



# Application for a State Waste Discharge Permit to Discharge Domestic Wastewater to Ground Water by Land Treatment or Application

This application is for a state waste discharge permit as required by Chapter 90.48 RCW and Chapter 173-216 WAC. Permit applications provide Ecology with information on pollutants in the waste stream, materials that may enter the waste stream, the flow characteristics of the discharge, and site characteristics at the point of discharge.

Ecology may request additional information to clarify the conditions of this discharge. The applicant should reference information previously submitted to Ecology that applies to this application in the appropriate section.

## SECTION A. GENERAL INFORMATION

CENTRAL REGION OFFICE  
EMAIL RECEIVED  
JANUARY 14, 2021

1. Applicant Name: BCSCBN, Inc.
2. Facility Name: Vantage Bay Water Reclamation Facility  
(if different from applicant)
3. Applicant Address: 21828 87<sup>th</sup> Avenue SE, Suite 200  
Street  
Woodinville, WA 98072  
City/State Zip
4. Facility Location Address: Kittitas County Parcels 272933 and 622933  
(if different from above) Street  
Vantage, WA 98050  
City/State Zip
5. Latitude/longitude of the processing facility as decimal degrees (NAD83/WGS84):  
46.9333 / 119.9883
6. Latitude/longitude of sprayfield/infiltration site discharge location (approximate center) as decimal degrees (NAD83/WGS84):  
46.9333 / 119.9887
7. Person to contact who is familiar with the information contained in this application:

Robert Scott, P.E.  
Name

Engineering Consultant  
Title

509-575-6990  
Telephone Number

N/A  
Fax Number

RScott@plsaoifyakima.com  
Email

<b>FOR ECOLOGY USE ONLY</b>	<b>Check One</b>	New/Renewal <input type="checkbox"/>	Modification <input type="checkbox"/>	
Date Application Received	_____	Application/Permit No.	_____	
Date Application Accepted	_____	Date Fee Paid	_____	

8. Check One:

**Permit Renewal** (including renewal of temporary permits)

Does this application request a greater amount of wastewater discharge, a greater amount of pollutant discharge, or a discharge of different pollutants than specified in the last permit application for this facility?  YES  NO

For permit renewals, the current permit is an attachment, by reference, to this application.

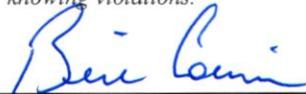
**Permit Modification**

**Existing Unpermitted Discharge**

**Proposed Discharge**

Anticipated date of discharge: December 2021

*I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of a fine and/or imprisonment for knowing violations.*



Signature\*

1/13/2021

Date

President

Title

Printed Name

\*Applications must be signed by either a principal executive officer or a ranking elected official. If these titles do not apply to your organization, the person who makes budget decisions for this facility must sign the application. For state facilities, this is typically a program manager.

The application signatory may delegate signature authority for submittals required by the permit, such as monthly reports, to a suitable employee. You can delegate this authority to a qualified individual or to a position, which you expect to fill with a qualified individual. If you wish to delegate signature authority, please complete the following:

\_\_\_\_\_  
Signature of delegated employee

\_\_\_\_\_  
Date

\_\_\_\_\_  
Title or function at the facility

\_\_\_\_\_  
Printed name

**SECTION B. TREATMENT PLANT INFORMATION**

1. Identify all industries, commercial facilities or communities discharging to this publicly owned treatment works (POTW) by name, type of industry, address, telephone number and contact name. Attach extra sheet(s) if needed and label as attachment B1.

	INDUSTRY #1	INDUSTRY #2
NAME:	N/A	
INDUSTRY:		
ADDRESS:		
TELEPHONE:		
CONTACT NAME:		
INDUSTRIAL PRODUCT(S):		

2. POTW design and operation manuals available for this treatment facility:

Type of Manual	Date	Is there a copy at the POTW?
<input checked="" type="checkbox"/> Engineering Report	October 2020	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO
<input checked="" type="checkbox"/> Operation and Maintenance Manual	To be Completed	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO
<input type="checkbox"/> Crop Management Plan		<input type="checkbox"/> YES <input type="checkbox"/> NO
<input type="checkbox"/> Sprayfield Management Plan		<input type="checkbox"/> YES <input type="checkbox"/> NO

3. POTW Design Data:

a. Average Influent Flow for Maximum Month (MGD):	0.050
b. Influent BOD Load (lbs/day):	119
c. Influent SS Load (lbs/day):	119
d. Began Operation (year):	2021 (assumed)
e. Last Major Upgrade (year):	N/A
f. Planned Upgrades (year):	2025, 2029
g. Design Population:	473
h. Actual Population:	0 (current)
i. Sprayfield loading - attach copy of the irrigation schedule if schedule if available	N/A

4. Are there plans to modify this facility within the next five years? If so, briefly describe what and when.

Based upon an assumed 10-year buildout of the development, the 2020 Engineering Report identified that in 2025, a parallel MBR treatment train, duplicate mechanical screen, membrane treatment system, effluent pump, and expansion of the rapid infiltration drainfield will be required. This will be evaluated as the need for this upgrade becomes necessary, as conservative assumptions were made in the Engineering Report with respect to occupancy and growth.

5. Attach a simple schematic drawing of the POTW. (Label as attachment B.5. Attachments should be 11 x 17" or smaller). The schematic should show all treatment processes (from B.6 below), flow direction and flow quantities in million gallons per day (MGD) or gallons per day (GPD).
6. Identify the type and number of unit processes at this facility.

Treatment	Unit Process	Number of Units
Lift stations	In collection system	
	At head of plant	1
Preliminary treatment	Manually operated bar screens	
	Mechanically operated bar screens	1
	Grit removal	
	Pre-aeration	
	Comminutors/grinders	
	Other (specify)	
Primary Treatment	Primary Sedimentation Tank/Clarifiers	
	Septic tanks	
	Other (specify) Equalization Tank	1
Secondary Treatment	Oxidation Ditch	
	Package Plant - Activated Sludge	1
	Package Plant - Physical/Chemical	
	Aerated Lagoon	
	Non-aerated Lagoon/Facultative Lagoon	
	Rotating Biological Contact	
	Secondary Clarifiers	
	Trickling Filter	
	Polishing Ponds	
Other (specify)		
Additional Treatment	Coagulation	
	Filtration	1 (Membranes)
	Storage (Lined Lagoon)	
	Storage (Unlined Lagoon)	
	Other (specify)	
Land Treatment or Application	Drainfield	
	Rapid Infiltration/Infiltration Lagoon	1
	Constructed Wetland	
	Sprinkler Irrigation	
	Flood Irrigation	
	Ridge and Furrow Irrigation	
	Subsurface Irrigation	
Other (specify)		
Disinfection	Chlorination	
	Ultraviolet	1
	Other	

## SECTION C. WASTEWATER INFORMATION



1. The average influent flow to the plant for the maximum month for at least the last 12 months: 0 gallons/day
2. The maximum daily flow applied to the land treatment/application site for the last 12 months: 0 gallons/day      inches/acre/month
3. Describe how the influent and effluent flow are measured? N/A, new facility
4. Attach flow records for at least the last 12 months. (*Label as attachment C.4.*)
5. Describe the collection method for the samples analyzed below (*i.e.*, grab, 24-hour composite). Applicants must collect grab samples (not composites) for analysis of pH, temperature, cyanide, total phenols, residual chlorine, oil and grease, fecal coliform (including *E. coli*), and Enterococci (previously known as fecal streptococcus at § 122.26 (d)(2)(iii)(A)(3)), or volatile organics.

N/A, no existing discharge

6. Provide measurement values or range of measurements for treated wastewater prior to land treatment/application for the parameters with an “X” in the left column of the table below. If you obtain the application from the Internet, contact Ecology’s regional office to see if testing for a subset of these parameters is permissible. All analyses (except pH) must be conducted by a laboratory registered or accredited by Ecology (WAC 173-216-125). If this is an application for permit renewal, provide data for the last year for parameters that are routinely measured. For parameters measured only for this application, place the values under “Maximum.” Report the values with units as specified in the parameter name or in the detection level.

The Permittee must use the specified analytical methods, detection limits (DLs) and quantitation levels (QLs) in the following table unless Ecology approves an alternate method **or the method used produces measurable results in the sample and EPA has listed it as an EPA approved method in 40 CFR Part 136. If the Permittee uses an alternative method as allowed above, it must report the test method, DL, and QL on the discharge monitoring report or in the required report.**



X	Parameter	Measurement Values			Number of Analyses	Analytical Method Std. Methods 19 <sup>th</sup> , 20 <sup>th</sup> edition or EPA	Detection Limit/Quantitation Level
		Minimum	Maximum	Average			
	BOD (5 day)					SM 5210 B	/2 mg/l
	COD					SM 5220 D	/10 mg/l
	Total suspended solids					SM 2540 D	/5 mg/l
	Total dissolved solids					SM 2540 C	
	Conductivity (micromhos/cm)					SM 2510 B	
	Ammonia-N as N					SM 4500-NH <sub>3</sub> C	/0.3 mg/L
	pH					SM 4500-H	0.1 standard units
	Total Residual Chlorine					SM4500-Cl G	50/ µg/L L
	Fecal coliform (organisms/100 mL)					SM 9221 E or 9222 D	
	Total coliform (organisms/100 mL)					SM 9221 B or 9222 B	
	Dissolved oxygen					SM 4500-O C/G	
	Nitrate + nitrite-N as N					SM 4500-NO <sub>3</sub> E	100 µg/L
	Total kjeldahl N as N					SM 4500-N <sub>org</sub> C/E/FG	300 µg/l
	Ortho-phosphate-P as P					SM 4500-P E/F	10 µg/l
	Total-phosphorous-P as P					SM 4500-P E/P/F	10 µg/l
	Total Oil & grease					EPA 1664A	1.4/5 mg/l
	NWTPH - Dx					Ecology NWTPH Dx	250/250 µg/l
	NWTPH - Gx					Ecology NWTPH Gx	250/250 µg/l
	Calcium					EPA 200.7	10 µg/l
	Chloride					SM 4500-Cl C	0.15 µg/l
	Fluoride					SM 4500-F E	.025/0.1 mg/l
	Magnesium					EPA 200.7	10/50 µg/l
	Potassium					EPA 200.7	700/ µg/l
	Sodium					EPA 200.7	29/ µg/l
	Sulfate					SM 4500-SO <sub>4</sub> C/D	/200 µg/l
	Alkalinity mg/L as CaCO <sub>3</sub>					SM 2320 B	/5 mg/L as CaCO <sub>3</sub>

X	Parameter	Measurement Values			Number of Analyses	Analytical Method Std. Methods 19 <sup>th</sup> , 20 <sup>th</sup> edition or EPA	Detection Limit/Quantitation Level
		Minimum	Maximum	Average			
█	Arsenic(total)	█	█	█	█	EPA 200.8	0.1/0.5 µg/l
█	Barium (total)	█	█	█	█	EPA 200.8	0.5/2 µg/l
█	Cadmium (total)	█	█	█	█	EPA 200.8	.05/.25 µg/l
█	Chromium (total)	█	█	█	█	EPA 200.8	0.2/1 µg/l
█	Copper (total)	█	█	█	█	EPA 200.8	0.4/2 µg/l
█	Iron (total)	█	█	█	█	EPA 200.7	12.5/50 µg/l
█	Lead (total)	█	█	█	█	EPA 200.8	0.1/0.5 µg/l
█	Manganese (total)	█	█	█	█	EPA 200.8	0.1/0.5 µg/l
█	Mercury (total) pg/L	█	█	█	█	EPA 1631E	0.2/.5 pg/l
█	Molybdenum(total)	█	█	█	█	EPA 200.8	0.1/0.5 µg/l
█	Nickel(total)	█	█	█	█	EPA 200.8	0.1/0.5 µg/l
█	Selenium (total)	█	█	█	█	EPA 200.8	1/1 µg/l
█	Silver (total)	█	█	█	█	EPA 200.8	.04/.2 µg/l
█	Zinc (total)	█	█	█	█	EPA 200.8	0.5/2.5 µg/l

Detection level (DL) or detection limit means the minimum concentration of an analyte (substance) that can be measured and reported with a 99% confidence that the analyte concentration is greater than zero as determined by the procedure given in 40 CFR part 136, Appendix B.

Quantitation Level (QL) also known as Minimum Level of Quantitation (ML) – The lowest level at which the entire analytical system must give a recognizable signal and acceptable calibration point for the analyte. It is equivalent to the concentration of the lowest calibration standard, assuming that the lab has used all method-specified sample weights, volumes, and cleanup procedures. The QL is calculated by multiplying the MDL by 3.18 and rounding the result to the number nearest to (1, 2, or 5) x 10<sup>n</sup>, where n is an integer. (64 FR 30417).

ALSO GIVEN AS:

The smallest detectable concentration of analyte greater than the Detection Limit (DL) where the accuracy (precision & bias) achieves the objectives of the intended purpose. (Report of the Federal Advisory Committee on Detection and Quantitation Approaches and Uses in Clean Water Act Programs Submitted to the US Environmental Protection Agency December 2007).

7. Has the effluent been analyzed for any other parameters than those identified in question C.6, or are there other pollutants that you know of or believe to be present?  
 YES  NO

If yes, specify the pollutants and their concentration if known (*attach laboratory analyses if available and label as Attachment C.6*). (*Note: Ecology may require additional testing.*)

N/A

## SECTION D. GROUNDWATER INFORMATION

Provide available data measurements or range of measurements from monitoring wells or supply wells in the area of discharge. Provide the analytical method and detection limit, if known. Provide the location of each well on the map required in E.3 below. Attach well logs when available (*label as Attachment D*). Copy this page as necessary for each well (*label as Attachment D*). Provide the latitude and longitude in decimal format.

Ecology Well Tag ID # BAJ036  
(*example AAB123*)

Well ID # 1 (*example MW-1*)

Latitude: 46.9381

Longitude: 119.9861

Well Elevation (to the nearest 0.01 feet) 592.0 Check the appropriate box; the elevation measurement is relative to: the NAVD88 standard  mean sea level

Parameter	Units	Range of Measurements	Number of Analyses	Analytical Method	Detection Limit
BOD (5 day)	mg/L				
COD	mg/L				
Total organic carbon	mg/L				
Dissolved Fixed Solids	mg/L				
Total dissolved solids	mg/L	478 - 497	2	SM 2540C	
pH	Standard units				
Conductivity	(micromhos/cm)	761 - 787	2	SM 2340B	
Alkalinity	mg/L as CaCO <sub>3</sub>				
Total hardness	mg/L	310.6	1	EPA 200.7	
Fecal coliform	organisms/100mL	ND	1	SM9223B	
Total coliform	organisms/100mL	ND	2	SM9223B	
Dissolved oxygen	mg/L				
Ammonia-N as N	mg/L				
Nitrate + nitrite-N, as N	mg/L	3.16 - 4.18	2	EPA 300.0	
Total kjeldahl N as N	mg/L				
Ortho-phosphate-P as P	mg/L				
Total-phosphorus-P as P	mg/L				
Total Oil & Grease	mg/L				
Total petroleum hydrocarbon	<input type="checkbox"/> mg/L <input type="checkbox"/> µg/l				
Calcium	<input checked="" type="checkbox"/> mg/L <input type="checkbox"/> µg/l	76.4	1	EPA 200.7	
Chloride	<input checked="" type="checkbox"/> mg/L <input type="checkbox"/> µg/l	86.8 - 95.0	2	EPA 300.0	
Fluoride	<input checked="" type="checkbox"/> mg/L <input type="checkbox"/> µg/l	0.24 - 0.28	2	EPA 300.0	
Magnesium	<input checked="" type="checkbox"/> mg/L <input type="checkbox"/> µg/l	27.6	1	EOA 200.7	
Potassium	<input type="checkbox"/> mg/L <input type="checkbox"/> µg/l				
Sodium	<input checked="" type="checkbox"/> mg/L <input type="checkbox"/> µg/l	31.8 - 33.2	2	EPA 200.7	
Sulfate	<input checked="" type="checkbox"/> mg/L <input type="checkbox"/> µg/l	48.4 - 50.9	2	EPA 300.0	
Barium	<input checked="" type="checkbox"/> mg/L <input type="checkbox"/> µg/l	0.019 - 0.028	2	EPA 200.8	
Cadmium	<input checked="" type="checkbox"/> mg/L <input type="checkbox"/> µg/l	<0.0001	2	EPA 200.8	
Chromium	<input checked="" type="checkbox"/> mg/L <input type="checkbox"/> µg/l	ND - 0.002	2	EPA 200.8	
Copper	<input checked="" type="checkbox"/> mg/L <input type="checkbox"/> µg/l	ND - 0.00062	2	EPA 200.8	
Iron	<input checked="" type="checkbox"/> mg/L <input type="checkbox"/> µg/l	0.051 - 1.22	2	EPA 200.7	
Lead	<input checked="" type="checkbox"/> mg/L <input type="checkbox"/> µg/l	ND - 0.00052	2	EPA 200.8	
Manganese	<input checked="" type="checkbox"/> mg/L <input type="checkbox"/> µg/l	0.0061 - 0.022	2	EPA 200.8	
Mercury	<input checked="" type="checkbox"/> mg/L <input type="checkbox"/> µg/l	<0.0002	2	EPA 245.1	
Selenium	<input checked="" type="checkbox"/> mg/L <input type="checkbox"/> µg/l	ND - 0.00158	2	EPA 200.8	
Silver	<input checked="" type="checkbox"/> mg/L <input type="checkbox"/> µg/l	<0.0001	2	EPA 200.8	
Zinc	<input checked="" type="checkbox"/> mg/L <input type="checkbox"/> µg/l	0.008 - 0.067	2	EPA 200.8	
Depth to water level (to the nearest .01 feet)		17.0			

## SECTION E. SITE ASSESSMENT

**Note: The Department of Ecology Water Resources Section can be consulted for identifying wells within one mile of your site. The local library and local city or county planning offices may be helpful in providing the information required in this section.**

1. Give the legal description of the land treatment/application site(s) by section/township/range and latitude/longitude (approximate center of the site; NAD83/WGS84 reference datum). Indicate the owner for each site. Give the acreage of each land treatment/application site(s). Attach a copy of the contract(s) authorizing use of(s) used land for treatment/application. *(Label as attachment E.1)*

Proposed rapid infiltration drainfield located within Tract H of the Vantage Bay PUD development. This land is owned by BCSCBN, Inc., ultimately to be owned by the future Vantage Bay Homeowner's Association.

Proposed rapid infiltration drainfield located in SE 1/4, SE 1/4 of Sect 30, Town 17, Range 23.  
Latitude: 46.9333, Longitude 119.9887

2. If this is a new discharge, list all environmental control permits or approvals needed for this project; for example, SEPA review, engineering reports, hydrogeologic reports, , biosolids permits, or air emissions permits.

The Vantage Bay development has received approval through Kittitas County Community Development Services, which has included a biological reserource review and wetland delineation. The development has also received a Group A water system approval through the Washington State Department of Health and approval of an engineering report describing the proposed water reclamation facility through the Washington State Department of Ecology.

3. Attach an original United States Geological Survey (USGS) 7.5 minute topographic map or aerial photograph that shows the POTW and the land treatment/application site(s).

**USGS topographical maps are available from the Department of Natural Resources (360-902-1234), Metsker Maps (206-588-5222), and some local bookstores and internet sites.**  
Show the following on this map: *(Label as attachment E.3.)*

- a. Location and name of internal and adjacent streets.
  - b. Surface water drainage systems within ¼ mile of the site.
  - c. All wells within 1 mile of the site.
  - d. Wastewater discharge points.
  - e. Land uses and zoning adjacent to the wastewater application site.
  - f. Ground water gradient.
4. Describe the soils on the site using information from local soil survey reports. **Soils information is available from your county conservation district or from information contained in the sites hydrogeologic report.**  
*(Label as attachment E.4.)*

5. Describe the local geology and hydrogeology within one mile of the site. Include any ground water quality data. **The local library, the sites hydrogeologic report, or soil conservation service may have this information.**  
(Label as attachment E.5.)
6. List the names and addresses of contractors or consultants who provided information, and cite sources of information by title and author.

Vantage Bay Final Development Plan - ESM Consulting Engineers

Vantage Bay Hydrogeological Evaluation - RH2 Engineering

Vantage Bay Development Biological Resource Review - Environmental Assessment Services

Hydrogeologic Evaluation of Class A Wastewater Discharge - RH2 Engineering

Vantage Bay Engineering Report - PLSA Engineering and Surveying

Infiltration Evaluation - Earth Solutions NW, LLC

<h2 style="margin: 0;">SECTION F. SLUDGE/BIOSOLIDS MANAGEMENT AND DISPOSAL</h2>
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1. If your wastewater treatment is by lagoon:

Has the depth of the sludge been measured in the last five years?

YES  NO (IF yes, include the measurements and a map that shows the approximate measurement sites) N/A

Will sludge be removed from the lagoon(s) in the next five years? If so, describe the sludge, stabilization, utilization, and disposal methods. Attach extra sheets as necessary.

2. If your wastewater treatment is by methods other than lagoon:

Do you have a Sludge Management Plan?  YES  NO

Is the Plan approved by:

Local health district?                      Date approved:    N/A

Department of Ecology?                      Date approved:    12/15/2020

3. Does your facility have a biosolids permit issued by Ecology? If so, please provide the permit's number and expiration date.

Biosolids Permit number                      N/A                      Permit expiration Date

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**Summary of Attachments That May be Required for This Application:**

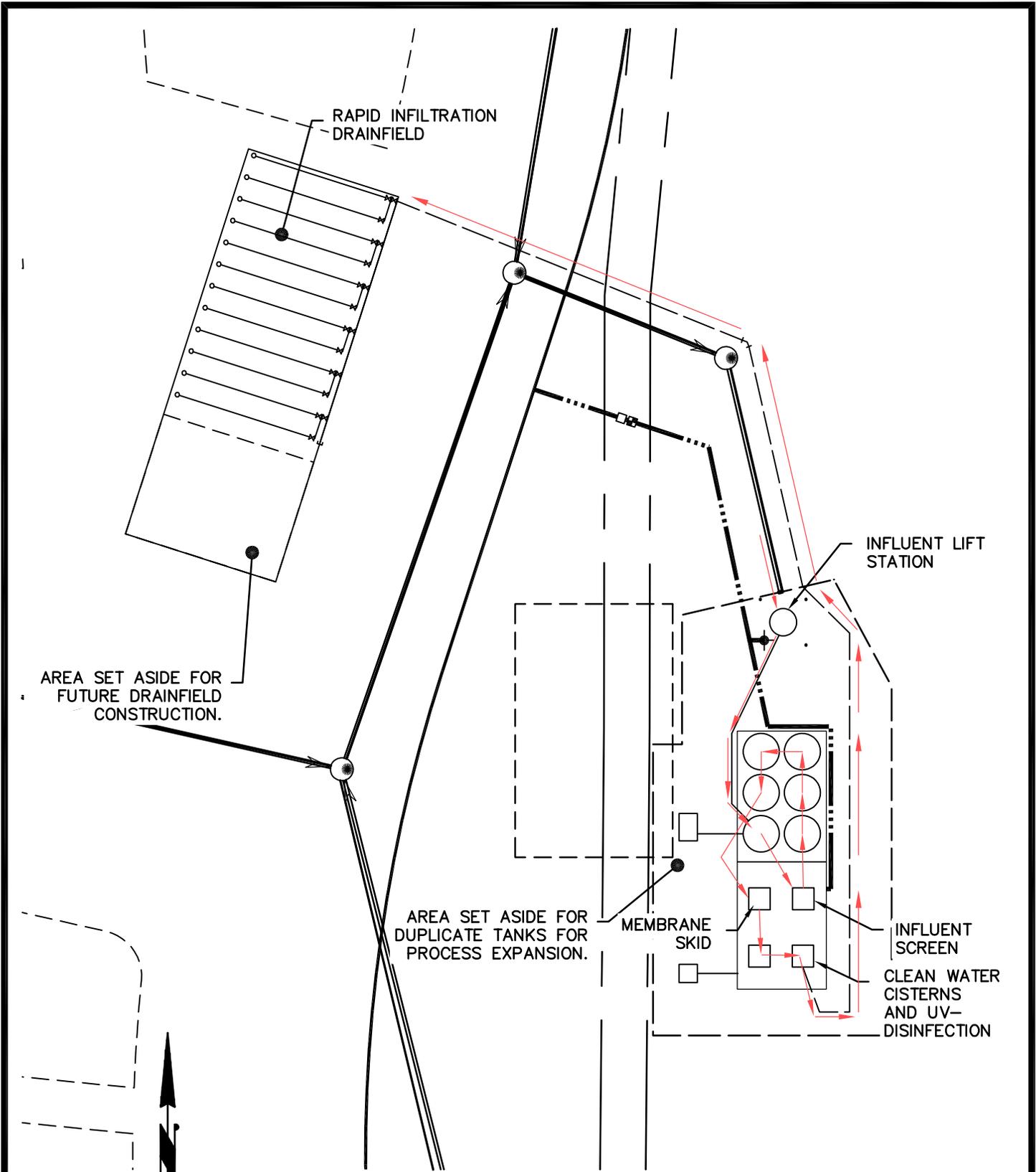
(Please check attachments that are included)

- B.5 Schematic drawing of POTW  
 C.4 Flow records

- C.6 Additional effluent analysis
- D. Additional ground water data
- E.1 Copies of contracts authorizing use of land for treatment
- E.3 USGS topographic map
- E.4 Soil information
- E.5 Local geology and hydrogeology

*If you need this document in a format for the visually impaired, call the Water Quality Program at 360-407-6600. Persons with hearing loss can call 711 for Washington Relay Service. Persons with a speech disability can call 877-833-6341.*

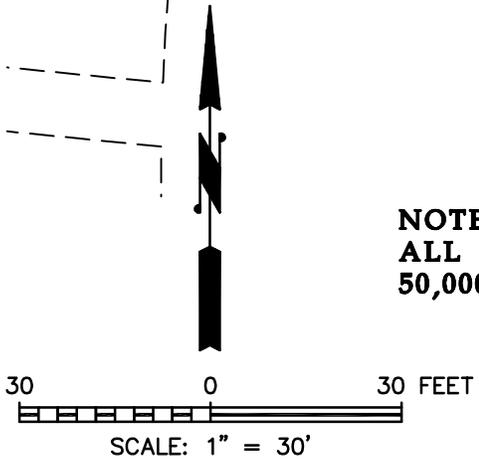
# **ATTACHMENT B.5**



**NOTE:**  
**ALL FLOWS EQUAL TO**  
**50,000 GALLON PER DAY**

**PROPOSED SITE PLAN**  
**ATTACHMENT B.5**  
**VANTAGE BAY**  
**STATE WASTE DISCHARGE**  
**PERMIT APPLICATION**

PLSA ENGINEERING & SURVEYING  
 JOB NO. 19316  
 01/14/21



# **ATTACHMENT D**



## **ATTACHMENT E.3**

# Vantage Bay - Attachment E.3

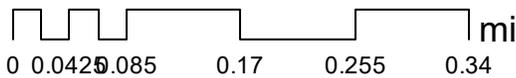


Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Date: 1/13/2021

1 inch = 752 feet  
Relative Scale 1:9,028

*Disclaimer:*  
Kittitas County makes every effort to produce and publish the most current and accurate information possible. No warranties, expressed or implied, are provided for the data, its use, or its interpretation. Kittitas County does not guarantee the accuracy of the material contained herein and is not responsible for any use, misuse or representations by others regarding this information or its derivatives.



## **ATTACHMENT E.4**



January 16, 2020  
ES-7104

Earth Solutions NW LLC

Geotechnical Engineering, Construction  
Observation/Testing and Environmental Services

BSCBN, Inc.  
21828 – 87<sup>th</sup> Avenue Southeast  
Woodinville, Washington 98072

Attention: Mr. Bill Cowin

**Subject: Infiltration Evaluation  
Proposed Vantage Bay PUD  
Huntzinger Road  
Kittitas County (Vantage), Washington**

Reference: D.R. Strong Consulting Engineers  
Boundary and Topographic Survey, dated November 14, 2019

ESM Consulting Engineers LLC  
Conceptual Grading and Utility Plan Sheets, dated May 17, 2019

RH2  
Vantage Bay Hydrogeologic Evaluation

Stephen P. Reidel and Karl R. Fecht  
Geologic Map of the Priest Rapids Quadrangle, Washington, September 1994

Department of Ecology Stormwater Management Manual for Eastern Washington

Dear Mr. Cowin:

As requested, Earth Solutions NW, LLC (ESNW) has prepared this infiltration evaluation report for the proposed project. Our scope of services included subsurface exploration, laboratory testing, engineering analyses, and preparation of this report.

### **Project Description**

The subject site is located on the east side of Huntzinger Road, about 1,000 feet south of I-90, in the Vantage area of Kittitas County, Washington (Plate 1). The site consists of two tax parcels (Kittitas County parcel numbers 622933 and 272933) totaling 57.21 acres. The site is currently undeveloped. The site topography descends to the east with some moderately to steeply sloped topography located in the southern half of the site.

We understand the project will consist of 104 new residential lots, 10 townhome buildings, community buildings, access roads, and associated improvements. We understand infiltration will be pursued to the extent feasible. The referenced conceptual grading and utility plan sheets show currently proposed stormwater facility locations.

If the above design assumptions are incorrect or change, ESNW should be contacted to review the recommendations in this infiltration evaluation. ESNW should review the final design to verify the geotechnical recommendations provided in this report have been incorporated into the plans.

### **Subsurface Conditions**

As part of this infiltration evaluation, an ESNW representative observed, logged, and sampled 12 test pits on January 2, 2020, excavated within vicinity of the proposed stormwater facility locations, using a trackhoe and operator retained by our firm. The approximate locations of the test pits are depicted on Plate 2 (Test Pit Location Plan). Please refer to the test pit logs (attached) for a more detailed description of subsurface conditions. Representative soil samples collected at the test pit locations were analyzed in general accordance with the Unified Soil Classification System (USCS) and United States Department of Agriculture methods and procedures.

### **Topsoil**

Where encountered, topsoil extended to approximately six inches below the existing ground surface (bgs). The topsoil was characterized by dark brown color and fine organic material.

### **Native Soil**

Native soil conditions at the test pit locations were observed to consist primarily of gravel with varying amounts of silt, sand, and cobbles (USCS: GM, GW, GP, SM). The fines content of the native soil generally decreased with depth. The native soil was observed to generally be in a medium dense and damp condition. Light to heavy caving was observed within the native gravel soils exposed in the test pits.

### **Bedrock**

Basalt bedrock was encountered at the terminus of test pits TP-9 through TP-12 which caused refusal at depths of four and one-half to eight feet bgs. The basalt was observed to be very hard, moist, and porphyritic.

### **Groundwater**

Groundwater seepage was not observed at the test pit locations. Groundwater seepage may be encountered in site excavations, depending on the time of year.

## **Geologic Mapping**

Geologic mapping of the area indicates the site is underlain by outburst flood deposits (Qfs). The native gravel soils encountered at the test pit locations are generally consistent with outburst flood deposits.

## **Infiltration Evaluation**

The purpose of the subsurface exploration was to evaluate infiltration feasibility at the proposed stormwater facility locations. Based on the subsurface exploration, infiltration within the upper gravel soils encountered at test pit locations TP-1 through TP-8 is feasible from a geotechnical standpoint; infiltration near test pits TP-9 through TP-12 may be difficult or infeasible due to shallow depth to bedrock. Based on the results of our investigation, the following infiltration design parameters are recommended:

Test Pit Location	Design Infiltration Rate	Depth to Impermeable Layer
TP1 through TP-8	20.0 inches per hour (iph)	Not observed to 10 to 15 feet
TP-9 and TP-10	3.8 iph	4 to 7.5 feet
TP-11 and TP-12	1.3 iph	4.5 feet

The design infiltration rates were calculated based on the soil grain size analysis method developed by Massman. A total correction factor of 0.12 was used to calculate the design rate with a maximum recommended design infiltration rate of 20.0 iph. The design recommendations are suitable for facilities designed within the vicinity of the test pit locations; ESNW should complete additional testing if alternative locations are proposed. ESNW should observe construction of the infiltration facilities and complete confirmation testing as necessary.

## **Limitations**

The recommendations and conclusions provided in this infiltration evaluation report are professional opinions consistent with the level of care and skill that is typical of other members in the profession currently practicing under similar conditions in this area. A warranty is not expressed or implied. Variations in the soil and groundwater conditions observed at the test pit locations may exist, and may not become evident until construction. ESNW should reevaluate the conclusions in this infiltration evaluation report if variations are encountered.

Should you require additional information, or have questions, please call.

Sincerely,

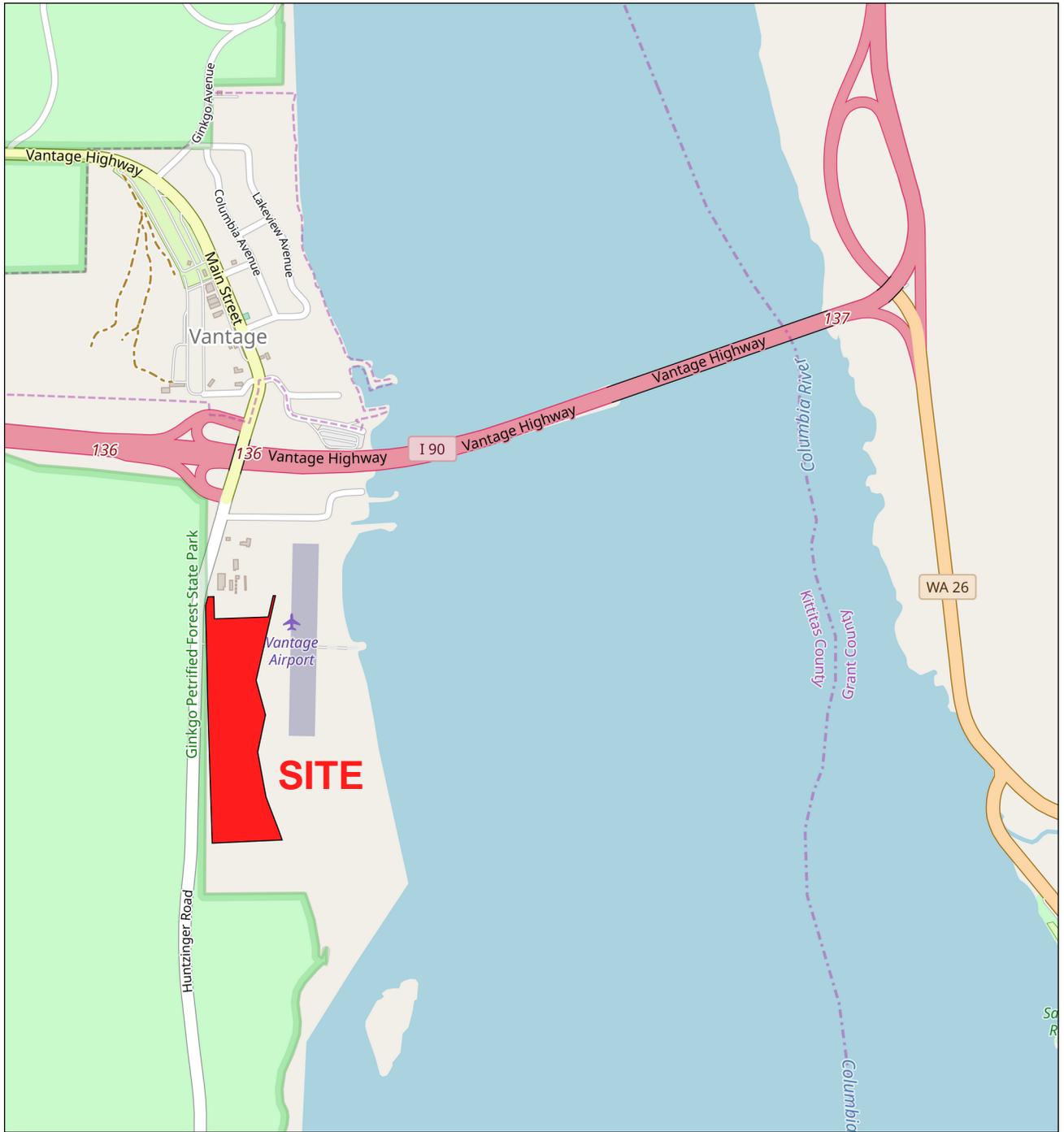
**EARTH SOLUTIONS NW, LLC**



Henry T. Wright, P.E.  
Senior Project Manager

Attachments: Plate 1 – Vicinity Map  
Plate 2 – Test Pit Location Plan  
Test Pit Logs  
Grain Size Distribution

cc: D.R. Strong Consulting Engineers  
Attention: Mr. Maher Joudi, P.E. (Email only)  
  
Mr. Skip Coddington (Email only)



Reference:  
 Kittitas County, Washington  
 OpenStreetMap.org





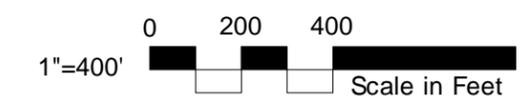
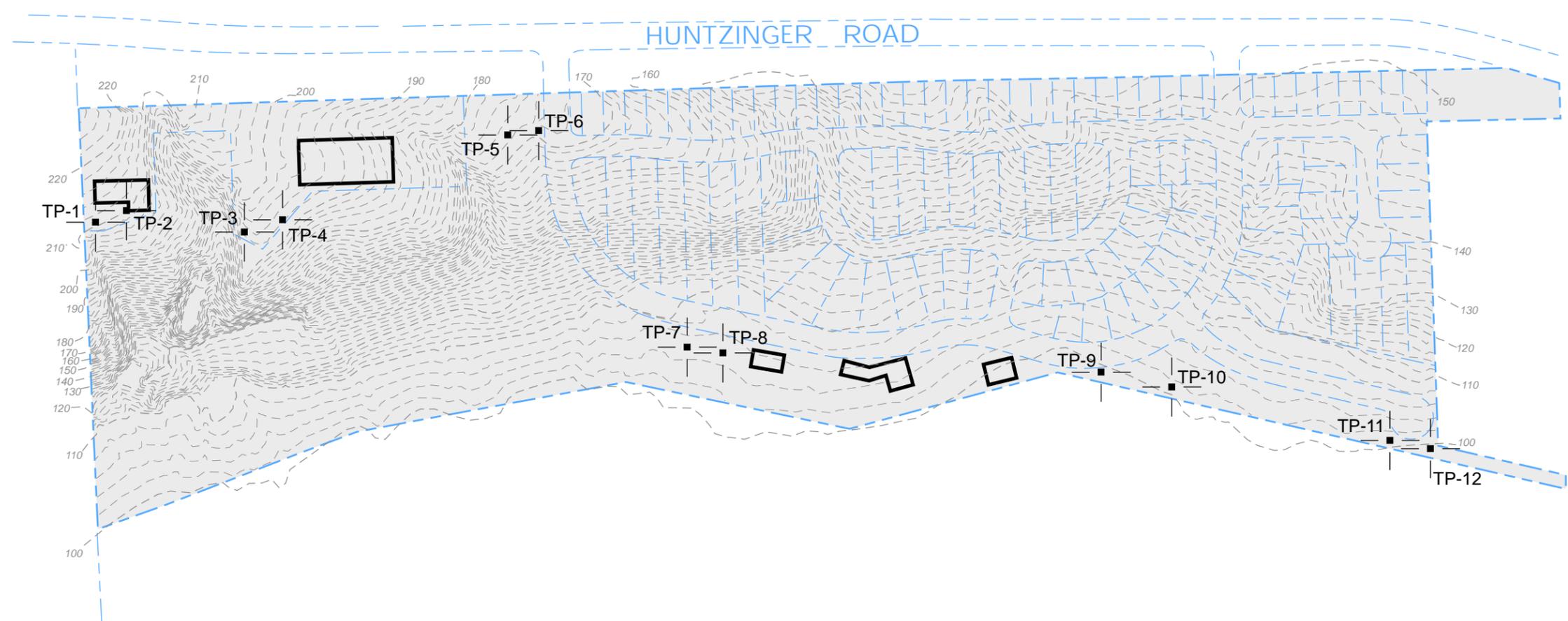
**Earth Solutions NW<sub>LLC</sub>**

Geotechnical Engineering, Construction  
 Observation/Testing and Environmental Services

**Vicinity Map  
 Vantage Bay  
 Kittitas County (Vantage), Washington**

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

Drwn. MRS	Date 01/13/2020	Proj. No. 7104
Checked AZS	Date Jan. 2020	Plate 1



**LEGEND**

- 
 Approximate Location of ESNW Test Pit, Proj. No. ES-7104, Jan. 2020
- 
 Subject Site
- 
 Proposed Building

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

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



Drwn. By  
 MRS

Checked By  
 AZS

Date  
 01/09/2020

Proj. No.  
 7104

Plate  
 2

# Earth Solutions NW<sub>LLC</sub>

## SOIL CLASSIFICATION CHART

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

DUAL SYMBOLS are used to indicate borderline soil classifications.

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



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# TEST PIT NUMBER TP-1

PROJECT NUMBER ES-7104 PROJECT NAME Vantage Bay  
 DATE STARTED 1/2/20 COMPLETED 1/2/20 GROUND ELEVATION \_\_\_\_\_ TEST PIT SIZE \_\_\_\_\_  
 EXCAVATION CONTRACTOR Advantage Dirt Contractors, Inc. GROUND WATER LEVELS:  
 EXCAVATION METHOD \_\_\_\_\_ AT TIME OF EXCAVATION ---  
 LOGGED BY AZS CHECKED BY HTW AT END OF EXCAVATION ---  
 NOTES Surface Conditions: brush/exposed soil AFTER EXCAVATION ---

DEPTH (ft)	SAMPLE TYPE NUMBER	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
0					
5		MC = 3.60%	GM		Brown silty GRAVEL, medium dense, damp -light caving to BOH
6.0		MC = 4.00%			Gray well-graded GRAVEL with sand, medium dense, damp
10		MC = 4.30% Fines = 3.00%	GW		[USDA Classification: extremely gravelly coarse SAND]
15		MC = 3.30%			Test pit terminated at 15.0 feet below existing grade. No groundwater encountered during excavation. Caving observed from TOH to BOH. Bottom of test pit at 15.0 feet.

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# TEST PIT NUMBER TP-2

PROJECT NUMBER ES-7104 PROJECT NAME Vantage Bay  
 DATE STARTED 1/2/20 COMPLETED 1/2/20 GROUND ELEVATION \_\_\_\_\_ TEST PIT SIZE \_\_\_\_\_  
 EXCAVATION CONTRACTOR Advantage Dirt Contractors, Inc. GROUND WATER LEVELS:  
 EXCAVATION METHOD \_\_\_\_\_ AT TIME OF EXCAVATION ---  
 LOGGED BY AZS CHECKED BY HTW AT END OF EXCAVATION ---  
 NOTES Surface Conditions: brush/exposed soil AFTER EXCAVATION ---

DEPTH (ft)	SAMPLE TYPE NUMBER	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
0					
			SM		Brown silty SAND, loose to medium dense, damp -light caving to BOH
		MC = 3.60%		2.0	
5		MC = 4.20%	GP		Gray poorly graded GRAVEL with sand, medium dense, damp
10		MC = 3.30%			
15		MC = 3.60%		15.0	
					Test pit terminated at 15.0 feet below existing grade. No groundwater encountered during excavation. Caving observed from TOH to BOH. Bottom of test pit at 15.0 feet.

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# TEST PIT NUMBER TP-3

PROJECT NUMBER ES-7104 PROJECT NAME Vantage Bay  
 DATE STARTED 1/2/20 COMPLETED 1/2/20 GROUND ELEVATION \_\_\_\_\_ TEST PIT SIZE \_\_\_\_\_  
 EXCAVATION CONTRACTOR Advantage Dirt Contractors, Inc. GROUND WATER LEVELS:  
 EXCAVATION METHOD \_\_\_\_\_ AT TIME OF EXCAVATION ---  
 LOGGED BY AZS CHECKED BY HTW AT END OF EXCAVATION ---  
 NOTES Surface Conditions: brush/exposed soil AFTER EXCAVATION ---

DEPTH (ft)	SAMPLE TYPE NUMBER	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
0					
			SM		Brown silty SAND, loose to medium dense, moist -roots, light caving to BOH
		MC = 2.40%			
5					
		MC = 3.50% Fines = 1.10%	GP		Gray poorly graded GRAVEL with sand, medium dense, damp  [USDA Classification: extremely gravelly coarse SAND]
10					
		MC = 3.50%			
15					
		MC = 3.20%			
					Test pit terminated at 15.0 feet below existing grade. No groundwater encountered during excavation. Caving observed from TOH to BOH. Bottom of test pit at 15.0 feet.

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# TEST PIT NUMBER TP-4

PROJECT NUMBER ES-7104 PROJECT NAME Vantage Bay  
 DATE STARTED 1/2/20 COMPLETED 1/2/20 GROUND ELEVATION \_\_\_\_\_ TEST PIT SIZE \_\_\_\_\_  
 EXCAVATION CONTRACTOR Advantage Dirt Contractors, Inc. GROUND WATER LEVELS:  
 EXCAVATION METHOD \_\_\_\_\_ AT TIME OF EXCAVATION ---  
 LOGGED BY AZS CHECKED BY HTW AT END OF EXCAVATION ---  
 NOTES Surface Conditions: brush/exposed soil AFTER EXCAVATION ---

DEPTH (ft)	SAMPLE TYPE NUMBER	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
0					
			SM		Brown silty SAND, loose to medium dense, damp -light caving to BOH
3.0		MC = 2.40%			
			GP		Gray poorly graded GRAVEL with sand, medium dense, damp
5		MC = 2.90%			
10					
15		MC = 3.50%			
					Test pit terminated at 15.0 feet below existing grade. No groundwater encountered during excavation. Caving observed from TOH to BOH. Bottom of test pit at 15.0 feet.

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# TEST PIT NUMBER TP-5

PROJECT NUMBER ES-7104 PROJECT NAME Vantage Bay  
 DATE STARTED 1/2/20 COMPLETED 1/2/20 GROUND ELEVATION \_\_\_\_\_ TEST PIT SIZE \_\_\_\_\_  
 EXCAVATION CONTRACTOR Advantage Dirt Contractors, Inc. GROUND WATER LEVELS:  
 EXCAVATION METHOD \_\_\_\_\_ AT TIME OF EXCAVATION ---  
 LOGGED BY AZS CHECKED BY HTW AT END OF EXCAVATION ---  
 NOTES Surface Conditions: brush/exposed soil AFTER EXCAVATION ---

DEPTH (ft)	SAMPLE TYPE NUMBER	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
0					
5		MC = 6.30%	SM		Brown silty SAND, loose to medium dense, moist -light caving to BOH
10		MC = 6.10%			Gray poorly graded GRAVEL with sand, dense, damp to moist
15		MC = 3.30%	GP		-large cobbles
15		MC = 2.80%			Test pit terminated at 15.0 feet below existing grade. No groundwater encountered during excavation. Caving observed from TOH to BOH. Bottom of test pit at 15.0 feet.

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# TEST PIT NUMBER TP-6

PROJECT NUMBER ES-7104 PROJECT NAME Vantage Bay  
 DATE STARTED 1/2/20 COMPLETED 1/2/20 GROUND ELEVATION \_\_\_\_\_ TEST PIT SIZE \_\_\_\_\_  
 EXCAVATION CONTRACTOR Advantage Dirt Contractors, Inc. GROUND WATER LEVELS:  
 EXCAVATION METHOD \_\_\_\_\_ AT TIME OF EXCAVATION ---  
 LOGGED BY AZS CHECKED BY HTW AT END OF EXCAVATION ---  
 NOTES Surface Conditions: brush/exposed soil AFTER EXCAVATION ---

DEPTH (ft)	SAMPLE TYPE NUMBER	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
0					
			SM		Brown silty SAND, loose to medium dense, damp -light caving to BOH
3.0		MC = 3.20%			
			GP		Gray poorly graded GRAVEL with sand, medium dense, damp
5					
		MC = 3.00% Fines = 0.80%			[USDA Classification: extremely gravelly coarse SAND]
10					
		MC = 2.70%			
15					Test pit terminated at 15.0 feet below existing grade. No groundwater encountered during excavation. Caving observed from TOH to BOH. Bottom of test pit at 15.0 feet.

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# TEST PIT NUMBER TP-7

PROJECT NUMBER ES-7104 PROJECT NAME Vantage Bay  
 DATE STARTED 1/2/20 COMPLETED 1/2/20 GROUND ELEVATION \_\_\_\_\_ TEST PIT SIZE \_\_\_\_\_  
 EXCAVATION CONTRACTOR Advantage Dirt Contractors, Inc. GROUND WATER LEVELS:  
 EXCAVATION METHOD \_\_\_\_\_ AT TIME OF EXCAVATION ---  
 LOGGED BY AZS CHECKED BY HTW AT END OF EXCAVATION ---  
 NOTES Depth of Topsoil & Sod 6": field grass AFTER EXCAVATION ---

DEPTH (ft)	SAMPLE TYPE NUMBER	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
0					
			TPSL		0.5 Dark brown TOPSOIL, light caving to 6.5'
			SM		Brown silty SAND, loose to medium dense, damp
					2.5
			GP		Gray poorly graded GRAVEL with sand, medium dense, damp
5		MC = 4.00%			
					-heavy caving 6.5' to BOH
		MC = 2.80% Fines = 1.30%			[USDA Classification: extremely gravelly loamy coarse SAND]
10		MC = 3.00%			10.0
					Test pit terminated at 10.0 feet below existing grade due to heavy caving. No groundwater encountered during excavation. Caving observed from TOH to BOH. Bottom of test pit at 10.0 feet.

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# TEST PIT NUMBER TP-8

PROJECT NUMBER ES-7104 PROJECT NAME Vantage Bay  
 DATE STARTED 1/2/20 COMPLETED 1/2/20 GROUND ELEVATION \_\_\_\_\_ TEST PIT SIZE \_\_\_\_\_  
 EXCAVATION CONTRACTOR Advantage Dirt Contractors, Inc. GROUND WATER LEVELS:  
 EXCAVATION METHOD \_\_\_\_\_ AT TIME OF EXCAVATION ---  
 LOGGED BY AZS CHECKED BY HTW AT END OF EXCAVATION ---  
 NOTES Depth of Topsoil & Sod 6": field grass AFTER EXCAVATION ---

DEPTH (ft)	SAMPLE TYPE NUMBER	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
0					
		MC = 3.60%	TPSL		0.5 Dark brown TOPSOIL, moderate caving to BOH
			SM		Brown silty SAND, loose to medium dense, damp
					3.0
			GP		Gray poorly graded GRAVEL with sand, loose to medium dense, damp
5		MC = 3.10%			
		MC = 2.90%			
					9.0
					Test pit terminated at 9.0 feet below existing grade due to heavy caving. No groundwater encountered during excavation. Caving observed from TOH to BOH. Bottom of test pit at 7.0 feet.

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# TEST PIT NUMBER TP-9

PROJECT NUMBER ES-7104 PROJECT NAME Vantage Bay  
 DATE STARTED 1/2/20 COMPLETED 1/2/20 GROUND ELEVATION \_\_\_\_\_ TEST PIT SIZE \_\_\_\_\_  
 EXCAVATION CONTRACTOR Advantage Dirt Contractors, Inc. GROUND WATER LEVELS:  
 EXCAVATION METHOD \_\_\_\_\_ AT TIME OF EXCAVATION ---  
 LOGGED BY AZS CHECKED BY HTW AT END OF EXCAVATION ---  
 NOTES Depth of Topsoil & Sod 6": field grass AFTER EXCAVATION ---

DEPTH (ft)	SAMPLE TYPE NUMBER	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
0					
			TPSL		0.5 Dark brown TOPSOIL, caving to BOH
			SM		Brown silty SAND, loose to medium dense, damp
		MC = 1.80% Fines = 6.80%			2.0 Gray poorly graded GRAVEL with silt and sand, medium dense, damp  [USDA Classification: extremely gravelly very fine sandy LOAM]
5			GM		
		MC = 2.40%			
			Basalt		7.5 8.0 Dark brown BASALT, very hard, moist -porphyritic
					Test pit terminated at 8.0 feet below existing grade due to refusal on very hard bedrock. No groundwater encountered during excavation. Caving observed from TOH to BOH. Bottom of test pit at 8.0 feet.



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# TEST PIT NUMBER TP-10

PAGE 1 OF 1

PROJECT NUMBER ES-7104 PROJECT NAME Vantage Bay  
 DATE STARTED 1/2/20 COMPLETED 1/2/20 GROUND ELEVATION \_\_\_\_\_ TEST PIT SIZE \_\_\_\_\_  
 EXCAVATION CONTRACTOR Advantage Dirt Contractors, Inc. GROUND WATER LEVELS:  
 EXCAVATION METHOD \_\_\_\_\_ AT TIME OF EXCAVATION ---  
 LOGGED BY AZS CHECKED BY HTW AT END OF EXCAVATION ---  
 NOTES Depth of Topsoil & Sod 6": field grass AFTER EXCAVATION ---

DEPTH (ft)	SAMPLE TYPE NUMBER	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
0					
		MC = 2.80%	TPSL		0.5 Dark brown TOPSOIL
			SM		Brown silty SAND, loose to medium dense, damp
			GM		2.0 Gray silty GRAVEL, dense, damp
			Basalt		4.0 Dark brown BASALT, very hard, moist -porphyritic
					4.5 Test pit terminated at 4.5 feet below existing grade due to refusal on very hard bedrock. No groundwater encountered during excavation. No caving observed. Bottom of test pit at 4.5 feet.

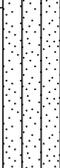
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# TEST PIT NUMBER TP-11

PROJECT NUMBER ES-7104 PROJECT NAME Vantage Bay  
 DATE STARTED 1/2/20 COMPLETED 1/2/20 GROUND ELEVATION \_\_\_\_\_ TEST PIT SIZE \_\_\_\_\_  
 EXCAVATION CONTRACTOR Advantage Dirt Contractors, Inc. GROUND WATER LEVELS:  
 EXCAVATION METHOD \_\_\_\_\_ AT TIME OF EXCAVATION ---  
 LOGGED BY AZS CHECKED BY HTW AT END OF EXCAVATION ---  
 NOTES Depth of Topsoil & Sod 6": field grass AFTER EXCAVATION ---

DEPTH (ft)	SAMPLE TYPE NUMBER	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
0					
			TPSL		0.5 Dark brown TOPSOIL
			SM		Brown silty SAND, loose to medium dense, damp
		MC = 4.60%	SM		2.0 Gray silty SAND, dense to very dense, damp -weakly cemented
			Basalt		4.5 Dark brown BASALT, very hard, moist -porphyritic
5		MC = 8.00%			5.0 Test pit terminated at 5.0 feet below existing grade due to refusal on very hard bedrock. No groundwater encountered during excavation. No caving observed. Bottom of test pit at 5.0 feet.

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# TEST PIT NUMBER TP-12

PROJECT NUMBER ES-7104 PROJECT NAME Vantage Bay  
 DATE STARTED 1/2/20 COMPLETED 1/2/20 GROUND ELEVATION \_\_\_\_\_ TEST PIT SIZE \_\_\_\_\_  
 EXCAVATION CONTRACTOR Advantage Dirt Contractors, Inc. GROUND WATER LEVELS:  
 EXCAVATION METHOD \_\_\_\_\_ AT TIME OF EXCAVATION ---  
 LOGGED BY AZS CHECKED BY HTW AT END OF EXCAVATION ---  
 NOTES Depth of Topsoil & Sod 6": field grass AFTER EXCAVATION ---

DEPTH (ft)	SAMPLE TYPE NUMBER	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
0					
			TPSL		0.5 Dark brown TOPSOIL
			SM		Brown silty SAND, loose to medium dense, damp
		MC = 4.60% Fines = 13.90%	SM		2.0 Gray silty SAND with gravel, dense, damp -weakly cemented [USDA Classification: very gravelly loamy coarse SAND]
			Basalt		4.5
5		MC = 6.30%			5.0 Dark brown BASALT, very hard, moist -porphyritic Test pit terminated at 5.0 feet below existing grade due to refusal on very hard bedrock. No groundwater encountered during excavation. No caving observed. Bottom of test pit at 5.0 feet.

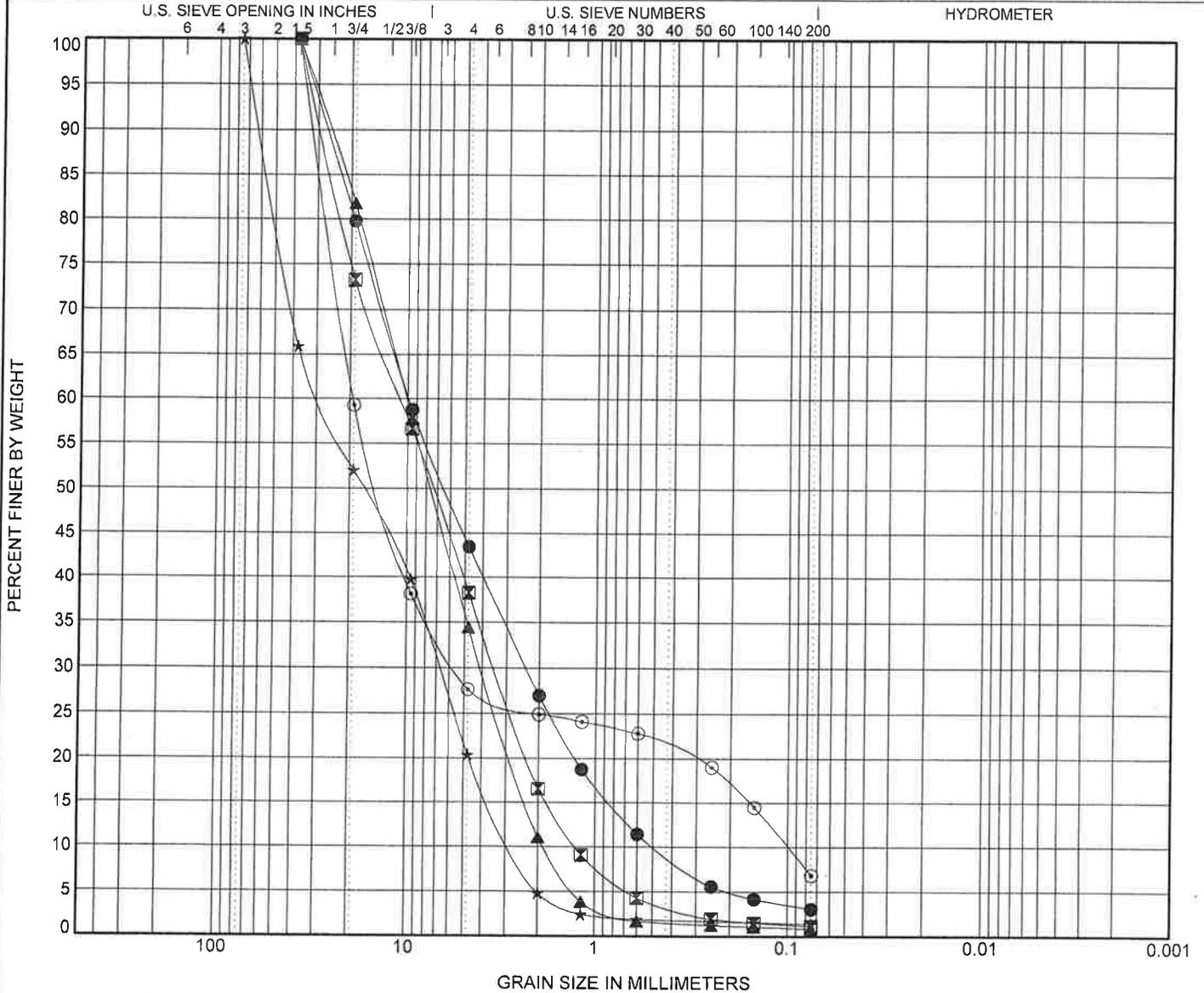


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# GRAIN SIZE DISTRIBUTION

PROJECT NUMBER **ES-7104**

PROJECT NAME **Vantage Bay**



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification	Classification						Cc	Cu
● TP-01 9.0ft.	USDA: Gray Extremely Gravelly Coarse Sand. USCS: GW with Sand.						1.14	20.40
⊠ TP-03 7.0ft.	USDA: Gray Extremely Gravelly Coarse Sand. USCS: GP with Sand.						0.85	8.68
▲ TP-06 9.5ft.	USDA: Gray Extremely Gravelly Coarse Sand. USCS: GP with Sand.						0.86	5.48
★ TP-07 8.0ft.	USDA: Gray Extremely Gravelly Loamy Coarse Sand. USCS: GP with Sand.						0.60	10.51
⊙ TP-09 3.0ft.	USDA: Gray Extremely Gravelly Very Fine Sandy Loam. USCS: GP-GM with Sand.						16.06	192.49

Specimen Identification	D100	D90	D60	D30	D10	LL	PL	PI	%Silt	%Clay
● TP-01 9.0ft.	37.5	26.796	9.906	2.346	0.486				3.0	
⊠ TP-03 7.0ft.	37.5	29.082	10.932	3.418	1.259				1.1	
▲ TP-06 9.5ft.	37.5	25.83	10.163	4.034	1.856				0.8	
★ TP-07 8.0ft.	75	61.21	28.098	6.704	2.673				1.3	
⊙ TP-09 3.0ft.	37.5	31.736	19.236	5.556	0.1				6.8	

GRAIN SIZE USDA WITH D90 ES-7104 VANTAGE BAY.GPJ GINT US LAB.GDT 1/7/20

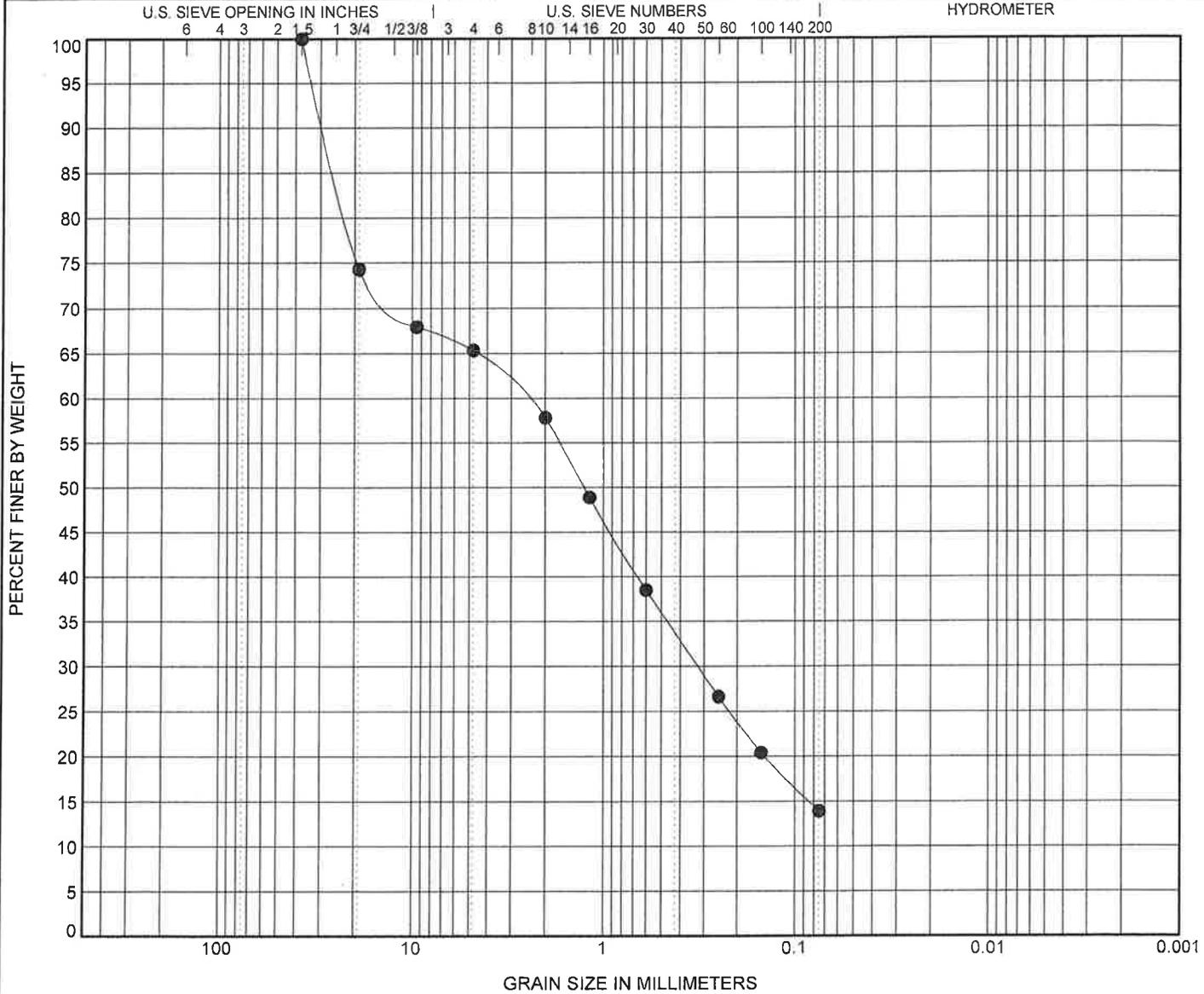


Earth Solutions NW, LLC  
 15365 N.E. 90th Street, Suite 100  
 Redmond, Washington 98052  
 Telephone: 425-449-4704  
 Fax: 425-449-4711

# GRAIN SIZE DISTRIBUTION

PROJECT NUMBER ES-7104

PROJECT NAME Vantage Bay



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification	Classification										Cc	Cu
● TP-12 3.0ft.	<b>USDA: Gray Very Gravelly Loamy Coarse Sand. USCS: SM with Gravel.</b>											

Specimen Identification	D100	D90	D60	D30	D10	LL	PL	PI	%Silt	%Clay
● TP-12 3.0ft.	37.5	28.785	2.571	0.321					13.9	

GRAIN SIZE USDA WITH D80 ES-7104 VANTAGE BAY GPJ GINT US LAB GDT 1/7/20

# **ATTACHMENT E.5**

# RH2 TECHNICAL MEMORANDUM

---

Client: Ketchikan Drywall Services

---

Project: Vantage Bay Planned Unit Development

---

Project File: KDS 20-0097.00.0002 Project Manager: Paul Cross, PE

---

Composed by: Steve Nelson, LHG

---

Reviewed by: Paul Cross, PE

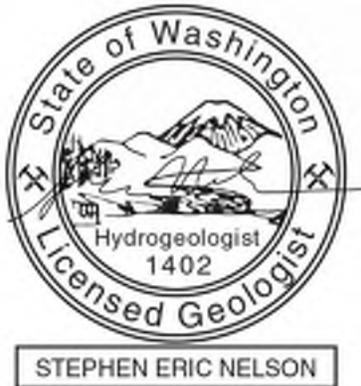
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Subject: Hydrogeologic Evaluation of Class A Wastewater Discharge

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Date: August 31, 2020

---



Signed: 08/31/2020



Signed: 08/31/2020

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## INTRODUCTION

The proposed residential Vantage Bay planned unit development (PUD) on approximately 58 acres of land near the Town of Vantage, Washington, will use an on-site wastewater treatment system with membrane bioreactor (MBR) technology to generate Class A wastewater that will be partially discharged to ground for reuse and partially reclaimed in the summer months for irrigation supply. The Class A wastewater will be discharged to an on-site infiltration system, and the wastewater will percolate into unconsolidated permeable soil, migrate laterally, and ultimately discharge into a mixing zone along an inlet (Inlet in this memorandum) of the nearby Columbia River and into the Columbia River mainstem. The wastewater discharge rate at full build-out is estimated to range from 37,600 to 66,300 gallons per day (gpd). The site is shown on **Figure 1**.

## Objectives

This hydrogeologic evaluation characterizes the project site surface water, geologic, and groundwater conditions and evaluates the fate of Class A wastewater discharge and its potential effect to the environment, in particular, whether the Class A wastewater discharge could degrade groundwater quality or surface water quality.

## Background Information

The Vantage Bay PUD (Site) development plan has been prepared by PLSA Engineering & Surveying (PLSA) of Yakima, Washington. **Attachment 1** shows the current design layout. The proposed development will consist of 104 building lots, ten 4-unit townhome lots and one 40-room hotel/condominium. The wastewater system was designed by Eneureau Americas of Ontario, Canada, and consists of an MBR that will generate Class A wastewater at full build-out at rates ranging from 37,600 to 66,300 gpd. For the first 5 to 10 years of operation, the discharge volume will likely start at approximately 10 percent of full build-out volumes and increase to approximately 50 percent of full build-out.

The geologic and geotechnical site conditions were evaluated and reported by Earth Solutions NW, LLC (ESNW) based on site investigations conducted in January 2020 (ESNW, 2020a, b). The investigation included excavation of 12 test pits to depths ranging from 5 to 15 feet below ground surface (bgs) and one soil boring to a depth of 100 feet bgs. The site investigation map, selected test pit logs, and soil boring logs are provided as **Attachment 2**.

Public Utility District No. 2 of Grant County (GCPUD) operates the Wanapum Dam on the Columbia River. Dam operation causes the river water (headwater) elevation behind the dam to fluctuate daily and seasonally. The headwater data are available on the United States Army Corps of Engineers (USACE) website at <https://www.nwd-wc.usace.army.mil/dd/common/dataquery/www/?k=wanapum>. GCPUD developed a bathymetric map of the Columbia River shoreline and bottom topography of the Columbia River upstream of the dam. **Attachment 3** shows the bathymetry of the Columbia River adjacent to the Site.

Several historical aerial photographs during the period from 2010 to 2018 are available on Google Earth. These aerial photographs illustrate the amount of water that may reside in the shallow Inlet of the Columbia River that extends within 200 feet of the Site's project boundary. Several aerial photographs are included in **Attachment 4**.

A licensed hydrogeologist from RH2 Engineering, Inc., (RH2) visited the Site and surrounding area on July 31, 2020, to observe Site conditions, exposed geologic units, and the Columbia River Inlet. In May 2008, the same hydrogeologist provided professional services to support the drilling and testing of the water supply well for the project. The supply well is completed approximately 900 feet north of the main development. The well is completed at a depth of 241 feet within the basalt aquifer. The basalt aquifer at the well is in hydraulic continuity with the Columbia River (RH2, 2008).

## SITE CONDITIONS

### Site Topography and Location

The Site is south of the town of Vantage in Kittitas County and accessible by Huntzinger Road immediately to the west of the Site. At the time of the site observation in July 2020, heavy equipment was grading the Site for the development, and there were several dirt access roads that lead onto the Site. The Site slopes generally to the east, with a terraced upland and slope area near Huntzinger Road and flat, broad terrain along the eastern portion of the Site. The elevation ranges from 650 feet above mean sea level (amsl) at Huntzinger Road to 580 feet amsl at the eastern property line. The Site is at latitude 46.933 W, longitude 119.988 E, and within Section 30 of Township 17N Range 23E. The main body of the Columbia River is approximately 1,000 to 1,300 feet east of the eastern Site boundary. However, a small Inlet of the Columbia River running north and south extends within 200 feet of the eastern property line (**Figure 1**). The Inlet is connected to the river approximately 1,100 feet southeast of the southern Site boundary. The Inlet is a shallow, partially excavated trough between 3 and 5 feet deep. Review of LiDAR imagery available on the Washington State Department of Natural Resources (WDNR) website indicates that the channel may have been used as a source of excavated soil borrow to construct the subgrade for the former disused airstrip that is immediately east of the north end of the Inlet.

The Site (before grading) was covered mostly with shrub-steppe vegetation consisting primarily of grass and sagebrush (**Photo 1**). Aquatic, shrub, and grass vegetation grows within 25 feet of the Inlet shoreline (**Photo 2**). The Site was lightly developed up until the grading activity, and included irrigated pasture, stock grazing, and soil borrow excavation. Property to the north is used for irrigated orchard. Property to the west and south is essentially undeveloped. Property to the east across the Inlet is owned by GCPUD and was developed with a paved airstrip but is otherwise undeveloped.



*Photo 1. Vantage Bay PUD Site looking north. July 2020.*



*Photo 2. Columbia River Inlet looking north. July 2020.*

## Surface Water

No surface water exists on the Site. The Inlet of the Columbia River is shallow, approximately 3 to 5 feet deep, and the operation of the Wanapum Dam has a significant effect on the elevation and flow of water in the Inlet.

The Columbia River headwater behind the Wanapum Dam varies during the year. During summer, the elevation is typically fixed at elevation 571 feet amsl. During fall through spring, the headwater elevation fluctuates between 566 and 570 feet, or an average elevation of 568 feet. (**Figures 2 and 3**).

Drawdown of the Wanapum headwater to below 566 feet amsl may cause the water in the Inlet to completely recede, leaving it dry during periods of fall to spring. Several Google Earth photos illustrating the amount of water in the Inlet during different times of the year are included in **Attachment 4**.

The surface water in the Inlet was observed at the time of the site visit in July 2020 (**Photo 2**). A grab sample of water was obtained, and field instrumentation indicated the following water quality parameters:

- Turbidity – 33 nephelometric turbidity units (NTUs)
- Specific Conductance – 147 microSiemens/cm
- pH – 7.09
- Temperature – 75 degrees Fahrenheit
- Color – light green tint (likely suspended organic matter and algae)

The water exhibited no indications of flow on the calm morning of the site visit. The shoreline was densely vegetated with grasses and low shrubs, and the Inlet bottom was covered with silt and fine sand.

## Geology

Undisturbed Site soil observed during the site visit consists of cobbly silty sand lightly covered with windblow silt. Exposed gullies in the upper terraced and sloped area on the Site revealed stratified sand and gravel layers that were partially cemented with caliche.

Geologic mapping by WDNR indicates that the Site is immediately underlain by recent alluvium and ice-age flood deposits consisting of layers of coarse sand and gravel with silt. The unconsolidated sand and gravel deposits (surficial geologic unit) as described in ESNW (2020a, b) were encountered at all testing locations, indicating that the surficial geologic unit is extensive and continuous, and ranges in thickness from less than 5 feet to the east to more than 100 feet thick to the west. (Refer to **Attachment 2** for figure for locations and soil test pit/boring logs.) The thickness increases away from the Columbia River shoreline, reaching a maximum near Huntzinger Road. Test pit explorations encountered more than 10 feet of the surficial geologic unit at the southeastern Site boundary, and less than 5 feet of these deposits at the northeaster Site boundary. The thickness of the surficial geologic unit at the proposed Class A wastewater infiltration area (**Figure 1**) is estimated at 10 feet deep. No groundwater was observed at any of the test pit locations. Basalt was encountered at nearly all test pit locations at depths of 10 feet or less. Refer to **Attachment 2** for test pit logs and a soil boring log.

The basalt bedrock is mapped by WDNR as the Frenchman Springs Member of the Wanapum Basalt. It is described in ECNW (2020a, b) as hard and porphyritic [basalt minerals are visible]. The borehole that was drilled for the water supply well encountered hard, fractured, and vesicular basalt from a depth of 7 feet to 241 feet bgs (RH2, 2008; **Attachment 2**).

## Groundwater

The surficial geologic unit is essentially dry and contains no measurable groundwater. The basalt unit underlying the surficial unit contains groundwater-bearing zones within fractures and open zones in the basalt, and hydraulically communicates with water in the Columbia River. Groundwater was encountered in the basalt boring at a depth of approximately 200 feet bgs. Groundwater level in the well is approximately the same as the nearby headwater level and fluctuates with the headwater elevation, generally between 550 and 571 feet amsl.

A thin water-bearing zone originating from surface water seepage into and out of the surficial geologic unit at high river levels likely extends from the Inlet shoreline to the west towards the eastern Site boundary. This water-bearing zone flows into and out of the surficial geologic unit as the headwater rises and falls with the elevation of the Columbia River. The extent of this thin zone depends on the topography of the contact between the surficial geologic unit and the top of the basalt. It is reasonable to assume that this contact slopes from west to east towards the centerline of the Columbia River, as suggested by the river bathymetry.

The operation of the dam, fluctuation of the water table, and the inflow and drainage of the Inlet indicates that the groundwater-surface water interaction at the Inlet is complex. As the headwater

level rises, surface water flows into the Inlet, and surface water enters and rises under pressure within the surficial geologic unit. As the headwater level drops, water in the Inlet flows out to the river, and the partially mixed surface water and groundwater drains from the thin water-bearing zone into the Inlet. This continuously circulating and mixing flow is pronounced during fall to spring and is relatively stable during summer when the headwater elevation is held constant.

The continuous fluctuation of the Inlet level results in a widespread mixing zone along the Inlet (**Figure 4**).

## HYDROGEOLOGIC ANALYSIS

### Estimated Travel Time to Point of Discharge

The Class A wastewater will infiltrate into the surficial geologic unit at the infiltration area, percolate downwards approximately 8 to 10 feet to the basalt layer, and then spread and accumulate as a small groundwater mound on top of the basalt. As the accumulated wastewater (now groundwater) builds in volume, the water will then flow radially into unsaturated soil below the infiltration area and to the east following the topography of the interface between the surficial geologic unit and the basalt (**Figure 4**). The topography of this interface likely varies, and is not known precisely, but it is reasonable to assume that the contact slopes easterly towards the Inlet.

The driving force for the migration of the wastewater/groundwater in the subsurface is the gradient or slope angle of the basalt contact, the amount of head or height of the accumulating groundwater mound, and the permeability or resistance to flow of the surficial geologic unit. Because the unit is nearly dry, additional capillary forces will act on the infiltrating wastewater, essentially wicking the water out into the soil. Initially, the wastewater will likely spread laterally in a radial direction below the infiltration area before accumulating a sufficient amount of saturated zone to promote more gradient-driven flow towards the Inlet.

A portion of the wastewater also will seep into fractures and open spaces at the top of the underlying basalt. The depth and quantity of this vertical seepage into the basalt will be limited by the density and distribution of these fractures and pore spaces. Some of the wastewater ultimately seeping into basalt will migrate laterally towards the river and disperse into the river at one or more locations near the shoreline. The water supply well (**Figure 1**) is more than 1,800 feet distant and hydraulically upgradient and upriver of the infiltration site and the Inlet; it is highly unlikely that any wastewater could migrate to the water bearing zones of the basalt aquifer and into the well.

It is reasonable to assume that the accumulated water mound in the surficial geologic unit will develop a height of a few inches to several feet, depending on the timing and volume of water discharge and the operation of the wastewater facility. During the first 5 to 10 years of operation, the discharge rate may be 10 to 50 percent of the maximum estimated full build-out rate, or approximately 3,500 to 20,000 gpd.

It is reasonable to assume that the discharge of wastewater/groundwater to the Inlet will occur over a broad area, and that headwater fluctuations and seepage into and out of the surficial geologic unit will result in a very broad mixing zone at the groundwater-surface water interface that will disperse and dilute the wastewater/groundwater (**Figure 4**).

The estimated volume of water in the Inlet is about 5,000,000 gallons, assuming an average water depth of 3 feet at maximum water level.

It is reasonable to assume that over time the wastewater/groundwater mound will develop a 1- to 2-foot-thick saturated layer above the basalt.

The shortest travel time for wastewater from the discharge area to mix with surface water can be estimated based on the shortest distance from the discharge area to the nearest surface water body (the Inlet), the elevation drop between the discharge area and the area of mixing, and the hydraulic conductivity of the surficial geologic unit.

Assuming a 420-foot distance from the infiltration area and an average height of groundwater above the Inlet elevation of 12 feet as the elevation drop from the groundwater mound, the estimated hydraulic gradient is 0.029 feet per foot. Using the soil grain-size analysis method of the Washington State Department of Ecology's *Stormwater Management Manual for Eastern Washington* and the sieve analysis results for soil samples collected at Test Pit 9, the estimated saturated hydraulic conductivity of the surficial geologic unit is 68 feet per day. Based on these data, the time of travel from the infiltration area to the nearest point on the Inlet shoreline is about 186 days or 6 months.

The elevation of the surface water in the Inlet varies with the fluctuation of the headwater elevation. The velocity of the wastewater/groundwater will increase as the water table drops and increases the gradient. As the water table rises, the gradient flattens and velocity decreases, and the radial dispersion or spreading of the wastewater/groundwater increases. Calculating the day to day changes in discharge rate, velocity, travel time, flow direction, and mixing rates is a complex problem, not reasonably possible with the limited data available. Therefore, average elevations were used to evaluate the travel time of the wastewater/groundwater flow.

## Fate of Wastewater at Discharge Area

Wastewater infiltrating to the subsurface will accumulate below the infiltration area then flow predominantly to the east towards the Inlet. As the wastewater interacts with the unconsolidated soil, the water quality will improve through nutrient removal, soil absorption, and mineral precipitation, processes that are typical for all wastewater discharges to the subsurface. Portions of the infiltrated wastewater will discharge to the Inlet, and a portion will bypass the Inlet and flow towards and ultimately discharge along a broad mixing zone along the Columbia River shoreline (**Figure 4**).

The wastewater will be treated to Class A standards, which includes estimated total dissolved solids (TDS) of no more than 500 milligrams per liter (mg/L), nitrogen below groundwater drinking water standards (10 mg/L), and a turbidity of less than 1 NTU. For comparison, a sample of Inlet water collected in July 2020 contained a TDS of approximately 100 mg/L and a turbidity of 30 NTU.

Upon reaching the surface water at the Inlet, the wastewater (now technically, groundwater) will interact with surface water along the mixing zone near the Inlet shoreline (**Figure 4**). During the summer months, when the headwater level is relatively high and stable, the groundwater will mix with and discharge to the surface water along a relatively narrow zone along the north end of the Inlet shoreline. Since the water level in the Inlet is relatively stable, little or no flushing action of discharged wastewater/groundwater will occur during summer. During summer, the shoreline vegetation will be undergoing maximum growth and absorbing available nutrients from soil and wastewater/groundwater discharging along the shoreline.

The temperature of the groundwater will decrease as it migrates through the soil and attain an average temperature in the range of 60 degrees Fahrenheit. Groundwater discharging into the Inlet during summer months will be lower than the relatively stagnant Inlet water; groundwater discharging to the Inlet during fall to spring will be warmer than Inlet water.

During most of the year, the headwater level rises and falls by several feet within a few days, which generates a high degree of exchange between groundwater and surface water in the Inlet and between water in the Inlet and the Columbia River mainstem as the Inlet fills and drains. There also will be a significant exchange of surface water infiltrating into the mixing zone to interact with wastewater/groundwater. During fall to spring, over several days of dam operation when the Inlet may completely drain and fill, approximately 5,000,000 gallons of water will fill and empty the Inlet. For comparison, during the same time, the amount of wastewater/groundwater discharging from the Site will be initially 3,500 gpd and up to a maximum of 66,000 gpd at build-out.

If wastewater is reclaimed for irrigation use in the summer, the anticipated winter-time groundwater discharge to the Inlet will be reduced, as the source of water was not infiltrated during summer months.

## CONCLUSIONS

Class A wastewater infiltrated at the Site will migrate towards and mix with surface water at the Inlet and discharge predominantly into the Inlet and into the Columbia River. A minor quantity will migrate into the underlying basalt and also discharge into the Columbia River. The wastewater will be treated to Class A standards, meeting groundwater drinking water standards, and will contain nutrients, metals, and dissolved solids. During subsurface flow in the surficial geologic unit, the wastewater/groundwater quality will improve through natural attenuation processes that will decrease nutrient and metals concentrations in the already highly treated wastewater. Additional processes of dispersion and dilution into a broad mixing zone along the Inlet shoreline will further attenuate the effect of wastewater discharge on surface water quality. Nutrients in the wastewater/groundwater discharging to the Inlet and Columbia River shorelines will be partially absorbed by shoreline vegetation during summer months.

There will be no degradation of groundwater quality downgradient of the Site, as no groundwater exists in the surficial geologic unit, and only trace amounts of wastewater will enter the basalt before discharging to the Columbia River.

There will be no degradation of surface water quality as the wastewater will be significantly attenuated through reactions, absorption, dispersion, and dilution through interaction with the surficial geologic unit and with surface water in the Inlet before ultimately discharging to the Columbia River mainstem.

Considering water balance issues, groundwater will be removed for municipal supply from the basalt aquifer that is in hydraulic continuity with the Columbia River, used at the development, treated to Class A quality, and discharged ultimately back to the river with minor losses from evaporation along this pathway.

## References

Earth Solutions NW, LLC. (January 2020a). *Infiltration Evaluation, Proposed Vantage Bay PUD, Huntzinger Road, Kittitas County (Vantage), Washington.*

Earth Solutions NW, LLC. (June 2020b). *Geotechnical Consulting Services, Proposed Vantage Bay PUD, Huntzinger Road, Kittitas County (Vantage), Washington.*

RH2 Engineering, Inc. (2008). *Vantage Bay Hydrogeologic Evaluation.* Prepared for BCSCBN, Inc.

## Figures

1. Figure 1 – Vantage Bay PUD Site Map
2. Figure 2 – Wanapum Headwater Elevation – August 2019 to August 2020
3. Figure 3 – Wanapum Headwater Elevation – Summer and Autumn, 2019
4. Figure 4 – Infiltration Area and Wastewater/Groundwater Flow Path

## Attachments

1. Vantage Bay PUD Conceptual Site Plan
2. Site Investigation Map and Investigation Logs
3. Vantage Bay Bathymetry
4. Vantage Bay Historical Aerial Photographs

## Figures

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# FIGURE 1 SITE MAP VANTAGE BAY PUD

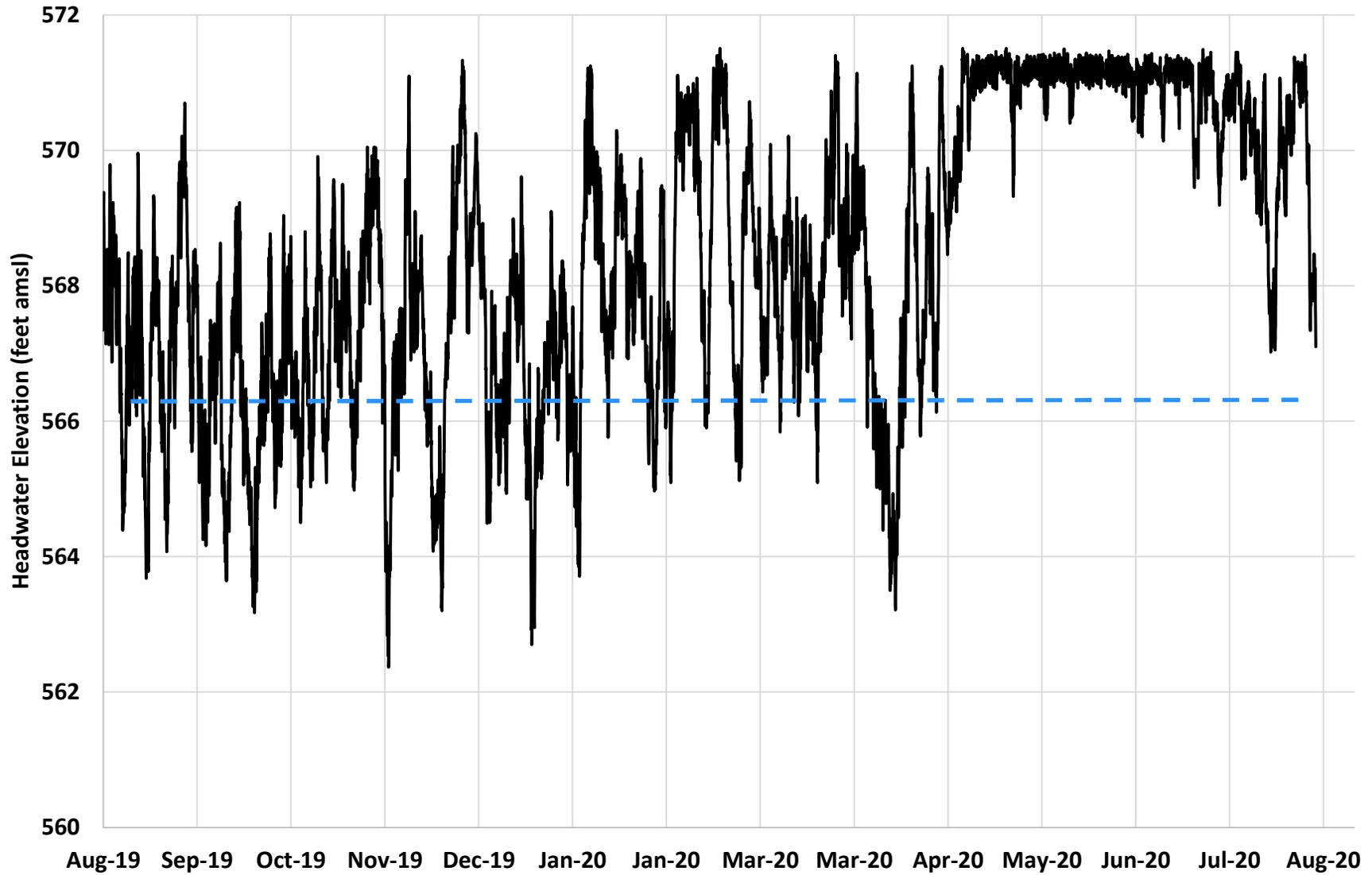


Source: Google Earth

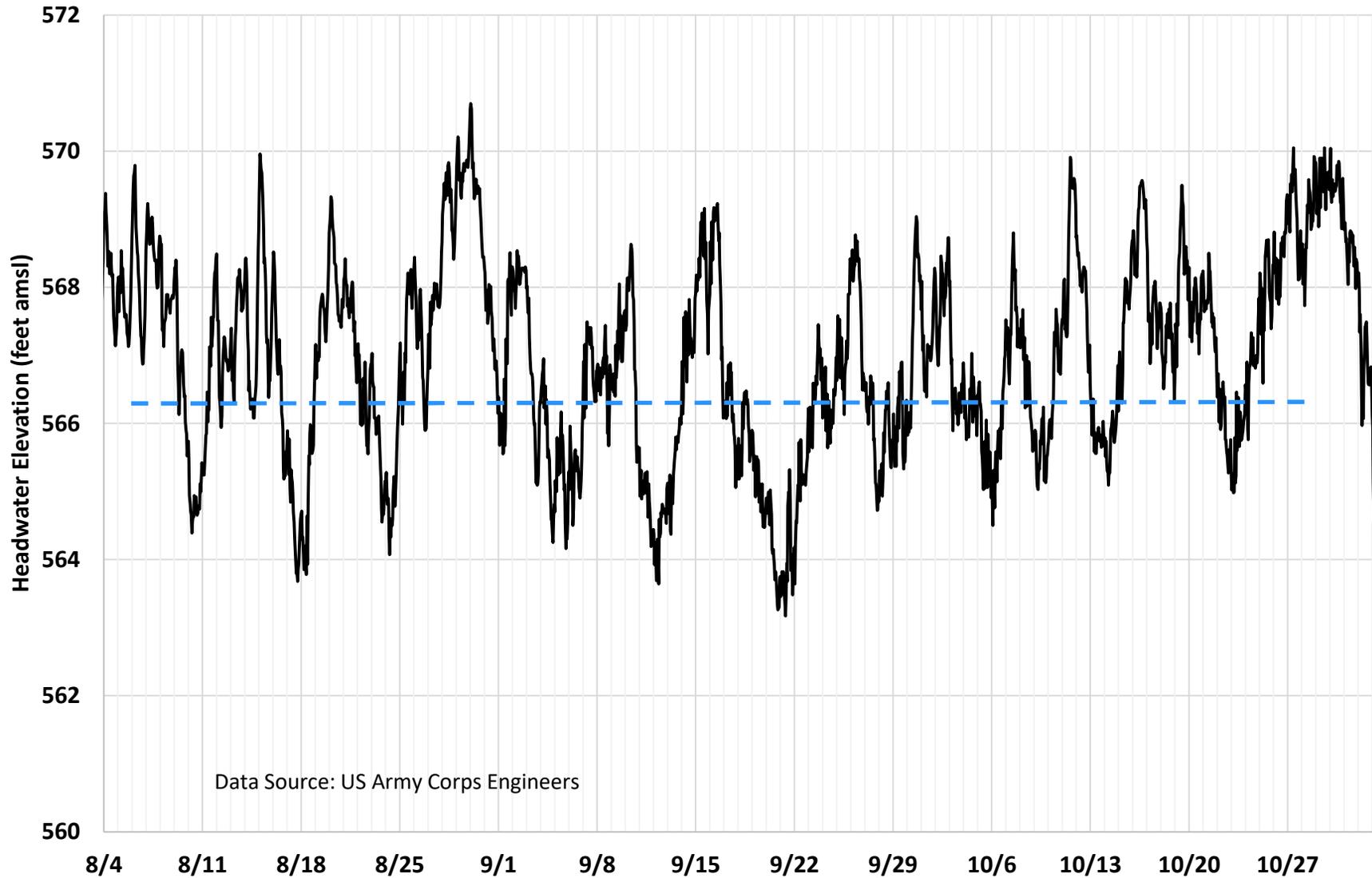
1,000 feet

RH2 ENGINEERING, INC.

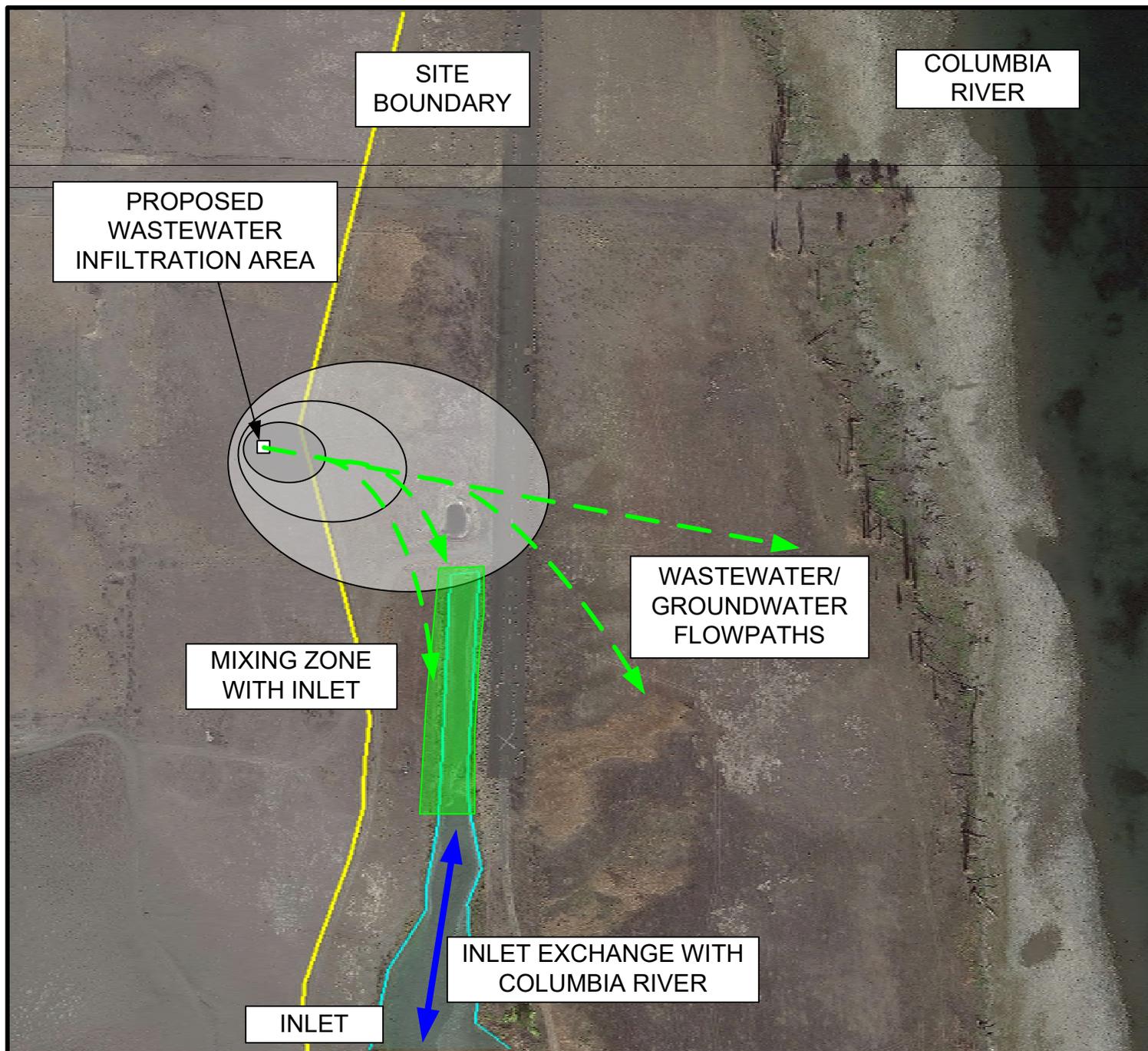
**Figure 2**  
**Wanapum Headwater Elevation - August 2019 to August 2020**  
**Vantage Bay Hydrogeologic Evaluation**



**Figure 3**  
**Wanapum Headwater Elevation - Summer and Autumn, 2019**  
**Vantage Bay Hydrogeologic Evaluation**



# FIGURE 4 INFILTRATION AREA AND WASTEWATER/ GROUNDWATER FLOW PATH VANTAGE BAY PUD



Source: Google Earth

200 feet

**Attachment 1**

**Vantage Bay PUD Conceptual Site Plan**

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A PORTION OF THE EAST 1/2 OF SECTION 30, TOWNSHIP 17 N., RANGE 26 E., W.M.



SCALE: 1" = 120'  
 120 60 0 120 240  
 CONTOUR INTERVAL = 2'

**OWNER/DEVELOPER**

BCSCBN, INC. dba VANTAGE BAY  
 21828 87TH AVE SE, #200  
 WOODINVILLE, WA 98072  
 425-488-7625  
 CONTACT: BILL COWAN

**BIOLOGIST**

ENVIRONMENTAL ASSESSMENT SERVICES  
 PO BOX 265  
 RICHLAND, WA 99352  
 509-375-1481  
 CONTACT: BRETT TILLER

**WASTEWATER ENGINEER**

PACE ENGINEERS, INC.  
 104 EAST 9TH STREET  
 WENATCHEE, WA 98801  
 509-662-1762  
 CONTACT: ROBIN NELSON

**SITE DATA**

- TAX PARCEL NOS.: 17-23-30000-0001, 17-23-30000-0003 AND 17-23-30010-0006
- SITE AREA: 75.6 ACRES TOTAL  
 PHASE 1 - 58.2 ACRES  
 PHASE 2 - 17.4 ACRES
- ZONING: PLANNED UNIT DEVELOPMENT (PUD)
- LAND USE APPROVALS:  
 KITTITAS COUNTY: ORDINANCE NO. 2006-60  
 PUD / REZONE: FILE NO. Z-06-25  
 PRELIMINARY PLAT: FILE NO. P-06-26  
 SEPA MDNS: APPROVED AUG. 29, 2006
- APPROVED DENSITY: 310 SINGLE-FAMILY RESIDENTIAL UNITS (±50'x90' TYP)
- PROPOSED DENSITY: UP TO 310 SINGLE-FAMILY RESIDENTIAL UNITS (MIXED SIZES, INCLUDING ATTACHED TOWNHOMES)

**SURVEYOR**

TODD LOKLUS LAND SURVEYING, LLC  
 NO LONGER IN BUSINESS  
 BOUNDARY AND TOPOGRAPHIC SURVEY  
 DATED MARCH 31, 2006

**TRAFFIC ENGINEER**

TRANSPORTATION ENGINEERING NORTHWEST  
 816 6TH STREET S  
 KIRKLAND, WA 98033  
 509-925-5379  
 CONTACT: JEFF HAYNIE

**HYDROGEOLOGIST**

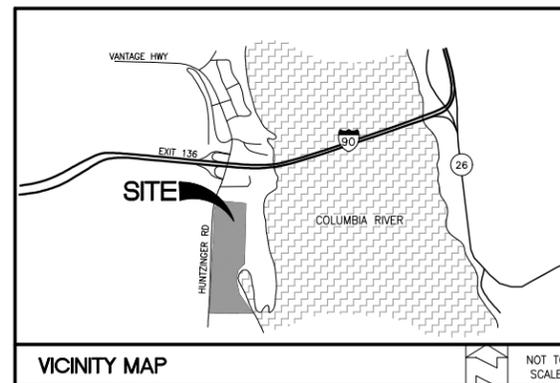
RH2 ENGINEERS  
 300 SIMON STREET SE, SUITE 5  
 EAST WENATCHEE, WA 98802  
 509-886-2900  
 CONTACT: STEVE NELSON

**PLANNER/CIVIL ENGINEER**

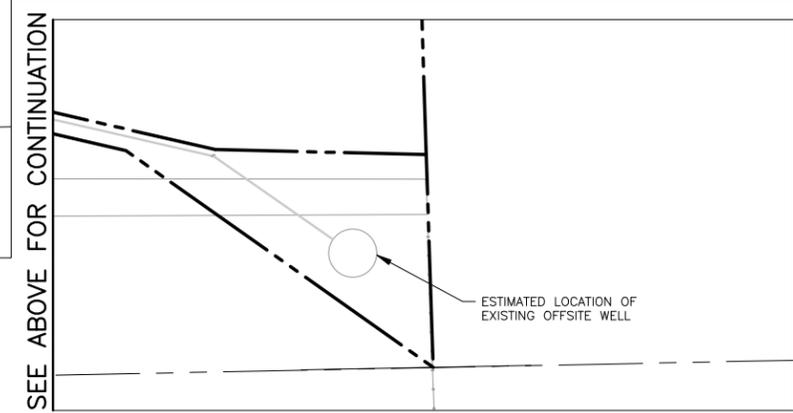
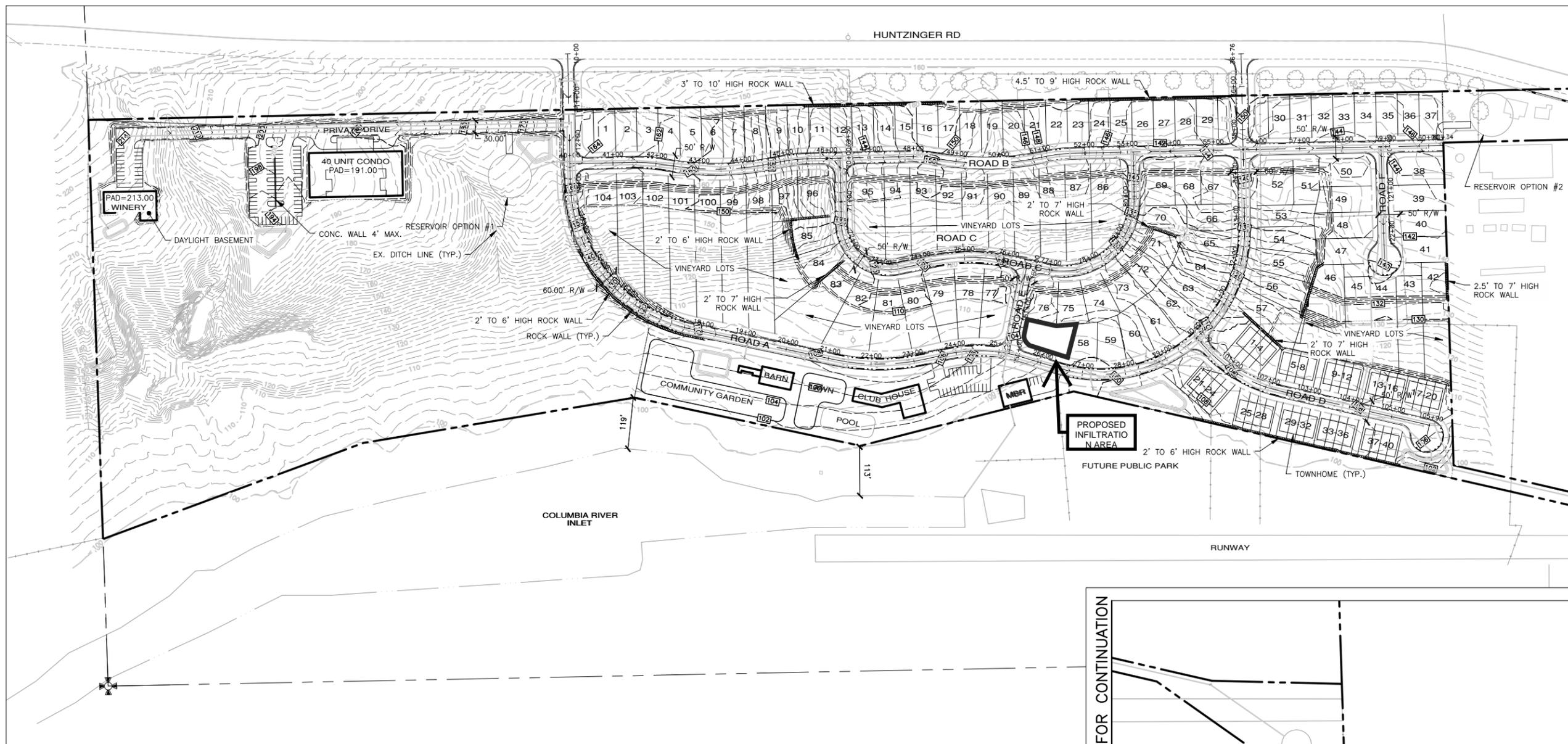
ESM CONSULTING ENGINEERS, LLC  
 33400 8TH AVE S, #205  
 FEDERAL WAY, WA 98003  
 253-638-6113  
 CONTACT: ERIC LABRIE

**ARCHAEOLOGICAL SURVEY**

NORTHWEST GEOCULTURAL CONSULTING  
 804 NORTH B STREET  
 ELLENSBURG, WA98926  
 509-925-5379  
 TUCKER ORWALD



**APPROXIMATE EARTHWORK QUANTITIES**  
 CUT = 69,800 cu yds.  
 FILL = 56,600 cu yds.  
 TOTAL = 13,200 net cu yds. CUT



SEE BELOW FOR CONTINUATION

REVISIONS		
NO.	DESCRIPTION/DATE	BY

ESM CONSULTING ENGINEERS, LLC  
 33400 8TH AVE S, #205  
 FEDERAL WAY, WA 98003  
 (253) 638-6113  
 (253) 297-1900  
 www.esmcivil.com  
 Civil Engineering | Project Management | Land Surveying | Landscape Architecture  
 Public Works

BCSCBN, INC.  
**VANTAGE BAY PUD**  
 CONCEPTUAL SITE PLAN  
 WASHINGTON  
 KITTITAS COUNTY

JOB NO.: 1396/001/014  
 DWG. NAME: GR-02  
 DESIGNED BY:  
 DRAWN BY: TMA  
 CHECKED BY:  
 DATE: 08/01/2017  
 DATE OF PRINT:

File: \\vms6\vmpl\ESM-0085\1396\001\014\plots\08-02.dwg  
 Plotted By: Tony Akerman  
 Date: 07/27/17 10:27 AM

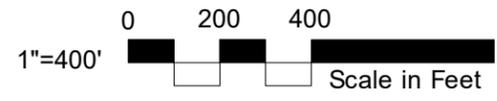
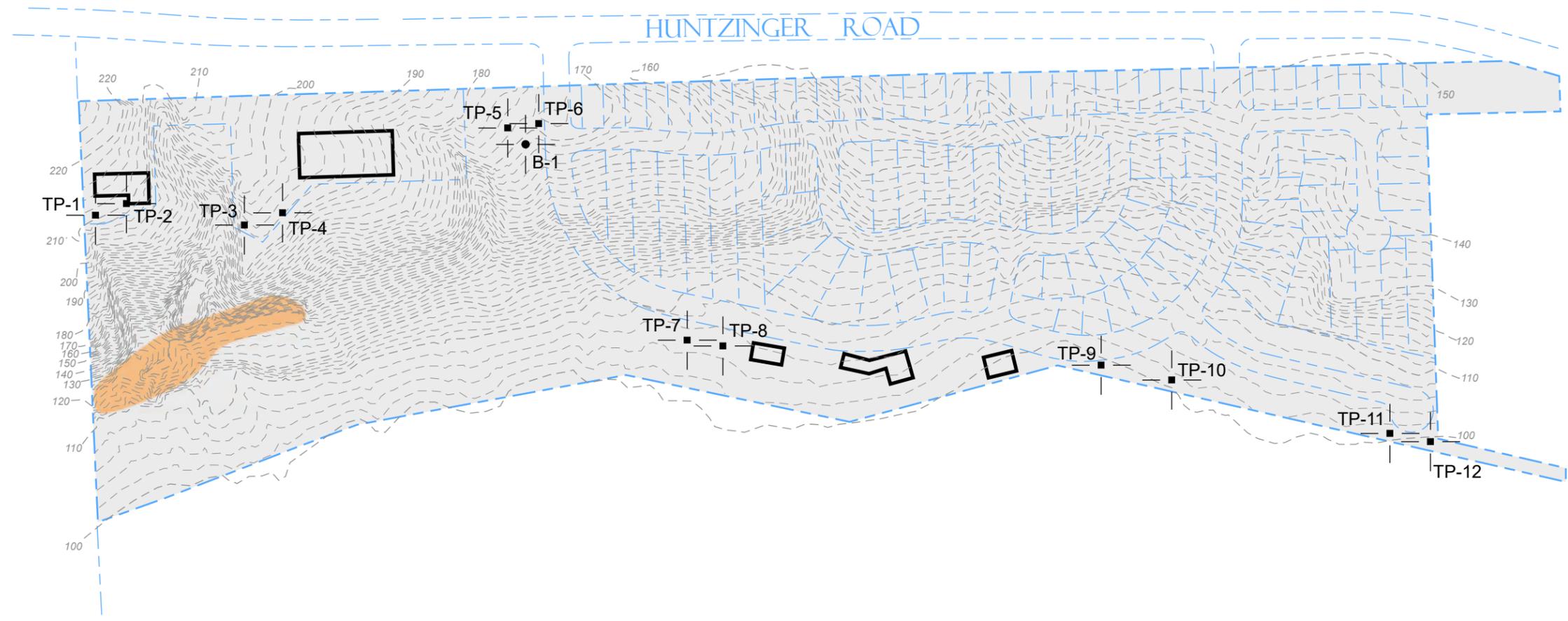
## **Attachment 2**

# **Site Investigation Map and Investigation Logs**

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Drwn. By MRS
Checked By HTW
Date 06/22/2020
Proj. No. 7104.01
Plate 2



**LEGEND**

- B-1 | ● | Approximate Location of ESNW Boring, Proj. No. ES-7104.01, May 2020
- TP-1 | ■ | Approximate Location of ESNW Test Pit, Proj. No. ES-7104, Jan. 2020
- | Subject Site
- | Proposed Building
- | Area of Grab Samples SG-01 through SG-04

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

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



Earth Solutions NW  
 15365 N.E. 90th Street, Suite 100  
 Redmond, Washington 98052  
 Telephone: 425-449-4704  
 Fax: 425-449-4711

# TEST PIT NUMBER TP-9

PAGE 1 OF 1

PROJECT NUMBER ES-7104 PROJECT NAME Vantage Bay  
 DATE STARTED 1/2/20 COMPLETED 1/2/20 GROUND ELEVATION \_\_\_\_\_ TEST PIT SIZE \_\_\_\_\_  
 EXCAVATION CONTRACTOR Advantage Dirt Contractors, Inc. GROUND WATER LEVELS:  
 EXCAVATION METHOD \_\_\_\_\_ AT TIME OF EXCAVATION ---  
 LOGGED BY AZS CHECKED BY HTW AT END OF EXCAVATION ---  
 NOTES Depth of Topsoil & Sod 6": field grass AFTER EXCAVATION ---

DEPTH (ft)	SAMPLE TYPE NUMBER	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
0					
			TPSL		0.5 Dark brown TOPSOIL, caving to BOH
			SM		Brown silty SAND, loose to medium dense, damp
		MC = 1.80% Fines = 6.80%			2.0 Gray poorly graded GRAVEL with silt and sand, medium dense, damp  [USDA Classification: extremely gravelly very fine sandy LOAM]
5			GM		
		MC = 2.40%			
			Basalt		7.5 8.0 Dark brown BASALT, very hard, moist -porphyritic
					Test pit terminated at 8.0 feet below existing grade due to refusal on very hard bedrock. No groundwater encountered during excavation. Caving observed from TOH to BOH. Bottom of test pit at 8.0 feet.

GENERAL BH / TP / WELL 7104.GPJ GINT US.GDT 1/17/20



Earth Solutions NW, LLC  
 15365 N.E. 90th Street, Suite 100  
 Redmond, Washington 98052  
 Telephone: 425-449-4704  
 Fax: 425-449-4711

PROJECT NUMBER ES-7104.01

PROJECT NAME Vantage Bay

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
90				MC = 22.70%			Brown silty SAND, dense, moist ( <i>continued</i> )  -becomes gray
95				MC = 29.70%	SM		
100	SS		50/6"	MC = 52.50%			-tree organics
						100.5	

Boring terminated at 100.5 feet below existing grade. Groundwater seepage encountered from 77.0 to 78.0 feet during drilling. Boring backfilled with bentonite.

The Department of Ecology does NOT Warranty the Data and/or the Information on this Well Report.



# WATER WELL REPORT

Original & 1<sup>st</sup> copy - Ecology, 2<sup>nd</sup> copy - owner, 3<sup>rd</sup> copy - driller

**Construction/Decommission ("x" in circle)** 298679

Construction  
 Decommission *ORIGINAL INSTALLATION*  
 Notice of Intent Number \_\_\_\_\_

<b>PROPOSED USE:</b>	
<input checked="" type="checkbox"/> Domestic	<input type="checkbox"/> Industrial
<input type="checkbox"/> DeWater	<input type="checkbox"/> Municipal
<input type="checkbox"/> Irrigation	<input type="checkbox"/> Test Well
<input type="checkbox"/> Other	<input type="checkbox"/> Other
<b>TYPE OF WORK:</b> Owner's number of well (if more than one) _____	
<input checked="" type="checkbox"/> New well	<input type="checkbox"/> Reconditioned
<input type="checkbox"/> Deepened	<input type="checkbox"/> Method
<input type="checkbox"/> Cable	<input type="checkbox"/> Dug
<input checked="" type="checkbox"/> Rotary	<input type="checkbox"/> Bored
<input type="checkbox"/> Jetted	<input type="checkbox"/> Driven
<b>DIMENSIONS:</b> Diameter of well <u>10</u> inches, drilled <u>241</u> ft	
Depth of completed well <u>241</u> ft	
<b>CONSTRUCTION DETAILS</b>	
Casing <input checked="" type="checkbox"/> Welded	<u>10</u> " Diam from <u>+2</u> ft to <u>26</u> ft
Installed: <input type="checkbox"/> Liner installed	" Diam from _____ ft to _____ ft
<input type="checkbox"/> Threaded	" Diam From _____ ft to _____ ft
<b>Perforations:</b> <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	
Type of perforator used _____	
SIZE of perfs _____ in by _____ in and no of perfs from _____ ft to _____ ft	
<b>Screens:</b> <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> K-Pac Location _____	
Manufacturer's Name _____	
Type _____ Model No _____	
Diam _____ Slot size _____	from _____ ft to _____ ft
Diam _____ Slot size _____	from _____ ft to _____ ft
<b>Gravel/Filter packed:</b> <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Size of gravel/sand _____	
Materials placed from _____ ft to _____ ft	
<b>Surface Seal:</b> <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No To what depth? <u>26</u> ft	
Material used in seal <u>BENTONITE CHIPS</u>	
Did any strata contain unusable water? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	
Type of water? _____ Depth of strata _____	
Method of sealing strata off _____	
<b>PUMP:</b> Manufacturer's Name _____	
Type _____ H P _____	
<b>WATER LEVELS:</b> Land-surface elevation above mean sea level _____ ft	
Static level <u>37</u> ft below top of well Date <u>5/14/08</u>	
Artesian pressure _____ lbs per square inch Date _____	
Artesian water is controlled by _____ (cap, valve, etc)	
<b>WELL TESTS:</b> Drawdown is amount water level is lowered below static level	
Was a pump test made? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No If yes, by whom? _____	
Yield _____ gal/min with _____ ft drawdown after _____ hrs	
Yield _____ gal/min with _____ ft drawdown after _____ hrs	
Yield _____ gal/min with _____ ft drawdown after _____ hrs	
Recovery data (time taken as zero when pump turned off) (water level measured from well top to water level)	
Time _____ Water Level _____	Time _____ Water Level _____
Time _____ Water Level _____	Time _____ Water Level _____
Time _____ Water Level _____	Time _____ Water Level _____
Date of test _____	
Bailer Test _____ gal/min with _____ ft drawdown after _____ hrs	
Artest <u>150</u> gal/min with stem set at <u>241</u> ft for <u>2</u> hrs	
Artesian flow _____ g.p.m. Date _____	
Temperature of water _____ Was a chemical analysis made? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	

**CURRENT**

**Notice of Intent No.** WE08192  
 Unique Ecology Well ID Tag No. BAJ036  
 Water Right Permit No. CS-ADJ73029  
 Property Owner Name B C S C B N INC  
 Well Street Address HUNTZINGER ROAD  
 City VANTAGE BAY County KITTITAS  
 Location SE 1/4-1/4 NE 1/4 Sec 30 Twn 17N R 23E  EWM  Check Or  One  
 (s, t, r Still REQUIRED)  
 Lat/Long Lat Deg \_\_\_\_\_ Lat Min/Sec \_\_\_\_\_  
 Long Deg \_\_\_\_\_ Long Min/Sec \_\_\_\_\_  
 Tax Parcel No. (Required) 142933

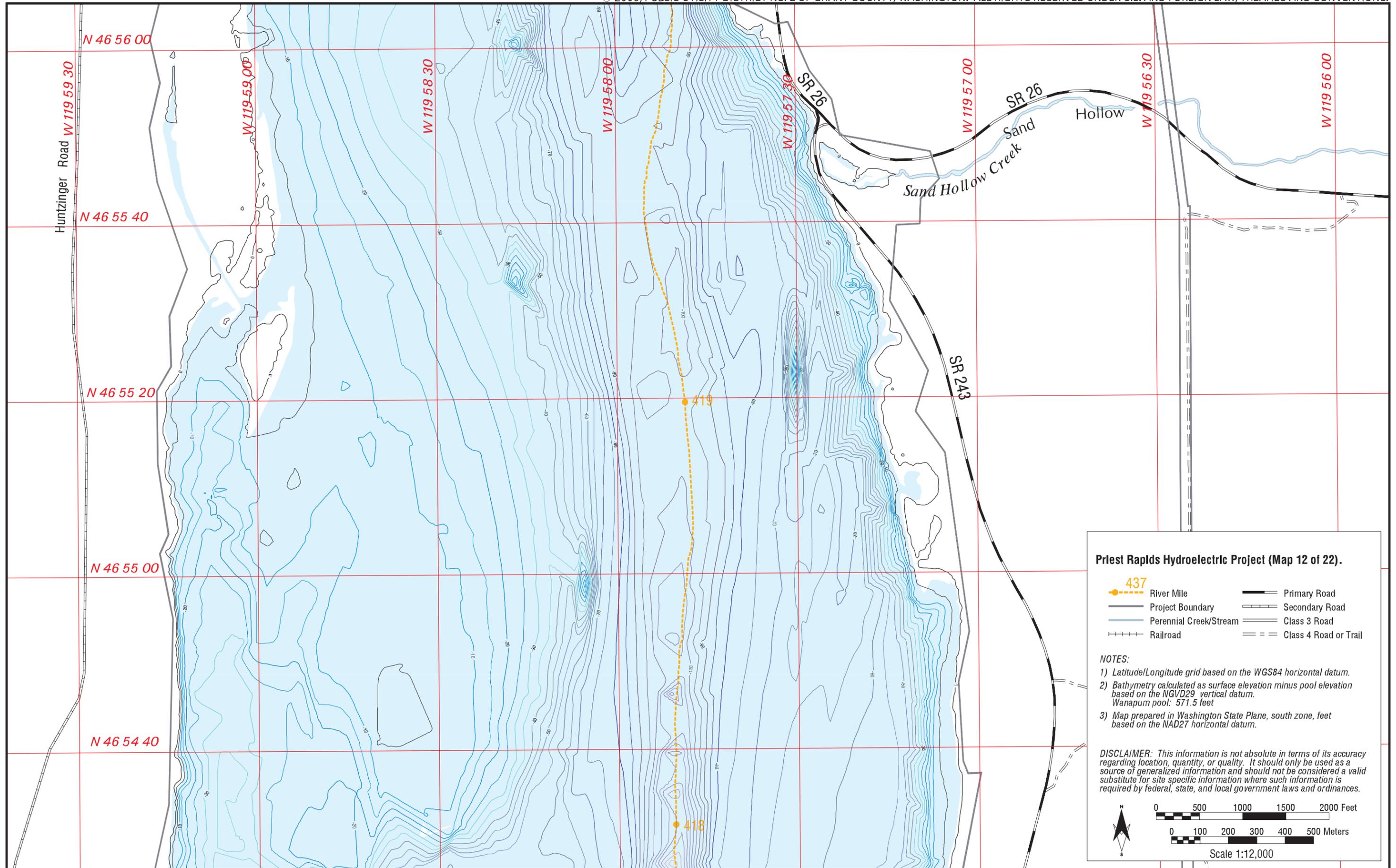
CONSTRUCTION OR DECOMMISSION PROCEDURE		
Formation Describe by color, character, size of material and structure, and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of information (USE ADDITIONAL SHEETS IF NECESSARY)		
MATERIAL	FROM	TO
BROWN FINE SAND, LOOSE, DRY WITH	0	
BLACK BASALT CHUNKS		7
WEATHERED BASALT, DRY	7	9
BLACK BASALT, WEAK, DRY,	9	32
FRACTURED BLACK & BROWN BASALT	32	35
BLACK BASALT, WEAK, DRY	35	46
BROWN & BLACK BASALT, FRACTURED	46	66
BLACK BASALT, MODERATE, DRY	66	80
BLACK BASALT, OCCASIONAL FRACTURE,	80	94
BLACK BASALT, DENSE, DRY	94	118
BLACK BASALT, FRACTURES, DRY	118	122
BLACK BASALT, DENSE, DRY	122	162
BLACK, GREEN, BLUE BASALT, FRACTURED	162	
WATER BEARING		194
BLACK BASALT, MODERATE, DRY	194	217
DARK GRAY BASALT, DENSE, HARD, DRY	217	221
BLACK & GRAY BASALT, FRACTURED,	221	
WATER BEARING		223
BLACK & RED BASALT, FRACTURED,	223	
WATER BEARING		224
BROWN WEATHERED BASALT, FRACTURED	224	
WATER BEARING		231
BLACK BASALT, MODERATE, DRY	231	241
<div style="border: 1px solid black; padding: 5px; display: inline-block;"> <b>JUN 17 2008</b>                      _____                      Department of Ecology                 </div>		
Start Date <u>5/12/08</u>	Completed Date <u>5/14/08</u>	

**WELL CONSTRUCTION CERTIFICATION:** I constructed and/or accept responsibility for construction of this well, and its compliance with all Washington well construction standards. Materials used and the information reported above are true to my best knowledge and belief.

Driller  Engineer  Trainee Name (Print) ROGERAY BRYTHIAN Drilling Company ARCADIA DRILLING INC  
 Driller/Engineer/Trainee Signature \_\_\_\_\_ Address PO BOX 1790  
 Driller or trainee License No. 2053 City, State, Zip SHELTON, WA, 98584  
 Contractor's Registration No. ARCADDI098K1 Date 5/20/08  
 IF TRAINEE Driller's License No. \_\_\_\_\_  
 Driller's Signature \_\_\_\_\_

**Attachment 3**  
**Vantage Bay Bathymetry**

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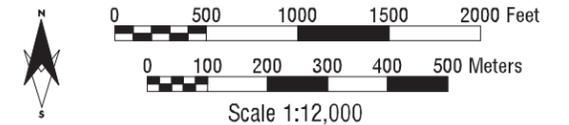
**Priest Rapids Hydroelectric Project (Map 12 of 22).**

- --- 437 River Mile
- Project Boundary
- Perennial Creek/Stream
- Railroad
- Primary Road
- Secondary Road
- Class 3 Road
- Class 4 Road or Trail

**NOTES:**

- 1) Latitude/Longitude grid based on the WGS84 horizontal datum.
- 2) Bathymetry calculated as surface elevation minus pool elevation based on the NGVD29 vertical datum.  
Wanapum pool: 571.5 feet
- 3) Map prepared in Washington State Plane, south zone, feet based on the NAD27 horizontal datum.

**DISCLAIMER:** This information is not absolute in terms of its accuracy regarding location, quantity, or quality. It should only be used as a source of generalized information and should not be considered a valid substitute for site specific information where such information is required by federal, state, and local government laws and ordinances.



**Attachment 4**

**Vantage Bay Historical Aerial Photographs**

# Vantage Bay Historic Aerial Photographs



# Vantage Bay Historic Aerial Photographs





(509) 662-1888  
 Fax: (509) 662-8183  
 3019 G. S. Center Road  
 Wenatchee, WA 98801

(509) 452-7707  
 Fax: (509) 452-7773  
 1008 W. Ahtanum Rd.  
 Union Gap, WA 98903

Batch: 017032  
 Client: Picatti Brothers  
 Account: 05554  
 Sampler: Cody

CASCADE ANALYTICAL #10525847  
 A EUROFINS COMPANY  
 1-800-545-4206

-- Drinking Water Analytical Report --

Report Date: 12/ 8/20

Picatti Brothers  
 PO Box 9576  
 Yakima, WA 98909

Date Received: 12/ 7/20  
 Date Sampled: 12/ 7/20

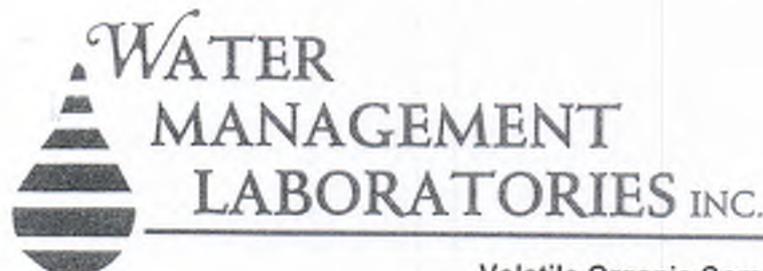
Lab Number	Sample Id	Test Requested	Results
20-M025847	Vantage Bay	Total Coliform Colilert	Negative

Approved By Name:

Signature: *Joanna Gschulke*

Function:

Eurofins-Cascade Analytical uses procedures established by EPA, AOAC, APHA, ASTM, and AMMA. Eurofins-Cascade Analytical makes no warranty of any kind. The client assumes all risk and liability from the use of these results. Results relate only to the items tested and the sample(s) as received by the laboratory. Eurofins-Cascade Analytical liability to the client as a result of use of the test results shall be limited to a sum equal to the fees paid by the client to Eurofins-Cascade Analytical for analysis. PLEASE REVIEW YOUR DATA IN A TIMELY MANNER. DATA GAPS OR ERRORS AFTER ONE MONTH WILL NOT BE OUR RESPONSIBILITY. THOUGH WE DO KEEP ALL ANALYTICAL DATA FOR SEVERAL YEARS, SAMPLES ARE DISPOSED OF AFTER SIX WEEKS.



1515 80th St. E.  
Tacoma, WA 98404  
(253) 531-3121

**Volatile Organic Compounds**  
Report of Analysis

Date Collected: 12-07-2020	System Group Type: (circle one) <b>(A)</b> B Other
Water System ID Number: N/A	System Name: Vantage Bay
Lab Number / Sample Number: 089 / 08012	County: Kittitas
Sample Location: Vantage Bay	Source Number(s): (list all sources if blended or composited)
Sample Purpose: (check appropriate box) <input type="checkbox"/> RC - Routine/Compliance (satisfies monitoring requirements) <input type="checkbox"/> C - Confirmation (confirmation of chemical result)* <input type="checkbox"/> I - Investigative (does not satisfy monitoring requirements) <input checked="" type="checkbox"/> O - Other (specify - does not satisfy monitoring requirements)	Date Received: 12-09-2020 Date Analyzed: 12-09-2020 Date Reported: 12-11-2020 Supervisor Initials: <i>RL</i>
Sample Composition: (check appropriate box) <input type="checkbox"/> S - Single Source <input type="checkbox"/> B - Blended (list source numbers in "Source Number" field) <input type="checkbox"/> C - Composite (list source numbers in "Source Number" field) <input type="checkbox"/> D - Distribution Sample	Sample Type: (check one) <input checked="" type="checkbox"/> Pre-treatment/Untreated (Raw) <input type="checkbox"/> Post-treatment (Finished) <input type="checkbox"/> Unknown or Other Sample Collected by: Cody Phone Number: 509-452-7707
Send Report & Bill to: Cascade Analytical, Inc 3019 G.S. Center Road, Wenatchee WA 98801	Comments: PO# 017062 / 20-C025906

**ANALYTICAL RESULTS**

DOH#	ANALYTE	DATA QUALIFIER	RESULTS	SDRL	TRIGGER	MCL	UNITS	EXCEEDS MCL?	METHOD/ INITIALS
0045	Vinyl chloride	--	ND	0.5	0.5	2	µg/L	No	524.2/RL
0046	1,1-Dichloroethylene	--	ND	0.5	0.5	7	µg/L	No	524.2/RL
0047	1,1,1 Trichloroethane	--	ND	0.5	0.5	200	µg/L	No	524.2/RL
0048	Carbon tetrachloride	--	ND	0.5	0.5	5	µg/L	No	524.2/RL
0049	Benzene	--	ND	0.5	0.5	5	µg/L	No	524.2/RL
0050	1,2 Dichloroethane	--	ND	0.5	0.5	5	µg/L	No	524.2/RL
0051	Trichloroethylene	--	ND	0.5	0.5	5	µg/L	No	524.2/RL
0052	Para-dichlorobenzene	--	ND	0.5	0.5	75	µg/L	No	524.2/RL
0056	Dichloromethane	--	ND	0.5	0.5	5	µg/L	No	524.2/RL
0057	trans-1,2-Dichloroethylene	--	ND	0.5	0.5	100	µg/L	No	524.2/RL
0060	cis- 1,2-Dichloroethylene	--	ND	0.5	0.5	70	µg/L	No	524.2/RL
0063	1,2-Dichloropropane	--	ND	0.5	0.5	5	µg/L	No	524.2/RL
0066	Toluene	--	ND	0.5	0.5	1000	µg/L	No	524.2/RL
0067	1,1,2-Trichloroethane	--	ND	0.5	0.5	5	µg/L	No	524.2/RL
0068	Tetrachloroethylene	--	ND	0.5	0.5	5	µg/L	No	524.2/RL
0071	Monochlorobenzene	--	ND	0.5	0.5	100	µg/L	No	524.2/RL
0073	Ethylbenzene	--	ND	0.5	0.5	700	µg/L	No	524.2/RL
0076	Styrene	--	ND	0.5	0.5	100	µg/L	No	524.2/RL
0084	Ortho-Dichlorobenzene	--	ND	0.5	0.5	600	µg/L	No	524.2/RL
0095	1,2,4- Trichlorobenzene	--	ND	0.5	0.5	70	µg/L	No	524.2/RL
0160	Total Xylenes	--	ND	0.5	0.5	10000	µg/L	No	524.2/RL
0074	m/p Xylenes (MCL for Total)	--	ND	0.5	0.5	--	µg/L	--	524.2/RL
0075	o- Xylene (MCL for Total)	--	ND	0.5	0.5	--	µg/L	--	524.2/RL
0027	Chloroform	--	ND	0.5	--	--	µg/L	--	524.2/RL

DOH#	ANALYTE	DATA QUALIFIER	RESULTS	SDRL	TRIGGER	MCL	UNITS	EXCEEDS MCL?	METHOD/ INITIALS
0028	Bromodichloromethane	--	ND	0.5	--	--	µg/L	--	524.2/RL
0029	Dibromochloromethane	--	ND	0.5	--	--	µg/L	--	524.2/RL
0030	Bromoform	--	ND	0.5	0.5	--	µg/L	--	524.2/RL
0031	Total Trihalomethanes	--	ND	--	--	80	µg/L	No	524.2/RL
0053	Chloromethane	--	ND	0.5	0.5	--	µg/L	--	524.2/RL
0054	Bromomethane	--	ND	0.5	0.5	--	µg/L	--	524.2/RL
0058	1,1 Dichloroethane	--	ND	0.5	0.5	--	µg/L	--	524.2/RL
0072	1,1,1,2-Tetrachloroethane	--	ND	0.5	0.5	--	µg/L	--	524.2/RL
0078	Bromobenzene	--	ND	0.5	0.5	--	µg/L	--	524.2/RL
0079	1,2,3- Trichloropropane	--	ND	0.5	0.5	--	µg/L	--	524.2/RL
0081	O-Chlorotoluene	--	ND	0.5	0.5	--	µg/L	--	524.2/RL
0085	Trichlorofluoromethane	--	ND	0.5	0.5	--	µg/L	--	524.2/RL
0086	Bromochloromethane	--	ND	0.5	0.5	--	µg/L	--	524.2/RL
0089	1,3,5- Trimethylbenzene	--	ND	0.5	0.5	--	µg/L	--	524.2/RL
0091	1,2,4- Trimethylbenzene	--	ND	0.5	0.5	--	µg/L	--	524.2/RL
0092	sec- Butylbenzene	--	ND	0.5	0.5	--	µg/L	--	524.2/RL
0093	p- Isopropyltoluene	--	ND	0.5	0.5	--	µg/L	--	524.2/RL
0094	n- Butylbenzene	--	ND	0.5	0.5	--	µg/L	--	524.2/RL
0096	Naphthalene	--	ND	0.5	0.5	--	µg/L	--	524.2/RL
0104	Dichlorodifluoromethane	--	ND	0.5	0.5	--	µg/L	--	524.2/RL
0154	1,3 Dichloropropene	--	ND	0.5	0.5	--	µg/L	--	524.2/RL
0062	1,1 Dichloropropene	--	ND	0.5	0.5	--	µg/L	--	524.2/RL
0064	Dibromomethane	--	ND	0.5	0.5	--	µg/L	--	524.2/RL
0070	1,3- Dichloropropane	--	ND	0.5	0.5	--	µg/L	--	524.2/RL
0080	1,1,2,2 Tetrachloroethane	--	ND	0.5	0.5	--	µg/L	--	524.2/RL
0082	P-Chlorotoluene	--	ND	0.5	0.5	--	µg/L	--	524.2/RL
0083	m- Dichlorobenzene	--	ND	0.5	0.5	--	µg/L	--	524.2/RL
0087	Isopropylbenzene	--	ND	0.5	0.5	--	µg/L	--	524.2/RL
0088	n- Propylbenzene	--	ND	0.5	0.5	--	µg/L	--	524.2/RL
0090	tert- Butylbenzene	--	ND	0.5	0.5	--	µg/L	--	524.2/RL
0097	Hexachlorobutadiene	--	ND	0.5	0.5	--	µg/L	--	524.2/RL
0098	1,2,3 Trichlorobenzene	--	ND	0.5	0.5	--	µg/L	--	524.2/RL
0427	EDB (screening)	--	ND	0.5	0.5	--	µg/L	--	524.2/RL
0428	DBCP (screening)	--	ND	0.5	0.5	--	µg/L	--	524.2/RL
N/A	MTBE	--	ND	0.5	0.5	--	µg/L	--	524.2/RL

Lab Number / Sample Number: 089 / 08012

Volatile Organic Compounds (cont)

**LAB COMMENTS**

\* Confirmation: include the original lab number, sample number, and collection date of original sample in either comment section.

Analysis for EDB and DBCP is screening only. Detections of EDB and DBCP are confirmed using the fumigant test panel.

--No existing value.

µg/L: micrograms per liter or parts per billion.

ANALYTE: The name of an analyte being tested for.

DATA QUALIFIER: A symbol or letter to denote additional information about the result.

DOH#: Department assigned analyte number.

EXCEED MCL: (Maximum Contamination Level): Marked if the contaminant amount exceeds the MCL under chapters 248-290 and 248-291 WAC. Please contact the department's drinking water regional office in your area to determine follow-up actions.

METHOD/INITIALS: Analytical method used. / Initials of the analyst that performed the analysis.

RESULT: The laboratory reported result.

SDRL: (State Detection Reporting Limit): The minimum reportable detection of an analyte as established by the Department of Health.

TRIGGER: The department's drinking water response level. Systems with contaminants detected at concentrations in excess of this level may be required to take additional samples or monitor more frequently. Please contact the department's drinking water regional office in your area for further information.

1008 W. Ahtanum Rd.  
Union Gap, WA 98903  
(509) 452-7707  
Fax: (509) 452-7773



3019 G.S. Center Rd.  
Wenatchee, WA 98801  
(509) 662-1888  
Fax: (509) 662-8183

Billing Code: 05554  
Batch #: 017053

## INORGANIC CONTAMINANTS (IOC) ANALYTICAL REPORT

<p>Send Report to:  <u>Picatti Brothers</u>  <u>PO Box 9576</u>  <u>Yakima, WA 98909</u></p>	<p>Bill to: (Client Name)  <u>Picatti Brothers</u>  <u>PO Box 9576</u>  <u>Yakima, WA 98909</u></p>
<p>Date Collected: (MM/DD/YY) <u>12</u> / <u>7</u> / <u>20</u></p>	<p>System Group Type: (Circle one) <u>A</u> B Other: (Specify)</p>
<p>Water System ID Number _____</p>	<p>System Name: <u>Vantage Bay</u></p>
<p>Lab -- Sample Number <u>105-151</u> -- <u>025092</u></p>	<p>County: <u>Kittitas</u></p>
<p>Sample Location: <u>Vantage Bay</u></p>	<p>Source Numbers(s) _____</p>
<p>Sample Purpose: (Check Appropriate Box)</p> <p><input checked="" type="checkbox"/> RC - Routine/Compliance (satellite monitoring requirements)</p> <p><input type="checkbox"/> C - Confirmation (confirmation of chemical result)</p> <p><input type="checkbox"/> I - Investigative (does not satisfy monitoring requirements)</p> <p><input type="checkbox"/> O - Other (specify)</p> <p><small>*Confirmation: Original Sample Lab # _____ Original Sample Date _____</small></p>	<p>Date Received: (MM/DD/YY) <u>12</u> / <u>7</u> / <u>20</u></p> <p>Date Analyzed: (MM/DD/YY) <u>12</u> / <u>22</u> / <u>20</u></p> <p>Date Reported: (MM/DD/YY) <u>12</u> / <u>28</u> / <u>20</u></p> <p>COMMENTS: _____</p>
<p>Sample Composition: (Check Appropriate Box)</p> <p><input type="checkbox"/> S - Single Source</p> <p><input type="checkbox"/> B - Blended (List Multiple Source Numbers in Source Nos. Field)</p> <p><input type="checkbox"/> C - Composite (Specify in Comments Field)</p> <p><input type="checkbox"/> D - Distribution sample</p>	<p>Sample Type: (Check one) <input type="checkbox"/> Pre-Treatment/Raw  <input type="checkbox"/> Post-Treatment/Finished  <input type="checkbox"/> Unknown</p> <p>Sample Collected by: <u>Client</u></p> <p>Phone Number: <u>509-248-5703</u></p>

### EPA/STATE REGULATED

DOH #	ANALYTE	RESULTS	UNITS	SRL	TRIGGER	MCL	MCL Exceeded	METHOD/Analyst Initials
0004	ARSENIC	0.002510	mg/L	0.0014	0.010	0.010	No	EPA 200.87/RLK
0005	BARIUM	0.01891	mg/L	0.1	2	2	No	EPA 200.87/RLK
0006	CADMIUM	< 0.0001	mg/L	0.001	0.005	0.005	No	EPA 200.87/RLK
0007	CHROMIUM	0.002030	mg/L	0.007	0.1	0.1	No	EPA 200.87/RLK
0011	MERCURY	< 0.0002	mg/L	0.0002	0.002	0.002	No	EPA 245.17/DS
0012	SELENIUM	0.001560	mg/L	0.002	0.05	0.05	No	EPA 200.87/RLK
0110	BERYLLIUM	< 0.0001	mg/L	0.0003	0.004	0.004	No	EPA 200.87/RLK
0111	NICKEL	0.000790	mg/L	0.005	--	--	No	EPA 200.87/RLK
0112	ANTIMONY	0.000110	mg/L	0.003	0.006	0.006	No	EPA 200.87/RLK
0113	THALLIUM	0.000400	mg/L	0.001	0.002	0.002	No	EPA 200.87/RLK
0116	CYANIDE	< 0.01	mg/L	0.01	0.2	0.2	No	DIA 1677-09/RMN
0019	FLUORIDE	0.24	mg/L	0.5	2	4	No	EPA 300.07/KI
0114	NITRITE-N	< 0.05	mg/L	0.1	0.5	1	No	EPA 300.07/KI
0020	NITRATE-N	3.16	mg/L	0.5	5	10	No	EPA 300.07/KI
0161	TOTAL NITRATE/NITRITE	3.16	mg/L	0.5	5	10	No	EPA 300.07/KI

DOH #	ANALYTE	RESULTS	UNITS	SRL	TRIGGER	MCL	>MCL? Exceeded	METHOD/Analyst Initials
0008	IRON	0.0513	mg/L	0.1	--	0.3 <sup>1</sup>	No	EPA 200.77/JRB
0010	MANGANESE	0.006130	mg/L	0.01	--	0.05 <sup>1</sup>	No	EPA 200.8/RLK
0013	SILVER	< 0.0001	mg/L	0.1	--	0.1 <sup>1</sup>	No	EPA 200.8/RLK
0021	CHLORIDE	95.0	mg/L	20	--	250 <sup>1</sup>	No	EPA 300.0/KT
0022	SULFATE	48.4	mg/L	50	--	250 <sup>1</sup>	No	EPA 300.0/KT
0024	ZINC	0.06721	mg/L	0.2	--	5 <sup>1</sup>	No	EPA 200.8/RLK

0014	SODIUM	31.8	mg/L	5	--	--	No	EPA 200.77/JRB
0015	HARDNESS	304.	mg/L	10	--	--	No	SM 2340 B/Calculated
0016	CONDUCTIVITY	761.	umhos/cm	70	--	700 <sup>1</sup>	Yes	SM 2510 B/KE
0017	TURBIDITY	0.41	NTU	0.1	--	--	No	SM 2130 B/KT
0018	COLOR	< 4	color units	15	--	15 <sup>1</sup>	No	SM 2120-B/KT
0026	TOTAL DISSOLVED SOLIDS (TDS)	476.	mg/L	100	--	500 <sup>1</sup>	No	SM 2540 C/KE
0009	LEAD	0.000520	mg/L	0.001		0.015	No	EPA 200.8/RLK
0023	COPPER	0.000520	mg/L	0.02		AL 1.3	No	EPA 200.8/RLK

OTHER

0171	ORTHOPHOSPHATE	NA	mg/L	0.01				
0172	SILICA	NA	mg/L	1.0				
0402	ALUMINUM	NA	mg/L	0.05				
0403	ALKALINITY	NA	mg/L	0.1				
0404	MAGNESIUM	27.60	mg/L	0.01			No	EPA 200.77/JRB
0405	CALCIUM	76.4	mg/L	0.5			No	EPA 200.77/JRB
0406	AMMONIA	NA	mg/L	1.0				
	pH	NA						
0421	Total Organic Carbon	NA	mg/L	0.7	--	--		

105-151

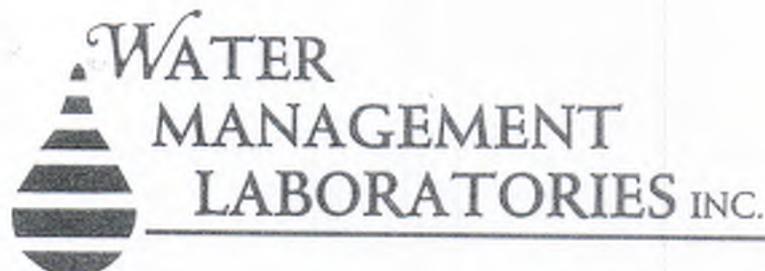
025892

NOTES:

- \*Confirmation: Include the original lab number, sample number, and collection date of original sample in either lab or sampler comments section.
- SRL (State Reporting Level): The minimum reporting level established by the Washington State Department of Health (DOH).
- Trigger Level: DOH drinking water response level. Systems with compounds detected at concentrations in excess of this level may be required to take additional samples or monitor more frequently.
- MCL (maximum containment level): If the contaminant amount exceeds the MCL, please contact your regional DOH office to determine follow-up actions.
- NA (Not Analyzed): In the results column, indicates this compound was not included in the current analysis.
- ND (Not Detected): In the results column, indicates this compound was analyzed and not detected at a level greater than or equal to SRL.
- NTU: Nephelometric turbidity units (a measure of water clarity).
- umhos/cm: Micro ohms per centimeter (a measure of water conductivity).
- <sup>1</sup>: Secondary MCL (Established for esthetic purposes, not health based)
- <(0.00X): The compound was not detected in the sample at or above the concentration indicated (usually the lab method reporting limit).
- : No existing value.

Comments:

Andy Schut  
Lab Manager/Nykima



1515 80th St. E.  
Tacoma, WA 98404  
(253) 531-3121

**Herbicides**  
Report of Analysis

Date Collected: 12-07-2020	System Group Type: (circle one) <b>A</b> B Other
Water System ID Number: N/A	System Name: Vantage Bay
Lab Number / Sample Number: 089 / 08011	County: Kittitas
Sample Location: Vantage Bay	Source Number(s): (list all sources if blended or composited)
Sample Purpose: (check appropriate box) <input type="checkbox"/> RC - Routine/Compliance (satisfies monitoring requirements) <input type="checkbox"/> C - Confirmation (confirmation of chemical result)* <input type="checkbox"/> I - Investigative (does not satisfy monitoring requirements) <input checked="" type="checkbox"/> O - Other (specify - does not satisfy monitoring requirements)	Date Received: 12-09-2020 Date Analyzed: 12-11-2020 Date Reported: 12-21-2020 Supervisor Initials: <i>PC</i>
Sample Composition: (check appropriate box) <input type="checkbox"/> S - Single Source <input type="checkbox"/> B - Blended (list source numbers in "Source Number" field) <input type="checkbox"/> C - Composite (list source numbers in "Source Number" field) <input type="checkbox"/> D - Distribution Sample	Sample Type: (check one) <input checked="" type="checkbox"/> Pre-treatment/Untreated (Raw) <input type="checkbox"/> Post-treatment (Finished) <input type="checkbox"/> Unknown or Other Sample Collected by: Cody Phone Number: 509-452-7707
Send Report & Bill to: Cascade Analytical, Inc 3019 G.S. Center Road, Wenatchee WA 98801	Comments: PO# 017058 / 20-C025900

**ANALYTICAL RESULTS**

DOH#	ANALYTE	DATA QUALIFIER	RESULTS	SDRL	TRIGGER	MCL	UNITS	EXCEEDS MCL?	METHOD/ INITIALS
0137	Dalapon	--	ND	1	1	200	µg/L	No	515.1/JA
0037	2,4-D	--	ND	0.1	0.1	70	µg/L	No	515.1/JA
0038	2,4,5-TP (Silvex)	--	ND	0.2	0.2	50	µg/L	No	515.1/JA
0134	Pentachlorophenol	--	ND	0.04	0.04	1	µg/L	No	515.1/JA
0139	Dinoseb	--	ND	0.2	0.2	7	µg/L	No	515.1/JA
0140	Picloram	--	ND	0.1	0.1	500	µg/L	No	515.1/JA
0138	Dicamba	--	ND	0.2	0.2	--	µg/L	--	515.1/JA
0135	2,4 DB	--	ND	1	1	--	µg/L	--	515.1/JA
0136	2,4,5 T	--	ND	0.4	0.4	--	µg/L	--	515.1/JA
0220	Bentazon	--	ND	0.5	0.5	--	µg/L	--	515.1/JA
0221	Dichlorprop	--	ND	0.5	0.5	--	µg/L	--	515.1/JA
0223	Acifluorfen	--	ND	2	2	--	µg/L	--	515.1/JA
0225	DCPA (Acid Metabolites)	--	ND	0.1	0.1	--	µg/L	--	515.1/JA
0226	3,5-Dichlorobenzoic Acid	--	ND	0.5	0.5	--	µg/L	--	515.1/JA

Lab Number / Sample Number: 089 / 08011

**Herbicides (cont)**

**NOTES:**

\* Confirmation: Include the original lab number, sample number, and collection date of original sample in either comment section.

µg/L: micrograms per liter or parts per billion.

**ANALYTE:** The name of an analyte being tested for.

**DATA QUALIFIER:** A symbol or letter to denote additional information about the result.

**DOH#:** Department assigned analyte number.

**EXCEED MCL:** (Maximum Contamination Level): Marked if the contaminant amount exceeds the MCL under chapters 246-290 and 246-291 WAC. Please contact the department's drinking water regional office in your area to determine follow-up actions.

**METHOD/INITIALS:** Analytical method used, / initials of the analyst that performed the analysis.

**RESULT:** The laboratory reported result.

**SDRL:** (State Detection Reporting Limit): The minimum reportable detection of an analyte as established by the Department of Health.

**TRIGGER:** The department's drinking water response level. Systems with contaminants detected at concentrations in excess of this level may be required to take additional samples or monitor more frequently. Please contact the department's drinking water regional office in your area for further information.

**LAB COMMENTS:**

**Pesticides  
Report of Analysis**

Date Collected: 12-07-2020	System Group Type: (circle one) <b>A</b> B Other
Water System ID Number: N/A	System Name: Vantage Bay
Lab Number / Sample Number: 089 / 08011	County: Kittitas
Sample Location: Vantage Bay	Source Number(s): (list all sources if blended or composited)
Sample Purpose: (check appropriate box) <input type="checkbox"/> RC - Routine/Compliance (satisfies monitoring requirements) <input type="checkbox"/> C - Confirmation (confirmation of chemical result)* <input type="checkbox"/> I - Investigative (does not satisfy monitoring requirements) <input checked="" type="checkbox"/> O - Other (specify - does not satisfy monitoring requirements)	Date Received: 12-09-2020 Date Analyzed: 12-14-2020 Date Reported: 12-21-2020 Supervisor Initials: <i>RC</i>
Sample Composition: (check appropriate box) <input type="checkbox"/> S - Single Source <input type="checkbox"/> B - Blended (list source numbers in "Source Number" field) <input type="checkbox"/> C - Composite (list source numbers in "Source Number" field) <input type="checkbox"/> D - Distribution Sample	Sample Type: (check one) <input checked="" type="checkbox"/> Pre-treatment/Untreated (Raw) <input type="checkbox"/> Post-treatment (Finished) <input type="checkbox"/> Unknown or Other Sample Collected by: Cody Phone Number: 509-452-7707
Send Report & Bill to: Cascade Analytical, Inc 3019 G.S. Center Road, Wenatchee WA 98801	Comments: PO# 017058 / 20-C025900

**ANALYTICAL RESULTS**

DOH#	ANALYTE	DATA QUALIFIER	RESULTS	SDRL	TRIGGER	MCL	UNITS	EXCEEDS MCL?	METHOD/ INITIALS
0033	Endrin	--	ND	0.01	0.01	2	µg/L	No	525.2/EW
0034	Lindane (BHC-gamma)	--	ND	0.02	0.02	0.2	µg/L	No	525.2/EW
0035	Methoxychlor	--	ND	0.1	0.1	40	µg/L	No	525.2/EW
0036	Toxaphene	--	ND	1	1	3.0	µg/L	No	508.1/EW
0117	Alachlor	--	ND	0.2	0.2	2	µg/L	No	525.2/EW
0119	Atrazine	--	ND	0.1	0.1	3	µg/L	No	525.2/EW
0120	Benzo(a)pyrene	--	ND	0.02	0.02	0.2	µg/L	No	525.2/EW
0122	Chlordane (total)	--	ND	0.2	0.2	2	µg/L	No	508.1/EW
0124	Di(2-ethylhexyl)adipate	--	ND	0.6	0.6	400	µg/L	No	525.2/EW
0125	Di(2-ethylhexyl)phthalate	--	ND	0.6	0.6	6	µg/L	No	525.2/EW
0126	Heptachlor	--	ND	0.04	0.04	0.4	µg/L	No	525.2/EW
0127	Heptachlor epoxide	--	ND	0.02	0.02	0.2	µg/L	No	525.2/EW
0128	Hexachlorobenzene	--	ND	0.1	0.1	1	µg/L	No	525.2/EW
0129	Hexachlorocyclopentadiene	--	ND	0.1	0.1	50	µg/L	No	525.2/EW
0133	Simazine	--	ND	0.07	0.07	4	µg/L	No	525.2/EW
0118	Aldrin	--	ND	0.1	0.1	--	µg/L	--	525.2/EW
0121	Butachlor	--	ND	0.1	0.1	--	µg/L	--	525.2/EW
0123	Dieldrin	--	ND	0.1	0.1	--	µg/L	--	525.2/EW
0130	Metolachlor	--	ND	0.1	0.1	--	µg/L	--	525.2/EW
0131	Metribuzin	--	ND	0.1	0.1	--	µg/L	--	525.2/EW
0132	Propachlor	--	ND	0.1	0.1	--	µg/L	--	525.2/EW
0254	Fluorene	--	ND	0.2	0.2	--	µg/L	--	525.2/EW
0173	Arochlor 1221	--	ND	20	20	--	µg/L	--	508.1/EW
0174	Arochlor 1232	--	ND	0.5	0.5	--	µg/L	--	508.1/EW

DOH#	ANALYTE	DATA QUALIFIER	RESULTS	SDRL	TRIGGER	MCL	UNITS	EXCEEDS MCL?	METHOD/ INITIALS
0175	Arochlor 1242'	--	ND	0.3	0.3	--	µg/L	--	508.1/EW
0176	Arochlor 1248'	--	ND	0.1	0.1	--	µg/L	--	508.1/EW
0177	Arochlor 1254'	--	ND	0.1	0.1	--	µg/L	--	508.1/EW
0178	Arochlor 1260'	--	ND	0.2	0.2	--	µg/L	--	508.1/EW
0179	Bromacil	--	ND	0.1	0.1	--	µg/L	--	525.2/EW
0180	Arochlor 1016'	--	ND	0.08	0.08	--	µg/L	--	508.1/EW
0190	Terbacil	--	ND	0.1	0.1	--	µg/L	--	525.2/EW
0208	EPTC	--	ND	0.1	0.1	--	µg/L	--	525.2/EW
0218	Molinate	--	ND	0.1	0.1	--	µg/L	--	525.2/EW
0232	4,4 DDD	--	ND	0.1	0.1	--	µg/L	--	525.2/EW
0233	4,4 DDE	--	ND	0.1	0.1	--	µg/L	--	525.2/EW
0234	4,4 DDT	--	ND	0.1	0.1	--	µg/L	--	525.2/EW
0243	Trifluralin	--	ND	0.1	0.1	--	µg/L	--	525.2/EW
0244	Acenaphthylene	--	ND	0.2	0.2	--	µg/L	--	525.2/EW
0246	Anthracene	--	ND	0.2	0.2	--	µg/L	--	525.2/EW
0247	Benzo(a)anthracene	--	ND	0.2	0.2	--	µg/L	--	525.2/EW
0248	Benzo(b)fluoranthene	--	ND	0.2	0.2	--	µg/L	--	525.2/EW
0250	Benzo(k)fluoranthene	--	ND	0.2	0.2	--	µg/L	--	525.2/EW
0251	Chrysene	--	ND	0.2	0.2	--	µg/L	--	525.2/EW
0253	Fluoranthene	--	ND	0.2	0.2	--	µg/L	--	525.2/EW
0256	Phenanthrene	--	ND	0.2	0.2	--	µg/L	--	525.2/EW
0257	Pyrene	--	ND	0.2	0.2	--	µg/L	--	525.2/EW
0258	Benzyl butyl phthalate	--	ND	1.0	1.0	--	µg/L	--	525.2/EW
0259	Di-n-butyl phthalate	--	ND	1.0	1.0	--	µg/L	--	525.2/EW
0260	Diethyl phthalate	--	ND	1.0	1.0	--	µg/L	--	525.2/EW
0261	Dimethyl phthalate	--	ND	1.0	1.0	--	µg/L	--	525.2/EW

Lab Number / Sample Number: 089 / 08011

**Pesticides (cont)**

**NOTES:**

\* Confirmation: Include the original lab number, sample number, and collection date of original sample in either comment section.

If Arochlors are detected using 505, 508, or 508.1, sample must be reanalyzed using Method 508A to quantify PCBs (as decachlorobiphenyl).

-- No existing value.

µg/L: micrograms per liter or parts per billion.

ANALYTE: The name of an analyte being tested for.

DATA QUALIFIER: A symbol or letter to denote additional information about the result.

DOH#: Department assigned analyte number.

EXCEED MCL: (Maximum Contamination Level): Marked if the contaminant amount exceeds the MCL under chapters 246-290 and 246-291 WAC. Please contact the department's drinking water regional office in your area to determine follow-up actions.

METHOD/INITIALS: Analytical method used, / initials of the analyst that performed the analysis.

RESULT: The laboratory reported result.

SDRL: (State Detection Reporting Limit): The minimum reportable detection of an analyte as established by the Department of Health.

TRIGGER: The department's drinking water response level. Systems with contaminants detected at concentrations in excess of this level may be required to take additional samples or monitor more frequently. Please contact the department's drinking water regional office in your area for further information.

**LAB COMMENTS:**



1515 80th St. E.  
Tacoma, WA 98404  
(253) 531-3121

**PCB Test Panel**  
**(SOC-PCB as Decachlorobiphenyl EPA Method 508A)**  
Report of Analysis

Date Collected: 12-07-2020	System Group Type: (circle one) <b>A</b> B Other
Water System ID Number: N/A	System Name: Vantage Bay
Lab Number / Sample Number: 089 / 08011	County: Kittitas
Sample Location: Vantage Bay	Source Number(s): (list all sources if blended or composited)
Sample Purpose: (check appropriate box) <input type="checkbox"/> RC - Routine/Compliance (satisfies monitoring requirements) <input type="checkbox"/> C - Confirmation (confirmation of chemical result)* <input type="checkbox"/> I - Investigative (does not satisfy monitoring requirements) <input checked="" type="checkbox"/> O - Other (specify - does not satisfy monitoring requirements)	Date Received: 12-09-2020 Date Analyzed: 12-14-2020 Date Reported: 12-21-2020 Supervisor Initials: <i>RC</i>
Sample Composition: (check appropriate box) <input type="checkbox"/> S - Single Source <input type="checkbox"/> B - Blended (list source numbers in "Source Number" field) <input type="checkbox"/> C - Composite (list source numbers in "Source Number" field) <input type="checkbox"/> D - Distribution Sample	Sample Type: (check one) <input checked="" type="checkbox"/> Pre-treatment/Untreated (Raw) <input type="checkbox"/> Post-treatment (Finished) <input type="checkbox"/> Unknown or Other Sample Collected by: Cody Phone Number: 509-452-7707
Send Report & Bill to: Cascade Analytical, Inc 3019 G.S. Center Road, Wenatchee WA 98801	Comments: PO# 017058 / 20-C025900

**ANALYTICAL RESULTS**

DOH#	ANALYTE	DATA QUALIFIER	RESULTS	SDRL	TRIGGER	MCL	UNITS	EXCEEDS MCL?	METHOD/ INITIALS
0401	PCB (as Decachlorobiphenyl)	--	ND	0.1	0.1	0.5	µg/L	--	508.1/EW

**NOTES:**

\* Confirmation: Include the original lab number, sample number, and collection date of original sample in either comment section.

µg/L: micrograms per liter or parts per billion.

ANALYTE: The name of an analyte being tested for.

DATA QUALIFIER: A symbol or letter to denote additional information about the result.

DOH#: Department assigned analyte number.

EXCEED MCL: (Maximum Contamination Level): Marked if the contaminant amount exceeds the MCL under chapters 246-290 and 246-291 WAC. Please contact the department's drinking water regional office in your area to determine follow-up actions.

METHOD/INITIALS: Analytical method used. / Initials of the analyst that performed the analysis.

RESULT: The laboratory reported result.

SDRL: (State Detection Reporting Limit): The minimum reportable detection of an analyte as established by the Department of Health.

TRIGGER: The department's drinking water response level. Systems with contaminants detected at concentrations in excess of this level may be required to take additional samples or monitor more frequently. Please contact the department's drinking water regional office in your area for further information.

LAB COMMENTS:



Burlington, WA	Corporate Laboratory (a)	1620 S Walnut St	Burlington, WA 98233	800.755.9295 • 360.757.1400
Bellingham, WA	Microbiology (b)	805 Orchard Dr Ste 4	Bellingham, WA 98225	360.715.1212
Portland, OR	Microbiology/Chemistry (c)	9150 SW Pioneer Ct Ste W	Wilsonville, OR 97070	503.682.7802
Corvallis, OR	Microbiology (d)	540 SW Third Street	Corvallis, OR 97333	541.753.4946

July 6, 2018

Page 1 of 1

## Case Narrative

Reference: **18-18398**

Lab Sample ID	Sample Information	
<b>37888</b>	<b>Vantage WA Well Head Parcel #17-23-30000-0001</b>	
Analytical Method	Notes	Created by
<b>525.2</b>	Data suspect. Original analysis detected di(ethylhexyl)-phthalate above the reporting limit at 0.79 ug/L. Analysis batch suspect for extraction contamination. Field duplicate extracted outside of holding time showed di(ethylhexyl)-phthalate below the reporting limit at 0.15 ug/L. Duplicate extracted 6/11/18 and QC for that batch with duplicate was within acceptance limits.	KRH
Analytical Method	Notes	Created by
<b>SM2120 B</b>	Sample was filtered prior to analysis. BSP 5/25/18	BSP



## QUALITY CONTROL REPORT SURROGATE REPORT

Reference Number: 18-18398  
Report Date: 07/06/18

Lab No	Analyte	Result	Qualifier	Units	Method	Limit
508_180531 37888	TETRACHLORO-M-XYLENE (SURR)	90		%	508.1	Acceptance Limits 70%-130%
515.4_180604 37888	2,4 - DCAA (SURR)	90		%	515.4	Acceptance Range is 70 - 130%
524_180614 37888	d8-TOLUENE (Surr)	105		%	524.2	Acceptance Range: 50-150%
525_180531 37888	1,3-DIMETHYL-2-NITROBENZENE (Surr)	95		%	525.2	Acceptance Range is 70% to 130%
	PYRENE-D10 (Surr)	94		%		Acceptance Range is 70% to 130%
	PERYLENE-D12 (Surr)*	98		%		Acceptance Range is 70% to 130%
	TRIPHENYLPHOSPHATE (Surr)	103		%		Acceptance Range is 70% to 130%

**\*Notation:**

A surrogate is a pure compound added to a sample in the laboratory just before processing so that the overall efficiency of a method can be determined.

The Acceptance Limits (or Control Limits) approximate a 99% confidence interval around the mean recovery.



Burlington, WA	Corporate Laboratory (a)	1620 S Walnut St	Burlington, WA 98233	800.755.9295 • 360.757.1400
Bellingham, WA	Microbiology (b)	805 Orchard Dr Ste 4	Bellingham, WA 98225	360.715.1212
Portland, OR	Microbiology/Chemistry (c)	9150 SW Pioneer Ct Ste W	Wilsonville, OR 97070	503.682.7802
Corvallis, OR	Microbiology (d)	540 SW Third Street	Corvallis, OR 97333	541.753.4946



## Washington State Department of Health WATER BACTERIOLOGICAL ANALYSIS

Client Name: Matt Reider  
33400 8th Ave S STE 205  
Vantage, WA 98950

Reference Number: 18-18541  
Project: Bacteria

System Name:  
System ID Number:  
DOH Source Number:  
Sample Type:  
Sample Purpose: Investigative or Other  
Sample Location: Vantage Wa Parcel #17-23-30000-0001  
County:  
Sampled By: Levi Simpson  
Sampler Phone:

Repeat Sample Number:  
Lab Number: 164-38095  
Field ID: Bacteria  
Date Collected: 5/24/18 10:22  
Date Received: 5/24/18  
Date Set: 5/24/18 17:57  
Date Analyzed: 5/25/18 14:03  
Report Date: 5/25/18  
Comment:  
Approved By: clh

Authorized by:

Cynthia L. Hansen  
Microbiologist/QA Officer

DOH#	PARAMETER	RESULT	Qualifier	UNITS	Analyst	METHOD	Batch	COMMENT
1	TOTAL COLIFORM	<b>Satisfactory, Coliforms Absent</b>		per 100mL	jma	SM9223 B	m_180524b	
3	E. COLI	<b>Absent</b>		per 100mL		SM9223 B	m_180524b	

If the sample is unsatisfactory you can get information at the following health department websites or phone numbers:

- Island Co: <http://www.islandcounty.net/health/Envh/DrinkingWater/index.htm>
- San Juan Co: <http://www.sanjuanco.com/health/ehswater.aspx>
- Skagit Co: <http://www.skagitcounty.net/drinkingwater> or 360-336-9380
- Snohomish Co: 425-339-5250
- Whatcom Co: [http://www.co.whatcom.wa.us/health/environmental/drinking\\_water/index.jsp](http://www.co.whatcom.wa.us/health/environmental/drinking_water/index.jsp)
- WSDOH: <http://www.doh.wa.gov/ehp/dw/Programs/coliform.htm>

**NOTES:**

If the result is Unsatisfactory a repeat sample is required for Public Water Systems. Private individuals should investigate the cause of the unsatisfactory result and resample.  
If E. Coli or Fecal Coliform are present in sample do not drink the water until it is properly treated.  
\*If data qualifiers are present, see accompanying Qualifier Definition report.



Burlington, WA	Corporate Laboratory (a)	1620 S Walnut St	Burlington, WA 98233	800.755.9295 • 360.757.1400
Bellingham, WA	Microbiology (b)	805 Orchard Dr Ste 4	Bellingham, WA 98225	360.715.1212
Portland, OR	Microbiology/Chemistry (c)	9150 SW Pioneer Ct Ste W	Wilsonville, OR 97070	503.682.7802
Corvallis, OR	Microbiology (d)	540 SW Third Street	Corvallis, OR 97333	541.753.4946



FL NELAP E871040

## INORGANIC COMPOUNDS (IOC) REPORT

Client Name: ESM Consulting Engineers, LLC  
33400 8th Ave South, Suite 205  
Federal Way, WA 98003

Reference Number: 18-18398  
Project: Vantage WA Well Head

Date Collected: 5/24/18 10:22  
System ID Number:  
Lab Number: **046-37888**  
Sample Location: Vantage WA Well Head Parcel #17-23-30000-0001  
Sample Purpose: Investigative or Other  
Sample Composition:  
Approved by: anp,bj,bsp,dst,hkl  
Authorized by:

Field ID:  
System Group Type:  
System Name:  
County:  
Source Number:  
Multiple Sources:  
Date Received: 5/24/18  
Report Date: 7/6/18  
Sample Type:  
Sampled By: Matt Reider  
Sampler Phone:

Lawrence J Henderson, PhD  
Director of Laboratories, Vice President

DOH#	ANALYTES	RESULTS	UNITS	SRL	Trigger	MCL	Analyst	METHOD	Lab	Analyzed	COMMENT
	<b>EPA Regulated</b>										
4	ARSENIC	<b>0.0025</b>	mg/L	0.001	0.010	0.010	bj	200.8	a	06/15/18	
5	BARIUM	<b>0.028</b>	mg/L	0.001	2	2	bj	200.8	a	06/15/18	
6	CADMIUM	<b>ND</b>	mg/L	0.001	0.005	0.005	bj	200.8	a	06/15/18	
7	CHROMIUM	<b>ND</b>	mg/L	0.001	0.1	0.1	bj	200.8	a	06/15/18	
11	MERCURY	<b>ND</b>	mg/L	0.0002	0.002	0.002	hkl	245.1	a	06/12/18	
12	SELENIUM	<b>ND</b>	mg/L	0.002	0.05	0.05	bj	200.8	a	06/15/18	
110	BERYLLIUM	<b>ND</b>	mg/L	0.0003	0.004	0.004	bj	200.8	a	06/15/18	
112	ANTIMONY	<b>ND</b>	mg/L	0.001	0.006	0.006	bj	200.8	a	06/15/18	
113	THALLIUM	<b>ND</b>	mg/L	0.0001	0.002	0.002	bj	200.8	a	06/15/18	
116	CYANIDE, AVAILABLE	<b>ND</b>	mg/L	0.010	0.2	0.2	lrs	OIA-1677-DW	a	05/31/18	
19	FLUORIDE	<b>0.28</b>	mg/L	0.1	2	4	hkl	300.0	a	05/25/18	
114	NITRITE-N	<b>ND</b>	mg/L	0.1	0.5	1	hkl	300.0	a	05/25/18 14:39	
20	NITRATE-N	<b>4.18</b>	mg/L	0.1	5	10	hkl	300.0	a	05/25/18 14:39	
161	TOTAL NITRATE/NITRITE	<b>4.18</b>	mg/L	0.50	5	10	hkl	300.0	a	05/25/18 14:39	
	<b>EPA Regulated (Secondary)</b>										
8	IRON	<b>1.22</b>	mg/L	0.100	0.3	0.3	anp	200.7	a	06/13/18	
10	MANGANESE	<b>0.022</b>	mg/L	0.001	0.05	0.05	bj	200.8	a	06/15/18	
13	SILVER	<b>ND</b>	mg/L	0.001	0.05	0.05	bj	200.8	a	06/15/18	
21	CHLORIDE	<b>86.8</b>	mg/L	0.1	250	250	hkl	300.0	a	05/25/18	
22	SULFATE	<b>50.9</b>	mg/L	0.2	250	250	hkl	300.0	a	05/25/18	
24	ZINC	<b>0.008</b>	mg/L	0.005	5	5	bj	200.8	a	06/15/18	
14	SODIUM	<b>33.2</b>	mg/L	5.0			anp	200.7	a	06/13/18	
15	HARDNESS as Calcium Carbonate	<b>310.6</b>	mg/L	10			anp	200.7	a	06/13/18	
16	ELECTRICAL CONDUCTIVITY	<b>787</b>	uS/cm	10	700	700	hkl	SM2510 B	a	05/29/18	
17	TURBIDITY	<b>12</b>	NTU	0.10	1.0	1.0	bsp	180.1	a	05/25/18 09:39	
18	COLOR	<b>ND N1</b>	Color Units	5	15	15	bsp	SM2120 B	a	05/25/18 10:06	pH:6.1
26	TOTAL DISSOLVED SOLIDS (TDS)	<b>497</b>	mg/L	10	500	500	bsp	SM2540 C	a	05/30/18	
111	NICKEL	<b>ND</b>	mg/L	0.001	0.1		bj	200.8	a	06/15/18	
	<b>State Unregulated</b>										
9	LEAD	<b>ND</b>	mg/L	0.001		0.015	bj	200.8	a	06/15/18	
23	COPPER	<b>ND</b>	mg/L	0.005		1.3	bj	200.8	a	06/15/18	

**NOTES:**

SRL (State Reporting Level): indicates the minimum reporting level required by the Washington Department of Health (DOH).  
MCL (Maximum Contaminant Level) maximum permissible level of a contaminant in water established by EPA; Federal Action Levels are 0.015 mg/L for Lead and 1.3 mg/L for Copper. Sodium has a recommended limit of 20 mg/L. A blank MCL value indicates a level is not currently established.  
Trigger Level: DOH Drinking Water Response level. Systems with compounds detected in excess of this level are required to take additional samples. Contact your regional DOH office.  
ND (Not Detected): indicates that the parameter was not detected above the Specified Reporting Limit (SRL).  
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Burlington, WA	Corporate Laboratory (a)	1620 S Walnut St	Burlington, WA 98233	800.755.9295 • 360.757.1400
Bellingham, WA	Microbiology (b)	805 Orchard Dr Ste 4	Bellingham, WA 98225	360.715.1212
Portland, OR	Microbiology/Chemistry (c)	9150 SW Pioneer Ct Ste W	Wilsonville, OR 97070	503.682.7802
Corvallis, OR	Microbiology (d)	540 SW Third Street	Corvallis, OR 97333	541.753.4946



FL NELAP E871040

## INORGANIC COMPOUNDS (IOC) REPORT

Client Name: ESM Consulting Engineers, LLC  
 33400 8th Ave South, Suite 205  
 Federal Way, WA 98003

Reference Number: 18-18398  
 Project: Vantage WA Well Head

Date Collected: 5/24/18 10:22  
 System ID Number:  
 Lab Number: **156-37888**  
 Sample Location: Vantage WA Well Head Parcel #17-23-30000-0001  
 Sample Purpose: Investigative or Other  
 Sample Composition:

Field ID:  
 System Group Type:  
 System Name:  
 County:  
 Source Number:  
 Multiple Sources:  
 Date Received: 5/24/18  
 Report Date: 7/6/18  
 Sample Type:  
 Sampled By: Matt Reider  
 Sampler Phone:

Approved by: anp,bj,bsp,dst,hkl  
 Authorized by:   
 Lawrence J Henderson, PhD  
 Director of Laboratories, Vice President

DOH#	ANALYTES	RESULTS	UNITS	SRL	Trigger	MCL	Analyst	METHOD	Lab	Analyzed	COMMENT
	<b>Radiological</b>										
	RADIUM 226	ND	pCi/L	1			kac	903.1		07/03/18	Analyzed by Pace
	RADIUM 228	ND	pCi/L	1			jlw	904.0		07/03/18	Analyzed by Pace
	GROSS ALPHA	ND	pCi/L	3		15	neg	900.0		06/25/18	Analyzed by Pace
	GROSS BETA	4.93	pCi/L	4		50	neg	900.0		06/25/18	Analyzed by Pace

**NOTES:**

SRL (State Reporting Level): indicates the minimum reporting level required by the Washington Department of Health (DOH).  
 MCL (Maximum Contaminant Level) maximum permissible level of a contaminant in water established by EPA; Federal Action Levels are 0.015 mg/L for Lead and 1.3 mg/L for Copper. Sodium has a recommended limit of 20 mg/L. A blank MCL value indicates a level is not currently established.  
 Trigger Level: DOH Drinking Water Response level. Systems with compounds detected in excess of this level are required to take additional samples. Contact your regional DOH office.  
 ND (Not Detected): indicates that the parameter was not detected above the Specified Reporting Limit (SRL).  
 An \* in front of the parameter name indicates it is not NELAP accredited but it is accredited through WSDOH or USEPA Region 10.

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 540 SW Third Street - Corvallis, OR 97333 - 541.753.4946

**Bend, OR Microbiology (e)**  
 20332 Empire Blvd Ste 4 - Bend, OR 97701 - 541.639.8425



# Data Report

Client Name: **ESM Consulting Engineers, LLC**  
 33400 8th Ave South, Suite 205  
 Federal Way, WA 98003

Reference Number: **18-18398**  
 Project: **Vantage WA Well Head**

Report Date: 7/6/18

Date Received: 5/24/18

Approved by: anp

Authorized by:

Lawrence J Henderson, PhD  
 Director of Laboratories, Vice President

Sample Description: Vantage WA Well Head Parcel #17-23-30000-0001	Sample Date: 5/24/18 10:22 am
Lab Number: 37888      Sample Comment:	Collected By: Matt Reider

CAS ID#	Parameter	Result	PQL	MDL	Units	DF	Method	Lab	Analyzed	Analyst	Batch	Comment
7440-61-1	<b>URANIUM</b>	0.006	0.001	9.00E-06	mg/L	1.0	200.8/200.2	a	6/15/18	BJ	200.8_180615A2	

**Notes:**

ND = Not detected above the listed practical quantitation limit (PQL) or not above the Method Detection Limit (MDL), if requested.  
 PQL = Practical Quantitation Limit is the lowest level that can be achieved within specified limits of precision and accuracy during routine laboratory operating conditions.  
 D.F. - Dilution Factor  
 An \* in front of the parameter name indicates it is not NELAP accredited but it is accredited through WSDOH or USEPA Region 10.  
 These test results meet all the requirements of NELAP, unless otherwise stated in writing, and relate only to these samples. Estimates of uncertainty are not included in this report. If this information is required please contact us at the phone number listed in the report header.  
 If you have any questions concerning this report contact us at the above phone number.



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 20332 Empire Blvd Ste 4 - Bend, OR 97701 - 541.639.8425



## VOLATILE ORGANIC COMPOUNDS (VOC) REPORT

Client Name: **ESM Consulting Engineers, LLC**  
 33400 8th Ave South, Suite 205  
 Federal Way, WA 98003

Reference Number: **18-18398**  
 Project: **Vantage WA Well Head**

Date Collected: **5/24/18 10:22**  
 System ID Number:  
 Lab Number: **046-37888**  
 Sample Location: **Vantage WA Well Head Parcel #17-23-30000-00**  
 Sample Purpose: **Investigative or Other**  
 Sample Composition:  
 Date Extracted: **524\_180614**  
 Approved By: **co**  
 Authorized By:

Field ID:  
 System Group Type:  
 System Name:  
 County:  
 Source Number:  
 Multiple Sources:  
 Date Received: **5/24/2018 3:15:00PI**  
 Date Analyzed: **06/14/18**  
 Date Reported: **7/6/18**  
 Sample Type:  
 Sample Collected By: **Matt Reider**  
 Sampler Phone:

  
 Lawrence J Henderson, PhD  
 Director of Laboratories, Vice President

### EPA Method 524.2 For State Drinking Water Compliance

DOH#	COMPOUNDS	RESULTS	UNITS	SRL	Trigger	MCL	Lab	Analyst	COMMENT
	<b>EPA/State Regulated</b>								
160	TOTAL XYLENES	ND	ug/L	0.5	0.5	10000	a	HY	
57	T - 1,2 - DICHLOROETHYLENE	ND	ug/L	0.5	0.5	100	a	HY	
60	CIS - 1,2 - DICHLOROETHYLENE	ND	ug/L	0.5	0.5	70	a	HY	
47	1,1,1 - TRICHLOROETHANE	ND	ug/L	0.5	0.5	200	a	HY	
48	CARBON TETRACHLORIDE	ND	ug/L	0.5	0.5	5	a	HY	
49	BENZENE	ND	ug/L	0.5	0.5	5	a	HY	
50	1,2 - DICHLOROETHANE	ND	ug/L	0.5	0.5	5	a	HY	
51	TRICHLOROETHYLENE	ND	ug/L	0.5	0.5	5	a	HY	
63	1,2 - DICHLOROPROPANE	ND	ug/L	0.5	0.5	5	a	HY	
66	TOLUENE	3.9	ug/L	0.5	0.5	1000	a	HY	Field Dup: 3.9 ug/L, TB: ND
67	1,1,2 - TRICHLOROETHANE	ND	ug/L	0.5	0.5	5	a	HY	
68	TETRACHLOROETHYLENE	ND	ug/L	0.5	0.5	5	a	HY	
71	CHLOROBENZENE	ND	ug/L	0.5	0.5	100	a	HY	
73	ETHYLBENZENE	ND	ug/L	0.5	0.5	700	a	HY	
74	M/P - XYLENE	ND	ug/L	0.5	0.5		a	HY	
45	VINYL CHLORIDE	ND	ug/L	0.5	0.5	2	a	HY	
75	O - XYLENE	ND	ug/L	0.5	0.5		a	HY	
76	STYRENE	ND	ug/L	0.5	0.5	100	a	HY	
52	P - DICHLOROBENZENE	ND	ug/L	0.5	0.5	75	a	HY	
84	O - DICHLOROBENZENE	ND	ug/L	0.5	0.5	600	a	HY	
95	1,2,4, - TRICHLOROBENZENE	ND	ug/L	0.5	0.5	70	a	HY	
46	1,1 - DICHLOROETHYLENE	ND	ug/L	0.5	0.5	7	a	HY	
56	METHYLENE CHLORIDE	ND	ug/L	0.5	0.5	5	a	HY	
102	*1,2 - DIBROMOETHANE (EDB)	ND	ug/L	0.5	0.02	0.05	a	HY	Screening Only
103	*1,2-DIBROMO-3-CHLOROPROPANE	ND	ug/L	0.5	0.04	0.2	a	HY	Screening Only

**NOTES:**  
 If a compound is detected > or = to the State Reporting Level, SRL, specified increased monitoring frequencies may occur per DOH.  
 MCL (Maximum Contaminant Level) maximum permissible level of a contaminant in water established by EPA; a blank MCL value indicates a level is not currently established.  
 Trigger Level: DOH Drinking Water Response level. Systems with compounds detected in excess of this level are required to take additional samples. Contact your regional DOH office.  
 ND (Not Detected); indicates that the parameter was not detected above the State Reporting Limit (SRL).  
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 FORM: cVOC.rpt

## VOLATILE ORGANIC COMPOUNDS (VOC) REPORT

DOH#	COMPOUNDS	RESULTS	UNITS	SRL	Trigger	MCL	Lab	Analyst	COMMENT
<b>EPA/State Unregulated</b>									
58	1,1 - DICHLOROETHANE	ND	ug/L	0.5	0.5		a	HY	
59	2,2 - DICHLOROPROPANE	ND	ug/L	0.5	0.5		a	HY	
86	BROMOCHLOROMETHANE	ND	ug/L	0.5	0.5		a	HY	
62	1,1 - DICHLOROPROPENE	ND	ug/L	0.5	0.5		a	HY	
104	DICHLORODIFLUOROMETHANE	ND	ug/L	0.5	0.5		a	HY	
64	DIBROMOMETHANE	ND	ug/L	0.5	0.5		a	HY	
65	CIS - 1,3 - DICHLOROPROPENE	ND	ug/L	0.5	0.5		a	HY	
69	TRANS- 1,3 - DICHLOROPROPENE	ND	ug/L	0.5	0.5		a	HY	
	1,3-DICHLOROPROPYLENE, TOTAL	ND	ug/L	0.5	0.5		a	HY	
53	CHLOROMETHANE	ND	ug/L	0.5	0.5		a	HY	
70	1,3 - DICHLOROPROPANE	ND	ug/L	0.5	0.5		a	HY	
72	1,1,1,2 - TETRACHLOROETHANE	ND	ug/L	0.5	0.5		a	HY	
87	ISOPROPYLBENZENE	ND	ug/L	0.5	0.5		a	HY	
79	1,2,3 - TRICHLOROPROPANE	ND	ug/L	0.5	0.5		a	HY	
78	BROMOBENZENE	ND	ug/L	0.5	0.5		a	HY	
80	1,1,2,2 - TETRACHLOROETHANE	ND	ug/L	0.5	0.5		a	HY	
81	O - CHLOROTOLUENE	ND	ug/L	0.5	0.5		a	HY	
88	N - PROPYLBENZENE	ND	ug/L	0.5	0.5		a	HY	
89	1,3,5 - TRIMETHYLBENZENE	ND	ug/L	0.5	0.5		a	HY	
54	BROMOMETHANE	ND	ug/L	0.5	0.5		a	HY	
82	P - CHLOROTOLUENE	ND	ug/L	0.5	0.5		a	HY	
90	TERT - BUTYLBENZENE	ND	ug/L	0.5	0.5		a	HY	
91	1,2,4 - TRIMETHYLBENZENE	ND	ug/L	0.5	0.5		a	HY	
92	SEC - BUTYLBENZENE	ND	ug/L	0.5	0.5		a	HY	
83	M - DICHLOROBENZENE	ND	ug/L	0.5	0.5		a	HY	
93	P - ISOPROPYLTOLUENE	ND	ug/L	0.5	0.5		a	HY	
94	N - BUTYLBENZENE	ND	ug/L	0.5	0.5		a	HY	
55	CHLOROETHANE	ND	ug/L	0.5	0.5		a	HY	
97	HEXACHLOROBUTADIENE	ND	ug/L	0.5	0.5		a	HY	
96	NAPHTHALENE	ND	ug/L	0.5	0.5		a	HY	
98	1,2,3 - TRICHLOROBENZENE	ND	ug/L	0.5	0.5		a	HY	
85	TRICHLOROFLUOROMETHANE	ND	ug/L	0.5	0.5		a	HY	
<b>EPA Regulated - Under Trihalomethanes Program</b>									
31	TOTAL TRIHALOMETHANE	ND	ug/L	0.5	60	80	a	HY	
27	CHLOROFORM	ND	ug/L	0.5			a	HY	
28	BROMODICHLOROMETHANE	ND	ug/L	0.5			a	HY	
29	CHLORODIBROMOMETHANE	ND	ug/L	0.5			a	HY	
30	BROMOFORM	ND	ug/L	0.5			a	HY	
<b>State Unregulated - Other</b>									
0	METHYL TERT-BUTYL ETHER	ND	ug/L	1.0			a	HY	

**NOTES:**  
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 MCL (Maximum Contaminant Level) maximum permissible level of a contaminant in water established by EPA; a blank MCL value indicates a level is not currently established.  
 Trigger Level: DOH Drinking Water Response level. Systems with compounds detected in excess of this level are required to take additional samples. Contact your regional DOH office.  
 ND (Not Detected); indicates that the parameter was not detected above the State Reporting Limit (SRL).  
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## SYNTHETIC ORGANIC COMPOUNDS (SOC) REPORT

Client Name: ESM Consulting Engineers, LLC  
33400 8th Ave South, Suite 205  
Federal Way, WA 98003

Reference Number: 18-18398

Project: Vantage WA Well Head

Date Collected: 5/24/18 10:22  
System ID Number:  
Lab Number: 046-37888  
Sample Location: Vantage WA Well Head Parcel #17-23-30000-00  
Sample Purpose: Investigative or Other  
Sample Composition:  
Date Extracted: 508\_180531  
Approved By: hy,nml  
Authorized By:

Field ID:  
System Group Type:  
System Name:  
County:  
Source Number:  
Multiple Sources:  
Date Received: 5/24/2018 3:15:00PI  
Date Analyzed: 05/31/18  
Date: Reported: 7/6/18  
Sample Type:  
Sample Collected By: Matt Reider  
Sampler Phone:

  
Lawrence J Henderson, PhD  
Director of Laboratories, Vice President

### EPA Method 508.1 For State Drinking Water Compliance

DOH#	COMPOUNDS	RESULTS	UNITS	SRL	Trigger	MCL	Lab	Analyst	COMMENT
	<b>EPA Regulated</b>								
122	CHLORDANE, TECHNICAL	ND	ug/L	0.2	0.2	2	a	KRH	
	<b>PCBs/Toxaphene</b>								
36	TOXAPHENE	ND	ug/L	1	1	3	a	KRH	
173	AROCLOR 1221	ND	ug/L	20	20		a	KRH	
174	AROCLOR 1232	ND	ug/L	0.5	0.5		a	KRH	
175	AROCLOR 1242	ND	ug/L	0.3	0.3		a	KRH	
176	AROCLOR 1248	ND	ug/L	0.1	0.1		a	KRH	
177	AROCLOR 1254	ND	ug/L	0.1	0.1		a	KRH	
178	AROCLOR 1260	ND	ug/L	0.2	0.2		a	KRH	
180	AROCLOR 1016	ND	ug/L	0.08	0.08		a	KRH	

**NOTES:**

If a compound is detected > or = to the State Reporting Level, SRL, specified increased monitoring frequencies may occur per DOH.

MCL (Maximum Contaminant Level) maximum permissible level of a contaminant in water established by EPA; a blank MCL value indicates a level is not currently established.

Trigger Level: DOH Drinking Water Response level. Systems with compounds detected in excess of this level are required to take additional samples. Contact your regional DOH office.

ND (Not Detected): indicates that the parameter was not detected above the State Reporting Limit (SRL).

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Bend, OR *Microbiology (e)*  
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## HERBICIDES IN DRINKING WATER

Client Name: ESM Consulting Engineers, LLC  
33400 8th Ave South, Suite 205  
Federal Way, WA 98003

Reference Number: 18-18398

Project: Vantage WA Well Head

Date Collected: 5/24/18 10:22  
System ID Number:  
Lab Number: 046-37888  
Sample Location: Vantage WA Well Head Parcel #17-23-30000-00  
Sample Purpose: Investigative or Other  
Sample Composition:  
Date Extracted: 515.4\_180604  
Approved By: hy,nml  
Authorized By:

Field ID:  
System Group Type:  
System Name:  
County:  
Source Number:  
Multiple Sources:  
Date Received: 5/24/2018 3:15:00PI  
Date Analyzed: 06/04/18  
Date Reported: 7/6/18  
Sample Type:  
Sample Collected By: Matt Reider  
Sampler Phone:

  
Lawrence J Henderson, PhD  
Director of Laboratories, Vice President

### EPA Method 515.4 For State Drinking Water Compliance

DOH#	COMPOUNDS	RESULTS	UNITS	SRL	Trigger	MCL	Lab	Analyst	COMMENT
	<b>EPA Regulated</b>								
37	2,4 - D	ND	ug/L	0.1	0.1	70	a	ELW	
38	2,4,5 - TP (SILVEX)	ND	ug/L	0.2	0.2	50	a	ELW	
134	PENTACHLOROPHENOL	ND	ug/L	0.04	0.04	1	a	ELW	
137	DALAPON	ND	ug/L	1	1	200	a	ELW	
139	DINOSEB	ND	ug/L	0.2	0.2	7	a	ELW	
140	PICLORAM	ND	ug/L	0.1	0.1	500	a	ELW	
	<b>Other</b>								
138	DICAMBA	ND	ug/L	0.2	0.2		a	ELW	
225	DCPA (ACID METABOLITES)	ND	ug/L	0.1	0.1		a	ELW	
135	2,4 DB	ND	ug/L	1.0	1.0		a	ELW	
223	ACIFLUORFEN	ND	ug/L	2.0	2.0		a	ELW	
226	3,5 - DICHLOROBENZOIC ACID	ND	ug/L	0.5	0.5		a	ELW	

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Corvallis, OR *Microbiology/Chemistry (d)*  
540 SW Third Street - Corvallis, OR 97333 - 541.753.4946

Bend, OR *Microbiology (e)*  
20332 Empire Blvd Ste 4 - Bend, OR 97701 - 541.639.8425



## SYNTHETIC ORGANIC COMPOUNDS (SOC) REPORT

Client Name: ESM Consulting Engineers, LLC  
33400 8th Ave South, Suite 205  
Federal Way, WA 98003

Reference Number: 18-18398

Project: Vantage WA Well Head

Date Collected: 5/24/18 10:22

Field ID:

System ID Number:

System Group Type:

Lab Number: 046-37888

System Name:

Sample Location: Vantage WA Well Head Parcel #17-23-30000-00

County:

Sample Purpose: Investigative or Other

Source Number:

Sample Composition:

Multiple Sources:

Date Extracted: 525\_180531

Date Received: 5/24/2018 3:15:00PI

Approved By: hy,nml

Date Analyzed: 06/01/18

Authorized By:

Date Reported: 7/6/18

  
Lawrence J Henderson, PhD  
Director of Laboratories, Vice President

Sample Type:  
Sample Collected By: Matt Reider  
Sampler Phone:

### EPA Method 525.2 For State Drinking Water Compliance

DOH#	COMPOUNDS	RESULTS	UNITS	SRL	Trigger	MCL	Lab	Analyst	COMMENT
	<b>EPA Regulated</b>								
33	ENDRIN	ND	ug/L	0.01	0.01	2	a	KRH	
34	LINDANE (BHC - GAMMA)	ND	ug/L	0.02	0.02	0.2	a	KRH	
35	METHOXYCHLOR	ND	ug/L	0.1	0.1	40	a	KRH	
117	ALACHLOR	ND	ug/L	0.2	0.2	2	a	KRH	
119	ATRAZINE	ND	ug/L	0.1	0.1	3	a	KRH	
120	BENZO(A)PYRENE	ND	ug/L	0.02	0.02	0.2	a	KRH	
124	DI(ETHYLHEXYL)-ADIPATE	ND	ug/L	0.6	0.6	400	a	KRH	
125	DI(ETHYLHEXYL)-PHTHALATE	ND N1	ug/L	0.6	0.6	6	a	KRH	Confirmation DUP: ND
126	HEPTACHLOR	ND	ug/L	0.04	0.04	0.4	a	KRH	
127	HEPTACHLOR EPOXIDE	ND	ug/L	0.02	0.02	0.2	a	KRH	
128	HEXACHLOROENZENE	ND	ug/L	0.1	0.1	1	a	KRH	
129	HEXACHLOROCYCLO-PENTADIENE	ND	ug/L	0.1	0.1	50	a	KRH	
133	SIMAZINE	ND	ug/L	0.07	0.07	4	a	KRH	
	<b>EPA Unregulated</b>								
118	ALDRIN	ND	ug/L	0.1	0.1		a	KRH	
121	BUTACHLOR	ND	ug/L	0.4	0.4		a	KRH	
123	DIELDRIN	ND	ug/L	0.1	0.1		a	KRH	
130	METOLACHLOR	ND	ug/L	1.0	1.0		a	KRH	
131	METRIBUZIN	ND	ug/L	0.2	0.2		a	KRH	
132	PROPACHLOR	ND	ug/L	0.1	0.1		a	KRH	
	<b>State Unregulated - Other</b>								
254	FLUORENE	ND	ug/L	0.2	0.2		a	KRH	
179	BROMACIL	ND	ug/L	0.2	0.2		a	KRH	
190	TERBACIL	ND	ug/L	0.1			a	KRH	

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## SYNTHETIC ORGANIC COMPOUNDS (SOC) REPORT

DOH#	COMPOUNDS	RESULTS	UNITS	SRL	Trigger	MCL	Lab	Analyst	COMMENT
208	EPTC	ND	ug/L	0.1			a	KRH	
218	MOLINATE	ND	ug/L	0.1			a	KRH	
232	4,4-DDD	ND	ug/L	0.1			a	KRH	
233	4,4-DDE	ND	ug/L	0.1			a	KRH	
234	4,4-DDT	ND	ug/L	0.1			a	KRH	
261	DIMETHYL PHTHALATE	ND	ug/L	1.0			a	KRH	
243	TRIFLURALIN	ND	ug/L	0.1			a	KRH	
244	ACENAPHTHYLENE	ND	ug/L	0.2			a	KRH	
246	ANTHRACENE	ND	ug/L	0.2			a	KRH	
247	BENZO(A)ANTHRACENE	ND	ug/L	0.2			a	KRH	
248	BENZO(B)FLUORANTHENE	ND	ug/L	0.2			a	KRH	
250	BENZO(K)FLUORANTHENE	ND	ug/L	0.2			a	KRH	
251	CHRYSENE	ND	ug/L	0.2			a	KRH	
253	*FLUORANTHENE	ND	ug/L	0.2			a	KRH	
256	PHENANTHRENE	ND	ug/L	0.2			a	KRH	
257	PYRENE	ND	ug/L	0.2			a	KRH	
258	*BENZYL BUTYL PHTHALATE	ND	ug/L	1.0			a	KRH	
259	DI-N-BUTYL PHTHALATE	ND	ug/L	1.0			a	KRH	
260	DIETHYL PHTHALATE	ND	ug/L	1.0			a	KRH	

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