limit, percent
PI: Plasticity Index, percent
SA: Sieve analysis (percent passing No. 200 Sieve)
UC: Unconfined compressive strength test, Qu, in ksf
WA: Wash sieve (percent passing No. 200 Sieve)

MATERIAL GRAPHIC SYMBOLS


Silty SAND (SM)


Poorly graded SAND (SP)


Poorly graded SAND with Silt (SP-SM)


Well graded SAND (SW)

TYPICAL SAMPLER GRAPHIC SYMBOLS


Auger sampler


Bulk Sample


3-inch-OD California w/ brass rings


CME Sampler


Continuous


Grab Sample


2.5-inch-OD Modified California w/ brass liners


Pitcher Sample


2-inch-OD unlined split spoon (SPT)


Shelby Tube (Thin-walled, fixed head)

OTHER GRAPHIC SYMBOLS

Water level (at time of drilling, ATD)

▼ Water level (after waiting)

Minor change in material properties within a stratum

Inferred/gradational contact between strata

Queried contact between strata

GENERAL NOTES

1: Soil classifications are based on the Unified Soil Classification System. Descriptions and stratum lines are interpretive, and actual lithologic changes may be gradual. Field descriptions may have been modified to reflect results of lab tests.
2: Descriptions on these logs apply only at the specific boring locations and at the time the borings were advanced. They are not warranted to be representative of subsurface conditions at other locations or times.

THE RILEY GROUP, INC.
17522 Bothell Way NE
Bothell, WA 98011

PHONE: (425) 415-0551
FAX: (425) 415-0311

GRAIN SIZE ANALYSIS
ASTM D421, D422, D1140, D2487, D6913

PROJECT TITLE	Raging River	**SAMPLE ID/TYPE**	IT-1
PROJECT NO.	2016-088	**SAMPLE DEPTH**	
TECH/TEST DATE	ELW 7/24/2016	**DATE RECEIVED**	7/21/2016

WATER CONTENT (Delivered Moisture)

Wt Wet Soil & Tare (gm)	(w1)	4386.2
Wt Dry Soil & Tare (gm)	(w2)	4087.8
Weight of Tare (gm)	(w3)	33.9
Weight of Water (gm)	(w4=w1-w2)	298.4
Weight of Dry Soil (gm)	(w5=w2-w3)	4053.9
Moisture Content (%)	(w4/w5)*100	7

Total Weight Of Sample Used For Sieve Corrected For Hygroscopic Moisture

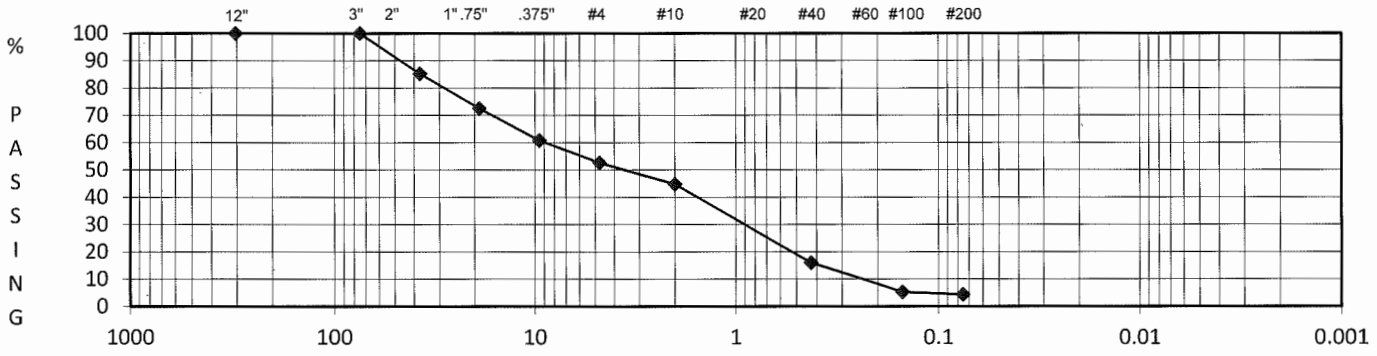
Weight Of Sample (gm)		4087.8
Tare Weight (gm)		33.9
Total Dry Weight (gm)	(W6)	4053.9

% COBBLES	**0.0**
% C GRAVEL	**27.4**
% F GRAVEL	**19.9**
% C SAND	**7.9**
% M SAND	**28.8**
% F SAND	**11.7**
% FINES	**4.3**
% TOTAL	**100.0**

D10 (mm)	0.23
D30 (mm)	0.9
D60 (mm)	9
Cu	39.1
Cc	0.4

SIEVE ANALYSIS

	Wt Ret +Tare	(Wt-Tare)	Cumulative (%Retained) {(wt ret/w6)*100}	% PASS (100-%ret)	
12.0"	33.9	0.00	0.00	100.00	cobbles
3.0"	33.9	0.00	0.00	100.00	coarse gravel
2.5"					coarse gravel
2.0"					coarse gravel
1.5"	631.1	597.20	14.73	85.27	coarse gravel
1.0"					coarse gravel
0.75"	1146.3	1112.40	27.44	72.56	fine gravel
0.50"					fine gravel
0.375"	1624.3	1590.40	39.23	60.77	fine gravel
#4	1953.6	1919.70	47.35	52.65	coarse sand
#10	2273.8	2239.90	55.25	44.75	medium sand
#20					medium sand
#40	3439.5	3405.60	84.01	15.99	fine sand
#60					fine sand
#100	3874.9	3841.00	94.75	5.25	fine sand
#200	3913.8	3879.90	95.71	4.29	fines
PAN	4087.8	4053.90	100.00	0.00	silt/clay



DESCRIPTION	Gravelly SAND with trace silt
USCS	SP

Prepared For: Raging River Quarry

Reviewed By: KMW

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17522 Bothell Way NE
Bothell, WA 98011

PHONE: (425) 415-0551
FAX: (425) 415-0311

GRAIN SIZE ANALYSIS
ASTM D421, D422, D1140, D2487, D6913

PROJECT TITLE	Raging River	**SAMPLE ID/TYPE**	IT-2
PROJECT NO.	2016-088	**SAMPLE DEPTH**	
TECH/TEST DATE	ELW 7/24/2016	**DATE RECEIVED**	7/21/2016

WATER CONTENT (Delivered Moisture)

Wt Wet Soil & Tare (gm)	(w1)	2029.7
Wt Dry Soil & Tare (gm)	(w2)	1761.3
Weight of Tare (gm)	(w3)	252.0
Weight of Water (gm)	(w4=w1-w2)	268.4
Weight of Dry Soil (gm)	(w5=w2-w3)	1509.3
Moisture Content (%)	(w4/w5)*100	18

Total Weight Of Sample Used For Sieve Corrected For Hygroscopic Moisture

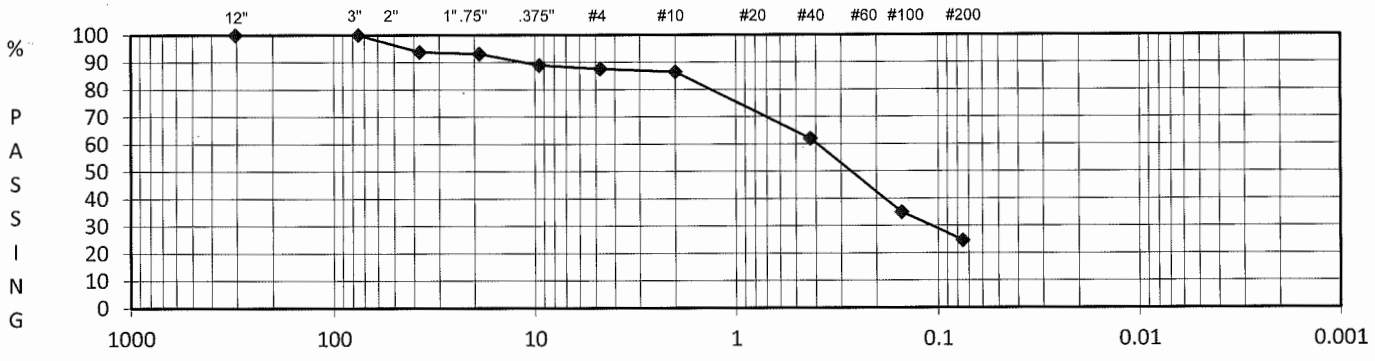
Weight Of Sample (gm)		1761.3
Tare Weight (gm)		252.0
(W6) Total Dry Weight (gm)		1509.3

% COBBLES	**0.0**
% C GRAVEL	**6.8**
% F GRAVEL	**5.6**
% C SAND	**1.2**
% M SAND	**24.4**
% F SAND	**37.5**
% FINES	**24.5**
% TOTAL	**100.0**

D10 (mm)	
D30 (mm)	
D60 (mm)	
Cu	
Cc	

SIEVE ANALYSIS

	Wt Ret +Tare	(Wt-Tare)	Cumulative (%Retained) {(wt ret/w6)*100}	% PASS (100-%ret)	
12.0"	252.0	0.00	0.00	100.00	cobbles
3.0"	252.0	0.00	0.00	100.00	coarse gravel
2.5"					coarse gravel
2.0"					coarse gravel
1.5"	344.8	92.80	6.15	93.85	coarse gravel
1.0"					coarse gravel
0.75"	355.3	103.30	6.84	93.16	fine gravel
0.50"					fine gravel
0.375"	420.6	168.60	11.17	88.83	fine gravel
#4	439.1	187.10	12.40	87.60	coarse sand
#10	457.5	205.50	13.62	86.38	medium sand
#20					medium sand
#40	825.2	573.20	37.98	62.02	fine sand
#60					fine sand
#100	1234.2	982.20	65.08	34.92	fine sand
#200	1390.9	1138.90	75.46	24.54	fines
PAN	1761.3	1509.30	100.00	0.00	silt/clay



DESCRIPTION	Silty SAND with trace gravel
USCS	SM

Prepared For: Raging River Quarry

Reviewed By: KMW

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THE RILEY GROUP, INC.
17522 Bothell Way NE
Bothell, WA 98011

PHONE: (425) 415-0551
FAX: (425) 415-0311

GRAIN SIZE ANALYSIS
ASTM D421, D422, D1140, D2487, D6913

PROJECT TITLE	Raging River	**SAMPLE ID/TYPE**	TP-1
PROJECT NO.	2016-088A	**SAMPLE DEPTH**	
TECH/TEST DATE	EW - 8/5/2016	**DATE RECEIVED**	8/5/2016

WATER CONTENT (Delivered Moisture)

Wt Wet Soil & Tare (gm)	(w1)	3414.1
Wt Dry Soil & Tare (gm)	(w2)	3301.5
Weight of Tare (gm)	(w3)	34.0
Weight of Water (gm)	(w4=w1-w2)	112.6
Weight of Dry Soil (gm)	(w5=w2-w3)	3267.5
Moisture Content (%)	(w4/w5)*100	3

Total Weight Of Sample Used For Sieve Corrected For Hygroscopic Moisture

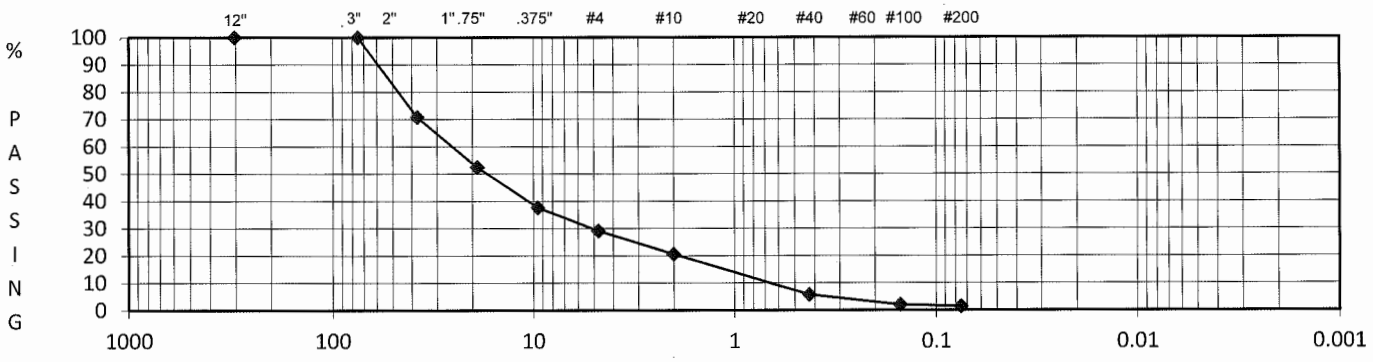
Weight Of Sample (gm)		3301.5
Tare Weight (gm)		34.0
(W6) Total Dry Weight (gm)		3267.5

% COBBLES	**0.0**
% C GRAVEL	**47.6**
% F GRAVEL	**23.4**
% C SAND	**8.5**
% M SAND	**14.8**
% F SAND	**4.3**
% FINES	**1.5**
% TOTAL	**100.0**

D10 (mm)	0.17
D30 (mm)	0.25
D60 (mm)	0.5
Cu	2.9
Cc	0.7

SIEVE ANALYSIS

	Wt Ret +Tare	(Wt-Tare)	Cumulative (%Retained) {(wt ret/w6)*100}	% PASS (100-%ret)	
12.0"	34.0	0.00	0.00	100.00	cobbles
3.0"	34.0	0.00	0.00	100.00	coarse gravel
2.5"					coarse gravel
2.0"					coarse gravel
1.5"	988.1	954.10	29.20	70.80	coarse gravel
1.0"					coarse gravel
0.75"	1587.9	1553.90	47.56	52.44	fine gravel
0.50"					fine gravel
0.375"	2072.6	2038.60	62.39	37.61	fine gravel
#4	2351.8	2317.80	70.93	29.07	coarse sand
#10	2628.0	2594.00	79.39	20.61	medium sand
#20					medium sand
#40	3112.8	3078.80	94.22	5.78	fine sand
#60					fine sand
#100	3238.4	3204.40	98.07	1.93	fine sand
#200	3254.0	3220.00	98.55	1.45	fines
PAN	3301.5	3267.50	100.00	0.00	silt/clay



DESCRIPTION Well-graded GRAVEL with some sand and trace silt

USCS GW

Prepared For: Raging River Quarry

Reviewed By: EW

RILEYGROUP

THE RILEY GROUP, INC.
17522 Bothell Way NE
Bothell, WA 98011

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FAX: (425) 415-0311

GRAIN SIZE ANALYSIS
ASTM D421, D422, D1140, D2487, D6913

PROJECT TITLE	Raging River	**SAMPLE ID/TYPE**	IT-3/TP-2
PROJECT NO.	2016-088	**SAMPLE DEPTH**	
TECH/TEST DATE	ELW 7/24/2016	**DATE RECEIVED**	7/21/2016

WATER CONTENT (Delivered Moisture)

Wt Wet Soil & Tare (gm)	(w1)	2298.5
Wt Dry Soil & Tare (gm)	(w2)	2191.8
Weight of Tare (gm)	(w3)	249.9
Weight of Water (gm)	(w4=w1-w2)	106.7
Weight of Dry Soil (gm)	(w5=w2-w3)	1941.9
Moisture Content (%)	(w4/w5)*100	5

Total Weight Of Sample Used For Sieve Corrected For Hygroscopic Moisture

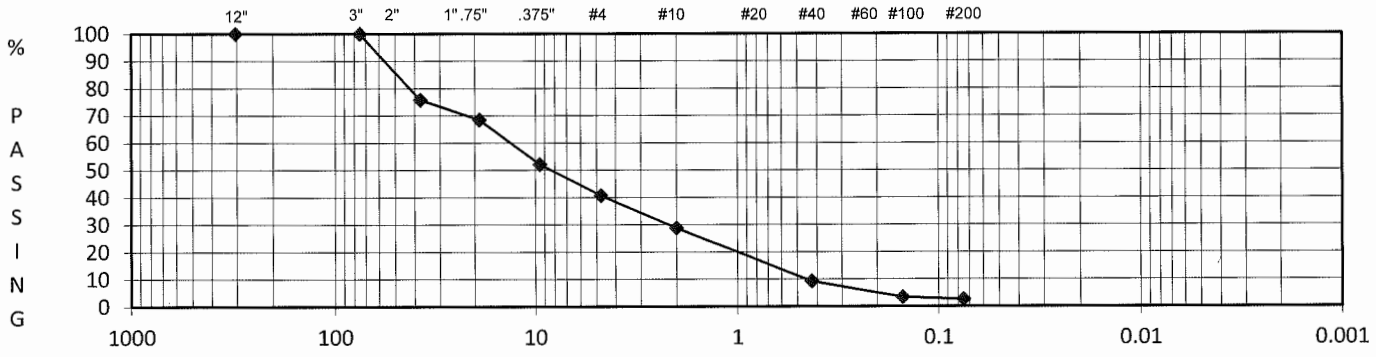
Weight Of Sample (gm)		2191.8
Tare Weight (gm)		249.9
(W6) Total Dry Weight (gm)		1941.9

% COBBLES	**0.0**
% C GRAVEL	**31.6**
% F GRAVEL	**27.7**
% C SAND	**12.0**
% M SAND	**19.5**
% F SAND	**6.7**
% FINES	**2.6**
% TOTAL	**100.0**

D10 (mm)	0.45
D30 (mm)	2.1
D60 (mm)	14
Cu	31.1
Cc	0.7

SIEVE ANALYSIS

	Wt Ret +Tare	(Wt-Tare)	Cumulative (%Retained) {(wt ret/w6)*100}	% PASS (100-%ret)	
12.0"	249.9	0.00	0.00	100.00	cobbles
3.0"	249.9	0.00	0.00	100.00	coarse gravel
2.5"					coarse gravel
2.0"					coarse gravel
1.5"	719.0	469.10	24.16	75.84	coarse gravel
1.0"					coarse gravel
0.75"	863.4	613.50	31.59	68.41	fine gravel
0.50"					fine gravel
0.375"	1178.8	928.90	47.83	52.17	fine gravel
#4	1401.4	1151.50	59.30	40.70	coarse sand
#10	1633.9	1384.00	71.27	28.73	medium sand
#20					medium sand
#40	2012.0	1762.10	90.74	9.26	fine sand
#60					fine sand
#100	2126.3	1876.40	96.63	3.37	fine sand
#200	2142.2	1892.30	97.45	2.55	fines
PAN	2191.8	1941.90	100.00	0.00	silt/clay



DESCRIPTION Sandy GRAVEL with trace silt

USCS GP

Prepared For: Raging River Quarry

Reviewed By: KMW

RILEYGROUP

Appendix F

Other Permits

Grading Permit, 1998

King County
Department of Development
and Environmental Services
900 Oakesdale Avenue S.W.
Renton, Washington 98055-1219

Activity No: L98GR035
Project No : L7361592
Page : 1 of 1
Date Issued:
Expires : 2-4-99

APPROVED * G R A D I N G P E R M I T *

Permit Type : GRADING PERMIT RENEWAL Type Code: G-EXTEND

Title : GRADING PERMIT #1592-599
Description : RAGING RIVER MINING

Location : 32715 WILLIAM CARMICHAEL RD Zone: MP
Parcel: 222407-9033 STR: SW,SW,22-24-07 Block:
Lot: Plat:

Applicant : CADMAN GRAVEL Phone number: 206-867-1234
Appl.Address: P.O. BOX 538
REDMOND, WA 98073

OTHER INFORMATION:

Total Site Area:	10	acres
Total Volume Disturbed:	UNKNOWN	yards
Vol. Fill/Exc.in 12 Mos:	0	yards
Non-Rehabilitated area:	10	acres
Rehabilitated area:	0	acres
Associated Permits:		

********** CONTACT **********

Please refer to the above "Project Number" when making inquiries regarding this application. For inquiries call 296-6610. FOR INSPECTIONS CALL 296-6610.

********** CERTIFICATION **********

I have read the attached conditions of approval and understand that failure to comply with all conditions set forth herein shall necessitate an immediate work stoppage until such time as compliance with the stipulated conditions is attained. Failure to comply with, or repeated violations of permit conditions, may result in permit suspension and/or revocation as provided for in K.C.C. Title 23. The granting of this permit shall not be construed as satisfying the requirements of other Federal, State or local government permits or authorizations. The operation to be undertaken through this grading Permit shall be conducted in accordance with the conditions contained herein and shall generally comply with the provisions of K.C.C. 16.28 and other applicable ordinances.

Owner/Owner's Agent Signature — Date: 7/8/98 — Place: Renton

King County
Department of Development
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900 Oakesdale Avenue S.W.
Renton, Washington 98055-1219

Activity No: L98GR035
Project No: L73G1592
Page : 1 of 1
Status : APPROVED
Date : 06/15/98

* A P P L I C A T I O N A C K N O W L E D G E M E N T *

Permit Type : GRADING PERMIT RENEWAL Type Code: G-EXTEND

Title : GRADING PERMIT #1592-599
Description : RAGING RIVER MINING

Location : 32715 WILLIAM CARMICHAEL RD Zone: MP
Parcel: 222407-9033 STR: SW,SW,22-24-07 Block:
Lot: Plat:

Applicant : CADMAN GRAVEL Phone number: 206-867-123
Appl.Address: P.O. BOX 538
REDMOND, WA 98073

OTHER INFORMATION:

Total Site Area:	10	acres
Total Volume Disturbed:	UNKNOWN	yards
Vol. Fill/Exc.in 12 Mos:	0	yards
Non-Rehabilitated area:	10	acres
Rehabilitated area:	0	acres
Associated Permits:		

********** CONTACT **********

Please refer to the above "Project Number" when making inquiries regarding this application. To make inquiries call 296-6610.

********** CERTIFICATION **********

I certify under penalty of perjury under the laws of the State of Washington that the information furnished by the owner or owner's agent in support of this application is true and correct. I further certify that all applicable King County requirements for the work authorized by this permit, if issued, will be met and that violation thereof will be cause for code enforcement action.

[signature] 7/2/98 Redmond

er/Owner's Agent Signature Date Place

King County
Department of Development
and Environmental Services
900 Oakesdale Avenue S.W.
Renton, Washington 98055-1219

Applicant : CADMAN GRAVEL
Appl.Address: P.O. BOX 538
REDMOND, WA 98073
Phone Number: 206-867-1234

Activity No: L98GR035
Project No : L7361592
Page : 1 of 1
Date : 09/01/98

* G R A D I N G P E R M I T C O N D I T I O N S *

The conditions attached to this cover sheet apply to the permit referenced here. All conditions must be complied with by the contractor and verified by a Grading Inspector (CALL 296-6610) or this permit will become null and void.

PROJECT REFERENCE INFORMATION:

Location : 32715 WILLIAM CARMICHAEL RD

Title : GRADING PERMIT #1592-599

Description : RAGING RIVER MINING

OTHER INFORMATION:

Total Site Area:	10	acres
Total Volume Disturbed:	UNKNOWN	yards
Vol. Fill/Exc.in 12 Mos:	0	yards
Non-Rehabilitated area:	10	acres
Rehabilitated area:	0	acres
Associated Permits:		

REVIEWED BY:

(Grading)

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** CONDITIONS OF PERMIT/APPROVAL **

DATE: 06/15/98
PAGE: 1

Activity No: C92B051R TYPE: G-RENEW
Location: 32715 WILLIAM CARMICHAEL RD

GRADING/MINING GENERAL COND'S

0005 - SITE SHALL BE OPERATED AT ALL TIMES IN CONFORMANCE WITH THE CONDITIONS OF DIVISION FILES #134-74-R, 007-80-SH, AND 122-86-R.

0030 - If work is to be suspended for 30 or more consecutive calender days, permittee shall notify the Grading Section prior to the cessation of work indicating their intention to do so and also prior to restarting operations.

0051 - WORK SHALL BE LIMITED TO MINING WITHIN TAX PARCEL 2224079011 PER THE APPROVED PLANS ON FILE WITH THE GRADING SECTION DATED 2-2-83. WORK WITH TAX PARCELS 2224079010 & 2224079033 SHALL BE AUTHORIZED ONLY UPON APPROVAL OF REVISED PLANS TO BE SUBMITTED BY PERMITTEE.

0080 - All work shall comply with the provisions of King County Ordinance 3139, relating to noise control.

0096 - HOURS OF OPERATION SHALL BE LIMITED TO 7:00 A.M. TO 7:00 P.M. MONDAY THROUGH FRIDAY, EXCEPT THAT LOADING OF TRUCKS SHALL BE LIMITED TO 7:30 A.M. TO 4:00 P.M. SATURDAY HOURS ARE LIMITED TO 8:00 A.M. TO 4:30 P.M. FOR MAINTENANCE ONLY.

0120 - Permittee shall abide by the regulations of the Puget Sound Air Pollution Control Agency (PSAPCA).

0140 - You must call 1-800-424-5555 not less than 48 hours before beginning excavation where any underground utilities may be located. Failure to do so could mean bearing substantial repair costs (up to three times the cost of repairs to the service).

0160 - A Forest Practices Permit may be required by the Washington State Department of Natural Resources for clearing associated with this permit. Contact DNR at (206) 825-1631 for information.

0170 - A National Pollutant Discharge Elimination System (NPDES) permit for surface water discharge and/or a Temporary Water Quality Modification permit may be required for this project. Contact the Washington State Department of Ecology at (206) 649-7000 for information.

0500 - A copy of the approved plans, conditions, and permit must be on the job site whenever construction is in progress.

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tivity No: C92G051R TYPE: G-RENEW
Location: 32715 WILLIAM CARMICHAEL RD

0600 - No external signs shall be permitted except those authorized by the King County Zoning Code or as required by this permit.

1150 - The tops and the toes of cut and fill slopes shall be set back from property boundaries as far as necessary for safety of the adjacent properties and to prevent damage resulting from water runoff or slope erosion.

1160 - The tops and the toes of cut and fill slopes shall be set back from structures as far as is necessary for adequacy of foundation support and to prevent damage as a result of water runoff or slope erosion.

2010 - Approval of this erosion/sedimentation control (ESC) plan does not constitute an approval of permanent road or drainage design (e.g. size and location of roads, pipes, restrictors, channels, retention facilities, utilities, etc.).

2020 - The implementation of these ESC plans and the construction, maintenance, replacement, and upgrading of these ESC facilities is the responsibility of the permittee until all construction is approved.

2030 - The boundaries of the clearing limits shown on this plan shall be clearly flagged in the field prior to construction. During the construction period, no disturbance beyond the flagged clearing limits shall be permitted. The flagging shall be maintained by the permittee for the duration of construction.

2040 - The ESC facilities shown on this plan must be constructed in conjunction with all clearing and grading activities, and in such a manner as to ensure that sediment-laden water does not enter the drainage system or violate applicable water standards. (KCC 9.04.090, KCC 9.12.025)

2110 - Stabilized construction entrances and wash pads shall be installed at the beginning of construction and maintained for the duration of the project. Additional measures may be required to ensure that all paved areas are kept clean for the duration of the project. (RCW 46.61.655.)

2130 - Where seeding for temporary erosion control is required, fast germinating grasses shall be applied at an appropriate rate (e.g. annual or perennial rye applied at approximately 80 pounds per acre).

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4060 - Waste or spoil piles shall be leveled.

4110 - Excavations not made to a water-producing depth shall be graded or backfilled in a manner to encourage the uses permitted within the underlying zone classification. Specifically: a) Grading or backfilling shall be made with non-noxious, nonflammable, noncombustible solids; b) The peaks and depressions of the area shall be reduced to a gently rolling topography in substantial conformity to the land area immediately surrounding and which will minimize erosion.

4120 - Where mining is by open pit, bench, or quarry methods, reclamation shall be performed in the following manner: a) Slopes between successive benches shall not, in unconsolidated material, be steeper than 1 and 1/2 foot horizontal to 1 foot vertical, and shall be topsoiled and revegetated; b) Slopes between successive benches in consolidated material shall have no prescribed angle of slope, and no attempt need be made to resurface or plant; c) All slopes in consolidated material shall be scaled of loose rock per the requirements of MSHA; d) Bench width and spacing shall be as shown on the reclamation plan as may be amended by King County and the Washington State Department of Natural Resources.

5010 - Road access to sites developed for mining or quarrying of minerals or materials shall be controlled by means of a gate. A sign warning of hazardous conditions, if such exist, shall be affixed to the gate or placed in a conspicuous manner near the gate. If the property has an exterior boundary line which is a common property line with developed R or S classified property, then a solid wall or fence not less than 5 feet in height shall be installed and maintained. (KCC 21.42.030A.)

5020 - Mining and quarrying shall be permitted up to within 10 feet of any property line other than Q-M classified property provided all provisions herein set forth are complied with and provided further that such mining or quarrying does not impair lateral support or cause earth movements or erosion to extend beyond the exterior boundary lines of the property. Structures or buildings shall not be located closer than 100 feet to an R or S property line, except where the common property line is so situated as to cause an elevation difference of 50 feet or more within said 100-foot setback, and in such case the required 100-foot setback may be reduced by the amount the slope distance exceeds the horizontal distance but in no event shall the structures or buildings be located closer than 50 feet to said common property line. Office buildings, scale facilities, equipment storage buildings, and other similar buildings or structures and stockpiles shall be excepted from this provi-

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2140 - Where straw mulch for temporary erosion control is required, it shall be applied at a minimum thickness of 2 inches.

2160 - Temporary sediment control facilities shall be constructed in accordance with the details shown. Temporary sediment control facility locations may be moved to suit field conditions subject to approval of the engineer and applicable governmental agencies.

2170 - All ponds and ditches and other erosion-sedimentation facilities shall be maintained in good working condition throughout construction.

2190 - Grass seeding will be done using an approved hydro-seeder or as otherwise approved by DDES. The performance bond, if required, will not be released until the grass is established, unless otherwise approved by DDES.

2200 - The erosion and sedimentation control systems depicted on this drawing are intended to be minimum requirements to meet anticipated site conditions. As construction progresses and unexpected or seasonal conditions dictate, the permittee should anticipate that more siltation and sedimentation control facilities will be necessary to ensure complete siltation control on the proposed site. During the course of construction, it shall be the obligation and responsibility of the permittee to address any new conditions that may be created by his activities and to provide additional facilities over and above minimum requirements as may be needed to protect adjacent properties and water quality of the receiving drainage system.

3010 - Upon the exhaustion of minerals or materials or the permanent abandonment of the quarrying or mining operation, all buildings, structures, apparatus, or appurtenances accessory to the operation will be removed or otherwise dismantled to the satisfation of the director.

3020 - All excavations must either be made to a water producing depth or backfilled and graded to allow natural drainage.

3050 - Excavations shall be reclaimed in a manner which will not allow water to collect and permit stagnant water to remain. Suitable drainage systems approved by the director shall be constructed or installed if natural drainage is not possible.

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S property line. (KCC 12.42.030B.)

5030 - All uses shall conform to the landscaping requirements set forth in KCC Chapter 21.51. (KCC 21.42.030C.)

5040 - Emission of smoke from any source other than heat processing equipment shall not exceed a percentage smoke density (average smoke emission) of 30% except when building a new fire or when due to breakdowns of a temporary nature. Said percentage smoke density shall be measured in conformance with the methods set forth in the United States Bureau of Mines publication Information Circular 7118 entitled, "Ringelmann Smoke Chart" edition of August, 1955. Continuous readings at appropriate time intervals of not less than 30 seconds shall be made, and in no event shall the average smoke emission be calculated for a duration of less than 60 minutes. (KCC 21.42.090.)

5050 - Blasting and all other activities shall be so conducted that ground vibrations measured next to structures or buildings situated on adjacent "R" or "S" property do not exceed the maximum amplitude of ground vibrations as related to frequencies of vibrations set forth in the following table: (KCC 21.47.100(A).)

Table of Frequency - Amplitude Relations

Frequency of Ground Motion in Cycles per Second	Maximum Amplitude of Ground Motion, in Inches
up to 10	not more than 0.0305
20	0.0153
30	0.0102
40	0.0076
50	0.0061
60	0.0051

5060 - Where ground frequency and displacement characteristics in relation to known quantities of detonated explosives have been determined by instrumentation, using either an accelograph or a seismograph, the allowable quantity of explosives used in relation to distance may be established by the formula:

$$(50/D)^2 C K = 1$$

where D = Distance from the blast in feet
C = Quantity of explosive detonated instantaneously in pounds
K = Ground transmission constant

The energy ratio thus determined shall not exceed 1, and all measurements shall be taken at the most critical location. (KCC 21.42.100B.)

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5070 - When ground characteristics for any specific blasting location have been determined by instrumentation, special explosives quantity limits for that location may be approved by the King County engineer, if said limits are computed and certified by a qualified vibration measurement specialist. (KCC 21.42.100C.)

5080 - In the absence of approved methods of instrumentation to restrict vibration to the levels specified in the foregoing table, the quantity of explosives used in blasting shall not exceed the following:

Quantity-Distance Table

Distance from the blast area to the nearest building, neither mine or quarry-owned, nor mine or quarry-leased in feet	Maximum quantity of explosives per shot for instaneous firing or per delay for delay firing, in pounds	
	Normal overburden	Abnormal overburden (1)
100	See Fn (2)	340 See Fn (3) 70 (See Fn (4)
200	420 See Fn (5)	78 (See Fn (6)
300	525	100
400	635	125
500	800	160
600	950	200
700	1175	245
800	1500	300
900	1830	360
1000	2250	430
1200	3500	610
1400	-	820
1600	-	1250
1800	-	1900
2000	-	3000

Footnote (1) Abnormal overburden is that which is unusually deep (more than 50 feet to bedrock), has a water table near the surface, or is so composed as to be spongy, flexible, or reverberant.

Footnote (2) 100 feet shall be the minimum allowable distance when approved missile protection methods are used.

Footnote (3) No more than 10 pounds of explosive material shall be placed in any single charge.

Footnote (4) No more than 5 pounds of explosive material shall be placed in any single charge.

Footnote (5) No more than 20 pounds of explosive material shall be placed in any single charge.

Footnote (6) No more than 8 pounds of explosive material shall be placed in any single charge. (KCC 21.42.100D.)

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Location: 32715 WILLIAM CARMICHAEL RD

5090 - Mining and quarrying shall be conducted in a manner which will not allow water to collect and permit stagnant water to remain in excavations. (KCC 21.42.110.)

5100 - Maximum allowable daytime sound pressure levels as measured next to occupied buildings or structures situated on adjacent R or S property shall not exceed the following standards at least 90% of the time between the hours of 5:00 a.m. and 10:00 p.m.

Sound Pressure Levels

Frequency band in cycles/second	Sound pressure level in decibels re 0.0002 microbar
25 - 300	60
300 - 2400	70
Above 2400	60

Maximum allowable nighttime sound pressure levels as measured next to occupied buildings or structures situated on adjacent "R" or "S" property shall not exceed the following standards at least 90% of the time between the hours of 10:00 p.m. and 5:00 a.m.

Sound Pressure Levels

Frequency band in cycles/second	Sound pressure level in decibels re 0.0002 microbar
25 - 300	70
300 - 2400	63
Above 2400	55

Sound pressure levels shall be measured by a sound level meter and associated octave band filter manufactured according to standards prescribed by the American Standards Association. (KCC 21.42.050.)

5110 - Odors from gases or other odorous matter shall not be emitted in quantities as to be unreasonably offensive beyond the exterior property lines. (KCC 21.42.060.)

5120 - Toxic gases and matter shall not be emitted in quantities damaging to health, to animals, vegetation or property beyond the exterior property lines. (KCC 21.42.070.)

5130 - Dust, dirt, and fly ash or airborne solids from any source shall not be emitted in quantities as to adversely affect adjacent property. (KCC 21.42.080.)

5140 - No building or structure shall be located closer than 20 feet to property lines other than R or S zoned property or to a public right-of-way (KCC 21.42.160), except that if any such structure exceeds 45 feet in height, it should be set back from each property line 1 foot additional for each 1 foot it exceeds 45 feet.

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Activity No: C920051R TYPE: G-RENEW
Location: 32715 WILLIAM CARMICHAEL RD

5160 - Fencing, where required by the director, to protect life, limb, and property shall be installed with lockable gates which must be closed and locked when not working the site. The fence must be no less than 5 feet in height, and the fence material shall have no horizontal opening larger than 2 inches.

7020 - During hauling operations, permittee shall provide effective dust control measures consisting of water, asphalt treated base, chemical dust palliatives, or equivalent measures to control dust from this operation.

7040 - Permittee shall be responsible for implementing all appropriate measures needed (i.e. paving, sweepers, and/or other techniques) to keep streets and roads used as haul routes for export or import of material clean and free from debris, mud, etc.

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Activity No: C92G051R TYPE: G-RENEW
Location: 32715 WILLIAM CARMICHAEL RD

5 070 - When ground characteristics for any specific blasting location have been determined by instrumentation, special explosives quantity limits for that location may be approved by the King County engineer, if said limits are computed and certified by a qualified vibration measurement specialist. (KCC 21.42.100C.)

5080 - In the absence of approved methods of instrumentation to restrict vibration to the levels specified in the foregoing table, the quantity of explosives used in blasting shall not exceed the following:

Quantity-Distance Table

Distance from the blast area to the nearest building, neither mine or quarry-owned, nor mine or quarry-leased in feet	Maximum quantity of explosives per shot for instaneous firing or per delay for delay firing, in pounds	
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(KCC 21.42.100D.)