PRELIMINARY
TECHNICAL INFORMATION REPORT

For

Wildlife Meadows
275## SE Kent-Kangley Road
Ravensdale, WA 98051

January 27, 2023

Prepared by:
Briana Bennington

Prepared For:

Robert Striker
P.O. Box 267
Ravensdale WA 98051

Encompass Engineering Job No. 22539

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Appendix A
Septic Feasibility Letter by Jenson Engineering LLC, Inc. dated July 5, 2022

Appendix B
King County Critical Areas Designation CADS22-0318, dated January 2, 2023

Appendix C
Traffic Impact Analysis by The Transpo Group, dated April 2022

Appendix D
Geotechnical Report by GEOTECH Consultants, dated February 16, 2021

Appendix E
WWHM Report

Appendix F
Operation & Maintenance Manual

Appendix G
Soil Management Plan

TECHNICAL INFORMATION REPORT (TIR) WORKSHEET

Part 1 PROJECT OWNER AND PROJECT ENGINEER

Project Owner: Robert Striker
Phone: (425)766-5975
Address: P.O. Box 267
Ravensdale WA 98051
Project Engineer: Briana Bennington
Company: Encompass Engineering
Phone: (425) 961-2075

Part 2 PROJECT LOCATION AND DESCRIPTION

Project Name: Wildlife Meadows
DPER Permit #: TBD
Location Township: 22 N
Range: 07 E
Section: 31
Site Address: 275## SE Kent-Kangley Ro
Ravensdale WA 98051

Part 3 TYPE OF PERMIT APPLICATION

- ☐ Landuse (e.g.,Subdivision / Short Subd. / UPD)
- ☐ Building (e.g.,M/F / Commercial / SFR)
- ☐ Clearing and Grading
- ☐ Right-of-Way Use
- ☑ Other Conditional Use Permit (CUP)

Part 4 OTHER REVIEWS AND PERMITS

- ☐ DFW HPA
- ☐ COE 404
- ☐ DOE Dam Safety
- ☐ FEMA Floodplain
- ☐ COE Wetlands
- ☐ Other _____
- ☐ Shoreline Management
- ☐ Structural Rockery/Vault/_____
- ☐ ESA Section 7

Part 5 PLAN AND REPORT INFORMATION

Technical Information Report

Type of Drainage Review (check one):
- ☑ Full
- ☐ Targeted
- ☐ Simplified
- ☐ Large Project
- ☐ Directed

Date (include revision dates): 1/27/2023
Date of Final: _____

Site Improvement Plan (Engr. Plans)

Plan Type (check one):
- ☑ Full
- ☐ Modified
- ☐ Simplified

Date (include revision dates): 1/27/2023
Date of Final: _____

Part 6 SWDM ADJUSTMENT APPROVALS

Type (circle one): Standard / Experimental / Blanket

Description: (include conditions in TIR Section 2)

_____

_____

_____

Approved Adjustment No. _____ Date of Approval: _____

TECHNICAL INFORMATION REPORT (TIR) WORKSHEET

Part 7 MONITORING REQUIREMENTS

Monitoring Required: Yes (No)

Start Date: _____

Completion Date: _____

Describe: _____

_____

_____

Re: KCSWDM Adjustment No. _____

Part 8 SITE COMMUNITY AND DRAINAGE BASIN

Community Plan : N/A

Special District Overlays: N/A

Drainage Basin: Lower Cedar River Drainage Basin

Stormwater Requirements: Conservation Flow Contol & Enhanced Basic Water Quality

Part 9 ONSITE AND ADJACENT SENSITIVE AREAS

- ☐ River/Stream _____
- ☐ Lake _____
- ☑ Wetlands Category IV Wetland
- ☐ Closed Depression _____
- ☐ Floodplain _____
- ☑ Other CARA

_____

- ☐ Steep Slope _____
- ☐ Erosion Hazard _____
- ☐ Landslide Hazard _____
- ☐ Coal Mine Hazard _____
- ☐ Seismic Hazard _____
- ☐ Habitat Protection _____
- ☐ _____

Part 10 SOILS

Soil Type	Slopes	Erosion Potential
Barneston gravelly ashy coarse sandy loam	0-8 %	

- ☐ High Groundwater Table (within 5 feet)
- ☐ Other _____
- ☐ Sole Source Aquifer
- ☐ Seeps/Springs

☐ Additional Sheets Attached

TECHNICAL INFORMATION REPORT (TIR) WORKSHEET

Part 11 DRAINAGE DESIGN LIMITATIONS

REFERENCE	LIMITATION / SITE CONSTRAINT
☐ Core 2 – Offsite Analysis	
☑ Sensitive/Critical Areas	CARA & Wetland
☑ SEPA	
☐ LID Infeasibility	
☐ Other	
☐	

☐ Additional Sheets Attached

Part 12 TIR SUMMARY SHEET (provide one TIR Summary Sheet per Threshold Discharge Area)

Threshold Discharge Area: (name or description) Lower Cedar River Drainage Basin

Core Requirements (all 8 apply):

Discharge at Natural Location	Number of Natural Discharge Locations: 2
Offsite Analysis	Level: (1) / 2 / 3 dated: 9/25/2022
Flow Control (include facility summary sheet)	Level: 1 / (2) / 3 or Exemption Number _____ Flow Control BMPs Full Dispersion/Full Infiltration
Conveyance System	Spill containment located at: TBD
Erosion and Sediment Control / Construction Stormwater Pollution Prevention	CSWPP/CESCL/ESC Site Supervisor: TBD Contact Phone: TBD After Hours Phone: TBD
Maintenance and Operation	Responsibility (circle one): (Private) / Public If Private, Maintenance Log Required: Yes / (No)
Financial Guarantees and Liability	Provided: (Yes) / No if required
Water Quality (include facility summary sheet)	Type (circle one): Basic / Sens. Lake / (Enhanced Basic) / Bog or Exemption No. _____ Landscape Management Plan: Yes / (No)

Special Requirements (as applicable):

Area Specific Drainage Requirements	Type: CDA / SDO / MDP / BP / LMP / Shared Fac. / (None) Name: _____
Floodplain/Floodway Delineation	Type (circle one): Major / Minor / Exemption / (None) 100-year Base Flood Elevation (or range): _____ Datum:
Flood Protection Facilities	Describe: None

TECHNICAL INFORMATION REPORT (TIR) WORKSHEET

Part 12 TIR SUMMARY SHEET (provide one TIR Summary Sheet per Threshold Discharge Area)	
Source Control (commercial / industrial land use)	Describe land use: Recreational / Camping Describe any structural controls: N/A
Oil Control	High-use Site: Yes / (No) Treatment BMP: _____ Maintenance Agreement: Yes / (No) with whom? _____
Other Drainage Structures	
Describe: Full Dispersion, Full Infiltration Trenches, Large Linear Sand Filters	

Part 13 EROSION AND SEDIMENT CONTROL REQUIREMENTS

MINIMUM ESC REQUIREMENTS DURING CONSTRUCTION	MINIMUM ESC REQUIREMENTS AFTER CONSTRUCTION
☑ Clearing Limits	☑ Stabilize exposed surfaces
☑ Cover Measures	☑ Remove and restore Temporary ESC Facilities
☑ Perimeter Protection	☑ Clean and remove all silt and debris, ensure operation of Permanent Facilities, restore operation of Flow Control BMP Facilities as necessary
☑ Traffic Area Stabilization	☑ Flag limits of SAO and open space preservation areas
☑ Sediment Retention	☐ Other _____
☑ Surface Water Collection	
☐ Dewatering Control	
☑ Dust Control	
☑ Flow Control	
☑ Protection of Flow Control BMP Facilities (existing and proposed)	
☑ Maintain BMPs / Manage Project	

Part 14 STORMWATER FACILITY DESCRIPTIONS (Note: Include Facility Summary and Sketch)

Flow Control	Type/Description	Water Quality	Type/Description
☐ Detention	_____	☑ Vegetated Flowpath	100-Feet Minimum
☑ Infiltration	Full Infiltration	☐ Wetpool	_____
☐ Regional Facility	_____	☑ Filtration	Lg Linear Sand Filter
☐ Shared Facility	_____	☐ Oil Control	_____
☑ Flow Control BMPs	Full Dispersion	☐ Spill Control	_____
☐ Other	_____	☑ Flow Control BMPs	Full Dispersion
		☐ Other	_____

TECHNICAL INFORMATION REPORT (TIR) WORKSHEET

Part 15 EASEMENTS/TRACTS		Part 16 STRUCTURAL ANALYSIS
☐ Drainage Easement		☑ Cast in Place Vault
☐ Covenant		☐ Retaining Wall
☑ Native Growth Protection Covenant		☐ Rockery > 4' High
☐ Tract		☐ Structural on Steep Slope
☐ Other _____		☐ Other _____

Part 17 SIGNATURE OF PROFESSIONAL ENGINEER

I, or a civil engineer under my supervision, have visited the site. Actual site conditions as observed were incorporated into this worksheet and the attached Technical Information Report. To the best of my knowledge the information provided here is accurate.

Briana Bennignton 01/27/2023

Signed/Date

PROJECT OVERVIEW

Project:	Wildlife Meadows
Site Address:	275## SE Kent-Kangley Road Ravensdale WA 98051
King County Tax Parcel:	302207-9103
Site Area:	2,060,943 SF (47.3 AC)
Zoning District:	RA-10 (one DU per 10 acres)

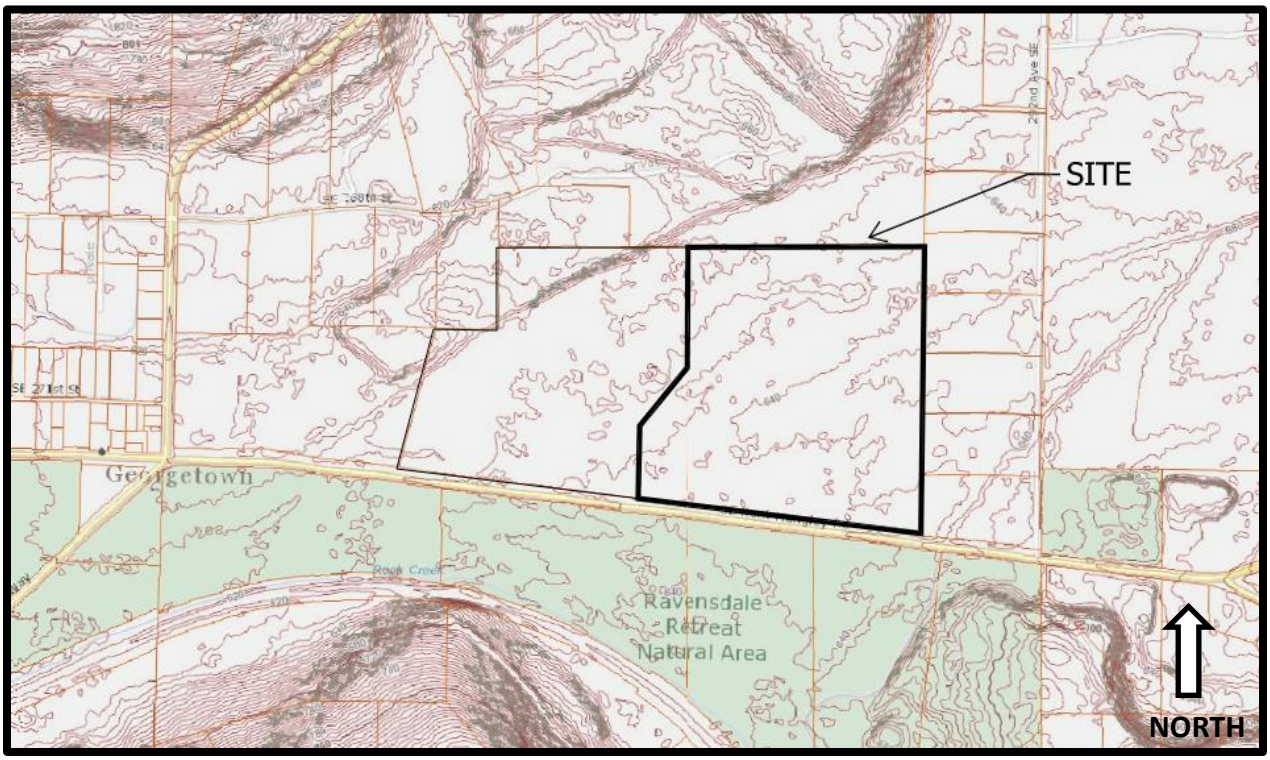


Figure 2: Vicinity Map

Pre-developed Site Conditions:
The project is located on tax parcel number 302207-9103 in unincorporated King County, near the community of Ravensdale WA. The 2,060,943 SF (47.3 AC) lot is zoned as RA-10 (Rural Area – one DU per 10 acres). The property is accessed via an existing gravel driveway that connects to SE Kent-Kangley Road on the south side of the site. The current site only includes this gravel driveway. No structures are located on this site. The total existing on-site impervious coverage is 20,323 SF, which is (20,323 SF / 2,060,943 SF) = 0.99% of the on-site area. The remainder of the lot is covered with native vegetation.

Existing half-street improvements on SE Kent-Kangley Road include an 11-foot wide travel lane and an 8-foot wide paved shoulder along the property's frontage, which meets the County's standard for a rural minor arterial road.

Although the surrounding area is served by Covington Water District, an existing exempt well is located centrally on the site (Recording # 20201005000765). Sewer service is not available for the subject parcel.

Stormwater from the site generally infiltrates into the native soils on-site. However, stormwater that does not infiltrate sheet flows to the south and west across gentle slopes ranging from 1-10%. The site is located within a single Threshold Discharge Area (TDA). A full description of the drainage patterns is included in Section III. An Existing Conditions Map is provided as Figure 4 at the end of this section.

Critical Areas:
According to King County iMap, the site is located within a Category 1 Critical Aquifer Recharge Area (CARA). In addition, a Critical Areas Designation (CAD) Report dated January 2, 2023 (Appendix B), has identified a Category IV wetland located in the northern half of the property approximately midway between the west and east property boundaries. The wetland requires a 50-foot buffer as well as a 15-foot building setback.

Soils:
The topography of the site is mostly flat, with grades of 1-10% sloping to the south and to the west. The soils on site have been classified by the United States Department of Agriculture (USDA) National Resource Conservation Service (NRCS) Web Soils Survey as (10) Barneston gravelly ashy coarse sandy loam, 0-8% slopes – (see Figure 3 below). According to the Septic Feasibility Letter (Appendix A), the soils have a shallow topsoil layer underlaid by a mixture of sandy loams, sand, and cobbles. The geotechnical report included in Appendix D, also confirms the soils as being well-draining outwash medium sand soils with gravel and cobbles. The report notes groundwater as relatively shallow at 4-8 feet below grade in a few of the test pits. Other test pits were found to be dry when samples were collected. The geotechnical report indicates the soils to have moderate infiltration potential and that small, localized, shallow infiltration systems are most appropriate given the shallow groundwater condition.

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
10	Barneston gravelly ashy coarse sandy loam, 0 to 8 percent slopes	124.2	99.3%
11	Barneston gravelly ashy coarse sandy loam, 8 to 15 percent slopes	0.8	0.7%
Totals for Area of Interest		125.0	100.0%

Figure 3: Soils Map and Legend

Developed Site Conditions:

Through a Conditional Use Permit (CUP), the project proposes to establish a campground that will accommodate 25 recreational vehicle (RVs) sites, 3 tipi sites, 8 walk-in tent sites, and 12 glamping sites with cabins/yurts. Additional campground facilities are proposed to include access roads, parking lots, restroom/shower buildings, a central office building with deck, and a host cabin. The campground entrance is in the SW corner of the site with direct access to SE Kent-Kangley Road. No frontage improvements are required along SE Kent-Kangley Road, as it already meets the requirements for a rural minor arterial.

The campground will be constructed in 3 phases. All proposed impervious and pervious surfaces are outlined in the table below based on the Phase in which they will be constructed. The project will result in a total of 156,056 SF (3.58 AC) of new/replaced pollution generating impervious surface (PGIS), 20,980 SF (0.48 AC) of new non-pollution generating impervious surface, and 231,548 SF (5.32 AC) non-pollution generating pervious surface. The total proposed impervious surface area is 177,036 SF (4.06 AC). Per King County Code, lots zoned RA-10 are limited to a maximum on-site impervious percentage of 15%. This project results in (177,036 SF /2,060,943 SF) = 8.6% impervious coverage, which is below the required threshold of 15%.

Phase	Site	Pollution Generating Impervious Surface (SF)	Non-Pollution Generating Impervious Surface (SF)	Non-Pollution Generaing Pervious Surface (SF)
1	North Asphalt Parking Lot	6,405		
1	Main Entrance and Circular Turnaround	16,288		
1	Tent Site Wood Bark Paths (6' wide)			2,129
1	Tent Site Wood Bark Trail (8' wide)			5,575
1	North Restroom		240	
1	Access Road (20' Asphalt w/ 2' Gravel Shoulders)	67,380		
1	Misc Lawn/Landscape Areas			36,775
2	Glamping Site Gravel Driveways (10' Wide)	12,105		
2	Glamping Yurts/Cabins (12 EA 1,200 SF)		14,400	
2	South Asphalt Parking	2,498		
2	Office Building		1,600	
2	Office Deck		600	
2	Gravel overflow parking Lot	6,094		
2	Tipi Wood Bark Wlakway (8' Wide)			3,311
2	Tipi Pads (3 EA 900 SF)		2,700	
2	Host Site Driveway (10' Wide)	723		
2	Host Cabin		1,200	
2	Misc Lawn/Landscape Areas			63,909
3	South Restroom		240	
3	RV Gravel Pads	44,563		
3	Misc Lawn/Landscape Areas			119,849
	SUBTOTALS=	**156,056**	**20,980**	**231,548**

All proposed impervious and pervious surfaces will be fully dispersed except for the main entrance access road/circular turnaround (16,288 SF), the north parking lot (6,405 SF), rooftop runoff from the 12 glamping site cabins/yurts (14,000 SF), rooftop runoff from the office building (1,600 SF), and rooftop runoff from the host cabin (1,200 SF). These remaining surfaces will be mitigated using full infiltration. Pollution-generating impervious surfaces will be treated for enhanced basic water quality using large linear sand filters prior to being fully infiltrated on site. In addition, a 914,287 SF (21 AC) Native Growth Retention Area (NGRA) is proposed. Please refer to Core Requirements 3, 8, and 9 in Section II as well as Section IV of this TIR for additional discussion on the storm design.

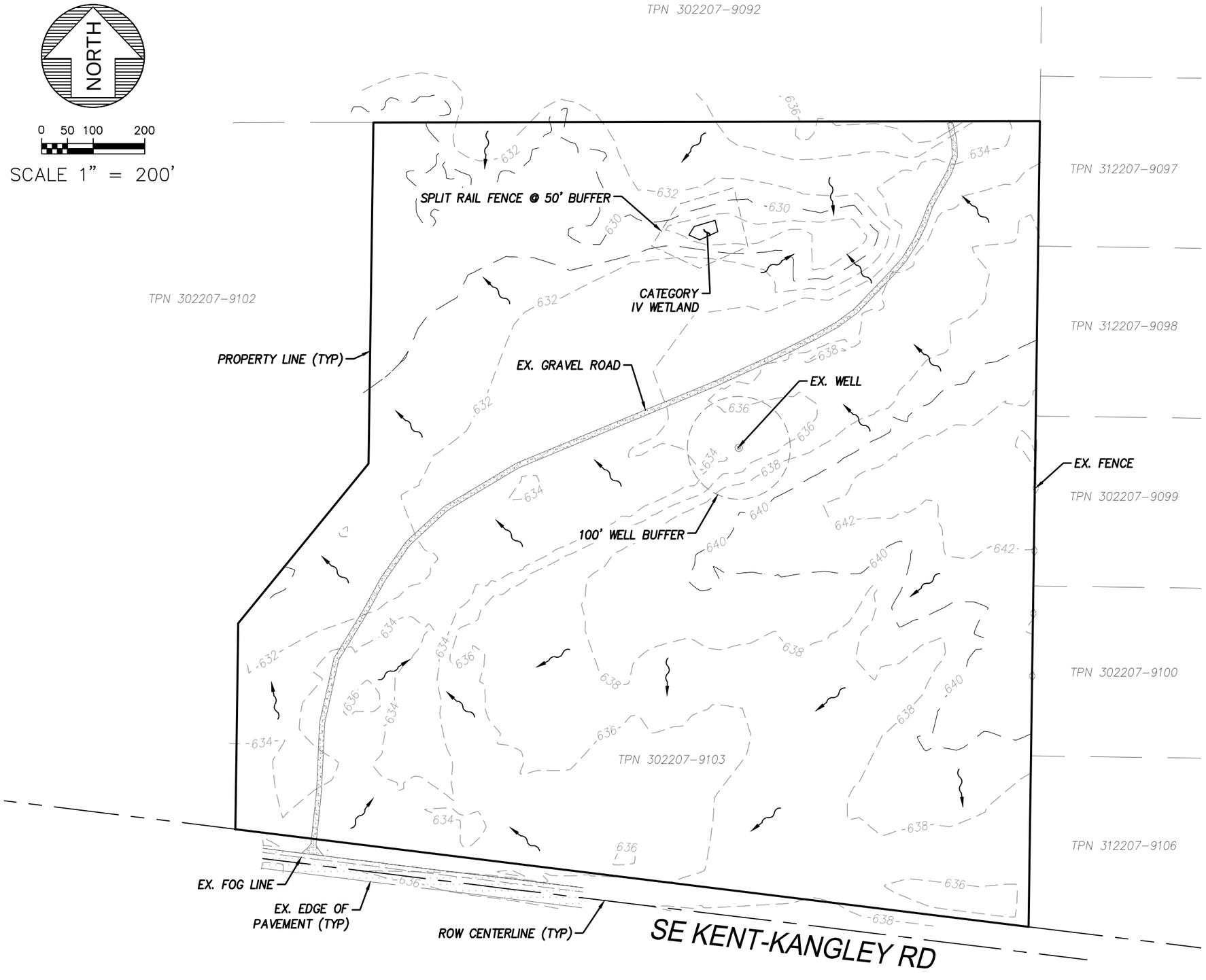
A septic system with primary and reserve drainfields is proposed in the southeast corner of the site. Drinking water service will be provided by the existing exempt well located centrally on the site (Recording # 20201005000765). Electric utility connection is available through Puget Sound Energy within the public right-of-way (ROW) for SE Kent-Kangley Road.

A Developed Conditions Map is provided as Figure 5 at this end of this Section.

NORTH

0 50 100 200

SCALE 1" = 200'



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REVISIONS

JOB NO. 22539

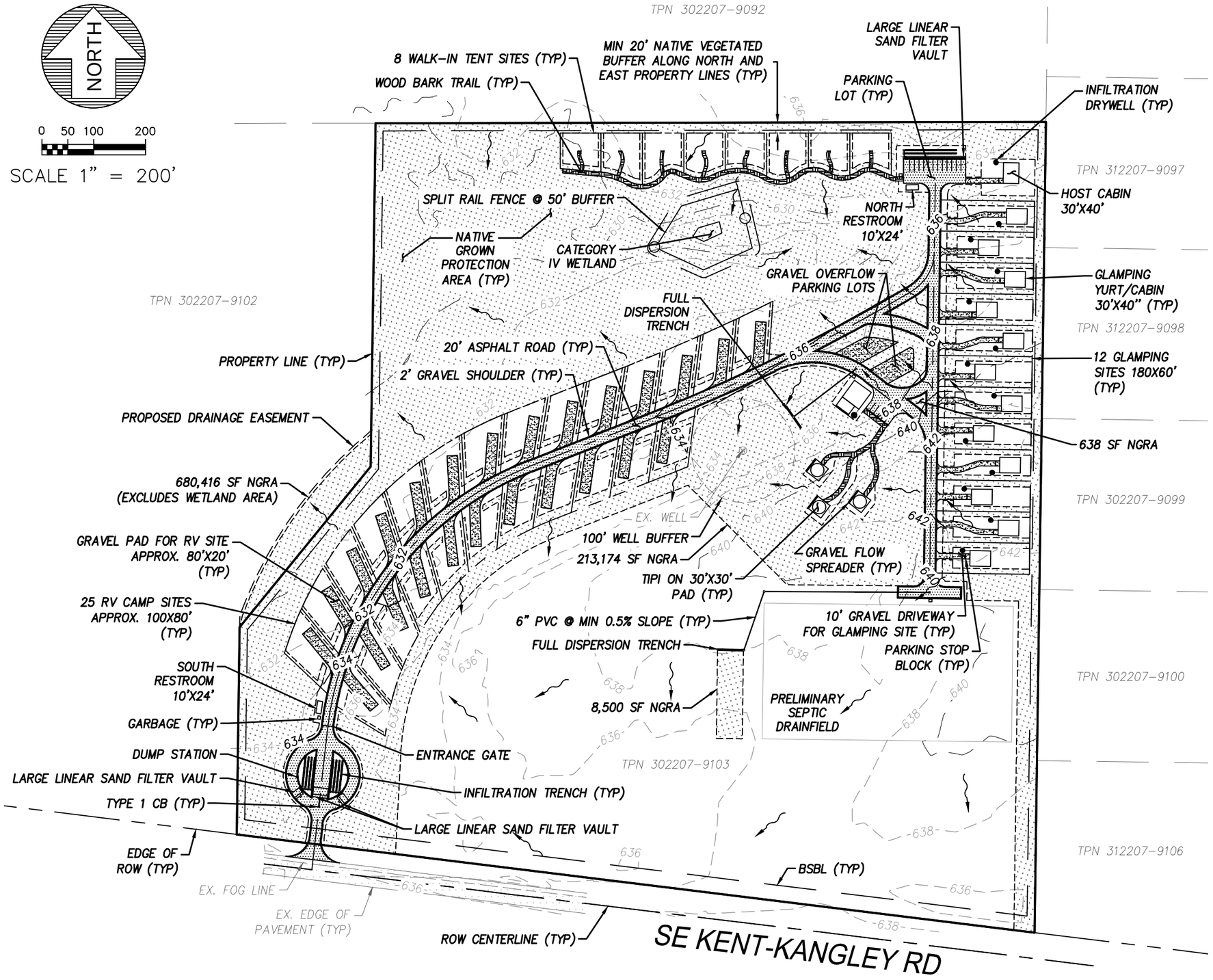
DATE 01/27/2023

SCALE 1"=200'

SHEET 1 of 1

PREPARED FOR
WILDLIFE MEADOWS
275## SE KENT-KANGLEY ROAD

EXISTING CONDITIONS



PROPOSED IMPERVIOUS SURFACE:

PHASE 1:

NORTH RESTROOM:	240 SF
NORTH PARKING LOT:	6,405 SF
MAIN ENTRANCE/CIRCULAR TURNAROUND:	16,288 SF
ACCESS ROADS:	67,380 SF
TOTAL:	90,313 SF

PHASE 2:

GLAMPING YURTS/CABINS:	14,400 SF
GLAMPING GRAVEL DRIVEWAYS:	12,105 SF
SOUTH PARKING LOT:	2,498 SF
OFFICE BUILDING:	1,600 SF
OFFICE DECK:	600 SF
GRAVEL OVERFLOW PARKING LOT:	6,094 SF
TIPI PADS:	2,700 SF
HOST CABIN:	1,200 SF
HOST DRIVEWAY:	723 SF
TOTAL:	41,920 SF

PHASE 3:

SOUTH RESTROOM:	240 SF
RV GRAVEL PADS:	44,563 SF
TOTAL:	44,803 SF

PHASES 1-3 (PROJECT TOTALS):

NON-POLLUTION GENERATING IMPERVIOUS:	20,980 SF
POLLUTION GENERATING IMPERVIOUS:	156,056 SF
TOTAL IMPERVIOUS:	177,036 SF (8.59%)

PROPOSED PERVIOUS SURFACE:

PHASES 1-3:

TENT SITE WOOD BARK PATHS/TRAILS:	7,704 SF
TIPI SITE WOOD BARK PATHS:	3,311 SF
NEW GRASS/LANDSCAPED AREAS:	220,533 SF
TOTAL:	231,548 SF

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SCALE	1"=200'
SHEET	1 of 1

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WILDLIFE MEADOWS
275## SE KENT-KANGLEY ROAD

PROPOSED CONDITIONS

II. CONDITIONS AND REQUIREMENTS SUMMARY

The 2021 King County Surface Water Design Manual (KCSWDM) was used to determine and address all core and special requirements. Based on the criteria specified in KCSWDM 1.1.2, the project falls under Full Drainage Review in accordance with KCSWDM Section 1.1.2.4. This means the property must meet all core and special requirements. See Figure 6 below for more information on how the type of drainage review required was determined.

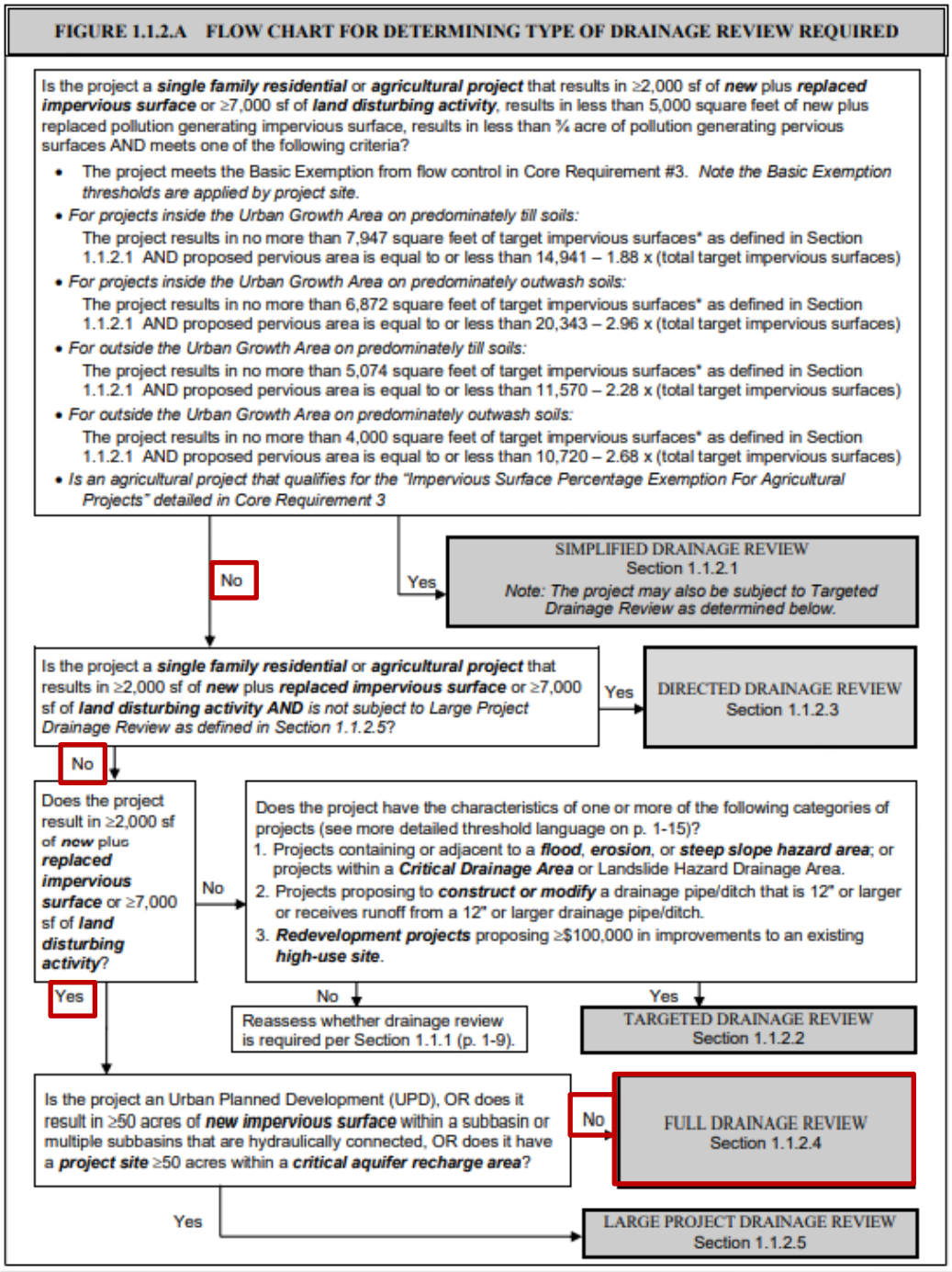


Figure 6: Drainage Review Flow Chart

Core Requirements

Core Requirement #1: Discharge at the Natural Location

Runoff from the proposed development will follow existing drainage patterns. Runoff will either fully infiltrate on site or be fully dispersed towards the natural discharge locations. Runoff from the site generally sheet flows in the westerly and southerly directions across flat forested terrain. Refer to the downstream analysis in Section III for further information.

Core Requirement #2: Offsite Analysis

Refer to Section III of this Technical Information Report (TIR) for included Level 1 Downstream Analysis.

Core Requirement #3: Flow Control Facilities

Per Section 1.2.3.1.B of the KCSWDM, this project is subject to the Level 2 Conservation Flow Control Standard, which requires developed discharge durations to match predeveloped durations for the range of predeveloped discharge rates from 50% of the 2-year peak flow up to the full 50-year peak flow. It must also match developed peak discharge rates to predeveloped peak discharge rates for the 2- and 10-year return periods. Please refer to Section IV of this report for flow control analysis.

Core Requirement #4: Conveyance System

Stormwater runoff will be mitigated on-site, and no off-site drainage systems are proposed. Additional conveyance analysis will be completed with final engineering, if required by the County. Please refer to Section V of this TIR for additional discussion.

Core Requirement #5: Construction Stormwater Pollution Prevention (CSWPPP)

A Construction Stormwater Pollution Prevention Plan (CSWPPP) and Temporary Erosion and Sediment Control (TESC) plan providing BMPs to be implemented during construction will be completed with final engineering. Please refer to Section VIII of this TIR for additional discussion on the CSWPPP.

Core Requirement #6: Maintenance and Operations

Please refer to Section X of this TIR for maintenance and operations requirements.

Core Requirement #7: Financial Guarantees and Liability

The owner will arrange for any financial guarantees and liabilities required by the permit.

Core Requirement #8: Water Quality Facilities

Per Section 1.2.8.1.A of the KCSWDM, this commercial campsite project is required to meet the Enhanced Basic Water Quality Treatment Standard. Per Section 1.2.8.1 of the KCSWDM, target surfaces include all new/replaced pollution generating surfaces (PGIS) that are not fully dispersed. All proposed PGIS will be fully dispersed except for the main entrance access road/circular turnaround (16,288 SF) and the north parking lot (6,405 SF). These pollution-generating impervious surfaces will be treated using large linear sand filters designed in accordance with Section 6.5.4 of the KCSWDM prior to being fully infiltrated on site. The large linear sand filter was selected as it does not require drop between the inlet and outlet pipes, thus allowing the storm

system to remain shallow enough to accommodate downstream infiltration without impacting groundwater levels. Please refer to Section IV of this TIR for additional details.

Core Requirement #9: Flow Control BMPs

The property is subject to Section 1.2.9.2.3 of the KCSWDM for Large Rural Lot BMP Requirements. Flow control BMPs have been evaluated below based on the order of preference described in the KCSWDM. Please refer to Section IV of this TIR for additional discussion.

1. Full Dispersion:

Full dispersion of runoff is feasible. Per Department of Ecology requirements, full dispersion systems and their flowpaths must be located a minimum of 30 FT downgradient or 100 FT upgradient of all septic drainfields. Full dispersion is proposed on-site as follows:

- TENT SITES: Full dispersion via sheet flow is proposed to mitigate runoff from the 8 tent sites located along the northern property line. New pervious surfaces created within the tent sites include the 8-foot wide wood bark trail and the 6-foot wide wood bark pathways to each of the tent sites. Some minor clearing within the tent sites is also proposed to allow for guests to set up tents and accessories during their stay. The average strip length of new pervious surface created perpendicular to the direction of surface water flow is 86 FT. Per C.2.1.6 of the KCSWDM, the area of non-native pervious surface being fully dispersed by sheet flow must have a width of no more than 25 feet unless the native vegetated flowpath segment is longer than the 25-foot minimum length. If the width of the non-native pervious surface is greater than 25 feet, the vegetated flowpath segment must be extended 1 foot for every 3 feet of width beyond 25 feet up to a maximum width of 250 feet. Therefore, for an 86 FT long pervious surface width, a minimum (25 FT)+(1 FT)((86 FT – 25 FT)/3 FT)= 45 FT long native vegetated flowpath is required. A significantly longer native vegetated flowpath is provided downstream of the 8 tent sites to mitigate stormwater runoff. In addition, 10 FT native vegetated buffers will be provided between each edge of the tent sites to provide further dispersion and privacy for guests.

- TIPI SITES: Full dispersion via sheet flow is proposed downstream of the three (3) tipi sites (900 SF each). Per Section C.2.1.6 of the KCSWDM, for sites outside the urban growth area (UGA) that are dispersing over outwash soils with a minimum design infiltration rate of 4 inches/hour, a native vegetated flowpath of only 10 feet is required for each 20-foot strip of tributary impervious. The tipi sites are 30 feet deep; therefore, a (30 FT/20 FT)(10 FT) = 15 FT native vegetated flowpath is required downstream of each tipi site. A 2-FT wide and 6-IN deep crushed rock flow spreader is required between the edge of the impervious surface and the native vegetated flowpath.

  Full dispersion via sheet flow is also proposed to mitigate runoff from the 8-foot-wide wood bark trail system near the tipi sites. Per C.2.1.6 of the KCSWDM, the area of non-native pervious surface being fully dispersed by sheet flow must have a width of no more than 25 feet unless the native vegetated flowpath segment is longer than the 25-foot minimum length. Therefore, a minimum 25 FT native vegetated flowpath is required downstream of the three (3) 8-FT wide wood bark trails located near the tipi sites. Significantly longer native vegetated flowpaths have been provided.

- GLAMPING SITES: Full dispersion via sheet flow is proposed to mitigate runoff from the 12-glamping site and the host site gravel driveways. A soil treatment liner will be required beneath all fully dispersed gravel driveways in order to protect groundwater quality within the critical aquafer recharge area. Per Section C.2.1.6 of the KCSWDM, for sites located outside the UGA that are dispersing over outwash soils with a minimum design infiltration rate of 4 inches/hour, a native vegetated flowpath of only 10 feet is required for each 20-foot strip of tributary impervious. The impervious surface width in the direction of sheet flow is approximately 20 FT; therefore, a 10 FT native vegetated flowpath is required downslope of each 10 FT gravel driveway.

  Full dispersion via sheet flow is also proposed to mitigate runoff from the new pervious surfaces created within the glamping and host cabin sites. Some minor clearing within the sites is proposed to allow for guests to set up their accessories during their stay. The average strip length of new pervious surface created perpendicular to the direction of surface water flow is 30 FT. Per C.2.1.6 of the KCSWDM, where sheet flow from a non-native pervious surface overlaps with the flowpath for sheet flow from an impervious surface, the impervious surface flowpath segment must be extended at least 1 foot for every 3 feet of non-native pervious surface area width draining to the same flowpath. Therefore, for a 30 FT long pervious surface width, an additional 30 FT/3 FT= 10 FT long native vegetated flowpath is required.

  The total minimum native vegetated flowpath downstream of glamping and host site driveways is 20 FT, and it will mitigate both the tributary pervious and impervious surfaces. To satisfy this requirement, 20 FT native vegetated buffers will be provided between each edge of the glamping and host sites to provide dispersion and privacy for guests.

  NOTE: Rooftop runoff from the proposed cabins/yurts on the glamping/host sites will be mitigated using full infiltration as described in Core Requirement #9, Item #2.

- OFFICE DECK: Full dispersion via sheet flow is proposed downstream of the 600 SF office deck. Per Section C.2.1.6 of the KCSWDM, for sites outside the UGA that are dispersing over outwash soils with a minimum design infiltration rate of 4 inches/hour, a native vegetated flowpath of only 10 feet is required for each 20-foot strip of tributary impervious. The deck is 20 feet deep; therefore, a 10 FT native vegetated flowpath is required. A 2-FT wide and 6-IN deep crushed rock flow spreader is required between the edge of the impervious surface and the native vegetated flowpath.

  Full dispersion via sheet flow is also proposed to mitigate runoff from the new pervious lawn surfaces created near the office building. Per C.2.1.6 of the KCSWDM, where sheet flow from a non-native pervious surface overlaps with the flowpath for sheet flow from an impervious surface, the impervious surface flowpath segment must be extended at least 1 foot for every 3 feet of non-native pervious surface area width draining to the same flowpath. As the new pervious area surrounding the office/deck intersects with the deck dispersion flowpath, all dispersion flowpaths

downstream of the office must be lengthened to a minimum of 25 FT. Significantly longer native vegetated flowpaths have been provided.

NOTE: Rooftop runoff from the proposed office building will be mitigated using full infiltration as described in Core Requirement #9, Item #2.

- NORTH RESTROOM: Full dispersion via sheet flow is proposed for the north restroom building, which does not have gutters/downspouts. Per Section C.2.1.6 of the KCSWDM, for sites outside the UGA that are dispersing over outwash soils with a minimum design infiltration rate of 4 inches/hour, a native vegetated flowpath of only 10 feet is required for each 20-foot strip of tributary impervious. The north restroom building is 10 feet deep; therefore, a 10 FT native vegetated flowpath is required.

  Full dispersion via sheet flow is also proposed to mitigate runoff from the new pervious lawn surfaces created near the north restroom. Per C.2.1.6 of the KCSWDM, where sheet flow from a non-native pervious surface overlaps with the flowpath for sheet flow from an impervious surface, the impervious surface flowpath segment must be extended at least 1 foot for every 3 feet of non-native pervious surface area width draining to the same flowpath. As the new pervious area surrounding the north restroom intersects with the impervious surface dispersion flowpath, all dispersion flowpaths downstream of the north restroom must be lengthened to a minimum of 25 FT. Significantly longer native vegetated flowpaths have been provided.

- SOUTH RESTROOM & ADJACENT ACCESS ROAD: Full dispersion via sheet flow is proposed for the south restroom building, which does not have gutters/downspouts, and the adjacent cross-sloped section of access road, which drain to the west. Per Section C.2.1.6 of the KCSWDM, for sites outside the UGA that are dispersing over outwash soils with a minimum design infiltration rate of 4 inches/hour, a native vegetated flowpath of only 10 feet is required for each 20-foot strip of tributary impervious. The south restroom building is 10 feet deep and the adjacent access roadway width is 24 FT; therefore, a 17 FT native vegetated flowpath is required. A soil treatment liner will be required beneath the gravel shoulders in order to protect groundwater quality within the critical aquafer recharge area.

  Full dispersion via sheet flow is also proposed to mitigate runoff from the new pervious lawn surfaces created near the south restroom. Per C.2.1.6 of the KCSWDM, where sheet flow from a non-native pervious surface overlaps with the flowpath for sheet flow from an impervious surface, the impervious surface flowpath segment must be extended at least 1 foot for every 3 feet of non-native pervious surface area width draining to the same flowpath. As the new pervious area surrounding the south restroom intersects with the impervious surface dispersion flowpath, all dispersion flowpaths downstream of the south restroom must be lengthened to a minimum of 25 FT. Significantly longer native vegetated flowpaths have been provided.

- RV SITES & ADJACENT ACCESS ROAD: Full dispersion via sheet flow is proposed for the 25 RV gravel pads and a portion of the access road that runs adjacent to the RV sites. The 2- FT wide gravel shoulder on each side of the access road will serve as a flow spreader. A soil treatment liner will be required beneath all fully dispersed gravel shoulders, roads, and RV pads to protect groundwater quality within the critical

aquafer recharge area. Along this stretch of access road, the impervious surface strip width varies as well as the direction of sheet flow. Therefore, cross sections were cut every 20 FT along the section of road to determine the average impervious strip width for the tributary access road and RV gravel pads. Based on this evaluation, the following average imperious strip widths and full dispersion flowpath lengths were determined:

- The southern third of the RV access road and RV Sites 1-5 and 22-25 are sloped to the northwest. The downstream native vegetative sheet flow dispersion flowpath for this portion of the RV access road receives the greatest amount of impervious surface runoff. The average impervious surface strip width was determined to be 60 feet along this section of road. Per Section C.2.1.7 of the KCSWDM, for sites outside the UGA that are dispersing over outwash soils with a minimum design infiltration rate of 4 inches/hour, a native vegetated flowpath of only 10 feet is required for each 20-foot strip of tributary impervious. As the calculated average impervious surface width for the area in question is 60 FT in outwash soils, a minimum 30 FT native vegetated flowpath is required downstream of RV Sites 1-5 towards which the tributary impervious surface runoff flows.

  Full dispersion via sheet flow is also proposed to mitigate runoff from the new pervious surfaces created within RV Sites 1-5 and 22-25, which drain to the northwest. Some minor clearing within the RV sites is proposed to allow for guests to set up their RVs and accessories during their stay. The average strip length of new pervious surface created perpendicular to the direction of surface water flow is 165 FT. Per C.2.1.6 of the KCSWDM, where sheet flow from a non-native pervious surface overlaps with the flowpath for sheet flow from an impervious surface, the impervious surface flowpath segment must be extended at least 1 foot for every 3 feet of non-native pervious surface area width draining to the same flowpath. Therefore, for a 165 FT long pervious surface width, an additional 165 FT/3 FT= 55 FT long native vegetated flowpath is required downstream of RV Sites 1-5 towards which the tributary pervious surface runoff flows.

  The total minimum native vegetated flowpath downstream of RV Sites 1-5 is therefore 85 FT long, and it will mitigate both the tributary pervious and impervious surfaces. To satisfy this requirement, a 100 FT native vegetated flowpath has been designated at the downstream edge of RV Sites 1-5 and additional 10 FT native vegetated buffers will be provided between each edge of the RV Sites to provide further dispersion and privacy for guests. The portion of the 100 FT native vegetated flowpath that extends off-sie will be placed within a storm drainage easement (adjacent property is the same owner as subject site).

- The northern two-thirds of the RV access road is crowned. Along this portion of crowned road, RV Sites 6-14 drain to the northwest and RV Sites 15-21 drain to the southeast. Therefore, downstream native vegetated flowpaths are required on both the northwest and southeastern sides of this section of road. The average impervious surface strip width was determined to be 30

feet on each side of the access road crown. Per Section C.2.1.6 of the KCSWDM, for sites outside the UGA that are dispersing over outwash soils with a minimum design infiltration rate of 4 inches/hour, a native vegetated flowpath of only 10 feet is required for each 20-foot strip of tributary impervious. As the calculated average impervious surface width for the area in question is 30 FT in outwash soils, a minimum 15 FT native vegetated flowpath is required downstream of RV Sites 6-21 towards which the tributary impervious surface runoff flows.

Full dispersion via sheet flow is also proposed to mitigate runoff from the new pervious surfaces created within RV Sites 6-21. Some minor clearing within the RV sites is proposed to allow for guests to set up their RVs and accessories during their stay. The average strip length of new pervious surface created perpendicular to the direction of surface water flow is 83 FT. Per C.2.1.6 of the KCSWDM, where sheet flow from a non-native pervious surface overlaps with the flowpath for sheet flow from an impervious surface, the impervious surface flowpath segment must be extended at least 1 foot for every 3 feet of non-native pervious surface area width draining to the same flowpath. Therefore, for an 83 FT long pervious surface width, an additional 83 FT/3 FT= 28 FT long native vegetated flowpath is required.

The total required minimum native vegetated flowpath downstream of RV Sites 6-21 is 43 FT long, and it will mitigate both the tributary pervious and impervious surfaces. Significantly longer native vegetated flowpaths have been provided at the downstream edge of RV Sites 6-21 and additional 10 FT native vegetated buffers will be provided between each edge of the RV Sites to provide further dispersion and privacy for guests.

NOTE: The portion of access road adjacent to RV Sites 13 and 14 is cross sloped to the north, so a native vegetated flowpath of not required southeast of this section of road. All drainage from this portion of road drains to the northwest. The minimum required 50 FT native vegetated flowpath is still adequate for this additional tributary impervious width. However, a significantly longer native vegetated flowpath has been designated downstream of RV Sites 13 and 14.

- ACCESS ROAD FROM RV SITES TO NORTH PARKING LOT: The portion of access road that runs from the RV Sites to the North Parking Lot is cross sloped to the northwest/west. Per Section C.2.1.7 of the KCSWDM, for sites outside the UGA that are dispersing over outwash soils with a minimum design infiltration rate of 4 inches/hour, a native vegetated flowpath of only 10 feet is required for each 20-foot strip of tributary impervious. The impervious surface width for the road is 24 FT in outwash soils, therefore, a minimum 12 FT native vegetated flowpath is required downstream of this section of road. The project proposes a significantly longer native vegetated flowpath downstream of this section of road. The additional flowpath length is provided downstream of this section of road in case excess runoff from other mitigated upstream sections of roadway occurs during larger storm events. See bullet below for mitigation of upstream road segments adjacent to the office and gravel overflow parking lot.

- ACCESS ROAD ADJACENT TO GLAMPING SITES 4-9, CONNECTING ACCESS ROADS, SOUTH PARKING LOT, & GRAVEL OVERFLOW PARKING LOTS: The runoff generated from the access road adjacent to Glamping Sites 4-9, the internal roads that connect the RV Site access road to the Glamping Site access road as well as the adjacent south parking lot and gravel overflow parking lots will be mitigated using a combination of full dispersion via sheet flow and a full dispersion trench. Per Section C.2.1.7 of the KCSWDM, for sites outside the UGA that are dispersing over outwash soils with a minimum design infiltration rate of 4 inches/hour, a native vegetated flowpath of only 10 feet is required for each 20-foot strip of tributary impervious. The impervious surface width for the road is 24 FT in outwash soils, therefore, a minimum 12 FT native vegetated flowpath is required downstream of each road segment being fully dispersed via sheet flow. This includes the following surfaces:

    - Access road adjacent to Glamping Sites 4-9 is cross sloped to the west. A minimum 12 FT native vegetated flowpath is required downstream of this section of roadway. Where connecting roads prevent dispersion flowpaths directly west of the road, impervious widths used to calculate flowpath lengths will be lengthened for the downstream segments.

    - Connecting roads north and southeast of gravel overflow parking lots are cross sloped to the south and northwest, respectively, toward the gravel parking lots. A minimum 12 FT native vegetated flowpath is required between these sections of roadway and the gravel parking lots. A longer 25 FT native vegetated flowpath is provided to account for any excess runoff that may result from the intersections with the Glamping Site access road.

    - The two (2) gravel overflow parking lots will utilize full dispersion via sheet flow to mitigate stormwater. Each gravel parking lot is approximately 40 FT in width measured in the direction of flow; therefore, a minimum 20 FT native vegetated flowpath is required downstream of each lot.

    - The 2,500 SF south parking lot and a 2,832 SF portion of the connecting road adjacent to the office building cannot achieve sheet flow full dispersion due to the location of the office building and a lack of an adjacent vegetated area. Therefore, these surfaces will be collected via catch basins and conveyed to a 50 FT long full dispersion trench located southwest of the office building. The trench will be located outside of the 100 FT well protection radius and will disperse flows to the southwest toward the well head location. A soil treatment liner will be required beneath dispersion trench rock to protect groundwater quality within the critical aquafer recharge area. According to the KCSWDM, a 50 FT long full dispersion trench with 100 FT native vegetated flowpath can mitigate up to 5,000 SF of tributary impervious. However, the flowpath can be lengthened proportionally up to 200 FT to accommodate additional impervious area. Therefore, to mitigate the 5,332 SF of tributary impervious surface, a 107 FT long native vegetated flowpath is required downstream of the dispersion trench (5,332 SF/5,000 SF * 100 FT = 107 FT). A 109 FT long native vegetated flowpath has been provided between the trench and the existing well, which meets this minimum requirement.

- ACCESS ROAD ADJACENT TO GLAMPING SITES 10-12 & SOUTH HAMMERHEAD: Full dispersion via a 50' long full dispersion trench is proposed for the 8,483 SF portion of the access road and glamping site gravel driveway aprons that flow to the south toward the proposed septic drainfield. A soil treatment liner will be required beneath dispersion trench rock to protect groundwater quality within the critical aquafer recharge area. According to the KCSWDM, a 50 FT long full dispersion trench with 100 FT native vegetated flowpath can mitigate up to 5,000 SF of tributary impervious. However, the flowpath can be lengthened proportionally up to 200 FT to accommodate additional impervious area. Therefore, to mitigate the 8,483 SF of tributary impervious surface, a 170 FT long native vegetated flowpath is required downstream of the dispersion trench (8,483 SF/5,000 SF * 100 FT = 170 FT). The dispersion trench has been placed to ensure the flowpath does not intersect with the proposed septic drainfield. A minimum 30' setback from the drainfield is required.

NATIVE GROWTH RETENTION AREA (NGRA): Per Section C.2.1.1 of the KCSWDM, the total area of impervious surface being fully dispersed must be no more than 15% of the total area of native vegetated surface being preserved by a recorded covenant on the site. The total area of impervious surface being fully dispersed is 137,143 SF; therefore, a minimum 137,143 SF/0.15 = 914,287 SF (21 AC) NGRA is required to be designated on the site plan and recorded via a covenant. The NGRA will include the required native vegetated flowpaths for surfaces undergoing full dispersion, as well as the additional area required to meet the 15% requirement. The 1,250 SF wetland located within the NGRA cannot be counted toward the minimum area requirement, but the associated wetland buffer can be.

In addition, the total area of impervious surface plus non-native pervious surface being fully dispersed must be no more than 35% of the site. The total area of impervious plus non-native pervious surface proposed is 368,691 SF, which is only 17.89% of the total site area of 2,060,943 SF; therefore, this requirement is met.

2. Full Infiltration:

Full infiltration of runoff is feasible for the remaining impervious surfaces. The geotechnical report included in Appendix D, notes the soils types as well-draining outwash medium sand soils with gravel and cobbles. The report notes groundwater as relatively shallow at 4-8 feet below grade in a few of the test pits. Other test pits were found to be dry when samples were collected. The geotechnical report indicates the soils to have moderate infiltration potential and that small, localized shallow infiltration systems are most appropriate given the shallow groundwater condition. All infiltration systems have been designed with 2-feet of rock storage depth to ensure the bottom of rock is at least 1-foot above the maximum detected groundwater level.

- NON-POLLUTION GENERATING: Full infiltration drywells are proposed for all remaining non-pollution generating structures, including the office building (1,600 SF), the host cabin (1,200 SF), and the 12 glamping yurts/cabins (1,200 SF each). Per Section C.2.2.4 of the KCSWDM, full infiltration drywells located in medium sands should be sized at a rate of 90 CF of gravel per 1,000 SF of tributary impervious surface. Infiltration testing will be completed for the specific drywell locations during final engineering if required by the County. A total of 17,800 SF of non-pollution

generating impervious surface will be fully infiltrated using drywells without additional water quality treatment as follows:

- The 1,600 SF office building is required to have a minimum (1,600 SF/1,000 SF)(90 CF) = 144 CF of rock storage. Therefore a 10-FT diameter, 2-FT deep drywell providing 157 CF of rock storage is proposed.

- The 1,200 SF host cabin and each of the 1,200 SF glamping cabins/yurts is required to have a minimum (1,200 SF/1,000 SF)(90 CF) = 108 CF of rock storage. Therefore an 8.5-FT diameter, 2-FT deep drywell providing 113.5 CF of rock storage is proposed for each cabin.

- POLLUTION GENERATING: Full infiltration trenches are proposed for the main entrance access road/circular turnaround (16,288 SF) and the north parking lot (6,405 SF). Per Section C.2.2.3 of the KCSWDM, full infiltration drywells located in medium sands should be sized at a rate of 30 LF of trench per 1,000 SF of tributary impervious surface. Infiltration testing will be completed for the specific trench locations during final engineering if required by the County. All pollution-generating impervious surfaces will be treated for enhanced basic water quality as described in Core Requirement #8 prior to being fully infiltrated on site.

  - The infiltration trench for the 6,405 SF north asphalt parking lot is required to have a minimum length of (6,405 SF/1,000 SF)(30 LF) = 192 LF (assumed minimum width of 2-FT). Per the KCSWDM, the maximum trench length allowed is 100-FT. Therefore, two (2) 100-FT long, 2-FT wide trench are proposed to provide an equivalent infiltration area. The trench centerlines are spaced 6-FT apart.

  - Approximately 16,288 SF of access road for the main entrance and circular turnaround will be mitigated using full infiltration trenches after enhanced basic water quality treatment. The infiltration trench for the 16,288 SF main entrance/circular turnaround is required to have a minimum length of (16,288 SF/1,000 SF)(30 LF) = 489 LF (assumed minimum width of 2-FT). Per the KCSWDM, the maximum trench length allowed is 100-FT. Therefore, eight (8) 61-FT long, 2-FT wide trenches are proposed to provide an equivalent infiltration area. The trench centerlines are spaced 6-FT apart.

3. **Limited Infiltration/Bioretention/Permeable Pavement/Basic Dispersion:**
   All new impervious and pervious surfaces will either be fully dispersed or fully infiltrated on-site as described above; therefore, no further BMPs have been evaluated for the project.

4. **Soil Moisture Holding Capacity:**
   The soil moisture holding capacity of new pervious surfaces must be protected in accordance with KCC 16.82.100 (F) and (G). KCC 16.82.100(F) requires that the duff layer or native topsoil be retained to the maximum extent practicable. KCC 16.82.100(G) requires soil amendment to mitigate for lost moisture holding capacity where compaction or removal of some or all of the duff layer or underlying topsoil has occurred. The amendment must be such that the replaced topsoil is a minimum of 8 inches thick, unless the applicant demonstrates that a different thickness will provide conditions equivalent to the soil moisture holding capacity

native to the site. The replaced topsoil must have an organic content of 5-10% dry weight and a pH suitable for the proposed surface vegetation (for most soils in King County, 4 inches of well-rotted compost tilled into the top 8 inches of soil is sufficient to achieve the organic content standard.) The amendment must take place between May 1 and October 1.

Special Requirements

Special Requirement #1: Other Adopted Area-Specific Requirements

Basin Plan – N/A
Master Drainage Plan – N/A
Salmon Conservation Plans – N/A
Flood Hazard Management Plan – N/A
Lake Management Plans – N/A

Special Requirement #2: Flood Hazard Area Delineation

The proposed project is not located within a delineated FEMA flood zone.

Special Requirement #3: Flood Protection Facilities

This project does not rely on or propose to modify or construct a new flood protection facility.

Special Requirement #4: Source Controls

Per Section 1.3.4 of the KCSWDM, source control is required for commercial site developments and commercial buildings. Due to the nature of this recreational campground project, typical commercial site pollutant levels are not anticipated; therefore, source control is not proposed. Source control will be implemented, if required by the County.

Special Requirement #5: Oil Control

This site is not considered high-use or in need of oil control. Oil control will be considered, if required by the County.

III. OFF-SITE ANALYSIS

Task 1: Study Area Definition and Maps

The project is located on tax parcel number 302207-9103 in unincorporated King County near the community of Ravensdale, WA. The site is contained within one drainage basin, Lower Cedar River Drainage Basin, in the Cedar River / Lake Washington Watershed. The site is located within a single Threshold Discharge Area (TDA). According to the Septic Feasibility Letter (Appendix A), stormwater from the site infiltrates into native soils on-site. However, stormwater that does not infiltrate generally sheet flows to the southwest towards SE Kent-Kangley RD across moderate slopes ranging from 1-10%. An Existing Conditions Map is included as Figure 4 in this TIR.

The study area for this analysis extends downstream for approximately ¼ mile. A Downstream Map showing the study area is included in Figure 7 on the following page.

Task 2: Resource Review

According to King County iMaps, the project site is listed as a Category 1 CARA. No other unique site aspects were listed on King County iMaps website. A well exists on-site with an associated 100-foot protection zone. There is a Category IV wetland in the north central portion of the property with an associated 50-foot buffer and additional 15-foot building setback.

Task 3: Field Inspection

The field inspection of the Off-Site Analysis was performed by Encompass Engineering & Surveying on Wednesday, September 14, 2022. The analysis was performed at approximately 10:30 AM under cloudy conditions with a temperature of 70°. Soil conditions were observed to be dry. Information collected during this study is included in the Task 4 description.

Task 4: Drainage System Description and Problem Descriptions

The site has only one natural discharge location (NDA) on the western side of the property, which results in one total TDA for the site. Stormwater runoff from the site generally sheet flows in the southwestern direction towards the western property line (A). After flowing off the property, the runoff continues sheet flowing to the southwest (B), following the natural topography throughout the adjacent lot. After roughly 1,000 FT, the runoff intercepts SE Kent-Kangley Rd and enters the roadside ditch on the northern side of the road (C). From here, the runoff continues being conveyed to the west within the roadside ditch until the ¼ mile downstream limit was reached (D). The runoff ultimately gets discharged into the Lower Cedar River. No drainage related issues were observed downstream of the site, and no relevant drainage complaints were identified on the King County iMap system within a quarter mile of the site discharge location. Please refer to the Downstream Map (Figure 7), Drainage System Table (Table 1), and photographs on the following pages for additional details.

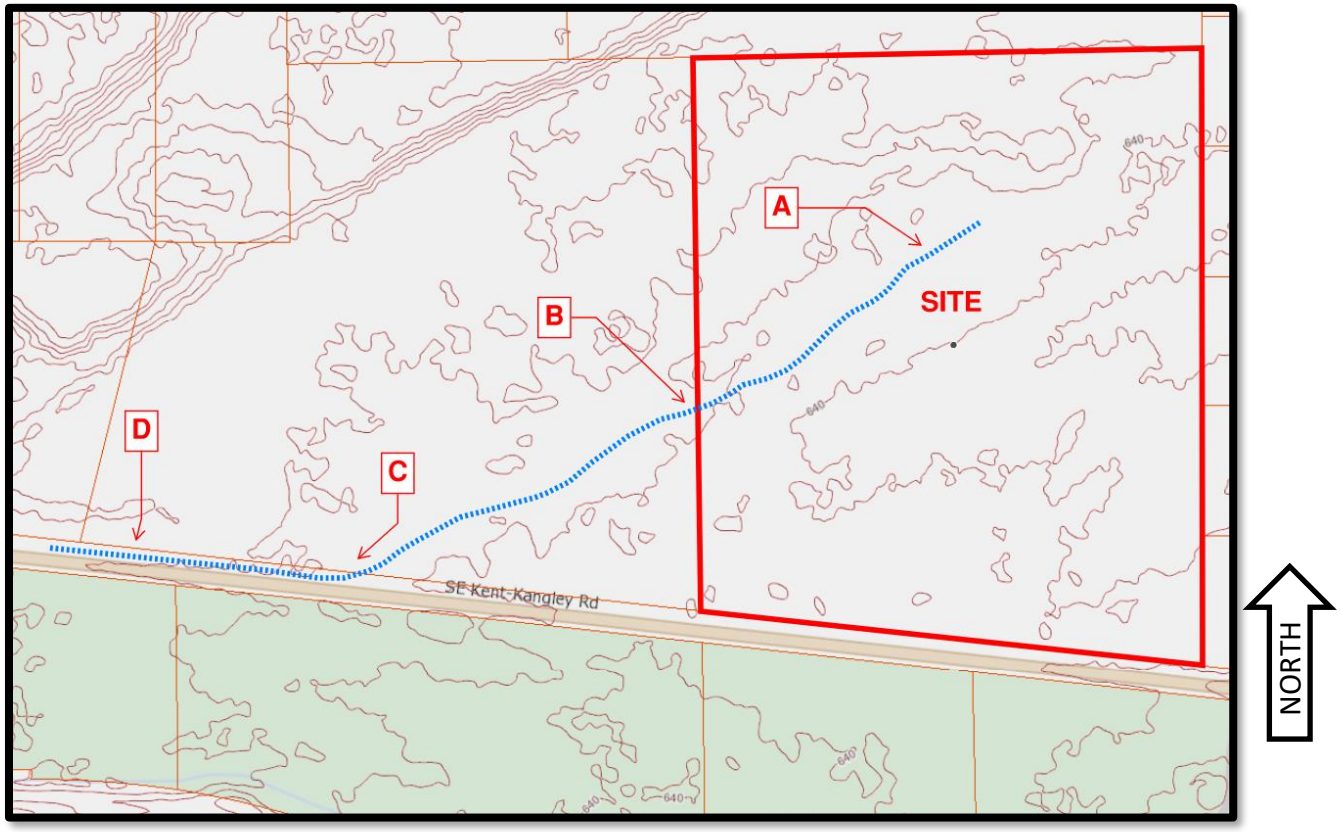


Figure 7: Downstream Map

Symbol (see map)	Drainage Component	Drainage Component Description	Slope %	Distance from site discharge (¼ ml = 1,320 ft.)	Existing Problems	Potential Problems	Observations of field inspector, resource reviewer, or resident
A	SHEET FLOW	VEGETATION	1-10%	0’	NO	NO	NO IMMINENT PROBLEMS
B	SHEET FLOW	VEGETATION	1-10%	0’	NO	NO	NO IMMINENT PROBLEMS
C	ROADSIDE DITCH	GRASS	1-5%	0-1,000’	NO	NO	NO IMMINENT PROBLEMS
D	ROADSIDE DITCH	GRASS	1-5%	1,000’-1,320’	NO	NO	NO IMMINENT PROBLEMS

Element A: Runoff from site sheet flows in the southwesterly direction

Element B: Runoff generally leaves the site from the western property line and continues sheet flowing through a separate lot

Element C: Runoff intercepts SE Kent-Kangley Rd and begins flowing west within the roadside ditch

Element D: Runoff continues flowing west within roadside ditch until ¼ downstream limit is reached

Task 5: Mitigation of Existing or Potential Problems

According to King County iMap, no drainage complaints were recorded for this site or for the neighboring properties.

IV. FLOW CONTROL ANALYSIS AND DESIGN

Part A: Existing Site Hydrology

The 2,060,943 SF (47.3 AC) lot currently contains a primitive 20,323 SF gravel driveway that connects to SE Kent-Kangley Road on the south side of the site. The gravel driveway is to be removed/replaced with construction of the new campground facilities. Apart from the existing driveway, the site is primarily vegetated with native vegetation, including grass, shrubs, and trees. The property is located within a single drainage basin, Lower Cedar Basin, and runoff from the site generally sheet flows off-site to the south and west. Refer to Figure 4 for an Existing Conditions Map.

The geotechnical report included in Appendix D classifies the soils as being well-draining outwash medium sand soils with gravel and cobbles; therefore, the soils have been modeled as Type A/B.

Part B: Developed Site Hydrology

The project proposes to establish a campground that will accommodate 25 RVs sites, 3 tipi sites, 8 walk-in tent sites, and 12 glamping sites with cabins/yurts. Additional campground facilities are proposed to include access roads, parking lots, restroom/shower buildings, a central office building with deck, and a host cabin. The campground entrance is in the SW corner of the site with direct access to SE Kent-Kangley Road.

The campground will be constructed in 3 phases. All proposed impervious and pervious surfaces are outlined in the table below based on the Phase in which they will be constructed. The project will result in a total of 156,056 SF (3.58 AC) of new/replaced pollution generating impervious surface (PGIS), 20,980 SF (0.48 AC) of new non-pollution generating impervious surface, and 231,548 SF (5.32 AC) non-pollution generating pervious surface. The total proposed impervious surface area is 177,036 SF (4.06 AC).

Phase	Site	Pollution Generating Impervious Surface (SF)	Non-Pollution Generating Impervious Surface (SF)	Non-Pollution Generaing Pervious Surface (SF)	Flow Control BMP Proposed
1	North Asphalt Parking Lot	6,405			Full Infiltration
1	Main Entrance and Circular Turnaround	16,288			Full Infiltration
1	Tent Site Wood Bark Paths (6' wide)			2,129	Full Dispersion
1	Tent Site Wood Bark Trail (8' wide)			5,575	Full Dispersion
1	North Restroom		240		Full Dispersion
1	Access Road (20' Asphalt w/ 2' Gravel Shoulders)	67,380			Full Dispersion
1	Misc Lawn/Landscape Areas			36,775	Full Dispersion
2	Glamping Site Gravel Driveways (10' Wide)	12,105			Full Dispersion
2	Glamping Yurts/Cabins (12 EA 1,200 SF)		14,400		Full Infiltration
2	South Asphalt Parking	2,498			Full Dispersion
2	Office Building		1,600		Full Infiltration
2	Office Deck		600		Full Dispersion
2	Gravel overflow parking Lot	6,094			Full Dispersion
2	Tipi Wood Bark Wlakway (8' Wide)			3,311	Full Dispersion
2	Tipi Pads (3 EA 900 SF)		2,700		Full Dispersion
2	Host Site Driveway (10' Wide)	723			Full Dispersion
2	Host Cabin		1,200		Full Infiltration
2	Misc Lawn/Landscape Areas			63,909	Full Dispersion
3	South Restroom		240		Full Dispersion
3	RV Gravel Pads	44,563			Full Dispersion
3	Misc Lawn/Landscape Areas			119,849	Full Dispersion
	SUBTOTALS=	**156,056**	**20,980**	**231,548**	

All proposed impervious and pervious surfaces will be fully dispersed except for the main entrance access road/circular turnaround (16,288 SF), the north parking lot (6,405 SF), rooftop runoff from the 12 glamping site cabins/yurts (14,000 SF), rooftop runoff from the office building (1,600 SF), and rooftop runoff from the host cabin (1,200 SF). These remaining surfaces will be mitigated using full infiltration. Pollution-generating impervious surfaces will be treated for enhanced basic water quality using large linear sand filters prior to being fully infiltrated on site. Please refer to Core Requirements 3, 8, and 9 in Section II of this TIR for additional discussion on the storm design. A Developed Conditions Map is provided in Figure 5.

Part C: Performance Standards

Per King County iMap, this project site is within the Conservation Flow Control area. In this area, flow control facilities are required to meet the level 2 flow control standard. In this area, flow control facilities are required to meet the level 2 flow control standard. This requires that the predeveloped and developed discharge durations match for 50% of the 2-year peak flow up to the full 50-year peak flow. Please refer to Part D of this Section for further discussion.

The proposed development is considered a "Large Lot"; therefore, the site has been designed to comply with the Large Lot BMP Requirements detailed in Section 1.2.9.2.2 of the 2021 KCSWDM. Please refer to Core Requirement #9 in Section II of this TIR for further discussion.

This commercial site is required to meet the Enhanced Basic Water Quality Treatment Standard. Please refer to Part E of this Section for further discussion.

Part D: Flow Control System

A total of 408,584 SF (9.38 AC) of new/replace impervious and pervious surface is proposed with the project. WWHM was utilized to model this area under the predeveloped condition as 100% forest with flat, Type A/B soils. Per Table 1.2.9.A in the KCSWDM, flow control BMP facility sizing credits may be taken for all new/replaced impervious and pervious surfaces meeting full dispersion and full infiltration requirements under Core Requirement #9. A total of 368,691 SF (8.4640 AC) of new/replaced impervious and pervious surfaces will be fully dispersed and have therefore been modeled as forest under the developed condition. A total of 39,893 SF (0.9158 AC) of new/replaced impervious surfaces will be fully infiltrated and have therefore been subtracted from the developed conditions model.

The site meets flow control exemption 2. As shown in Table 4 below, the proposed development results in a 0.1140 CFS decrease in the 100-year peak flow using 15-minute time steps, which is below the exemption threshold of a 0.15 CFS increase. No flow control facilities are proposed at this time; however, flow control BMPs will be implemented as described under Core Requirement #9 in Section II of this TIR. Please refer to Appendix E for a copy of the full WWHM data output.

Table 4: Flow Frequency Return Periods

Flow Frequency			
Flow(cfs)		Predeveloped	Mitigated
2 Year	=	0.0273	0.0246
5 Year	=	0.0914	0.0825
10 Year	=	0.1837	0.1658
25 Year	=	0.4074	0.3677
50 Year	=	0.7016	0.6331
100 Year	=	1.1667	1.0527

Part E: Water Quality System

Per Section 1.2.8.1.A of the KCSWDM, this commercial campsite project is required to meet the Enhanced Basic Water Quality Treatment Standard. Per Section 1.2.8.1 of the KCSWDM, target surfaces include all new/replaced PGIS that is not fully dispersed. All proposed pollution generating surfaces will be fully dispersed except for the main entrance access road/circular turnaround (16,288 SF) and the north parking lot (6,405 SF). These pollution-generating impervious surfaces will be treated using large linear sand filters sized in WWHM and designed in accordance with Section 6.5.4 of the KCSWDM prior to being fully infiltrated on site. The large linear sand filter was selected as it does not require drop between the inlet and outlet pipes, thus allowing the storm system to remain shallow enough to accommodate downstream infiltration without impacting groundwater levels. A large linear sand filter vaults have been sized using WWHM based on a filter media depth of 1.5 FT and a hydraulic conductivity of 1 in/hour. The overflow weir will be located 1 FT above the filter media. The proposed water quality facilities are summarized below:

- Runoff from the 16,288 SF (0.3739 AC) main entry/circular turnaround will be collected and conveyed to a series of three (3) large linear sand filter systems. A central system located along the main entry driveway will be utilized to mitigate an 8,490 SF (0.1949 AC) portion of the main entry road. Per the WWHM results in Appendix E, the central system is required to provide a sand filter bed area of 392 SF to meet the 95% enhanced basic water quality treatment threshold. Therefore, a 28 FT long and 14 FT wide filter bed providing 392 SF of area is proposed. Per Section 6.5.4.1 of the KCSWDM, a sediment cell that is at least one-third the width of the sand filter bed is required upstream of the 14 FT wide sand filter bed; therefore, a 5 FT wide sediment cell is proposed. The treated stormwater outflow from the central large linear sand filter will be split even between the two (2) adjacent full infiltration systems post water quality treatment.

  Separate systems will capture runoff from the east and west portions of the circular turnaround (approximately 3,897 SF or 0.0895 AC each). Per the WWHM results in Appendix E, the east and west systems are required to provide a sand filter bed area of 180 SF each to meet the 95% enhanced basic water quality treatment threshold. Therefore, a 18 FT long and 10 FT wide filter bed providing 180 SF of area is proposed for each side of the circular turnaround. Per Section 6.5.4.1 of the KCSWDM, a sediment cell that is at least one-third the width of the sand filter bed is required upstream of the 10 FT wide sand filter bed; therefore, a 3.5 FT wide sediment cell is proposed. The treated stormwater outflow from each of the large linear sand filters within the circular turnaround will be routed to the adjacent full infiltration systems post water quality treatment.

- Runoff from the 6,405 SF (0.1470 AC) north parking lot will sheet flow to the north edge of pavement where it will flow into a large linear sand filter system. Per the WWHM results in Appendix E, the system is required to provide a sand filter bed area of 290 SF to meet the 95% enhanced basic water quality treatment threshold. Therefore, a 116 FT long and 2.5 FT wide filter bed providing 290 SF of area is proposed. Per Section 6.5.4.1 of the KCSWDM, an 18 IN wide sediment cell is required upstream of the 2.5 FT wide sand filter bed. The treated stormwater outflow from the large linear sand filter will be routed to a full infiltration system post water quality treatment.

Please refer to Appendix E for a copy of the full WWHM data output.

V. CONVEYANCE SYSTEM ANALYSIS AND DESIGN

Stormwater runoff will be mitigated on-site, and no off-site drainage systems are proposed. Additional conveyance analysis for the on-site systems will be completed with final engineering, if required by the County.

VI. SPECIAL REPORTS AND STUDIES

- Septic Feasibility Letter by Jenson Engineering LLC, Inc. dated July 5, 2022 (Appendix A)
- King County Critical Areas Designation CADS22-0318, dated January 2, 2023 (Appendix B)
- Wildlife Meadow Glamping & RV Park Traffic Impact Analysis by TranspoGroup dated April 2022 (Appendix C)
- Geotechnical Engineering Study by Geotech Consultants, Inc dated February 16, 2021 (Appendix D).

VII. OTHER PERMITS

- Conditional Use Permit
- SEPA Review
- Building Permits
- Clearing & Grading Permit
- Department of Health Approval

VIII. CSWPPP ANALYSIS AND DESIGN

The total limits of disturbance for this project are greater than one acre; therefore, a formal CSWPPP is required. In addition, a Construction Stormwater General Permit (CSWGP) and Notice of Intent (NOI) will be required. A CSWPPP, CSWGP, and NOI will be prepared with final engineering.

IX. BOND QUANTITIES and DECLARATION of COVENANT

Bond Quantities will be provided with final engineering if requested by the County.

X. OPERATION AND MAINTENANCE MANUAL

An Operation and Maintenance Manual is provided in Appendix F.

Appendix A

Septic Feasibility Letter by Jenson Engineering LLC, Inc. dated July 5, 2022

Jensen Engineering LLC
David Jensen P.E.
4004 NE 4th St., #107-508
Renton, WA 98056
Phone: (425) 457-6029
Fax: 14259881324
Email: jenseneng@yahoo.com

Project Number 22008-100

July 5, 2022

Robert Striker
Robertandsuzanne59@outlook.com

Dear Mr. Striker:

This letter is in regard to the on-site sewage disposal feasibility study done by Jensen Engineering LLC (JE) for your property in the Kanaskat area of King County, Washington. The parcel is described as Lots 2 and 3 of King County Large Segregation L07M0063 with a parcel number of 3022079102 and 9103. The following will summarize our findings.

The property is a total of 84 acres in size and is relatively flat. The majority of the property is covered by low brush and except for the borders few trees. The property is bordered on the south by SE Kent Kangley Road and on the other three sides by other residential and large parcels.

JE performed a site visit on the property on February 19, 2022. There is a well on the property in the approximate center of the site. There were six machine dug holes to the south of and greater than 100 feet from the well. Please find attached a map that shows the approximate location of the well and soil logs.

All of the soil logs were greater than four feet in depth. All of the soil logs had a shallow topsoil layer underlaid by a mixture of sandy loams, sand, and cobbles. Portions of these soil layers are Type 1 sands and gravels which are excessively permeable. These soils are still acceptable for on-site sewage disposal but need additional treatment to allow for proper treatment prior to the effluent going thru the coarse soils.

In summary this site appears feasible for on-site sewage disposal. The area where the soil logs were located is likely the same type of soil types and depths as over the rest of the parcel based on other work that JE has done in the area.

It is our pleasure to be of service to you with your engineering needs. If you have questions or need further information, please contact our offices.

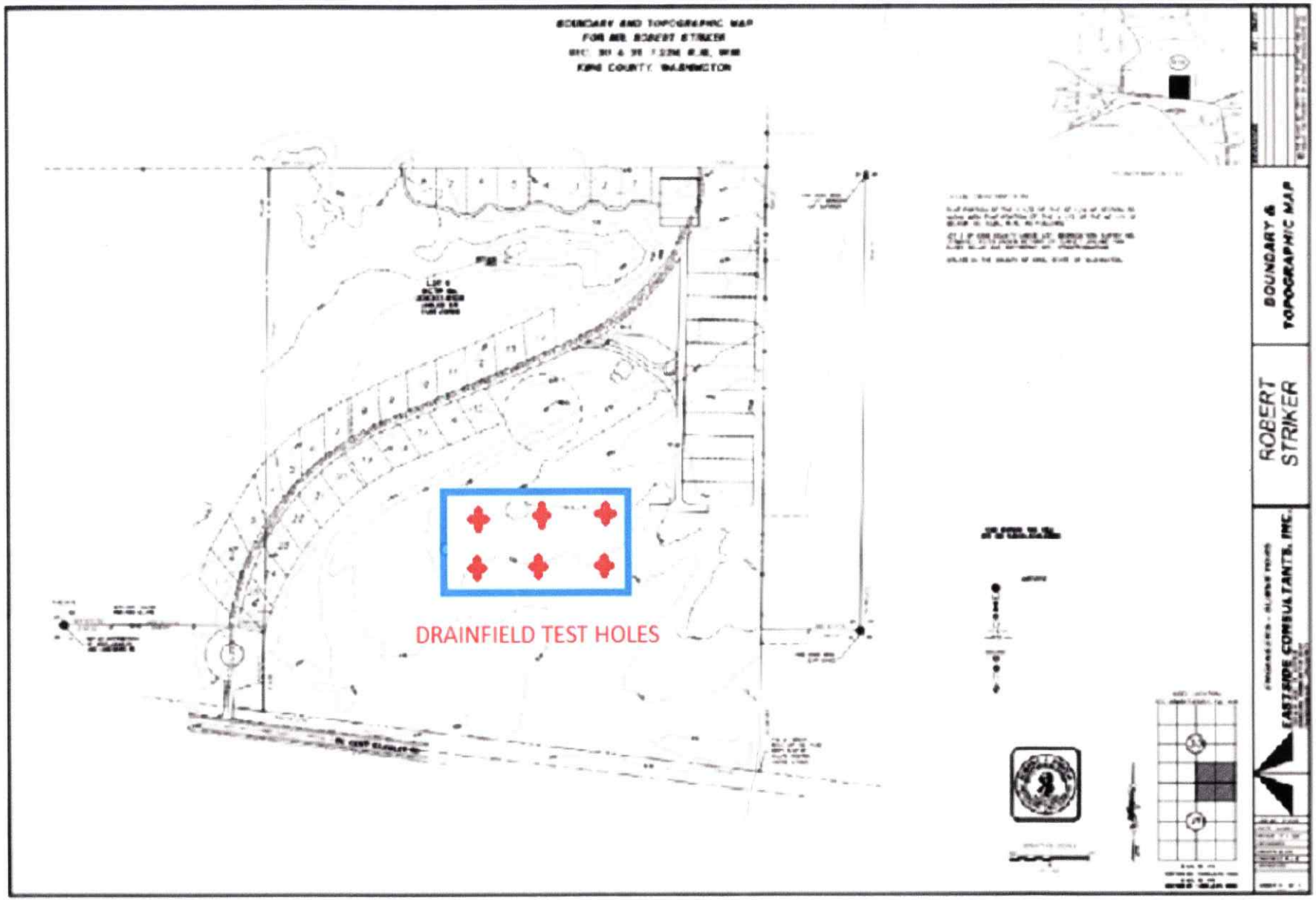
Sincerely yours,
Jensen Engineering LLC

David Jensen PE

David Jensen PE
Principal

Enclosures

DAVID R. JENSEN
STATE OF WASHINGTON
David Jensen
7/5/22
26105
REGISTERED
PROFESSIONAL ENGINEER


BOUNDARY AND TOPOGRAPHIC MAP
FOR MR. ROBERT STRIKER
KING COUNTY, WASHINGTON
DRAINFIELD TEST HOLES
BOUNDARY & TOPOGRAPHIC MAP
ROBERT STRIKER
EASTSIDE CONSULTANTS, INC.

Appendix B

King County Critical Areas Designation CADS22-0318, dated January 2, 2023

King County
Department of Local Services
Permitting Division
RTN-LS-0300
919 SW Grady Way, Suite 300
Renton, WA 98057
206-296-6600 TTY Relay: 711
https://kingcounty.gov/depts/local-services/permits

January 2, 2022

Robert Striker
Post Office Box 267
Ravensdale, Washington 98051

RE: Critical Areas Designation CADS22-0318, Parcel 302207-9103
Status: Complete

Dear Applicant:

Your property was recently reviewed for a Critical Areas Designation. Our review consisted of a site visit and an in-office review of existing background data. The result of our study is that we have determined that your parcel is host to the critical areas discussed separately below. Specific impacts to development on your parcel are also discussed.

The determinations reported in this letter as to the existence, location, and classification of critical areas and critical area buffers are effective for five years from the date of this letter if there has been no change in site conditions. The Department of Local Services, Permitting Division (Permitting) shall rely on these determinations of the existence, location and classification of critical areas and critical area buffers in its review of complete applications for permits or approvals filed for the subject development site or parcel within five years after the letter is issued. If you do not plan to develop your property soon after receiving this letter, it may be in your interest to contact us to see if any of the conclusions in this letter have changed or are no longer valid.

Critical Aquifer Recharge Area (21A.24.311 to 21A.24.316)

Your parcel is within a Category **I** Critical Aquifer Recharge Area (CARA). However, because your site is greater than one acre in size, no restrictions apply for normal residential development.

Wetlands (21A.24.318 to 21A.24.345)

Your parcel contains a Category **IV** wetland**.** The buffer width for this category of wetland (which on an undeveloped lot is to remain unaltered native vegetation) is 50 feet for high impact developments. Structures must honor an additional 15-foot building setback beyond the buffer. Within a currently undeveloped buffer, no development of any kind is usually allowed, including clearing, grading, or any other alteration of the existing vegetation. Within legally developed

buffers, maintenance of existing structures and landscaping is allowed as well as limited expansions of some structures.

In your particular case, the wetland was descrbied in a report (Dated February 1, 2021) by *Sewall Wetland Consulting, Incorporated*. The wetland is a Category IV depressional wetland that is located on the north end of the parcel. Category IV wetlands are assigned 40-foot buffers for moderate impact projects and 50-foot buffers for high impact projects, which is what the attached site map shows. Residential development is conserved a moderate impact project and commercial development is considered a high impact project. If you develop the parcel into a commercial campground that would be considered a high impact project so the 50-foot buffers would apply.

There is an unmapped flood plain (21A.24.230) associated with this wetland. The elevation change between the boundary of the wetland and the proposed development site is less than 10 feet based upon iMap. A minor flood study may be required to demonstrate the proposed development is not located within the flood hazard area.

Water Service

New development in the rural area must be served by Group A water systems, Group B water systems or individual private wells as provided for in King County Code (KCC) 13.24.138. If potable water is required for development, a Certificate of Water Availability or approval of an alternative water source consistent with the priority order provided in KCC 13.24.138 will be required under KCC 21A. 21A.28.040. Attached is a flow chart summarizing water service requirements and links to additional information. Read the chart by starting in the upper left corner, "Unincorporated King County, Property Location." It appears this property is in the Covington Water District water service area, which should be confirmed by the applicant. It is the applicant's responsibility to verify water availability, in priority order, preceding submittal of an application. If you have questions about these requirements please contact a Permit Review Coordinator at the Permitting Division.

Closure

When you are applying to the Health Department for septic system design approval or water well site approval, please include a copy of this letter and any attachments with your application to them. Similarly, a copy should be included with any building permit application. This critical area determination is not based on a professional survey of the site. As a result, this CAD may be relied on for the type and general location of critical areas but does not represent a confirmation of the precise boundaries of identified critical areas. Depending on the scope and type of development proposed on the site, a survey may be required with a permit application. If additional critical areas that are not reflected in the CAD become known during permit review, the development would still need to comply with applicable critical areas regulations.

The purpose of this review is to determine the location and classification of critical areas on your site that might affect your proposed development activities and is not an approval of existing or proposed development. Additional reviews, including but not limited to drainage, floodplain, clearing, grading, compliance with critical area codes, and fire flow may occur during the building permit review process.

A clearing and grading permit would be required in order to clear land for access to a well site within critical areas prior to obtaining a building permit.

Please feel free to contact me at 206-477-3721 or cholcomb@kingcounty.gov if you have any questions regarding critical areas.

Sincerely,

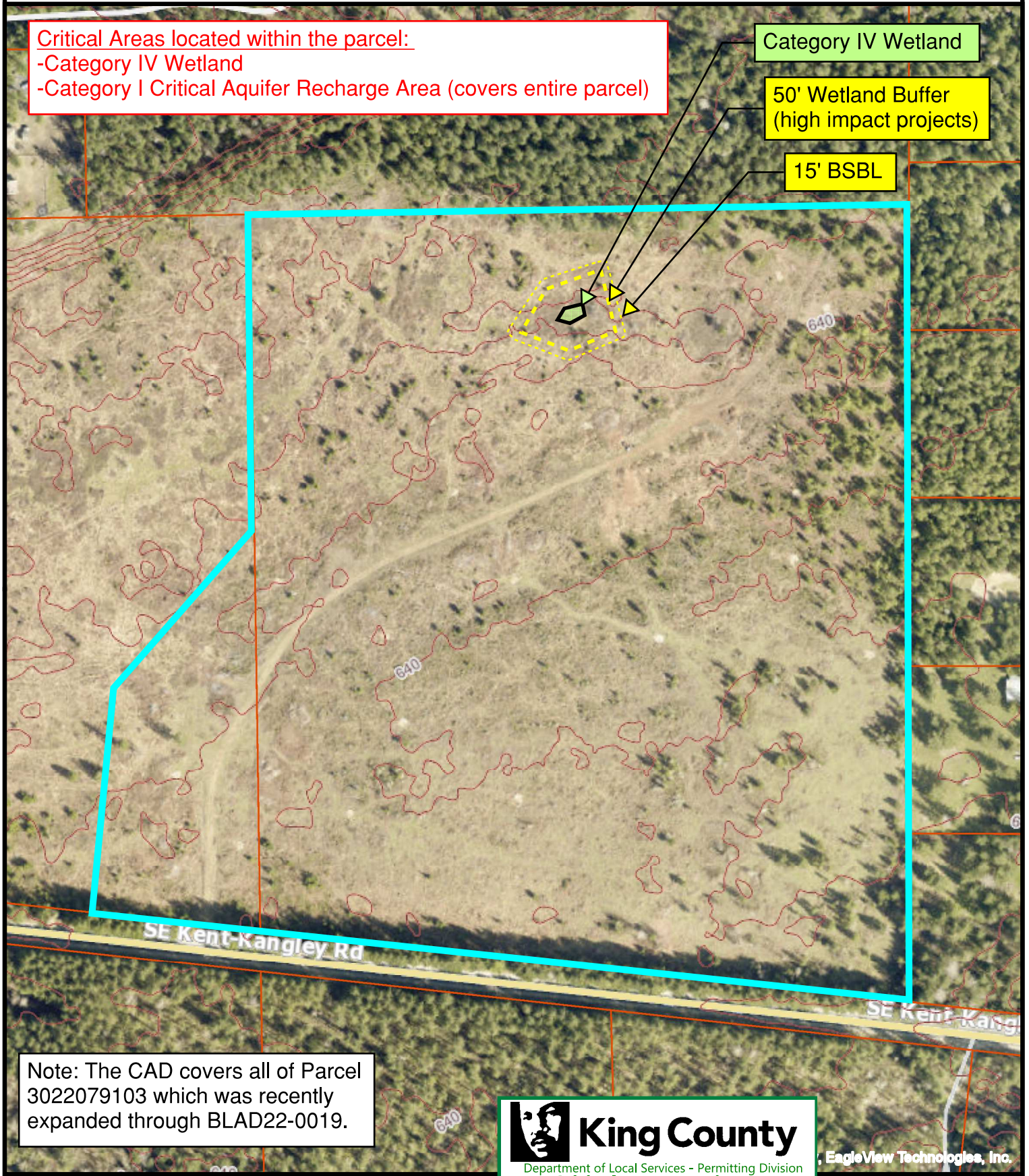
Chris Holcomb

Digitally signed by Chris Holcomb
DN: C=US, E=CHolcomb@kingcounty.gov, O=Department of Local Services, OU=Permitting Division, CN=Chris Holcomb
Date: 2023.01.02 01:44:00-08'00'

Chris Holcomb, MES
Environmental Scientist II-Ecologist

Attachments: Critical Areas Site Map
Water Service Requirements Flow Chart

CADS22-0318 Critical Areas Site Map



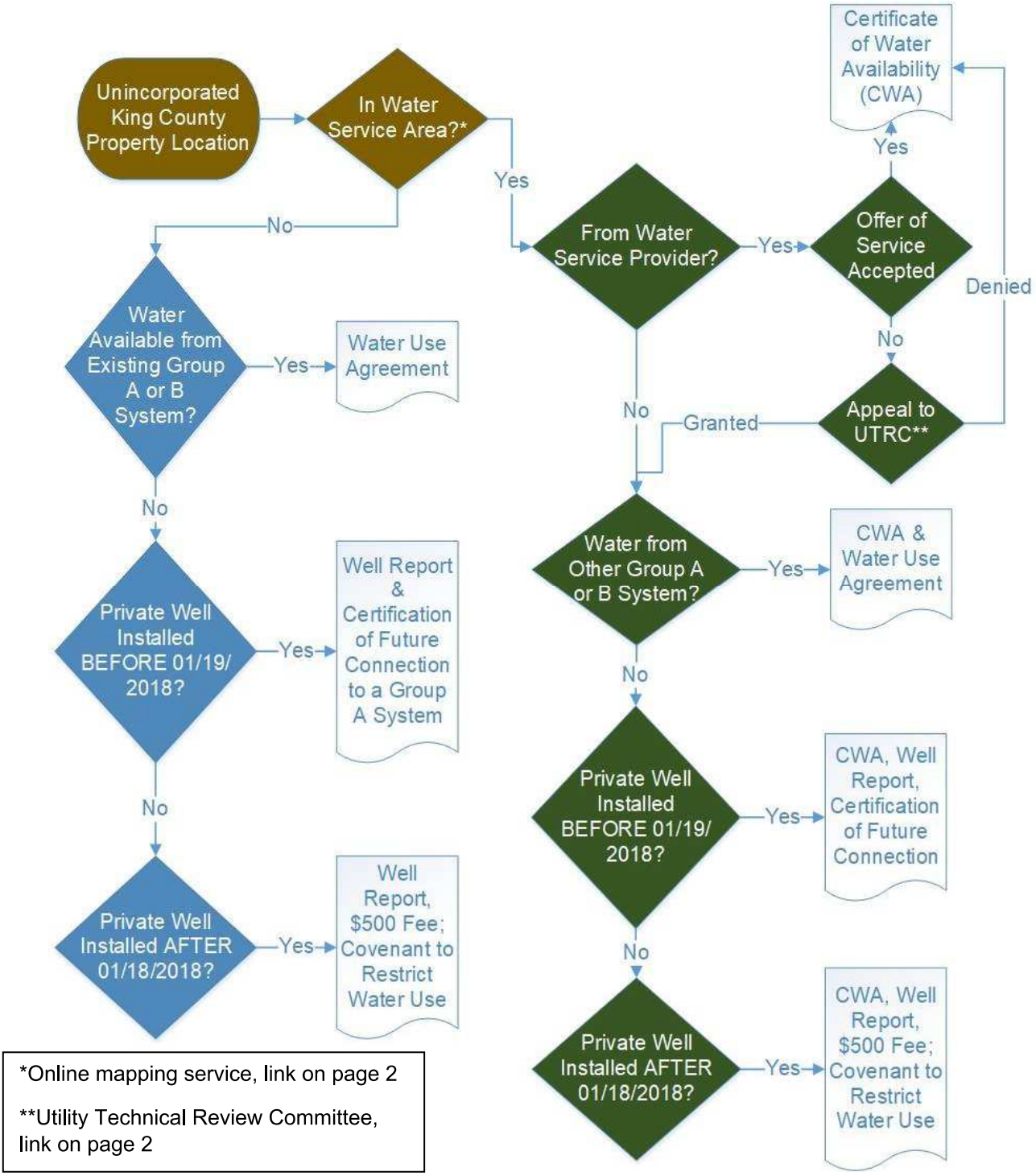
King County
Department of Local Services - Permitting Division
Critical Areas Review
APPROVED
By: Date: **01/02/2023**
Chris Holcomb, Environmental Scientist II

Date: 1/2/2023 Notes: Map not to scale.

N

King County

Water Service Requirements



*Online mapping service, link on page 2

**Utility Technical Review Committee, link on page 2

Water Service Area Provider Notes:

If the water service area provider is not willing or able to provide a Certificate of Water Availability (CWA) that indicates water is not presently available at a property, a letter or email to that effect from the water service area provider will be sufficient in lieu of the CWA.

If the water service area provider is not willing to sign the Certification of Future Water Connection, an email or letter to that effect from the water service area provider will be sufficient and the applicant can record the certification with the email or letter as an attachment, in lieu of the water district signature.

The certification of future connection for properties not located in a water service area need only to be signed by the owner.

If you feel the offer of water availability from the water service provider is not timely and/or reasonable, you can appeal their determination of water availability to the Utility Technical Review Committee (UTRC), King County Department of Natural Resources and Parks. The link to their appeal procedures and application requirements are included below.

Resources:

Parcel Located in King County, Check Jurisdiction and Zoning

* Interactive Water Service Area Maps

Water Availability; Certificate of Availability

Dept. of Ecology, Well Construction & Licensing and Well Notice of Intent

Water Connection; Certification of Future Water Connection

Water Connection; Certification of Future Water Connection to a Group A System

Water Usage, Recording Document; Covenant Form

Groundwater Maps and Reports

Public Health, Private Wells, Plumbing, Gas Piping and Onsite-Sewage Systems

** Utility Technical Review Committee (UTRC) - Water Service Appeal Procedures and Forms

Appendix C

Traffic Impact Analysis by The Transpo Group, dated April 2022

Traffic Impact Analysis

WILDLIFE MEADOW GLAMPING & RV PARK

Prepared for:

Robert Striker

April 2022

Prepared by:

12131 113th Avenue NE, Suite 203
Kirkland, WA 98034-7120
Phone: 425-821-3665
Fax: 425-825-8434
www.transpogroup.com

1.22066.00

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Introduction

The purpose of this traffic impact analysis (TIA) is to identify potential transportation-related impacts associated with the proposed Wildlife Meadow Glamping & RV Park development in unincorporated King County. As required by King County Road Services, the analysis provides a description of the project and study area, an evaluation of future conditions at the site access point, and identified potential impacts and mitigation measures, as necessary.

Project Description

The project site is currently undeveloped and located along SE Kent Kangley Rd between SE Ravensdale Way and 292nd Avenue SE. The site vicinity is shown on Figure 1. The project would include the development of up to 45 tent, glamping, and RV sites. One vehicular access point is proposed along the southern frontage of the project, accessed via SE Kent Kangley Rd. A preliminary site plan for the development is shown on Figure 2. The proposed project is anticipated to be constructed and operational by 2025.

Study Scope

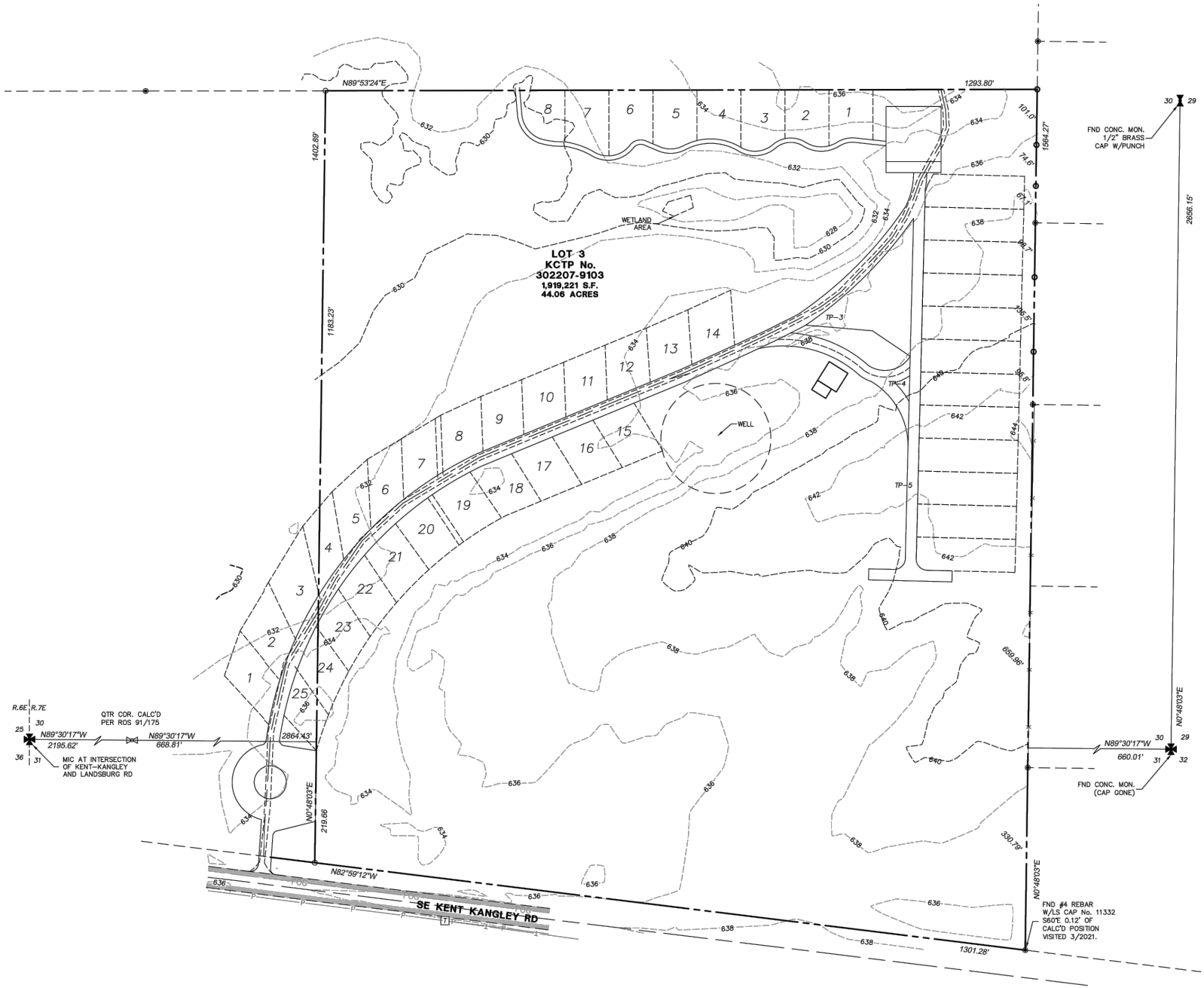
The scope of this analysis is based on discussions with King County staff and the County's Level 1 TIA guidelines. As specified in these guidelines, only intersections that would be impacted by 30 or more peak hour trips and at least 20 percent of total peak hour project traffic must be studied. Given the low peak hour trip generation of this project (detailed in a later section of this report), no off-site intersections were identified for evaluation. For the purposes of this study, only the site access along SE Kent Kangley Road was evaluated. This study focuses on the weekday AM and PM peak hours for the future with-project conditions. Additionally, this analysis includes a review of existing roadway conditions near the project site and a sight distance evaluation for the proposed site access.

Site Vicinity & Site Access

Wildlife Meadow Glamping & RV Park

FIGURE
1

transpogroup



Preliminary Site Plan

Wildlife Meadow Glamping & RV Park

FIGURE
2

transpogroup

Existing Conditions

This section describes the existing conditions within the identified study area. Study area characteristics are provided for the roadway network, non-motorized facilities, transit, and existing traffic volumes.

Roadway Network

The following sections describe the existing street network within the vicinity of the proposed project and any anticipated changes resulting from planned improvements.

Existing Inventory

SE Kent Kangley Road is a two-lane roadway classified as a minor arterial per the King County Arterial Functional Classification Map (2019). In the vicinity of the project, the posted speed limit is 45 miles per hour (mph) and there is no parking, sidewalks, or bicycle facilities along the roadway. Access to the site would be provided via SE Kent Kangley Road.

Landsburg Road SE is a two-lane roadway classified as a minor arterial per the King County Arterial Functional Classification Map (2019). In the vicinity of the project, the posted speed limit is 40 mph and there is no parking, sidewalks or bike facilities provided along the roadway.

SE Ravensdale Way is a two-lane roadway classified as a minor arterial per the King County Arterial Functional Classification Map (2019). In the vicinity of the project, the posted speed limit is 35 mph and there is no parking, sidewalks or bike facilities provided along the roadway.

292nd Avenue SE is a two-lane local road. In the vicinity of the project, the posted speed limit is 45 mph and there is no parking, sidewalks or bike facilities provided along the roadway.

Planned Improvements

Based on a review of the *King County Transportation Needs Report (TNR, 2020)*, one planned improvement was identified in the vicinity of the project.

SE Kent-Kangley Intersection Improvement: This intersection was recently converted from a side-street stop-controlled intersection to an all-way stop-controlled intersection. The impacts of this treatment will be monitored to determine if installing a permanent traffic calming safety improvement such as a roundabout or signal may be necessary. The potential changes to this intersection are not anticipated to impact the operations at the project's site access.

Non-Motorized Facilities

There are limited pedestrian and bicycle facilities within the vicinity of the project, although the shoulders along SE Kent Kangley Road are approximately 10 feet wide and may accommodate pedestrian and bicycle traffic. Additionally, nearby walking trails provide an alternative to walking along SE Kent Kangley Road.

Transit

There is currently no transit service within the vicinity of the project site.

Vehicle Traffic Volumes

Existing weekday peak period traffic volumes were collected at SE Kent Kangley Road/Landsburg Road SE as a basis for determining traffic volumes along SE Kent Kangley Road at the location of the proposed site driveway. Weekday PM peak hour (4-6 p.m.) traffic volumes were collected in November 2019 and weekday AM peak period (7-9 a.m.) traffic volumes were collected in March 2022. To account for the impacts of COVID-19 on the weekday AM peak hour traffic volumes, historic 2019 and March 2022 counts at the SE Kent Kangley Road/Landsburg Road SE intersection were compared. Based on this comparison, the March 2022 counts were increased by 4 percent to represent typical non-pandemic conditions. Since the weekday PM peak period traffic volumes were collected before the COVID-19 pandemic, no adjustment was made to these volumes aside from the application of a 1.5 percent annual growth rate from 2019 to 2022.

The estimated existing (2022) weekday AM and PM peak hour traffic volumes along SE Kent Kangley Road in the vicinity of the project are shown on Figure 3. The traffic volumes were rounded to the nearest five vehicles to account for daily fluctuations. The detailed weekday peak period traffic counts are included in Appendix A.

Existing Peak Hour Traffic Volumes

Wildlife Meadow Glamping & RV Park

FIGURE 3

transpogroup

Project Impacts

This section of the analysis documents the potential impacts of the proposed project. First, estimated traffic volumes generated by the proposed project are distributed and assigned to the site driveway. Next, these project trips and inherent traffic growth are added to existing traffic volumes to develop the future (2025) with-project traffic volumes at the site driveway. Finally, the proposed site access point is evaluated to determine consistency with King County sight distance standards.

Vehicle Trip Generation

Trip generation estimates for this project are based on average trip rates summarized in the Institute of Transportation Engineers' (ITE) *Trip Generation Manual*, 11th Edition (2021). The trip rates for the proposed project were based on ITE's Campground/Recreational Vehicle Park (LU #416) land use. The trip generation for the proposed development is shown in Table 1.

Table 1. Estimated Weekday Vehicle Trip Generation

Land Use	Size	Daily Trips[1]	AM Peak Hour Trips			PM Peak Hour Trips		
			In	Out	Total	In	Out	Total
Campground/Recreational Vehicle Park (LU #416)	45 ou	120[2]	4	6	10	8	4	12

Notes: ou = Occupied Units
1. Trip generation based on ITE *Trip Generation Manual* (11th Edition, 2021).
2. No ITE daily rate for this land use. Daily trips projected as ten times the PM peak hour trips.

As shown in Table 1, the proposed project is anticipated to generate approximately 120 daily trips with 10 occurring during the AM peak hour, and 12 occurring during the PM peak hour.

Vehicle Trip Distribution & Assignment

Trip distribution patterns to and from the project site were based on existing vehicle travel patterns and evaluating the likely origins/destinations of travelers. The project trip distribution and assignment for vehicle trips is shown in Figure 4.

Site Access Evaluation

The project will be accessible from a single side-street stop-controlled driveway located along the southern frontage of the site on SE Kent Kangley Road. The following section summarizes the operational and sight distance analysis completed for the proposed site access intersection.

Future (2025) With-Project Traffic Volumes

The future (2025) with-project traffic volumes at the site access were forecasted by: (1) applying an annual growth rate of 1.5 percent to existing traffic volumes along SE Kent Kangley Road to estimate background traffic growth, and (2) adding project-generated traffic as shown on Figure 4. The resulting future (2025) with-project traffic volumes are shown on Figure 5.

Traffic Operations

The operational characteristics of an intersection are determined by calculating the intersection level of service (LOS). At unsignalized side-street, stop-controlled intersections, LOS is measured by the average delay on the critical-movement of the intersection. Traffic operations and average vehicle delay can be described qualitatively with a range of levels of service (LOS A through

LOS F), with LOS A indicating free-flowing traffic and LOS F indicating extreme congestion and long vehicle delays. Appendix B contains a detailed explanation of LOS criteria and definitions.

The future (2025) with-project traffic operations at the site driveway were evaluated based on the above methodology. A single-lane approach was assumed along the driveway. The resulting vehicular operations are shown in Table 3. Detailed LOS worksheets are provided in Appendix C.

Table 2. Future (2025) With-Project Peak Hour LOS Summary

		AM Peak Hour			PM Peak Hour		
Intersection	**Traffic Control**	**LOS[1]**	**Delay[2]**	**WM[3]**	**LOS**	**Delay**	**WM**
SE Kent Kangley Rd/Site Driveway	Stop-Controlled	B	10.3	SB	A	9.5	SB

Note: SB = southbound approach
1. Level of Service (A – F) as defined by the 2016 *Highway Capacity Manual* (HCM)
2. Average delay per vehicle in seconds
3. Worst movement reported for unsignalized intersections. SB = southbound, NB = northbound.

As shown in Table 3, the site driveway is forecast to operate at LOS B and LOS A in the AM and PM peak hours, respectively, and would meet King County level of service standards.

The 95th percentile queues were also reviewed for the site access and are shown to be minimal (less than one vehicle in the AM and PM peak hours). Detailed queuing information is provided Appendix C.

Sight Distance

Stopping and entering sight distance were evaluated at the proposed site driveway. Stopping sight distance is the distance necessary to enable a motorist to stop before reaching a stationary object in its path. In contrast, entering sight distance is the distance necessary for a motorist to enter the traffic stream without causing traffic on the major street to reduce its travel speed. The methods and standards used to measure the available sight distance are defined in the *King County Road Design and Construction Standards (2016).* With an estimated 55 mph design speed along SE Kent Kangley Road (equal to 10 mph above the posted speed limit as defined on page 1-13 of these *Standards)*, the recommended minimum stopping sight distance is 495 feet and the recommended minimum entering sight distance is 610 feet and 530 feet for the left- and right- turning vehicles, respectively.

The sight distance triangles for the driveway were evaluated by in-field measurements and are shown in Appendix D. As shown in the appendix, sight distance at the site driveway in the east and west directions are anticipated to meet the recommended entering and stopping sight distances.

Project Trip Distribution & Assignment

Wildlife Meadow Glamping & RV Park

FIGURE 4

transpogroup

Future (2025) With-Project Peak Hour Traffic Volumes

Wildlife Meadow Glamping & RV Park

FIGURE **5**

transpogroup

Findings and Conclusions

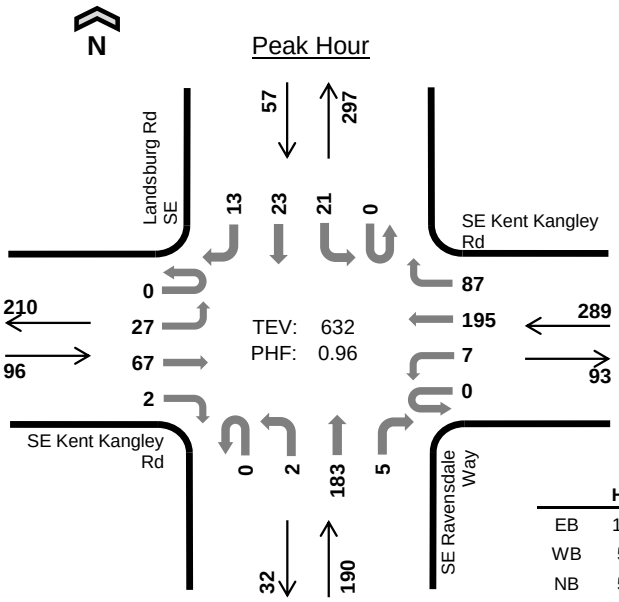
This analysis summarizes the potential traffic impacts of the proposed Wildlife Meadow Glamping & RV Park development in the City of Ravensdale. General findings and recommendations include:

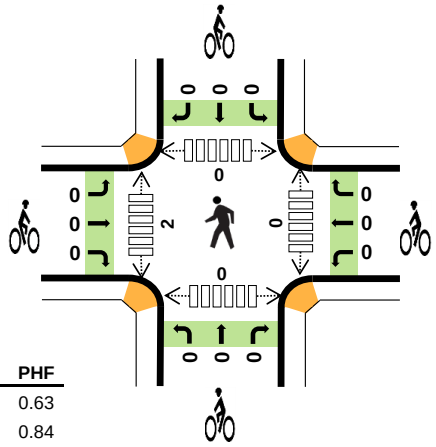
- The proposed project would develop up to 45 tent, glamping, and RV sites. The project site is currently undeveloped.
- The development is estimated to generate approximately 10 new trips during the weekday AM peak hour, and 12 new trips during the weekday PM peak hour.
- One side-street stop-controlled site driveway is proposed along SE Kent Kangley Road. The site access is forecast to operate at LOS B or better during the weekday AM and PM peak hours meeting King County LOS standards.
- Sight distance requirements at the site driveway are satisfied in both directions.

Appendix A: Traffic Counts

SE Ravensdale Way
SE Kent Kangley Rd

Date: 03/02/2022
Count Period: 7:00 AM to 9:00 AM
Peak Hour: 7:00 AM to 8:00 AM





	HV %:	PHF
EB	13.5%	0.63
WB	5.2%	0.84
NB	5.8%	0.86
SB	8.8%	0.46
TOTAL	7.0%	0.96

Two-Hour Count Summaries

Interval Start	SE Kent Kangley Rd Eastbound				SE Kent Kangley Rd Westbound				SE Ravensdale Way Northbound				Landsburg Rd SE Southbound				15-min Total	Rolling One Hour
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
7:00 AM	**0**	**3**	**10**	**0**	**0**	**1**	**66**	**19**	**0**	**1**	**52**	**1**	**0**	**4**	**5**	**3**	**165**	0
7:15 AM	**0**	**4**	**15**	**1**	**0**	**0**	**55**	**20**	**0**	**1**	**54**	**0**	**0**	**0**	**2**	**4**	**156**	0
7:30 AM	**0**	**8**	**16**	**1**	**0**	**5**	**41**	**23**	**0**	**0**	**45**	**2**	**0**	**3**	**4**	**1**	**149**	0
7:45 AM	**0**	**12**	**26**	**0**	**0**	**1**	**33**	**25**	**0**	**0**	**32**	**2**	**0**	**14**	**12**	**5**	**162**	**632**
8:00 AM	0	6	16	0	0	2	44	7	0	1	36	2	0	8	8	9	139	606
8:15 AM	0	9	22	0	0	4	40	13	0	2	28	5	0	13	13	5	154	604
8:30 AM	1	6	17	0	0	14	41	18	0	1	28	0	0	7	16	2	151	606
8:45 AM	0	5	18	0	0	8	36	20	0	0	28	2	0	11	8	7	143	587
Count Total	1	53	140	2	0	35	356	145	0	6	303	14	0	60	68	36	1,219	0
Peak Hour All	**0**	**27**	**67**	**2**	**0**	**7**	**195**	**87**	**0**	**2**	**183**	**5**	**0**	**21**	**23**	**13**	**632**	**0**
Peak Hour HV	**0**	**2**	**10**	**1**	**0**	**1**	**9**	**5**	**0**	**0**	**11**	**0**	**0**	**2**	**2**	**1**	**44**	**0**
Peak Hour HV%	**-**	**7%**	**15%**	**50%**	**-**	**14%**	**5%**	**6%**	**-**	**0%**	**6%**	**0%**	**-**	**10%**	**9%**	**8%**	**7%**	**0**

Note: Two-hour count summary volumes include heavy vehicles but exclude bicycles in overall count.

Interval Start	Heavy Vehicle Totals					Bicycles					Pedestrians (Crossing Leg)				
	EB	WB	NB	SB	Total	EB	WB	NB	SB	Total	East	West	North	South	Total
7:00 AM	**3**	**7**	**4**	**2**	***16***	**0**	**0**	**0**	**0**	***0***	**0**	**0**	**0**	**0**	*0*
7:15 AM	**6**	**2**	**1**	**0**	***9***	**0**	**0**	**0**	**0**	***0***	**0**	**0**	**0**	**0**	*0*
7:30 AM	**2**	**6**	**4**	**0**	***12***	**0**	**0**	**0**	**0**	***0***	**0**	**0**	**0**	**0**	*0*
7:45 AM	**2**	**0**	**2**	**3**	***7***	**0**	**0**	**0**	**0**	***0***	**0**	**2**	**0**	**0**	***2***
8:00 AM	1	3	4	2	*10*	0	0	0	0	*0*	0	0	0	0	*0*
8:15 AM	6	4	4	2	*16*	0	0	0	0	*0*	0	0	0	0	*0*
8:30 AM	2	7	2	1	*12*	0	0	0	0	*0*	0	2	0	0	*2*
8:45 AM	2	7	1	4	*14*	0	0	0	0	*0*	0	2	0	0	*2*
Count Total	24	36	22	14	*96*	0	0	0	0	*0*	0	6	0	0	*6*
Peak Hour	**13**	**15**	**11**	**5**	***44***	**0**	**0**	**0**	**0**	***0***	**0**	**2**	**0**	**0**	***2***

Two-Hour Count Summaries - Heavy Vehicles

Interval Start	SE Kent Kangley Rd				SE Kent Kangley Rd				SE Ravensdale Way				Landsburg Rd SE				15-min Total	Rolling One Hour
	Eastbound				Westbound				Northbound				Southbound					
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
7:00 AM	**0**	**1**	**2**	**0**	**0**	**0**	**5**	**2**	**0**	**0**	**4**	**0**	**0**	**2**	**0**	**0**	**16**	0
7:15 AM	**0**	**1**	**5**	**0**	**0**	**0**	**2**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**9**	0
7:30 AM	**0**	**0**	**1**	**1**	**0**	**1**	**2**	**3**	**0**	**0**	**4**	**0**	**0**	**0**	**0**	**0**	**12**	0
7:45 AM	**0**	**0**	**2**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**2**	**0**	**0**	**0**	**2**	**1**	**7**	**44**
8:00 AM	0	0	1	0	0	0	3	0	0	1	2	1	0	1	0	1	10	38
8:15 AM	0	2	4	0	0	1	1	2	0	1	1	2	0	1	1	0	16	45
8:30 AM	0	1	1	0	0	3	3	1	0	0	2	0	0	0	1	0	12	45
8:45 AM	0	0	2	0	0	0	3	4	0	0	1	0	0	2	1	1	14	52
Count Total	0	5	18	1	0	5	19	12	0	2	17	3	0	6	5	3	96	0
Peak Hour	**0**	**2**	**10**	**1**	**0**	**1**	**9**	**5**	**0**	**0**	**11**	**0**	**0**	**2**	**2**	**1**	**44**	**0**

Two-Hour Count Summaries - Bikes

Interval Start	SE Kent Kangley Rd			SE Kent Kangley Rd			SE Ravensdale Way			Landsburg Rd SE			15-min Total	Rolling One Hour
	Eastbound			Westbound			Northbound			Southbound				
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT		
7:00 AM	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	0
7:15 AM	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	0
7:30 AM	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	0
7:45 AM	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
8:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Count Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Peak Hour	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

Note: U-Turn volumes for bikes are included in Left-Turn, if any.

Prepared for: **Transpo Group**

Traffic Count Consultants, Inc.

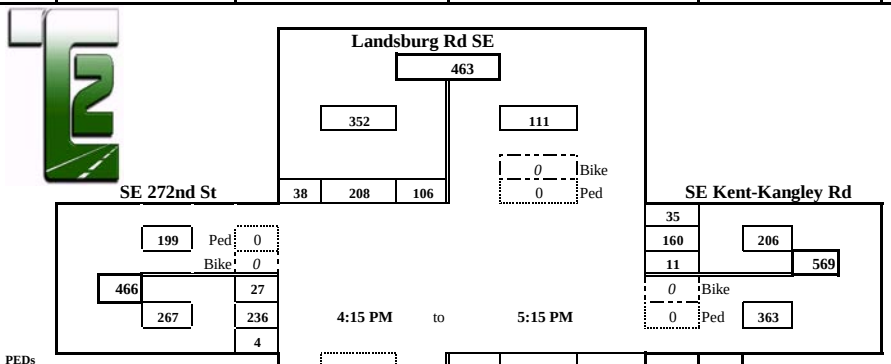
Phone: (253) 770-1407 FAX: (253) 770-1411 E-Mail: Team@TC2inc.com

WBE/DBE

Intersection: Landsburg Rd SE/SE Ravensdale Rd & SE Kent-Kangley Rd/SE 272nd St **Date of Count:** Wed 11/20/2019

Location: Black Diamond, Washington **Checked By:** Jess

Time Interval	From North on (SB) Landsburg Rd SE				From South on (NB) SE Ravensdale Rd				From East on (WB) SE Kent-Kangley Rd				From West on (EB) SE 272nd St				Interval Total
Ending at	T	L	S	R	T	L	S	R	T	L	S	R	T	L	S	R	
4:15 P	2	23	45	13	1	2	11	4	0	2	36	6	3	4	65	0	211
4:30 P	3	22	48	11	1	0	20	4	3	1	41	11	2	7	57	0	222
4:45 P	2	25	56	6	0	0	10	6	1	2	40	11	0	6	68	0	230
5:00 P	3	29	54	9	0	1	11	4	1	3	36	6	0	4	51	1	209
5:15 P	2	30	50	12	0	0	8	7	0	5	43	7	0	10	60	3	235
5:30 P	1	24	49	6	0	0	10	5	1	4	33	3	1	7	61	3	205
5:45 P	2	23	47	4	0	0	9	0	2	4	39	6	0	5	55	0	192
6:00 P	0	13	43	6	1	0	8	0	0	2	21	6	1	10	61	0	170
6:15 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:30 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:45 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:00 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Survey	15	189	392	67	3	3	87	30	8	23	289	56	7	53	478	7	1674
Peak Hour: 4:15 PM to 5:15 PM																	
Total	10	106	208	38	1	1	49	21	5	11	160	35	2	27	236	4	896
Approach	352				71				206				267				896
%HV	2.8%				1.4%				2.4%				0.7%				2.0%
PHF	0.96				0.74				0.94				0.90				0.95



940 *1.0 PHF Peak Hour Volume*

		PHF	%HV
	EB	0.90	0.7%
Check	WB	0.94	2.4%
In: 896	NB	0.74	1.4%
Out: 896	SB	0.96	2.8%
	T Int.	0.95	2.0%

Conditions:

PEDs Across:

	N	S	E	W	
INT 01					0
INT 02					0
INT 03					0
INT 04					0
INT 05					0
INT 06					0
INT 07					0
INT 08				1	1
INT 09					0
INT 10					0
INT 11					0
INT 12					0
	0	0	0	1	1

Bicycles From:

	N	S	E	W	
INT 01					0
INT 02					0
INT 03					0
INT 04					0
INT 05					0
INT 06	NO BIKES				0
INT 07					0
INT 08					0
INT 09					0
INT 10					0
INT 11					0
INT 12					0
	0	0	0	0	0

Special Notes

TPG19121M_15p

Prepared for: **The Transpo Group**

Traffic Count Consultants, Inc.

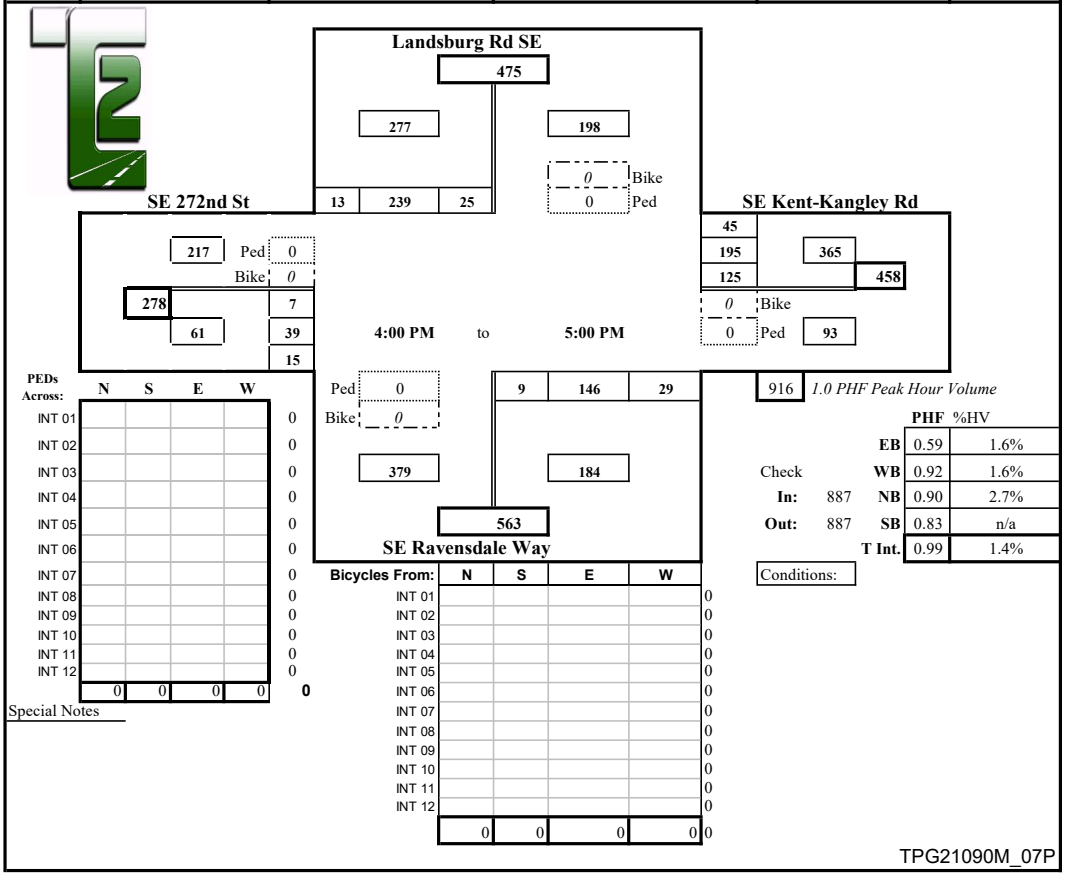
Phone: (253) 770-1407 FAX: (253) 770-1411 E-Mail: Team@TC2inc.com

WBE/DBE

Intersection: Landsburg Rd SE/SE Ravensdale Way & SE Kent-Kangley Rd/SE 272nd St **Date of Count:** Tue 11/16/2021

Location: Black Diamond, Washington **Checked By:** Jen

Time Interval	From North on (SB) Landsburg Rd SE				From South on (NB) SE Ravensdale Way				From East on (WB) SE Kent-Kangley Rd				From West on (EB) SE 272nd St				Interval Total
Ending at	T	L	S	R	T	L	S	R	T	L	S	R	T	L	S	R	
4:15 P	0	6	53	2	1	1	42	8	3	33	43	11	1	4	15	7	225
4:30 P	0	9	53	0	2	6	38	7	2	30	46	14	0	1	8	3	215
4:45 P	0	6	74	3	1	1	35	5	1	24	52	13	0	0	7	5	225
5:00 P	0	4	59	8	1	1	31	9	0	38	54	7	0	2	9	0	222
5:15 P	0	5	53	4	0	3	37	11	1	20	48	9	0	2	2	5	199
5:30 P	0	4	71	0	0	4	38	7	1	24	51	8	1	2	12	8	229
5:45 P	0	5	52	2	0	5	34	4	0	15	52	6	0	2	11	6	194
6:00 P	0	4	39	1	0	2	26	11	1	26	49	11	0	3	12	2	186
6:15 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:30 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:45 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:00 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Survey	0	43	454	20	5	23	281	62	9	210	395	79	2	16	76	36	1695
Peak Hour: 4:00 PM to 5:00 PM																	
Total	0	25	239	13	5	9	146	29	6	125	195	45	1	7	39	15	887
Approach	277				184				365				61				887
%HV	n/a				2.7%				1.6%				1.6%				1.4%
PHF	0.83				0.90				0.92				0.59				0.99



PEDs Across:	N	S	E	W	
INT 01					0
INT 02					0
INT 03					0
INT 04					0
INT 05					0
INT 06					0
INT 07					0
INT 08					0
INT 09					0
INT 10					0
INT 11					0
INT 12					0
	0	0	0	0	0

Bicycles From:	N	S	E	W	
INT 01					0
INT 02					0
INT 03					0
INT 04					0
INT 05					0
INT 06					0
INT 07					0
INT 08					0
INT 09					0
INT 10					0
INT 11					0
INT 12					0
	0	0	0	0	0

		PHF	%HV
	EB	0.59	1.6%
Check	WB	0.92	1.6%
In: 887	NB	0.90	2.7%
Out: 887	SB	0.83	n/a
	T Int.	0.99	1.4%

Conditions:

Special Notes

TPG21090M_07P

Appendix B: LOS Definitions

Highway Capacity Manual 2010/6th Edition

Signalized intersection level of service (LOS) is defined in terms of a weighted average control delay for the entire intersection. Control delay quantifies the increase in travel time that a vehicle experiences due to the traffic signal control as well as provides a surrogate measure for driver discomfort and fuel consumption. Signalized intersection LOS is stated in terms of average control delay per vehicle (in seconds) during a specified time period (e.g., weekday PM peak hour). Control delay is a complex measure based on many variables, including signal phasing and coordination (i.e., progression of movements through the intersection and along the corridor), signal cycle length, and traffic volumes with respect to intersection capacity and resulting queues. Table 1 summarizes the LOS criteria for signalized intersections, as described in the *Highway Capacity Manual 2010* and 6th Edition (Transportation Research Board, 2010 and 2016, respectively).

Table 1. Level of Service Criteria for Signalized Intersections

Level of Service	Average Control Delay (seconds/vehicle)	General Description
A	≤10	Free Flow
B	>10 – 20	Stable Flow (slight delays)
C	>20 – 35	Stable flow (acceptable delays)
D	>35 – 55	Approaching unstable flow (tolerable delay, occasionally wait through more than one signal cycle before proceeding)
E	>55 – 80	Unstable flow (intolerable delay)
F[1]	>80	Forced flow (congested and queues fail to clear)

Source: *Highway Capacity Manual 2010 and 6th Edition*, Transportation Research Board, 2010 and 2016, respectively.

1. If the volume-to-capacity (v/c) ratio for a lane group exceeds 1.0 LOS F is assigned to the individual lane group. LOS for overall approach or intersection is determined solely by the control delay.

Unsignalized intersection LOS criteria can be further reduced into two intersection types: all-way stop and two-way stop control. All-way stop control intersection LOS is expressed in terms of the weighted average control delay of the overall intersection or by approach. Two-way stop-controlled intersection LOS is defined in terms of the average control delay for each minor-street movement (or shared movement) as well as major-street left-turns. This approach is because major-street through vehicles are assumed to experience zero delay, a weighted average of all movements results in very low overall average delay, and this calculated low delay could mask deficiencies of minor movements. Table 2 shows LOS criteria for unsignalized intersections.

Table 2. Level of Service Criteria for Unsignalized Intersections

Level of Service	Average Control Delay (seconds/vehicle)
A	0 – 10
B	>10 – 15
C	>15 – 25
D	>25 – 35
E	>35 – 50
F[1]	>50

Source: *Highway Capacity Manual 2010 and 6th Edition*, Transportation Research Board, 2010 and 2016, respectively.

1. If the volume-to-capacity (v/c) ratio exceeds 1.0, LOS F is assigned an individual lane group for all unsignalized intersections, or minor street approach at two-way stop-controlled intersections. Overall intersection LOS is determined solely by control delay.

Appendix C: LOS Worksheets

Intersection	
Int Delay, s/veh	0.2

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	4	100	315	0	1	5
Future Vol, veh/h	4	100	315	0	1	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	13	13	5	5	2	2
Mvmt Flow	4	104	328	0	1	5

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	328	0	-	0	440	328
Stage 1	-	-	-	-	328	-
Stage 2	-	-	-	-	112	-
Critical Hdwy	4.23	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.317	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1172	-	-	-	574	713
Stage 1	-	-	-	-	730	-
Stage 2	-	-	-	-	913	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1172	-	-	-	572	713
Mov Cap-2 Maneuver	-	-	-	-	572	-
Stage 1	-	-	-	-	727	-
Stage 2	-	-	-	-	913	-

Approach	EB	WB	SB
HCM Control Delay, s	0.3	0	10.3
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1172	-	-	-	685
HCM Lane V/C Ratio	0.004	-	-	-	0.009
HCM Control Delay (s)	8.1	0	-	-	10.3
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0	-	-	-	0

Intersection	
Int Delay, s/veh	0.1

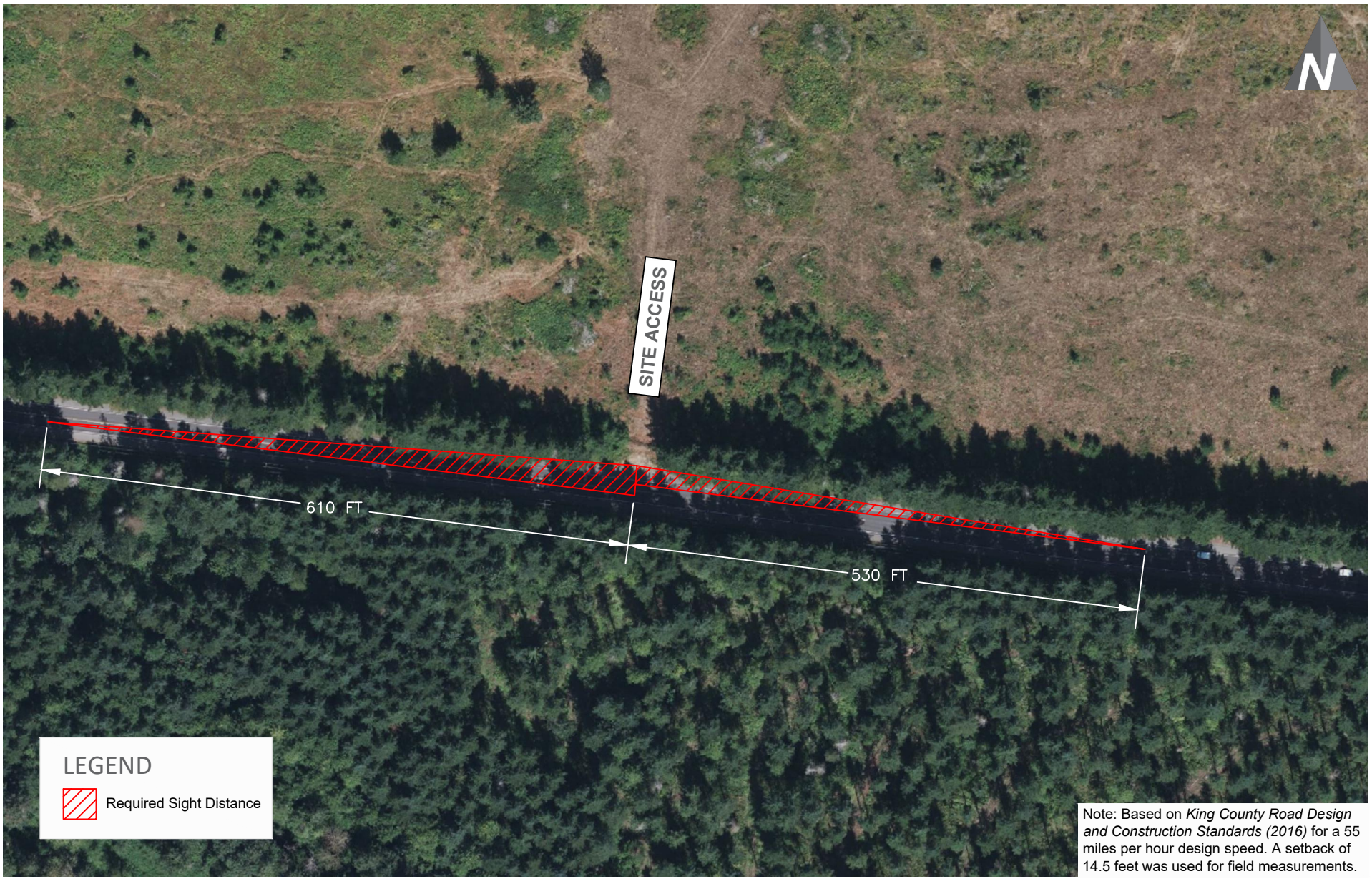
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	7	395	225	1	0	4
Future Vol, veh/h	7	395	225	1	0	4
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	1	1	2	2	2	2
Mvmt Flow	7	416	237	1	0	4

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	238	0	-	0	668	238
Stage 1	-	-	-	-	238	-
Stage 2	-	-	-	-	430	-
Critical Hdwy	4.11	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.209	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1335	-	-	-	423	801
Stage 1	-	-	-	-	802	-
Stage 2	-	-	-	-	656	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1335	-	-	-	420	801
Mov Cap-2 Maneuver	-	-	-	-	420	-
Stage 1	-	-	-	-	796	-
Stage 2	-	-	-	-	656	-

Approach	EB	WB	SB
HCM Control Delay, s	0.1	0	9.5
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1335	-	-	-	801
HCM Lane V/C Ratio	0.006	-	-	-	0.005
HCM Control Delay (s)	7.7	0	-	-	9.5
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0

Appendix D: Sight Distance Triangles

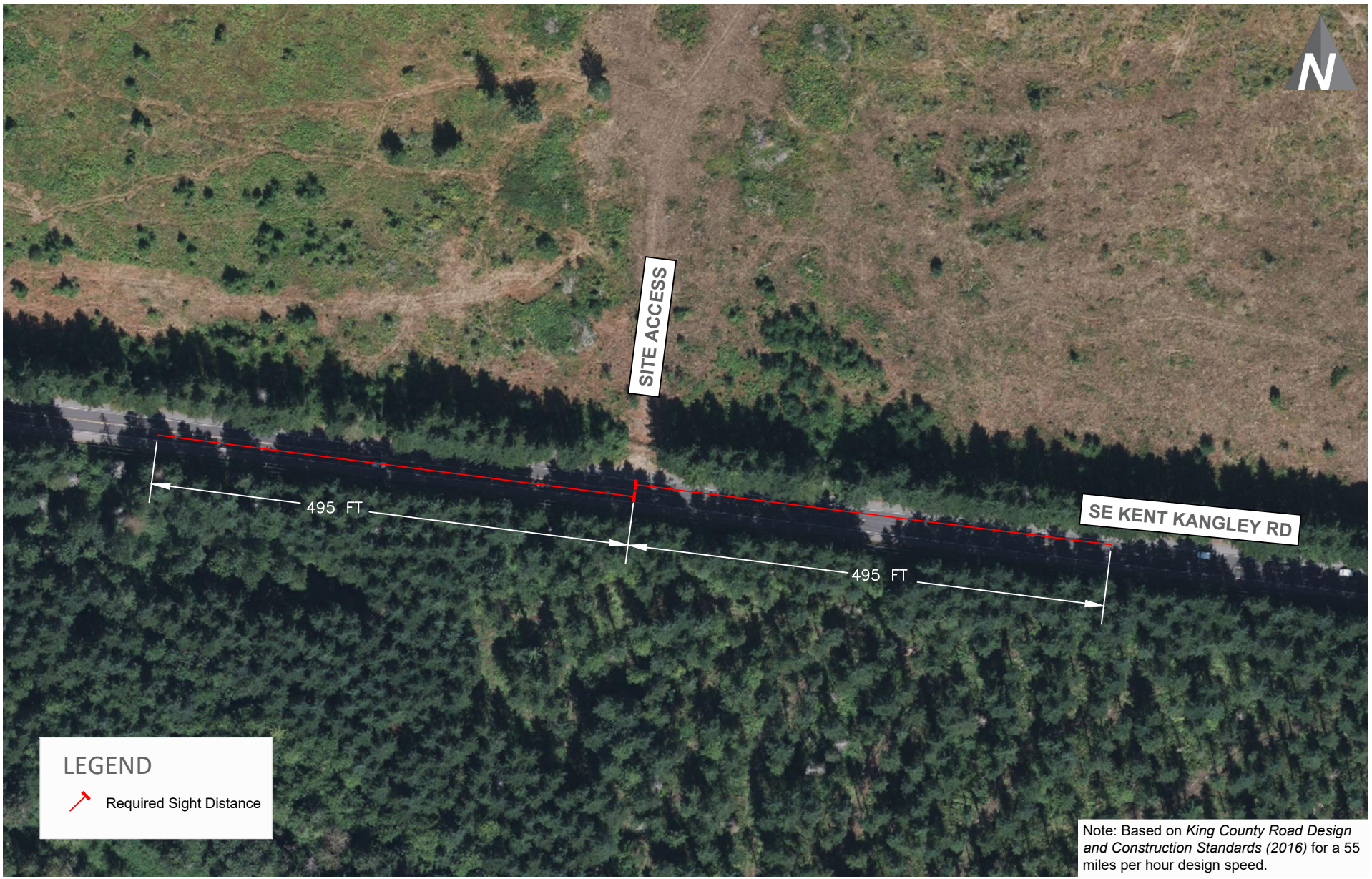


Entering Sight Distance

Wildlife Meadow Glamping & RV Park

APPENDIX
D-1

transpogroup



Stopping Sight Distance

Wildlife Meadow Glamping & RV Park

APPENDIX
D-2

transpogroup

Appendix D

Geotechnical Report by GEOTECH Consultants, dated February 16, 2021

GEOTECH
CONSULTANTS, INC.

2401 10th Ave E
Seattle, Washington 98102
(425) 747-5618

February 16, 2021

JN 21015

Robert Striker
28805 Southeast 268th Street
Ravensdale, Washington 98051
via email: robertandsuzanne59@outlook.com

Subject: **Transmittal Letter - Geotechnical Engineering Study**
Proposed Elkridge Recreational Vehicle Park and Camping Sites
Parcels 3022079103 & 3022079102
Ravensdale, King County, Washington

Dear Mr. Striker,

Attached to this transmittal letter is our geotechnical engineering report for the proposed Recreational Vehicle Park and Camping Sites to be constructed in Ravensdale, Washington. The scope of our services consisted of exploring site surface and subsurface conditions, and then developing this report to provide recommendations for general earthwork and design considerations for foundations, retaining walls, subsurface drainage, infiltration considerations, and temporary excavations. This work was authorized by your acceptance of our Contract for Professional Services, dated January 13, 2021.

The attached report contains a discussion of the study and our recommendations. Please contact us if there are any questions regarding this report, or for further assistance during the design and construction phases of this project.

Respectfully submitted,

GEOTECH CONSULTANTS, INC.

Marc R. McGinnis, P.E.
Principal

MKM/MRM:kg

GEOTECHNICAL ENGINEERING STUDY
Proposed Recreational Vehicle Park and Camping Sites
Parcels 3022079103 & 3022079102
Ravensdale, King County, Washington

This report presents the findings and recommendations of our geotechnical engineering study for the site of the proposed Recreational Vehicle Park and Camping Sites to be located in the Ravensdale area of unincorporated King County.

Development of the property is in the early planning stages, and detailed plans were not available at the time of this study. Based on a preliminary site plan developed by Robert Striker, and from conversations with him, we understand that the eastern two-thirds of the subject parcel is to be developed as a recreational area, containing numerous Recreational Vehicle (RV) and camping sites. The RV camping/parking areas are planned to follow a new road alignment that runs from the center of the southern property line towards the northeastern property corner, roughly following the approximate alignment of an existing trail that currently runs through the site. The trace of this current trail is visible on the aerial photograph image used for our Site Exploration Plan, Plate 2. Several cabins are proposed near the northern extent of the property, and numerous campsites will be scattered along the eastern extent of the site. A limited number of small structures is proposed within the campsite and cabin areas, mostly for maintenance, amenities, and utilities for the patrons. A majority of the cabin and camp sites, as well as the auxiliary buildings are proposed to be constructed as non-permanent structures.

If the scope of the project changes from what we have described above, we should be provided with revised plans in order to determine if modifications to the recommendations and conclusions of this report are warranted.

SITE CONDITIONS

SURFACE

The Vicinity Map, Plate 1, illustrates the general location of the site in Ravensdale. The two parcels comprise a total site area of 80-acres. The large parcels are bounded to the north and east by large, single family properties, to the south by Southeast Kent Kangley Road, and to the west by a vacant parcel.

The site is currently undeveloped, and is covered with underbrush, young saplings, and remnants of a previous logging operation. An access trail runs angles from southwest to northeast beginning near the center of the southern property boundary. This trail extends between Southeast Kent-Kangley Road and the southeastern corner of the developed parcel that abuts the north side of the western half of the site. The grade slopes gently across the large site, with only a few feet of elevation change noted through the cleared area. Two localized low spots; one located east of the access road near the center of the site, and the other located near the northern tree-line, contain elevation drops of several feet. A steep slope extends upward near the northwestern property corner into a neighboring developed parcel. This slope appears to have been graded at one point and appears to be inclined approximately 50 to 60 percent over an elevation rise of 15 to 20 feet. This steeply inclined slope is located at least 500 feet away from any proposed development as part of this project.

The adjacent developed parcels all contain large single-family residences located well away from the shared property lines.

SUBSURFACE

The subsurface conditions were explored by excavating eighteen test pits at the approximate locations shown on the Site Exploration Plan, Plate 2. Our exploration program was based on the proposed construction, anticipated subsurface conditions and those encountered during exploration, and the scope of work outlined in our proposal.

The test pits were excavated on January 14, 2021 with a tracked excavator provided by the client. A geotechnical engineer from our staff observed the excavation process, logged the test pits, and obtained representative samples of the soil encountered. "Grab" samples of selected subsurface soil were collected from the backhoe bucket. The Test Pit Logs are attached to this report as Plates 3 through 11.

Soil Conditions

The test pits were excavated throughout the proposed development area and encountered similar conditions. Beneath the ground surface, heavily weathered sand, silty sand, and gravel were encountered. This upper layer of soil contained roots, organics, and some remnants of previous logging activities in the form of fragments of wood debris located near the ground surface. Beneath the upper, 1.5 to 3-foot-thick layer of loose weathered soil, native, very sandy gravel and gravelly sand were encountered. This sand and gravel did not appear to have been disturbed by previous site activities, contained fewer organics, and had a negligible fines content. The underlying sand and gravel were initially loose, becoming loose to medium-dense beneath depths ranging from 2 to 4 feet, and became medium-dense with depth in several of the test pits. This loose and medium-dense sand and gravel extended to the base of the test pits at depths of 4 to 8.5 feet.

Research of available geologic information maps this area of Ravensdale as undifferentiated outwash, which can consist of recessional and proglacial sand, gravel and cobbles with minor silt and clay lenses. The soils encountered in the test pits would generally confirm this mapping.

The Natural Resources Conservation Service (NRCS) maps the site soils as Barneston gravelly coarse sandy loam.

No obstructions were revealed by our explorations. However, debris, buried utilities, and old foundation and slab elements are commonly encountered on sites that have had previous development.

Our explorations encountered numerous cobbles or boulders. Cobbles and boulders are often found in soils that have been deposited by glaciers or fast-moving water.

Groundwater Conditions

The test pits were conducted following several months of rainy weather, when groundwater levels would be near their highest seasonal elevations. Groundwater seepage was observed at a depth of 4 to 7.5 feet in Test Pits 1, 2, 3, 8, 9, 11, 12, 13, 14, 15, 16, 17, and 18. The shallowest depth to groundwater was encountered in Test Pits 8 and 9, which were

excavated in a localized low spot east of the access road. The test pits that did not encounter groundwater were excavated at an elevation slightly higher than the other test pits and may have reached to within several feet of the groundwater levels that were encountered in the remaining explorations. Furthermore, standing water was observed in a low depression near the northern edge of the eastern parcel, located west of Test Pit 2 and north of Test Pits 17 and 18. The test pits were left open for only a short time period. It should be noted that groundwater levels vary seasonally with rainfall and other factors. The levels encountered in our test pits are likely close to the seasonal highs regarding groundwater fluctuations.

The stratification lines on the logs represent the approximate boundaries between soil types at the exploration locations. The actual transition between soil types may be gradual, and subsurface conditions can vary between exploration locations. The logs provide specific subsurface information only at the locations tested. The relative densities and moisture descriptions indicated on the test pit logs are interpretive descriptions based on the conditions observed during excavation.

CONCLUSIONS AND RECOMMENDATIONS

GENERAL

THIS SECTION CONTAINS A SUMMARY OF OUR STUDY AND FINDINGS FOR THE PURPOSES OF A GENERAL OVERVIEW ONLY. MORE SPECIFIC RECOMMENDATIONS AND CONCLUSIONS ARE CONTAINED IN THE REMAINDER OF THIS REPORT. ANY PARTY RELYING ON THIS REPORT SHOULD READ THE ENTIRE DOCUMENT.

The test pits conducted for this study encountered loose to medium-dense, native, recessional outwash beneath a surficial layer of weathered soils ranging in thickness from 1.5 to 3 feet in depth. Conventional foundations supported on the recessional outwash soils will provide suitable support for any lightly loaded, permanent structure. Due to the high gravel content of the native soils, they will be easily disturbed by excavation. Therefore, we recommend that the exposed subgrade soils be recompacted with a vibratory compactor prior to placing forms and rebar. Additional foundation recommendations can be found in the ***Conventional Foundations*** section of this report.

As a part of this study, we assessed the potential feasibility of using infiltration for disposal of runoff from the proposed developments. Native, fine to coarse-grained, recessional outwash consisting generally of very sandy gravel and gravelly sand was encountered beneath a surficial layer of weathered soils in all eighteen of the test pits. These native soils were observed to be in a loose and medium-dense state and exhibit a moderate infiltration potential. Representative soil samples were obtained from several of the test pits across the property and were returned to our lab for grain-size analyses. Graphical results of these analyses can be found attached to the end of this report as Plates 12 through 15. From our site observations, the site surface and subsurface characteristics appear conducive to sheetflow and dispersion of runoff from impervious surfaces. If infiltration is used, we recommend that small, localized systems, such as drywells, be used, in order to infiltrate collected water as closely to the source as possible. The shallow groundwater table will also promote the use of shallower, localized infiltration systems. Based on the conducted laboratory testing, the samples utilized are composed of poorly graded sand and gravel based on USCS soil classification. The NRCS indicates that the saturated permeability for the Barneston soil group is in the range of 3.54 to 21.3 inches/hour. For preliminary design, we recommend a design infiltration rate of 4 inches per hour be assumed for the recessional outwash located above the groundwater table. If infiltration is used for portions of the development, we expect that King County may require

actual infiltration testing once a preliminary design is completed. As with any infiltration system, their performance will naturally degrade over time as the surrounding soils become clogged by fines and debris carried in with storm runoff. Cleaning of surfaces and collection basins that discharge to infiltration systems can increase their effective life.

We recommend including this report, in its entirety, in the project contract documents. This report should also be provided to any future property owners so they will be aware of our findings and recommendations.

SEISMIC CONSIDERATIONS

In accordance with the International Building Code (IBC), the site class within 100 feet of the ground surface is best represented by Site Class Type D (Stiff Soil). As noted in the USGS website, the mapped spectral acceleration value for a 0.2 second (S_s) and 1.0 second period (S_1) equals 1.18g and 0.44g, respectively.

The IBC and ASCE 7 require that the potential for liquefaction (soil strength loss) during an earthquake be evaluated for the peak ground acceleration of the Maximum Considered Earthquake (MCE), which has a probability of occurring once in 2,475 years (2 percent probability of occurring in a 50-year period). The coarse-grained outwash soils located beneath the site have a low potential for seismic liquefaction due to their free-drained, gravelly nature.

CONVENTIONAL FOUNDATIONS

Permanent structures could be supported on conventional continuous and spread footings bearing on native, recompacted recessional outwash soils located beneath the upper weathered layer of soil, or on structural fill placed above this native soil. See the section entitled ***General Earthwork and Structural Fill*** for recommendations regarding the placement and compaction of structural fill beneath structures.

We recommend that continuous and individual spread footings have minimum widths of 16 and 24 inches, respectively. Exterior footings should also be bottomed at least 18 inches below the lowest adjacent finish ground surface for protection against frost and erosion. The local building codes should be reviewed to determine if different footing widths or embedment depths are required. Footing subgrades must be cleaned of loose or disturbed soil prior to pouring concrete. Depending upon site and equipment constraints, this may require removing the disturbed soil by hand.

An allowable bearing pressure of 2,000 pounds per square foot (psf) is appropriate for footings supported on competent, recompacted native soil. A one-third increase in this design bearing pressure may be used when considering short-term wind or seismic loads. For the above design criteria, it is anticipated that the total post-construction settlement of footings founded on competent native soil, or on structural fill up to 5 feet in thickness, will be about one-inch, with differential settlements on the order of one-inch in a distance of 25 feet along a continuous footing with a uniform load.

Lateral loads due to wind or seismic forces may be resisted by friction between the foundation and the bearing soil, or by passive earth pressure acting on the vertical, embedded portions of the foundation. For the latter condition, the foundation must be either poured directly against relatively

level, undisturbed soil or be surrounded by level, well-compacted fill. We recommend using the following ultimate values for the foundation's resistance to lateral loading:

PARAMETER	ULTIMATE VALUE
Coefficient of Friction	0.40
Passive Earth Pressure	250 pcf

Where: pcf is Pounds per Cubic Foot, and Passive Earth Pressure is computed using the Equivalent Fluid Density.

If the ground in front of a foundation is loose or sloping, the passive earth pressure given above will not be appropriate. The above ultimate values for passive earth pressure and coefficient of friction do not include a safety factor.

BUILDING FLOORS

Even where the exposed soils appear dry, water vapor will tend to naturally migrate upward through the soil to the new constructed space above it. This can affect moisture-sensitive flooring, cause imperfections or damage to the slab, or simply allow excessive water vapor into the space above the slab. All interior slabs-on-grade should be underlain by a capillary break drainage layer consisting of a minimum 4-inch thickness of clean gravel or crushed rock that has a fines content (percent passing the No. 200 sieve) of less than 3 percent and a sand content (percent passing the No. 4 sieve) of no more than 10 percent. Pea gravel or crushed rock are typically used for this layer.

As noted by the American Concrete Institute (ACI) in the *Guides for Concrete Floor and Slab Structures*, proper moisture protection is desirable immediately below any on-grade slab that will be covered by tile, wood, carpet, impermeable floor coverings, or any moisture-sensitive equipment or products. ACI recommends a minimum 10-mil thickness vapor retarder for better durability and long-term performance than is provided by 6-mil plastic sheeting that has historically been used. A vapor retarder is defined as a material with a permeance of less than 0.3 perms, as determined by ASTM E 96. It is possible that concrete admixtures may meet this specification, although the manufacturers of the admixtures should be consulted. Where vapor retarders are used under slabs, their edges should overlap by at least 6 inches and be sealed with adhesive tape. The sheeting should extend to the foundation walls for maximum vapor protection.

If no potential for vapor passage through the slab is desired, a vapor *barrier* should be used. A vapor barrier, as defined by ACI, is a product with a water transmission rate of 0.01 perms when tested in accordance with ASTM E 96. Reinforced membranes having sealed overlaps can meet this requirement.

We recommend that the contractor, the project materials engineer, and the owner discuss these issues and review recent ACI literature and ASTM E-1643 for installation guidelines and guidance on the use of the protection/blotter material.

DRAINAGE CONSIDERATIONS

Footing drains should be used where: (1) crawl spaces or basements will be below a structure; (2) a slab is below the outside grade; or, (3) the outside grade does not slope downward from a building.

Footing drains should also be placed at the base of all earth-retaining walls. Subsurface drains are not needed where the above conditions do not apply.

These drains should be surrounded by at least 6 inches of 1-inch-minus, washed rock that is encircled with non-woven, geotextile filter fabric (Mirafi 140N, Supac 4NP, or similar material). At its highest point, a perforated pipe invert should be at least 6 inches below the bottom of a slab floor or the level of a crawl space. The discharge pipe for subsurface drains should be sloped for flow to the outlet point. Roof and surface water drains must not discharge into the foundation drain system. A typical footing drain detail is attached to this report as Plate 16. For the best long-term performance, perforated PVC pipe is recommended for all subsurface drains. Clean-outs should be provided for potential future flushing or cleaning of footing drains. Foundation drains are not necessary if the finish floor elevation of the lowest level living space is at a higher elevation than the exterior grade, if the exterior grade slopes away from the structure.

As a minimum, a vapor retarder, as defined in the ***Slabs-On-Grade*** section, should be provided in any crawl space area to limit the transmission of water vapor from the underlying soils. Crawl space grades are sometimes left near the elevation of the bottom of the footings. As a result, an outlet drain is recommended for all crawl spaces to prevent an accumulation of any water that may bypass the footing drains. Providing a few inches of free draining gravel underneath the vapor retarder is also prudent to limit the potential for seepage to build up on top of the vapor retarder.

Groundwater was observed during our field work. If seepage is encountered in an excavation, it should be drained from the site by directing it through drainage ditches, perforated pipe, or French drains, or by pumping it from sumps interconnected by shallow connector trenches at the bottom of the excavation.

The excavation and site should be graded so that surface water is directed off the site and away from the tops of slopes. Water should not be allowed to stand in any area where foundations, slabs, or pavements are to be constructed. Final site grading in areas adjacent to a building should slope away at least one to 2 percent, except where the area is paved. Surface drains should be provided where necessary to prevent ponding of water behind foundation or retaining walls.

LIMITATIONS

The conclusions and recommendations contained in this report are based on site conditions as they existed at the time of our exploration and assume that the soil and groundwater conditions encountered in the test pits are representative of subsurface conditions on the site. If the subsurface conditions encountered during construction are significantly different from those observed in our explorations, we should be advised at once so that we can review these conditions and reconsider our recommendations where necessary. Unanticipated conditions are commonly encountered on construction sites and cannot be fully anticipated by merely taking samples in test pits. Subsurface conditions can also vary between exploration locations. Such unexpected conditions frequently require making additional expenditures to attain a properly constructed project. It is recommended that the owner consider providing a contingency fund to accommodate such potential extra costs and risks. This is a standard recommendation for all projects.

This report has been prepared for the exclusive use of Robert Striker and his representatives, for specific application to this project and site. Our conclusions and recommendations are professional opinions derived in accordance with our understanding of current local standards of practice, and within the scope of our services. No warranty is expressed or implied. The scope of our services

does not include services related to construction safety precautions, and our recommendations are not intended to direct the contractor's methods, techniques, sequences, or procedures, except as specifically described in our report for consideration in design. Our services also do not include assessing or minimizing the potential for biological hazards, such as mold, bacteria, mildew and fungi in either the existing or proposed site development.

ADDITIONAL SERVICES

In addition to reviewing the final plans, Geotech Consultants, Inc. should be retained to provide geotechnical consultation, testing, and observation services during construction. This is to confirm that subsurface conditions are consistent with those indicated by our exploration, to evaluate whether earthwork and foundation construction activities comply with the general intent of the recommendations presented in this report, and to provide suggestions for design changes in the event subsurface conditions differ from those anticipated prior to the start of construction. However, our work would not include the supervision or direction of the actual work of the contractor and its employees or agents. Also, job and site safety, and dimensional measurements, will be the responsibility of the contractor.

During the construction phase, we will provide geotechnical observation and testing services when requested by you or your representatives. Please be aware that we can only document site work we actually observe. It is still the responsibility of your contractor or on-site construction team to verify that our recommendations are being followed, whether we are present at the site or not.

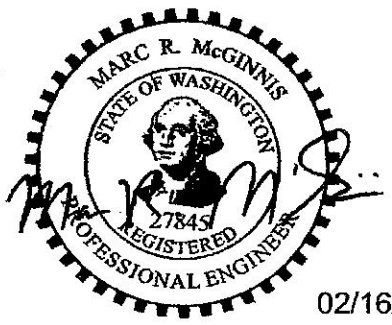
The following plates are attached to complete this report:

Plate 1	Vicinity Map
Plate 2	Site Exploration Plan
Plates 3 - 11	Test Pit Logs
Plates 12 - 15	Grain Size Analyses
Plate 16	Typical Footing Drain Detail

We appreciate the opportunity to be of service on this project. Please contact us if you have any questions, or if we can be of further assistance.

Respectfully submitted,

GEOTECH CONSULTANTS, INC.



Marc R. McGinnis, P.E.
Principal

02/16/2021

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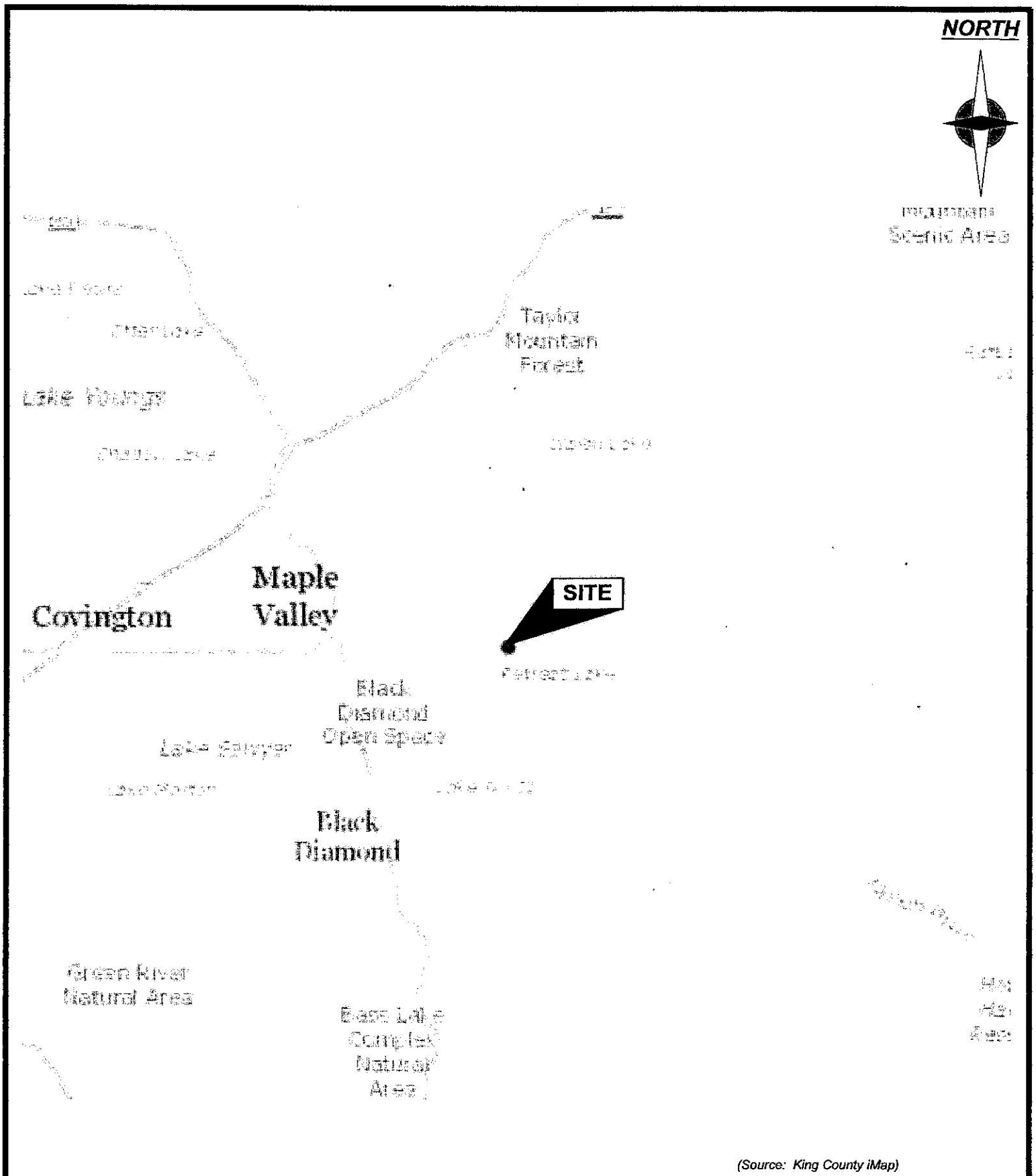

(Source: King County iMap)

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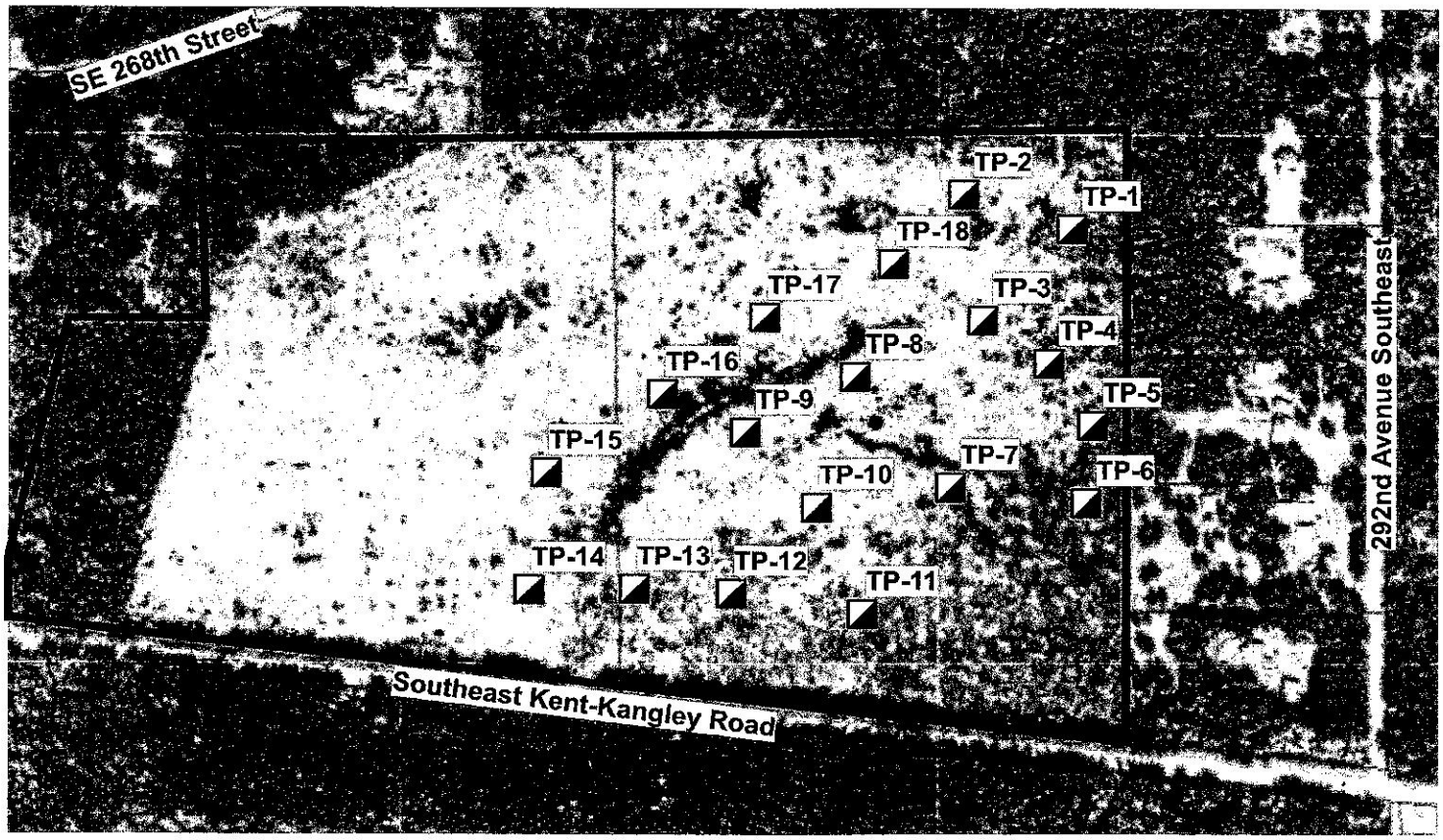
VICINITY MAP

2811 Southeast Kent-Kangley Road
Ravensdale, Washington

Job No:	Date:	Plate:

NORTH



Legend:

Test Pit Location

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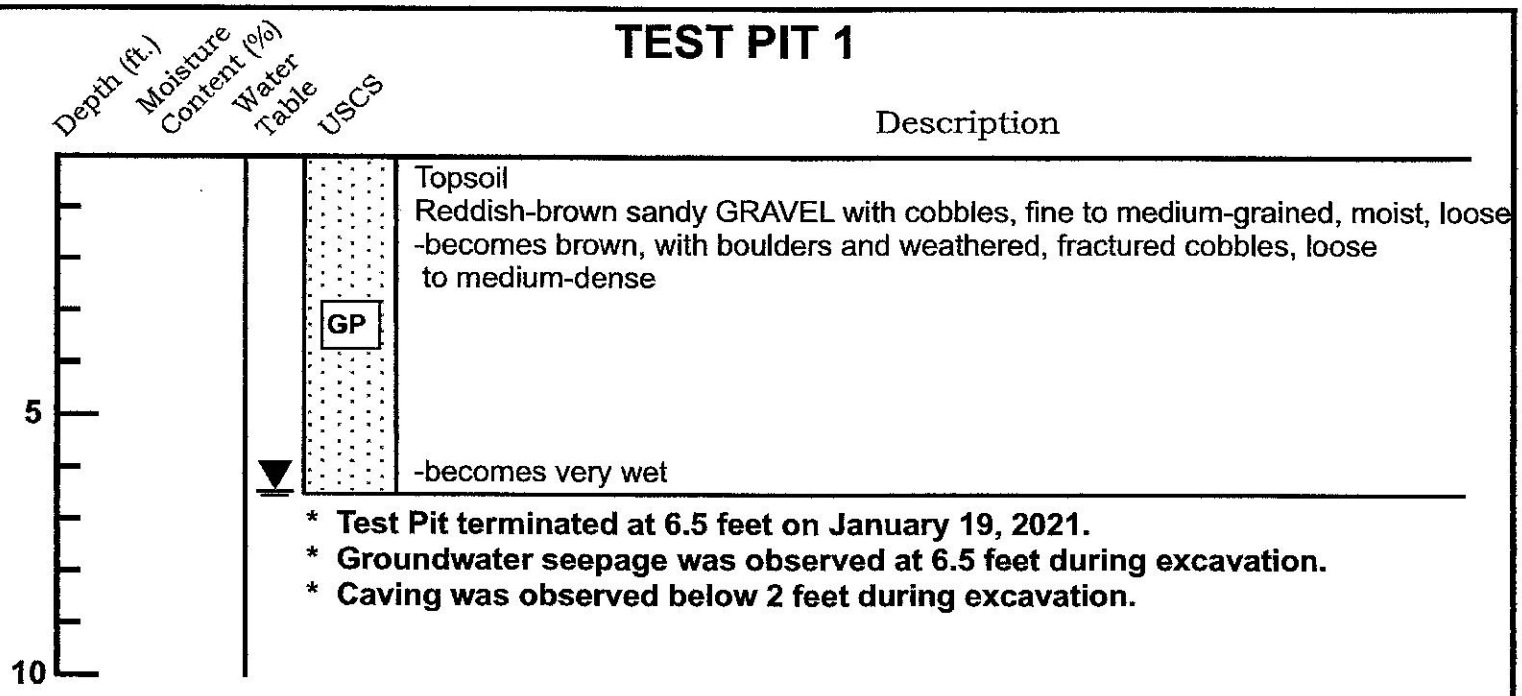
SITE EXPLORATION PLAN

2811 Southeast Kent-Kangley Road
Ravensdale, Washington

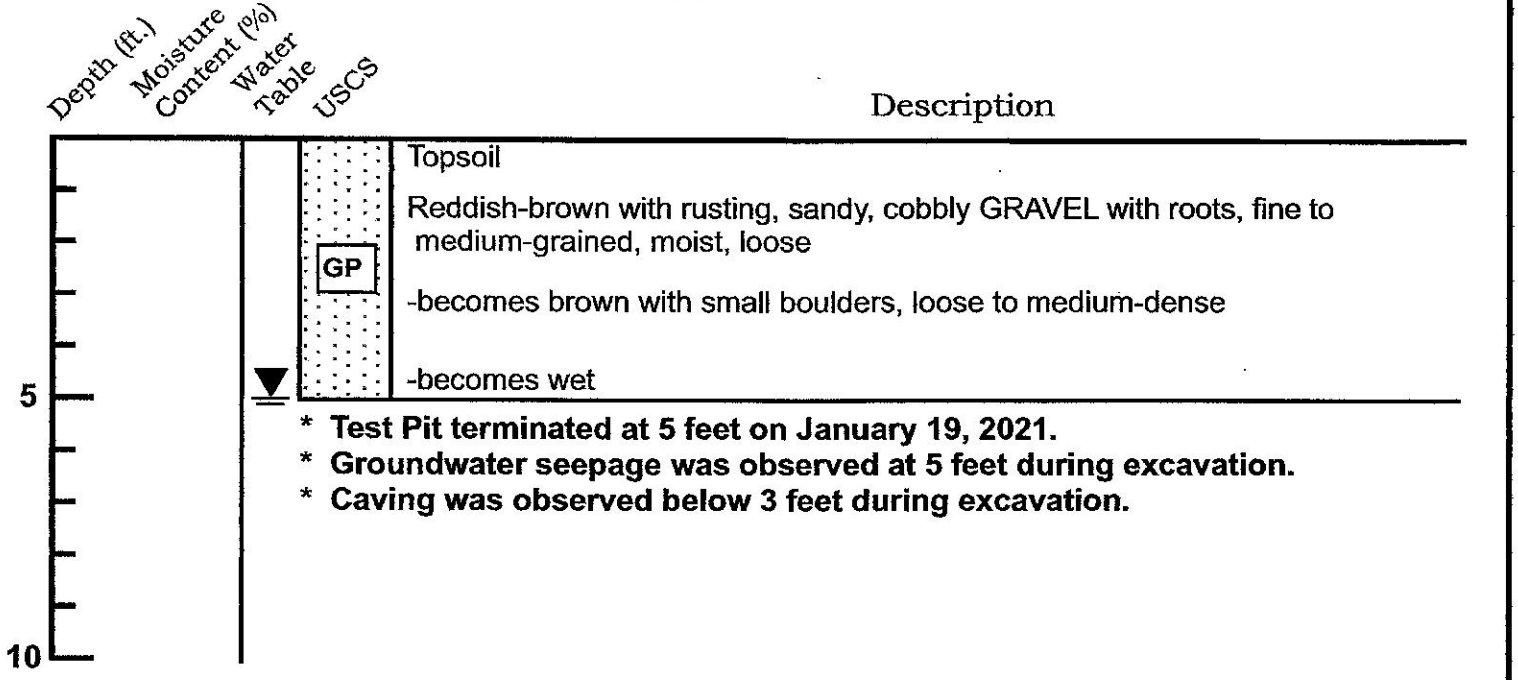
Job No:	Date:	Plate:

TEST PIT 1



* **Test Pit terminated at 6.5 feet on January 19, 2021.**
* **Groundwater seepage was observed at 6.5 feet during excavation.**
* **Caving was observed below 2 feet during excavation.**

TEST PIT 2



* **Test Pit terminated at 5 feet on January 19, 2021.**
* **Groundwater seepage was observed at 5 feet during excavation.**
* **Caving was observed below 3 feet during excavation.**

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TEST PIT LOG

2811 Southeast Kent-Kangley Road
Ravensdale, Washington

Job	Date:	Logged by:	Plate:
21015	Feb.2021	MKM	3

TEST PIT 3

Depth (ft.) | Moisture Content (%) | Water Table | USCS | Description

5

10

Topsoil
Reddish-brown sandy, GRAVEL with rusted, fractured cobbles and boulders, fine to medium-grained, moist, loose

SP
GP

-becomes grayish-brown, loose to medium-dense

-becomes medium-dense

-becomes wet

* **Test Pit terminated at 7 feet on January 19, 2021**
* **Groundwater seepage was observed at 6.5 feet during excavation.**
* **Caving was observed below 2 feet during excavation.**

TEST PIT 4

Depth (ft.) | Moisture Content (%) | Water Table | USCS | Description

5

10

Topsoil

Red-brown cobbly, very gravelly SAND with small boulders, fine to medium-grained, moist, loose

SP
GP

-becomes brown, loose to medium-dense

-becomes gray-brown

-reduced boulders and cobbles, becomes gray, medium-dense

* **Test Pit terminated at 7 feet on January 19, 2021.**
* **No groundwater seepage was observed during excavation.**
* **No caving observed during excavation.**

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TEST PIT LOG

2811 Southeast Kent-Kangley Road
Ravensdale, Washington

Job	Date:	Logged by:	Plate:
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TEST PIT 5

Depth (ft.)	Moisture Content (%)	Water Table	USCS	Description
			SM	Topsoil Dark-brown gravelly, silty SAND, fine to medium-grained, moist, loose
			SP GP	Red-brown cobbly, very sandy GRAVEL with boulders and trace roots, fine to medium-grained, moist, loose -with large fractured cobbles and boulders -becomes gray-brown, loose to medium-dense
5				-becomes gray, medium-dense
				-very large boulder, refusal
10				

* **Test Pit terminated at 7.5 feet on January 19, 2021 due to refusal on a large boulder.**
* **No groundwater seepage was observed during excavation.**
* **Caving was observed beneath 3 feet during excavation.**

TEST PIT 6

Depth (ft.)	Moisture Content (%)	Water Table	USCS	Description
			SP	Topsoil Red-brown gravelly SAND with cobbles, boulders, and roots, fine to medium-grained, moist, loose
			SP GP	Gray-brown cobbly, very gravelly SAND with boulders, fine to coarse-grained, moist, loose to medium-dense
5				-becomes gray, medium-dense
10				

* **Test Pit terminated at 8 feet on January 19, 2021.**
* **No groundwater seepage was observed during excavation.**
* **Caving was observed below 3 feet during excavation.**

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TEST PIT LOG

2811 Southeast Kent-Kangley Road
Ravensdale, Washington

Job	Date:	Logged by:	Plate:
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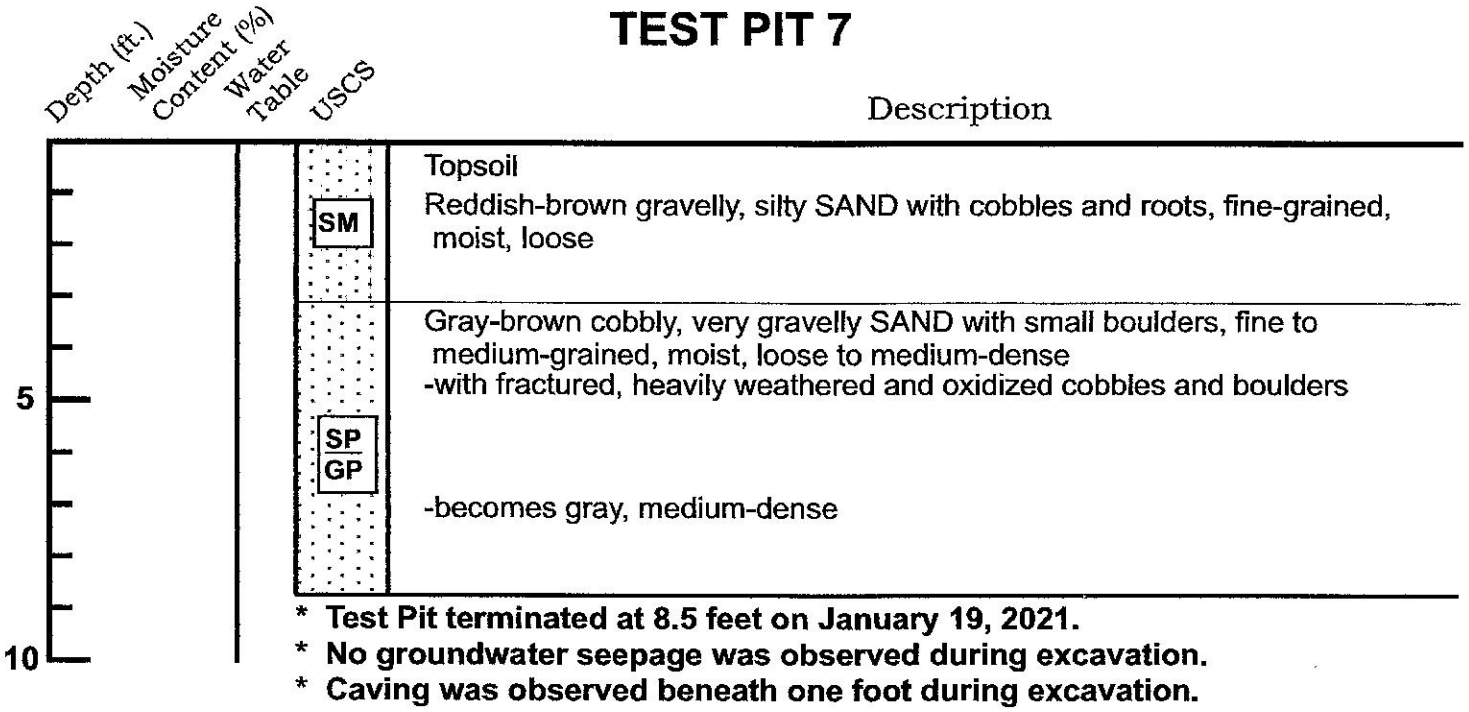
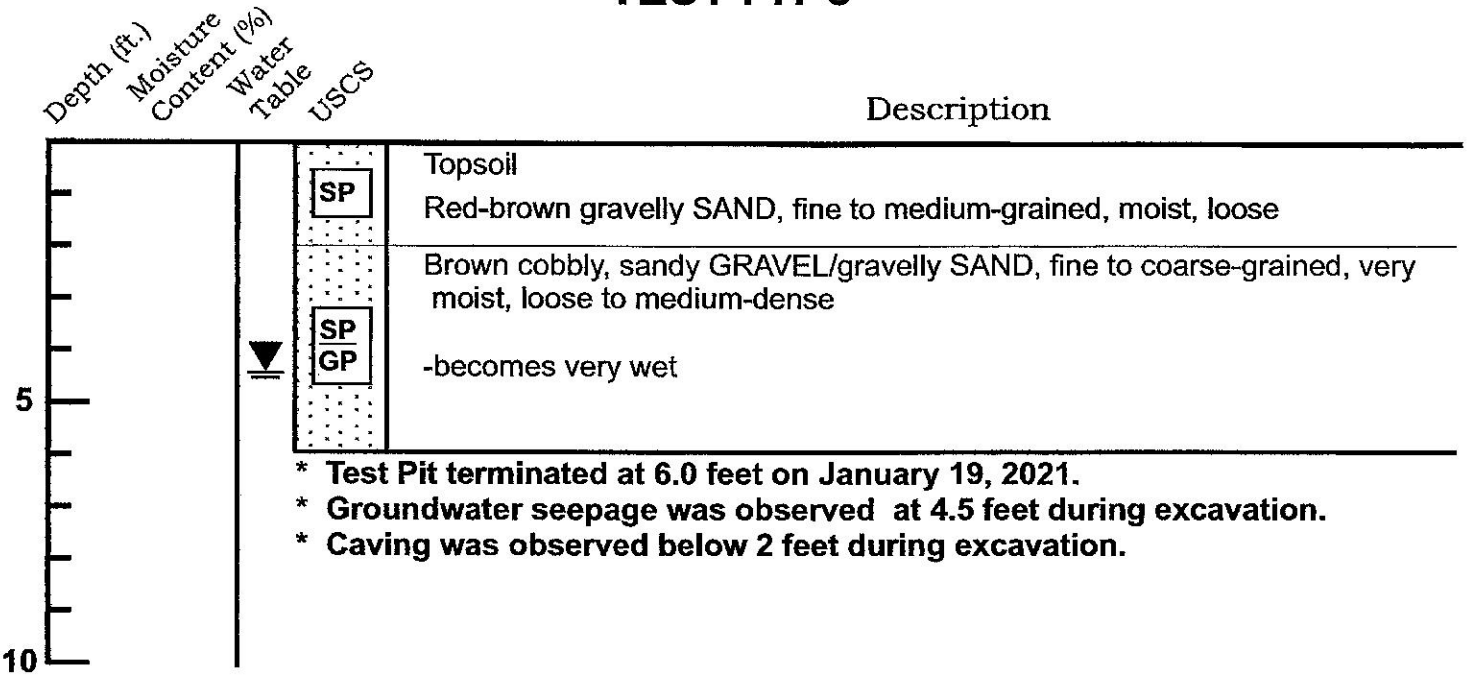
TEST PIT 7



* **Test Pit terminated at 8.5 feet on January 19, 2021.**
* **No groundwater seepage was observed during excavation.**
* **Caving was observed beneath one foot during excavation.**

TEST PIT 8



* **Test Pit terminated at 6.0 feet on January 19, 2021.**
* **Groundwater seepage was observed at 4.5 feet during excavation.**
* **Caving was observed below 2 feet during excavation.**

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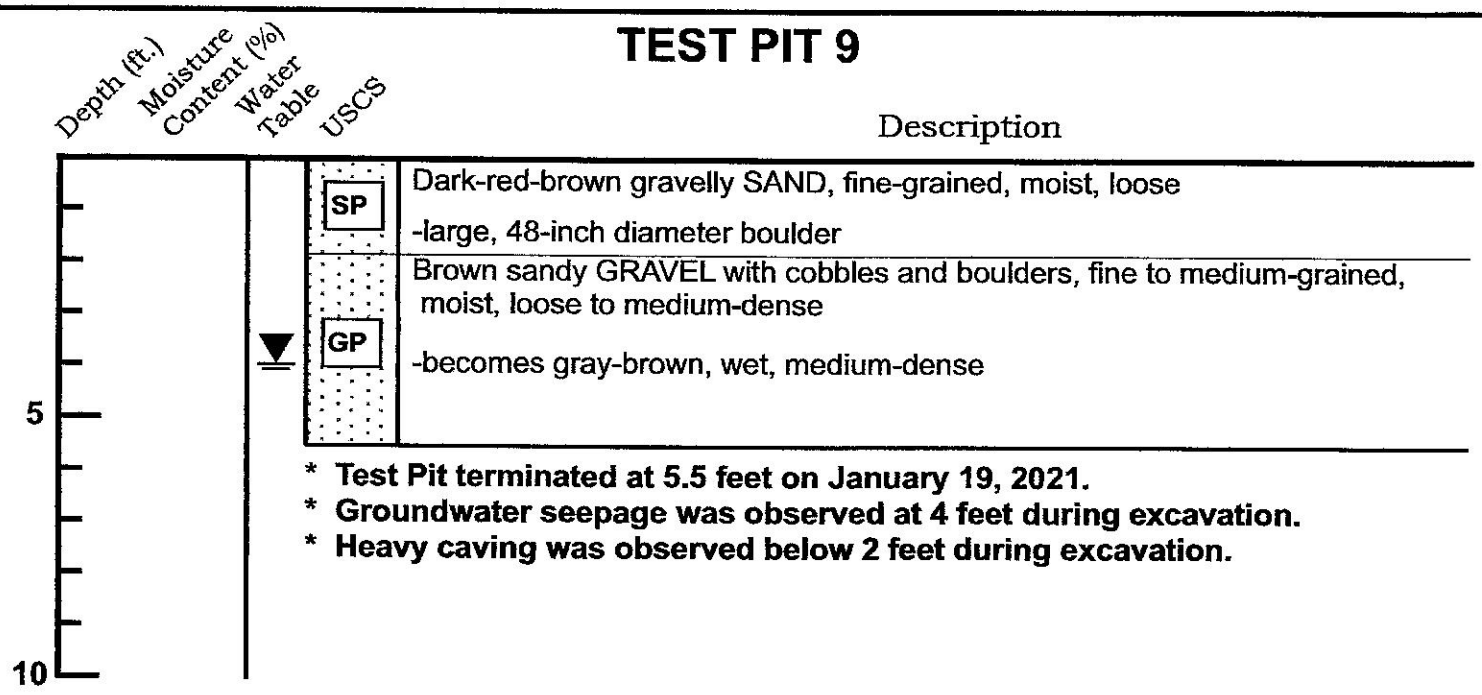
TEST PIT LOG

2811 Southeast Kent-Kangley Road
Ravensdale, Washington

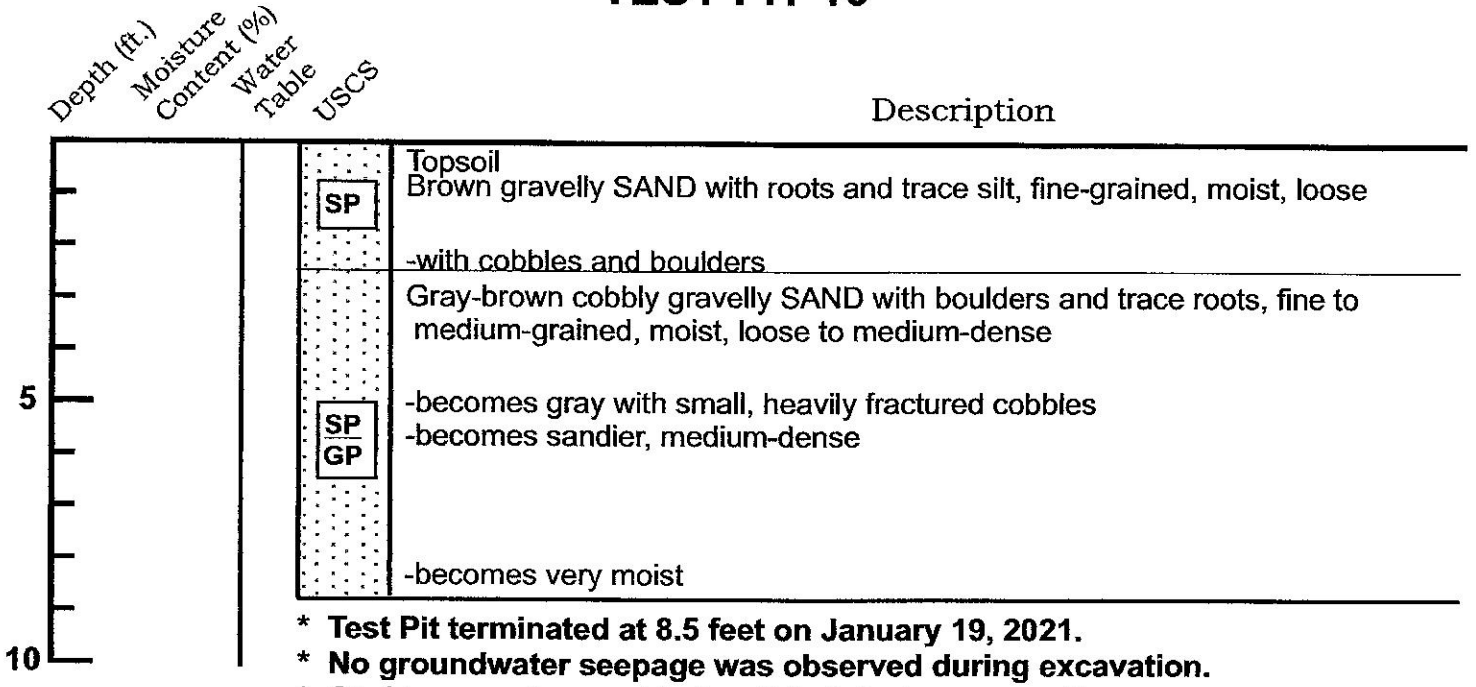
Job	Date:	Logged by:	Plate:
21015	Feb.2021	MKM	6

TEST PIT 9



* **Test Pit terminated at 5.5 feet on January 19, 2021.**
* **Groundwater seepage was observed at 4 feet during excavation.**
* **Heavy caving was observed below 2 feet during excavation.**

TEST PIT 10



* **Test Pit terminated at 8.5 feet on January 19, 2021.**
* **No groundwater seepage was observed during excavation.**
* **Caving was observed below 2 feet during excavation.**

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TEST PIT LOG

2811 Southeast Kent-Kangley Road
Ravensdale, Washington

Job	Date:	Logged by:	Plate:
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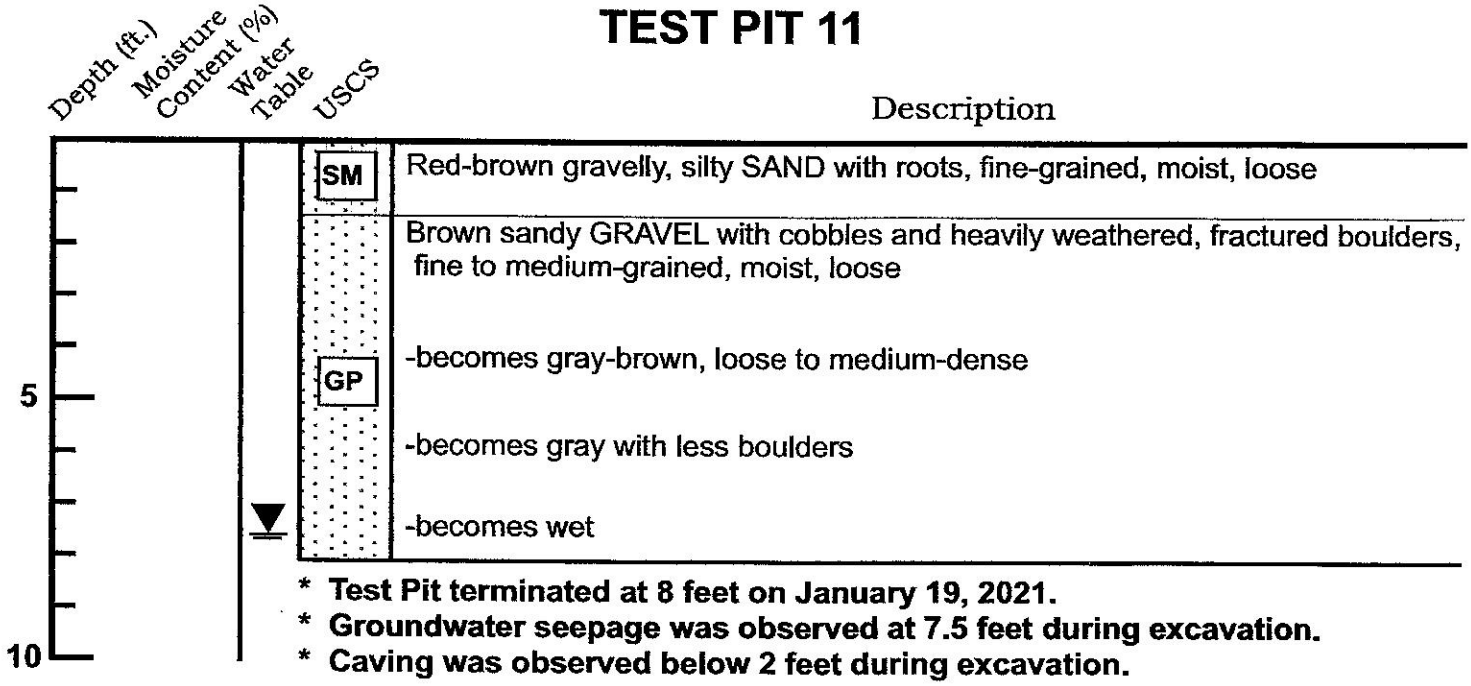
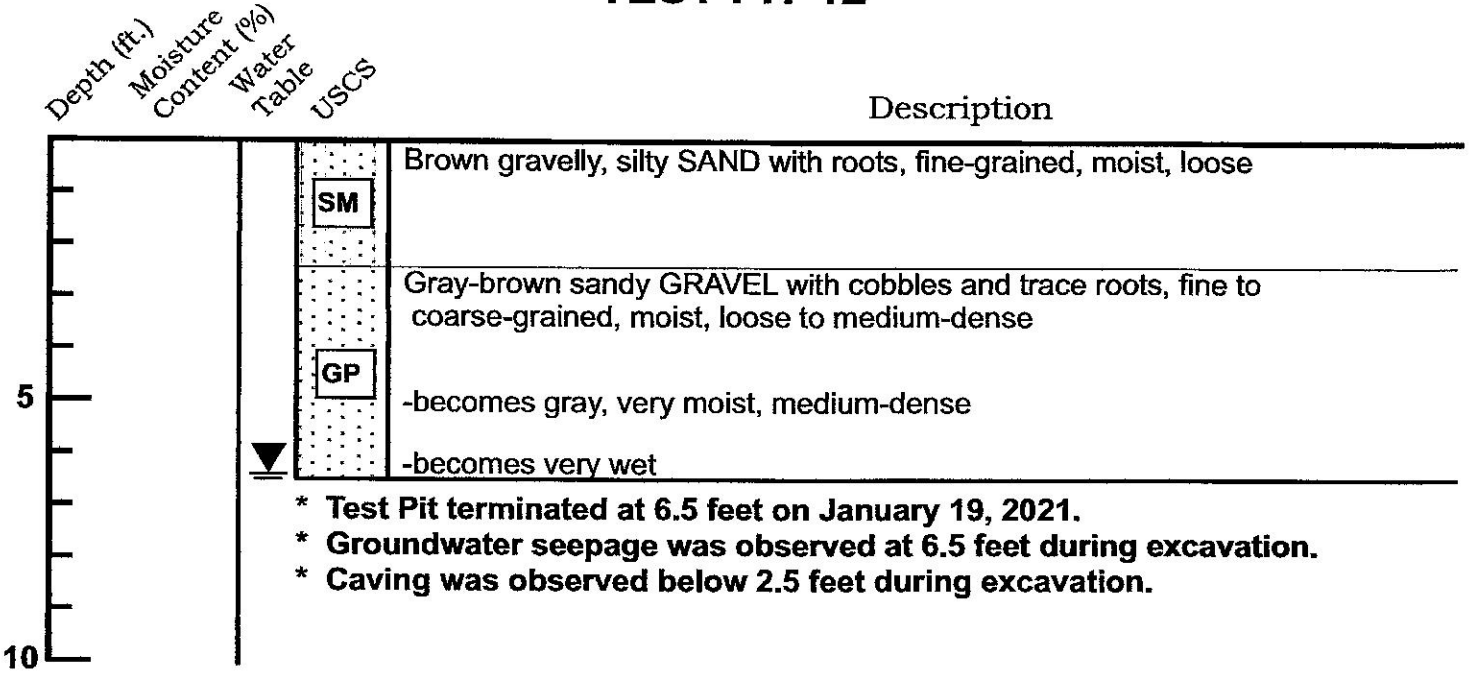
TEST PIT 11



* **Test Pit terminated at 8 feet on January 19, 2021.**
* **Groundwater seepage was observed at 7.5 feet during excavation.**
* **Caving was observed below 2 feet during excavation.**

TEST PIT 12



* **Test Pit terminated at 6.5 feet on January 19, 2021.**
* **Groundwater seepage was observed at 6.5 feet during excavation.**
* **Caving was observed below 2.5 feet during excavation.**

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TEST PIT LOG

2811 Southeast Kent-Kangley Road
Ravensdale, Washington

Job	Date:	Logged by:	Plate:
21015	Feb.2021	MKM	8

TEST PIT 13

Depth (ft.)	Moisture Content (%)	Water Table	USCS	Description
			SP/SM	Topsoil Red-brown slightly silty SAND with roots and cobbles, fine-grained moist, loose
				Gray-brown very gravelly SAND to sandy GRAVEL, fine to medium-grained, moist, loose to medium-dense -with cobbles and trace roots
5			SP/GP	
		▼		-becomes very moist -becomes wet
10				

* **Test Pit terminated at 7.5 feet on January 19, 2021.**
* **Groundwater seepage was observed at 7 feet during excavation.**
* **No caving observed during excavation.**

TEST PIT 14

Depth (ft.)	Moisture Content (%)	Water Table	USCS	Description
			SM	Red-brown cobbly, gravelly, silty SAND with small boulders, fine-grained, moist, loose
				Gray-brown very gravelly SAND to sandy GRAVEL with cobbles and boulders, fine to medium-grained, moist, loose to medium-dense
5			SP/GP	
		▼		-becomes very moist, medium-dense -becomes very wet
10				

* **Test Pit terminated at 6.5 feet on January 19, 2021.**
* **Groundwater seepage was observed at 6 feet during excavation.**
* **Caving was observed below 3 feet during excavation.**

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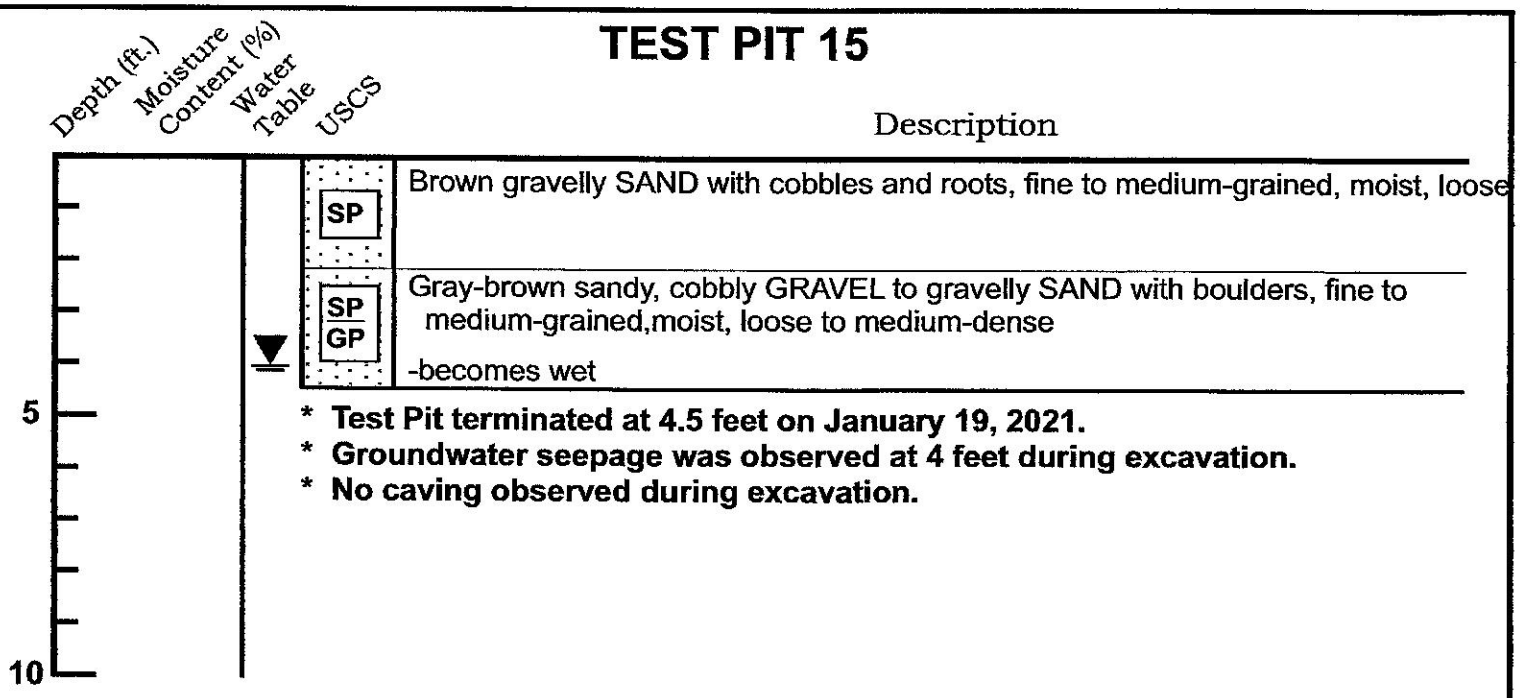
CONSULTANTS, INC.

TEST PIT LOG

2811 Southeast Kent-Kangley Road
Ravensdale, Washington

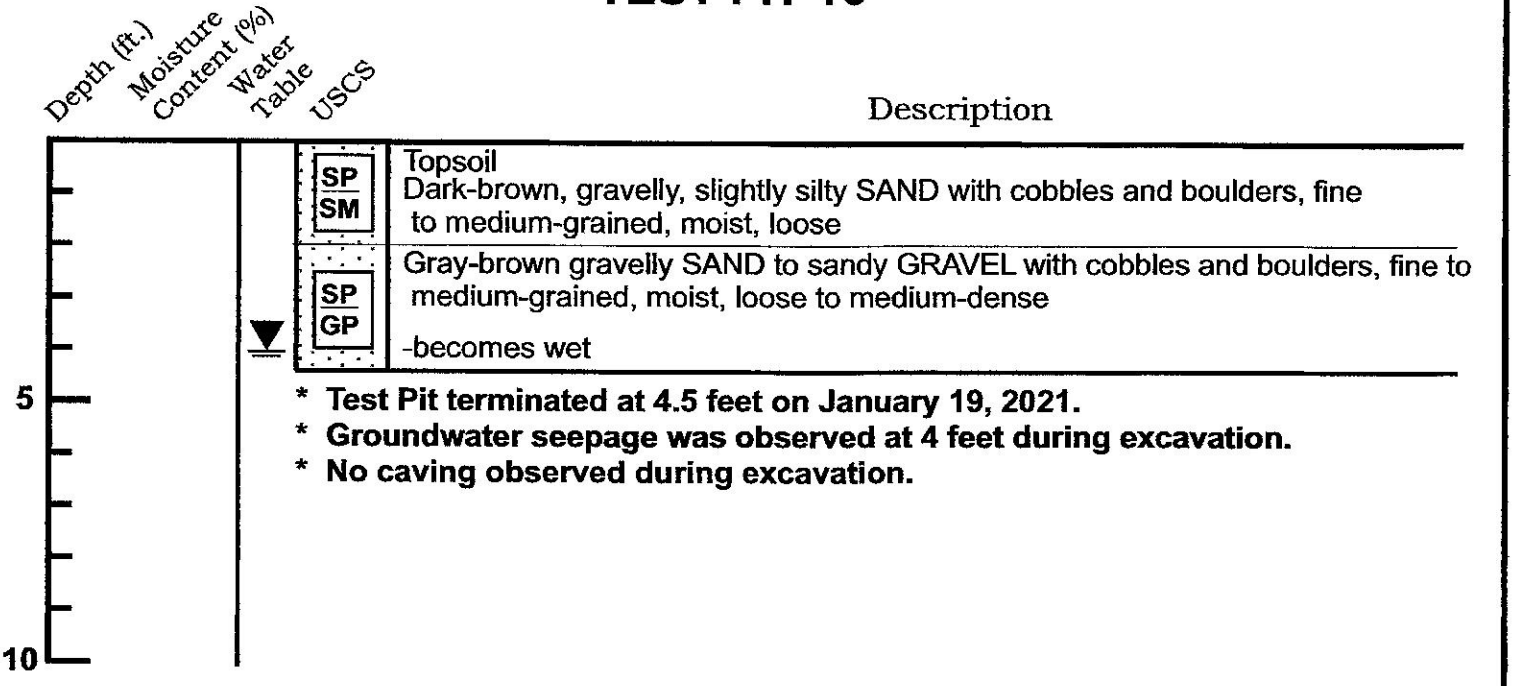
Job	Date:	Logged by:	Plate:
21015	Feb.2021	MKM	9

TEST PIT 15



* **Test Pit terminated at 4.5 feet on January 19, 2021.**
* **Groundwater seepage was observed at 4 feet during excavation.**
* **No caving observed during excavation.**

TEST PIT 16



* **Test Pit terminated at 4.5 feet on January 19, 2021.**
* **Groundwater seepage was observed at 4 feet during excavation.**
* **No caving observed during excavation.**

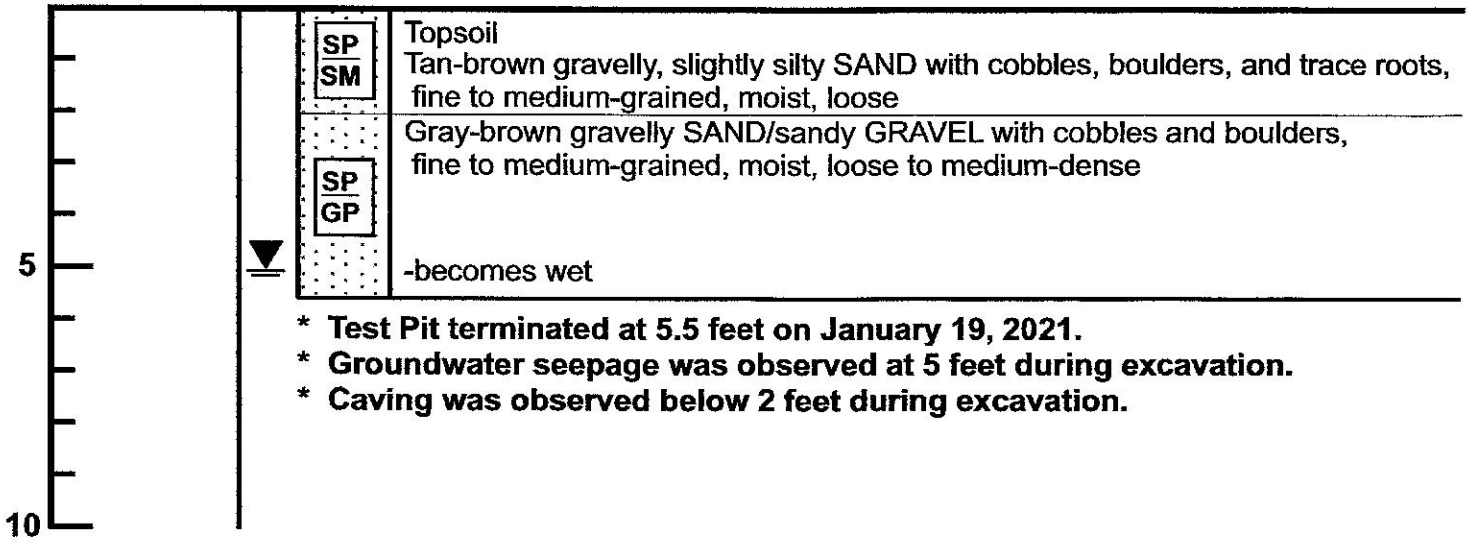
GEOTECH CONSULTANTS, INC.

TEST PIT LOG

2811 Southeast Kent-Kangley Road
Ravensdale, Washington

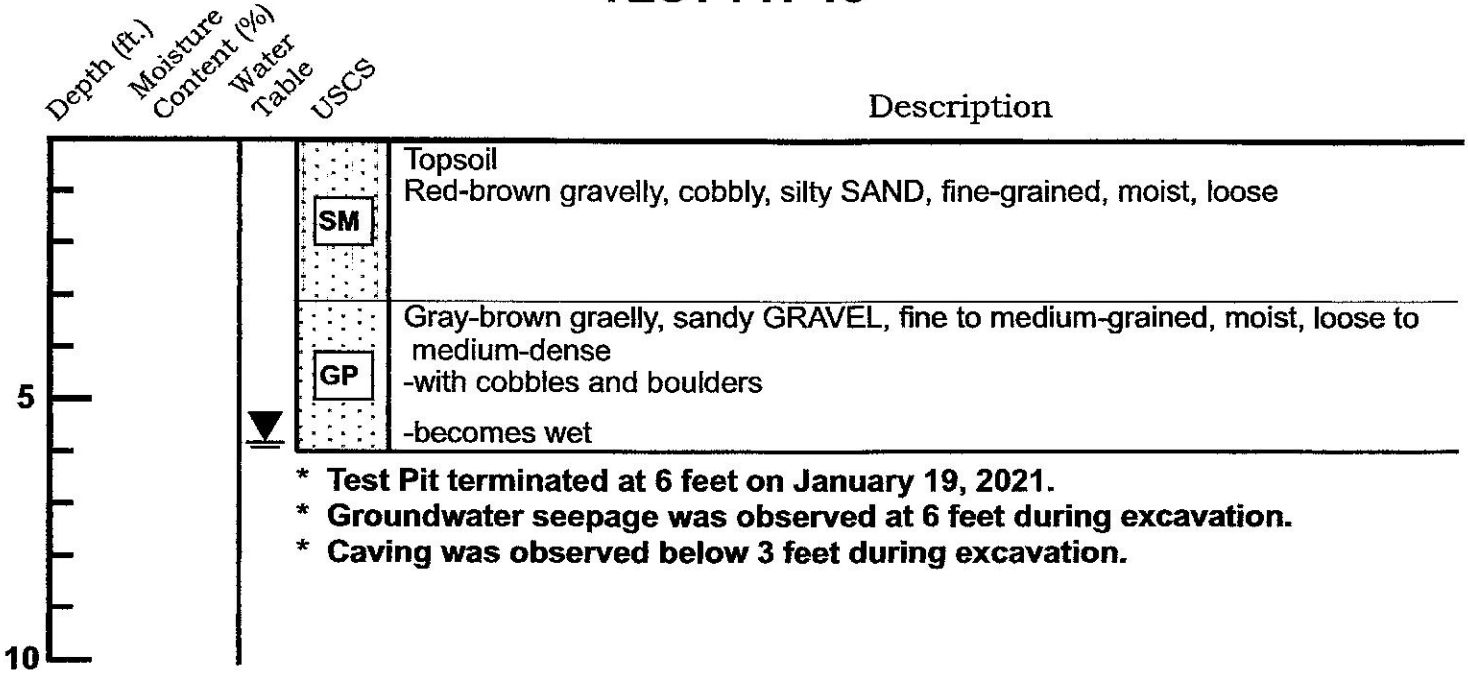
Job	Date:	Logged by:	Plate:
21015	Feb.2021	MKM	10

TEST PIT 17



* **Test Pit terminated at 5.5 feet on January 19, 2021.**
* **Groundwater seepage was observed at 5 feet during excavation.**
* **Caving was observed below 2 feet during excavation.**

TEST PIT 18



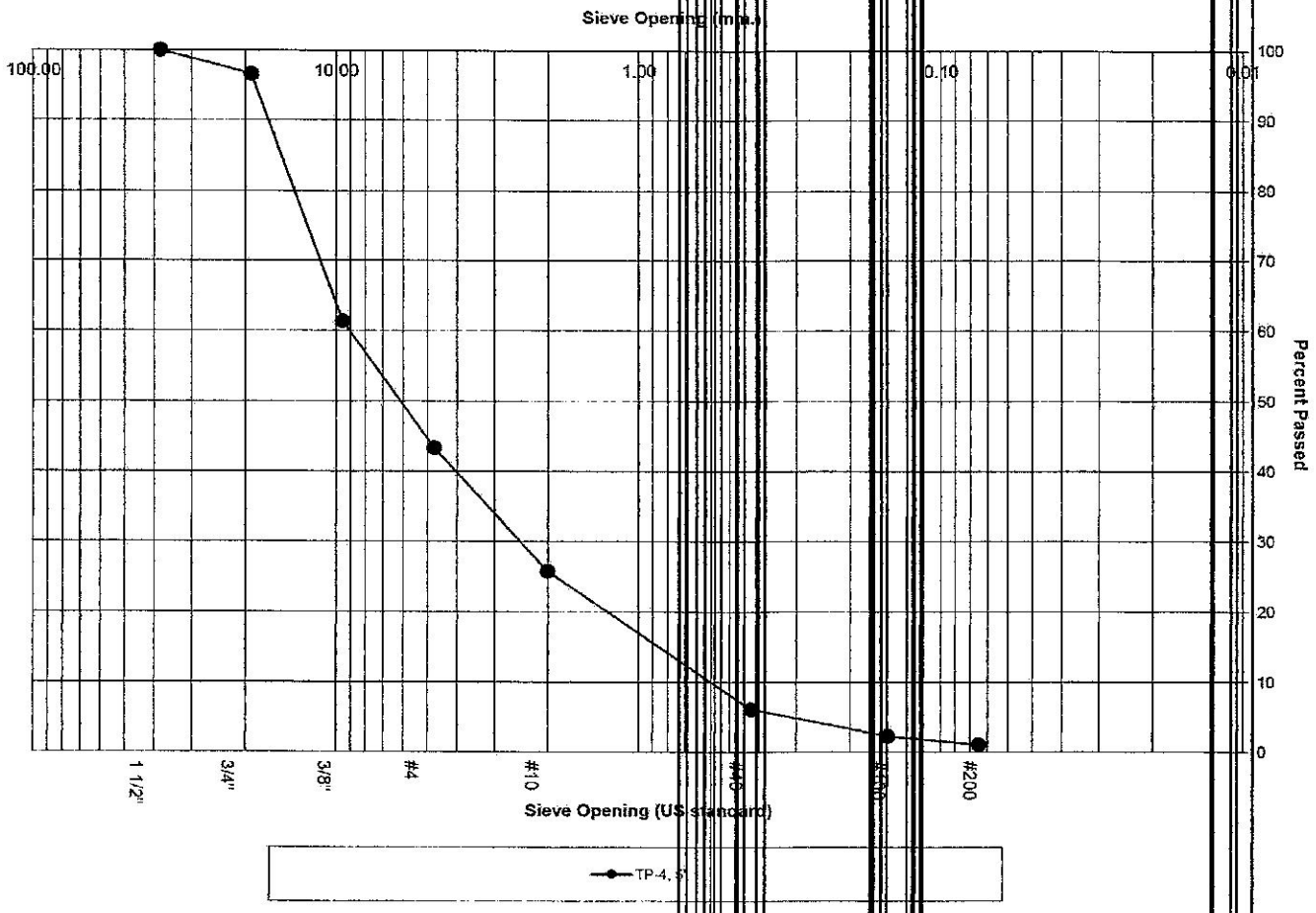
* **Test Pit terminated at 6 feet on January 19, 2021.**
* **Groundwater seepage was observed at 6 feet during excavation.**
* **Caving was observed below 3 feet during excavation.**

GEOTECH
CONSULTANTS, INC.

TEST PIT LOG

2811 Southeast Kent-Kangley Road
Ravensdale, Washington

Job	Date:	Logged by:	Plate:
21015	Feb.2021	MKM	11

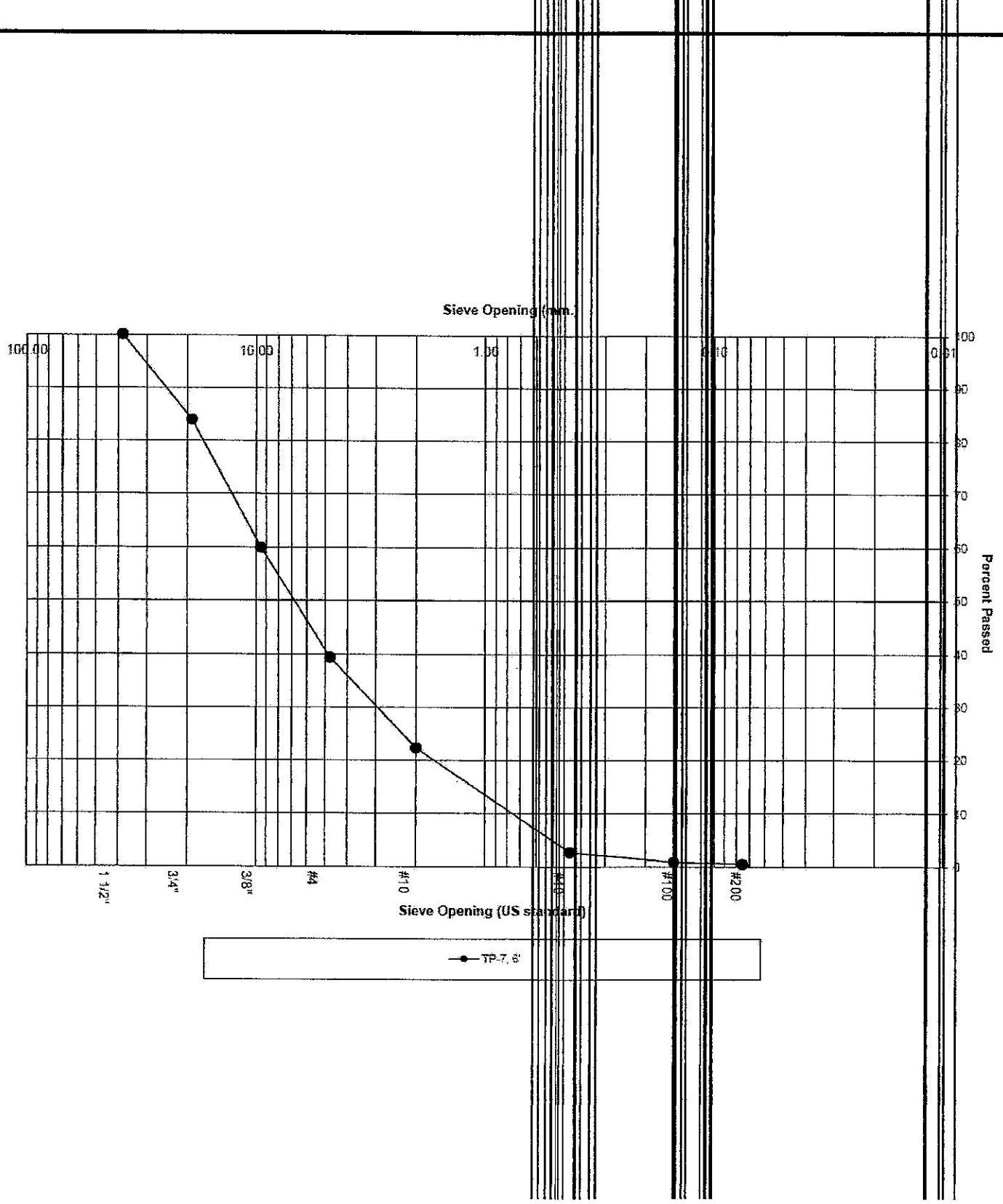


GEOTECH
CONSULTANTS, INC.

SIEVE ANALYSIS

2811 Southeast Kent-Kangley Road
Ravensdale, Washington

Job No:	Date:	Plate:

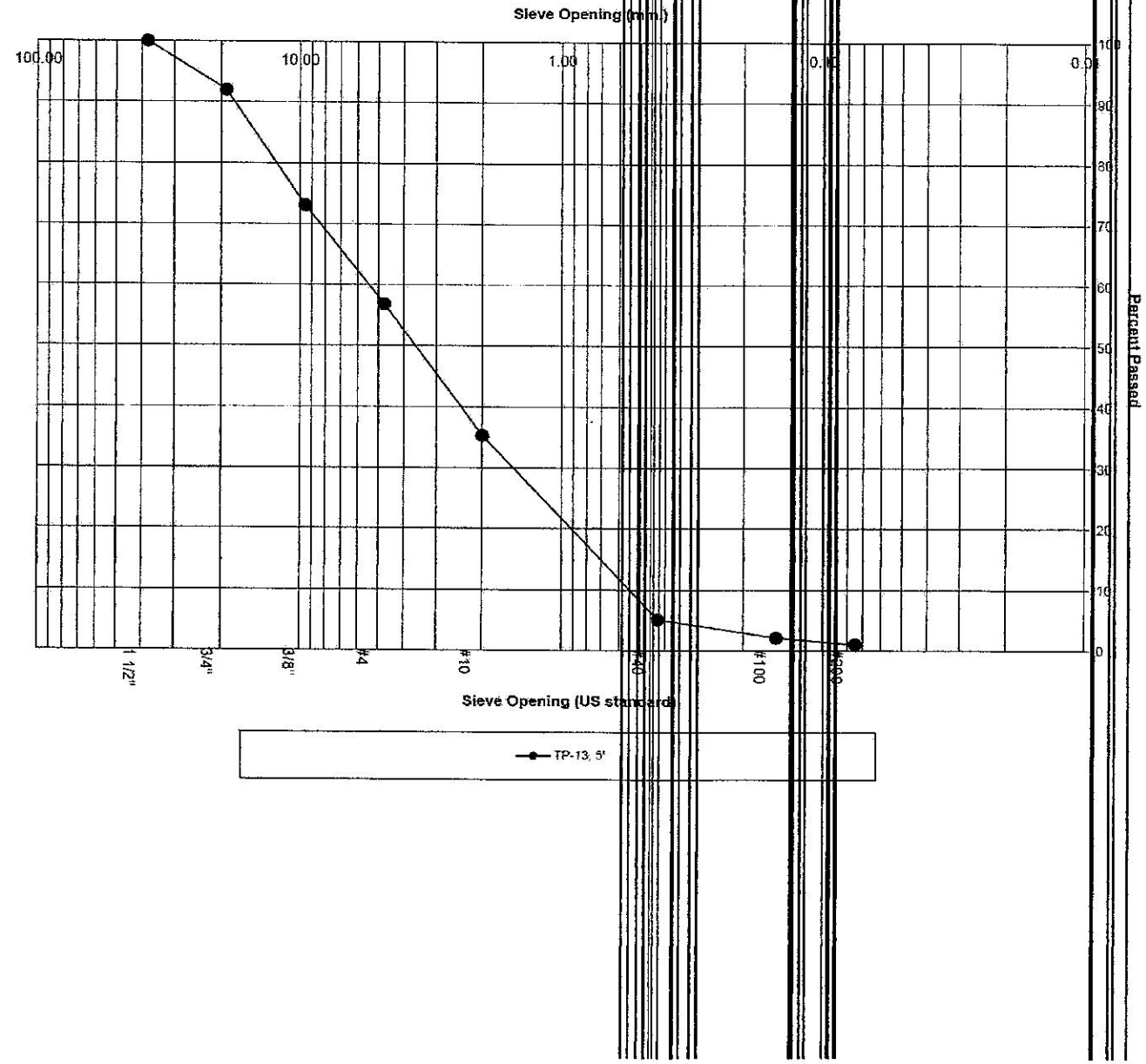


GEOTECH
CONSULTANTS, INC.

SIEVE ANALYSIS

2811 Southeast Kent-Kangley Road
Ravensdale, Washington

Job No:	Date:	Plate:

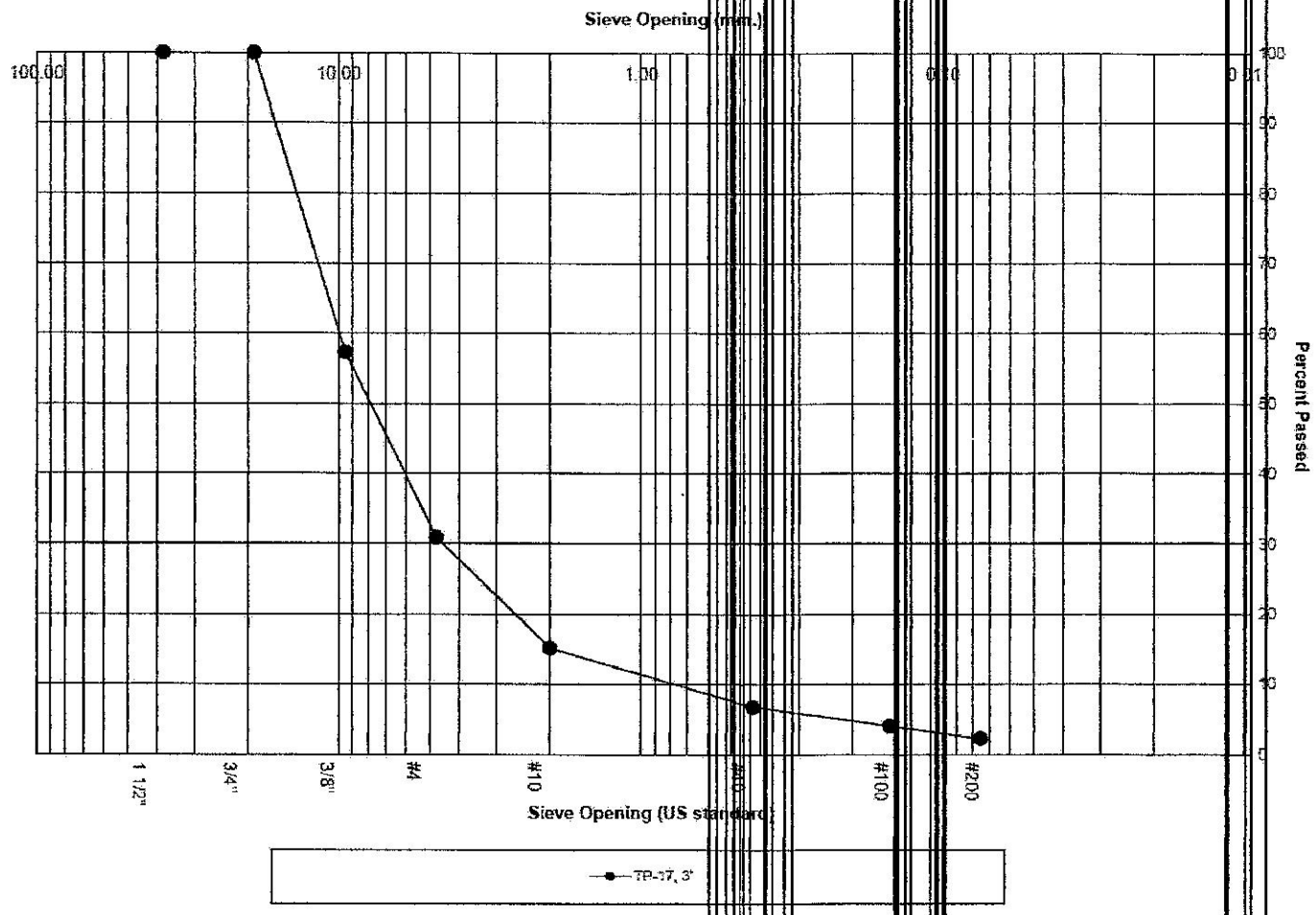


GEOTECH
CONSULTANTS, INC.

SIEVE ANALYSIS

2811 Southeast Kent-Kangley Road
Ravensdale, Washington

Job No:	Date:	Plate:

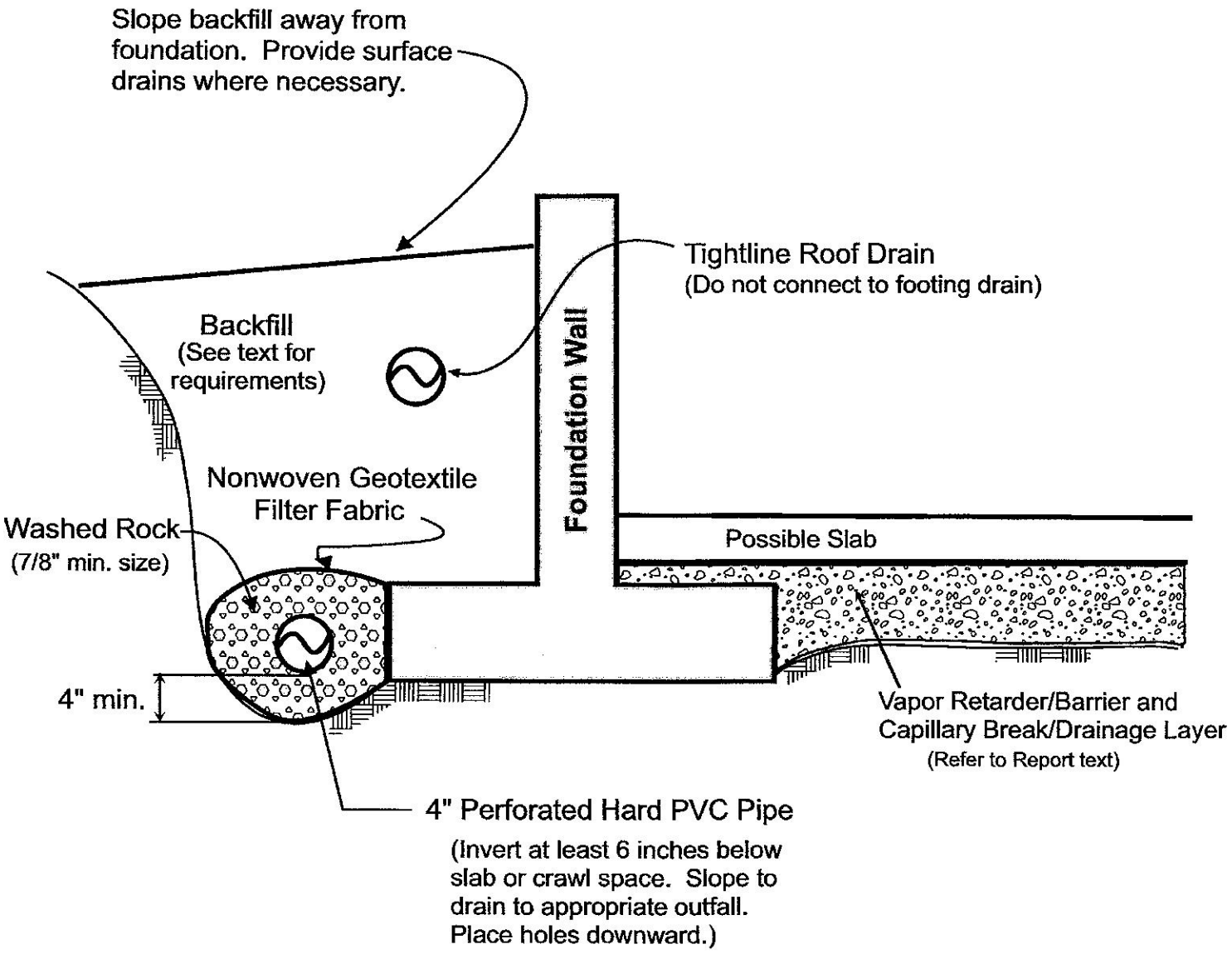


GEOTECH
CONSULTANTS, INC.

SIEVE ANALYSIS

2811 Southeast Kent-Kangley Road
Ravensdale, Washington

Job No:	Date:	Plate:



NOTES:

(1) In crawl spaces, provide an outlet drain to prevent buildup of water that bypasses the perimeter footing drains.

(2) Refer to report text for additional drainage, waterproofing, and slab considerations.

GEOTECH
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FOOTING DRAIN DETAIL

2811 Southeast Kent-Kangley Road
Ravensdale, Washington

Job No:	Date:	Plate:

Appendix E

WWHM Report

WWHM2012

PROJECT REPORT

General Model Information

Project Name:	WildlifeMeadows_WWHM Sand Filter Sizing
Site Name:	Wildlife Meadows
Site Address:	27534 se kent-kangley road
City:	ravensdale
Report Date:	11/23/2022
Gage:	Seatac
Data Start:	1948/10/01
Data End:	2009/09/30
Timestep:	15 Minute
Precip Scale:	0.000 (adjusted)
Version Date:	2019/09/13
Version:	4.2.17

POC Thresholds

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

Landuse Basin Data

Predeveloped Land Use

Basin 1

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
A B, Forest, Flat	0.3739
Pervious Total	0.3739
Impervious Land Use	acre
Impervious Total	0
Basin Total	0.3739

Element Flows To:

Surface	Interflow	Groundwater

Mitigated Land Use

Main Entry

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
Pervious Total	0
Impervious Land Use	acre
ROADS FLAT	0.1949
Impervious Total	0.1949
Basin Total	0.1949

Element Flows To:

Surface	Interflow	Groundwater
Main Entry - Sand Filter	Main Entry - Sand Filter	

Circle Left

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
Pervious Total	0
Impervious Land Use	acre
ROADS FLAT	0.0895
Impervious Total	0.0895
Basin Total	0.0895

Element Flows To:

Surface	Interflow	Groundwater
Circle Left - Sand Filter	Circle Left - Sand Filter	

Circle Right

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
Pervious Total	0
Impervious Land Use	acre
ROADS FLAT	0.0895
Impervious Total	0.0895
Basin Total	0.0895

Element Flows To:

Surface	Interflow	Groundwater
Circle Right - Sand Filter	Circle Right - Sand Filter	

North Parking Lot

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
Pervious Total	0
Impervious Land Use	acre
PARKING FLAT	0.147
Impervious Total	0.147
Basin Total	0.147

Element Flows To:

Surface	Interflow	Groundwater
North Parking Lot - Sand Filter	North Parking Lot - Sand Filter	

Mitigated Routing

Main Entry - Sand Filter

Bottom Length:	28.00 ft.
Bottom Width:	14.00 ft.
Depth:	2 ft.
Side slope 1:	0 To 1
Side slope 2:	0 To 1
Side slope 3:	0 To 1
Side slope 4:	0 To 1
Filtration On	
Hydraulic conductivity:	1
Depth of filter medium:	1.5

Total Volume Infiltrated (ac-ft.):	40.874
Total Volume Through Riser (ac-ft.):	1.951
Total Volume Through Facility (ac-ft.):	42.826
Percent Infiltrated:	95.44
Total Precip Applied to Facility:	0
Total Evap From Facility:	0

Discharge Structure

Riser Height:	1 ft.
Riser Diameter:	18 in.

Element Flows To:

Outlet 1 Outlet 2

Sand Filter Hydraulic Table

Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	Infilt(cfs)
0.0000	0.009	0.000	0.000	0.000
0.0222	0.009	0.000	0.000	0.009
0.0444	0.009	0.000	0.000	0.009
0.0667	0.009	0.000	0.000	0.009
0.0889	0.009	0.000	0.000	0.009
0.1111	0.009	0.001	0.000	0.009
0.1333	0.009	0.001	0.000	0.009
0.1556	0.009	0.001	0.000	0.010
0.1778	0.009	0.001	0.000	0.010
0.2000	0.009	0.001	0.000	0.010
0.2222	0.009	0.002	0.000	0.010
0.2444	0.009	0.002	0.000	0.010
0.2667	0.009	0.002	0.000	0.010
0.2889	0.009	0.002	0.000	0.010
0.3111	0.009	0.002	0.000	0.011
0.3333	0.009	0.003	0.000	0.011
0.3556	0.009	0.003	0.000	0.011
0.3778	0.009	0.003	0.000	0.011
0.4000	0.009	0.003	0.000	0.011
0.4222	0.009	0.003	0.000	0.011
0.4444	0.009	0.004	0.000	0.011
0.4667	0.009	0.004	0.000	0.011
0.4889	0.009	0.004	0.000	0.012
0.5111	0.009	0.004	0.000	0.012
0.5333	0.009	0.004	0.000	0.012
0.5556	0.009	0.005	0.000	0.012
0.5778	0.009	0.005	0.000	0.012
0.6000	0.009	0.005	0.000	0.012

0.6222	0.009	0.005	0.000	0.012
0.6444	0.009	0.005	0.000	0.013
0.6667	0.009	0.006	0.000	0.013
0.6889	0.009	0.006	0.000	0.013
0.7111	0.009	0.006	0.000	0.013
0.7333	0.009	0.006	0.000	0.013
0.7556	0.009	0.006	0.000	0.013
0.7778	0.009	0.007	0.000	0.013
0.8000	0.009	0.007	0.000	0.013
0.8222	0.009	0.007	0.000	0.014
0.8444	0.009	0.007	0.000	0.014
0.8667	0.009	0.007	0.000	0.014
0.8889	0.009	0.008	0.000	0.014
0.9111	0.009	0.008	0.000	0.014
0.9333	0.009	0.008	0.000	0.014
0.9556	0.009	0.008	0.000	0.014
0.9778	0.009	0.008	0.000	0.015
1.0000	0.009	0.009	0.000	0.015
1.0222	0.009	0.009	0.052	0.015
1.0444	0.009	0.009	0.149	0.015
1.0667	0.009	0.009	0.273	0.015
1.0889	0.009	0.009	0.421	0.015
1.1111	0.009	0.010	0.587	0.015
1.1333	0.009	0.010	0.771	0.015
1.1556	0.009	0.010	0.970	0.016
1.1778	0.009	0.010	1.181	0.016
1.2000	0.009	0.010	1.404	0.016
1.2222	0.009	0.011	1.636	0.016
1.2444	0.009	0.011	1.877	0.016
1.2667	0.009	0.011	2.123	0.016
1.2889	0.009	0.011	2.374	0.016
1.3111	0.009	0.011	2.628	0.017
1.3333	0.009	0.012	2.882	0.017
1.3556	0.009	0.012	3.135	0.017
1.3778	0.009	0.012	3.386	0.017
1.4000	0.009	0.012	3.632	0.017
1.4222	0.009	0.012	3.871	0.017
1.4444	0.009	0.013	4.103	0.017
1.4667	0.009	0.013	4.326	0.017
1.4889	0.009	0.013	4.537	0.018
1.5111	0.009	0.013	4.737	0.018
1.5333	0.009	0.013	4.924	0.018
1.5556	0.009	0.014	5.097	0.018
1.5778	0.009	0.014	5.256	0.018
1.6000	0.009	0.014	5.401	0.018
1.6222	0.009	0.014	5.532	0.018
1.6444	0.009	0.014	5.649	0.019
1.6667	0.009	0.015	5.754	0.019
1.6889	0.009	0.015	5.848	0.019
1.7111	0.009	0.015	5.934	0.019
1.7333	0.009	0.015	6.014	0.019
1.7556	0.009	0.015	6.159	0.019
1.7778	0.009	0.016	6.249	0.019
1.8000	0.009	0.016	6.338	0.020
1.8222	0.009	0.016	6.425	0.020
1.8444	0.009	0.016	6.512	0.020
1.8667	0.009	0.016	6.597	0.020
1.8889	0.009	0.017	6.681	0.020

1.9111	0.009	0.017	6.764	0.020
1.9333	0.009	0.017	6.846	0.020
1.9556	0.009	0.017	6.927	0.020
1.9778	0.009	0.017	7.007	0.021
2.0000	0.009	0.018	7.086	0.021
2.0222	0.009	0.018	7.165	0.021

Circle Left - Sand Filter

Bottom Length:	18.00 ft.
Bottom Width:	10.00 ft.
Depth:	2 ft.
Side slope 1:	0 To 1
Side slope 2:	0 To 1
Side slope 3:	0 To 1
Side slope 4:	0 To 1
Filtration On	
Hydraulic conductivity:	1
Depth of filter medium:	1.5
Total Volume Infiltrated (ac-ft.):	18.751
Total Volume Through Riser (ac-ft.):	0.899
Total Volume Through Facility (ac-ft.):	19.65
Percent Infiltrated:	95.42
Total Precip Applied to Facility:	0
Total Evap From Facility:	0
Discharge Structure	
Riser Height:	1 ft.
Riser Diameter:	18 in.
Element Flows To:	
Outlet 1	Outlet 2

Sand Filter Hydraulic Table

Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	Infilt(cfs)
0.0000	0.004	0.000	0.000	0.000
0.0222	0.004	0.000	0.000	0.004
0.0444	0.004	0.000	0.000	0.004
0.0667	0.004	0.000	0.000	0.004
0.0889	0.004	0.000	0.000	0.004
0.1111	0.004	0.000	0.000	0.004
0.1333	0.004	0.000	0.000	0.004
0.1556	0.004	0.000	0.000	0.004
0.1778	0.004	0.000	0.000	0.004
0.2000	0.004	0.000	0.000	0.004
0.2222	0.004	0.000	0.000	0.004
0.2444	0.004	0.001	0.000	0.004
0.2667	0.004	0.001	0.000	0.004
0.2889	0.004	0.001	0.000	0.005
0.3111	0.004	0.001	0.000	0.005
0.3333	0.004	0.001	0.000	0.005
0.3556	0.004	0.001	0.000	0.005
0.3778	0.004	0.001	0.000	0.005
0.4000	0.004	0.001	0.000	0.005
0.4222	0.004	0.001	0.000	0.005
0.4444	0.004	0.001	0.000	0.005
0.4667	0.004	0.001	0.000	0.005
0.4889	0.004	0.002	0.000	0.005
0.5111	0.004	0.002	0.000	0.005
0.5333	0.004	0.002	0.000	0.005
0.5556	0.004	0.002	0.000	0.005
0.5778	0.004	0.002	0.000	0.005
0.6000	0.004	0.002	0.000	0.005
0.6222	0.004	0.002	0.000	0.005
0.6444	0.004	0.002	0.000	0.006

0.6667	0.004	0.002	0.000	0.006
0.6889	0.004	0.002	0.000	0.006
0.7111	0.004	0.002	0.000	0.006
0.7333	0.004	0.003	0.000	0.006
0.7556	0.004	0.003	0.000	0.006
0.7778	0.004	0.003	0.000	0.006
0.8000	0.004	0.003	0.000	0.006
0.8222	0.004	0.003	0.000	0.006
0.8444	0.004	0.003	0.000	0.006
0.8667	0.004	0.003	0.000	0.006
0.8889	0.004	0.003	0.000	0.006
0.9111	0.004	0.003	0.000	0.006
0.9333	0.004	0.003	0.000	0.006
0.9556	0.004	0.003	0.000	0.006
0.9778	0.004	0.004	0.000	0.006
1.0000	0.004	0.004	0.000	0.006
1.0222	0.004	0.004	0.052	0.007
1.0444	0.004	0.004	0.149	0.007
1.0667	0.004	0.004	0.273	0.007
1.0889	0.004	0.004	0.421	0.007
1.1111	0.004	0.004	0.587	0.007
1.1333	0.004	0.004	0.771	0.007
1.1556	0.004	0.004	0.970	0.007
1.1778	0.004	0.004	1.181	0.007
1.2000	0.004	0.005	1.404	0.007
1.2222	0.004	0.005	1.636	0.007
1.2444	0.004	0.005	1.877	0.007
1.2667	0.004	0.005	2.123	0.007
1.2889	0.004	0.005	2.374	0.007
1.3111	0.004	0.005	2.628	0.007
1.3333	0.004	0.005	2.882	0.007
1.3556	0.004	0.005	3.135	0.007
1.3778	0.004	0.005	3.386	0.008
1.4000	0.004	0.005	3.632	0.008
1.4222	0.004	0.005	3.871	0.008
1.4444	0.004	0.006	4.103	0.008
1.4667	0.004	0.006	4.326	0.008
1.4889	0.004	0.006	4.537	0.008
1.5111	0.004	0.006	4.737	0.008
1.5333	0.004	0.006	4.924	0.008
1.5556	0.004	0.006	5.097	0.008
1.5778	0.004	0.006	5.256	0.008
1.6000	0.004	0.006	5.401	0.008
1.6222	0.004	0.006	5.532	0.008
1.6444	0.004	0.006	5.649	0.008
1.6667	0.004	0.006	5.754	0.008
1.6889	0.004	0.007	5.848	0.008
1.7111	0.004	0.007	5.934	0.008
1.7333	0.004	0.007	6.014	0.009
1.7556	0.004	0.007	6.159	0.009
1.7778	0.004	0.007	6.249	0.009
1.8000	0.004	0.007	6.338	0.009
1.8222	0.004	0.007	6.425	0.009
1.8444	0.004	0.007	6.512	0.009
1.8667	0.004	0.007	6.597	0.009
1.8889	0.004	0.007	6.681	0.009
1.9111	0.004	0.007	6.764	0.009
1.9333	0.004	0.008	6.846	0.009

1.9556	0.004	0.008	6.927	0.009
1.9778	0.004	0.008	7.007	0.009
2.0000	0.004	0.008	7.086	0.009
2.0222	0.004	0.008	7.165	0.009

Circle Right - Sand Filter

Bottom Length:	18.00 ft.
Bottom Width:	10.00 ft.
Depth:	2 ft.
Side slope 1:	0 To 1
Side slope 2:	0 To 1
Side slope 3:	0 To 1
Side slope 4:	0 To 1
Filtration On	
Hydraulic conductivity:	1
Depth of filter medium:	1.5
Total Volume Infiltrated (ac-ft.):	18.751
Total Volume Through Riser (ac-ft.):	0.899
Total Volume Through Facility (ac-ft.):	19.65
Percent Infiltrated:	95.42
Total Precip Applied to Facility:	0
Total Evap From Facility:	0
Discharge Structure	
Riser Height:	1 ft.
Riser Diameter:	18 in.
Element Flows To:	
Outlet 1	Outlet 2

Sand Filter Hydraulic Table

Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	Infilt(cfs)
0.0000	0.004	0.000	0.000	0.000
0.0222	0.004	0.000	0.000	0.004
0.0444	0.004	0.000	0.000	0.004
0.0667	0.004	0.000	0.000	0.004
0.0889	0.004	0.000	0.000	0.004
0.1111	0.004	0.000	0.000	0.004
0.1333	0.004	0.000	0.000	0.004
0.1556	0.004	0.000	0.000	0.004
0.1778	0.004	0.000	0.000	0.004
0.2000	0.004	0.000	0.000	0.004
0.2222	0.004	0.000	0.000	0.004
0.2444	0.004	0.001	0.000	0.004
0.2667	0.004	0.001	0.000	0.004
0.2889	0.004	0.001	0.000	0.005
0.3111	0.004	0.001	0.000	0.005
0.3333	0.004	0.001	0.000	0.005
0.3556	0.004	0.001	0.000	0.005
0.3778	0.004	0.001	0.000	0.005
0.4000	0.004	0.001	0.000	0.005
0.4222	0.004	0.001	0.000	0.005
0.4444	0.004	0.001	0.000	0.005
0.4667	0.004	0.001	0.000	0.005
0.4889	0.004	0.002	0.000	0.005
0.5111	0.004	0.002	0.000	0.005
0.5333	0.004	0.002	0.000	0.005
0.5556	0.004	0.002	0.000	0.005
0.5778	0.004	0.002	0.000	0.005
0.6000	0.004	0.002	0.000	0.005
0.6222	0.004	0.002	0.000	0.005
0.6444	0.004	0.002	0.000	0.006

0.6667	0.004	0.002	0.000	0.006
0.6889	0.004	0.002	0.000	0.006
0.7111	0.004	0.002	0.000	0.006
0.7333	0.004	0.003	0.000	0.006
0.7556	0.004	0.003	0.000	0.006
0.7778	0.004	0.003	0.000	0.006
0.8000	0.004	0.003	0.000	0.006
0.8222	0.004	0.003	0.000	0.006
0.8444	0.004	0.003	0.000	0.006
0.8667	0.004	0.003	0.000	0.006
0.8889	0.004	0.003	0.000	0.006
0.9111	0.004	0.003	0.000	0.006
0.9333	0.004	0.003	0.000	0.006
0.9556	0.004	0.003	0.000	0.006
0.9778	0.004	0.004	0.000	0.006
1.0000	0.004	0.004	0.000	0.006
1.0222	0.004	0.004	0.052	0.007
1.0444	0.004	0.004	0.149	0.007
1.0667	0.004	0.004	0.273	0.007
1.0889	0.004	0.004	0.421	0.007
1.1111	0.004	0.004	0.587	0.007
1.1333	0.004	0.004	0.771	0.007
1.1556	0.004	0.004	0.970	0.007
1.1778	0.004	0.004	1.181	0.007
1.2000	0.004	0.005	1.404	0.007
1.2222	0.004	0.005	1.636	0.007
1.2444	0.004	0.005	1.877	0.007
1.2667	0.004	0.005	2.123	0.007
1.2889	0.004	0.005	2.374	0.007
1.3111	0.004	0.005	2.628	0.007
1.3333	0.004	0.005	2.882	0.007
1.3556	0.004	0.005	3.135	0.007
1.3778	0.004	0.005	3.386	0.008
1.4000	0.004	0.005	3.632	0.008
1.4222	0.004	0.005	3.871	0.008
1.4444	0.004	0.006	4.103	0.008
1.4667	0.004	0.006	4.326	0.008
1.4889	0.004	0.006	4.537	0.008
1.5111	0.004	0.006	4.737	0.008
1.5333	0.004	0.006	4.924	0.008
1.5556	0.004	0.006	5.097	0.008
1.5778	0.004	0.006	5.256	0.008
1.6000	0.004	0.006	5.401	0.008
1.6222	0.004	0.006	5.532	0.008
1.6444	0.004	0.006	5.649	0.008
1.6667	0.004	0.006	5.754	0.008
1.6889	0.004	0.007	5.848	0.008
1.7111	0.004	0.007	5.934	0.008
1.7333	0.004	0.007	6.014	0.009
1.7556	0.004	0.007	6.159	0.009
1.7778	0.004	0.007	6.249	0.009
1.8000	0.004	0.007	6.338	0.009
1.8222	0.004	0.007	6.425	0.009
1.8444	0.004	0.007	6.512	0.009
1.8667	0.004	0.007	6.597	0.009
1.8889	0.004	0.007	6.681	0.009
1.9111	0.004	0.007	6.764	0.009
1.9333	0.004	0.008	6.846	0.009

1.9556	0.004	0.008	6.927	0.009
1.9778	0.004	0.008	7.007	0.009
2.0000	0.004	0.008	7.086	0.009
2.0222	0.004	0.008	7.165	0.009

North Parking Lot - Sand Filter

Bottom Length:	116.00 ft.	
Bottom Width:	2.50 ft.	
Depth:	2 ft.	
Side slope 1:	0 To 1	
Side slope 2:	0 To 1	
Side slope 3:	0 To 1	
Side slope 4:	0 To 1	
Filtration On		
Hydraulic conductivity:	1	
Depth of filter medium:	1.5	
Total Volume Infiltrated (ac-ft.):		30.748
Total Volume Through Riser (ac-ft.):		1.547
Total Volume Through Facility (ac-ft.):		32.295
Percent Infiltrated:		95.21
Total Precip Applied to Facility:		0
Total Evap From Facility:		0
Discharge Structure		
Riser Height:	1 ft.	
Riser Diameter:	18 in.	
Element Flows To:		
Outlet 1	Outlet 2	

Sand Filter Hydraulic Table

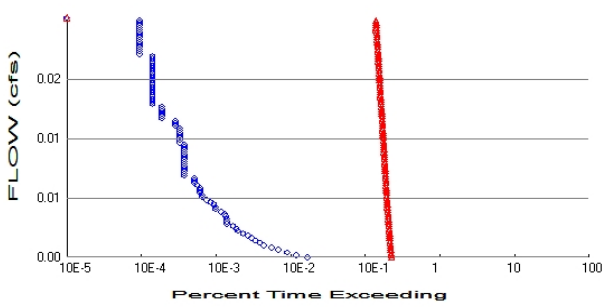
Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	Infilt(cfs)
0.0000	0.006	0.000	0.000	0.000
0.0222	0.006	0.000	0.000	0.006
0.0444	0.006	0.000	0.000	0.006
0.0667	0.006	0.000	0.000	0.007
0.0889	0.006	0.000	0.000	0.007
0.1111	0.006	0.000	0.000	0.007
0.1333	0.006	0.000	0.000	0.007
0.1556	0.006	0.001	0.000	0.007
0.1778	0.006	0.001	0.000	0.007
0.2000	0.006	0.001	0.000	0.007
0.2222	0.006	0.001	0.000	0.007
0.2444	0.006	0.001	0.000	0.007
0.2667	0.006	0.001	0.000	0.007
0.2889	0.006	0.001	0.000	0.008
0.3111	0.006	0.002	0.000	0.008
0.3333	0.006	0.002	0.000	0.008
0.3556	0.006	0.002	0.000	0.008
0.3778	0.006	0.002	0.000	0.008
0.4000	0.006	0.002	0.000	0.008
0.4222	0.006	0.002	0.000	0.008
0.4444	0.006	0.003	0.000	0.008
0.4667	0.006	0.003	0.000	0.008
0.4889	0.006	0.003	0.000	0.008
0.5111	0.006	0.003	0.000	0.009
0.5333	0.006	0.003	0.000	0.009
0.5556	0.006	0.003	0.000	0.009
0.5778	0.006	0.003	0.000	0.009
0.6000	0.006	0.004	0.000	0.009
0.6222	0.006	0.004	0.000	0.009
0.6444	0.006	0.004	0.000	0.009

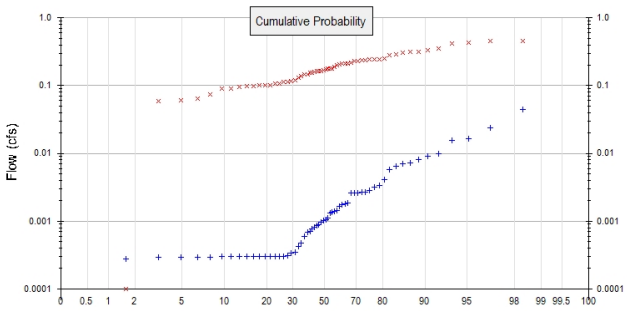
0.6667	0.006	0.004	0.000	0.009
0.6889	0.006	0.004	0.000	0.009
0.7111	0.006	0.004	0.000	0.009
0.7333	0.006	0.004	0.000	0.010
0.7556	0.006	0.005	0.000	0.010
0.7778	0.006	0.005	0.000	0.010
0.8000	0.006	0.005	0.000	0.010
0.8222	0.006	0.005	0.000	0.010
0.8444	0.006	0.005	0.000	0.010
0.8667	0.006	0.005	0.000	0.010
0.8889	0.006	0.005	0.000	0.010
0.9111	0.006	0.006	0.000	0.010
0.9333	0.006	0.006	0.000	0.010
0.9556	0.006	0.006	0.000	0.011
0.9778	0.006	0.006	0.000	0.011
1.0000	0.006	0.006	0.000	0.011
1.0222	0.006	0.006	0.052	0.011
1.0444	0.006	0.007	0.149	0.011
1.0667	0.006	0.007	0.273	0.011
1.0889	0.006	0.007	0.421	0.011
1.1111	0.006	0.007	0.587	0.011
1.1333	0.006	0.007	0.771	0.011
1.1556	0.006	0.007	0.970	0.011
1.1778	0.006	0.007	1.181	0.012
1.2000	0.006	0.008	1.404	0.012
1.2222	0.006	0.008	1.636	0.012
1.2444	0.006	0.008	1.877	0.012
1.2667	0.006	0.008	2.123	0.012
1.2889	0.006	0.008	2.374	0.012
1.3111	0.006	0.008	2.628	0.012
1.3333	0.006	0.008	2.882	0.012
1.3556	0.006	0.009	3.135	0.012
1.3778	0.006	0.009	3.386	0.012
1.4000	0.006	0.009	3.632	0.013
1.4222	0.006	0.009	3.871	0.013
1.4444	0.006	0.009	4.103	0.013
1.4667	0.006	0.009	4.326	0.013
1.4889	0.006	0.009	4.537	0.013
1.5111	0.006	0.010	4.737	0.013
1.5333	0.006	0.010	4.924	0.013
1.5556	0.006	0.010	5.097	0.013
1.5778	0.006	0.010	5.256	0.013
1.6000	0.006	0.010	5.401	0.013
1.6222	0.006	0.010	5.532	0.014
1.6444	0.006	0.010	5.649	0.014
1.6667	0.006	0.011	5.754	0.014
1.6889	0.006	0.011	5.848	0.014
1.7111	0.006	0.011	5.934	0.014
1.7333	0.006	0.011	6.014	0.014
1.7556	0.006	0.011	6.159	0.014
1.7778	0.006	0.011	6.249	0.014
1.8000	0.006	0.012	6.338	0.014
1.8222	0.006	0.012	6.425	0.014
1.8444	0.006	0.012	6.512	0.015
1.8667	0.006	0.012	6.597	0.015
1.8889	0.006	0.012	6.681	0.015
1.9111	0.006	0.012	6.764	0.015
1.9333	0.006	0.012	6.846	0.015

1.9556	0.006	0.013	6.927	0.015
1.9778	0.006	0.013	7.007	0.015
2.0000	0.006	0.013	7.086	0.015
2.0222	0.006	0.013	7.165	0.015

Analysis Results

POC 1





\+ Predeveloped x Mitigated

Predeveloped Landuse Totals for POC #1
Total Pervious Area: 0.3739
Total Impervious Area: 0

Mitigated Landuse Totals for POC #1
Total Pervious Area: 0
Total Impervious Area: 0.5209

Flow Frequency Method: Log Pearson Type III 17B

Flow Frequency Return Periods for Predeveloped. POC #1

Return Period	**Flow(cfs)**
2 year	0.001087
5 year	0.003643
10 year	0.007324
25 year	0.016241
50 year	0.027967
100 year	0.046504

Flow Frequency Return Periods for Mitigated. POC #1

Return Period	**Flow(cfs)**
2 year	0.184315
5 year	0.279468
10 year	0.344139
25 year	0.426674
50 year	0.488381
100 year	0.550083

Annual Peaks

Annual Peaks for Predeveloped and Mitigated. POC #1

Year	**Predeveloped**	**Mitigated**
1949	0.001	0.146
1950	0.016	0.314
1951	0.003	0.175
1952	0.001	0.129
1953	0.000	0.114
1954	0.003	0.106
1955	0.000	0.164
1956	0.006	0.139
1957	0.001	0.237
1958	0.001	0.112

1959	0.001	0.118
1960	0.003	0.180
1961	0.002	0.107
1962	0.000	0.060
1963	0.001	0.100
1964	0.004	0.121
1965	0.001	0.101
1966	0.001	0.154
1967	0.010	0.291
1968	0.003	0.229
1969	0.001	0.213
1970	0.000	0.214
1971	0.001	0.206
1972	0.009	0.251
1973	0.000	0.090
1974	0.001	0.064
1975	0.002	0.235
1976	0.003	0.169
1977	0.000	0.061
1978	0.000	0.232
1979	0.000	0.099
1980	0.000	0.201
1981	0.000	0.242
1982	0.002	0.354
1983	0.000	0.280
1984	0.001	0.097
1985	0.000	0.246
1986	0.000	0.179
1987	0.003	0.209
1988	0.000	0.075
1989	0.000	0.000
1990	0.024	0.452
1991	0.008	0.336
1992	0.000	0.164
1993	0.000	0.095
1994	0.000	0.000
1995	0.006	0.148
1996	0.016	0.241
1997	0.003	0.154
1998	0.001	0.161
1999	0.007	0.432
2000	0.000	0.178
2001	0.000	0.100
2002	0.002	0.306
2003	0.001	0.089
2004	0.001	0.457
2005	0.000	0.190
2006	0.003	0.163
2007	0.044	0.421
2008	0.007	0.317
2009	0.000	0.217

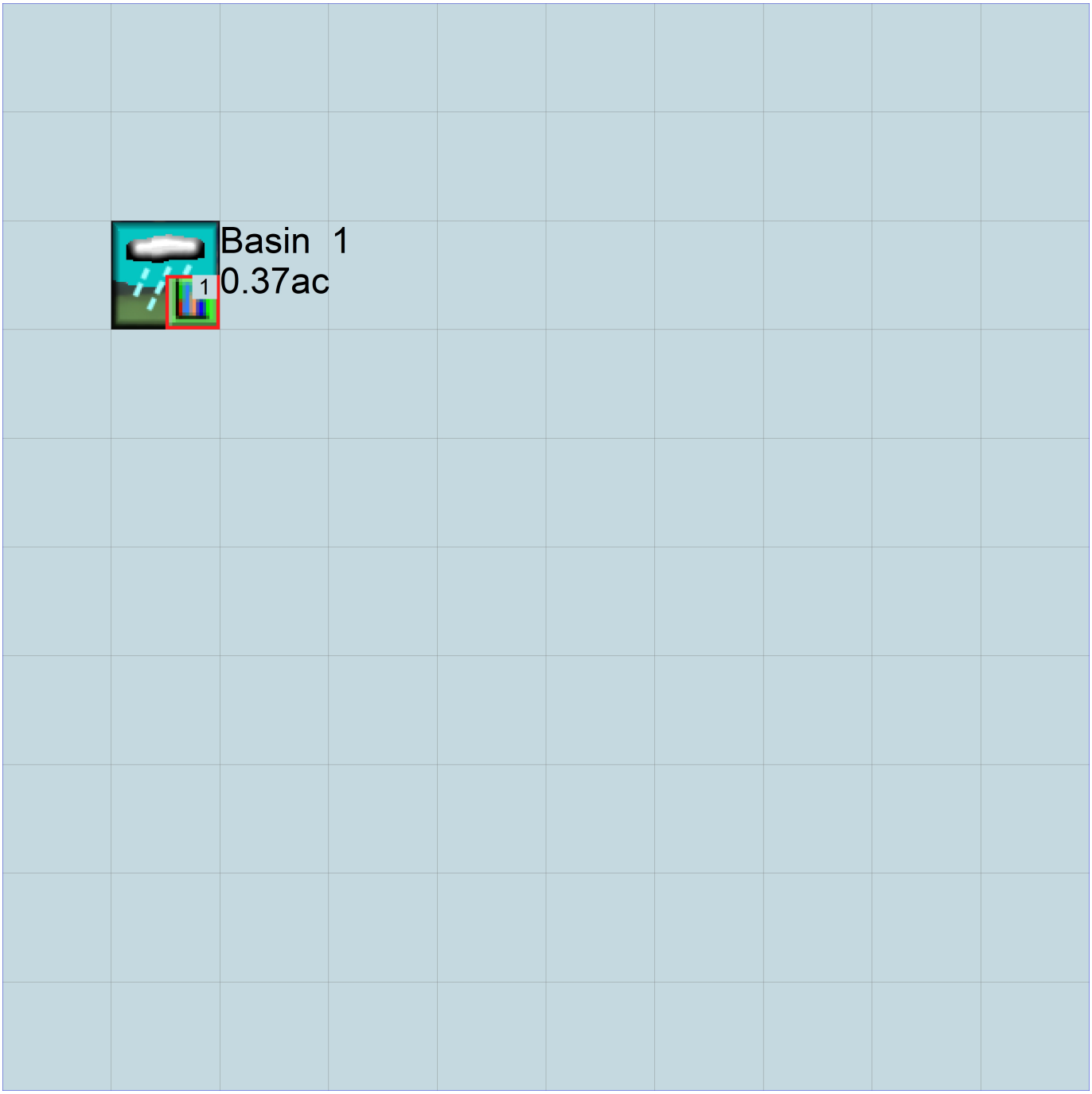
Ranked Annual Peaks

Ranked Annual Peaks for Predeveloped and Mitigated. POC #1

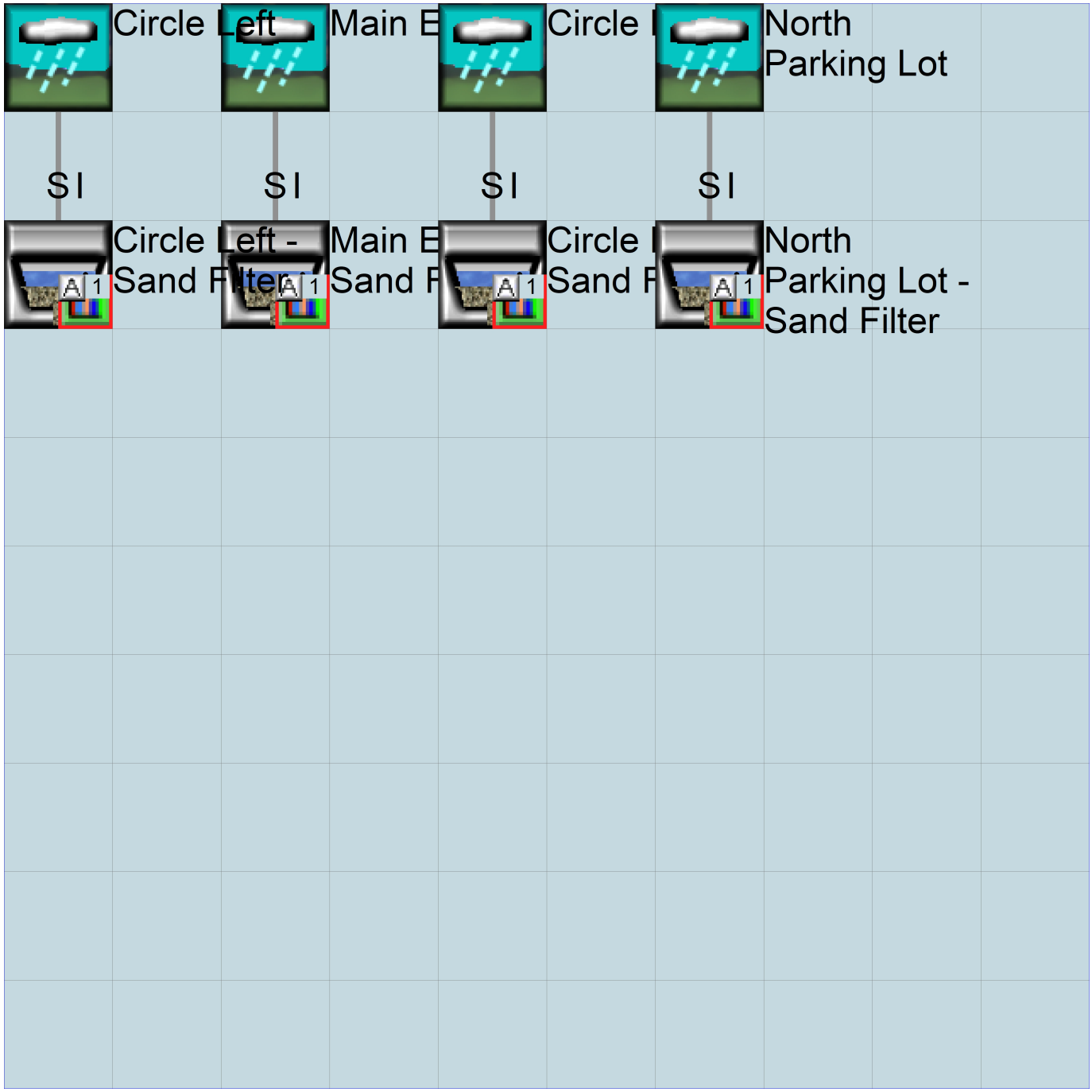
Rank	Predeveloped	Mitigated
1	0.0444	0.4571
2	0.0238	0.4520
3	0.0164	0.4315

4	0.0157	0.4205
5	0.0098	0.3545
6	0.0091	0.3361
7	0.0080	0.3173
8	0.0072	0.3135
9	0.0071	0.3064
10	0.0065	0.2907
11	0.0058	0.2803
12	0.0041	0.2506
13	0.0034	0.2463
14	0.0031	0.2415
15	0.0029	0.2405
16	0.0027	0.2370
17	0.0027	0.2346
18	0.0026	0.2320
19	0.0026	0.2293
20	0.0026	0.2170
21	0.0019	0.2136
22	0.0018	0.2126
23	0.0018	0.2090
24	0.0016	0.2055
25	0.0014	0.2009
26	0.0014	0.1903
27	0.0014	0.1800
28	0.0013	0.1791
29	0.0011	0.1782
30	0.0010	0.1747
31	0.0010	0.1690
32	0.0010	0.1643
33	0.0009	0.1637
34	0.0009	0.1628
35	0.0008	0.1611
36	0.0008	0.1540
37	0.0007	0.1536
38	0.0007	0.1478
39	0.0006	0.1460
40	0.0005	0.1394
41	0.0004	0.1289
42	0.0003	0.1209
43	0.0003	0.1179
44	0.0003	0.1143
45	0.0003	0.1117
46	0.0003	0.1071
47	0.0003	0.1064
48	0.0003	0.1015
49	0.0003	0.1001
50	0.0003	0.0998
51	0.0003	0.0987
52	0.0003	0.0971
53	0.0003	0.0954
54	0.0003	0.0904
55	0.0003	0.0891
56	0.0003	0.0750
57	0.0003	0.0638
58	0.0003	0.0607
59	0.0003	0.0598
60	0.0003	0.0000
61	0.0002	0.0000

Appendix
Predeveloped Schematic



Mitigated Schematic



Predeveloped UCI File

```
RUN

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

FILES
<File>  <Un#>   <-----------File Name------------------------------>***
<-ID->                                                              ***
WDM        26   WildlifeMeadows_WWHM Sand Filter Sizing.wdm
MESSU      25   PreWildlifeMeadows_WWHM Sand Filter Sizing.MES
           27   PreWildlifeMeadows_WWHM Sand Filter Sizing.L61
           28   PreWildlifeMeadows_WWHM Sand Filter Sizing.L62
           30   POCWildlifeMeadows_WWHM Sand Filter Sizing1.dat
END FILES

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

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

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

```
  PWAT-PARM1
    <PLS >  PWATER variable monthly parameter value flags  ***
    # -  # CSNO RTOP UZFG  VCS  VUZ  VNN VIFW VIRC  VLE INFC  HWT ***
    1         0    0    0    0    0    0    0    0    0    0    0
  END PWAT-PARM1

  PWAT-PARM2
    <PLS >      PWATER input info: Part 2         ***
    # -  # ***FOREST      LZSN    INFILT      LSUR     SLSUR     KVARY     AGWRC
    1             0         5         2       400      0.05       0.3     0.996
  END PWAT-PARM2

  PWAT-PARM3
    <PLS >      PWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN    INFEXP    INFILD    DEEPFR    BASETP    AGWETP
    1             0         0         2         2         0         0         0
  END PWAT-PARM3
  PWAT-PARM4
    <PLS >     PWATER input info: Part 4                              ***
    # -  #     CEPSC      UZSN      NSUR     INTFW       IRC     LZETP ***
    1          0.2       0.5      0.35         0       0.7       0.7
  END PWAT-PARM4
  PWAT-PARM6
    <PLS >      PWATER input info: Part 3         ***
    # -  # ***MELEV     BELV      GWDATM    PCW       PGW       UPGW
    1           400         0         0      0.35      0.38      0.45
  END PWAT-PARM6
  PWAT-PARM7
    <PLS >      PWATER input info: Part 3         ***
    <PLS > ***STABNO      SRRC     SREXP     IFWSC     DELTA    UELFAC    LELFAC
    1           501       0.1         0         4       0.2         4       2.5
  END PWAT-PARM7

  PWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
               ran from 1990 to end of 1992 (pat 1-11-95) RUN 21 ***
    # -  # ***  CEPS      SURS       UZS      IFWS       LZS      AGWS      GWVS
    1             0         0         0         0         3         1         0
  END PWAT-STATE1

END PERLND

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

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

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

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

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

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

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

END IMPLND

SCHEMATIC
<-Source->                  <--Area-->     <-Target->   MBLK   ***
<Name>   #                  <-factor->     <Name>   #   Tbl#   ***
Basin  1***
PERLND   1                      0.3739     COPY   501     12
PERLND   1                      0.3739     COPY   501     13

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

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



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

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

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

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

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

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

```
SPEC-ACTIONS
END SPEC-ACTIONS
FTABLES
END FTABLES

EXT SOURCES
<-Volume-> <Member> SsysSgap<--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   # <Name> # tem strg<-factor->strg <Name>   #   #        <Name> # #  ***
WDM      2 PREC     ENGL    1.333          PERLND   1 999 EXTNL  PREC
WDM      2 PREC     ENGL    1.333          IMPLND   1 999 EXTNL  PREC
WDM      1 EVAP     ENGL    0.76           PERLND   1 999 EXTNL  PETINP
WDM      1 EVAP     ENGL    0.76           IMPLND   1 999 EXTNL  PETINP

END EXT SOURCES

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

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

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


END MASS-LINK

END RUN
```

Mitigated UCI File

```
RUN

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

FILES
<File>  <Un#>   <-----------File Name------------------------------>***
<-ID->                                                              ***
WDM         26   WildlifeMeadows_WWHM Sand Filter Sizing.wdm
MESSU       25   MitWildlifeMeadows_WWHM Sand Filter Sizing.MES
            27   MitWildlifeMeadows_WWHM Sand Filter Sizing.L61
            28   MitWildlifeMeadows_WWHM Sand Filter Sizing.L62
            30   POCWildlifeMeadows_WWHM Sand Filter Sizing1.dat
END FILES

OPN SEQUENCE
    INGRP              INDELT 00:15
      IMPLND       1
      IMPLND      11
      RCHRES       1
      RCHRES       2
      RCHRES       3
      RCHRES       4
      COPY         1
      COPY       501
      DISPLY       1
    END INGRP
END OPN SEQUENCE
DISPLY
  DISPLY-INFO1
    # -  #<----------Title---------->***TRAN PIVL DIG1 FIL1  PYR DIG2 FIL2 YRND
    1        Main Entry - Sand Filter    MAX                   1    2   30    9
  END DISPLY-INFO1
END DISPLY
COPY
  TIMESERIES
    # -  #  NPT  NMN ***
    1         1    1
  501         1    1
  END TIMESERIES
END COPY
GENER
  OPCODE
    #    # OPCD ***
  END OPCODE
  PARM
    #    #         K ***
  END PARM
END GENER
PERLND
  GEN-INFO
    <PLS ><-------Name------->NBLKS   Unit-systems   Printer ***
    # -  #                          User  t-series Engl Metr ***
                                          in  out           ***
  END GEN-INFO
  *** Section PWATER***

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

  PRINT-INFO
    <PLS > ***************** Print-flags **************************** PIVL  PYR
```

```
    # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC  *********
  END PRINT-INFO

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

  PWAT-PARM2
    <PLS >      PWATER input info: Part 2         ***
    # -  # ***FOREST      LZSN    INFILT      LSUR     SLSUR     KVARY     AGWRC
  END PWAT-PARM2

  PWAT-PARM3
    <PLS >      PWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN    INFEXP    INFILD    DEEPFR    BASETP    AGWETP
  END PWAT-PARM3
  PWAT-PARM4
    <PLS >     PWATER input info: Part 4                              ***
    # -  #     CEPSC      UZSN      NSUR     INTFW       IRC     LZETP ***
  END PWAT-PARM4

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

END PERLND

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

  ACTIVITY
    <PLS > ************ Active Sections ******************************
    # -  # ATMP SNOW IWAT  SLD  IWG IQAL   ***
    1         0    0    1    0    0    0
   11         0    0    1    0    0    0
  END ACTIVITY

  PRINT-INFO
    <ILS > ******** Print-flags ******** PIVL  PYR
    # -  # ATMP SNOW IWAT  SLD  IWG IQAL    *********
    1         0    0    4    0    0    0    1    9
   11         0    0    4    0    0    0    1    9
  END PRINT-INFO

  IWAT-PARM1
    <PLS >  IWATER variable monthly parameter value flags  ***
    # -  # CSNO RTOP  VRS  VNN RTLI     ***
    1         0    0    0    0    0
   11         0    0    0    0    0
  END IWAT-PARM1

  IWAT-PARM2
    <PLS >      IWATER input info: Part 2         ***
    # -  # ***  LSUR     SLSUR      NSUR     RETSC
    1            400      0.01       0.1       0.1
   11            400      0.01       0.1       0.1
  END IWAT-PARM2

  IWAT-PARM3
    <PLS >      IWATER input info: Part 3         ***
```

```
    # -  # ***PETMAX    PETMIN
    1              0         0
   11              0         0
  END IWAT-PARM3

  IWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
    # -  # ***  RETS      SURS
    1              0         0
   11              0         0
  END IWAT-STATE1

END IMPLND

SCHEMATIC
<-Source->                  <--Area-->     <-Target->   MBLK   ***
<Name>   #                  <-factor->     <Name>   #   Tbl#   ***
Main Entry***
IMPLND   1                      0.1949     RCHRES   1      5
Circle Left***
IMPLND   1                      0.0895     RCHRES   2      5
Circle Right***
IMPLND   1                      0.0895     RCHRES   3      5
North Parking Lot***
IMPLND  11                       0.147     RCHRES   4      5

******Routing******
IMPLND   1                      0.1949     COPY     1     15
IMPLND   1                      0.0895     COPY     1     15
IMPLND   1                      0.0895     COPY     1     15
IMPLND  11                       0.147     COPY     1     15
RCHRES   1                          1     COPY   501     17
RCHRES   2                          1     COPY   501     17
RCHRES   3                          1     COPY   501     17
RCHRES   4                          1     COPY   501     17
END SCHEMATIC

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



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

RCHRES
  GEN-INFO
    RCHRES       Name        Nexits   Unit Systems   Printer                ***
    # -  #<------------------><---> User T-series  Engl Metr LKFG           ***
                                        in  out                             ***
    1     Main Entry - San-035    2    1    1    1   28    0    1
    2     Circle Left - Sa-038    2    1    1    1   28    0    1
    3     Circle Right - S-040    2    1    1    1   28    0    1
    4     North Parking Lo-044    2    1    1    1   28    0    1
  END GEN-INFO
  *** Section RCHRES***

  ACTIVITY
    <PLS > ************ Active Sections ******************************
    # -  # HYFG ADFG CNFG HTFG SDFG GQFG OXFG NUFG PKFG PHFG ***
    1         1    0    0    0    0    0    0    0    0    0
    2         1    0    0    0    0    0    0    0    0    0
    3         1    0    0    0    0    0    0    0    0    0
    4         1    0    0    0    0    0    0    0    0    0
  END ACTIVITY

  PRINT-INFO
```

```
    <PLS > ***************** Print-flags ****************** PIVL  PYR
    # -  # HYDR ADCA CONS HEAT  SED  GQL OXRX NUTR PLNK PHCB PIVL  PYR  *********
    1         4    0    0    0    0    0    0    0    0    0    1    9
    2         4    0    0    0    0    0    0    0    0    0    1    9
    3         4    0    0    0    0    0    0    0    0    0    1    9
    4         4    0    0    0    0    0    0    0    0    0    1    9
  END PRINT-INFO

  HYDR-PARM1
    RCHRES  Flags for each HYDR Section                                    ***
    # -  #  VC A1 A2 A3  ODFVFG for each *** ODGTFG for each     FUNCT  for each
           FG FG FG FG  possible  exit  *** possible  exit      possible  exit
            *  *  *  *    *  *  *  *  *      *  *  *  *  *       ***
    1        0  1  0  0    4  5  0  0  0       0  0  0  0  0       2  2  2  2  2
    2        0  1  0  0    4  5  0  0  0       0  0  0  0  0       2  2  2  2  2
    3        0  1  0  0    4  5  0  0  0       0  0  0  0  0       2  2  2  2  2
    4        0  1  0  0    4  5  0  0  0       0  0  0  0  0       2  2  2  2  2
  END HYDR-PARM1

  HYDR-PARM2
    # -  #    FTABNO       LEN      DELTH     STCOR        KS      DB50       ***
  <------><--------><--------><--------><--------><--------><-------->       ***
    1              1      0.01       0.0       0.0       0.5       0.0
    2              2      0.01       0.0       0.0       0.5       0.0
    3              3      0.01       0.0       0.0       0.5       0.0
    4              4      0.02       0.0       0.0       0.5       0.0
  END HYDR-PARM2
  HYDR-INIT
    RCHRES  Initial conditions for each HYDR section                       ***
    # -  # ***   VOL     Initial  value  of COLIND     Initial  value  of OUTDGT
         *** ac-ft     for each possible exit        for each possible exit
  <------><-------->     <---><---><---><---><---> *** <---><---><---><---><--->
    1            0         4.0  5.0  0.0  0.0  0.0       0.0  0.0  0.0  0.0  0.0
    2            0         4.0  5.0  0.0  0.0  0.0       0.0  0.0  0.0  0.0  0.0
    3            0         4.0  5.0  0.0  0.0  0.0       0.0  0.0  0.0  0.0  0.0
    4            0         4.0  5.0  0.0  0.0  0.0       0.0  0.0  0.0  0.0  0.0
  END HYDR-INIT
END RCHRES

SPEC-ACTIONS
END SPEC-ACTIONS
FTABLES
  FTABLE      1
   91    5
      Depth      Area    Volume  Outflow1  Outflow2  Velocity  Travel Time***
       (ft)   (acres) (acre-ft)   (cfs)      (cfs)   (ft/sec)    (Minutes)***
  0.000000  0.008999  0.000000  0.000000  0.000000
  0.022222  0.008999  0.000200  0.000000  0.009209
  0.044444  0.008999  0.000400  0.000000  0.009343
  0.066667  0.008999  0.000600  0.000000  0.009477
  0.088889  0.008999  0.000800  0.000000  0.009612
  0.111111  0.008999  0.001000  0.000000  0.009746
  0.133333  0.008999  0.001200  0.000000  0.009881
  0.155556  0.008999  0.001400  0.000000  0.010015
  0.177778  0.008999  0.001600  0.000000  0.010150
  0.200000  0.008999  0.001800  0.000000  0.010284
  0.222222  0.008999  0.002000  0.000000  0.010418
  0.244444  0.008999  0.002200  0.000000  0.010553
  0.266667  0.008999  0.002400  0.000000  0.010687
  0.288889  0.008999  0.002600  0.000000  0.010822
  0.311111  0.008999  0.002800  0.000000  0.010956
  0.333333  0.008999  0.003000  0.000000  0.011091
  0.355556  0.008999  0.003200  0.000000  0.011225
  0.377778  0.008999  0.003400  0.000000  0.011359
  0.400000  0.008999  0.003600  0.000000  0.011494
  0.422222  0.008999  0.003800  0.000000  0.011628
  0.444444  0.008999  0.004000  0.000000  0.011763
  0.466667  0.008999  0.004200  0.000000  0.011897
  0.488889  0.008999  0.004400  0.000000  0.012032
  0.511111  0.008999  0.004600  0.000000  0.012166
```

```
0.533333  0.008999  0.004800  0.000000  0.012300
0.555556  0.008999  0.004999  0.000000  0.012435
0.577778  0.008999  0.005199  0.000000  0.012569
0.600000  0.008999  0.005399  0.000000  0.012704
0.622222  0.008999  0.005599  0.000000  0.012838
0.644444  0.008999  0.005799  0.000000  0.012973
0.666667  0.008999  0.005999  0.000000  0.013107
0.688889  0.008999  0.006199  0.000000  0.013241
0.711111  0.008999  0.006399  0.000000  0.013376
0.733333  0.008999  0.006599  0.000000  0.013510
0.755556  0.008999  0.006799  0.000000  0.013645
0.777778  0.008999  0.006999  0.000000  0.013779
0.800000  0.008999  0.007199  0.000000  0.013914
0.822222  0.008999  0.007399  0.000000  0.014048
0.844444  0.008999  0.007599  0.000000  0.014182
0.866667  0.008999  0.007799  0.000000  0.014317
0.888889  0.008999  0.007999  0.000000  0.014451
0.911111  0.008999  0.008199  0.000000  0.014586
0.933333  0.008999  0.008399  0.000000  0.014720
0.955556  0.008999  0.008599  0.000000  0.014855
0.977778  0.008999  0.008799  0.000000  0.014989
1.000000  0.008999  0.008999  0.000000  0.015123
1.022222  0.008999  0.009199  0.052737  0.015258
1.044444  0.008999  0.009399  0.149070  0.015392
1.066667  0.008999  0.009599  0.273695  0.015527
1.088889  0.008999  0.009799  0.421060  0.015661
1.111111  0.008999  0.009999  0.587805  0.015796
1.133333  0.008999  0.010199  0.771465  0.015930
1.155556  0.008999  0.010399  0.970000  0.016064
1.177778  0.008999  0.010599  1.181580  0.016199
1.200000  0.008999  0.010799  1.404464  0.016333
1.222222  0.008999  0.010999  1.636945  0.016468
1.244444  0.008999  0.011199  1.877310  0.016602
1.266667  0.008999  0.011399  2.123824  0.016737
1.288889  0.008999  0.011599  2.374724  0.016871
1.311111  0.008999  0.011799  2.628224  0.017005
1.333333  0.008999  0.011999  2.882519  0.017140
1.355556  0.008999  0.012199  3.135803  0.017274
1.377778  0.008999  0.012399  3.386283  0.017409
1.400000  0.008999  0.012599  3.632201  0.017543
1.422222  0.008999  0.012799  3.871856  0.017678
1.444444  0.008999  0.012999  4.103633  0.017812
1.466667  0.008999  0.013199  4.326027  0.017947
1.488889  0.008999  0.013399  4.537676  0.018081
1.511111  0.008999  0.013599  4.737392  0.018215
1.533333  0.008999  0.013799  4.924197  0.018350
1.555556  0.008999  0.013999  5.097354  0.018484
1.577778  0.008999  0.014199  5.256407  0.018619
1.600000  0.008999  0.014399  5.401220  0.018753
1.622222  0.008999  0.014599  5.532017  0.018888
1.644444  0.008999  0.014798  5.649420  0.019022
1.666667  0.008999  0.014998  5.754494  0.019156
1.688889  0.008999  0.015198  5.848795  0.019291
1.711111  0.008999  0.015398  5.934405  0.019425
1.733333  0.008999  0.015598  6.013989  0.019560
1.755556  0.008999  0.015798  6.159923  0.019694
1.777778  0.008999  0.015998  6.249853  0.019829
1.800000  0.008999  0.016198  6.338508  0.019963
1.822222  0.008999  0.016398  6.425940  0.020097
1.844444  0.008999  0.016598  6.512198  0.020232
1.866667  0.008999  0.016798  6.597328  0.020366
1.888889  0.008999  0.016998  6.681374  0.020501
1.911111  0.008999  0.017198  6.764376  0.020635
1.933333  0.008999  0.017398  6.846371  0.020770
1.955556  0.008999  0.017598  6.927396  0.020904
1.977778  0.008999  0.017798  7.007484  0.021038
2.000000  0.008999  0.017998  7.086668  0.021173
END FTABLE  1
FTABLE      2
 91    5
```

Depth (ft)	Area (acres)	Volume (acre-ft)	Outflow1 (cfs)	Outflow2 (cfs)	Velocity (ft/sec)	Travel Time*** (Minutes)***
0.000000	0.004132	0.000000	0.000000	0.000000		
0.022222	0.004132	0.000092	0.000000	0.004228		
0.044444	0.004132	0.000184	0.000000	0.004290		
0.066667	0.004132	0.000275	0.000000	0.004352		
0.088889	0.004132	0.000367	0.000000	0.004414		
0.111111	0.004132	0.000459	0.000000	0.004475		
0.133333	0.004132	0.000551	0.000000	0.004537		
0.155556	0.004132	0.000643	0.000000	0.004599		
0.177778	0.004132	0.000735	0.000000	0.004660		
0.200000	0.004132	0.000826	0.000000	0.004722		
0.222222	0.004132	0.000918	0.000000	0.004784		
0.244444	0.004132	0.001010	0.000000	0.004846		
0.266667	0.004132	0.001102	0.000000	0.004907		
0.288889	0.004132	0.001194	0.000000	0.004969		
0.311111	0.004132	0.001286	0.000000	0.005031		
0.333333	0.004132	0.001377	0.000000	0.005093		
0.355556	0.004132	0.001469	0.000000	0.005154		
0.377778	0.004132	0.001561	0.000000	0.005216		
0.400000	0.004132	0.001653	0.000000	0.005278		
0.422222	0.004132	0.001745	0.000000	0.005340		
0.444444	0.004132	0.001837	0.000000	0.005401		
0.466667	0.004132	0.001928	0.000000	0.005463		
0.488889	0.004132	0.002020	0.000000	0.005525		
0.511111	0.004132	0.002112	0.000000	0.005586		
0.533333	0.004132	0.002204	0.000000	0.005648		
0.555556	0.004132	0.002296	0.000000	0.005710		
0.577778	0.004132	0.002388	0.000000	0.005772		
0.600000	0.004132	0.002479	0.000000	0.005833		
0.622222	0.004132	0.002571	0.000000	0.005895		
0.644444	0.004132	0.002663	0.000000	0.005957		
0.666667	0.004132	0.002755	0.000000	0.006019		
0.688889	0.004132	0.002847	0.000000	0.006080		
0.711111	0.004132	0.002938	0.000000	0.006142		
0.733333	0.004132	0.003030	0.000000	0.006204		
0.755556	0.004132	0.003122	0.000000	0.006265		
0.777778	0.004132	0.003214	0.000000	0.006327		
0.800000	0.004132	0.003306	0.000000	0.006389		
0.822222	0.004132	0.003398	0.000000	0.006451		
0.844444	0.004132	0.003489	0.000000	0.006512		
0.866667	0.004132	0.003581	0.000000	0.006574		
0.888889	0.004132	0.003673	0.000000	0.006636		
0.911111	0.004132	0.003765	0.000000	0.006698		
0.933333	0.004132	0.003857	0.000000	0.006759		
0.955556	0.004132	0.003949	0.000000	0.006821		
0.977778	0.004132	0.004040	0.000000	0.006883		
1.000000	0.004132	0.004132	0.000000	0.006944		
1.022222	0.004132	0.004224	0.052737	0.007006		
1.044444	0.004132	0.004316	0.149070	0.007068		
1.066667	0.004132	0.004408	0.273695	0.007130		
1.088889	0.004132	0.004500	0.421060	0.007191		
1.111111	0.004132	0.004591	0.587805	0.007253		
1.133333	0.004132	0.004683	0.771465	0.007315		
1.155556	0.004132	0.004775	0.970000	0.007377		
1.177778	0.004132	0.004867	1.181580	0.007438		
1.200000	0.004132	0.004959	1.404464	0.007500		
1.222222	0.004132	0.005051	1.636945	0.007562		
1.244444	0.004132	0.005142	1.877310	0.007623		
1.266667	0.004132	0.005234	2.123824	0.007685		
1.288889	0.004132	0.005326	2.374724	0.007747		
1.311111	0.004132	0.005418	2.628224	0.007809		
1.333333	0.004132	0.005510	2.882519	0.007870		
1.355556	0.004132	0.005601	3.135803	0.007932		
1.377778	0.004132	0.005693	3.386283	0.007994		
1.400000	0.004132	0.005785	3.632201	0.008056		
1.422222	0.004132	0.005877	3.871856	0.008117		
1.444444	0.004132	0.005969	4.103633	0.008179		
1.466667	0.004132	0.006061	4.326027	0.008241		
1.488889	0.004132	0.006152	4.537676	0.008302		

1.511111	0.004132	0.006244	4.737392	0.008364
1.533333	0.004132	0.006336	4.924197	0.008426
1.555556	0.004132	0.006428	5.097354	0.008488
1.577778	0.004132	0.006520	5.256407	0.008549
1.600000	0.004132	0.006612	5.401220	0.008611
1.622222	0.004132	0.006703	5.532017	0.008673
1.644444	0.004132	0.006795	5.649420	0.008735
1.666667	0.004132	0.006887	5.754494	0.008796
1.688889	0.004132	0.006979	5.848795	0.008858
1.711111	0.004132	0.007071	5.934405	0.008920
1.733333	0.004132	0.007163	6.013989	0.008981
1.755556	0.004132	0.007254	6.159923	0.009043
1.777778	0.004132	0.007346	6.249853	0.009105
1.800000	0.004132	0.007438	6.338508	0.009167
1.822222	0.004132	0.007530	6.425940	0.009228
1.844444	0.004132	0.007622	6.512198	0.009290
1.866667	0.004132	0.007713	6.597328	0.009352
1.888889	0.004132	0.007805	6.681374	0.009414
1.911111	0.004132	0.007897	6.764376	0.009475
1.933333	0.004132	0.007989	6.846371	0.009537
1.955556	0.004132	0.008081	6.927396	0.009599
1.977778	0.004132	0.008173	7.007484	0.009660
2.000000	0.004132	0.008264	7.086668	0.009722

END FTABLE 2

FTABLE 3

91 5

Depth (ft)	Area (acres)	Volume (acre-ft)	Outflow1 (cfs)	Outflow2 (cfs)	Velocity (ft/sec)	Travel Time*** (Minutes)***
0.000000	0.004132	0.000000	0.000000	0.000000		
0.022222	0.004132	0.000092	0.000000	0.004228		
0.044444	0.004132	0.000184	0.000000	0.004290		
0.066667	0.004132	0.000275	0.000000	0.004352		
0.088889	0.004132	0.000367	0.000000	0.004414		
0.111111	0.004132	0.000459	0.000000	0.004475		
0.133333	0.004132	0.000551	0.000000	0.004537		
0.155556	0.004132	0.000643	0.000000	0.004599		
0.177778	0.004132	0.000735	0.000000	0.004660		
0.200000	0.004132	0.000826	0.000000	0.004722		
0.222222	0.004132	0.000918	0.000000	0.004784		
0.244444	0.004132	0.001010	0.000000	0.004846		
0.266667	0.004132	0.001102	0.000000	0.004907		
0.288889	0.004132	0.001194	0.000000	0.004969		
0.311111	0.004132	0.001286	0.000000	0.005031		
0.333333	0.004132	0.001377	0.000000	0.005093		
0.355556	0.004132	0.001469	0.000000	0.005154		
0.377778	0.004132	0.001561	0.000000	0.005216		
0.400000	0.004132	0.001653	0.000000	0.005278		
0.422222	0.004132	0.001745	0.000000	0.005340		
0.444444	0.004132	0.001837	0.000000	0.005401		
0.466667	0.004132	0.001928	0.000000	0.005463		
0.488889	0.004132	0.002020	0.000000	0.005525		
0.511111	0.004132	0.002112	0.000000	0.005586		
0.533333	0.004132	0.002204	0.000000	0.005648		
0.555556	0.004132	0.002296	0.000000	0.005710		
0.577778	0.004132	0.002388	0.000000	0.005772		
0.600000	0.004132	0.002479	0.000000	0.005833		
0.622222	0.004132	0.002571	0.000000	0.005895		
0.644444	0.004132	0.002663	0.000000	0.005957		
0.666667	0.004132	0.002755	0.000000	0.006019		
0.688889	0.004132	0.002847	0.000000	0.006080		
0.711111	0.004132	0.002938	0.000000	0.006142		
0.733333	0.004132	0.003030	0.000000	0.006204		
0.755556	0.004132	0.003122	0.000000	0.006265		
0.777778	0.004132	0.003214	0.000000	0.006327		
0.800000	0.004132	0.003306	0.000000	0.006389		
0.822222	0.004132	0.003398	0.000000	0.006451		
0.844444	0.004132	0.003489	0.000000	0.006512		
0.866667	0.004132	0.003581	0.000000	0.006574		
0.888889	0.004132	0.003673	0.000000	0.006636		
0.911111	0.004132	0.003765	0.000000	0.006698		

```
0.933333  0.004132  0.003857  0.000000  0.006759
0.955556  0.004132  0.003949  0.000000  0.006821
0.977778  0.004132  0.004040  0.000000  0.006883
1.000000  0.004132  0.004132  0.000000  0.006944
1.022222  0.004132  0.004224  0.052737  0.007006
1.044444  0.004132  0.004316  0.149070  0.007068
1.066667  0.004132  0.004408  0.273695  0.007130
1.088889  0.004132  0.004500  0.421060  0.007191
1.111111  0.004132  0.004591  0.587805  0.007253
1.133333  0.004132  0.004683  0.771465  0.007315
1.155556  0.004132  0.004775  0.970000  0.007377
1.177778  0.004132  0.004867  1.181580  0.007438
1.200000  0.004132  0.004959  1.404464  0.007500
1.222222  0.004132  0.005051  1.636945  0.007562
1.244444  0.004132  0.005142  1.877310  0.007623
1.266667  0.004132  0.005234  2.123824  0.007685
1.288889  0.004132  0.005326  2.374724  0.007747
1.311111  0.004132  0.005418  2.628224  0.007809
1.333333  0.004132  0.005510  2.882519  0.007870
1.355556  0.004132  0.005601  3.135803  0.007932
1.377778  0.004132  0.005693  3.386283  0.007994
1.400000  0.004132  0.005785  3.632201  0.008056
1.422222  0.004132  0.005877  3.871856  0.008117
1.444444  0.004132  0.005969  4.103633  0.008179
1.466667  0.004132  0.006061  4.326027  0.008241
1.488889  0.004132  0.006152  4.537676  0.008302
1.511111  0.004132  0.006244  4.737392  0.008364
1.533333  0.004132  0.006336  4.924197  0.008426
1.555556  0.004132  0.006428  5.097354  0.008488
1.577778  0.004132  0.006520  5.256407  0.008549
1.600000  0.004132  0.006612  5.401220  0.008611
1.622222  0.004132  0.006703  5.532017  0.008673
1.644444  0.004132  0.006795  5.649420  0.008735
1.666667  0.004132  0.006887  5.754494  0.008796
1.688889  0.004132  0.006979  5.848795  0.008858
1.711111  0.004132  0.007071  5.934405  0.008920
1.733333  0.004132  0.007163  6.013989  0.008981
1.755556  0.004132  0.007254  6.159923  0.009043
1.777778  0.004132  0.007346  6.249853  0.009105
1.800000  0.004132  0.007438  6.338508  0.009167
1.822222  0.004132  0.007530  6.425940  0.009228
1.844444  0.004132  0.007622  6.512198  0.009290
1.866667  0.004132  0.007713  6.597328  0.009352
1.888889  0.004132  0.007805  6.681374  0.009414
1.911111  0.004132  0.007897  6.764376  0.009475
1.933333  0.004132  0.007989  6.846371  0.009537
1.955556  0.004132  0.008081  6.927396  0.009599
1.977778  0.004132  0.008173  7.007484  0.009660
2.000000  0.004132  0.008264  7.086668  0.009722
END FTABLE  3
FTABLE      4
 91    5
   Depth      Area    Volume  Outflow1  Outflow2  Velocity  Travel Time***
    (ft)   (acres) (acre-ft)   (cfs)     (cfs)   (ft/sec)    (Minutes)***
0.000000  0.006657  0.000000  0.000000  0.000000
0.022222  0.006657  0.000148  0.000000  0.006812
0.044444  0.006657  0.000296  0.000000  0.006912
0.066667  0.006657  0.000444  0.000000  0.007011
0.088889  0.006657  0.000592  0.000000  0.007111
0.111111  0.006657  0.000740  0.000000  0.007210
0.133333  0.006657  0.000888  0.000000  0.007310
0.155556  0.006657  0.001036  0.000000  0.007409
0.177778  0.006657  0.001184  0.000000  0.007509
0.200000  0.006657  0.001331  0.000000  0.007608
0.222222  0.006657  0.001479  0.000000  0.007707
0.244444  0.006657  0.001627  0.000000  0.007807
0.266667  0.006657  0.001775  0.000000  0.007906
0.288889  0.006657  0.001923  0.000000  0.008006
0.311111  0.006657  0.002071  0.000000  0.008105
0.333333  0.006657  0.002219  0.000000  0.008205
```

0.355556	0.006657	0.002367	0.000000	0.008304
0.377778	0.006657	0.002515	0.000000	0.008404
0.400000	0.006657	0.002663	0.000000	0.008503
0.422222	0.006657	0.002811	0.000000	0.008603
0.444444	0.006657	0.002959	0.000000	0.008702
0.466667	0.006657	0.003107	0.000000	0.008801
0.488889	0.006657	0.003255	0.000000	0.008901
0.511111	0.006657	0.003403	0.000000	0.009000
0.533333	0.006657	0.003551	0.000000	0.009100
0.555556	0.006657	0.003699	0.000000	0.009199
0.577778	0.006657	0.003847	0.000000	0.009299
0.600000	0.006657	0.003994	0.000000	0.009398
0.622222	0.006657	0.004142	0.000000	0.009498
0.644444	0.006657	0.004290	0.000000	0.009597
0.666667	0.006657	0.004438	0.000000	0.009697
0.688889	0.006657	0.004586	0.000000	0.009796
0.711111	0.006657	0.004734	0.000000	0.009895
0.733333	0.006657	0.004882	0.000000	0.009995
0.755556	0.006657	0.005030	0.000000	0.010094
0.777778	0.006657	0.005178	0.000000	0.010194
0.800000	0.006657	0.005326	0.000000	0.010293
0.822222	0.006657	0.005474	0.000000	0.010393
0.844444	0.006657	0.005622	0.000000	0.010492
0.866667	0.006657	0.005770	0.000000	0.010592
0.888889	0.006657	0.005918	0.000000	0.010691
0.911111	0.006657	0.006066	0.000000	0.010790
0.933333	0.006657	0.006214	0.000000	0.010890
0.955556	0.006657	0.006362	0.000000	0.010989
0.977778	0.006657	0.006510	0.000000	0.011089
1.000000	0.006657	0.006657	0.000000	0.011188
1.022222	0.006657	0.006805	0.052737	0.011288
1.044444	0.006657	0.006953	0.149070	0.011387
1.066667	0.006657	0.007101	0.273695	0.011487
1.088889	0.006657	0.007249	0.421060	0.011586
1.111111	0.006657	0.007397	0.587805	0.011686
1.133333	0.006657	0.007545	0.771465	0.011785
1.155556	0.006657	0.007693	0.970000	0.011884
1.177778	0.006657	0.007841	1.181580	0.011984
1.200000	0.006657	0.007989	1.404464	0.012083
1.222222	0.006657	0.008137	1.636945	0.012183
1.244444	0.006657	0.008285	1.877310	0.012282
1.266667	0.006657	0.008433	2.123824	0.012382
1.288889	0.006657	0.008581	2.374724	0.012481
1.311111	0.006657	0.008729	2.628224	0.012581
1.333333	0.006657	0.008877	2.882519	0.012680
1.355556	0.006657	0.009025	3.135803	0.012779
1.377778	0.006657	0.009173	3.386283	0.012879
1.400000	0.006657	0.009320	3.632201	0.012978
1.422222	0.006657	0.009468	3.871856	0.013078
1.444444	0.006657	0.009616	4.103633	0.013177
1.466667	0.006657	0.009764	4.326027	0.013277
1.488889	0.006657	0.009912	4.537676	0.013376
1.511111	0.006657	0.010060	4.737392	0.013476
1.533333	0.006657	0.010208	4.924197	0.013575
1.555556	0.006657	0.010356	5.097354	0.013675
1.577778	0.006657	0.010504	5.256407	0.013774
1.600000	0.006657	0.010652	5.401220	0.013873
1.622222	0.006657	0.010800	5.532017	0.013973
1.644444	0.006657	0.010948	5.649420	0.014072
1.666667	0.006657	0.011096	5.754494	0.014172
1.688889	0.006657	0.011244	5.848795	0.014271
1.711111	0.006657	0.011392	5.934405	0.014371
1.733333	0.006657	0.011540	6.013989	0.014470
1.755556	0.006657	0.011688	6.159923	0.014570
1.777778	0.006657	0.011836	6.249853	0.014669
1.800000	0.006657	0.011983	6.338508	0.014769
1.822222	0.006657	0.012131	6.425940	0.014868
1.844444	0.006657	0.012279	6.512198	0.014967
1.866667	0.006657	0.012427	6.597328	0.015067
1.888889	0.006657	0.012575	6.681374	0.015166

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  1.911111  0.006657  0.012723  6.764376  0.015266
  1.933333  0.006657  0.012871  6.846371  0.015365
  1.955556  0.006657  0.013019  6.927396  0.015465
  1.977778  0.006657  0.013167  7.007484  0.015564
  2.000000  0.006657  0.013315  7.086668  0.015664
  END FTABLE  4
END FTABLES

EXT SOURCES
<-Volume-> <Member> SsysSgap<--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   # <Name> # tem strg<-factor->strg <Name>   #   #        <Name> # #  ***
WDM      2 PREC     ENGL    1.333          PERLND   1 999 EXTNL  PREC
WDM      2 PREC     ENGL    1.333          IMPLND   1 999 EXTNL  PREC
WDM      1 EVAP     ENGL    0.76           PERLND   1 999 EXTNL  PETINP
WDM      1 EVAP     ENGL    0.76           IMPLND   1 999 EXTNL  PETINP

END EXT SOURCES

EXT TARGETS
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Volume-> <Member> Tsys Tgap Amd ***
<Name>   #        <Name> # #<-factor->strg <Name>   # <Name>    tem strg strg***
RCHRES   1 HYDR   RO     1 1        1      WDM   1012 FLOW     ENGL      REPL
RCHRES   1 HYDR   O      1 1        1      WDM   1013 FLOW     ENGL      REPL
RCHRES   1 HYDR   O      2 1        1      WDM   1014 FLOW     ENGL      REPL
RCHRES   1 HYDR   STAGE  1 1        1      WDM   1015 STAG     ENGL      REPL
COPY     1 OUTPUT MEAN   1 1     48.4      WDM    701 FLOW     ENGL      REPL
COPY   501 OUTPUT MEAN   1 1     48.4      WDM    801 FLOW     ENGL      REPL
RCHRES   2 HYDR   RO     1 1        1      WDM   1016 FLOW     ENGL      REPL
RCHRES   2 HYDR   O      1 1        1      WDM   1017 FLOW     ENGL      REPL
RCHRES   2 HYDR   O      2 1        1      WDM   1018 FLOW     ENGL      REPL
RCHRES   2 HYDR   STAGE  1 1        1      WDM   1019 STAG     ENGL      REPL
RCHRES   3 HYDR   RO     1 1        1      WDM   1020 FLOW     ENGL      REPL
RCHRES   3 HYDR   O      1 1        1      WDM   1021 FLOW     ENGL      REPL
RCHRES   3 HYDR   O      2 1        1      WDM   1022 FLOW     ENGL      REPL
RCHRES   3 HYDR   STAGE  1 1        1      WDM   1023 STAG     ENGL      REPL
RCHRES   4 HYDR   RO     1 1        1      WDM   1024 FLOW     ENGL      REPL
RCHRES   4 HYDR   O      1 1        1      WDM   1025 FLOW     ENGL      REPL
RCHRES   4 HYDR   O      2 1        1      WDM   1026 FLOW     ENGL      REPL
RCHRES   4 HYDR   STAGE  1 1        1      WDM   1027 STAG     ENGL      REPL
END EXT TARGETS

MASS-LINK
<Volume>   <-Grp> <-Member-><--Mult-->     <Target>       <-Grp> <-Member->***
<Name>             <Name> # #<-factor->     <Name>                <Name> # #***
  MASS-LINK        5
IMPLND     IWATER SURO       0.083333      RCHRES         INFLOW IVOL
  END MASS-LINK    5

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

  MASS-LINK       17
RCHRES     OFLOW  OVOL   1                 COPY           INPUT  MEAN
  END MASS-LINK   17


END MASS-LINK

END RUN
```

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WWHM2012

PROJECT REPORT

General Model Information

Project Name:	WildlifeMeadows_WWHM Flow Control
Site Name:	Wildlife Meadows
Site Address:	27534 se kent-kangley road
City:	ravensdale
Report Date:	11/23/2022
Gage:	Seatac
Data Start:	1948/10/01
Data End:	2009/09/30
Timestep:	15 Minute
Precip Scale:	1.333
Version Date:	2019/09/13
Version:	4.2.17

POC Thresholds

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

Landuse Basin Data

Predeveloped Land Use

Basin 1

Bypass:	No
GroundWater:	No

Pervious Land Use	acre
A B, Forest, Flat	9.38
Pervious Total	9.38

Impervious Land Use	acre
Impervious Total	0
Basin Total	9.38

Element Flows To:

Surface	Interflow	Groundwater

Mitigated Land Use

Basin 1

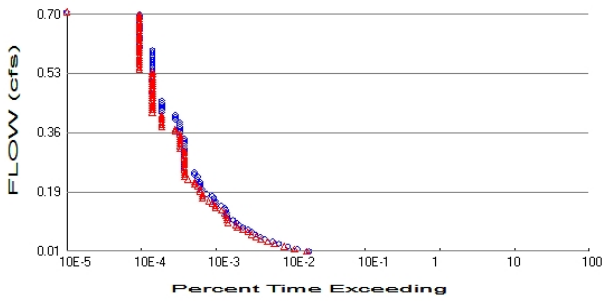
Bypass:	No
GroundWater:	No
Pervious Land Use	acre
A B, Forest, Flat	8.464
Pervious Total	8.464
Impervious Land Use	acre
Impervious Total	0
Basin Total	8.464

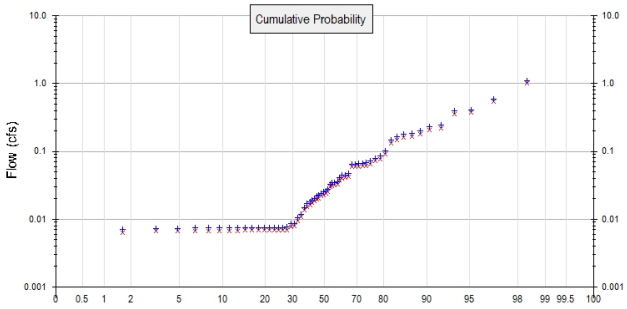
Element Flows To:

Surface	Interflow	Groundwater

Analysis Results

POC 1





\+ Predeveloped x Mitigated

Predeveloped Landuse Totals for POC #1
Total Pervious Area: 9.38
Total Impervious Area: 0

Mitigated Landuse Totals for POC #1
Total Pervious Area: 8.464
Total Impervious Area: 0

Flow Frequency Method: Log Pearson Type III 17B

Flow Frequency Return Periods for Predeveloped. POC #1

Return Period	**Flow(cfs)**
2 year	0.027277
5 year	0.09139
10 year	0.18373
25 year	0.407449
50 year	0.701599
100 year	1.16665

Flow Frequency Return Periods for Mitigated. POC #1

Return Period	**Flow(cfs)**
2 year	0.024614
5 year	0.082465
10 year	0.165788
25 year	0.36766
50 year	0.633085
100 year	1.052722

Annual Peaks

Annual Peaks for Predeveloped and Mitigated. POC #1

Year	**Predeveloped**	**Mitigated**
1949	0.019	0.017
1950	0.394	0.355
1951	0.065	0.059
1952	0.022	0.020
1953	0.008	0.007
1954	0.067	0.060
1955	0.011	0.009
1956	0.163	0.147
1957	0.026	0.024
1958	0.028	0.025

1959	0.024	0.022
1960	0.085	0.076
1961	0.041	0.037
1962	0.007	0.006
1963	0.036	0.032
1964	0.102	0.092
1965	0.022	0.020
1966	0.015	0.013
1967	0.245	0.221
1968	0.065	0.059
1969	0.033	0.030
1970	0.008	0.007
1971	0.035	0.031
1972	0.229	0.207
1973	0.007	0.007
1974	0.025	0.023
1975	0.047	0.042
1976	0.072	0.065
1977	0.007	0.007
1978	0.009	0.008
1979	0.007	0.007
1980	0.008	0.007
1981	0.008	0.007
1982	0.044	0.040
1983	0.009	0.008
1984	0.018	0.016
1985	0.007	0.007
1986	0.008	0.007
1987	0.079	0.071
1988	0.007	0.007
1989	0.008	0.007
1990	0.597	0.539
1991	0.201	0.181
1992	0.008	0.007
1993	0.007	0.007
1994	0.005	0.004
1995	0.146	0.132
1996	0.412	0.371
1997	0.065	0.059
1998	0.034	0.031
1999	0.177	0.160
2000	0.008	0.007
2001	0.007	0.007
2002	0.045	0.040
2003	0.017	0.015
2004	0.020	0.018
2005	0.008	0.007
2006	0.068	0.061
2007	1.114	1.005
2008	0.182	0.164
2009	0.012	0.011

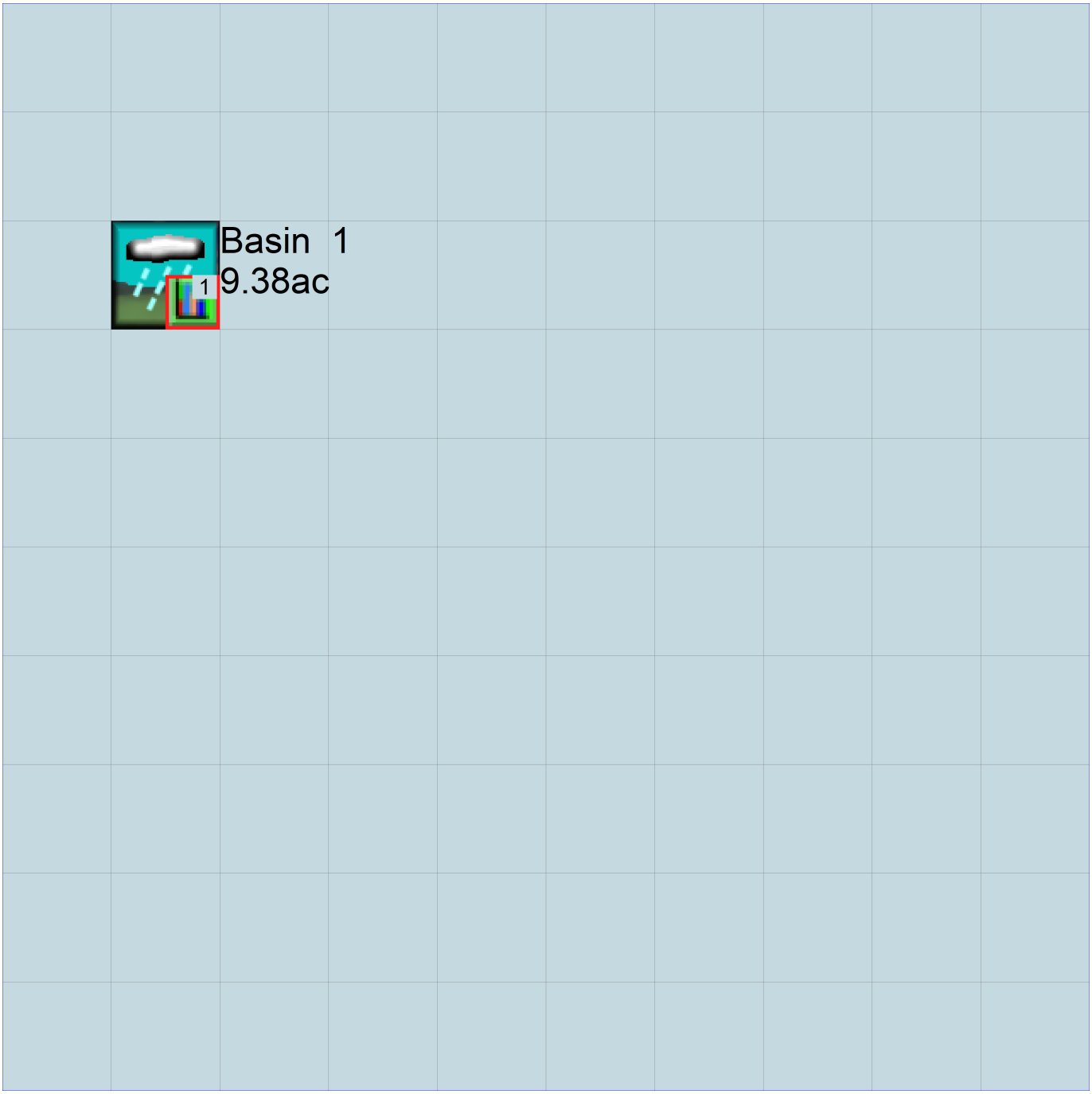
Ranked Annual Peaks

Ranked Annual Peaks for Predeveloped and Mitigated. POC #1

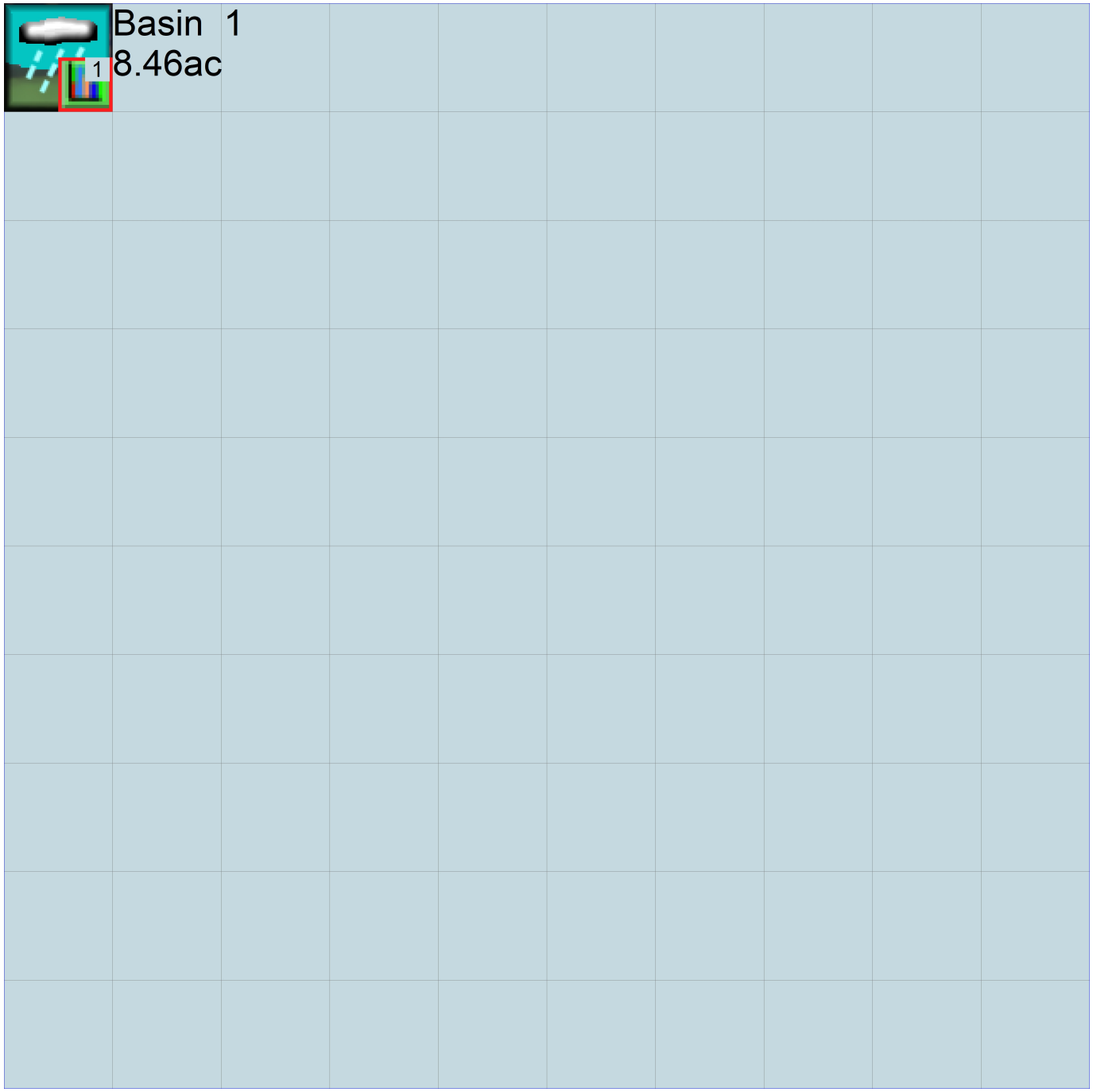
Rank	Predeveloped	Mitigated
1	1.1139	1.0051
2	0.5975	0.5391
3	0.4116	0.3714

4	0.3938	0.3554
5	0.2447	0.2208
6	0.2290	0.2066
7	0.2007	0.1811
8	0.1818	0.1640
9	0.1773	0.1600
10	0.1629	0.1470
11	0.1459	0.1316
12	0.1020	0.0920
13	0.0846	0.0764
14	0.0789	0.0712
15	0.0718	0.0648
16	0.0680	0.0614
17	0.0669	0.0604
18	0.0654	0.0590
19	0.0650	0.0586
20	0.0650	0.0586
21	0.0467	0.0422
22	0.0448	0.0405
23	0.0441	0.0398
24	0.0412	0.0371
25	0.0357	0.0322
26	0.0347	0.0313
27	0.0342	0.0308
28	0.0331	0.0298
29	0.0279	0.0252
30	0.0262	0.0236
31	0.0253	0.0228
32	0.0241	0.0217
33	0.0224	0.0202
34	0.0218	0.0197
35	0.0203	0.0183
36	0.0193	0.0174
37	0.0179	0.0161
38	0.0170	0.0153
39	0.0149	0.0134
40	0.0119	0.0107
41	0.0105	0.0095
42	0.0086	0.0078
43	0.0085	0.0077
44	0.0077	0.0069
45	0.0076	0.0068
46	0.0076	0.0068
47	0.0075	0.0068
48	0.0075	0.0068
49	0.0075	0.0068
50	0.0075	0.0068
51	0.0075	0.0068
52	0.0075	0.0068
53	0.0075	0.0068
54	0.0075	0.0068
55	0.0075	0.0067
56	0.0074	0.0067
57	0.0074	0.0066
58	0.0073	0.0066
59	0.0073	0.0066
60	0.0070	0.0063
61	0.0050	0.0045

Appendix
Predeveloped Schematic



Mitigated Schematic



Predeveloped UCI File

```
RUN

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

FILES
<File>  <Un#>   <-----------File Name------------------------------>***
<-ID->                                                              ***
WDM         26   WildlifeMeadows_WWHM Flow Control.wdm
MESSU       25   PreWildlifeMeadows_WWHM Flow Control.MES
            27   PreWildlifeMeadows_WWHM Flow Control.L61
            28   PreWildlifeMeadows_WWHM Flow Control.L62
            30   POCWildlifeMeadows_WWHM Flow Control1.dat
END FILES

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

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

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

```
  PWAT-PARM1
    <PLS >  PWATER variable monthly parameter value flags  ***
    # -  # CSNO RTOP UZFG  VCS  VUZ  VNN VIFW VIRC  VLE INFC  HWT ***
    1         0    0    0    0    0    0    0    0    0    0    0
  END PWAT-PARM1

  PWAT-PARM2
    <PLS >      PWATER input info: Part 2         ***
    # -  # ***FOREST      LZSN    INFILT      LSUR     SLSUR     KVARY     AGWRC
    1             0         5         2       400      0.05       0.3     0.996
  END PWAT-PARM2

  PWAT-PARM3
    <PLS >      PWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN    INFEXP    INFILD    DEEPFR    BASETP    AGWETP
    1             0         0         2         2         0         0         0
  END PWAT-PARM3
  PWAT-PARM4
    <PLS >     PWATER input info: Part 4                              ***
    # -  #     CEPSC      UZSN      NSUR     INTFW       IRC     LZETP ***
    1          0.2       0.5      0.35         0       0.7       0.7
  END PWAT-PARM4
  PWAT-PARM6
    <PLS >      PWATER input info: Part 3         ***
    # -  # ***MELEV     BELV      GWDATM    PCW       PGW       UPGW
    1           400         0         0      0.35      0.38      0.45
  END PWAT-PARM6
  PWAT-PARM7
    <PLS >      PWATER input info: Part 3         ***
    <PLS > ***STABNO      SRRC     SREXP     IFWSC     DELTA    UELFAC    LELFAC
    1           501       0.1         0         4       0.2         4       2.5
  END PWAT-PARM7

  PWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
               ran from 1990 to end of 1992 (pat 1-11-95) RUN 21 ***
    # -  # ***  CEPS      SURS       UZS      IFWS       LZS      AGWS      GWVS
    1             0         0         0         0         3         1         0
  END PWAT-STATE1

END PERLND

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

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

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

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

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

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

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

END IMPLND

SCHEMATIC
<-Source->                  <--Area-->     <-Target->   MBLK   ***
<Name>   #                  <-factor->     <Name>   #   Tbl#   ***
Basin  1***
PERLND   1                        9.38     COPY   501     12
PERLND   1                        9.38     COPY   501     13

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

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



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

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

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

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

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

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

```
SPEC-ACTIONS
END SPEC-ACTIONS
FTABLES
END FTABLES

EXT SOURCES
<-Volume-> <Member> SsysSgap<--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   # <Name> # tem strg<-factor->strg <Name>   #   #        <Name> # #  ***
WDM      2 PREC     ENGL    1.333          PERLND   1 999 EXTNL  PREC
WDM      2 PREC     ENGL    1.333          IMPLND   1 999 EXTNL  PREC
WDM      1 EVAP     ENGL    0.76           PERLND   1 999 EXTNL  PETINP
WDM      1 EVAP     ENGL    0.76           IMPLND   1 999 EXTNL  PETINP

END EXT SOURCES

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

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

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


END MASS-LINK

END RUN
```

Mitigated UCI File

```
RUN

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

FILES
<File>  <Un#>   <-----------File Name------------------------------>***
<-ID->                                                              ***
WDM         26   WildlifeMeadows_WWHM Flow Control.wdm
MESSU       25   MitWildlifeMeadows_WWHM Flow Control.MES
            27   MitWildlifeMeadows_WWHM Flow Control.L61
            28   MitWildlifeMeadows_WWHM Flow Control.L62
            30   POCWildlifeMeadows_WWHM Flow Control1.dat
END FILES

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

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

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

```
  PWAT-PARM1
    <PLS >  PWATER variable monthly parameter value flags  ***
    # -  # CSNO RTOP UZFG  VCS  VUZ  VNN VIFW VIRC  VLE INFC  HWT ***
    1         0    0    0    0    0    0    0    0    0    0    0
  END PWAT-PARM1

  PWAT-PARM2
    <PLS >      PWATER input info: Part 2         ***
    # -  # ***FOREST      LZSN    INFILT      LSUR     SLSUR     KVARY     AGWRC
    1             0         5         2       400      0.05       0.3     0.996
  END PWAT-PARM2

  PWAT-PARM3
    <PLS >      PWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN    INFEXP    INFILD    DEEPFR    BASETP    AGWETP
    1             0         0         2         2         0         0         0
  END PWAT-PARM3
  PWAT-PARM4
    <PLS >     PWATER input info: Part 4                              ***
    # -  #     CEPSC      UZSN      NSUR     INTFW       IRC     LZETP ***
    1          0.2       0.5      0.35         0       0.7       0.7
  END PWAT-PARM4
  PWAT-PARM6
    <PLS >      PWATER input info: Part 3         ***
    # -  # ***MELEV     BELV      GWDATM    PCW       PGW       UPGW
    1           400         0         0      0.35      0.38      0.45
  END PWAT-PARM6
  PWAT-PARM7
    <PLS >      PWATER input info: Part 3         ***
    <PLS > ***STABNO      SRRC     SREXP     IFWSC     DELTA    UELFAC    LELFAC
    1           501       0.1         0         4       0.2         4       2.5
  END PWAT-PARM7

  PWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
               ran from 1990 to end of 1992 (pat 1-11-95) RUN 21 ***
    # -  # ***  CEPS      SURS       UZS      IFWS       LZS      AGWS      GWVS
    1             0         0         0         0         3         1         0
  END PWAT-STATE1

END PERLND

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

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

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

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

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

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

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

END IMPLND

SCHEMATIC
<-Source->                  <--Area-->     <-Target->   MBLK   ***
<Name>   #                  <-factor->     <Name>   #   Tbl#   ***
Basin  1***
PERLND   1                       8.464     COPY   501     12
PERLND   1                       8.464     COPY   501     13

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

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



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

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

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

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

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

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

```
SPEC-ACTIONS
END SPEC-ACTIONS
FTABLES
END FTABLES

EXT SOURCES
<-Volume-> <Member> SsysSgap<--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   # <Name> # tem strg<-factor->strg <Name>   #   #        <Name> # #  ***
WDM      2 PREC     ENGL    1.333          PERLND   1 999 EXTNL  PREC
WDM      2 PREC     ENGL    1.333          IMPLND   1 999 EXTNL  PREC
WDM      1 EVAP     ENGL    0.76           PERLND   1 999 EXTNL  PETINP
WDM      1 EVAP     ENGL    0.76           IMPLND   1 999 EXTNL  PETINP

END EXT SOURCES

EXT TARGETS
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Volume-> <Member> Tsys Tgap Amd ***
<Name>   #        <Name> # #<-factor->strg <Name>   # <Name>    tem strg strg***
COPY     1 OUTPUT MEAN   1 1     48.4      WDM    701 FLOW     ENGL      REPL
COPY   501 OUTPUT MEAN   1 1     48.4      WDM    801 FLOW     ENGL      REPL
END EXT TARGETS

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

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


END MASS-LINK

END RUN
```

Disclaimer

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Appendix F

Operation & Maintenance Manual

NO. 2 – INFILTRATION FACILITIES

Maintenance Component	Defect or Problem	Conditions When Maintenance Is Needed	Results Expected When Maintenance Is Performed
Site	Trash and debris	Any trash and debris which exceed 1 cubic foot per 1,000 square feet (this is about equal to the amount of trash it would take to fill up one standard size office garbage can). In general, there should be no visual evidence of dumping.	Trash and debris cleared from site.
	Noxious weeds	Any noxious or nuisance vegetation which may constitute a hazard to County personnel or the public.	Noxious and nuisance vegetation removed according to applicable regulations. No danger of noxious vegetation where County personnel or the public might normally be.
	Contaminants and pollution	Any evidence of contaminants or pollution such as oil, gasoline, concrete slurries or paint.	Materials removed and disposed of according to applicable regulations. Source control BMPs implemented if appropriate. No contaminants present other than a surface oil film.
	Grass/groundcover	Grass or groundcover exceeds 18 inches in height.	Grass or groundcover mowed to a height no greater than 6 inches.
Infiltration Pond, Top or Side Slopes of Dam, Berm or Embankment	Rodent holes	Any evidence of rodent holes if facility is acting as a dam or berm, or any evidence of water piping through dam or berm via rodent holes.	Rodents removed or destroyed and dam or berm repaired.
	Tree growth	Tree growth threatens integrity of dams, berms or slopes, does not allow maintenance access, or interferes with maintenance activity. If trees are not a threat to dam, berm, or embankment integrity or not interfering with access or maintenance, they do not need to be removed.	Trees do not hinder facility performance or maintenance activities.
	Erosion	Eroded damage over 2 inches deep where cause of damage is still present or where there is potential for continued erosion. Any erosion observed on a compacted slope.	Slopes stabilized using appropriate erosion control measures. If erosion is occurring on compacted slope, a licensed civil engineer should be consulted to resolve source of erosion.
	Settlement	Any part of a dam, berm or embankment that has settled 4 inches lower than the design elevation.	Top or side slope restored to design dimensions. If settlement is significant, a licensed civil engineer should be consulted to determine the cause of the settlement.
Infiltration Pond, Tank, Vault, Trench, or Small Basin Storage Area	Sediment accumulation	If two inches or more sediment is present or a percolation test indicates facility is working at or less than 90% of design.	Facility infiltrates as designed.
	Liner damaged (If Applicable)	Liner is visible or pond does not hold water as designed.	Liner repaired or replaced.
Infiltration Tank Structure	Plugged air vent	Any blockage of the vent.	Tank or vault freely vents.
	Tank bent out of shape	Any part of tank/pipe is bent out of shape more than 10% of its design shape.	Tank repaired or replaced to design.
	Gaps between sections, damaged joints or cracks or tears in wall	A gap wider than ½-inch at the joint of any tank sections or any evidence of soil particles entering the tank at a joint or through a wall.	No water or soil entering tank through joints or walls.
Infiltration Vault Structure	Damage to wall, frame, bottom, and/or top slab	Cracks wider than ½-inch, any evidence of soil entering the structure through cracks or qualified inspection personnel determines that the vault is not structurally sound.	Vault is sealed and structurally sound.

NO. 2 – INFILTRATION FACILITIES

Maintenance Component	Defect or Problem	Conditions When Maintenance Is Needed	Results Expected When Maintenance Is Performed
Inlet/Outlet Pipes	Sediment accumulation	Sediment filling 20% or more of the pipe.	Inlet/outlet pipes clear of sediment.
	Trash and debris	Trash and debris accumulated in inlet/outlet pipes (includes floatables and non-floatables).	No trash or debris in pipes.
	Damaged	Cracks wider than ½-inch at the joint of the inlet/outlet pipes or any evidence of soil entering at the joints of the inlet/outlet pipes.	No cracks more than ¼-inch wide at the joint of the inlet/outlet pipe.
Access Manhole	Cover/lid not in place	Cover/lid is missing or only partially in place. **Any open manhole requires immediate maintenance.**	Manhole access covered.
	Locking mechanism not working	Mechanism cannot be opened by one maintenance person with proper tools. Bolts cannot be seated. Self-locking cover/lid does not work.	Mechanism opens with proper tools.
	Cover/lid difficult to remove	One maintenance person cannot remove cover/lid after applying 80 lbs of lift.	Cover/lid can be removed and reinstalled by one maintenance person.
	Ladder rungs unsafe	Missing rungs, misalignment, rust, or cracks.	Ladder meets design standards. Allows maintenance person safe access.
Large access doors/plate	Damaged or difficult to open	Large access doors or plates cannot be opened/removed using normal equipment.	Replace or repair access door so it can opened as designed.
	Gaps, doesn't cover completely	Large access doors not flat and/or access opening not completely covered.	Doors close flat; covers access opening completely.
	Lifting Rings missing, rusted	Lifting rings not capable of lifting weight of door or plate.	Lifting rings sufficient to lift or remove door or plate.
Infiltration Pond, Tank, Vault, Trench, or Small Basin Filter Bags	Plugged	Filter bag more than $^1/_2$ full.	Replace filter bag or redesign system.
Infiltration Pond, Tank, Vault, Trench, or Small Basin Pre-settling Ponds and Vaults	Sediment accumulation	6" or more of sediment has accumulated.	Pre-settling occurs as designed
Infiltration Pond, Rock Filter	Plugged	High water level on upstream side of filter remains for extended period of time or little or no water flows through filter during heavy rain storms.	Rock filter replaced evaluate need for filter and remove if not necessary.
Infiltration Pond Emergency Overflow Spillway	Rock missing	Only one layer of rock exists above native soil in area five square feet or larger, or any exposure of native soil at the top of out flow path of spillway. Rip-rap on inside slopes need not be replaced.	Spillway restored to design standards.
	Tree growth	Tree growth impedes flow or threatens stability of spillway.	Trees removed.

NO. 5 – CATCH BASINS AND MANHOLES

Maintenance Component	Defect or Problem	Condition When Maintenance is Needed	Results Expected When Maintenance is Performed
Structure	Sediment	Sediment exceeds 60% of the depth from the bottom of the catch basin to the invert of the lowest pipe into or out of the catch basin or is within 6 inches of the invert of the lowest pipe into or out of the catch basin.	Sump of catch basin contains no sediment.
	Trash and debris	Trash or debris of more than ½ cubic foot which is located immediately in front of the catch basin opening or is blocking capacity of the catch basin by more than 10%.	No Trash or debris blocking or potentially blocking entrance to catch basin.
		Trash or debris in the catch basin that exceeds $^1/_3$ the depth from the bottom of basin to invert the lowest pipe into or out of the basin.	No trash or debris in the catch basin.
		Dead animals or vegetation that could generate odors that could cause complaints or dangerous gases (e.g., methane).	No dead animals or vegetation present within catch basin.
		Deposits of garbage exceeding 1 cubic foot in volume.	No condition present which would attract or support the breeding of insects or rodents.
	Damage to frame and/or top slab	Corner of frame extends more than ¾ inch past curb face into the street (If applicable).	Frame is even with curb.
		Top slab has holes larger than 2 square inches or cracks wider than ¼ inch.	Top slab is free of holes and cracks.
		Frame not sitting flush on top slab, i.e., separation of more than ¾ inch of the frame from the top slab.	Frame is sitting flush on top slab.
	Cracks in walls or bottom	Cracks wider than ½ inch and longer than 3 feet, any evidence of soil particles entering catch basin through cracks, or maintenance person judges that catch basin is unsound.	Catch basin is sealed and is structurally sound.
		Cracks wider than ½ inch and longer than 1 foot at the joint of any inlet/outlet pipe or any evidence of soil particles entering catch basin through cracks.	No cracks more than $^1/_4$ inch wide at the joint of inlet/outlet pipe.
	Settlement/ misalignment	Catch basin has settled more than 1 inch or has rotated more than 2 inches out of alignment.	Basin replaced or repaired to design standards.
	Damaged pipe joints	Cracks wider than ½-inch at the joint of the inlet/outlet pipes or any evidence of soil entering the catch basin at the joint of the inlet/outlet pipes.	No cracks more than ¼-inch wide at the joint of inlet/outlet pipes.
	Contaminants and pollution	Any evidence of contaminants or pollution such as oil, gasoline, concrete slurries or paint.	Materials removed and disposed of according to applicable regulations. Source control BMPs implemented if appropriate. No contaminants present other than a surface oil film.
Inlet/Outlet Pipe	Sediment accumulation	Sediment filling 20% or more of the pipe.	Inlet/outlet pipes clear of sediment.
	Trash and debris	Trash and debris accumulated in inlet/outlet pipes (includes floatables and non-floatables).	No trash or debris in pipes.
	Damaged	Cracks wider than ½-inch at the joint of the inlet/outlet pipes or any evidence of soil entering at the joints of the inlet/outlet pipes.	No cracks more than ¼-inch wide at the joint of the inlet/outlet pipe.

NO. 5 – CATCH BASINS AND MANHOLES

Maintenance Component	Defect or Problem	Condition When Maintenance is Needed	Results Expected When Maintenance is Performed
Metal Grates (Catch Basins)	Unsafe grate opening	Grate with opening wider than $^{7}/_{8}$ inch.	Grate opening meets design standards.
	Trash and debris	Trash and debris that is blocking more than 20% of grate surface.	Grate free of trash and debris.
	Damaged or missing	Grate missing or broken member(s) of the grate. **Any open structure requires urgent maintenance**.	Grate is in place and meets design standards.
Manhole Cover/Lid	Cover/lid not in place	Cover/lid is missing or only partially in place. **Any open structure requires urgent maintenance**.	Cover/lid protects opening to structure.
	Locking mechanism Not Working	Mechanism cannot be opened by one maintenance person with proper tools. Bolts cannot be seated. Self-locking cover/lid does not work.	Mechanism opens with proper tools.
	Cover/lid difficult to Remove	One maintenance person cannot remove cover/lid after applying 80 lbs. of lift.	Cover/lid can be removed and reinstalled by one maintenance person.

NO. 6 – CONVEYANCE PIPES AND DITCHES

Maintenance Component	Defect or Problem	Conditions When Maintenance is Needed	Results Expected When Maintenance is Performed
Pipes	Sediment & debris accumulation	Accumulated sediment or debris that exceeds 20% of the diameter of the pipe.	Water flows freely through pipes.
	Vegetation/roots	Vegetation/roots that reduce free movement of water through pipes.	Water flows freely through pipes.
	Contaminants and pollution	Any evidence of contaminants or pollution such as oil, gasoline, concrete slurries or paint.	Materials removed and disposed of according to applicable regulations. Source control BMPs implemented if appropriate. No contaminants present other than a surface oil film.
	Damage to protective coating or corrosion	Protective coating is damaged; rust or corrosion is weakening the structural integrity of any part of pipe.	Pipe repaired or replaced.
	Damaged	Any dent that decreases the cross section area of pipe by more than 20% or is determined to have weakened structural integrity of the pipe.	Pipe repaired or replaced.
Ditches	Trash and debris	Trash and debris exceeds 1 cubic foot per 1,000 square feet of ditch and slopes.	Trash and debris cleared from ditches.
	Sediment accumulation	Accumulated sediment that exceeds 20% of the design depth.	Ditch cleaned/flushed of all sediment and debris so that it matches design.
	Noxious weeds	Any noxious or nuisance vegetation which may constitute a hazard to County personnel or the public.	Noxious and nuisance vegetation removed according to applicable regulations. No danger of noxious vegetation where County personnel or the public might normally be.
	Contaminants and pollution	Any evidence of contaminants or pollution such as oil, gasoline, concrete slurries or paint.	Materials removed and disposed of according to applicable regulations. Source control BMPs implemented if appropriate. No contaminants present other than a surface oil film.
	Vegetation	Vegetation that reduces free movement of water through ditches.	Water flows freely through ditches.
	Erosion damage to slopes	Any erosion observed on a ditch slope.	Slopes are not eroding.
	Rock lining out of place or missing (If Applicable)	One layer or less of rock exists above native soil area 5 square feet or more, any exposed native soil.	Replace rocks to design standards.

NO. 12 – ACCESS ROADS

Maintenance Component	Defect or Problem	Condition When Maintenance is Needed	Results Expected When Maintenance is Performed
Site	Trash and debris	Trash and debris exceeds 1 cubic foot per 1,000 square feet (i.e., trash and debris would fill up one standards size garbage can).	Roadway drivable by maintenance vehicles.
		Debris which could damage vehicle tires or prohibit use of road.	Roadway drivable by maintenance vehicles.
	Contaminants and pollution	Any evidence of contaminants or pollution such as oil, gasoline, concrete slurries or paint.	Materials removed and disposed of according to applicable regulations. Source control BMPs implemented if appropriate. No contaminants present other than a surface oil film.
	Blocked roadway	Any obstruction which reduces clearance above road surface to less than 14 feet.	Roadway overhead clear to 14 feet high.
		Any obstruction restricting the access to a 10- to 12 foot width for a distance of more than 12 feet or any point restricting access to less than a 10 foot width.	At least 12-foot of width on access road.
Road Surface	Erosion, settlement, potholes, soft spots, ruts	Any surface defect which hinders or prevents maintenance access.	Road drivable by maintenance vehicles.
	Vegetation on road surface	Trees or other vegetation prevent access to facility by maintenance vehicles.	Maintenance vehicles can access facility.
Shoulders and Ditches	Erosion	Erosion within 1 foot of the roadway more than 8 inches wide and 6 inches deep.	Shoulder free of erosion and matching the surrounding road.
	Weeds and brush	Weeds and brush exceed 18 inches in height or hinder maintenance access.	Weeds and brush cut to 2 inches in height or cleared in such a way as to allow maintenance access.
Modular Grid Pavement	Contaminants and pollution	Any evidence of contaminants or pollution such as oil, gasoline, concrete slurries or paint.	Materials removed and disposed of according to applicable regulations. Source control BMPs implemented if appropriate. No contaminants present other than a surface oil film.
	Damaged or missing	Access surface compacted because of broken on missing modular block.	Access road surface restored so road infiltrates.

NO. 20 – SAND FILTER VAULT

Maintenance Component	Defect or Problem	Condition When Maintenance is Needed	Results Expected When Maintenance is Performed
Site	Trash and debris	Trash and debris accumulated on facility site.	Trash and debris removed from facility site.
	Noxious weeds	Any noxious or nuisance vegetation which may constitute a hazard to County personnel or the public.	Noxious and nuisance vegetation removed according to applicable regulations. No danger of noxious vegetation where County personnel or the public might normally be.
	Contaminants and pollution	Any evidence of contaminants or pollution such as oil, gasoline, concrete slurries or paint.	Materials removed and disposed of according to applicable regulations. Source control BMPs implemented if appropriate. No contaminants present other than a surface oil film.
	Grass/groundcover	Grass or groundcover exceeds 18 inches in height.	Grass or groundcover mowed to a height no greater than 6 inches.
Pre-Treatment Chamber	Sediment accumulation	Sediment accumulation exceeds the depth of the sediment zone plus 6 inches.	Sediment storage contains no sediment.
Sand Filter Media	Sediment accumulation	Sediment depth exceeds ½-inch on sand filter media.	Sand filter freely drains at normal rate.
	Trash and debris	Trash and debris accumulated in vault (floatables and non-floatables).	No trash or debris in vault.
	Plugging	Drawdown of water through the sand filter media, takes longer than 24 hours, and/or flow through the overflow pipes occurs frequently. A sieve analysis of >4% -100 or >2% -200 requires replacing sand filter media.	Sand filter media drawdown rate is normal.
	Short circuiting	Seepage or flow occurs along the vault walls and corners. Sand eroding near inflow area. Cleanout wyes are not watertight.	Sand filter media section re-laid and compacted along perimeter of vault to form a semi-seal. Erosion protection added to dissipate force of incoming flow and curtail erosion.
Vault Structure	Damaged to walls, frame, bottom and/or top slab.	Cracks wider than ½-inch, any evidence of soil entering the structure through cracks or qualified inspection personnel determines that the vault is not structurally sound.	Vault replaced or repaired to provide complete sealing of the structure.
	Ventilation	Ventilation area blocked or plugged.	No reduction of ventilation area exists.
Underdrains and Cleanouts	Sediment/debris	Underdrains or clean-outs partially plugged, filled with sediment and/or debris or not watertight.	Underdrains and clean-outs free of sediment and debris and sealed.
Inlet/Outlet Pipe	Sediment accumulation	Sediment filling 20% or more of the pipe.	Inlet/outlet pipes clear of sediment.
	Trash and debris	Trash and debris accumulated in inlet/outlet pipes (includes floatables and non-floatables).	No trash or debris in pipes.
	Damaged	Cracks wider than ½-inch at the joint of the inlet/outlet pipes or any evidence of soil entering at the joints of the inlet/outlet pipes.	No cracks more than ¼-inch wide at the joint of the inlet/outlet pipe.

NO. 20 – SAND FILTER VAULT

Maintenance Component	Defect or Problem	Condition When Maintenance is Needed	Results Expected When Maintenance is Performed
Access Manhole	Cover/lid not in place	Cover/lid is missing or only partially in place. Any open manhole requires immediate maintenance.	Manhole access covered.
	Locking mechanism not working	Mechanism cannot be opened by one maintenance person with proper tools. Bolts cannot be seated. Self-locking cover/lid does not work.	Mechanism opens with proper tools.
	Cover/lid difficult to remove	One maintenance person cannot remove cover/lid after applying 80 lbs of lift.	Cover/lid can be removed and reinstalled by one maintenance person.
	Ladder rungs unsafe	Missing rungs, misalignment, rust, or cracks.	Ladder meets design standards. Allows maintenance person safe access.
Large access doors/plate	Damaged or difficult to open	Large access doors or plates cannot be opened/removed using normal equipment.	Replace or repair access door so it can opened as designed.
	Gaps, doesn't cover completely	Large access doors not flat and/or access opening not completely covered.	Doors close flat; covers access opening completely.
	Lifting Rings missing, rusted	Lifting rings not capable of lifting weight of door or plate.	Lifting rings sufficient to lift or remove door or plate.

NO. 25 – DRYWELL BMP

Maintenance Component	Defect or Problem	Conditions When Maintenance is Needed	Results Expected When Maintenance is Performed
Preventative	Plugging, obstructions	Any cause limiting flow into drywell.	Drywell able to receive full flow prior to and during wet season.
Site	Trash and debris	Trash or debris that could end up in the drywell is evident.	No trash or debris that could get into the drywell can be found.
Pipes	Inlet is plugged	The entrance to the pipe is restricted due to sediment, trash, or debris.	The entrance to the pipe is not restricted.
	Vegetation/roots	Vegetation/roots that reduce free movement of water through pipes.	Water flows freely through pipes.
	Plugged	Sediment or other material prevents free flow of water through the pipe.	Water flows freely through pipes.
	Broken or joint leaks.	Damage to the pipe or pipe joints allowing water to seep out.	Pipe does not allow water to exit other than at the outlet.
Structure	Basin leaks	Holes or breaks in the basin allow water to leave the basin at locations other than per design.	Basin is sealed and allows water to exit only where designed.
Filter Media	Filter media plugged	Filter media plugged.	Flow through filter media is normal.
Inspection	Frequency	Annually and prior to and following significant storms.	Inspect drywell system for any defects of deficiencies.

NO. 26 – GRAVEL FILLED INFILTRATION TRENCH BMP

Maintenance Component	Defect or Problem	Conditions When Maintenance is Needed	Results Expected When Maintenance is Performed
Preventative	Blocking, obstructions	Debris or trash limiting flow to infiltration trench.	Infiltration trench able to receive full flow prior to and during wet season.
Site	Trash and debris	Trash or debris that could end up in the infiltration trench is evident.	No trash or debris that could get into the infiltration trench can be found.
Pipes	Inlet is plugged	The entrance to the pipe is restricted due to sediment, trash, or debris.	The entrance to the pipe is not restricted.
	Vegetation/roots	Vegetation/roots that reduce free movement of water through pipes.	Water flows freely through pipes.
	Plugged	Sediment or other material prevents free flow of water through the pipe.	Water flows freely through pipes.
	Broken or joint leaks.	Damage to the pipe or pipe joints allowing water to seep out.	Pipe does not allow water to exit other than at the outlet to the trench.
Structure	Flow not reaching trench	Flows are not getting into the trench as designed.	Water enters and exits trench as designed.
	Cleanout/inspection access does not allow cleaning or inspection of trench	The cleanout/inspection access is not available.	Cleanout/inspection access is available.
Filter Media	Filter media plugged	Filter media plugged.	Flow through filter media is normal.
Inspection	Frequency	Annually and prior to and following significant storms.	Inspect infiltration trench system for any defects of deficiencies.

NO. 27 – GRAVEL FILLED DISPERSION TRENCH BMP

Maintenance Component	Defect or Problem	Conditions When Maintenance is Needed	Results Expected When Maintenance is Performed
Preventative	Blocking, obstructions	Debris or trash limiting flow to dispersion trench or preventing spreader function.	Dispersion trench able to receive full flow prior to and during wet season.
Site	Trash and debris	Trash or debris that could end up in the dispersion trench is evident.	No trash or debris that could get into the dispersion trench can be found.
Pipes	Inlet is plugged	The entrance to the pipe is restricted due to sediment, trash, or debris.	The entrance to the pipe is not restricted.
	Vegetation/roots	Vegetation/roots that reduce free movement of water through pipes.	Water flows freely through pipes.
	Plugged	Sediment or other material prevents free flow of water through the pipe.	Water flows freely through pipes.
	Broken joint or joint leaks.	Damage to the pipe or pipe joints allowing water to seep out.	Pipe does not allow water to exit other than at the outlet to the trench.
	Cleanout caps	Cleanout caps are broken, missing, or buried.	Cleanout caps are accessible and intact.
Structure	Flow not reaching trench	Flows are not getting into the trench as designed.	Water enters and exits trench as designed.
	Perforated pipe plugged	Flow not able to enter or properly exit from perforated pipe.	Water freely enters and exits perforated pipe.
	Flow not spreading evenly at outlet of trench	Outlet flows channelizing or not spreading evenly from trench.	Sheet flow occurs at the outlet of the trench.
	Cleanout/inspection access does not allow cleaning or inspection of perforated pipe	The cleanout/inspection access is not available.	Cleanout/inspection access is available.
Filter Media	Filter media plugged	Filter media plugged.	Flow through filter media is normal.
Inspection	Frequency	Annually and prior to and following significant storms.	Inspect dispersion trench system for any defects of deficiencies.

NO. 28 – NATIVE VEGETATED SURFACE / NATIVE VEGETATED LANDSCAPE BMP

Maintenance Component	Defect or Problem	Condition When Maintenance is Needed	Results Expected When Maintenance Is Performed
Site	Trash and debris	Trash and debris accumulated on the native vegetated surface/native vegetated landscape site.	Native vegetated surface site free of any trash or debris.
Vegetation	Native vegetation type	Less than two species each of native trees, shrubs, and groundcover occur in the design area.	A minimum of two species each of native trees, shrubs, and groundcover is established and healthy.
	Native vegetated area	Less than 90% if the required vegetated area has healthy growth.	A minimum of 90% of the required vegetated area has healthy growth.
	Undesirable vegetation	Weeds, blackberry, and other undesirable plants are invading more than 10% of vegetated area.	Less than 10% undesirable vegetation occurs in the required native vegetated surface area.
Vegetated Area	Soil compaction	Soil in the native vegetation area compacted.	Less than 8% of native vegetation area is compacted.
	Insufficient area	Less than 3.5 square feet of native vegetation area for every 1 square foot of impervious surface.	A minimum of 3.5 square feet of native vegetation area for every 1 square foot of impervious surface.
	Excess slope	Slope of native vegetation area greater than 15%.	Slope of native growth area does not exceed 15%.
Inspection	Frequency	Annually	Inspect native vegetation area for any defects of deficiencies

NO. 34 – SHEET FLOW BMP

Maintenance Component	Defect or Problem	Conditions When Maintenance is Needed	Results Expected When Maintenance is Performed
Site	Trash and debris	Trash and debris accumulated on the sheet flow site.	Sheet flow site free of any trash or debris.
Sheet flow area	Erosion	Soil erosion occurring in sheet flow zone.	Soil erosion is not occurring and rills and channels have been repaired.
	Concentrated flow	Sheet flow is not occurring in the sheet flow zone.	Sheet flow area is regraded to provide sheet flow.
Inspection	Frequency	Annually and after large storms	Rain harvesting equipment is functioning normally.

Appendix G

Soil Management Plan

SOIL MANAGEMENT PLAN FOR KING COUNTY SOIL IMPROVEMENT CODE

(For use with *Achieving the Post-Construction Soil Standard* brochure)

PROJECT INFORMATION

Site Address 275XX SE Kent-Kangley Road Ravensdale WA 98051	
DDES Permit Number: TBD	
Applicant: Robert Striker	Phone: (425) 766-5975
Mailing Address: P.O. Box 267 Ravensdale WA 98051	
Plan Prepared By: Briana Bennington	

ATTACHMENTS REQUIRED

_X_ To-scale site plan showing planting beds and turf areas and which soil management options will be applied, with the square foot area for each. Also show areas where soil will be left undisturbed and protected during construction.
___ Soil test results (required if proposing custom amendment rates).

AMENDMENT AND TOPSOIL CALCULATIONS

TURF AREAS (As labeled on plan) B			**TOTAL AREA**: 232 ,000 square feet
TREATMENT SELECTED:	X___ Pre-approved Amendment 1.75 inches	___ Custom Amendment ___ inches (attach tests and calculations)	___ Topsoil Import ___ inches (8" default)
AMENDMENT OR TOPSOIL	1.75 inches compost / topsoil to be applied (from above box) X 3.1 5.425 = cu. yards / 1,000 sq. ft. X 232 ,000s sq.ft. 1259 = cubic yards amendment		PRODUCT: Compost QUANTITY: 1259 CU. YDS.

PLANTING BEDS (As labeled on plan)			**TOTAL AREA**: ___,000 square feet
TREATMENT SELECTED:	___ Pre-approved Amendment 3.0 inches	___ Custom Amendment Rate ___ inches (attach tests and calculations)	___ Topsoil Import ___ inches (8" default)
AMENDMENT OR TOPSOIL	____inches compost / topsoil to be applied (from above box) X 3.1 _____= cubic yards / 1,000 sq. ft. X____ ,000s sq.ft. ____ = cubic yards amendment		PRODUCT:_____ QUANTITY:_____CU. YDS.
MULCH	___ inches mulch to be applied (minimum 2" recommended) X 3.1 _____= cubic yards / 1,000 sq. ft. X____ ,000s sq.ft. ____ = cubic yards amendment		PRODUCT:_____ QUANTITY:_____CU. YDS.

TOTAL AMENDMENT / TOPSOIL / MULCH FOR ALL AREAS

Product #1 Name Pacific Topsoil Compost or Equivalent ☐ **Topsoil** ☑ **Compost** ☐ **Mulch**	**Quantity:** 1259 **cu. yds.** ☐ **Test Results Supplied**
Product #2 Name: _____ ☐ **Topsoil** ☐ **Compost** ☐ **Mulch**	**Quantity:** _____**cu. yds.** ☐ **Test Results Supplied**
Product #3 Name: _____ ☐ **Topsoil** ☐ **Compost** ☐ **Mulch**	**Quantity:** _____**cu. yds.** ☐ **Test Results Supplied**

Date:	**Inspector:**	**Approved:**	**Revisions Required:**
Comments:			

SOIL MANAGEMENT PLAN FOR KING COUNTY SOIL IMPROVEMENT CODE

(For use with *Achieving the Post-Construction Soil Standard* brochure)

HOW TO DETERMINE SOIL AMENDMENT, TOPSOIL AND MULCH NEEDS

STEP 1. Review site conditions, landscape and grading plans.
Determine if subsoil can be easily amended or if compaction will require subsoil plowing or topsoil import. Identify areas that can be left undisturbed, and where soil can be stockpiled, amended and reapplied after grading. It is recommended that compacted subsoils be scarified before applying amendments or topsoil.

STEP 2. Select a soil management option and suitable pH for each planting area.
Choose soil management options and suitable pH's from the chart below for each landscape area within your proposed area of disturbance.

STEP 3. Calculate compost and/or topsoil volumes for each area.
Use the formulas on the back of this page or the online compost calculator at http://your.kingcounty.gov/solidwaste/compost_to calculate the cubic yards of compost, topsoil and mulch needed.

STEP 4. Identify compost and/or topsoils to be applied and retain records.
Compost used as amendment or in topsoil mixes must be **weed-free** and supplied by a permitted composting facility (see list of compost facilities at http://www.ecy.wa.gov/programs/swfa/compost/). Include name of product and supplier in **"Total Amendment/Topsoil/Mulch for All Areas"** section on back of this page.

STEP 5. Turn in completed DDES soil Management form to DDES staff for review and approval.

Soil Management Options and pH	**Soil Management Options**		
	Using pre-approved amendment rates		**Using Custom Amendment rates***
	Turf	**Planting Beds**	**Turf or planting beds**
Option 1 Leave native soil undisturbed, protect from compaction	Not applicable - Undisturbed areas do not require soil amendment	Not applicable - Undisturbed areas do not require soil amendment	Not applicable - Undisturbed areas do not require soil amendment
Soils that have been cleared and graded, and not covered by impervious surfaces or developed as a storm water structure, must be restored to 8 inches deep, using one of the following three options:			
Option 2 Amend soil in place	Mix 1.75 inches of compost 8 inches deep	Mix 3 inches of compost 8 inches deep	Use online calculator*
Option 3 Import topsoil containing adequate organic amendment	Import 8 inches of soil mix containing approx. 75-80% sandy loam and 20-25% compost	Import 8 inches of soil mix containing approx. 60-65% sandy loam, 35-40% compost	Not applicable
Option 4 Stockpile site soil, reapply, amend in place	Reapply stockpiled soil and amend in place with 1.75 inches of compost, for a combined minimum depth of 8 inches of soil and compost.	Reapply stockpiled soil and amend in place with 3 inches of compost, for a combined minimum depth of 8 inches of soil and compost.	Use online calculator to determine amendment rate*. Reapply stockpiled soil and amend in place with a combined minimum depth of 8 inches of soil and compost.
Soil pH (acidity) – test and adjust if needed, based on plant types	Washington State University recommends a soil pH of 5.5-6.5 for lawns.	Should be compatible with plant needs.	Washington State University recommends a soil pH of 5.5-6.5 for lawns. For planting beds, the pH should be compatible with specific plant needs.

***Custom amendment rates** may be approved based on soil and amendment tests and calculations using the Soil Amendment Calculator at (http://your.kingcounty.gov/solidwaste/compost_calculator.htm).