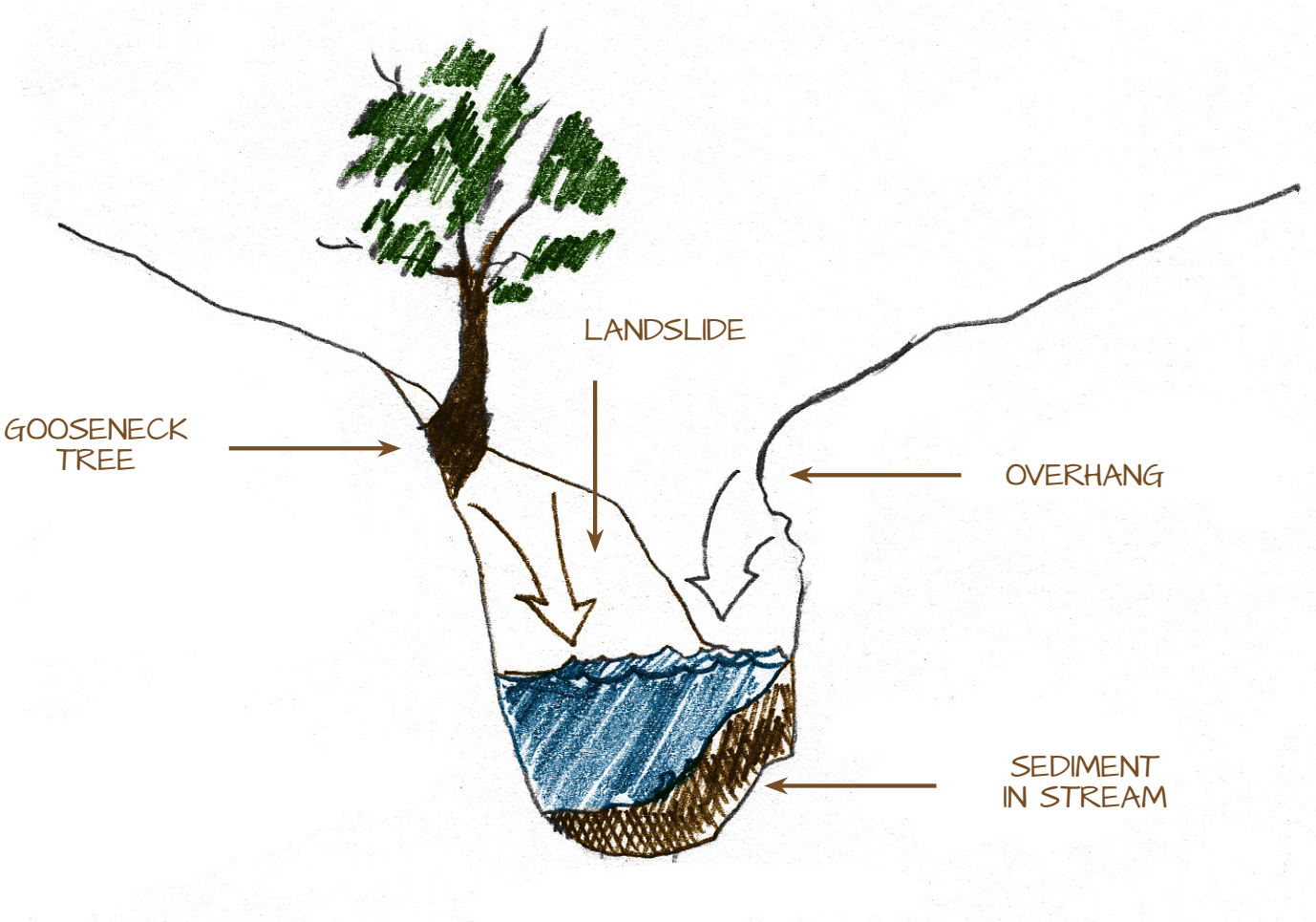
Landslide/Sediment

The purpose of the landslide study was to identify sediment sources that could impact fish and water quality in the Vasa Creek Basin. This study focused solely on potential impacts to the stream, it did not evaluate human safety or property hazards.

For the purposes of this study, a landslide is any area of loose sediment or organic material on the slopes of the ravine that could potentially slide into the stream. Sediment is the sand, gravel, and rocks at the bottom of a stream. Landslides in ravines can cause excess sediment, which can harm habitat and water quality and cause loss of property.

Upper Vasa Creek Floodplain



Landslide/Sediment

Key Findings

All of the areas of potential landslides were located within the areas the city has already documented as steep slopes/geologic hazard (landslide) areas, (see Attachment C). The study found:

5	Inactive landslides	Site of previous landslide, but the slope and conditions have stabilized
4	Potentially active landslides	Sites with water seeping from the bank or vegetation that requires wet soils (e.g. skunk cabbage), bent tree trunks, or surface ruptures and cracks
4	High landslide potential areas	Sites with exposed soils, undercut vegetation, or nearly vertical banks

- Potential sources of sediment also include stormwater outfall pipes that discharge water onto exposed soils. Stormwater flowing out onto the slope can cause erosion and landslides. The study identified eight (8) public and ten (10) private outfall pipes.
- The Washington Department of Transportation maintains a sediment collection pond near I-90. As long as excess sediment is removed regularly from this pond, downstream reaches of Vasa Creek have the potential to be restored to improve fish habitat.

What will Bellevue Utilities do with this information?

- Repair public outfalls
- Work with Washington Department of Transportation to assure
  - maintenance of sediment control facility and
  - monitoring of unstable areas within the WSDOT right of way.
- Inspect culverts during and after storms to check for sediment and debris to reduce the potential for blockages.
- Promote natural drainage practices where feasible when properties re-develop to reduce storm runoff.

Landslide/Sediment

What can you do to reduce landslides?

- Divert water outfalls away from steep slopes.
- Inspect and maintain drainage pipes.
- Dispose of leaves and debris in yard waste service, not into the ravine. Yard waste piles absorbs water and can kill plants whose roots stabilize the soil, increasing the potential for slides. Yard waste piles also create habitat for rats and snakes.
- Hire a geotechnical specialist to evaluate potential hazards and provide recommendations to reduce risk. Homeowners with fractures in their foundation, settling of the building or yard, or gooseneck tree trunks, should consider hiring specialists to help reduce risk of landslides.

Property owners should make sure the outfalls are intact.

Gooseneck trees indicate areas of increased risk for landslides.

For Additional Information

Questions? Rick Watson 425-452-4896

Vasa Basin Study Reports: http://bellevuewa.gov/pdf/Utilities/Vasa_Creek_Final_Landslide_Memo.pdf

Maps: Nwmaps.net, Environmental www.nwmaps.net/mapsearch.htm

Vasa Creek Landslide Inventory and Slope Stability Reconnaissance

Prepared for:

City of Bellevue
450 110th Ave. NE
Bellevue, WA 98009

Prepared by:

TETRA TECH
19803 North Creek Parkway
Bothell, WA 98011

June 2014

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1. Introduction

1.1 Background Information

Vasa Creek is a 1,085-acre basin located in the Puget Lowland that drains into the southwestern end of Lake Sammamish. The watershed is highly developed with a mixture of predominately residential, commercial and institutional development. Forty percent of the land cover is classified as impervious surface. The basin elevation ranges from 31 to 1,195 feet (City of Bellevue 2009).

The lower reach of Vasa Creek, downstream of the fish passage barrier at Interstate 90 (I-90), is fish bearing with rainbow trout, cutthroat trout, coho salmon, and late-run kokanee salmon present. Kokanee spawning habitat within the tributary creeks to Lake Sammamish is relatively limited. Suitable spawning habitat occurs in short reaches due to migration barriers or poor channel conditions upstream (Connor et. al. 2000).

Recent results from the Lake Sammamish Kokanee Technical Work Group (LSKTWG) highlight the importance of the Lake Sammamish tributaries for kokanee salmon. The LSKTWG (2013) report results have shown a major spike in escapement estimates from 2013 demonstrating the success of the supplementation program that began in 2010-2011 and underscoring the need for evaluating kokanee habitat and restoration potential in Lake Sammamish tributaries.

Upstream of the I-90 crossing there is sedimentation pond that forms a large gravel deposit. Flows are subsurface in this reach during the summer low flow period with perennial flow both upstream and downstream. A high-flow bypass at the interstate crossing redirects storm flows from Vasa Creek directly into Lake Sammamish through storm drain pipes.

The bedrock in the drainage basin is known as the Blakeley Formation (Tba), which comprises sandstone and mudstone. The Blakely formation is overlain by a complex pattern of glacial till (Qvt), glacial advance outwash (Qva), glacial lacustrine deposits (Qvrlb), and fan deposits (Qf). Figure A-1 in Attachment A contains a figure showing the mapped surficial geology and hillslope gradients in the basin.

The landslide hazard areas in the Vasa Creek Basin that have been identified by the City of Bellevue (City) include hillslopes with gradients greater than 40 percent. Throughout much of its reach length, Vasa Creek and the East Tributary to Vasa Creek have eroded relatively deep gorges into the glacial sediments with steep side slopes greater than 40 percent. Gorges are canyon-like landforms with steep side-slopes. Landslides are relatively common in gorge landforms, particularly in areas composed of glacial sediments (Benda et al. 1998; Sarikhan et al. 2008). Steep, convergent slopes are associated with the highest landslide probability in western Washington (Montgomery et al. 2000; Stewart et al. 2012). Due to steep slopes and proximity to

the stream, landslides that occur in these gorges are highly likely to deliver sediment and trees to the stream.

Landslides that reach streams can affect aquatic organisms through complex patterns of in-stream scour and deposition (Cederholm and Reid 1987). Landslide effects, including sediment deposition, have been shown to negatively impact spawning and rearing habitat (Everest et al. 1987; Cederholm and Reid 1987). However, the delivery of gravel, large wood, and boulders from landslides is also recognized as creating important components of habitat (Benda et al. 2003).

Known landslide deposits have previously been mapped by Troost (2012) and Britton (2013). The area is subject to earthquakes and uplift associated with a strand of the Seattle Fault Zone (SFZ) that bisects the basin east-trending fault that intersects Vase Creek near the I-90 crossing. The Entire basin is within the SFZ. In the event of a large earthquake along the SFZ, the area would likely experience significant vertical displacement along the fault line, violent earth shaking, liquefaction, and widespread landsliding. Britton (2013) provides a summary of the local geology, fault systems, and tectonic forces, which includes a more through description of seismic hazards including liquefaction.

1.2 Project Overview

Tetra Tech was contracted by the City to assist with ongoing efforts to study fish habitat and slope stability in the Vasa Creek (State Stream #08-0156) and the East Tributary to Vasa Creek stream corridors. The objective of this project is to evaluate kokanee salmon habitat in the accessible lower reach of Vasa Creek (downstream of I-90) and slope stability concerns upstream that may negatively impact habitat quality and/or restoration potential. This work will build on the technical report (master's thesis) by Britton (2013) that examined Vasa Creek channel conditions and slope stability in a stream segment upstream of the I-90 crossing, which is a complete barrier to fish passage.

This project has two discrete components; a landslide assessment, and a fish habitat assessment. The landslide assessment field work occurred in May of 2014 and the fish habitat assessment field work is scheduled to be completed in June of 2014. During the landslide assessment field work, Tetra Tech staff conducted a landslide inventory and slope stability reconnaissance. The assessment area included the Vasa Creek and East Tributary to Vasa Creek stream corridors with hillslope gradients greater than 40 percent. In addition to the landslide assessment data collected, Outfall Reconnaissance Inventory/Sample Collection forms were completed for observed discharges.

The field survey was divided into a series of stream reaches shown in Figure 1:

- Vasa Creek Reach 1 – 163rd Avenue SE to I-90

- Vasa Creek Reach 2 – I-90 to SE Newport Way, previously evaluated by Britton (2013)
- Vasa Creek Reach 3 – SE Newport Way to SE 45th Street
- Vasa Creek Reach 4 – SE 45th Street to SE 46th Way
- Vasa Creek Reach 5 – SE 46th Way to SE 48th Drive
- East Tributary to Vasa Creek – Newport Way to SE 44th Place

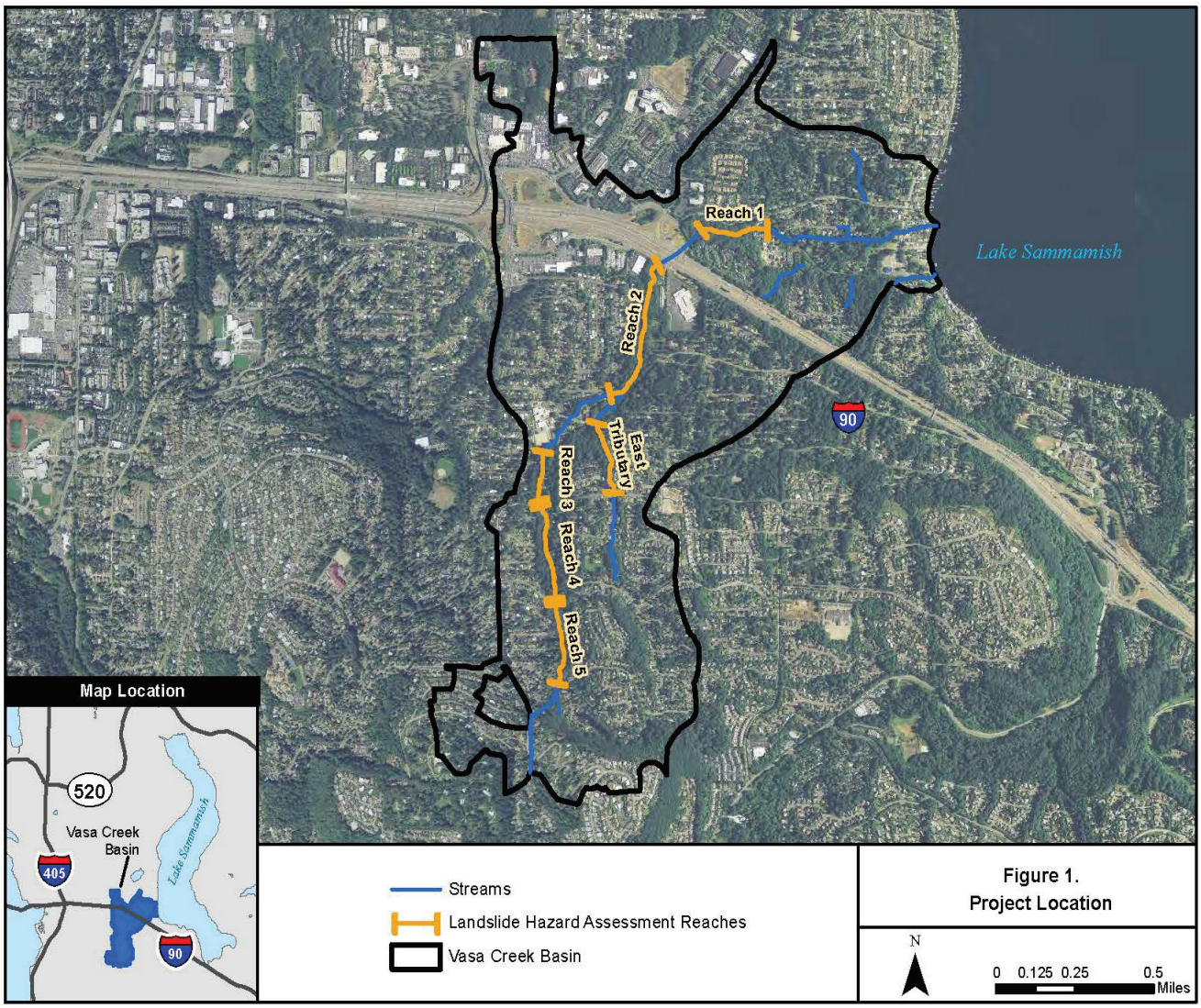

Figure 1. Location Map of Vasa Creek Basin and Landslide Assessment Field Survey Reaches

While Tetra Tech staff did conduct a landslide inventory and slope stability reconnaissance, no geotechnical analyses or detailed slope stability evaluations were included in the scope of work and, therefore, this landslide assessment should not be used as a guarantee of slope stability. It is intended to be provided as a summary of observed existing landslides in the reaches

surveyed, and an identification of landslide size and type. The slope stability reconnaissance is also intended to identify specific areas that have the high potential for landslides that may require further investigation.

The remainder of this document will describe the results of the landslide inventory and slope stability reconnaissance. Section 2 contains a description of the field data collection methods, reporting methods, and a summary of methodology limitations. Section 3 contains a summary of the landslide inventory and slope stability reconnaissance findings, and Section 4 contains a list of recommendations based on the work that was conducted.

2. Methods

2.1 Data Collection

Tetra Tech's field crew conducted a landslide assessment of the Vasa Creek and East Tributary to Vasa Creek stream corridors. The assessment was focused on reaches of the Vasa Creek and East Tributary to Vasa Creek with steep, potentially unstable slopes (greater than 40 percent). A relatively short reach of 334 meters (1,096 feet) downstream of the I-90 crossing was surveyed, with the remaining reaches being located upstream of I-90. The survey area generally excluded the 720-meter (2,362 feet) reach immediately upstream of the I-90 crossing where Britton (2013) had previously surveyed; however this reach was walked to confirm observations. A survey length of 350 meters (1,148 feet) was also evaluated in the East Tributary to Vasa Creek. In total, 1,730 meters (5,676 feet) was surveyed in the landslide inventory and slope stability reconnaissance. Figure 1 illustrates the locations of each of the reaches surveyed.

Landslide Inventory and Slope Stability Reconnaissance Field Forms were developed to identify and document characteristics of three specific types of erosion: 1) observed landslides (LS); 2) potentially unstable slopes (PI); and 3) in-stream erosion areas which are related to stream processes rather than hillslope processes (IE). The field data collected included the following items:

- The location, including Global Positioning System (GPS) coordinates, of scarps, landslides, landslide deposits, and in-channel erosional features
- The location of landforms prone to landslides and slopes that exhibit several signs of potential instability including hummocky terrain, concentrated surface or subsurface flows (seeps), wet soil vegetation indicators (e.g., Skunk Cabbage, Devil's Club), jack-strawed or pistol-butted trees, or surface ruptures
- Photos of observed scarps, landslides and landslide deposits, in-channel erosional features, seeps, potentially unstable sites, revetment structures, and drainage outfalls

- Approximate volume of observed existing landslides
- GPS coordinates of revetment structures
- GPS coordinates of seeps or drainage structures

The entire set of completed field forms is included in Attachment B (Landslide Inventory and Slope Stability Reconnaissance Field Forms).

The City Outfall Reconnaissance Inventory/Sample Collection Field Forms were also completed to document characteristics of all outfalls that were observed during field surveys. There may have been additional outfalls within the project area that were not detected due to vegetation cover and therefore not surveyed. The field data collected included the following items regarding detected outfalls:

- Location data (GPS Point, Photo)
- Outfall type (Material, Shape, Size)
- Flow dependent indicators (Odor, Color, Turbidity, Floatables)
- Site indicators (Outfall Damage, Deposits/Stains, Abnormal Vegetation, Poor Pool Quality, Pipe Benthic Growth)

The entire set of completed field forms is included in Attachment C (Outfall Reconnaissance Inventory/Sample Collection Field Forms).

2.2 Methodology Limitations

As discussed in Section 1.2, Project Overview, the landslide inventory and slope stability reconnaissance should not be used as a guarantee of slope stability. No geotechnical analyses or detailed slope stability evaluations were included in the scope of work for this project. Numerous factors that influence landsliding, including subsurface hydrology, orientation of bedding and fractures in the bedrock, and other factors that may influence the specific location of landslides were not considered in this assessment.

The landslide assessment results, presented in Section 3, Summary of Findings, provide valuable knowledge about landslides, landslide potential, and sediment supply in Vasa Creek. However, due to the complexity of stream channel processes, a more detailed examination, such as a geomorphic assessment, would be required to determine the full extent of potential impacts of landslides, or other erosion, on proposed restoration actions in the downstream reach. The examination needs to evaluate channel adjustment processes (e.g., bank erosion, scour, aggradation) and patterns and utilize them to evaluate various management scenarios.

3. Summary of Findings

3.1 Landslide Assessment

All survey reaches are situated in gorge landforms that are the result of post-glacial channel incision into a variety of glacial sediments. Upstream of Newport Way, both Vasa Creek and East Tributary to Vasa Creek have eroded through the glacial sediments to bedrock in many locations halting incision. Intermittent exposures of glacial lacustrine deposits (Qvrlb) also result in narrow slots due to the more resistant nature of the sediments. The forest canopy within the gorges consists of mature second-growth timber. Upstream of I-90, old-growth stumps were frequently observed indicating that those areas have been relatively stable for centuries.

The landslide assessment field survey reach characteristics including the survey length, the average channel gradient, maximum hillslope relief, and the quantity of large woody debris (LWD) per 100 meters are included in Table 1. Channel gradient and maximum hillslope relief were calculated from the Light Detection and Ranging (LiDAR) Digital Elevation Model (DEM). The hillslope relief is measured as the elevation difference from the channel bottom to the scarp at the top of the gorge landform.

Table 1. Landslide Assessment Reach Characteristics

Reach Name	Length (m)	Average Channel Gradient (%)	Maximum Hillslope Relief (m)	LWD Quantity Pieces/100 m
Vasa Creek Reach 1	340	7	31	3.8
Vasa Creek Reach 2	700	4.5[1/]	19	--[2/]
Vasa Creek Reach 3	240	6	9	12
Vasa Creek Reach 4	430	8	10	15[3/]
Vasa Creek Reach 5	370	10	8	8
East Vasa Tributary	350	12	15	33

[1/] Upstream of the sediment wedge and downstream of East Tributary to Vasa confluence
[2/] The amount of LWD in Vasa Creek Reach 2 is included in Britton (2013).
[3/] Includes LWD that was placed as part of restoration projects (41 pieces of the 63 tallied)

Field survey results support the City landslide hazard criteria that areas with a gradient greater than 40 percent are susceptible to landslides. However, the probability of landslides increases considerably on steeper slopes (greater than 70 percent), with greater relief, saturated soils, and other factors. The highest potential for landslide activity in the survey reaches occurs in Vasa Reach 1 and East Vasa Tributary reaches.

Landslide inventory and reconnaissance field survey results for each of the survey reaches are presented in the following sections. Located at the end of the section are summary tables for all of the survey reaches. Table 2 contains a summary of the observed landslides data, Table 3 contains a summary of the potentially unstable areas, and Table 4 contains a summary of the in-stream bank erosion areas. Maps representing the results for all survey reaches are located in Attachment A. On the maps, observed features are identified as follows:

- Landslide sites - LS
- Potentially unstable sites - PI
- In-stream erosion sites - IE
- Outfall sites - OF

Each feature is identified with one of these codes, followed by a numeric code to represent the sites in tables and in figures. Each of these locations has an associated photograph with a GPS location as well. In addition, there are other GPS points and associated photographs of features of interest that are identified with PP followed by a numeric code. The list of GPS points and associated photo names is included in Attachment D. Also shown on the map is the boundary of the gorge landform as estimated from the distinct break in slope calculated from the LiDAR DEM.

The sites that are identified as having potential instability (PI) are not intended to identify all areas where landslides could occur, but instead highlight sites and areas of particular concern because of greater landslide probability or risk to property or infrastructure.

Landslide hazards maps for all survey reaches were developed following the methods of Troost and Wisher (2009) and Britton (2013) according to WAC 365-190-120 6a-I, and the results are included as Figure A-8 (Attachment A).

3.1.1 Vasa Creek Reach 1 – 163rd Avenue SE to I-90

Landslides that occur in Vasa Creek Reach 1 have the greatest potential to impact kokanee salmon habitat due the close proximity and the fact that upstream of I-90 there is a large area at the inlet to the I-90 crossing and high-flow bypass intake that effectively traps much of the sediment and mobile debris generated from landslides in the upstream reaches. There were two specific areas of concern in Vasa Reach 1: 1) the north-facing slope of the gorge where there were several observed landslides and potential instability sites, and 2) the south-facing slopes located upslope of the access road for the storm drain infrastructure (Attachment A, Figure A-2).

There were three observed landslides (Sites LS-01, LS-02, and LS-03) in Reach 1. As shown in Figure A-2, all three of the existing landslides were located on the north-facing slope opposite of SE 35th Place. Two of the observed landslides (LS-01 and LS-03) were shallow, rapid debris

slides with deposition volumes estimated to range from 450 cubic meters (m^3) (589 cubic yards [CY]) to 3,750 m^3 (4,905 CY), which was the largest range of landslide deposits in all study reaches (Table 2). The third landslide (LS-02) was a debris fan from primarily fluvial erosion from a small tributary.

The north-facing slope of Reach 1was also identified as having a relatively high potential for future instability (Site PI-01). This is due to steep slopes (> 60%), the presence of several existing landslides in similar adjacent terrain, wet soil vegetation indicators, and tree deformation (Table 3). Site PI-01 is shown as only two points on Figure A-2 (Attachment A); however, all of the north-facing slopes in Reach 1 could accurately be defined as potential instable. The potential for instability is considerably less on the west and east ends of the slope where the hillslope gradients are predominately less than 60 percent. Based on conditions observed in the field, the residential properties in close proximity to the gorge boundary on the north-facing slope may be subject to potential property damage from future landslides. Further geotechnical analyses would be required to determine which properties are at risk and the level of potential hazard.

Figure 2. Seep Observed Upslope of Access Road

There were no existing landslides observed on the south-facing slopes of Reach 1. East of the access road on the south-facing slopes, the landslide potential is low. Hillslope gradients are relatively low and there were no observed signs of potential instability.

There was potential instability observed on the south-facing slope at Site PI-02, as shown in Figure A-2 (Attachment A). Site PI-02 was identified as having several indicators of potential instability including steep slopes (> 60%), wet soil vegetation indicators and the highly abundant presence of seeps and subsurface drainage as shown in the example photograph in Figure 2. The flow from seeps and subsurface flows at this location is intercepted and stored by the existing access road and an abandoned road grade shown in Figure A-2. There is an existing 18-inch culvert on the access road and a 24-inch culvert on the abandoned road but no cross drain structures were observed to drain any of the seeps.

Figure 3. Cracked Road Fill Slope along SE 35th Place (PP-11)

Insufficient road drainage may increase soil saturation and lead to an increased landslide risk on potentially unstable slopes. Also observed was a surface rupture in the road fill and asphalt on SE 35th Place, as shown in the photograph in Figure 3. Surface ruptures in glacial materials are a good indicator of potential instability and may indicate the potential for deep-seated landslides. Further geotechnical analyses would be required to determine the landslide hazard at this location, as discussed further in Section 4.

The west-facing slope at the upstream end of Reach 1 is comprised of non-native road fill material that appears to be well-drained and does not exhibit any signs of potential instability (Figure A-2).

There were no areas of substantial in-stream erosion observed in Reach 1.

3.1.2 Vasa Creek Reach 2 – I-90 to SE Newport Way (Britton study area)

The results of the slope stability assessment of Vasa Creek Reach 2 are included in Britton (2013). The field data from Britton (2013) are shown in Figure A-3 (Attachment A) for completeness, and also to correct an error by showing the correct slope gradients calculated from the LiDAR DEM. The corrected slopes are also shown in the landslide hazard map (Figure A-8).

The lower segment of this reach of Vasa Creek serves as a large sediment storage area. The I-90 crossing has caused aggradation in the lower segment of Reach 2 resulting in deep deposits of alluvial gravels. Britton (2013) observed that flows are subsurface in this area during the summer low flow period, while flows upstream and downstream are perennial. This observation in combination with the abundant subsurface flow observed downstream of the I-90 crossing in Reach 1 may indicate that a considerable portion of Vasa Creek flows are subsurface through the I-90 crossing rather than in storm drain infrastructure. More detailed hydrologic analyses would need to be conducted to determine flow distributions.

3.1.3 Vasa Creek Reach 3 – SE Newport Way to SE 45th Street

The survey of Vasa Creek Reach 3 started approximately 200 meters (656 feet) upstream of Newport Way near the southern edge of the Eastgate Elementary School property. Downstream from this point through SE 45th Street, Vasa Creek is carried by storm drainage pipes with a dry overflow channel (Attachment A, Figure A-4).

The overall landslide risk in Reach 3 is relatively low. There was one small slump landslide observed (LS-06) on the west-facing slope. The LS-06 landslide had an estimated deposition volume of 248 m^3 (324 CY). The addition of flow to this location delivered from the storm drain shown on Figure A-4 may have contributed to the slope failure. The LS-06 deposit has

apparently forced the flow of Vasa Creek into the opposite bank causing additional bank erosion. Table 2 contains a summary of the data collected for LS-06.

There was one area identified as having potential instability (PI-03) in Reach 3. Table 3 contains summary of the data collected for PI-03. The primary cause for potential instability at PI-03 is bank erosion undermining a small forested streambank. This location has the potential for continued undercutting to cause bank collapse and maintenance issues particularly because this site is located just upstream of the intake structure that diverts water through the Eastgate Elementary property. The overall sediment volume for PI-03 would be relatively modest however, since the relief of the slope is small (approximately 20 feet). The photograph in Figure 4 shows the bank erosion at PI-03.

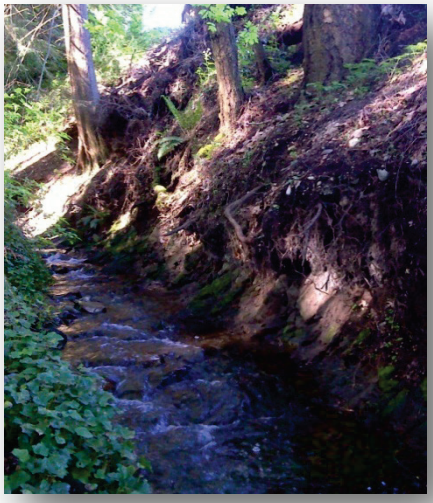

Figure 4. Bank Erosion Undercutting Slope at PI-03

There were no areas of substantial in-stream erosion observed in Reach 3 other than the bank erosion associated with the potential instability at PI-03 described above.

3.1.4 Vasa Creek Reach 4 – SE 45th Street to SE 46th Way

A pedestrian trail system follows the creek along Reach 4. In addition, there have been a number of restoration efforts (e.g. installed grade control structures, LWD bank protection and sediment retention) made in the channel in this reach to improve channel conditions. The landslide risk in Reach 4 increases slightly from Reach 3 due to generally steeper slopes and somewhat greater relief (Attachment A, Figure A-5 and Table 1).

There were two observed landslides (LS-07 and LS-08) in Reach 4. The observed landslides were shallow rapid debris slides on east-facing slopes with deposition volumes ranging from 96 m^3 to 150 m^3 (126 CY to 196 CY). Table 2 contains summary information of the observed landslides and Figure A-5 shows their location.

Figure 5. Bank Erosion Causing Potential Instability at PI-04

There was one area in Reach 4 identified as having indicators of potential instability (PI-04). Table 3 contains a summary of PI-04 information. The potential instability at PI-04 is due to the

bank erosion (shown in the photograph in Figure 5) undercutting steep slopes (> 80%), with wet soil vegetation indicators and seeps present. PI-04 is on a west-facing slope with the location shown in Figure A-5.

There was one area of active in-stream erosion (bank erosion) of 26 meters (85 feet) in length observed in Reach 4 (IE-01). Table 4 contains a summary of the data collected at IE-01. The in-stream erosion at this site is differentiated from the bank erosion at PI-03 and PI-04 in that the erosion at IE-01 was not believed to be associated with future potential hillslope instability.

3.1.5 Vasa Creek Reach 5 – SE 46th Way to SE 48th Drive

The pedestrian trail system continues to follows the creek upstream along Reach 5 until a foot bridge crossing near LS-09 where the trail climbs out of the gorge for the remainder of the reach. In addition, there have been a number of restoration efforts. In general, the landslide risk in Reach 5 is similar to Reach 4 although there are less steep slopes (> 60%) and somewhat less relief (Figure A-6). There was one landslide (LS-09) observed in Reach 5. The landslide was a shallow rapid debris slides on the east-facing slope with a deposit volume of 28 m^3 (37 CY). Table 2 contains a summary of the data collected for LS-09. As shown in the photograph in Figure 6, the scarp of LS-09 was close to the deck of the property to the west of the landslide. Other properties in Reach 5 that are in close proximity to the gorge boundary may be subject to property damage from future landslides. Further geotechnical analyses would be required to determine which properties are at risk and the level of hazard.

Figure 6. Close Proximity of Residential Property to the Scarp of LS-09

There was one site identified as potentially unstable (PI-05). Table 3 contains a summary of the data collected for PI-05. In addition there is the potential for future instability at LS-09. There is a block of oversteepened and saturated material still in place on the hillslope to the north of LS-09 that is potentially unstable. The deposit volume of this landslide would be relatively small but would likely cause severe damage to the footbridge at this location.

There were three areas of in-stream erosion (bank erosion) observed in Reach 5 (IE-02, IE-03, and IE-04). The bank erosion at these sites ranged from 13 meters to 20 meters (43 feet to 66 feet) in length. Table 4 contains a summary of the data collected at IE-02, IE-03, and IE-04.

3.1.6 East Tributary to Vasa Creek – Newport Way to SE 44th Place

The characteristics of the East Tributary to Vasa Creek are notably different than those of Vasa Creek. The average channel gradient (12%) is much steeper and the channel bed is scoured to bedrock in most places except where in-channel LWD are retaining wedges of sediment. The channel gradient of frequent bedrock chutes exceeds 20 percent. The channel is highly confined in a narrow gorge bottom and has a high density of LWD (Table 1). The photograph in Figure 7 shows typical channel conditions in East Tributary to Vasa Creek. Of the reaches surveyed, the East Tributary of Vasa Creek has the greatest potential to produce a landslide that could develop into a debris flow that could travel for considerable distance down the channel. A debris flow from East Vasa Creek would likely cause considerable damage to the SE Newport Way crossing and have potential downstream impacts as well.

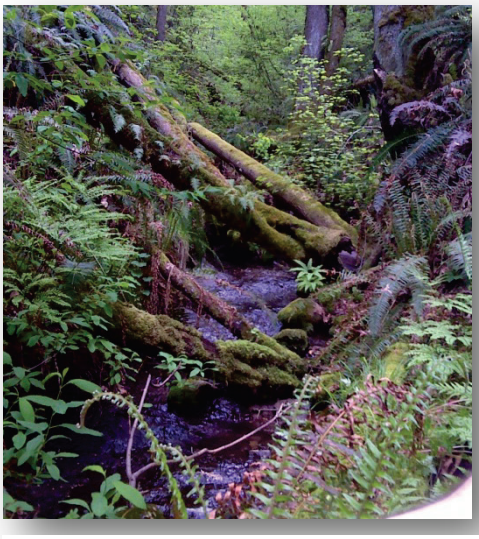

Figure 7. Typical Channel Conditions in East Tributary to Vasa Creek

There were two observed landslides (LS-04 and LS-05) in Reach 5 (Attachment A, Figure A-7). Table 2 contains a summary of the data collected for LS-04 and LS-05. These landslides were shallow rapid debris slides. Deposit volumes were not measured because the landslide material had been transported downstream, likely shortly after or during the event.

The East Tributary to Vasa Creek survey reach should all be considered potentially unstable although the risk increases on the steeper slopes (> 60%). As in Reach 5, the East Tributary to Vasa Creek has residential properties that are in close proximity to the gorge boundary that may be subject to property damage from future landslides. Further geotechnical analyses would be required to determine which properties are at risk and the level of hazard.

There were no areas of substantial in-stream erosion observed in the East Tributary to Vasa Creek.

Table 2. Observed Landslide Inventory

ID#	Reach	Observed Bank Erosion	Scarp Length (m)	Deposit Volume (m^3)	Current Activity[1/]	Average Slope (%)	Percent Forested (%)	Surface Hydrology
LS-01	Vasa 1	No	25	450	Inactive	70	85	No
LS-02	Vasa 1	No	--[2/]	--[2/]	Inactive	75	70	Seeps Present
LS-03	Vasa 1	No	16	3,750	Inactive	75	70	Seeps Present
LS-04	East Trib.	No	75	--	Potentially Active	100	20	None
LS-05	East Trib.	No	20	--	Potentially Active	80	50	None
LS-06	Vasa 3	Yes	15	248	Potentially Active	50	90	Seeps Present
LS-07	Vasa 4	No	11	96	Inactive	90+	50	None
LS-08	Vasa 4	No	10	150	Inactive	80	80	None
LS-09	Vasa 5	Yes	11	28	Potentially Active	100	0	Seeps Present

[1/] An inactive landslide, as defined in this report, is one that has occurred in a way that does not appear to pose any risk of further movement (i.e., scarp appears stable and deposit material has either been evacuated or in a stable location). A potentially active landslide has the potential for continued movement of the landslide deposit or the scarp may still be unstable.
[2/] Sites did not have deposition volume estimates because the deposit had been evacuated by in-stream processes.

Table 3. Areas with High Potential Instability

ID#	Reach	Observed Bank Erosion	Length of Erosion (m)	Average Slope (%)	Forested (%)	Surface Hydrology	Wet Soil Vegetation Indicators
PI-01	Vasa 1	No	--[1/]	75	70	Seep	Yes
PI-02	Vasa 1	No	--[1/]	40	60	Seep	Yes
PI-03	Vasa 3	Yes	10	30	100	None	No
PI-04	Vasa 4	Yes	13	60	60	Tributary, Seep	Yes
PI-05	Vasa 5	No	--[1/]	80	30	Seep	Yes

[1/] Sites did not have observed bank erosion.

Table 4. In-Stream Erosion (Bank Erosion)

ID#	Reach	Length of Erosion (m)	Current Activity
IE-01	Vasa 4	26	Active
IE-02	Vasa 5	18	Active
IE-03	Vasa 5	20	Active
IE-04	Vasa 5	13	Active

3.2 Outfall Reconnaissance Inventory

During the landslide assessment, the location of observed outfalls was documented and Outfall Reconnaissance Inventory/Sample Collection Filed Forms completed. The completed Outfall Reconnaissance Inventory/Sample Collection Filed Forms are included as Attachment C.

Eighteen outfalls were inventoried during surveys. Table 5 contains a summary of the data collected at the outfall reconnaissance inventory sites. Flow observations indicated that 8 of the 18 outfalls surveyed were completely dry at the time of the survey. Only 2 of the outfalls warranted any notable comments (OF-02 and OF-18) due to a slight odor and staining of the local substrate from benthic growth. The locations of the outfalls inventoried are shown on Figures A-2, A-4, A-5, A-6, and A-7 (Attachment A). No illicit discharges were observed during the field surveys.

Table 5. Outfall Reconnaissance Inventory

ID#	Reach	Material	Diameter (inches)	Flow	Notes about Discharge
OF-01	Vasa 1	Concrete	18in	Trickle	None
OF-02	Vasa 1	CMP	12in	Moderate	Odor (sulfide, faint), Stain (bed coloration), Pool (suds), Benthic growth (orange)
OF-03	Vasa 3	Steel	12in	Trickle	None
OF-04	Vasa 3	PVC	3in	No	None
OF-05	Vasa 3	PVC	9in	No	None
OF-06	Vasa 3	PVC	12in	Moderate	Pool (suds, few)
OF-07	Vasa 4	PVC	12in	Moderate	Pool (suds, few), Benthic growth (green, minor)
OF-08	Vasa 4	Steel	12in	Substantial	Outfall (cracking), Pool (suds, minor), Benthic growth (green, minor)
OF-09	Vasa 4	PVC	4in	No	None
OF-10	Vasa 4	PVC	4in	No	None
OF-11	Vasa 4	PVC	4in	No	None
OF-12	Vasa 4	PVC	4in	No	None
OF-13	Vasa 4	Steel	12in	Moderate	Benthic growth (green, minor)
OF-14	Vasa 4	Steel	24in	Substantial	Pool (suds, minor), Benthic growth (green, minor)
OF-15	Vasa 5	Steel	12in	Substantial	Benthic growth (brown, orange)
OF-16	Vasa 5	PVC	4in	No	None
OF-17	Vasa 5	PVC	4in	No	None
OF-18	Vasa 5	PVC	4in	Trickle	Stains (orange), Benthic growth (orange)

4. Discussion and Recommendations

During the landslide inventory and slope stability reconnaissance, field observations were made that were used to develop the recommendations included in this section. Field survey results support the City sensitive area criterion that areas with a gradient greater than 40 percent are susceptible to landslides. However, the probability of landslides increases considerably on steeper slopes (> 60%), with greater relief, saturated soils, and other contributing factors. Existing landslides and areas of particular concern because of greater landslide potential were identified during the slope stability reconnaissance survey.

The following recommendations are based on the findings of the landslide inventory and slope stability reconnaissance:

- Divert water discharge away from any slopes that are greater than 40 percent, where possible, in all survey reaches and particularly in areas that were identified as potentially unstable in the slope stability reconnaissance including all of East Tributary to Vasa Creek.
- Conduct a detailed geotechnical evaluation of landslide hazard in Reach 1 of Vasa Creek, particularly in the two areas described in Section 3.1 and shown in Figure A-2.
- Identify opportunities to improve road drainage on the access road and abandoned road in Figure A-2.
- Conduct a geomorphic assessment to evaluate the potential downstream impacts of landslides, particularly in Vasa Creek Reach 1, on existing kokanee habitat including proposed or potential restoration alternatives.
- Conduct a risk assessment and detailed geotechnical evaluation for residential properties in close proximity to the gorge boundary, particularly in Vasa Reach 1 and East Vasa Tributary to Vasa Creek, and evaluate potential hazards downstream of Vasa Reach 1.

Overall, slope stability conditions vary among the reaches surveyed. The highest potential for landslide activity in the survey reaches was observed in the Vasa Reach 1 and East Vasa Tributary to Vasa Creek reaches. Landslides that occur in Vasa Creek Reach 1 have the greatest potential to impact kokanee salmon habitat due the close proximity and the fact that there is a large sediment retention area upstream of I-90 that would buffer landslide impacts from the upper reaches. Landslides in Vasa Creek Reach 1 also have the potential to impact private property downstream due to many low-lying properties adjacent to the creek downstream of Reach 1.

5. References

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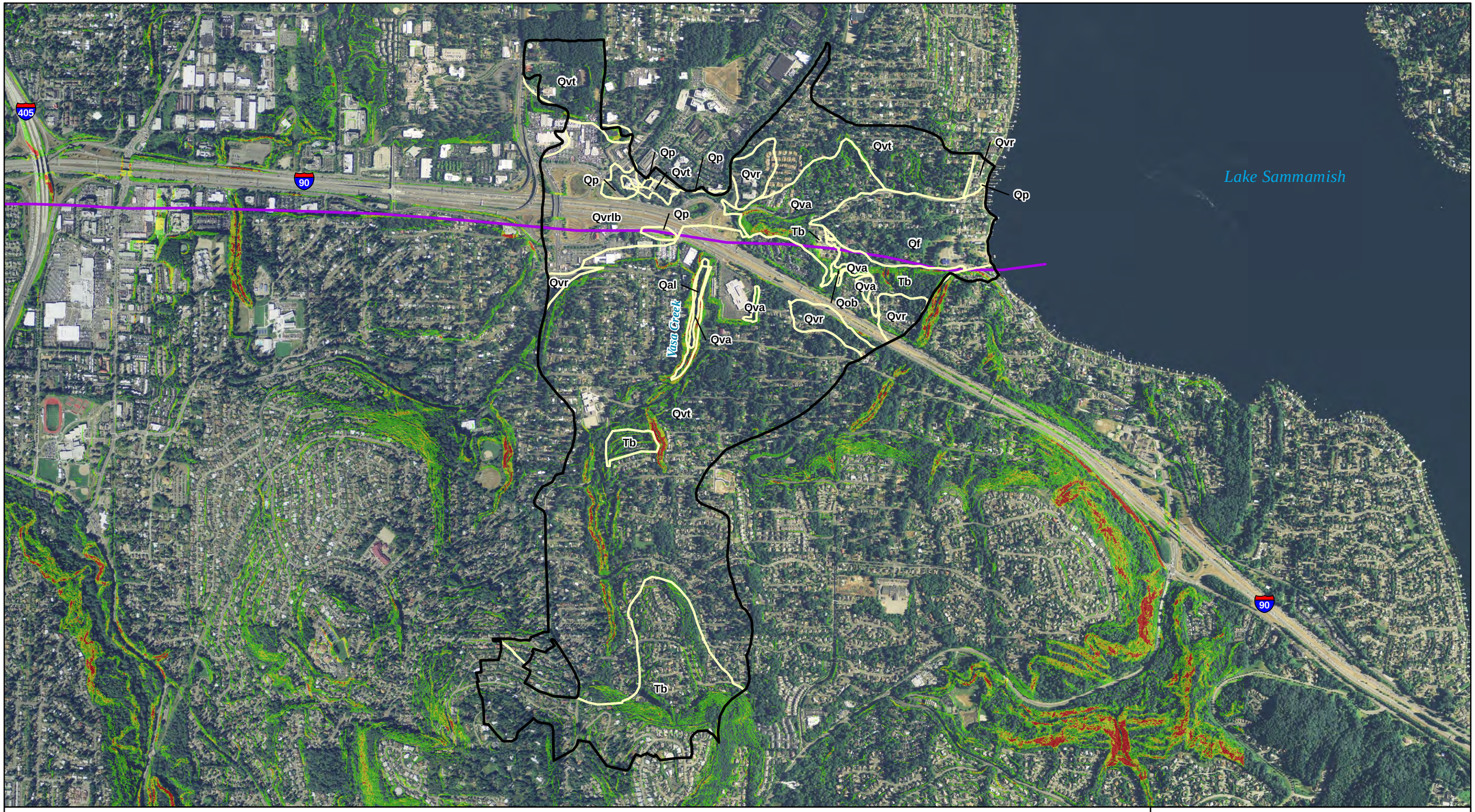
ATTACHMENT A

MAPS



Vasa Creek Basin

Vasa Park Fault (Seattle Fault Zone)

Slope Classification

- 0 - 40%
- 40% - 60%
- 60% - 80%
- > 80%

Geologic Unit

- Qal, Alluvium
- Qf, Fan deposits
- Qob, Olympia beds
- Qp, Peat
- Qva, Vashon advance outwash deposits
- Qvr, Vashon recessional outwash deposits
- Qvrlb, Vashon recessional lacustrine deposits
- Qvt, Vashon subglacial till
- Tb, Blakely Formation (bedrock)

Figure A-1
Overview of Geology and Slopes

N

0 0.125 0.25 0.5 Miles

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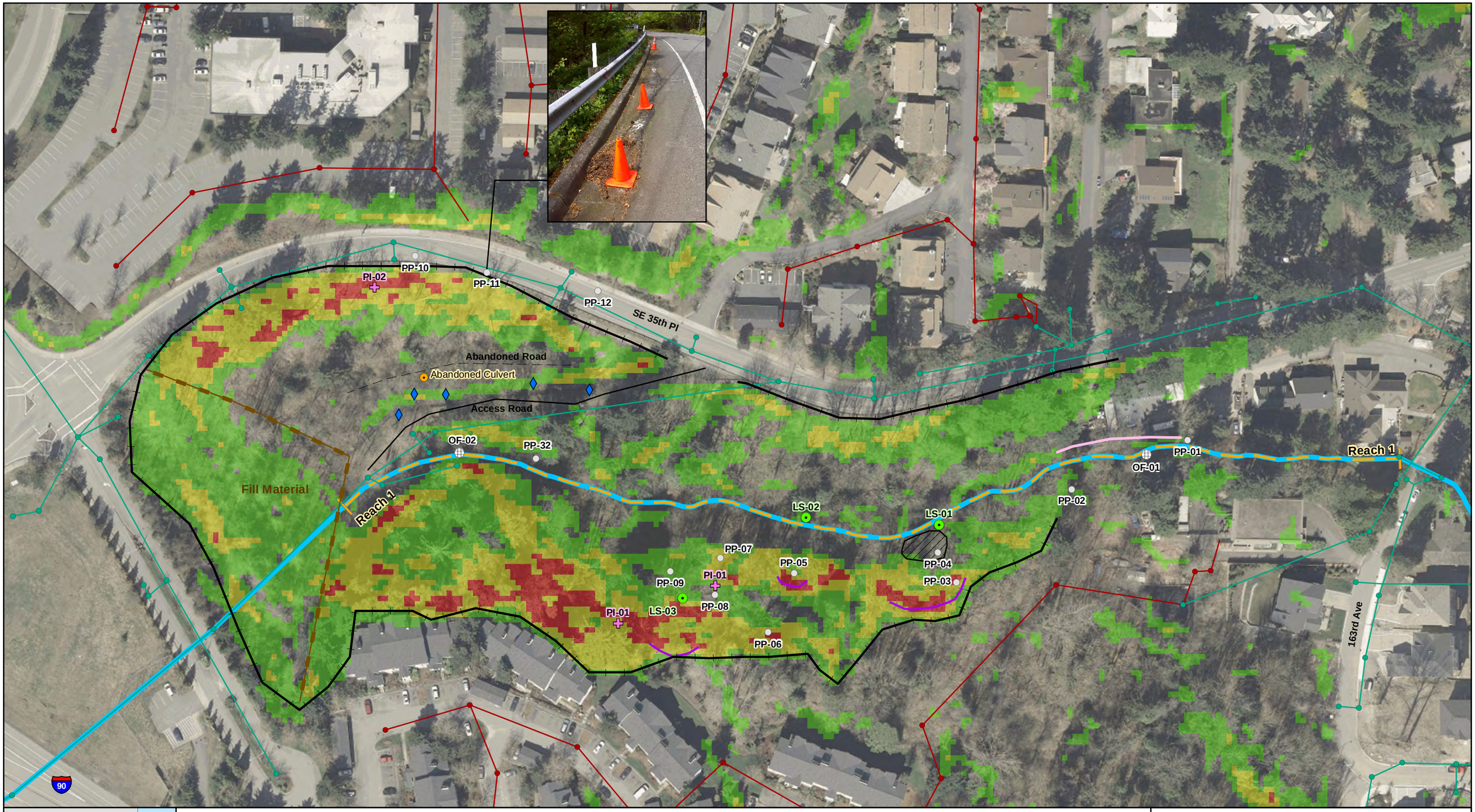

Figure A-2.
Vasa Creek Landslide Assessment
Reach 1 Field Data

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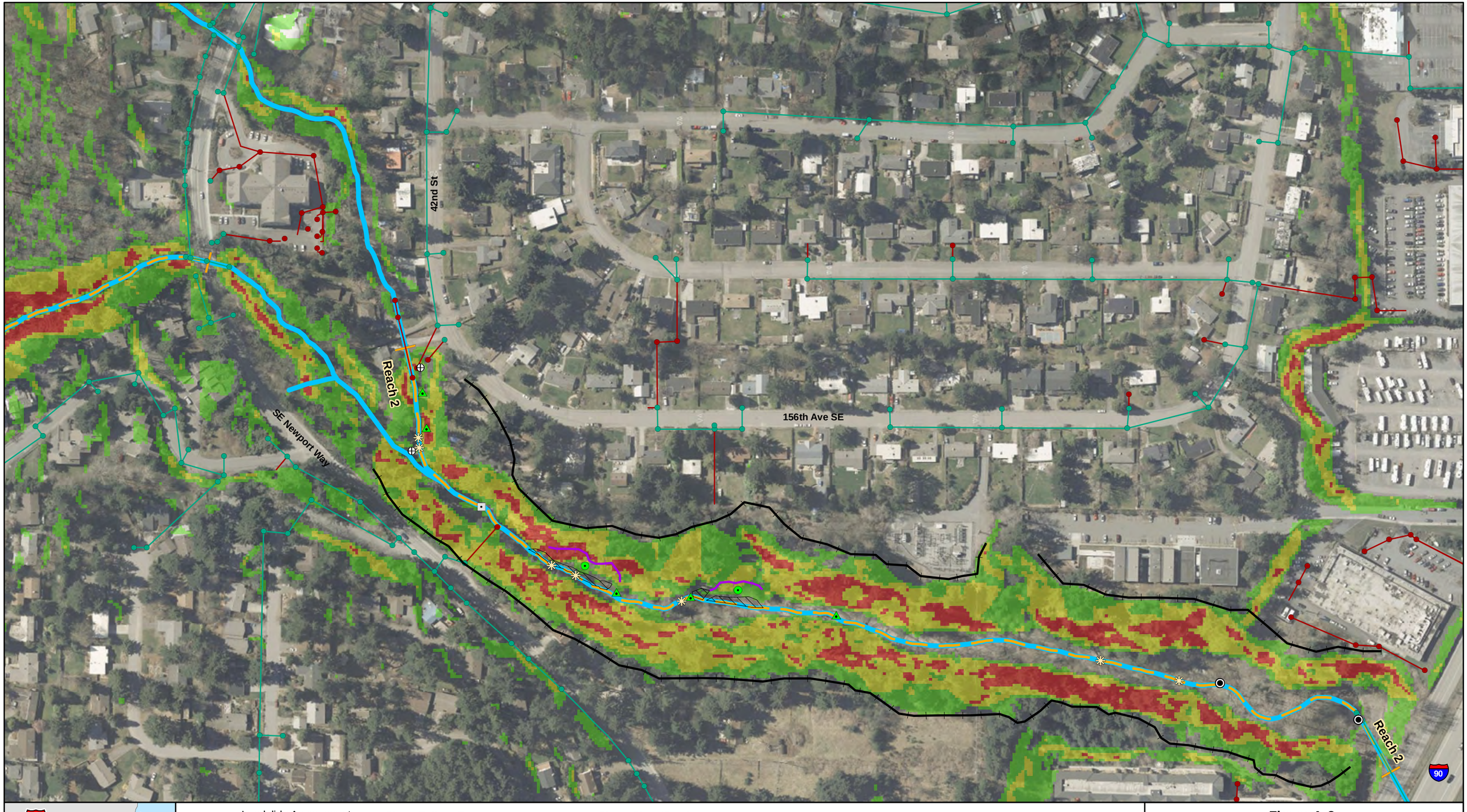

Figure A-3.
Vasa Creek Landslide Assessment
Reach 2 Field Data

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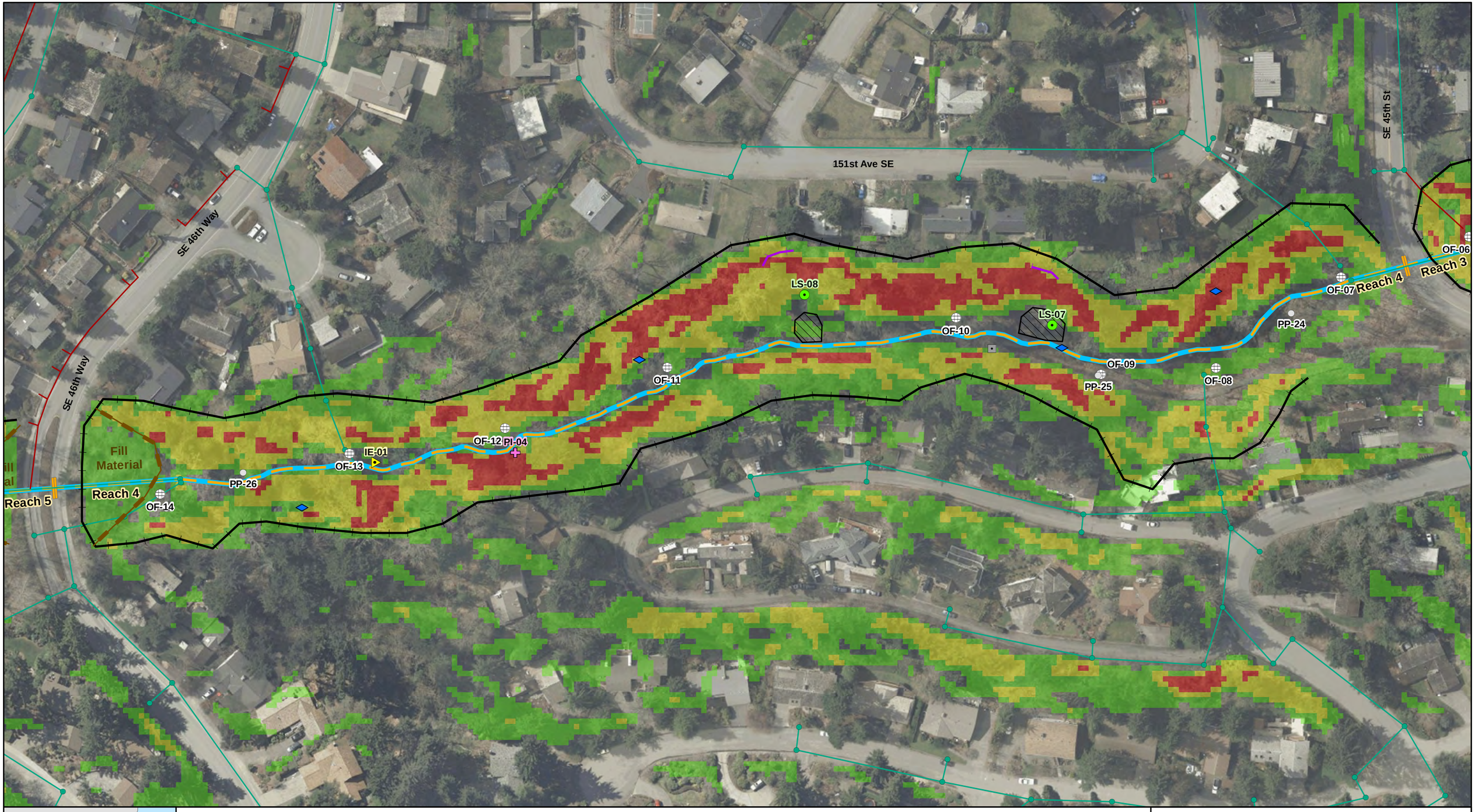
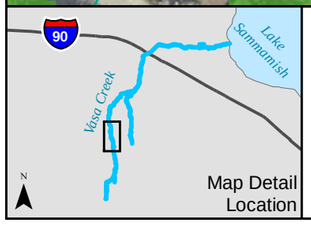
SE 45th St
OF-05
OF-04
LS-06
PP-23
PP-22
OF-06
OF-03
PP-22
Reach 3
OF-07
Reach 4
PP-24
SE 45th St
PP-21
PI-03
PP-20
Reach 3
Overflow Swale
Creek in Drainage Pipe
SE Newport Way
90
Lake Sammamish
Vasa Creek
N
Map Detail Location
Landslide Assessment Reaches
Streams
Photo Points
Slope Stability Features
Bank Erosion
Observed Landslide Locations
Potential Instability
Seeps
Revetment
Gorge Boundary
Landslide Scarps
Landslide Debris
Slope Classification
0 - 40%
40% - 60%
60% - 80%
> 80%
Drainage Structures
Outfall
Storm Drain
Storm Drain (Private)
Storm Drain Pipes
Storm Drain Pipes (Private)
N
0 50 100 200
Feet
R:\Projects_2014\Vasa_Creek\maps\FigureA-X_Reaches_Mapbook.mxd

Figure A-4.
Vasa Creek Landslide Assessment
Reach 3 Field Data





Landslide Assessment Reaches
Streams
Photo Points
Foot Bridge

Slope Stability Features

Bank Erosion
Observed Landslide Locations
Potential Instability
Seeps

Revetment
Gorge Boundary
Landslide Scarps
Landslide Debris

Slope Classification

0 - 40%
40% - 60%
60% - 80%
> 80%

Drainage Structures

Outfall
Storm Drain
Storm Drain (Private)
Storm Drain Pipes
Storm Drain Pipes (Private)

Figure A-5.
Vasa Creek Landslide Assessment
Reach 4 Field Data

N

0 50 100 200 Feet

R:\Projects_2014\Vasa_Creek\maps\FigureA-X_Reaches_Mapbook.mxd

SE 48th Dr
SE 46th Pl
SE 46th Way
Reach 5
Reach 4
Fill Material
Fill Material
OF-18
PP-31
IE-04
PP-30
IE-03
LS-09
PP-29
OF-17
OF-16
IE-02
PI-05
OF-15
OF-14

Landslide Assessment Reaches
Streams
Photo Points
Foot Bridge

Slope Stability Features
Bank Erosion
Observed Landslide Locations
Potential Instability
Seeps

Revetment
Gorge Boundary
Landslide Scarps
Landslide Debris

Slope Classification
0 - 40%
40% - 60%
60% - 80%
> 80%

Drainage Structures
Outfall
Storm Drain
Storm Drain (Private)
Storm Drain Pipes
Storm Drain Pipes (Private)

Figure A-6.
Vasa Creek Landslide Assessment
Reach 5 Field Data

N
0 50 100 200 Feet

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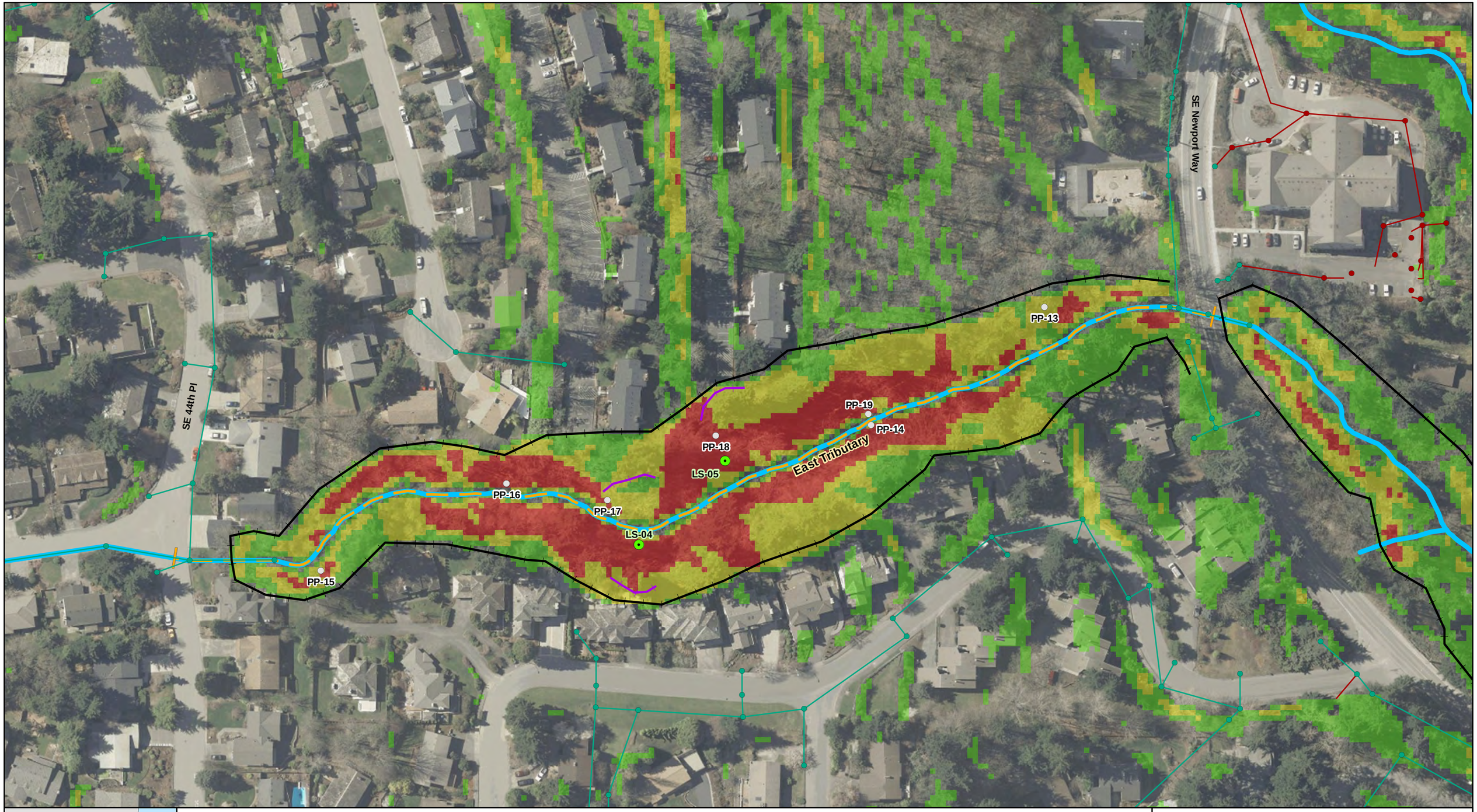
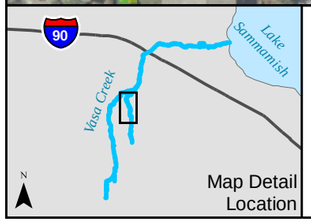




Landslide Assessment Reaches
Streams
Photo Points

Slope Stability Features
Bank Erosion
Observed Landslide Locations
Potential Instability
Seeps

Revetment
Gorge Boundary
Landslide Scarps
Landslide Debris

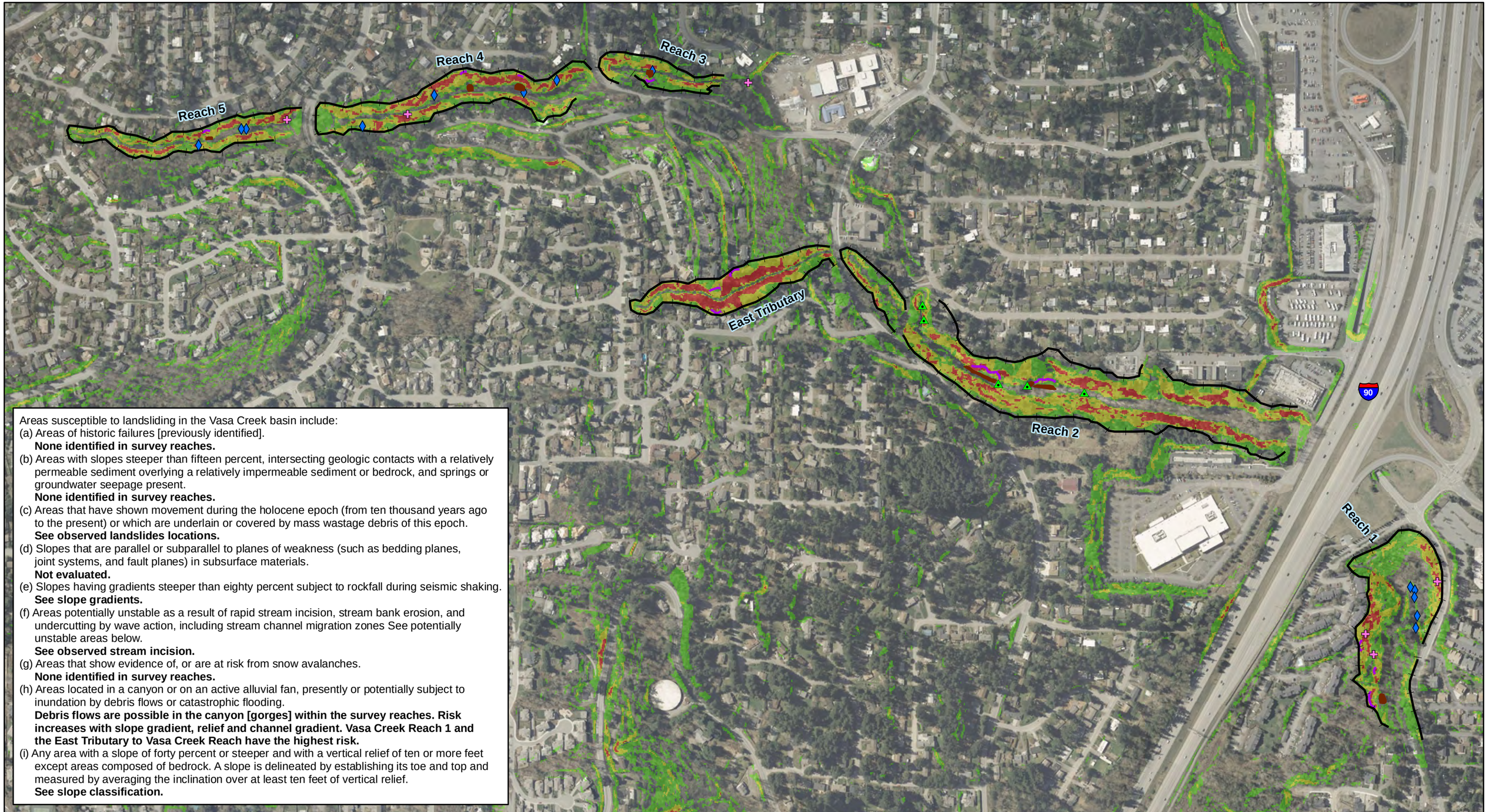
Slope Classification
0 - 40%
40% - 60%
60% - 80%
> 80%

Drainage Structures
Outfall
Storm Drain
Storm Drain (Private)
Storm Drain Pipes
Storm Drain Pipes (Private)

Figure A-7.
Vasa Creek Landslide Assessment
East Tributary to Vasa Creek Field Data

N
0 50 100 200 Feet

R:\Projects_2014\Vasa_Creek\maps\FigureA-X_Reaches_Mapbook.mxd



Areas susceptible to landsliding in the Vasa Creek basin include:

(a) Areas of historic failures [previously identified].
None identified in survey reaches.

(b) Areas with slopes steeper than fifteen percent, intersecting geologic contacts with a relatively permeable sediment overlying a relatively impermeable sediment or bedrock, and springs or groundwater seepage present.
None identified in survey reaches.

(c) Areas that have shown movement during the holocene epoch (from ten thousand years ago to the present) or which are underlain or covered by mass wastage debris of this epoch.
See observed landslides locations.

(d) Slopes that are parallel or subparallel to planes of weakness (such as bedding planes, joint systems, and fault planes) in subsurface materials.
Not evaluated.

(e) Slopes having gradients steeper than eighty percent subject to rockfall during seismic shaking.
See slope gradients.

(f) Areas potentially unstable as a result of rapid stream incision, stream bank erosion, and undercutting by wave action, including stream channel migration zones See potentially unstable areas below.
See observed stream incision.

(g) Areas that show evidence of, or are at risk from snow avalanches.
None identified in survey reaches.

(h) Areas located in a canyon or on an active alluvial fan, presently or potentially subject to inundation by debris flows or catastrophic flooding.
Debris flows are possible in the canyon [gorges] within the survey reaches. Risk increases with slope gradient, relief and channel gradient. Vasa Creek Reach 1 and the East Tributary to Vasa Creek Reach have the highest risk.

(i) Any area with a slope of forty percent or steeper and with a vertical relief of ten or more feet except areas composed of bedrock. A slope is delineated by establishing its toe and top and measured by averaging the inclination over at least ten feet of vertical relief.
See slope classification.

Observed Landslides (c)
- Observed Landslide Scarps
- Observed Landslide Debris

Stream Incision (f)
- Erosional Features

Canyon Features (h)
- Gorge Scarps
- Potential Instability
- Seeps

Slope Classification (e, h, i)
- 0 - 40%
- 40% - 60%
- 60% - 80%
- > 80%

Figure A-8
Vasa Creek and East Tributary to Vasa Creek Landslide Hazard Map

N

0 250 500 1,000 Feet

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ATTACHMENT B

LANDSLIDE INVENTORY AND SLOPE STABILITY RECONNAISSANCE FIELD FORMS

2014 LANDSLIDE ASSESSMENT FIELD FORM

VASA CREEK FISH HABITAT EVALUATION AND LANDSLIDE ASSESSMENT PROJECT

Site Information

Tt_ID: TE-01 Surveyed By: JP SP Date: 5/7/14 Weather: Sunny

GPS Unit # Col Long. Distance: _____ Observation Type: Landslide Potential instability In-channel erosion

GPS Data

RB

GPS Point # 95 camera Description: Old Bank Erosion Photo # 000 81

Additional Point # _____ Description: _____ Photo # _____

Additional Point # _____ Description: _____ Photo # _____

Additional Point # _____ Description: _____ Photo # _____

Additional Point # _____ Description: _____ Photo # _____

Hillslope Characteristics

Mapped Geology: _____ Slope Orientation: _____

Landslide Observed? Yes (No) In-channel Erosion Observed? (Yes) No

Erosion ~~Scarp~~ Legth: 26m Landslide deposit width: _____ Length: _____ Depth: _____ Delivery (Y/N)

Length of In-channel Erosion: _____

Type of Movement: Deep-seated Rotational Debris Flow Debris Avalanche (Other) Bank Erosion

Current Activity: _____ Active X Inactive _____ Mitigated (describe) _____

Possible failure cause: Old erosion

Average Slope: _____ % Forested: 90 Veg Type: Mixed / LT under shrubs

Slope appearance:	(Straight)	Hummocky	Concave	Convex	Other
Hydrology:	Tributary Creek	Seeps Present	Outfall (see recon form)	Groundwater recharge	Other
Soil Origin:	Colluvium	Glacial Till	Fill	Combination	Other

Soil Description: _____

Signs of Potential Instability: _____

Stream Characteristics

Stream Type:	Source (>10%) Bedrock	Colluvial	Trans (3-10%) Alluvial	Incised	Response (<3%) Fan
Bank characteristics:	Naturally Non-erodible		Erosion resistant		Highly Erodible
Scour potential:	Low		Moderate		High
Dominant hydrologic regime:	Spring	Snowmelt	Rain	Rain-on-snow	Conv. Thunderstorm

Channel Morphology: Riffle / Pool LWD Present (Y/N) _____ GPS and photo # _____

Streambed Substrate

SA = Sand, Silt, and Clay	(<0.08 in, <2mm.)	(smaller than "BB")
GR = Gravel	(0.08 - 2.5 in., 2 - 64 mm.)	("BB to tennis ball)
CO = Cobble	(2.5 - 10 in., 64 - 256 mm.)	(tennis ball to basketball)
BO = Boulder	(10 - 160 in., 256 - 4096 mm.)	(basketball to small car)
BR = Bedrock	>160 in., >4096 mm.)	(larger than a small car)

2014 LANDSLIDE ASSESSMENT FIELD FORM

VASA CREEK FISH HABITAT EVALUATION AND LANDSLIDE ASSESSMENT PROJECT

Site Information

Tt_ID: IE-02 Surveyed By: JP JP Date: 5/7/14 Weather: Sunny

GPS Unit # Col Long. Distance: _____ Observation Type: Landslide Potential instability In-channel erosion

GPS Data

GPS Point #		Description:	RB Bank Erosion	Photo #	0009
Additional Point #		Description:		Photo #	
Additional Point #		Description:		Photo #	
Additional Point #		Description:		Photo #	
Additional Point #		Description:		Photo #	

Hillslope Characteristics

Mapped Geology: _____ Slope Orientation: West / SW 240

Landslide Observed? Yes No In-channel Erosion Observed? Yes No

Scarp Legth: 18m Landslide deposit width: _____ Length: _____ Depth: _____ Delivery (Y/N)

Length of In-channel Erosion: _____

Type of Movement: Deep-seated Rotational Debris Flow Debris Avalanche Other Bank Erosion

Current Activity: X Active _____ Inactive _____ Mitigated (describe) _____

Possible failure cause: Seep + Bank Erosion

Average Slope: _____ % Forested: 50 Veg Type: Mixed mature / LT shrubs

Slope appearance:	Straight	Hummocky	Concave	Convex	Other
Hydrology:	Tributary Creek	Seeps Present	Outfall (see recon form)	Groundwater recharge	Other
Soil Origin:	Colluvium	Glacial Till	Fill	Combination	Other

Soil Description: _____

Signs of Potential Instability: _____

Stream Characteristics

Stream Type:	Source (>10%) Bedrock	Colluvial	Trans (3-10%) Alluvial	Incised	Response (<3%) Fan
Bank characteristics:	Naturally Non-erodible		Erosion resistant		Highly Erodible
Scour potential:	Low		Moderate		High
Dominant hydrologic regime:	Spring	Snowmelt	Rain	Rain-on-snow	Conv. Thunderstorm

Channel Morphology: riffle / pool LWD Present (Y/N) N GPS and photo # _____

Streambed Substrate

SA = Sand, Silt, and Clay	(<0.08 in, <2mm.)	(smaller than "BB")
GR = Gravel	(0.08 - 2.5 in., 2 - 64 mm.)	("BB to tennis ball)
CO = Cobble	(2.5 - 10 in., 64 - 256 mm.)	(tennis ball to basketball)
BO = Boulder	(10 - 160 in., 256 - 4096 mm.)	(basketball to small car)
BR = Bedrock	>160 in., >4096 mm.)	(larger than a small car)

2014 LANDSLIDE ASSESSMENT FIELD FORM

VASA CREEK FISH HABITAT EVALUATION AND LANDSLIDE ASSESSMENT PROJECT

Site Information

Tt_ID: TE-03 Surveyed By: JP JP Date: 5/7/14 Weather: Sunny

GPS Unit # Col Long. Distance: _____ Observation Type: Landslide Potential instability

In-channel erosion

GPS Data

GPS Point # _____ Description: D/S shot of RB erosion Photo # U00 99

Additional Point # _____ Description: _____ Photo # _____

Additional Point # _____ Description: _____ Photo # _____

Additional Point # _____ Description: _____ Photo # _____

Additional Point # _____ Description: _____ Photo # _____

Hillslope Characteristics

Mapped Geology: _____ Slope Orientation: _____

Landslide Observed? Yes (No) In-channel Erosion Observed? (Yes) No

Bank ~~Scarp~~ Legth: 20 Landslide deposit width: _____ Length: _____ Depth: _____ Delivery (Y/N)

Length of In-channel Erosion: 25m

Type of Movement: Deep-seated Rotational Debris Flow Debris Avalanche (Other) Bank Erosion

Current Activity: X RB Active LB Inactive _____ Mitigated (describe) _____

Possible failure cause: Seep + saturated soils, steep, 3-6m high

Average Slope: _____ % Forested: _____ Veg Type: _____

Slope appearance: Straight Hummocky Concave (Convex) Other

Hydrology: (Tributary Creek) (Seeps Present) Outfall (see recon form) Groundwater recharge Other

Soil Origin: Colluvium Glacial Till Fill Combination Other

Soil Description: _____

Signs of Potential Instability: _____

Stream Characteristics

Stream Type:	Source (>10%) Bedrock	Colluvial	Trans (3-10%) Alluvial	Incised	Response (<3%) Fan
Bank characteristics:	Naturally Non-erodible		Erosion resistant		Highly Erodible
Scour potential:	Low		Moderate		High
Dominant hydrologic regime:	Spring	Snowmelt	Rain	Rain-on-snow	Conv. Thunderstorm

Channel Morphology: Riffle / Pool LWD Present (Y/N) _____ GPS and photo # _____

Streambed Substrate

SA = Sand, Silt, and Clay	(<0.08 in, <2mm.)	(smaller than "BB")
GR = Gravel	(0.08 - 2.5 in., 2 - 64 mm.)	("BB to tennis ball)
CO = Cobble	(2.5 - 10 in., 64 - 256 mm.)	(tennis ball to basketball)
BO = Boulder	(10 - 160 in., 256 - 4096 mm.)	(basketball to small car)
BR = Bedrock	>160 in., >4096 mm.)	(larger than a small car)

2014 LANDSLIDE ASSESSMENT FIELD FORM

VASA CREEK FISH HABITAT EVALUATION AND LANDSLIDE ASSESSMENT PROJECT

Site Information

Tt_ID: IE-04 Surveyed By: JP, JP Date: 5/7/14 Weather: Sunny

GPS Unit # Co1 Long. Distance: _____ Observation Type: Landslide Potential instability In-channel erosion

GPS Data

GPS Point #	_____	Description:	RB Bank	Photo #	00103
Additional Point #	_____	Description:	_____	Photo #	_____
Additional Point #	_____	Description:	_____	Photo #	_____
Additional Point #	_____	Description:	_____	Photo #	_____
Additional Point #	_____	Description:	_____	Photo #	_____

Hillslope Characteristics

Mapped Geology: _____ Slope Orientation: _____

Landslide Observed? Yes (No) In-channel Erosion Observed? (Yes) No

Scarp Legth: 13 Landslide deposit width: _____ Length: _____ Depth: _____ Delivery (Y/N)

Length of In-channel Erosion: 13 m

Type of Movement: Deep-seated Rotational Debris Flow Debris Avalanche (Other) Bank Erosion

Current Activity: X RB Active _____ Inactive _____ Mitigated (describe) _____

Possible failure cause: Water eroding To

Average Slope: _____ % Forested: 100 Veg Type: Decid Mature

Slope appearance:	(Straight)	Hummocky	Concave	Convex	Other
Hydrology:	(Tributary Creek)	(Seeps Present)	Outfall (see recon form)	Groundwater recharge	Other
Soil Origin:	Colluvium	(Glacial Till)	Fill	Combination	Other

Soil Description: _____

Signs of Potential Instability: _____

Stream Characteristics

Stream Type:	Source (>10%) Bedrock	Colluvial	Trans (3-10%) Alluvial	Incised	Response (<3%) Fan
Bank characteristics:	Naturally Non-erodible		Erosion resistant		Highly Erodible
Scour potential:	Low		Moderate		High
Dominant hydrologic regime:	Spring	Snowmelt	Rain	Rain-on-snow	Conv. Thunderstorm

Channel Morphology: _____ LWD Present (Y/N) _____ GPS and photo # _____

Streambed Substrate

SA = Sand, Silt, and Clay	(<0.08 in, <2mm.)	(smaller than "BB")
GR = Gravel	(0.08 - 2.5 in., 2 - 64 mm.)	("BB to tennis ball)
CO = Cobble	(2.5 - 10 in., 64 - 256 mm.)	(tennis ball to basketball)
BO = Boulder	(10 - 160 in., 256 - 4096 mm.)	(basketball to small car)
BR = Bedrock	>160 in., >4096 mm.)	(larger than a small car)

2014 LANDSLIDE ASSESSMENT FIELD FORM

VASA CREEK FISH HABITAT EVALUATION AND LANDSLIDE ASSESSMENT PROJECT

Site Information

Tt_ID: LS-01 Surveyed By: JP, JP Date: 5/2/14 Weather: Sunny

GPS Unit # Col Long. Distance: Observation Type: (Landslide) Potential instability In-channel erosion

GPS Data

GPS Point #	as Photo	Description:	BB landslide Scarp	Photo #	00004
Additional Point #	as Photo	Description:	D/S end of Scarp	Photo #	00005
Additional Point #	as Photo	Description:	Deposit	Photo #	00006
Additional Point #		Description:		Photo #	
Additional Point #		Description:		Photo #	

Hillslope Characteristics

Mapped Geology: Slope Orientation: 330

Landslide Observed? (Yes) No In-channel Erosion Observed? Yes (No)

Scarp Legth: 25m Landslide deposit width: 15m Length: 10 Depth: 3m Delivery (Y/N)

Length of In-channel Erosion: NA

Type of Movement: Deep-seated Rotational Debris Flow Debris Avalanche Other Debris Slide

Current Activity: Active X Inactive Mitigated (describe)

Possible failure cause: heavy rains,

Average Slope: 70% % Forested: 85% Veg Type: Conifer, Rip shrubs

Slope appearance: Straight Hummocky (Concave) Convex Other

Hydrology: NA Tributary Creek Seeps Present Outfall (see recon form) Groundwater recharge Other

Soil Origin: Colluvium (Glacial Till) Outwash Fill Combination Other

Soil Description: Qva = Vashon Outwash

Signs of Potential Instability: already failed, shrubs & ferns growing

Stream Characteristics

Stream Type:	Source (>10%) Bedrock	Colluvial	(Trans (3-10%) Alluvial	Incised	Response (<3%) Fan
Bank characteristics:	Naturally Non-erodible		(Erosion resistant		Highly Erodible
Scour potential:	Low		(Moderate		High
Dominant hydrologic regime:	Spring	Snowmelt	(Rain	Rain-on-snow	Conv. Thunderstorm

Channel Morphology: Pool (small) Riffle LWD Present (Y/N) Y GPS and photo #

Streambed Substrate

SA = Sand, Silt, and Clay	(<0.08 in, <2mm.)	(smaller than "BB")
GR = Gravel	(0.08 - 2.5 in., 2 - 64 mm.)	("BB to tennis ball)
CO = Cobble	(2.5 - 10 in., 64 - 256 mm.)	(tennis ball to basketball)
BO = Boulder	(10 - 160 in., 256 - 4096 mm.)	(basketball to small car)
BR = Bedrock	>160 in., >4096 mm.)	(larger than a small car)

2014 LANDSLIDE ASSESSMENT FIELD FORM

VASA CREEK FISH HABITAT EVALUATION AND LANDSLIDE ASSESSMENT PROJECT

Site Information

Tt_ID: LS-02 Surveyed By: JP JP Date: 5/2/14 Weather: Sunny

GPS Unit # Col Long. Distance: 291 ft from START Observation Type: (Landslide) (Potential instability) In-channel erosion

GPS Data

GPS Point #	as PHOTO	Description:	Deposition fan	Photo #	0007
Additional Point #		Description:	Drainage outlet	Photo #	0008
Additional Point #		Description:		Photo #	
Additional Point #		Description:	Sweeping conifer @ top	Photo #	0010
Additional Point #		Description:		Photo #	

Hillslope Characteristics

Mapped Geology: _____ Slope Orientation: _____

Landslide Observed? (Yes) No In-channel Erosion Observed? Yes (No)

Scarp Legth: _____ Landslide deposit width: _____ Length: _____ Depth: _____ Delivery (Y/N)

Length of In-channel Erosion: _____

Type of Movement: Deep-seated Rotational Debris Flow Debris Avalanche Other Debris fan

Current Activity: _____ Active X Inactive _____ Mitigated (describe) _____

Possible failure cause: Drainage steep deposition fan. Soils saturated, slight flow entering. Trees show signs of movement

Average Slope: 75% % Forested: 70 Veg Type: Mixed / shrub

Slope appearance:	(Straight)	Hummocky	Concave	Convex	Other
Hydrology:	Tributary Creek	(Seeps Present)	Outfall (see recon form)	Groundwater recharge	Other
Soil Origin:	Colluvium	(Glacial Till)	Fill	Combination	Other

Soil Description: Saturated soils, slight flow entering.

Signs of Potential Instability: Perched bed of materials on top. ~~Soils~~ Trees show signs of movement

Stream Characteristics

Stream Type:	Source (>10%) Bedrock	Colluvial	(Trans (3-10%) Alluvial	Incised	Response (<3%) Fan
Bank characteristics:	Naturally Non-erodible		(Erosion resistant)		Highly Erodible
Scour potential:	Low		(Moderate)		High
Dominant hydrologic regime:	Spring	Snowmelt	(Rain)	Rain-on-snow	Conv. Thunderstorm

Channel Morphology: _____ LWD Present (Y/N) _____ GPS and photo # _____

Streambed Substrate

SA = Sand, Silt, and Clay	(<0.08 in, <2mm.)	(smaller than "BB")
GR = Gravel	(0.08 - 2.5 in., 2 - 64 mm.)	("BB to tennis ball)
CO = Cobble	(2.5 - 10 in., 64 - 256 mm.)	(tennis ball to basketball)
BO = Boulder	(10 - 160 in., 256 - 4096 mm.)	(basketball to small car)
BR = Bedrock	>160 in., >4096 mm.)	(larger than a small car)

2014 LANDSLIDE ASSESSMENT FIELD FORM

VASA CREEK FISH HABITAT EVALUATION AND LANDSLIDE ASSESSMENT PROJECT

Site Information

Tt_ID: LS-03 Surveyed By: JP, JP Date: 5/2/14 Weather: Sunny

GPS Unit # Col Long. Distance: Observation Type: (Landslide) Potential instability In-channel erosion

GPS Data

GPS Point #	as Photo	Description:	Deposit	Photo #	00014
Additional Point #		Description:	slope	Photo #	00015
Additional Point #	Vasa_US_Unstable	Description:	end of Potential zone	~~Photo #~~	~~00016~~
Additional Point #		Description:		Photo #	
Additional Point #		Description:		Photo #	

Hillslope Characteristics

Mapped Geology: Qva Slope Orientation: North

Landslide Observed? (Yes) No In-channel Erosion Observed? Yes (No)

Scarp Legth: 16m Landslide deposit width: 50 Length: 25 Depth: 3 Delivery (Y/N)

Length of In-channel Erosion: NA

Type of Movement: Deep-seated Rotational Debris Flow Debris Avalanche Other Debris Slide

Current Activity: Active X Inactive Mitigated (describe)

Possible failure cause: heavy rains

Average Slope: 75 % Forested: 70% Veg Type: mixed / shrubs / ferns Salmonberry, OC

Slope appearance:	Straight	Hummocky	(Concave)	Convex	Other
Hydrology:	Tributary Creek	(Seeps Present)	Outfall (see recon form)	Groundwater recharge	Other
Soil Origin:	Colluvium	(Glacial Till)	Fill	Combination	Other

Soil Description:

Signs of Potential Instability:

Stream Characteristics

Stream Type:	Source (>10%) Bedrock	Colluvial	(Trans (3-10%) Alluvial)	Incised	Response (<3%) Fan
Bank characteristics:	Naturally Non-erodible		(Erosion resistant)		Highly Erodible
Scour potential:	Low		(Moderate)		High
Dominant hydrologic regime:	Spring	Snowmelt	(Rain)	Rain-on-snow	Conv. Thunderstorm

Channel Morphology: Pool / riffle LWD Present (Y/N) N GPS and photo #

Streambed Substrate

SA = Sand, Silt, and Clay	(<0.08 in, <2mm.)	(smaller than "BB")
GR = Gravel	(0.08 - 2.5 in., 2 - 64 mm.)	("BB to tennis ball)
CO = Cobble	(2.5 - 10 in., 64 - 256 mm.)	(tennis ball to basketball)
BO = Boulder	(10 - 160 in., 256 - 4096 mm.)	(basketball to small car)
BR = Bedrock	>160 in., >4096 mm.)	(larger than a small car)

2014 LANDSLIDE ASSESSMENT FIELD FORM

VASA CREEK FISH HABITAT EVALUATION AND LANDSLIDE ASSESSMENT PROJECT

Site Information

Tt_ID: LS-04 Surveyed By: JP, JP Date: 5/21/14 Weather: Sunny

GPS Unit # Col Long. Distance: _____ Observation Type: (Landslide) Potential instability

In-channel erosion

GPS Data

GPS Point #	as Photo	Description:	West facing	Photo #	DSC 000 37
Additional Point #		Description:	East facing	Photo #	38
Additional Point #		Description:		Photo #	
Additional Point #		Description:		Photo #	
Additional Point #		Description:		Photo #	

Hillslope Characteristics

Mapped Geology: _____ Slope Orientation: W / E

Landslide Observed? (Yes) No In-channel Erosion Observed? Yes (No)

25 depth Scarp Legth: 75m Landslide deposit width: 0 Length: 0 Depth: _____ Delivery (Y/N)

Length of In-channel Erosion: 0

Type of Movement: Deep-seated Rotational Debris Flow Debris Avalanche Other Debris slide

Current Activity: X Active _____ Inactive _____ Mitigated (describe) _____

Possible failure cause: Heavy rains

Average Slope: 100 % Forested: 20 Veg Type: Conifer / Shrub

Slope appearance: Straight Hummocky (Concave) Convex Other

Hydrology: Tributary Creek Seeps Present Outfall (see recon form) Groundwater recharge (Other) None

Soil Origin: Colluvium (Glacial Till) Fill Combination Other

Soil Description: _____

Signs of Potential Instability: _____

Stream Characteristics

Stream Type:	(Source (>10%) Bedrock	Colluvial		(Trans (3-10%) Alluvial	Incised		Response (<3%) Fan		
Bank characteristics:	Naturally Non-erodible			(Erosion resistant			Highly Erodible		
Scour potential:	(Low			Moderate			High		
Dominant hydrologic regime:	Spring	Snowmelt	(Rain	Rain-on-snow	Conv. Thunderstorm				
Channel Morphology: Cascade			LWD Present (Y/N) _____			GPS and photo # _____			

Streambed Substrate

SA = Sand, Silt, and Clay	(<0.08 in, <2mm.)	(smaller than "BB")
GR = Gravel	(0.08 - 2.5 in., 2 - 64 mm.)	("BB to tennis ball)
CO = Cobble	(2.5 - 10 in., 64 - 256 mm.)	(tennis ball to basketball)
BO = Boulder	(10 - 160 in., 256 - 4096 mm.)	(basketball to small car)
BR = Bedrock	>160 in., >4096 mm.)	(larger than a small car)

2014 LANDSLIDE ASSESSMENT FIELD FORM

VASA CREEK FISH HABITAT EVALUATION AND LANDSLIDE ASSESSMENT PROJECT

Site Information

Tt_ID: LS-05 Surveyed By: JP, JP Date: 5/2/14 Weather: Sunny

GPS Unit # Col Long. Distance: _____ Observation Type: (Landslide) Potential instability

In-channel erosion

GPS Data

GPS Point #	as PhoTo	Description:	Scarp	Photo #	00039
Additional Point #	as PhoTo	Description:	D/S - channel conditions	Photo #	00040
Additional Point #		Description:		Photo #	
Additional Point #		Description:		Photo #	
Additional Point #		Description:		Photo #	

Hillslope Characteristics

Mapped Geology: _____ Slope Orientation: East

Landslide Observed? (Yes) No In-channel Erosion Observed? Yes (No)

D: 26m Scarp Legth: 20m Landslide deposit width: _____ Length: _____ Depth: 2.5 Delivery (Y/N)

Length of In-channel Erosion: _____

Type of Movement: Deep-seated Rotational Debris Flow Debris Avalanche Other Debris Slide

Current Activity: X Active (X) Inactive _____ Mitigated (describe) _____

Possible failure cause: older than upstream slide

Heavy rains

Average Slope: 39 % Forested: 50 Veg Type: Mixed / shrubs

Slope appearance: Straight Hummocky (Concave) Convex Other

Hydrology: Tributary Creek Seeps Present Outfall (see recon form) Groundwater recharge (Other) None

Soil Origin: Colluvium (Glacial Till) Fill Combination Other

Soil Description: _____

Signs of Potential Instability: _____

Stream Characteristics

Stream Type:	(Source (>10%) Bedrock)	Colluvial	Trans (3-10%) Alluvial	Incised	Response (<3%) Fan
Bank characteristics:	(Naturally Non-erodible)		Erosion resistant		Highly Erodible
Scour potential:	(Low)		Moderate		High
Dominant hydrologic regime:	Spring	Snowmelt	(Rain)	Rain-on-snow	Conv. Thunderstorm

Channel Morphology: Bedrock chute LWD Present (Y/N) Y GPS and photo # _____

Streambed Substrate

SA = Sand, Silt, and Clay	(<0.08 in, <2mm.)	(smaller than "BB")
GR = Gravel	(0.08 - 2.5 in., 2 - 64 mm.)	("BB to tennis ball)
CO = Cobble	(2.5 - 10 in., 64 - 256 mm.)	(tennis ball to basketball)
BO = Boulder	(10 - 160 in., 256 - 4096 mm.)	(basketball to small car)
BR = Bedrock	>160 in., >4096 mm.)	(larger than a small car)

2014 LANDSLIDE ASSESSMENT FIELD FORM

VASA CREEK FISH HABITAT EVALUATION AND LANDSLIDE ASSESSMENT PROJECT

Site Information

Tt_ID: LS-06 Surveyed By: JP JP Date: 5/7/14 Weather: clear

GPS Unit # Coll Long. Distance: _____ Observation Type: (Landslide) Potential instability

In-channel erosion

GPS Data

GPS Point #		Description:	Downslope from Top of Scarp	Photo #	00048
Additional Point #		Description:	LB Seep	Photo #	00049
Additional Point #		Description:		Photo #	
Additional Point #		Description:		Photo #	
Additional Point #		Description:		Photo #	

Hillslope Characteristics

Mapped Geology: _____ Slope Orientation: 290 West

Landslide Observed? (Yes) No In-channel Erosion Observed? (Yes) No

Scarp Legth: 15m Landslide deposit width: 15 Length: 11 Depth: 1.5m Delivery (Y/N)

Length of In-channel Erosion: _____

Type of Movement: Deep-seated Rotational Debris Flow Debris Avalanche (Other) Small Slump

Current Activity: X Active _____ Inactive _____ Mitigated (describe) _____

Possible failure cause: RB slump, forcing stream to Left bank, creating erosion LB seep and erosion. Slump caused by outfall Drainage saturating the slope

Average Slope: 50% % Forested: 90 Veg Type: Mixed

Slope appearance:	Straight	Hummocky	(Concave)	Convex	Other
Hydrology:	Tributary Creek	(Seeps Present)	Outfall (see recon form)	Groundwater recharge	Other
Soil Origin:	Colluvium	(Glacial Till)	Fill	Combination	Other

Soil Description: _____

Signs of Potential Instability: _____

Stream Characteristics

Stream Type:	Source (>10%) Bedrock	Colluvial	(Trans (3-10%) Alluvial)	Incised	Response (<3%) Fan
Bank characteristics:	Naturally Non-erodible		(Erosion resistant)		Highly Erodible
Scour potential:	Low		(Moderate)		High
Dominant hydrologic regime:	Spring	Snowmelt	(Rain)	Rain-on-snow	Conv. Thunderstorm

Channel Morphology: riffle/pool LWD Present (Y/N) Y GPS and photo # _____

Streambed Substrate

SA = Sand, Silt, and Clay	(<0.08 in, <2mm.)	(smaller than "BB")
GR = Gravel	(0.08 - 2.5 in., 2 - 64 mm.)	("BB to tennis ball)
CO = Cobble	(2.5 - 10 in., 64 - 256 mm.)	(tennis ball to basketball)
BO = Boulder	(10 - 160 in., 256 - 4096 mm.)	(basketball to small car)
BR = Bedrock	>160 in., >4096 mm.)	(larger than a small car)

2014 LANDSLIDE ASSESSMENT FIELD FORM

VASA CREEK FISH HABITAT EVALUATION AND LANDSLIDE ASSESSMENT PROJECT

Site Information

Tt_ID: LS-07 Surveyed By: JP JP Date: 5/7/14 Weather: Sunny

GPS Unit # Colville Long. Distance: _____ Observation Type: (Landslide) Potential instability In-channel erosion

GPS Data

GPS Point #		Description:	Scarp	Photo #	000 66
Additional Point #		Description:		Photo #	
Additional Point #		Description:		Photo #	
Additional Point #		Description:		Photo #	
Additional Point #		Description:		Photo #	

Hillslope Characteristics

Mapped Geology: _____ Slope Orientation: East

Landslide Observed? (Yes) No In-channel Erosion Observed? Yes (No)

Scarp Legth: 10-12 Landslide deposit width: 16 m Length: 12 m Depth: 0.5 Delivery (Y/N)

Length of In-channel Erosion: _____

Type of Movement:	Deep-seated Rotational	Debris Flow	Debris Avalanche	(Other)	Debris slide
Current Activity:	Active	X Inactive	Mitigated (describe)		

Possible failure cause: LB fail, steep slope,

Average Slope: 90+ % Forested: 50 Veg Type: Decid/ some shrubs

Slope appearance:	Straight	Hummocky	Concave	(Convex)	Other
Hydrology:	Tributary Creek	Seeps Present	Outfall (see recon form)	Groundwater recharge	Other
Soil Origin:	Colluvium	(Glacial Till)	Fill	Combination	Other

Soil Description: _____

Signs of Potential Instability: _____

Stream Characteristics

Stream Type:	Source (>10%) Bedrock	Colluvial	(Trans (3-10%) Alluvial)	Incised	Response (<3%) Fan
Bank characteristics:	Naturally Non-erodible		(Erosion resistant)		Highly Erodible
Scour potential:	Low		(Moderate)		High
Dominant hydrologic regime:	Spring	Snowmelt	(Rain)	Rain-on-snow	Conv. Thunderstorm

Channel Morphology: Riffle pool LWD Present (Y/N) Y GPS and photo #

Streambed Substrate

SA = Sand, Silt, and Clay	(<0.08 in, <2mm.)	(smaller than "BB")
GR = Gravel	(0.08 - 2.5 in., 2 - 64 mm.)	("BB to tennis ball)
CO = Cobble	(2.5 - 10 in., 64 - 256 mm.)	(tennis ball to basketball)
BO = Boulder	(10 - 160 in., 256 - 4096 mm.)	(basketball to small car)
BR = Bedrock	>160 in., >4096 mm.)	(larger than a small car)

2014 LANDSLIDE ASSESSMENT FIELD FORM

VASA CREEK FISH HABITAT EVALUATION AND LANDSLIDE ASSESSMENT PROJECT

Site Information

Tt_ID: LS-08 Surveyed By: JP JP Date: 5/7/14 Weather: Sunny

GPS Unit #101 Long. Distance: _____ Observation Type: (Landslide) Potential instability

In-channel erosion

GPS Data

GPS Point #		Description:	Photo of Scarp	Photo #	000 73
Additional Point #		Description:		Photo #	
Additional Point #		Description:		Photo #	
Additional Point #		Description:		Photo #	
Additional Point #		Description:		Photo #	

Hillslope Characteristics

Mapped Geology: _____ Slope Orientation: East

Landslide Observed? (Yes) No In-channel Erosion Observed? Yes (No)

Scarp Legth: 10m Landslide deposit width: 10m Length: 10m Depth: 1.5 Delivery (Y/N)

Length of In-channel Erosion: NA

Type of Movement: Deep-seated Rotational Debris Flow Debris Avalanche Other Debris slide

Current Activity: Active X Inactive Mitigated (describe)

Possible failure cause: Steep slope

Ivy covered currently, Conifer growing on top D: 1.5in 12ft high

Average Slope: 86 % Forested: 90 Veg Type: Mixed, IT Understory

Slope appearance:	Straight	Hummocky	(Concave)	Convex	Other
Hydrology:	Tributary Creek	Seeps Present	Outfall (see recon form)	Groundwater recharge	Other
Soil Origin:	Colluvium	(Glacial Till)	Fill	Combination	Other

Soil Description: _____

Signs of Potential Instability: _____

Stream Characteristics

Stream Type:	Source (>10%) Bedrock	Colluvial	(Trans (3-10%) Alluvial)	Incised	Response (<3%) Fan
Bank characteristics:	Naturally Non-erodible		(Erosion resistant)		Highly Erodible
Scour potential:	Low		(Moderate)		High
Dominant hydrologic regime:	Spring	Snowmelt	(Rain)	Rain-on-snow	Conv. Thunderstorm

Channel Morphology: Riffle/Pool LWD Present (Y/N) NO GPS and photo #

Streambed Substrate

SA = Sand, Silt, and Clay	(<0.08 in, <2mm.)	(smaller than "BB")
GR = Gravel	(0.08 - 2.5 in., 2 - 64 mm.)	("BB to tennis ball)
CO = Cobble	(2.5 - 10 in., 64 - 256 mm.)	(tennis ball to basketball)
BO = Boulder	(10 - 160 in., 256 - 4096 mm.)	(basketball to small car)
BR = Bedrock	>160 in., >4096 mm.)	(larger than a small car)

2014 LANDSLIDE ASSESSMENT FIELD FORM

VASA CREEK FISH HABITAT EVALUATION AND LANDSLIDE ASSESSMENT PROJECT

Site Information

Tt_ID: LS-09 Surveyed By: JP JP Date: 5/7/14 Weather: Sunny

GPS Unit # Col Long. Distance: _____ Observation Type: Landslide Potential instability In-channel erosion

GPS Data

GPS Point #		Description:	LB Scarp	Photo #	00095
Additional Point #		Description:	Deposit	Photo #	96
Additional Point #		Description:		Photo #	
Additional Point #		Description:		Photo #	
Additional Point #		Description:		Photo #	

Hillslope Characteristics

Mapped Geology: _____ Slope Orientation: East

Landslide Observed? Yes No In-channel Erosion Observed? Yes No

Scarp Legth: 11m Landslide deposit width: 11m Length: 5m Depth: .5 Delivery (Y/N)

Length of In-channel Erosion: _____

Type of Movement: Deep-seated Rotational Debris Flow Debris Avalanche Other slide

Current Activity: X Active _____ Inactive _____ Mitigated (describe) _____

Possible failure cause: Seep ~~+ Ground~~ Saturated Soils, Deposit pushing stream right, recorrection causing more RB erosion.

Average Slope: 100+ % Forested: Ø Veg Type: —

Slope appearance: Straight Hummocky Concave Convex Other

Hydrology: Tributary Creek Seeps Present Outfall (see recon form) Groundwater recharge Other

Soil Origin: Colluvium Glacial Till Fill Combination Other

Soil Description: Saturated

Signs of Potential Instability: Large Maple on edge may fall on/near foot bridge

Stream Characteristics

Stream Type:	Source (>10%) Bedrock	Colluvial	Trans (3-10%) Alluvial	Incised	Response (<3%) Fan
Bank characteristics:	Naturally Non-erodible		Erosion resistant		Highly Erodible
Scour potential:	Low		Moderate		High
Dominant hydrologic regime:	Spring	Snowmelt	Rain	Rain-on-snow	Conv. Thunderstorm

Channel Morphology: Riffle / Pool LWD Present (Y/N) Y GPS and photo # _____

Streambed Substrate

SA = Sand, Silt, and Clay	(<0.08 in, <2mm.)	(smaller than "BB")
GR = Gravel	(0.08 - 2.5 in., 2 - 64 mm.)	("BB to tennis ball)
CO = Cobble	(2.5 - 10 in., 64 - 256 mm.)	(tennis ball to basketball)
BO = Boulder	(10 - 160 in., 256 - 4096 mm.)	(basketball to small car)
BR = Bedrock	>160 in., >4096 mm.)	(larger than a small car)

2014 LANDSLIDE ASSESSMENT FIELD FORM

VASA CREEK FISH HABITAT EVALUATION AND LANDSLIDE ASSESSMENT PROJECT

Site Information

Tt_ID: P1-02 Surveyed By: JP JP Date: 5/2/14 Weather: Sunny

GPS Unit # Col Long. Distance: 325 Observation Type: Landslide (Potential instability) In-channel erosion

GPS Data

GPS Point #	as Photo	Description:	Top	Photo #	000 11
Additional Point #	as Photo	Description:	Debris fan	Photo #	000 12
Additional Point #	as Photo	Description:	Clay lens	Photo #	000 13
Additional Point #		Description:		Photo #	
Additional Point #		Description:		Photo #	

Hillslope Characteristics

Mapped Geology: _____ Slope Orientation: _____

Landslide Observed? Yes No In-channel Erosion Observed? Yes No

Scarp Legth: _____ Landslide deposit width: _____ Length: _____ Depth: _____ Delivery (Y/N)

Length of In-channel Erosion: _____

Type of Movement: Deep-seated Rotational Debris Flow Debris Avalanche Other _____

Current Activity: _____ Active _____ Inactive _____ Mitigated (describe) _____

Possible failure cause: _____

Average Slope: 75% % Forested: 70 Veg Type: Mixed / shrubs

Slope appearance: (Straight) Hummocky Concave Convex Other

Hydrology: Tributary Creek (Seeps Present) Outfall (see recon form) Groundwater recharge Other

Soil Origin: Colluvium (Glacial Till) Fill Combination Other

Soil Description: Soil saturated more than previous site.

Signs of Potential Instability: Water actively flowing into Creek, Devils Club, area between previous site also unstable

Stream Characteristics

Stream Type:	Source (>10%) Bedrock	Colluvial	(Trans (3-10%) Alluvial	ncised	Response (<3%) Fan
Bank characteristics:	Naturally Non-erodible		(Erosion resistant)		Highly Erodible
Scour potential:	Low		Moderate		High
Dominant hydrologic regime:	Spring	Snowmelt	(Rain)	Rain-on-snow	Conv. Thunderstorm

Channel Morphology: Pool / riffle LWD Present (Y/N) N GPS and photo # _____

Streambed Substrate

SA = Sand, Silt, and Clay	(<0.08 in, <2mm.)	(smaller than "BB")
GR = Gravel	(0.08 - 2.5 in., 2 - 64 mm.)	("BB to tennis ball)
CO = Cobble	(2.5 - 10 in., 64 - 256 mm.)	(tennis ball to basketball)
BO = Boulder	(10 - 160 in., 256 - 4096 mm.)	(basketball to small car)
BR = Bedrock	>160 in., >4096 mm.)	(larger than a small car)

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2014 LANDSLIDE ASSESSMENT FIELD FORM

VASA CREEK FISH HABITAT EVALUATION AND LANDSLIDE ASSESSMENT PROJECT

Site Information

Tt_ID: P1-02 Surveyed By: JP, JP Date: 5/2/14 Weather: Sunny

GPS Unit # Col Long. Distance: — Observation Type: Landslide (Potential instability) In-channel erosion

GPS Data

GPS Point #	as photo	Description:	of outlet 18" classic	Photo #	DSC 00018
Additional Point #		Description:	Pond water U/S of inlet	Photo #	19
Additional Point #		Description:	S	Photo #	~~20~~
Additional Point #		Description:	Seep	Photo #	21
Additional Point #		Description:	2nd 24" culvert upslope of other culvert, seeps to left & right of culvert	Photo #	22 Seep 23 Seep 24

Hillslope Characteristics

Mapped Geology: Slope Orientation:

Landslide Observed? Yes No In-channel Erosion Observed? Yes No

Scarp Legth: Landslide deposit width: Length: Depth: Delivery (Y/N)

Length of In-channel Erosion:

Type of Movement: Deep-seated Rotational Debris Flow Debris Avalanche Other

Current Activity: Active Inactive Mitigated (describe)

Possible failure cause:

Average Slope: % Forested: 60 Veg Type: Decid/shrubs

Slope appearance:	Straight	(Hummocky)	Concave	Convex	Other
Hydrology:	Tributary Creek	(Seeps Present)	Outfall (see recon form)	Groundwater recharge	Other
Soil Origin:	Colluvium	(Glacial Till)	Fill	Combination	Other

Soil Description: multiple flow lines to inlet, seeps along upslope of access road

Signs of Potential Instability:

Stream Characteristics

Stream Type:	Source (>10%) Bedrock	Colluvial	(Trans (3-10%) Alluvial)	Incised	Response (<3%) Fan
Bank characteristics:	Naturally Non-erodible		Erosion resistant		Highly Erodible
Scour potential:	Low		Moderate		High
Dominant hydrologic regime:	Spring	Snowmelt	Rain	Rain-on-snow	Conv. Thunderstorm

Channel Morphology: LWD Present (Y/N) GPS and photo #

Streambed Substrate

SA = Sand, Silt, and Clay	(<0.08 in, <2mm.)	(smaller than "BB")
GR = Gravel	(0.08 - 2.5 in., 2 - 64 mm.)	("BB to tennis ball)
CO = Cobble	(2.5 - 10 in., 64 - 256 mm.)	(tennis ball to basketball)
BO = Boulder	(10 - 160 in., 256 - 4096 mm.)	(basketball to small car)
BR = Bedrock	>160 in., >4096 mm.)	(larger than a small car)

2014 LANDSLIDE ASSESSMENT FIELD FORM

VASA CREEK FISH HABITAT EVALUATION AND LANDSLIDE ASSESSMENT PROJECT

Site Information

Tt_ID: 01-03 Surveyed By: JP JP Date: 5/7/14 Weather: _____

GPS Unit # Col Long. Distance: _____ Observation Type: Landslide Potential instability In-channel erosion

DSC

GPS Data

GPS Point #	as plot	Description:	LB erosion	Photo #	000 43
Additional Point #	as photo	Description:	RB stream Gauge	Photo #	44
Additional Point #		Description:	Instream LWD control	Photo #	45
Additional Point #		Description:		Photo #	
Additional Point #		Description:		Photo #	

Hillslope Characteristics

Mapped Geology: _____ Slope Orientation: _____

Landslide Observed? Yes No In-channel Erosion Observed? Yes No

Scarp Legth: _____ Landslide deposit width: _____ Length: _____ Depth: _____ Delivery (Y/N)

Length of In-channel Erosion: _____

Type of Movement: Deep-seated Rotational Debris Flow Debris Avalanche Other _____

Current Activity: _____ Active _____ Inactive _____ Mitigated (describe) _____

Possible failure cause: _____

Average Slope: _____ % Forested: 100 Veg Type: _____

Slope appearance:	Straight	Hummocky	Concave	Convex	Other
Hydrology:	(Tributary Creek)	Seeps Present	Outfall (see recon form)	Groundwater recharge	Other
Soil Origin:	Colluvium	(Glacial Till)	Fill	Combination	Other

Soil Description: Dry

Signs of Potential Instability: In-channel erosion on left bank (15m) potential undercut of mature conifers which would pull down portion of Bank

Stream Characteristics

Stream Type:	Source (>10%) Bedrock	Colluvial	Trans (3-10%) Alluvial	Incised	Response (<3%) Fan
Bank characteristics:	Naturally Non-erodible		Erosion resistant		Highly Erodible
Scour potential:	Low		Moderate		High
Dominant hydrologic regime:	Spring	Snowmelt	Rain	Rain-on-snow	Conv. Thunderstorm

Channel Morphology: Bedrock channel LWD Present (Y/N) N GPS and photo # _____

Streambed Substrate

SA = Sand, Silt, and Clay	(<0.08 in, <2mm.)	(smaller than "BB")
GR = Gravel	(0.08 - 2.5 in., 2 - 64 mm.)	("BB to tennis ball)
CO = Cobble	(2.5 - 10 in., 64 - 256 mm.)	(tennis ball to basketball)
BO = Boulder	(10 - 160 in., 256 - 4096 mm.)	(basketball to small car)
BR = Bedrock	>160 in., >4096 mm.)	(larger than a small car)

2014 LANDSLIDE ASSESSMENT FIELD FORM

VASA CREEK FISH HABITAT EVALUATION AND LANDSLIDE ASSESSMENT PROJECT

Site Information

Tt_ID: 11-04 Surveyed By: JP SP Date: 5/7/14 Weather: _____

GPS Unit # 201 Long. Distance: _____ Observation Type: Landslide (Potential instability) (In-channel erosion)

GPS Data

GPS Point #	_____	Description:	In channel Erosion	Photo #	0077
Additional Point #	_____	Description:	_____	Photo #	_____
Additional Point #	_____	Description:	_____	Photo #	_____
Additional Point #	_____	Description:	_____	Photo #	_____
Additional Point #	_____	Description:	_____	Photo #	_____

Hillslope Characteristics

Mapped Geology: _____ Slope Orientation: West

Landslide Observed? (Yes) No In-channel Erosion Observed? (Yes) No

Bank Er ~~Scarp~~ Legth: 13 Landslide deposit width: _____ Length: _____ Depth: 2.0m Delivery (Y/N)

Length of In-channel Erosion: _____

Type of Movement: Deep-seated Rotational Debris Flow Debris Avalanche (Other) Bank Erosion

Current Activity: X Active _____ Inactive _____ Mitigated (describe) _____

Possible failure cause: Seep present

Average Slope: _____ % Forested: 60 Veg Type: Mixed / LT

Slope appearance:	(Straight)	Hummocky	Concave	Convex	Other
Hydrology:	(Tributary Creek)	(Seeps Present)	Outfall (see recon form)	Groundwater recharge	Other
Soil Origin:	Colluvium	(Glacial Till)	Fill	Combination	Other

Soil Description: _____

Signs of Potential Instability: Present above erosion,

Stream Characteristics

Stream Type:	Source (>10%) Bedrock	Colluvial	Trans (3-10%) Alluvial	Incised	Response (<3%) Fan
Bank characteristics:	Naturally Non-erodible		Erosion resistant		Highly Erodible
Scour potential:	Low		Moderate		High
Dominant hydrologic regime:	Spring	Snowmelt	Rain	Rain-on-snow	Conv. Thunderstorm

Channel Morphology: Riffle / Pool LWD Present (Y/N) _____ GPS and photo # _____

Streambed Substrate

8 0

SA = Sand, Silt, and Clay	(<0.08 in, <2mm.)	(smaller than "BB")
GR = Gravel	(0.08 - 2.5 in., 2 - 64 mm.)	("BB to tennis ball)
CO = Cobble	(2.5 - 10 in., 64 - 256 mm.)	(tennis ball to basketball)
BO = Boulder	(10 - 160 in., 256 - 4096 mm.)	(basketball to small car)
BR = Bedrock	>160 in., >4096 mm.)	(larger than a small car)

2014 LANDSLIDE ASSESSMENT FIELD FORMS

VASA CREEK FISH HABITAT EVALUATION AND LANDSLIDE HAZARD ASSESSMENT PROJECT

Site Information

Tt_ID: P1-05 Surveyed By: JP JP Date: 5/7/14 Weather: Sunny

GPS Unit # Col Long. Distance: _____ Observation Type: Landslide Potential instability

GPS Data

GPS Point #		Description:	Slope	Photo #	000 87
Additional Point #		Description:		Photo #	
Additional Point #		Description:		Photo #	
Additional Point #		Description:		Photo #	
Additional Point #		Description:		Photo #	

Hillslope Characteristics

Mapped Geology: _____ Slope Orientation: _____

Landslide Observed? Yes No

Scarp Legth: _____ Landslide deposit width: _____ Length: _____ Depth: _____ Delivery (Y/N)

Type of Movement: Deep-seated Rotational Debris Flow Debris Avalanche Other _____

Current Activity: _____ Active _____ Inactive _____ Mitigated (describe) _____

Possible failure cause: Steep

Average Slope: 80 % Forested 30 Veg Type Young Alders Other described below

Slope appearance: Straight Hummocky Concave Convex Other

Hydrology: Tributary Creek Seeps Present Outfall (see recon form) Groundwater recharge Other

Soil Origin: Colluvium Glacial Till Fill Combination Other

Soil Description: _____

Signs of Potential Instability: Steep with seep on LB right above culvert crossing May plug with failure intake, small scarp near top, wet veg ples, sat soils.

Stream Characteristics

Stream Type:	Source (>10%) Bedrock	Colluvial	Trans (3-10%) Alluvial	Incised	Response (<3%) Fan
Bank characteristics:	Naturally Non-erodible		Erosion resistant		Highly Erodible
Scour potential:	Low		Moderate		High
Dominant hydrologic regime:	Spring	Snowmelt	Rain	Rain-on-snow	Conv. Thunderstorm

Channel Morphology: riffle / pool LWD Present (Y/N) N GPS and photo # _____

Streambed Substrate

SA = Sand, Silt, and Clay	(<0.08 in, <2mm.)	(smaller than "BB")
GR = Gravel	(0.08 - 2.5 in., 2 - 64 mm.)	("BB to tennis ball)
CO = Cobble	(2.5 - 10 in., 64 - 256 mm.)	(tennis ball to basketball)
BO = Boulder	(10 - 160 in., 256 - 4096 mm.)	(basketball to small car)
BR = Bedrock	>160 in., >4096 mm.)	(larger than a small car)

ATTACHMENT C

OUTFALL RECONNAISSANCE INVENTORY/SAMPLE COLLECTION FIELD FORMS

OUTFALL RECONNAISSANCE INVENTORY/ SAMPLE COLLECTION FIELD SHEET

Section 1: Background Data

Subwatershed: Vasa Creek		Outfall ID: TT-OF01	
Today's date: 5/2/2014		Time (Military): 09:00	
Investigators: Jeff Phillips + Jet Parr		Form completed by: Jeff Phillips (Tetra Tech)	
Temperature (°F): 55°	Rainfall (in.): Last 24 hours: 0	Last 48 hours: 0	
Latitude:	Longitude:	GPS Unit:	GPS LMK #:
Camera: GPS		Photo #s: DSC00003	

Land Use in Drainage Area (Check all that apply):

- ☐ Industrial
- ☐ Ultra-Urban Residential
- ☑ Suburban Residential
- ☐ Commercial
- ☐ Open Space
- ☐ Institutional
- Other: _____
- Known Industries: _____

Notes (e.g., origin of outfall, if known):

Section 2: Outfall Description

LOCATION	MATERIAL	SHAPE		DIMENSIONS (IN.)	SUBMERGED
☐ Closed Pipe	☐ RCP ☐ CMP ☐ PVC ☐ HDPE ☐ Steel ☐ Other: _____	☐ Circular ☐ Elliptical ☐ Box ☐ Other: ____	☐ Single ☐ Double ☐ Triple ☐ Other: ____	Diameter/Dimensions: _____	In Water: ☐ No ☐ Partially ☐ Fully With Sediment: ☐ No ☐ Partially ☐ Fully
☒ Open drainage	☒ Concrete ☐ Earthen ☐ rip-rap ☐ Other: ____	☐ Trapezoid ☐ Parabolic ☐ Other: ____		Depth: ____ Top Width: 18" Bottom Width: ____	
☐ In-Stream	(applicable when collecting samples)				
Flow Present?	☒ Yes ☐ No *If No, Skip to Section 5*				
Flow Description (If present)	☒ Trickle ☐ Moderate ☐ Substantial				

Section 3: Quantitative Characterization

FIELD DATA FOR FLOWING OUTFALLS				
PARAMETER		RESULT	UNIT	EQUIPMENT
☐ Flow #1	Volume		Liter	Bottle
	Time to fill		Sec	
☐ Flow #2	Flow depth		In	Tape measure
	Flow width	____' ____"	Ft, In	Tape measure
	Measured length	____' ____"	Ft, In	Tape measure
	Time of travel		S	Stop watch
Temperature			°F	Thermometer
pH			pH Units	Test strip/Probe
Ammonia			mg/L	Test strip

Outfall Reconnaissance Inventory Field Sheet

Section 4: Physical Indicators for Flowing Outfalls Only

Are Any Physical Indicators Present in the flow? ☐ Yes ☐ No *(If No, Skip to Section 5)*

INDICATOR	CHECK if Present	DESCRIPTION	RELATIVE SEVERITY INDEX (1-3)		
Odor No	☐	☐ Sewage ☐ Rancid/sour ☐ Petroleum/gas ☐ Sulfide ☐ Other:	☐ 1 – Faint	☐ 2 – Easily detected	☐ 3 – Noticeable from a distance
Color No	☐	☐ Clear ☐ Brown ☐ Gray ☐ Yellow ☐ Green ☐ Orange ☐ Red ☐ Other:	☐ 1 – Faint colors in sample bottle	☐ 2 – Clearly visible in sample bottle	☐ 3 – Clearly visible in outfall flow
Turbidity No	☐	See severity	☐ 1 – Slight cloudiness	☐ 2 – Cloudy	☐ 3 – Opaque
Floatables -Does Not Include Trash!! No	☐	☐ Sewage (Toilet Paper, etc.) ☐ Suds ☐ Petroleum (oil sheen) ☐ Other:	☐ 1 – Few/slight; origin not obvious	☐ 2 – Some; indications of origin (e.g., possible suds or oil sheen)	☐ 3 - Some; origin clear (e.g., obvious oil sheen, suds, or floating sanitary materials)

Section 5: Physical Indicators for Both Flowing and Non-Flowing Outfalls

Are physical indicators that are not related to flow present? ☐ Yes ☐ No *(If No, Skip to Section 6)*

INDICATOR	CHECK if Present	DESCRIPTION	COMMENTS
Outfall Damage	☐	☐ Spalling, Cracking or Chipping ☐ Peeling Paint ☐ Corrosion	
Deposits/Stains	☐	☐ Oily ☐ Flow Line ☐ Paint ☐ Other:	
Abnormal Vegetation	☐	☐ Excessive ☐ Inhibited	
Poor pool quality	☐	☐ Odors ☐ Colors ☐ Floatables ☐ Oil Sheen ☐ Suds ☐ Excessive Algae ☐ Other:	
Pipe benthic growth	☐	☐ Brown ☐ Orange ☐ Green ☐ Other:	

Section 6: Overall Outfall Characterization

☒ Unlikely ☐ Potential (presence of two or more indicators) ☐ Suspect (one or more indicators with a severity of 3) ☐ Obvious

Section 7: Data Collection

1.	Sample for the lab?	☐ Yes	☐ No
2.	If yes, collected from:	☐ Flow	☐ Pool
3.	Intermittent flow trap set?	☐ Yes ☐ No	If Yes, type: ☐ OBM ☐ Caulk dam

Section 8: Any Non-Illicit Discharge Concerns (e.g., trash or needed infrastructure repairs)?

OUTFALL RECONNAISSANCE INVENTORY/ SAMPLE COLLECTION FIELD SHEET

Section 1: Background Data

Subwatershed: Vasa		Outfall ID: OF-02	
Today's date: 5/2/14		Time (Military):	
Investigators: JParr JPhillips		Form completed by:	
Temperature (°F):	Rainfall (in.): Last 24 hours: 0	Last 48 hours: 0	
Latitude:	Longitude:	GPS Unit: Co	GPS LMK #:
Camera:		Photo #s: DSC 016, 017	

Land Use in Drainage Area (Check all that apply):

- ☐ Industrial
- ☐ Ultra-Urban Residential
- ☐ Suburban Residential
- ☐ Commercial
- ☐ Open Space
- ☐ Institutional
- Other: _____
- Known Industries: _____

Notes (e.g., origin of outfall, if known): → Bed Straining

Section 2: Outfall Description

LOCATION	MATERIAL	SHAPE		DIMENSIONS (IN.)	SUBMERGED
☑ Closed Pipe	☐ RCP ☑ CMP ☐ PVC ☐ HDPB ☐ Steel ☐ Other: _____	☑ Circular ☐ Bliptical ☐ Box ☐ Other: _____	☑ Single ☐ Double ☐ Triple ☐ Other: _____	Diameter/Dimensions: 12"	In Water: ☑ No ☐ Partially ☐ Fully With Sediment: ☑ No ☐ Partially ☐ Fully
☐ Open drainage	☐ Concrete ☐ Barthen ☐ rip-rap ☐ Other: _____	☐ Trapezoid ☐ Parabolic ☐ Other: _____		Depth: _____ Top Width: _____ Bottom Width: _____	
☐ In-Stream	(applicable when collecting samples)				
Flow Present?	☑ Yes ☐ No *If No, Skip to Section 5*				
Flow Description (If present)	☐ Trickle ☑ Moderate ☐ Substantial				

Section 3: Quantitative Characterization

FIELD DATA FOR FLOWING OUTFALLS				
PARAMETER		RESULT	UNIT	EQUIPMENT
☐ Flow #1	Volume		Liter	Bottle
	Time to fill		Sec	
☐ Flow #2	Flow depth		In	Tape measure
	Flow width	____' ____"	Ft, In	Tape measure
	Measured length	____' ____"	Ft, In	Tape measure
	Time of travel		S	Stop watch
Temperature			°F	Thermometer
pH			pH Units	Test strip/Probe
Ammonia			mg/L	Test strip

Outfall Reconnaissance Inventory Field Sheet

Section 4: Physical Indicators for Flowing Outfalls Only

Are Any Physical Indicators Present in the flow? ☐ Yes ☐ No *(If No, Skip to Section 5)*

INDICATOR	CHECK if Present	DESCRIPTION	RELATIVE SEVERITY INDEX (1-3)		
Odor	☑	☐ Sewage ☐ Rancid/sour ☐ Petroleum/gas ☑ Sulfide ☐ Other:	☑ 1 – Faint	☐ 2 – Easily detected	☐ 3 – Noticeable from a distance
Color	☑	☐ Clear ☐ Brown ☐ Gray ☑ Yellow (Staining of Bo) ☐ Green ☑ Orange ☐ Red ☐ Other:	☑ 1 – Faint colors in sample bottle	☐ 2 – Clearly visible in sample bottle	☐ 3 – Clearly visible in outfall flow
Turbidity	☐	See severity	☐ 1 – Slight cloudiness	☐ 2 – Cloudy	☐ 3 – Opaque
Floatables -Does Not Include Trash!!	☑	☐ Sewage (Toilet Paper, etc.) ☑ Suds ☐ Petroleum (oil sheen) ☐ Other:	☐ 1 – Few/slight; origin not obvious	☐ 2 – Some; indications of origin (e.g., possible suds or oil sheen)	☐ 3 - Some; origin clear (e.g., obvious oil sheen, suds, or floating sanitary materials)

Section 5: Physical Indicators for Both Flowing and Non-Flowing Outfalls

Are physical indicators that are not related to flow present? ☐ Yes ☐ No *(If No, Skip to Section 6)*

INDICATOR	CHECK if Present	DESCRIPTION	COMMENTS
Outfall Damage	☐	☐ Spalling, Cracking or Chipping ☐ Peeling Paint ☐ Corrosion	
Deposits/Stains	☑	☐ Oily ☐ Flow Line ☐ Paint ☑ Other: Collection	
Abnormal Vegetation	☐	☐ Excessive ☐ Inhibited	
Poor pool quality	☑	☐ Odors ☑ Colors ☐ Floatables ☐ Oil Sheen ☑ Suds ☐ Excessive Algae ☐ Other:	
Pipe benthic growth	☐	☐ Brown ☑ Orange ☐ Green ☐ Other:	

Section 6: Overall Outfall Characterization

☐ Unlikely ☑ Potential (presence of two or more indicators) ☐ Suspect (one or more indicators with a severity of 3) ☐ Obvious

Section 7: Data Collection

1. Sample for the lab?	☐ Yes	☐ No	
2. If yes, collected from:	☐ Flow	☐ Pool	
3. Intermittent flow trap set?	☐ Yes	☐ No	If Yes, type: ☐ OBM ☐ Caulk dam

Section 8: Any Non-Illicit Discharge Concerns (e.g., trash or needed infrastructure repairs)?

OUTFALL RECONNAISSANCE INVENTORY/ SAMPLE COLLECTION FIELD SHEET

Section 1: Background Data

Subwatershed: Vasa		Outfall ID: OF-03	
Today's date: 5/7/14		Time (Military): 0906	
Investigators: JP JP		Form completed by: JP	
Temperature (°F):	Rainfall (in.): Last 24 hours: No	Last 48 hours: Yes	
Latitude:	Longitude:	GPS Unit: Col	GPS LMK #:
Camera: Colville GPS		Photo #s: 00047	

Land Use in Drainage Area (Check all that apply):

- ☐ Industrial
- ☐ Ultra-Urban Residential
- ☑ Suburban Residential
- ☐ Commercial
- ☐ Open Space
- ☐ Institutional
- Other: _____
- Known Industries: _____

Notes (e.g., origin of outfall, if known): Old steel corrugated Road Drainage RB, Top of Bank, 50-60ft sitting on surface

Section 2: Outfall Description

LOCATION	MATERIAL	SHAPE		DIMENSIONS (IN.)	SUBMERGED
☑ Closed Pipe	☐ RCP ☐ CMP ☐ PVC ☐ HDPE ☑ Steel ☐ Other: _____	☑ Circular ☐ Eliptical ☐ Box ☐ Other: ____	☑ Single ☐ Double ☐ Triple ☐ Other: ____	Diameter/Dimensions: 12 in	In Water: ☑ No ☐ Partially ☐ Fully With Sediment: ☑ No ☐ Partially ☐ Fully
☐ Open drainage	☐ Concrete ☐ Earthen ☐ rip-rap ☐ Other: ____	☐ Trapezoid ☐ Parabolic ☐ Other: ____		Depth: ____ Top Width: ____ Bottom Width: ____	
☐ In-Stream	(applicable when collecting samples)				
Flow Present?	☑ Yes ☐ No *If No, Skip to Section 5*				
Flow Description (If present)	☑ Trickle ☐ Moderate ☐ Substantial				

Section 3: Quantitative Characterization

FIELD DATA FOR FLOWING OUTFALLS				
PARAMETER		RESULT	UNIT	EQUIPMENT
☐ Flow #1	Volume		Liter	Bottle
	Time to fill		Sec	
☐ Flow #2	Flow depth		In	Tape measure
	Flow width	____' ____"	Ft, In	Tape measure
	Measured length	____' ____"	Ft, In	Tape measure
	Time of travel		S	Stop watch
Temperature			°F	Thermometer
pH			pH Units	Test strip/Probe
Ammonia			mg/L	Test strip

Outfall Reconnaissance Inventory Field Sheet

Section 4: Physical Indicators for Flowing Outfalls Only

Are Any Physical Indicators Present in the flow? ☐ Yes ☑ No *(If No, Skip to Section 5)*

INDICATOR	CHECK if Present	DESCRIPTION	RELATIVE SEVERITY INDEX (1-3)		
Odor	☐	☐ Sewage ☐ Rancid/sour ☐ Petroleum/gas ☐ Sulfide ☐ Other:	☐ 1 – Faint	☐ 2 – Easily detected	☐ 3 – Noticeable from a distance
Color	☐	☑ Clear ☐ Brown ☐ Gray ☐ Yellow ☐ Green ☐ Orange ☐ Red ☐ Other:	☐ 1 – Faint colors in sample bottle	☐ 2 – Clearly visible in sample bottle	☐ 3 – Clearly visible in outfall flow
Turbidity	☐	See severity	☐ 1 – Slight cloudiness	☐ 2 – Cloudy	☐ 3 – Opaque
Floatables -Does Not Include Trash!!	☐	☐ Sewage (Toilet Paper, etc.) ☐ Suds ☐ Petroleum (oil sheen) ☐ Other:	☐ 1 – Few/slight; origin not obvious	☐ 2 – Some; indications of origin (e.g., possible suds or oil sheen)	☐ 3 - Some; origin clear (e.g., obvious oil sheen, suds, or floating sanitary materials)

Section 5: Physical Indicators for Both Flowing and Non-Flowing Outfalls

Are physical indicators that are not related to flow present? ☐ Yes ☐ No *(If No, Skip to Section 6)*

INDICATOR	CHECK if Present	DESCRIPTION	COMMENTS
Outfall Damage	☐	☐ Spalling, Cracking or Chipping ☐ Peeling Paint ☐ Corrosion	
Deposits/Stains	☐	☐ Oily ☐ Flow Line ☐ Paint ☐ Other:	
Abnormal Vegetation	☐	☐ Excessive ☐ Inhibited	
Poor pool quality	☐	☐ Odors ☐ Colors ☐ Floatables ☐ Oil Sheen ☐ Suds ☐ Excessive Algae ☐ Other:	
Pipe benthic growth	☐	☐ Brown ☐ Orange ☐ Green ☐ Other:	

Section 6: Overall Outfall Characterization

☑ Unlikely ☐ Potential (presence of two or more indicators) ☐ Suspect (one or more indicators with a severity of 3) ☐ Obvious

Section 7: Data Collection

1. Sample for the lab?	☐ Yes	☐ No	
2. If yes, collected from:	☐ Flow	☐ Pool	
3. Intermittent flow trap set?	☐ Yes	☐ No	If Yes, type: ☐ OBM ☐ Caulk dam

Section 8: Any Non-Illicit Discharge Concerns (e.g., trash or needed infrastructure repairs)?

OUTFALL RECONNAISSANCE INVENTORY/ SAMPLE COLLECTION FIELD SHEET

Section 1: Background Data

Subwatershed: Vasa		Outfall ID: OF-04	
Today's date: 5/7/14		Time (Military): 0921	
Investigators: JP JP		Form completed by: JP	
Temperature (°F):	Rainfall (in.): Last 24 hours:	Last 48 hours: X	
Latitude:	Longitude:	GPS Unit: Colville	GPS LMK #:
Camera: Colville		Photo #s: 0005 0	

Land Use in Drainage Area (Check all that apply):

- ☐ Industrial
- ☐ Ultra-Urban Residential
- ☒ Suburban Residential
- ☐ Commercial
- ☐ Open Space
- ☐ Institutional
- Other: _____
- Known Industries: _____

Notes (e.g., origin of outfall, if known):

Section 2: Outfall Description

LOCATION	MATERIAL	SHAPE		DIMENSIONS (IN.)	SUBMERGED
☒ Closed Pipe	☐ RCP ☐ CMP ☒ PVC ☐ HDPE ☐ Steel ☐ Other: _____	☒ Circular ☐ Eliptical ☐ Box ☐ Other: _____ Corrugated	☒ Single ☐ Double ☐ Triple ☐ Other: _____	Diameter/Dimensions: .25 ft 3 in	In Water: ☒ No ☐ Partially ☐ Fully With Sediment: ☒ No ☐ Partially ☐ Fully
☐ Open drainage	☐ Concrete ☐ Earthen ☐ rip-rap ☐ Other: _____	☐ Trapezoid ☐ Parabolic ☐ Other: _____		Depth: _____ Top Width: _____ Bottom Width: _____	
☐ In-Stream	(applicable when collecting samples)				
Flow Present?	☒ Yes ☒ No *If No, Skip to Section 5*				
Flow Description (If present)	☐ Trickle ☐ Moderate ☐ Substantial				

Section 3: Quantitative Characterization

FIELD DATA FOR FLOWING OUTFALLS				
PARAMETER		RESULT	UNIT	EQUIPMENT
☐ Flow #1	Volume		Liter	Bottle
	Time to fill		Sec	
☐ Flow #2	Flow depth		In	Tape measure
	Flow width	____' ____"	Ft, In	Tape measure
	Measured length	____' ____"	Ft, In	Tape measure
	Time of travel		S	Stop watch
Temperature			°F	Thermometer
pH			pH Units	Test strip/Probe
Ammonia			mg/L	Test strip

Outfall Reconnaissance Inventory Field Sheet

Section 4: Physical Indicators for Flowing Outfalls Only

Are Any Physical Indicators Present in the flow? ☐ Yes ☒ No *(If No, Skip to Section 5)*

INDICATOR	CHECK if Present	DESCRIPTION	RELATIVE SEVERITY INDEX (1-3)		
Odor	☐	☐ Sewage ☐ Rancid/sour ☐ Petroleum/gas ☐ Sulfide ☐ Other:	☐ 1 – Faint	☐ 2 – Easily detected	☐ 3 – Noticeable from a distance
Color	☐	☐ Clear ☐ Brown ☐ Gray ☐ Yellow ☐ Green ☐ Orange ☐ Red ☐ Other:	☐ 1 – Faint colors in sample bottle	☐ 2 – Clearly visible in sample bottle	☐ 3 – Clearly visible in outfall flow
Turbidity	☐	See severity	☐ 1 – Slight cloudiness	☐ 2 – Cloudy	☐ 3 – Opaque
Floatables -Does Not Include Trash!!	☐	☐ Sewage (Toilet Paper, etc.) ☐ Suds ☐ Petroleum (oil sheen) ☐ Other:	☐ 1 – Few/slight; origin not obvious	☐ 2 – Some; indications of origin (e.g., possible suds or oil sheen)	☐ 3 - Some; origin clear (e.g., obvious oil sheen, suds, or floating sanitary materials)

Section 5: Physical Indicators for Both Flowing and Non-Flowing Outfalls

Are physical indicators that are not related to flow present? ☐ Yes ☐ No *(If No, Skip to Section 6)*

INDICATOR	CHECK if Present	DESCRIPTION	COMMENTS
Outfall Damage	☐	☐ Spalling, Cracking or Chipping ☐ Peeling Paint ☐ Corrosion	
Deposits/Stains	☐	☐ Oily ☐ Flow Line ☐ Paint ☐ Other:	
Abnormal Vegetation	☐	☐ Excessive ☐ Inhibited	
Poor pool quality	☐	☐ Odors ☐ Colors ☐ Floatables ☐ Oil Sheen ☐ Suds ☐ Excessive Algae ☐ Other:	
Pipe benthic growth	☐	☐ Brown ☐ Orange ☐ Green ☐ Other:	

Section 6: Overall Outfall Characterization

☒ Unlikely ☐ Potential (presence of two or more indicators) ☐ Suspect (one or more indicators with a severity of 3) ☐ Obvious

Section 7: Data Collection

1. Sample for the lab?	☐ Yes	☐ No	
2. If yes, collected from:	☐ Flow	☐ Pool	
3. Intermittent flow trap set?	☐ Yes	☐ No	If Yes, type: ☐ OBM ☐ Caulk dam

Section 8: Any Non-Illicit Discharge Concerns (e.g., trash or needed infrastructure repairs)?

OUTFALL RECONNAISSANCE INVENTORY/ SAMPLE COLLECTION FIELD SHEET

Section 1: Background Data

Subwatershed: Vasa		Outfall ID: OF-05	
Today's date: 5/7/14		Time (Military): 0925	
Investigators: JP JP		Form completed by: JP	
Temperature (°F):	Rainfall (in.): Last 24 hours:	Last 48 hours: X	
Latitude:	Longitude:	GPS Unit: Colville	GPS LMK #:
Camera: Colville		Photo #s: 00051	

Land Use in Drainage Area (Check all that apply):

- ☐ Industrial
- ☐ Ultra-Urban Residential
- ☑ Suburban Residential
- ☐ Commercial
- ☐ Open Space
- ☐ Institutional
- Other: _____
- Known Industries: _____

Notes (e.g., origin of outfall, if known): Revetments on both sides
LB, smooth plastic outfall, 1-5m above water edge, flows onto rocks

Section 2: Outfall Description

LOCATION	MATERIAL	SHAPE		DIMENSIONS (IN.)	SUBMERGED
☑ Closed Pipe	☐ RCP ☐ CMP ☑ PVC ☐ HDPE ☐ Steel ☐ Other: _____	☑ Circular ☐ Eliptical ☐ Box ☐ Other: _____ Smooth	☑ Single ☐ Double ☐ Triple ☐ Other: _____	Diameter/Dimensions: 7 9 in	In Water: ☑ No ☐ Partially ☐ Fully With Sediment: ☑ No ☐ Partially ☐ Fully
☐ Open drainage	☐ Concrete ☐ Earthen ☐ rip-rap ☐ Other: _____	☐ Trapezoid ☐ Parabolic ☐ Other: _____		Depth: _____ Top Width: _____ Bottom Width: _____	
☐ In-Stream	(applicable when collecting samples)				
Flow Present?	☐ Yes ☒ No *If No, Skip to Section 5*				
Flow Description (If present)	☐ Trickle ☐ Moderate ☐ Substantial				

Section 3: Quantitative Characterization

FIELD DATA FOR FLOWING OUTFALLS				
PARAMETER		RESULT	UNIT	EQUIPMENT
☐ Flow #1	Volume		Liter	Bottle
	Time to fill		Sec	
☐ Flow #2	Flow depth		In	Tape measure
	Flow width	____' ____"	Ft, In	Tape measure
	Measured length	____' ____"	Ft, In	Tape measure
	Time of travel		S	Stop watch
Temperature			°F	Thermometer
pH			pH Units	Test strip/Probe
Ammonia			mg/L	Test strip

Outfall Reconnaissance Inventory Field Sheet

Section 4: Physical Indicators for Flowing Outfalls Only

Are Any Physical Indicators Present in the flow? ☐ Yes ☒ No *(If No, Skip to Section 5)*

INDICATOR	CHECK if Present	DESCRIPTION	RELATIVE SEVERITY INDEX (1-3)		
Odor	☐	☐ Sewage ☐ Rancid/sour ☐ Petroleum/gas ☐ Sulfide ☐ Other:	☐ 1 – Faint	☐ 2 – Easily detected	☐ 3 – Noticeable from a distance
Color	☐	☐ Clear ☐ Brown ☐ Gray ☐ Yellow ☐ Green ☐ Orange ☐ Red ☐ Other:	☐ 1 – Faint colors in sample bottle	☐ 2 – Clearly visible in sample bottle	☐ 3 – Clearly visible in outfall flow
Turbidity	☐	See severity	☐ 1 – Slight cloudiness	☐ 2 – Cloudy	☐ 3 – Opaque
Floatables -Does Not Include Trash!!	☐	☐ Sewage (Toilet Paper, etc.) ☐ Suds ☐ Petroleum (oil sheen) ☐ Other:	☐ 1 – Few/slight; origin not obvious	☐ 2 – Some; indications of origin (e.g., possible suds or oil sheen)	☐ 3 - Some; origin clear (e.g., obvious oil sheen, suds, or floating sanitary materials)

Section 5: Physical Indicators for Both Flowing and Non-Flowing Outfalls

Are physical indicators that are not related to flow present? ☐ Yes ☒ No *(If No, Skip to Section 6)*

INDICATOR	CHECK if Present	DESCRIPTION	COMMENTS
Outfall Damage	☐	☐ Spalling, Cracking or Chipping ☐ Peeling Paint ☐ Corrosion	
Deposits/Stains	☐	☐ Oily ☐ Flow Line ☐ Paint ☐ Other:	
Abnormal Vegetation	☐	☐ Excessive ☐ Inhibited	
Poor pool quality	☐	☐ Odors ☐ Colors ☐ Floatables ☐ Oil Sheen ☐ Suds ☐ Excessive Algae ☐ Other:	
Pipe benthic growth	☐	☐ Brown ☐ Orange ☐ Green ☐ Other:	

Section 6: Overall Outfall Characterization

☒ Unlikely ☐ Potential (presence of two or more indicators) ☐ Suspect (one or more indicators with a severity of 3) ☐ Obvious

Section 7: Data Collection

1.	Sample for the lab?	☐ Yes	☐ No
2.	If yes, collected from:	☐ Flow	☐ Pool
3.	Intermittent flow trap set?	☐ Yes ☐ No	If Yes, type: ☐ OBM ☐ Caulk dam

Section 8: Any Non-Illicit Discharge Concerns (e.g., trash or needed infrastructure repairs)?

Outfall Reconnaissance Inventory/ Sample Collection Field Sheet

Section 1: Background Data

Subwatershed: Vasa		Outfall ID: OF-06	
Today's date: 5/17/14		Time (Military): 0936	
Investigators: JP JP		Form completed by: JP	
Temperature (°F):	Rainfall (in.): Last 24 hours:	Last 48 hours: X	
Latitude:	Longitude:	GPS Unit: Col	GPS LMK #:
Camera: Col		Photo #s: 000 54	

Land Use in Drainage Area (Check all that apply):

- ☐ Industrial
- ☐ Ultra-Urban Residential
- ☑ Suburban Residential
- ☐ Commercial
- ☐ Open Space
- ☐ Institutional
- Other: _____
- Known Industries: _____

Notes (e.g., origin of outfall, if known):

Section 2: Outfall Description

LOCATION	MATERIAL	SHAPE		DIMENSIONS (IN.)	SUBMERGED
☑ Closed Pipe	☐ RCP ☐ CMP ☑ PVC ☐ HDPB ☐ Steel ☐ Other: _____	☑ Circular ☐ Bliptical ☐ Box ☐ Other: _____ smooth white	☑ Single ☐ Double ☐ Triple ☐ Other: _____	Diameter/Dimensions: 12in	In Water: ☑ No ☐ Partially ☐ Fully With Sediment: ☑ No ☐ Partially ☐ Fully
☐ Open drainage	☐ Concrete ☐ Barthen ☐ rip-rap ☐ Other: _____	☐ Trapezoid ☐ Parabolic ☐ Other: _____		Depth: _____ Top Width: _____ Bottom Width: _____	
☐ In-Stream	(applicable when collecting samples)				
Flow Present?	☑ Yes ☐ No *If No, Skip to Section 5*				
Flow Description (If present)	☐ Trickle ☑ Moderate ☐ Substantial				

Section 3: Quantitative Characterization

FIELD DATA FOR FLOWING OUTFALLS				
PARAMETER		RESULT	UNIT	EQUIPMENT
☐ Flow #1	Volume		Liter	Bottle
	Time to fill		Sec	
☐ Flow #2	Flow depth		In	Tape measure
	Flow width	____' ____"	Ft, In	Tape measure
	Measured length	____' ____"	Ft, In	Tape measure
	Time of travel		S	Stop watch
Temperature			°F	Thermometer
pH			pH Units	Test strip/Probe
Ammonia			mg/L	Test strip

Outfall Reconnaissance Inventory Field Sheet

Section 4: Physical Indicators for Flowing Outfalls Only

Are Any Physical Indicators Present in the flow? ☐ Yes ☒ No *(If No, Skip to Section 5)*

INDICATOR	CHECK if Present	DESCRIPTION	RELATIVE SEVERITY INDEX (1-3)		
Odor	☐	☐ Sewage ☐ Rancid/sour ☐ Petroleum/gas ☐ Sulfide ☐ Other:	☐ 1 – Faint	☐ 2 – Easily detected	☐ 3 – Noticeable from a distance
Color	☐	☒ Clear ☐ Brown ☐ Gray ☐ Yellow ☐ Green ☐ Orange ☐ Red ☐ Other:	☐ 1 – Faint colors in sample bottle	☐ 2 – Clearly visible in sample bottle	☐ 3 – Clearly visible in outfall flow
Turbidity	☐	See severity	☐ 1 – Slight cloudiness	☐ 2 – Cloudy	☐ 3 – Opaque
Floatables -Does Not Include Trash!!	☐	☐ Sewage (Toilet Paper, etc.) ☐ Suds ☐ Petroleum (oil sheen) ☐ Other:	☐ 1 – Few/slight; origin not obvious	☐ 2 – Some; indications of origin (e.g., possible suds or oil sheen)	☐ 3 - Some; origin clear (e.g., obvious oil sheen, suds, or floating sanitary materials)

Section 5: Physical Indicators for Both Flowing and Non-Flowing Outfalls

Are physical indicators that are not related to flow present? ☒ Yes ☐ No *(If No, Skip to Section 6)*

INDICATOR	CHECK if Present	DESCRIPTION	COMMENTS
Outfall Damage	☐	☐ Spalling, Cracking or Chipping ☐ Peeling Paint ☐ Corrosion	
Deposits/Stains	☐	☐ Oily ☐ Flow Line ☐ Paint ☐ Other:	
Abnormal Vegetation	☐	☐ Excessive ☐ Inhibited	
Poor pool quality	☒	☐ Odors ☐ Colors ☐ Floatables ☐ Oil Sheen ☒ Suds ☐ Excessive Algae ☐ Other:	
Pipe benthic growth	☐	☐ Brown ☐ Orange ☐ Green ☐ Other:	

Section 6: Overall Outfall Characterization

☒ Unlikely ☐ Potential (presence of two or more indicators) ☐ Suspect (one or more indicators with a severity of 3) ☐ Obvious

Section 7: Data Collection

1. Sample for the lab?	☐ Yes	☐ No	
2. If yes, collected from:	☐ Flow	☐ Pool	
3. Intermittent flow trap set?	☐ Yes	☐ No	If Yes, type: ☐ OBM ☐ Caulk dam

Section 8: Any Non-Illicit Discharge Concerns (e.g., trash or needed infrastructure repairs)?

Outfall Reconnaissance Inventory/ Sample Collection Field Sheet

Section 1: Background Data

Subwatershed: Vasa		Outfall ID: OF-07	
Today's date: 5/7/14		Time (Military): 0946	
Investigators: JP JP		Form completed by: JP	
Temperature (°F):	Rainfall (in.): Last 24 hours:	Last 48 hours: ?	
Latitude:	Longitude:	GPS Unit: Colville	GPS LMK #:
Camera: Colville		Photo #s: 000 55	

Land Use in Drainage Area (Check all that apply):

- ☐ Industrial
- ☐ Ultra-Urban Residential
- ☒ Suburban Residential
- ☐ Commercial
- ☐ Open Space
- ☐ Institutional
- Other: _____
- Known Industries: _____

Notes (e.g., origin of outfall, if known):
LB discharge, perched above bankfull, small pool present

Section 2: Outfall Description

LOCATION	MATERIAL	SHAPE		DIMENSIONS (IN.)	SUBMERGED
☒ Closed Pipe	☐ RCP ☐ CMP ☒ PVC ☐ HDPE ☐ Steel ☐ Other: _____	☒ Circular ☐ Eliptical ☐ Box ☐ Other: _____ white smooth	☒ Single ☐ Double ☐ Triple ☐ Other: _____	Diameter/Dimensions: 12 in	In Water: ☐ No ☒ Partially ☐ Fully With Sediment: ☒ No ☐ Partially ☐ Fully
☐ Open drainage	☐ Concrete ☐ Barthen ☐ rip-rap ☐ Other: _____	☐ Trapezoid ☐ Parabolic ☐ Other: _____		Depth: _____ Top Width: _____ Bottom Width: _____	
☐ In-Stream	(applicable when collecting samples)				
Flow Present?	☒ Yes ☐ No *If No, Skip to Section 5*				
Flow Description (If present)	☐ Trickle ☒ Moderate ☐ Substantial				

Section 3: Quantitative Characterization

FIELD DATA FOR FLOWING OUTFALLS				
PARAMETER		RESULT	UNIT	EQUIPMENT
☐ Flow #1	Volume		Liter	Bottle
	Time to fill		Sec	
☐ Flow #2	Flow depth		In	Tape measure
	Flow width	____' ____"	Ft, In	Tape measure
	Measured length	____' ____"	Ft, In	Tape measure
	Time of travel		S	Stop watch
Temperature			°F	Thermometer
pH			pH Units	Test strip/Probe
Ammonia			mg/L	Test strip

Outfall Reconnaissance Inventory Field Sheet

Section 4: Physical Indicators for Flowing Outfalls Only

Are Any Physical Indicators Present in the flow? ☐ Yes ☒ No *(If No, Skip to Section 5)*

INDICATOR	CHECK if Present	DESCRIPTION	RELATIVE SEVERITY INDEX (1-3)		
Odor	☐	☐ Sewage ☐ Rancid/sour ☐ Petroleum/gas ☐ Sulfide ☐ Other:	☐ 1 – Faint	☐ 2 – Easily detected	☐ 3 – Noticeable from a distance
Color	☐	☒ Clear ☐ Brown ☐ Gray ☐ Yellow ☐ Green ☐ Orange ☐ Red ☐ Other:	☐ 1 – Faint colors in sample bottle	☐ 2 – Clearly visible in sample bottle	☐ 3 – Clearly visible in outfall flow
Turbidity	☐	See severity	☐ 1 – Slight cloudiness	☐ 2 – Cloudy	☐ 3 – Opaque
Floatables -Does Not Include Trash!!	☐	☐ Sewage (Toilet Paper, etc.) ☐ Suds ☐ Petroleum (oil sheen) ☐ Other:	☐ 1 – Few/slight; origin not obvious	☐ 2 – Some; indications of origin (e.g., possible suds or oil sheen)	☐ 3 - Some; origin clear (e.g., obvious oil sheen, suds, or floating sanitary materials)

Section 5: Physical Indicators for Both Flowing and Non-Flowing Outfalls

Are physical indicators that are not related to flow present? ☒ Yes ☐ No *(If No, Skip to Section 6)*

INDICATOR	CHECK if Present	DESCRIPTION	COMMENTS
Outfall Damage	☐	☐ Spalling, Cracking or Chipping ☐ Peeling Paint ☐ Corrosion	
Deposits/Stains	☐	☐ Oily ☐ Flow Line ☐ Paint ☐ Other:	
Abnormal Vegetation	☐	☐ Excessive ☐ Inhibited	
Poor pool quality	☒	☐ Odors ☐ Colors ☐ Floatables ☐ Oil Sheen ☒ Suds ☐ Excessive Algae ☐ Other:	minor
Pipe benthic growth	☒ minor	☐ Brown ☐ Orange ☒ Green ☐ Other:	minor

Section 6: Overall Outfall Characterization

☐ Unlikely ☒ Potential (presence of two or more indicators) ☐ Suspect (one or more indicators with a severity of 3) ☐ Obvious

Section 7: Data Collection

1. Sample for the lab?	☐ Yes	☐ No	
2. If yes, collected from:	☐ Flow	☐ Pool	
3. Intermittent flow trap set?	☐ Yes	☐ No	If Yes, type: ☐ OBM ☐ Caulk dam

Section 8: Any Non-Illicit Discharge Concerns (e.g., trash or needed infrastructure repairs)?

OUTFALL RECONNAISSANCE INVENTORY/ SAMPLE COLLECTION FIELD SHEET

Section 1: Background Data

Subwatershed: Vasa		Outfall ID: OF-08	
Today's date: 5/7/14		Time (Military): 1003	
Investigators: JP JP		Form completed by: JP	
Temperature (°F):	Rainfall (in.): Last 24 hours:	Last 48 hours: X	
Latitude:	Longitude:	GPS Unit: Colville	GPS LMK #:
Camera: Colville		Photo #s: 00059	

Land Use in Drainage Area (Check all that apply):

- ☐ Industrial
- ☐ Ultra-Urban Residential
- ☒ Suburban Residential
- ☐ Commercial
- ☐ Open Space
- ☐ Institutional
- Other: _____
- Known Industries: _____

Notes (e.g., origin of outfall, if known):

RB, Pipe on Trail, end length broken off, flowing onto Cobble & rip rap

Section 2: Outfall Description

LOCATION	MATERIAL	SHAPE		DIMENSIONS (IN.)	SUBMERGED
☒ Closed Pipe	☐ RCP ☐ CMP ☐ PVC ☐ HDPE ☒ Steel ☐ Other: _____	☒ Circular ☐ Eliptical ☐ Box ☐ Other: _____ Corrugated	☒ Single ☐ Double ☐ Triple ☐ Other: _____	Diameter/Dimensions: 12in	In Water: ☒ No ☐ Partially ☐ Fully With Sediment: ☒ No ☐ Partially ☐ Fully
☐ Open drainage	☐ Concrete ☐ Earthen ☐ rip-rap ☐ Other: _____	☐ Trapezoid ☐ Parabolic ☐ Other: _____		Depth: _____ Top Width: _____ Bottom Width: _____	
☐ In-Stream	(applicable when collecting samples)				
Flow Present?	☒ Yes ☐ No *If No, Skip to Section 5*				
Flow Description (If present)	☐ Trickle ☐ Moderate ☒ Substantial				

Section 3: Quantitative Characterization

FIELD DATA FOR FLOWING OUTFALLS				
PARAMETER		RESULT	UNIT	EQUIPMENT
☐ Flow #1	Volume		Liter	Bottle
	Time to fill		Sec	
☐ Flow #2	Flow depth		In	Tape measure
	Flow width	____' ____"	Ft, In	Tape measure
	Measured length	____' ____"	Ft, In	Tape measure
	Time of travel		S	Stop watch
Temperature			°F	Thermometer
pH			pH Units	Test strip/Probe
Ammonia			mg/L	Test strip

Outfall Reconnaissance Inventory Field Sheet

Section 4: Physical Indicators for Flowing Outfalls Only

Are Any Physical Indicators Present in the flow? ☐ Yes ☑ No *(If No, Skip to Section 5)*

INDICATOR	CHECK if Present	DESCRIPTION	RELATIVE SEVERITY INDEX (1-3)		
Odor	☐	☐ Sewage ☐ Rancid/sour ☐ Petroleum/gas ☐ Sulfide ☐ Other:	☐ 1 – Faint	☐ 2 – Easily detected	☐ 3 – Noticeable from a distance
Color	☐	☐ Clear ☐ Brown ☐ Gray ☐ Yellow ☐ Green ☐ Orange ☐ Red ☐ Other:	☐ 1 – Faint colors in sample bottle	☐ 2 – Clearly visible in sample bottle	☐ 3 – Clearly visible in outfall flow
Turbidity	☐	See severity	☐ 1 – Slight cloudiness	☐ 2 – Cloudy	☐ 3 – Opaque
Floatables -Does Not Include Trash!!	☐	☐ Sewage (Toilet Paper, etc.) ☐ Suds ☐ Petroleum (oil sheen) ☐ Other:	☐ 1 – Few/slight; origin not obvious	☐ 2 – Some; indications of origin (e.g., possible suds or oil sheen)	☐ 3 - Some; origin clear (e.g., obvious oil sheen, suds, or floating sanitary materials)

Section 5: Physical Indicators for Both Flowing and Non-Flowing Outfalls

Are physical indicators that are not related to flow present? ☑ Yes ☐ No *(If No, Skip to Section 6)*

INDICATOR	CHECK if Present	DESCRIPTION	COMMENTS
Outfall Damage	☑	☑ Spalling, Cracking or Chipping ☐ Peeling Paint ☐ Corrosion	
Deposits/Stains	☐	☐ Oily ☐ Flow Line ☐ Paint ☐ Other:	
Abnormal Vegetation	☐	☐ Excessive ☐ Inhibited Moss	
Poor pool quality	☑	☐ Odors ☐ Colors ☐ Floatables ☐ Oil Sheen ☑ Suds ☐ Excessive Algae ☐ Other:	minor
Pipe benthic growth	☑	☐ Brown ☐ Orange ☑ Green ☐ Other:	

Section 6: Overall Outfall Characterization

☐ Unlikely ☑ Potential (presence of two or more indicators) ☐ Suspect (one or more indicators with a severity of 3) ☐ Obvious

Section 7: Data Collection

1. Sample for the lab?	☐ Yes	☐ No	
2. If yes, collected from:	☐ Flow	☐ Pool	
3. Intermittent flow trap set?	☐ Yes	☐ No	If Yes, type: ☐ OBM ☐ Caulk dam

Section 8: Any Non-Illicit Discharge Concerns (e.g., trash or needed infrastructure repairs)?

OUTFALL RECONNAISSANCE INVENTORY/ SAMPLE COLLECTION FIELD SHEET

Section 1: Background Data

Subwatershed: Vasa		Outfall ID: OF-09	
Today's date: 5/7/14		Time (Military): 1018	
Investigators: JP JP		Form completed by: JP	
Temperature (°F):	Rainfall (in.): Last 24 hours:	Last 48 hours: X	
Latitude:	Longitude:	GPS Unit: Colville	GPS LMK #:
Camera: Colville		Photo #s: 0062 / 0063 source of pipe	

Land Use in Drainage Area (Check all that apply):

- ☐ Industrial
- ☐ Ultra-Urban Residential
- ☒ Suburban Residential
- ☐ Commercial
- ☐ Open Space
- ☐ Institutional
- Other: _____
- Known Industries: _____

Notes (e.g., origin of outfall, if known):

Section 2: Outfall Description

LOCATION	MATERIAL	SHAPE		DIMENSIONS (IN.)	SUBMERGED
☐ Closed Pipe	☐ RCP ☐ CMP ☒ PVC ☐ HDPE ☐ Steel ☐ Other: _____	☒ Circular ☐ Eliptical ☐ Box ☐ Other: _____ (Black corrugated)	☑ Single ☐ Double ☐ Triple ☐ Other: _____	Diameter/Dimensions: [redacted] n [redacted] 0.3 ft 4 in	In Water: ☐ No ☒ Partially ☐ Fully With Sediment: ☒ No ☐ Partially ☐ Fully
☐ Open drainage	☐ Concrete ☐ Earthen ☐ rip-rap ☐ Other: _____	☐ Trapezoid ☐ Parabolic ☐ Other: _____		Depth: _____ Top Width: _____ Bottom Width: _____	
☐ In-Stream	(applicable when collecting samples)				
Flow Present?	☐ Yes ☒ No *If No, Skip to Section 5*				
Flow Description (If present)	☐ Trickle ☐ Moderate ☐ Substantial				

Section 3: Quantitative Characterization

FIELD DATA FOR FLOWING OUTFALLS				
PARAMETER		RESULT	UNIT	EQUIPMENT
☐ Flow #1	Volume		Liter	Bottle
	Time to fill		Sec	
☐ Flow #2	Flow depth		In	Tape measure
	Flow width	____' ____"	Ft, In	Tape measure
	Measured length	____' ____"	Ft, In	Tape measure
	Time of travel		S	Stop watch
Temperature			°F	Thermometer
pH			pH Units	Test strip/Probe
Ammonia			mg/L	Test strip

Outfall Reconnaissance Inventory Field Sheet

Section 4: Physical Indicators for Flowing Outfalls Only

Are Any Physical Indicators Present in the flow? ☐ Yes ☒ No *(If No, Skip to Section 5)*

INDICATOR	CHECK if Present	DESCRIPTION	RELATIVE SEVERITY INDEX (1-3)		
Odor	☐	☐ Sewage ☐ Rancid/sour ☐ Petroleum/gas ☐ Sulfide ☐ Other:	☐ 1 – Faint	☐ 2 – Easily detected	☐ 3 – Noticeable from a distance
Color	☐	☐ Clear ☐ Brown ☐ Gray ☐ Yellow ☐ Green ☐ Orange ☐ Red ☐ Other:	☐ 1 – Faint colors in sample bottle	☐ 2 – Clearly visible in sample bottle	☐ 3 – Clearly visible in outfall flow
Turbidity	☐	See severity	☐ 1 – Slight cloudiness	☐ 2 – Cloudy	☐ 3 – Opaque
Floatables -Does Not Include Trash!!	☐	☐ Sewage (Toilet Paper, etc.) ☐ Suds ☐ Petroleum (oil sheen) ☐ Other:	☐ 1 – Few/slight; origin not obvious	☐ 2 – Some; indications of origin (e.g., possible suds or oil sheen)	☐ 3 - Some; origin clear (e.g., obvious oil sheen, suds, or floating sanitary materials)

Section 5: Physical Indicators for Both Flowing and Non-Flowing Outfalls

Are physical indicators that are not related to flow present? ☐ Yes ☒ No *(If No, Skip to Section 6)*

INDICATOR	CHECK if Present	DESCRIPTION	COMMENTS
Outfall Damage	☐	☐ Spalling, Cracking or Chipping ☐ Peeling Paint ☐ Corrosion	
Deposits/Stains	☐	☐ Oily ☐ Flow Line ☐ Paint ☐ Other:	
Abnormal Vegetation	☐	☐ Excessive ☐ Inhibited	
Poor pool quality	☐	☐ Odors ☐ Colors ☐ Floatables ☐ Oil Sheen ☐ Suds ☐ Excessive Algae ☐ Other:	
Pipe benthic growth	☐	☐ Brown ☐ Orange ☐ Green ☐ Other:	

Section 6: Overall Outfall Characterization

☒ Unlikely ☐ Potential (presence of two or more indicators) ☐ Suspect (one or more indicators with a severity of 3) ☐ Obvious

Section 7: Data Collection

1. Sample for the lab?	☐ Yes	☐ No	
2. If yes, collected from:	☐ Flow	☐ Pool	
3. Intermittent flow trap set?	☐ Yes	☐ No	If Yes, type: ☐ OBM ☐ Caulk dam

Section 8: Any Non-Illicit Discharge Concerns (e.g., trash or needed infrastructure repairs)?

OUTFALL RECONNAISSANCE INVENTORY/ SAMPLE COLLECTION FIELD SHEET

Section 1: Background Data

Subwatershed: Vasa Crk		Outfall ID: OF-10	
Today's date: 5/7/14		Time (Military): 1042	
Investigators: JP JP		Form completed by: JP	
Temperature (°F):	Rainfall (in.): Last 24 hours:	Last 48 hours: X	
Latitude:	Longitude:	GPS Unit: Colville	GPS LMK #:
Camera: Colville		Photo #s: 00069	

Land Use in Drainage Area (Check all that apply):

- ☐ Industrial
- ☐ Ultra-Urban Residential
- ☑ Suburban Residential
- ☐ Commercial
- ☐ Open Space
- ☐ Institutional
- Other: _____
- Known Industries: _____

Notes (e.g., origin of outfall, if known):

LB, small Plastic, output on trail. Disconected midway up slope

Section 2: Outfall Description

LOCATION	MATERIAL	SHAPE		DIMENSIONS (IN.)	SUBMERGED
☑ Closed Pipe	☐ RCP ☐ CMP ☑ PVC ☐ HDPE ☐ Steel ☐ Other: _____	☑ Circular ☐ Eliptical ☐ Box ☐ Other: _____ Corrugated	☐ Single ☐ Double ☐ Triple ☐ Other: _____	Diameter/Dimensions: .3 ft 4 in	In Water: ☑ No ☐ Partially ☐ Fully With Sediment: ☑ No ☐ Partially ☐ Fully
☐ Open drainage	☐ Concrete ☐ Earthen ☐ rip-rap ☐ Other: _____	☐ Trapezoid ☐ Parabolic ☐ Other: _____		Depth: _____ Top Width: _____ Bottom Width: _____	
☐ In-Stream	(applicable when collecting samples)				
Flow Present?	☐ Yes ☒ No	*If No, Skip to Section 5*			
Flow Description (If present)	☐ Trickle ☐ Moderate ☐ Substantial				

Section 3: Quantitative Characterization

FIELD DATA FOR FLOWING OUTFALLS				
PARAMETER		RESULT	UNIT	EQUIPMENT
☐ Flow #1	Volume		Liter	Bottle
	Time to fill		Sec	
☐ Flow #2	Flow depth		In	Tape measure
	Flow width	____' ____"	Ft, In	Tape measure
	Measured length	____' ____"	Ft, In	Tape measure
	Time of travel		S	Stop watch
Temperature			°F	Thermometer
pH			pH Units	Test strip/Probe
Ammonia			mg/L	Test strip

Outfall Reconnaissance Inventory Field Sheet

Section 4: Physical Indicators for Flowing Outfalls Only

Are Any Physical Indicators Present in the flow? ☐ Yes ☒ No *(If No, Skip to Section 5)*

INDICATOR	CHECK if Present	DESCRIPTION	RELATIVE SEVERITY INDEX (1-3)		
Odor	☐	☐ Sewage ☐ Rancid/sour ☐ Petroleum/gas ☐ Sulfide ☐ Other:	☐ 1 – Faint	☐ 2 – Easily detected	☐ 3 – Noticeable from a distance
Color	☐	☐ Clear ☐ Brown ☐ Gray ☐ Yellow ☐ Green ☐ Orange ☐ Red ☐ Other:	☐ 1 – Faint colors in sample bottle	☐ 2 – Clearly visible in sample bottle	☐ 3 – Clearly visible in outfall flow
Turbidity	☐	See severity	☐ 1 – Slight cloudiness	☐ 2 – Cloudy	☐ 3 – Opaque
Floatables -Does Not Include Trash!!	☐	☐ Sewage (Toilet Paper, etc.) ☐ Suds ☐ Petroleum (oil sheen) ☐ Other:	☐ 1 – Few/slight; origin not obvious	☐ 2 – Some; indications of origin (e.g., possible suds or oil sheen)	☐ 3 - Some; origin clear (e.g., obvious oil sheen, suds, or floating sanitary materials)

Section 5: Physical Indicators for Both Flowing and Non-Flowing Outfalls

Are physical indicators that are not related to flow present? ☐ Yes ☒ No *(If No, Skip to Section 6)*

INDICATOR	CHECK if Present	DESCRIPTION	COMMENTS
Outfall Damage	☐	☐ Spalling, Cracking or Chipping ☐ Peeling Paint ☐ Corrosion	
Deposits/Stains	☐	☐ Oily ☐ Flow Line ☐ Paint ☐ Other:	
Abnormal Vegetation	☐	☐ Excessive ☐ Inhibited	
Poor pool quality	☐	☐ Odors ☐ Colors ☐ Floatables ☐ Oil Sheen ☐ Suds ☐ Excessive Algae ☐ Other:	
Pipe benthic growth	☐	☐ Brown ☐ Orange ☐ Green ☐ Other:	

Section 6: Overall Outfall Characterization

☒ Unlikely ☐ Potential (presence of two or more indicators) ☐ Suspect (one or more indicators with a severity of 3) ☐ Obvious

Section 7: Data Collection

1. Sample for the lab?	☐ Yes	☐ No	
2. If yes, collected from:	☐ Flow	☐ Pool	
3. Intermittent flow trap set?	☐ Yes	☐ No	If Yes, type: ☐ OBM ☐ Caulk dam

Section 8: Any Non-Illicit Discharge Concerns (e.g., trash or needed infrastructure repairs)?

OUTFALL RECONNAISSANCE INVENTORY/ SAMPLE COLLECTION FIELD SHEET

Section 1: Background Data

Subwatershed: Vasq		Outfall ID: OF11	
Today's date: 5/7/14		Time (Military): 1101	
Investigators: JP JP		Form completed by: JP	
Temperature (°F):	Rainfall (in.): Last 24 hours:	Last 48 hours: X	
Latitude:	Longitude:	GPS Unit: Col	GPS LMK #:
Camera: Colville		Photo #s: 0075	

Land Use in Drainage Area (Check all that apply):

- ☒ Industrial
- ☐ Ultra-Urban Residential
- ☐ Suburban Residential
- ☐ Commercial
- ☐ Open Space
- ☐ Institutional
- Other: _____
- Known Industries: _____

Notes (e.g., origin of outfall, if known):
RB. 2 pipes

Section 2: Outfall Description

LOCATION	MATERIAL	SHAPE		DIMENSIONS (IN.)	SUBMERGED
☒ Closed Pipe	☐ RCP ☐ CMP ☒ PVC ☐ HDPE ☐ Steel ☐ Other: _____	☒ Circular ☐ Eliptical ☐ Box ☐ Other: _____ (corrugated)	☐ Single ☐ Double ☒ Triple ☐ Other: _____	Diameter/Dimensions: .3ft -3ft 4in	In Water: ☒ No ☐ Partially ☐ Fully With Sediment: ☒ No ☐ Partially ☐ Fully
☐ Open drainage	☐ Concrete ☐ Earthen ☐ rip-rap ☐ Other: _____	☐ Trapezoid ☐ Parabolic ☐ Other: _____		Depth: _____ Top Width: _____ Bottom Width: _____	
☐ In-Stream	(applicable when collecting samples)				
Flow Present?	☐ Yes ☒ No *If No, Skip to Section 5*				
Flow Description (If present)	☐ Trickle ☐ Moderate ☐ Substantial				

Section 3: Quantitative Characterization

FIELD DATA FOR FLOWING OUTFALLS				
PARAMETER		RESULT	UNIT	EQUIPMENT
☐ Flow #1	Volume		Liter	Bottle
	Time to fill		Sec	
☐ Flow #2	Flow depth		In	Tape measure
	Flow width	____' ____"	Ft, In	Tape measure
	Measured length	____' ____"	Ft, In	Tape measure
	Time of travel		S	Stop watch
Temperature			°F	Thermometer
pH			pH Units	Test strip/Probe
Ammonia			mg/L	Test strip

Outfall Reconnaissance Inventory Field Sheet

Section 4: Physical Indicators for Flowing Outfalls Only

Are Any Physical Indicators Present in the flow? ☐ Yes ☒ No *(If No, Skip to Section 5)*

INDICATOR	CHECK if Present	DESCRIPTION	RELATIVE SEVERITY INDEX (1-3)		
Odor	☐	☐ Sewage ☐ Rancid/sour ☐ Petroleum/gas ☐ Sulfide ☐ Other:	☐ 1 – Faint	☐ 2 – Basily detected	☐ 3 – Noticeable from a distance
Color	☐	☐ Clear ☐ Brown ☐ Gray ☐ Yellow ☐ Green ☐ Orange ☐ Red ☐ Other:	☐ 1 – Faint colors in sample bottle	☐ 2 – Clearly visible in sample bottle	☐ 3 – Clearly visible in outfall flow
Turbidity	☐	See severity	☐ 1 – Slight cloudiness	☐ 2 – Cloudy	☐ 3 – Opaque
Floatables -Does Not Include Trash!!	☐	☐ Sewage (Toilet Paper, etc.) ☐ Suds ☐ Petroleum (oil sheen) ☐ Other:	☐ 1 – Few/slight; origin not obvious	☐ 2 – Some; indications of origin (e.g., possible suds or oil sheen)	☐ 3 - Some; origin clear (e.g., obvious oil sheen, suds, or floating sanitary materials)

Section 5: Physical Indicators for Both Flowing and Non-Flowing Outfalls

Are physical indicators that are not related to flow present? ☐ Yes ☒ No *(If No, Skip to Section 6)*

INDICATOR	CHECK if Present	DESCRIPTION	COMMENTS
Outfall Damage	☐	☐ Spalling, Cracking or Chipping ☐ Peeling Paint ☐ Corrosion	
Deposits/Stains	☐	☐ Oily ☐ Flow Line ☐ Paint ☐ Other:	
Abnormal Vegetation	☐	☐ Excessive ☐ Inhibited	
Poor pool quality	☐	☐ Odors ☐ Colors ☐ Floatables ☐ Oil Sheen ☐ Suds ☐ Excessive Algae ☐ Other:	
Pipe benthic growth	☐	☐ Brown ☐ Orange ☐ Green ☐ Other:	

Section 6: Overall Outfall Characterization

☒ Unlikely ☐ Potential (presence of two or more indicators) ☐ Suspect (one or more indicators with a severity of 3) ☐ Obvious

Section 7: Data Collection

1. Sample for the lab?	☐ Yes	☐ No	
2. If yes, collected from:	☐ Flow	☐ Pool	
3. Intermittent flow trap set?	☐ Yes	☐ No	If Yes, type: ☐ OBM ☐ Caulk dam

Section 8: Any Non-Illicit Discharge Concerns (e.g., trash or needed infrastructure repairs)?

OUTFALL RECONNAISSANCE INVENTORY/ SAMPLE COLLECTION FIELD SHEET

Section 1: Background Data

Subwatershed:		Outfall ID: OF-12	
Today's date: 5/7/14		Time (Military): 1110	
Investigators: JP JP		Form completed by: JP	
Temperature (°F):	Rainfall (in.): Last 24 hours:	Last 48 hours: X	
Latitude:	Longitude:	GPS Unit: Col	GPS LMK #:
Camera: Col		Photo #s: 0078	

Land Use in Drainage Area (Check all that apply):

- ☐ Industrial
- ☐ Ultra-Urban Residential
- ☒ Suburban Residential
- ☐ Commercial
- ☐ Open Space
- ☐ Institutional
- Other: _____
- Known Industries: _____

Notes (e.g., origin of outfall, if known):
RB . Single Pipe M steep slope, NEXT TO in stream erosion

Section 2: Outfall Description

LOCATION	MATERIAL	SHAPE		DIMENSIONS (IN.)	SUBMERGED
☒ Closed Pipe	☐ RCP ☐ CMP ☒ PVC ☐ HDPE ☐ Steel ☐ Other: _____	☒ Circular ☐ Eliptical ☐ Box ☐ Other: _____	☒ Single ☐ Double ☐ Triple ☐ Other: _____	Diameter/Dimensions: .3 ft 4 in	In Water: ☒ No ☐ Partially ☐ Fully With Sediment: ☒ No ☐ Partially ☐ Fully
☐ Open drainage	☐ Concrete ☐ Earthen ☐ rip-rap ☐ Other: _____	☐ Trapezoid ☐ Parabolic ☐ Other: _____		Depth: _____ Top Width: _____ Bottom Width: _____	
☐ In-Stream	(applicable when collecting samples)				
Flow Present?	☐ Yes ☒ No *If No, Skip to Section 5*				
Flow Description (If present)	☐ Trickle ☐ Moderate ☐ Substantial				

Section 3: Quantitative Characterization

FIELD DATA FOR FLOWING OUTFALLS				
PARAMETER		RESULT	UNIT	EQUIPMENT
☐ Flow #1	Volume		Liter	Bottle
	Time to fill		Sec	
☐ Flow #2	Flow depth		In	Tape measure
	Flow width	____' ____"	Ft, In	Tape measure
	Measured length	____' ____"	Ft, In	Tape measure
	Time of travel		S	Stop watch
Temperature			°F	Thermometer
pH			pH Units	Test strip/Probe
Ammonia			mg/L	Test strip

Outfall Reconnaissance Inventory Field Sheet

Section 4: Physical Indicators for Flowing Outfalls Only

Are Any Physical Indicators Present in the flow? ☐ Yes ☒ No *(If No, Skip to Section 5)*

INDICATOR	CHECK if Present	DESCRIPTION	RELATIVE SEVERITY INDEX (1-3)		
Odor	☐	☐ Sewage ☐ Rancid/sour ☐ Petroleum/gas ☐ Sulfide ☐ Other:	☐ 1 – Faint	☐ 2 – Easily detected	☐ 3 – Noticeable from a distance
Color	☐	☐ Clear ☐ Brown ☐ Gray ☐ Yellow ☐ Green ☐ Orange ☐ Red ☐ Other:	☐ 1 – Faint colors in sample bottle	☐ 2 – Clearly visible in sample bottle	☐ 3 – Clearly visible in outfall flow
Turbidity	☐	See severity	☐ 1 – Slight cloudiness	☐ 2 – Cloudy	☐ 3 – Opaque
Floatables -Does Not Include Trash!!	☐	☐ Sewage (Toilet Paper, etc.) ☐ Suds ☐ Petroleum (oil sheen) ☐ Other:	☐ 1 – Few/slight; origin not obvious	☐ 2 – Some; indications of origin (e.g., possible suds or oil sheen)	☐ 3 - Some; origin clear (e.g., obvious oil sheen, suds, or floating sanitary materials)

Section 5: Physical Indicators for Both Flowing and Non-Flowing Outfalls

Are physical indicators that are not related to flow present? ☐ Yes ☒ No *(If No, Skip to Section 6)*

INDICATOR	CHECK if Present	DESCRIPTION	COMMENTS
Outfall Damage	☐	☐ Spalling, Cracking or Chipping ☐ Peeling Paint ☐ Corrosion	
Deposits/Stains	☐	☐ Oily ☐ Flow Line ☐ Paint ☐ Other:	
Abnormal Vegetation	☐	☐ Excessive ☐ Inhibited	
Poor pool quality	☐	☐ Odors ☐ Colors ☐ Floatables ☐ Oil Sheen ☐ Suds ☐ Excessive Algae ☐ Other:	
Pipe benthic growth	☐	☐ Brown ☐ Orange ☐ Green ☐ Other:	

Section 6: Overall Outfall Characterization

☒ Unlikely ☐ Potential (presence of two or more indicators) ☐ Suspect (one or more indicators with a severity of 3) ☐ Obvious

Section 7: Data Collection

1. Sample for the lab?	☐ Yes	☐ No	
2. If yes, collected from:	☐ Flow	☐ Pool	
3. Intermittent flow trap set?	☐ Yes	☐ No	If Yes, type: ☐ OBM ☐ Caulk dam

Section 8: Any Non-Illicit Discharge Concerns (e.g., trash or needed infrastructure repairs)?

OUTFALL RECONNAISSANCE INVENTORY/ SAMPLE COLLECTION FIELD SHEET

Section 1: Background Data

Subwatershed: Vasa		Outfall ID: OF-13	
Today's date: 5/7/14		Time (Military): 1117	
Investigators: SP SP		Form completed by:	
Temperature (°F):	Rainfall (in.): Last 24 hours:	Last 48 hours: 8	
Latitude:	Longitude:	GPS Unit: Colville	GPS LMK #:
Camera: Colville		Photo #s: 0082	

Land Use in Drainage Area (Check all that apply):

- ☐ Industrial
- ☐ Ultra-Urban Residential
- ☑ Suburban Residential
- ☐ Commercial
- ☐ Open Space
- ☐ Institutional
- Other: _____
- Known Industries: _____

Notes (e.g., origin of outfall, if known):

LB.

Section 2: Outfall Description

LOCATION	MATERIAL	SHAPE		DIMENSIONS (IN.)	SUBMERGED
☑ Closed Pipe	☐ RCP ☐ CMP ☐ PVC ☐ HDPE ☑ Steel ☐ Other: _____	☑ Circular ☐ Eliptical ☐ Box ☐ Other: ____ Corrugated	☑ Single ☐ Double ☐ Triple ☐ Other: ____	Diameter/Dimensions: 12 in	In Water: ☑ No ☐ Partially ☐ Fully With Sediment: ☑ No ☐ Partially ☐ Fully
☐ Open drainage	☐ Concrete ☐ Earthen ☐ rip-rap ☐ Other: ____	☐ Trapezoid ☐ Parabolic ☐ Other: ____		Depth: ____ Top Width: ____ Bottom Width: ____	
☐ In-Stream	(applicable when collecting samples)				
Flow Present?	☑ Yes ☐ No *If No, Skip to Section 5*				
Flow Description (If present)	☐ Trickle ☑ Moderate ☐ Substantial				

Section 3: Quantitative Characterization

FIELD DATA FOR FLOWING OUTFALLS				
PARAMETER		RESULT	UNIT	EQUIPMENT
☐ Flow #1	Volume		Liter	Bottle
	Time to fill		Sec	
☐ Flow #2	Flow depth		In	Tape measure
	Flow width	____' ____"	Ft, In	Tape measure
	Measured length	____' ____"	Ft, In	Tape measure
	Time of travel		S	Stop watch
Temperature			°F	Thermometer
pH			pH Units	Test strip/Probe
Ammonia			mg/L	Test strip

Outfall Reconnaissance Inventory Field Sheet

Section 4: Physical Indicators for Flowing Outfalls Only

Are Any Physical Indicators Present in the flow? ☐ Yes ☑ No *(If No, Skip to Section 5)*

INDICATOR	CHECK if Present	DESCRIPTION	RELATIVE SEVERITY INDEX (1-3)		
Odor	☐	☐ Sewage ☐ Rancid/sour ☐ Petroleum/gas ☐ Sulfide ☐ Other:	☐ 1 – Faint	☐ 2 – Easily detected	☐ 3 – Noticeable from a distance
Color	☐	☑ Clear ☐ Brown ☐ Gray ☐ Yellow ☐ Green ☐ Orange ☐ Red ☐ Other:	☐ 1 – Faint colors in sample bottle	☐ 2 – Clearly visible in sample bottle	☐ 3 – Clearly visible in outfall flow
Turbidity	☐	See severity	☐ 1 – Slight cloudiness	☐ 2 – Cloudy	☐ 3 – Opaque
Floatables -Does Not Include Trash!!	☐	☐ Sewage (Toilet Paper, etc.) ☐ Suds ☐ Petroleum (oil sheen) ☐ Other:	☐ 1 – Few/slight; origin not obvious	☐ 2 – Some; indications of origin (e.g., possible suds or oil sheen)	☐ 3 - Some; origin clear (e.g., obvious oil sheen, suds, or floating sanitary materials)

Section 5: Physical Indicators for Both Flowing and Non-Flowing Outfalls

Are physical indicators that are not related to flow present? ☑ Yes ☐ No *(If No, Skip to Section 6)*

INDICATOR	CHECK if Present	DESCRIPTION	COMMENTS
Outfall Damage	☐	☐ Spalling, Cracking or Chipping ☐ Peeling Paint ☐ Corrosion	
Deposits/Stains	☐	☐ Oily ☐ Flow Line ☐ Paint ☐ Other:	
Abnormal Vegetation	☐	☐ Excessive ☐ Inhibited	
Poor pool quality	☐	☐ Odors ☐ Colors ☐ Floatables ☐ Oil Sheen ☐ Suds ☐ Excessive Algae ☐ Other:	
Pipe benthic growth	☑	☐ Brown ☐ Orange ☑ Green ☐ Other:	

Section 6: Overall Outfall Characterization

☑ Unlikely ☐ Potential (presence of two or more indicators) ☐ Suspect (one or more indicators with a severity of 3) ☐ Obvious

Section 7: Data Collection

1. Sample for the lab?	☐ Yes	☐ No	
2. If yes, collected from:	☐ Flow	☐ Pool	
3. Intermittent flow trap set?	☐ Yes	☐ No	If Yes, type: ☐ OBM ☐ Caulk dam

Section 8: Any Non-Illicit Discharge Concerns (e.g., trash or needed infrastructure repairs)?

OUTFALL RECONNAISSANCE INVENTORY/ SAMPLE COLLECTION FIELD SHEET

Section 1: Background Data

Subwatershed:		Outfall ID: OF-14	
Today's date: 5/7/14		Time (Military): 1132	
Investigators: JP JP		Form completed by: JP	
Temperature (°F):	Rainfall (in.): Last 24 hours:	Last 48 hours: X	
Latitude:	Longitude:	GPS Unit: Col	GPS LMK #:
Camera: Col		Photo #s: 0095	

Land Use in Drainage Area (Check all that apply):

- ☐ Industrial
- ☐ Ultra-Urban Residential
- ☒ Suburban Residential
- ☐ Commercial
- ☐ Open Space
- ☐ Institutional
- Other: _____
- Known Industries: _____

Notes (e.g., origin of outfall, if known):
RB side of Main Culvert ( ) of Vasq under the road

Section 2: Outfall Description

LOCATION	MATERIAL	SHAPE		DIMENSIONS (IN.)	SUBMERGED
☐ Closed Pipe	☐ RCP ☐ CMP ☐ PVC ☐ HDPE ☒ Steel ☐ Other: _____	☒ Circular ☐ Eliptical ☐ Box ☐ Other: ____	☐ Single ☐ Double ☐ Triple ☐ Other: ____	Diameter/Dimensions: 24" (2ft)	In Water: ☒ No ☐ Partially ☐ Fully With Sediment: ☒ No ☐ Partially ☐ Fully
☐ Open drainage	☐ Concrete ☐ Earthen ☐ rip-rap ☐ Other: ____	☐ Trapezoid ☐ Parabolic ☐ Other: ____		Depth: ____ Top Width: ____ Bottom Width: ____	
☐ In-Stream	(applicable when collecting samples)				
Flow Present?	☒ Yes ☐ No *If No, Skip to Section 5*				
Flow Description (If present)	☐ Trickle ☐ Moderate ☒ Substantial				

Section 3: Quantitative Characterization

FIELD DATA FOR FLOWING OUTFALLS				
PARAMETER		RESULT	UNIT	EQUIPMENT
☐ Flow #1	Volume		Liter	Bottle
	Time to fill		Sec	
☐ Flow #2	Flow depth		In	Tape measure
	Flow width	____' ____"	Ft, In	Tape measure
	Measured length	____' ____"	Ft, In	Tape measure
	Time of travel		S	Stop watch
Temperature			°F	Thermometer
pH			pH Units	Test strip/Probe
Ammonia			mg/L	Test strip

Outfall Reconnaissance Inventory Field Sheet

Section 4: Physical Indicators for Flowing Outfalls Only

Are Any Physical Indicators Present in the flow? ☐ Yes ☒ No *(If No, Skip to Section 5)*

INDICATOR	CHECK if Present	DESCRIPTION	RELATIVE SEVERITY INDEX (1-3)		
Odor	☐	☐ Sewage ☐ Rancid/sour ☐ Petroleum/gas ☐ Sulfide ☐ Other:	☐ 1 – Faint	☐ 2 – Easily detected	☐ 3 – Noticeable from a distance
Color	☐	☒ Clear ☐ Brown ☐ Gray ☐ Yellow ☐ Green ☐ Orange ☐ Red ☐ Other:	☐ 1 – Faint colors in sample bottle	☐ 2 – Clearly visible in sample bottle	☐ 3 – Clearly visible in outfall flow
Turbidity	☐	See severity	☐ 1 – Slight cloudiness	☐ 2 – Cloudy	☐ 3 – Opaque
Floatables -Does Not Include Trash!!	☐	☐ Sewage (Toilet Paper, etc.) ☐ Suds ☐ Petroleum (oil sheen) ☐ Other:	☐ 1 – Few/slight; origin not obvious	☐ 2 – Some; indications of origin (e.g., possible suds or oil sheen)	☐ 3 - Some; origin clear (e.g., obvious oil sheen, suds, or floating sanitary materials)

Section 5: Physical Indicators for Both Flowing and Non-Flowing Outfalls

Are physical indicators that are not related to flow present? ☐ Yes ☒ No *(If No, Skip to Section 6)*

INDICATOR	CHECK if Present	DESCRIPTION	COMMENTS
Outfall Damage	☐	☐ Spalling, Cracking or Chipping ☐ Peeling Paint ☐ Corrosion	
Deposits/Stains	☐	☐ Oily ☐ Flow Line ☐ Paint ☐ Other:	
Abnormal Vegetation	☐	☐ Excessive ☐ Inhibited	
Poor pool quality	☒	☐ Odors ☐ Colors ☐ Floatables ☐ Oil Sheen ☒ Suds ☐ Excessive Algae ☐ Other: minor	
Pipe benthic growth	☒	☐ Brown ☐ Orange ☒ Green ☐ Other:	

Section 6: Overall Outfall Characterization

☒ Unlikely ☐ Potential (presence of two or more indicators) ☐ Suspect (one or more indicators with a severity of 3) ☐ Obvious

Section 7: Data Collection

1. Sample for the lab?	☐ Yes	☐ No	
2. If yes, collected from:	☐ Flow	☐ Pool	
3. Intermittent flow trap set?	☐ Yes	☐ No	If Yes, type: ☐ OBM ☐ Caulk dam

Section 8: Any Non-Illicit Discharge Concerns (e.g., trash or needed infrastructure repairs)?

OUTFALL RECONNAISSANCE INVENTORY/ SAMPLE COLLECTION FIELD SHEET

Section 1: Background Data

Subwatershed: Vasa		Outfall ID: OF-15	
Today's date: 5/7/14		Time (Military): 1155	
Investigators: JP JP		Form completed by: JP	
Temperature (°F):	Rainfall (in.): Last 24 hours:	Last 48 hours: X	
Latitude:	Longitude:	GPS Unit: Col	GPS LMK #:
Camera: Col		Photo #s: 0086	

Land Use in Drainage Area (Check all that apply):

- ☐ Industrial
- ☐ Ultra-Urban Residential
- ☑ Suburban Residential
- ☐ Commercial
- ☐ Open Space
- ☐ Institutional
- Other: _____
- Known Industries: _____

Notes (e.g., origin of outfall, if known):
RB, up by trail, partially buried

Section 2: Outfall Description

LOCATION	MATERIAL	SHAPE		DIMENSIONS (IN.)	SUBMERGED
☑ Closed Pipe	☐ RCP ☐ CMP ☐ PVC ☐ HDPE ☑ Steel ☐ Other: _____	☑ Circular ☐ Eliptical ☐ Box ☐ Other: ____	☑ Single ☐ Double ☐ Triple ☐ Other: ____	Diameter/Dimensions: 17 in	In Water: ☐ No ☑ Partially ☐ Fully With Sediment: ☐ No ☐ Partially ☑ Fully
☐ Open drainage	☐ Concrete ☐ Earthen ☐ rip-rap ☐ Other: ____	☐ Trapezoid ☐ Parabolic ☐ Other: ____		Depth: ____ Top Width: ____ Bottom Width: ____	
☐ In-Stream	(applicable when collecting samples)				
Flow Present?	☑ Yes ☐ No *If No, Skip to Section 5*				
Flow Description (If present)	☐ Trickle ☐ Moderate ☑ Substantial				

Section 3: Quantitative Characterization

FIELD DATA FOR FLOWING OUTFALLS				
PARAMETER		RESULT	UNIT	EQUIPMENT
☐ Flow #1	Volume		Liter	Bottle
	Time to fill		Sec	
☐ Flow #2	Flow depth		In	Tape measure
	Flow width	____' ____"	Ft, In	Tape measure
	Measured length	____' ____"	Ft, In	Tape measure
	Time of travel		S	Stop watch
Temperature			°F	Thermometer
pH			pH Units	Test strip/Probe
Ammonia			mg/L	Test strip

Outfall Reconnaissance Inventory Field Sheet

Section 4: Physical Indicators for Flowing Outfalls Only

Are Any Physical Indicators Present in the flow? ☐ Yes ☑ No *(If No, Skip to Section 5)*

INDICATOR	CHECK if Present	DESCRIPTION	RELATIVE SEVERITY INDEX (1-3)		
Odor	☐	☐ Sewage ☐ Rancid/sour ☐ Petroleum/gas ☐ Sulfide ☐ Other:	☐ 1 – Faint	☐ 2 – Easily detected	☐ 3 – Noticeable from a distance
Color	☐	☑ Clear ☐ Brown ☐ Gray ☐ Yellow ☐ Green ☐ Orange ☐ Red ☐ Other:	☐ 1 – Faint colors in sample bottle	☐ 2 – Clearly visible in sample bottle	☐ 3 – Clearly visible in outfall flow
Turbidity	☐	See severity	☐ 1 – Slight cloudiness	☐ 2 – Cloudy	☐ 3 – Opaque
Floatables -Does Not Include Trash!!	☐	☐ Sewage (Toilet Paper, etc.) ☐ Suds ☐ Petroleum (oil sheen) ☐ Other:	☐ 1 – Few/slight; origin not obvious	☐ 2 – Some; indications of origin (e.g., possible suds or oil sheen)	☐ 3 - Some; origin clear (e.g., obvious oil sheen, suds, or floating sanitary materials)

Section 5: Physical Indicators for Both Flowing and Non-Flowing Outfalls

Are physical indicators that are not related to flow present? ☑ Yes ☐ No *(If No, Skip to Section 6)*

INDICATOR	CHECK if Present	DESCRIPTION	COMMENTS
Outfall Damage	☐	☐ Spalling, Cracking or Chipping ☐ Peeling Paint ☐ Corrosion	
Deposits/Stains	☐	☐ Oily ☐ Flow Line ☐ Paint ☐ Other:	
Abnormal Vegetation	☐	☐ Excessive ☐ Inhibited	
Poor pool quality	☐	☐ Odors ☐ Colors ☐ Floatables ☐ Oil Sheen ☐ Suds ☐ Excessive Algae ☐ Other:	
Pipe benthic growth	☑	☑ Brown ☑ Orange ☐ Green ☐ Other:	

Section 6: Overall Outfall Characterization

☑ Unlikely ☐ Potential (presence of two or more indicators) ☐ Suspect (one or more indicators with a severity of 3) ☐ Obvious

Section 7: Data Collection

1. Sample for the lab?	☐ Yes	☐ No	
2. If yes, collected from:	☐ Flow	☐ Pool	
3. Intermittent flow trap set?	☐ Yes	☐ No	If Yes, type: ☐ OBM ☐ Caulk dam

Section 8: Any Non-Illicit Discharge Concerns (e.g., trash or needed infrastructure repairs)?

OUTFALL RECONNAISSANCE INVENTORY/ SAMPLE COLLECTION FIELD SHEET

Section 1: Background Data

Subwatershed: Jasa		Outfall ID: OF-16	
Today's date: 5/7/14		Time (Military): 1219	
Investigators: JP JP		Form completed by: JP	
Temperature (°F):	Rainfall (in.): Last 24 hours:	Last 48 hours: X	
Latitude:	Longitude:	GPS Unit:	GPS LMK #:
Camera: Col		Photo #s: 000 93	

Land Use in Drainage Area (Check all that apply):

- ☐ Industrial
- ☐ Ultra-Urban Residential
- ☒ Suburban Residential
- ☐ Commercial
- ☐ Open Space
- ☐ Institutional
- Other: _____
- Known Industries: _____

Notes (e.g., origin of outfall, if known):
RB, mid bank

Section 2: Outfall Description

LOCATION	MATERIAL	SHAPE		DIMENSIONS (IN.)	SUBMERGED
☒ Closed Pipe	☐ RCP ☐ CMP ☒ PVC ☐ HDPE ☐ Steel ☐ Other: _____	☒ Circular ☐ Eliptical ☐ Box ☐ Other: ____	☒ Single ☐ Double ☐ Triple ☐ Other: ____	Diameter/Dimensions: .3 fo 4 in	In Water: ☒ No ☐ Partially ☐ Fully With Sediment: ☒ No ☐ Partially ☐ Fully
☐ Open drainage	☐ Concrete ☐ Earthen ☐ rip-rap ☐ Other: ____	☐ Trapezoid ☐ Parabolic ☐ Other: ____		Depth: ____ Top Width: ____ Bottom Width: ____	
☐ In-Stream	(applicable when collecting samples)				
Flow Present?	☐ Yes ☒ No *If No, Skip to Section 5*				
Flow Description (If present)	☐ Trickle ☐ Moderate ☐ Substantial				

Section 3: Quantitative Characterization

FIELD DATA FOR FLOWING OUTFALLS				
PARAMETER		RESULT	UNIT	EQUIPMENT
☐ Flow #1	Volume		Liter	Bottle
	Time to fill		Sec	
☐ Flow #2	Flow depth		In	Tape measure
	Flow width	____' ____"	Ft, In	Tape measure
	Measured length	____' ____"	Ft, In	Tape measure
	Time of travel		S	Stop watch
Temperature			°F	Thermometer
pH			pH Units	Test strip/Probe
Ammonia			mg/L	Test strip

Outfall Reconnaissance Inventory Field Sheet

Section 4: Physical Indicators for Flowing Outfalls Only

Are Any Physical Indicators Present in the flow? ☐ Yes ☒ No *(If No, Skip to Section 5)*

INDICATOR	CHECK if Present	DESCRIPTION	RELATIVE SEVERITY INDEX (1-3)		
Odor	☐	☐ Sewage ☐ Rancid/sour ☐ Petroleum/gas ☐ Sulfide ☐ Other:	☐ 1 – Faint	☐ 2 – Easily detected	☐ 3 – Noticeable from a distance
Color	☐	☐ Clear ☐ Brown ☐ Gray ☐ Yellow ☐ Green ☐ Orange ☐ Red ☐ Other:	☐ 1 – Faint colors in sample bottle	☐ 2 – Clearly visible in sample bottle	☐ 3 – Clearly visible in outfall flow
Turbidity	☐	See severity	☐ 1 – Slight cloudiness	☐ 2 – Cloudy	☐ 3 – Opaque
Floatables -Does Not Include Trash!!	☐	☐ Sewage (Toilet Paper, etc.) ☐ Suds ☐ Petroleum (oil sheen) ☐ Other:	☐ 1 – Few/slight; origin not obvious	☐ 2 – Some; indications of origin (e.g., possible suds or oil sheen)	☐ 3 - Some; origin clear (e.g., obvious oil sheen, suds, or floating sanitary materials)

Section 5: Physical Indicators for Both Flowing and Non-Flowing Outfalls

Are physical indicators that are not related to flow present? ☐ Yes ☒ No *(If No, Skip to Section 6)*

INDICATOR	CHECK if Present	DESCRIPTION	COMMENTS
Outfall Damage	☐	☐ Spalling, Cracking or Chipping ☐ Peeling Paint ☐ Corrosion	
Deposits/Stains	☐	☐ Oily ☐ Flow Line ☐ Paint ☐ Other:	
Abnormal Vegetation	☐	☐ Excessive ☐ Inhibited	
Poor pool quality	☐	☐ Odors ☐ Colors ☐ Floatables ☐ Oil Sheen ☐ Suds ☐ Excessive Algae ☐ Other:	
Pipe benthic growth	☐	☐ Brown ☐ Orange ☐ Green ☐ Other:	

Section 6: Overall Outfall Characterization

☒ Unlikely ☐ Potential (presence of two or more indicators) ☐ Suspect (one or more indicators with a severity of 3) ☐ Obvious

Section 7: Data Collection

1. Sample for the lab?	☐ Yes	☐ No	
2. If yes, collected from:	☐ Flow	☐ Pool	
3. Intermittent flow trap set?	☐ Yes	☐ No	If Yes, type: ☐ OBM ☐ Caulk dam

Section 8: Any Non-Illicit Discharge Concerns (e.g., trash or needed infrastructure repairs)?

OUTFALL RECONNAISSANCE INVENTORY/ SAMPLE COLLECTION FIELD SHEET

Section 1: Background Data

Subwatershed: Vasa		Outfall ID: OF-17	
Today's date: 5/7/14		Time (Military): 1232	
Investigators: JP JP		Form completed by: JP	
Temperature (°F):	Rainfall (in.): Last 24 hours:	Last 48 hours: X	
Latitude:	Longitude:	GPS Unit: Colville	GPS LMK #:
Camera: Col		Photo #s: 00098	

Land Use in Drainage Area (Check all that apply):

- ☐ Industrial
- ☐ Ultra-Urban Residential
- ☒ Suburban Residential
- ☐ Commercial
- ☐ Open Space
- ☐ Institutional
- Other: _____
- Known Industries: _____

Notes (e.g., origin of outfall, if known):
LB ; 3 emerging from PROPERTY on TOP of slope

Section 2: Outfall Description

LOCATION	MATERIAL	SHAPE		DIMENSIONS (IN.)	SUBMERGED
☒ Closed Pipe	☐ RCP ☐ CMP ☒ PVC ☐ HDPE ☐ Steel ☐ Other: _____	☒ Circular ☐ Eliptical ☐ Box ☐ Other: ____ (corrugate)	☐ Single ☐ Double ☐ Triple ☒ Other: 4 other side of PROPERTY	Diameter/Dimensions: 0.3 ft 4 in	In Water: ☒ No ☐ Partially ☐ Fully With Sediment: ☒ No ☐ Partially ☐ Fully
☐ Open drainage	☐ Concrete ☐ Earthen ☐ rip-rap ☐ Other: ____	☐ Trapezoid ☐ Parabolic ☐ Other: ____		Depth: ____ Top Width: ____ Bottom Width: ____	
☐ In-Stream	(applicable when collecting samples)				
Flow Present?	☐ Yes ☒ No *If No, Skip to Section 5*				
Flow Description (If present)	☐ Trickle ☐ Moderate ☐ Substantial				

Section 3: Quantitative Characterization

FIELD DATA FOR FLOWING OUTFALLS				
PARAMETER		RESULT	UNIT	EQUIPMENT
☐ Flow #1	Volume		Liter	Bottle
	Time to fill		Sec	
☐ Flow #2	Flow depth		In	Tape measure
	Flow width	____' ____"	Ft, In	Tape measure
	Measured length	____' ____"	Ft, In	Tape measure
	Time of travel		S	Stop watch
Temperature			°F	Thermometer
pH			pH Units	Test strip/Probe
Ammonia			mg/L	Test strip

Outfall Reconnaissance Inventory Field Sheet

Section 4: Physical Indicators for Flowing Outfalls Only

Are Any Physical Indicators Present in the flow? ☐ Yes ☒ No *(If No, Skip to Section 5)*

INDICATOR	CHECK if Present	DESCRIPTION	RELATIVE SEVERITY INDEX (1-3)		
Odor	☐	☐ Sewage ☐ Rancid/sour ☐ Petroleum/gas ☐ Sulfide ☐ Other:	☐ 1 – Faint	☐ 2 – Easily detected	☐ 3 – Noticeable from a distance
Color	☐	☐ Clear ☐ Brown ☐ Gray ☐ Yellow ☐ Green ☐ Orange ☐ Red ☐ Other:	☐ 1 – Faint colors in sample bottle	☐ 2 – Clearly visible in sample bottle	☐ 3 – Clearly visible in outfall flow
Turbidity	☐	See severity	☐ 1 – Slight cloudiness	☐ 2 – Cloudy	☐ 3 – Opaque
Floatables -Does Not Include Trash!!	☐	☐ Sewage (Toilet Paper, etc.) ☐ Suds ☐ Petroleum (oil sheen) ☐ Other:	☐ 1 – Few/slight; origin not obvious	☐ 2 – Some; indications of origin (e.g., possible suds or oil sheen)	☐ 3 - Some; origin clear (e.g., obvious oil sheen, suds, or floating sanitary materials)

Section 5: Physical Indicators for Both Flowing and Non-Flowing Outfalls

Are physical indicators that are not related to flow present? ☐ Yes ☒ No *(If No, Skip to Section 6)*

INDICATOR	CHECK if Present	DESCRIPTION	COMMENTS
Outfall Damage	☐	☐ Spalling, Cracking or Chipping ☐ Peeling Paint ☐ Corrosion	
Deposits/Stains	☐	☐ Oily ☐ Flow Line ☐ Paint ☐ Other:	
Abnormal Vegetation	☐	☐ Excessive ☐ Inhibited	
Poor pool quality	☐	☐ Odors ☐ Colors ☐ Floatables ☐ Oil Sheen ☐ Suds ☐ Excessive Algae ☐ Other:	
Pipe benthic growth	☐	☐ Brown ☐ Orange ☐ Green ☐ Other:	

Section 6: Overall Outfall Characterization

☒ Unlikely ☐ Potential (presence of two or more indicators) ☐ Suspect (one or more indicators with a severity of 3) ☐ Obvious

Section 7: Data Collection

1. Sample for the lab?	☐ Yes	☐ No	
2. If yes, collected from:	☐ Flow	☐ Pool	
3. Intermittent flow trap set?	☐ Yes	☐ No	If Yes, type: ☐ OBM ☐ Caulk dam

Section 8: Any Non-Illicit Discharge Concerns (e.g., trash or needed infrastructure repairs)?

OUTFALL RECONNAISSANCE INVENTORY/ SAMPLE COLLECTION FIELD SHEET

Section 1: Background Data

Subwatershed: Vasa		Outfall ID: OF-18	
Today's date: 5/7/14		Time (Military): 1308	
Investigators: JP JP		Form completed by: JP	
Temperature (°F):	Rainfall (in.): Last 24 hours:	Last 48 hours: X	
Latitude:	Longitude:	GPS Unit: Col	GPS LMK #:
Camera: Col		Photo #s: 000 105/106	

Land Use in Drainage Area (Check all that apply):

- ☐ Industrial
- ☐ Ultra-Urban Residential
- ☒ Suburban Residential
- ☐ Commercial
- ☐ Open Space
- ☐ Institutional
- Other: _____
- Known Industries: _____

Notes (e.g., origin of outfall, if known):

RB, from under walking Trail, by Timber retaining wall

Section 2: Outfall Description

LOCATION	MATERIAL	SHAPE		DIMENSIONS (IN.)	SUBMERGED
☐ Closed Pipe	☐ RCP ☐ CMP ☒ PVC ☐ HDPE ☐ Steel ☐ Other: _____	☒ Circular ☐ Eliptical ☐ Box ☐ Other: _____ Blac	☒ Single ☐ Double ☐ Triple ☐ Other: _____	Diameter/Dimensions: 0-3 4 in	In Water: ☒ No ☐ Partially ☐ Fully With Sediment: ☒ No ☐ Partially ☐ Fully
☐ Open drainage	☐ Concrete ☐ Earthen ☐ rip-rap ☐ Other: _____	☐ Trapezoid ☐ Parabolic ☐ Other: _____		Depth: _____ Top Width: _____ Bottom Width: _____	
☐ In-Stream	(applicable when collecting samples)				
Flow Present?	☒ Yes ☐ No *If No, Skip to Section 5*				
Flow Description (If present)	☒ Trickle ☐ Moderate ☐ Substantial				

Section 3: Quantitative Characterization

FIELD DATA FOR FLOWING OUTFALLS				
PARAMETER		RESULT	UNIT	EQUIPMENT
☐ Flow #1	Volume		Liter	Bottle
	Time to fill		Sec	
☐ Flow #2	Flow depth		In	Tape measure
	Flow width	____' ____"	Ft, In	Tape measure
	Measured length	____' ____"	Ft, In	Tape measure
	Time of travel		S	Stop watch
Temperature			°F	Thermometer
pH			pH Units	Test strip/Probe
Ammonia			mg/L	Test strip

Outfall Reconnaissance Inventory Field Sheet

Section 4: Physical Indicators for Flowing Outfalls Only

Are Any Physical Indicators Present in the flow? ☒ Yes ☐ No *(If No, Skip to Section 5)*

INDICATOR	CHECK if Present	DESCRIPTION	RELATIVE SEVERITY INDEX (1-3)		
Odor	☒	☐ Sewage ☐ Rancid/sour ☐ Petroleum/gas ☒ Sulfide ☐ Other:	☒ 1 – Faint	☐ 2 – Easily detected	☐ 3 – Noticeable from a distance
Color	☐	☒ Clear ☐ Brown ☐ Gray ☐ Yellow ☐ Green ☐ Orange ☐ Red ☐ Other:	☐ 1 – Faint colors in sample bottle	☐ 2 – Clearly visible in sample bottle	☐ 3 – Clearly visible in outfall flow
Turbidity	☐	See severity	☐ 1 – Slight cloudiness	☐ 2 – Cloudy	☐ 3 – Opaque
Floatables -Does Not Include Trash!!	☐	☐ Sewage (Toilet Paper, etc.) ☒ Suds ☐ Petroleum (oil sheen) ☐ Other:	☐ 1 – Few/slight; origin not obvious	☐ 2 – Some; indications of origin (e.g., possible suds or oil sheen)	☐ 3 - Some; origin clear (e.g., obvious oil sheen, suds, or floating sanitary materials)

Section 5: Physical Indicators for Both Flowing and Non-Flowing Outfalls

Are physical indicators that are not related to flow present? ☒ Yes ☐ No *(If No, Skip to Section 6)*

INDICATOR	CHECK if Present	DESCRIPTION	COMMENTS
Outfall Damage	☐	☐ Spalling, Cracking or Chipping ☐ Peeling Paint ☐ Corrosion	
Deposits/Stains	☐	☐ Oily ☐ Flow Line ☐ Paint ☒ Other: Orange	Orange staining on bank below
Abnormal Vegetation	☐	☐ Excessive ☐ Inhibited	
Poor pool quality	☐	☐ Odors ☐ Colors ☐ Floatables ☐ Oil Sheen ☒ Suds ☐ Excessive Algae ☐ Other:	
Pipe benthic growth	☐	☐ Brown ☒ Orange ☐ Green ☐ Other:	0

Section 6: Overall Outfall Characterization

☐ Unlikely ☒ Potential (presence of two or more indicators) ☐ Suspect (one or more indicators with a severity of 3) ☐ Obvious

Section 7: Data Collection

1. Sample for the lab?	☐ Yes	☐ No	
2. If yes, collected from:	☐ Flow	☐ Pool	
3. Intermittent flow trap set?	☐ Yes	☐ No	If Yes, type: ☐ OBM ☐ Caulk dam

Section 8: Any Non-Illicit Discharge Concerns (e.g., trash or needed infrastructure repairs)?

ATTACHMENT D

DIGITAL DELIVERABLES (PROVIDED SEPARATELY)

Attachment D contains a summary of digital data that will be delivered separately including: 1) GPS point locations and associated digital photographs, and 2) a list of the GIS data that will be included the project geodatabase.

1) Photolog of GPS Points with Associated Digital Photographs

Photo Name	TT-ID	Point Type	Latitude Longitude	Time	Comments
DSC00001 20140502 Revetment PP-01	PP-01	Photo	47.57844800000 -122.12346800000	2014/05/02 15:56:20	Downstream end of private revetment
DSC00002 20140502 Revetment PP-02	PP-02	Photo	47.57828900000 -122.12399600000	2014/05/02 16:01:22	Upstream stream end of private revetment
DSC00003 20140502 Outfall OF-01	OF-01	Outfall	47.57840000000 -122.12365500000	2014/05/02 16:07:55	OF-01 Outfall GPS point and Photo
DSC00004 20140502 landslide scarp LS-01	LS-01	Landslide	47.57817300000 -122.12460000000	2014/05/02 16:20:09	LS-01 scarp
DSC00005 20140502 Scarp Photo PP-03	PP-03	Photo	47.57799500000 -122.12451600000	2014/05/02 16:22:09	LS-01 scarp photo
DSC00006 20140502 Deposit PP-04	PP-04	Photo	47.57808600000 -122.12460500000	2014/05/02 16:24:27	LS-01 deposit photo
DSC00007 20140502 Deposition Fan LS-02	LS-02	Landslide	47.57818800000 -122.12521000000	2014/05/02 16:42:19	LS-02 deposit
DSC00008 20140502 Drainage outlet PP-05	PP-05	Photo	47.57801600000 -122.12526100000	2014/05/02 16:43:08	LS-02 drainage outlet photo
DSC00010 20140502 Sweeping conifer PP-06	PP-06	Photo	47.57783000000 -122.12537500000	2014/05/02 16:48:26	Photo of Sweeping conifer on top of bank
DSC00011 20140502 Potential Instability PI-01	PI-01	Potential Instability	47.57797100000 -122.12562000000	2014/05/02 16:56:45	PI-01 Potential Instability site top
DSC00013 20140502 Clay Lense PP-08	PP-08	Photo	47.57794400000 -122.12562100000	2014/05/02 16:59:36	PI-01 clay lens photo
DSC00014 20140502 Deposit PP-09	PP-09	Photo	47.57801400000 -122.12582900000	2014/05/02 17:09:05	LS-03 deposit photo
DSC00015 20140502 Slope LS-03	LS-03	Landslide	47.57793100000 -122.12577000000	2014/05/02 17:09:39	LS-03
DSC00016 20140502 Outfall OF-02	OF-02	Outfall	47.57837000000 -122.12680400000	2014/05/02 17:30:08	OF-02 Outfall GPS point and Photo
DSC00017 20140502 DS sediment staining PP-32	PP-32	Photo	47.57835700000 -122.12645300000	2014/05/02 17:31:29	Photo of sediment staining from OF-02
DSC00018 20140502 Culvert Outlet PI-02	PI-02	Culvert	47.57841900000 -122.12696200000	2014/05/02 17:44:22	outlet of culvert on access road
DSC00019 20140502 Ponded water		Seep	47.57855000000 -122.12701400000	2014/05/02 17:45:34	Photo of seep upstream of access road
DSC00021 20140502 Seep		Seep	47.57848500000 -122.12708300000	2014/05/02 17:47:42	Photo of seep upstream of access road
DSC00022 20140502 Abandoned Road Culvert PI-02	PI-02	Culvert	47.57861100000 -122.12695300000	2014/05/02 17:51:17	outlet of culvert on abandoned access road

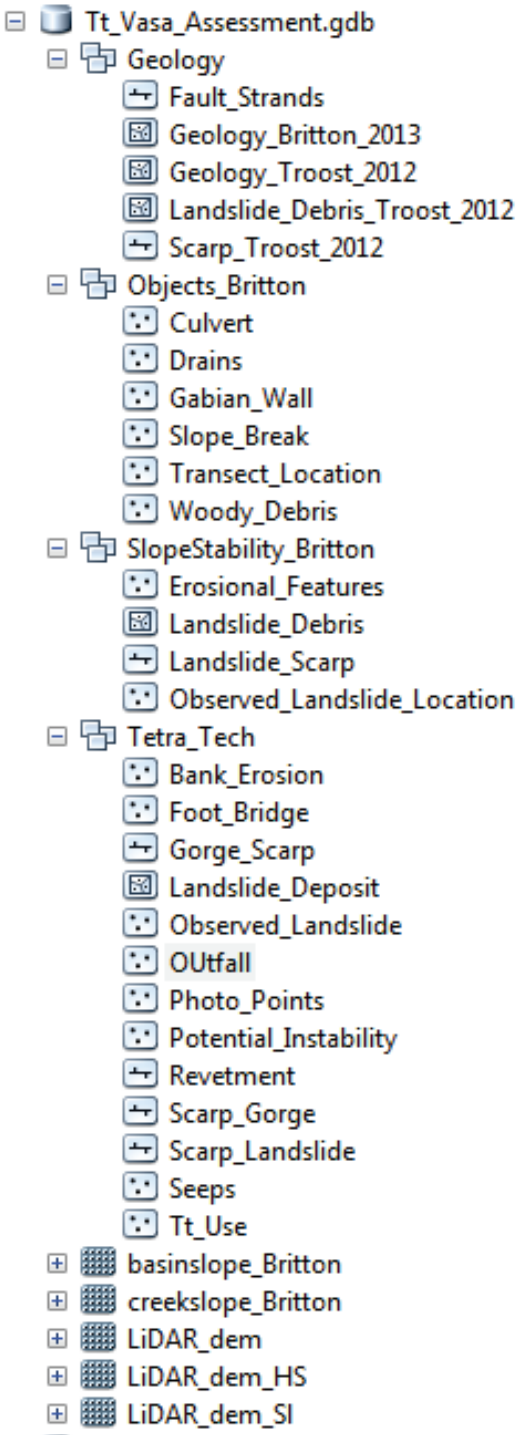
Photo Name	TT-ID	Point Type	Latitude Longitude	Time	Comments
DSC00024 20140502 Seep		Seep	-122.12687000000	2014/05/02 17:54:59	Photo of seep upstream of access road
DSC00025 20140502 Seep		Seep	47.57858800000 -122.12647000000	2014/05/02 17:57:09	Photo of seep upstream of access road
DSC00026 20140502 Seep		Seep	47.57857200000 -122.12621200000	2014/05/02 17:59:24	Photo of seep upstream of access road
DSC00027 20140502 Road Drainage PP-10	PP-10	Photo	47.57897800000 -122.12702100000	2014/05/02 18:15:47	Road drainage infrastructure photo
DSC00028 20140502 Road Cracking PP-11	PP-11	Photo	47.57893200000 -122.12669200000	2014/05/02 18:27:36	Road damage from slope movement
DSC00029 20140502 Exposed Till PP-12	PP-12	Photo	47.57887900000 -122.12618100000	2014/05/02 18:31:12	Exposed glacial till cap on 35th street road cut slope
DSC00033 20140502 Bedrock PP-13	PP-13	Photo	47.56954600000 -122.13408000000	2014/05/02 20:25:35	Bedrock grade control
DSC00034 20140502 Channel Conditions PP-14	PP-14	Photo	47.56901400000 -122.13352700000	2014/05/02 20:32:35	Photo of characteristic channel conditions
DSC00035 20140502 Channel Conditions PP-15	PP-15	Photo	47.56731700000 -122.13281700000	2014/05/02 20:52:17	Photo of characteristic channel conditions
DSC00036 20140502 Channel Conditions PP-16	PP-16	Photo	47.56788800000 -122.13323000000	2014/05/02 21:03:26	Photo of characteristic channel conditions
DSC00037 20140502 West face LS-04	LS-04	Landslide	47.56830100000 -122.13295900000	2014/05/02 21:09:50	LS-04 west face
DSC00038 20140502 East face PP-17	PP-17	Photo	47.56820100000 -122.13316200000	2014/05/02 21:11:51	LS-04 East face
DSC00039 20140502 Scarp LS-05	LS-05	Landslide	47.56856400000 -122.13335100000	2014/05/02 21:22:04	LS-05 scarp
DSC00040 20140502 Channel Conditions PP-18	PP-18	Photo	47.56853400000 -122.13346500000	2014/05/02 21:25:00	Photo of characteristic channel conditions
DSC00041 20140502 Channel Conditions PP-19	PP-19	Photo	47.56900500000 -122.13357600000	2014/05/02 21:29:58	Photo of characteristic channel conditions
DSC00043 20140507 Bank Erosion with Potential Instability PI-03	PI-03	Potential Instability	47.56870800000 -122.13771600000	2014/05/07 15:41:37	PI-03 Bank Erosion with Potential Instability
DSC00044 20140507 RB stream gauge PP-20	PP-20	Photo	47.56860700000 -122.13768600000	2014/05/07 15:45:30	Photo of stream gauge
DSC00045 20140507 Instream LWD control PP-21	PP-21	Photo	47.56853700000 -122.13777700000	2014/05/07 15:47:31	Photo of Instream LWD control
DSC00046 20140507 Channel Conditions PP-22	PP-22	Photo	47.56746100000 -122.13796200000	2014/05/07 16:00:55	Channel conditions photo

Photo Name	TT-ID	Point Type	Latitude Longitude	Time	Comments
DSC00047 20140507 Outfall OF-03	OF-03	Outfall	47.56722400000 -122.13794100000	2014/05/07 16:06:37	OF-03 Outfall
DSC00048 20140507 Downslope from top of scarp LS-06	LS-06	Landslide	47.56725700000 -122.13795900000	2014/05/07 16:11:38	Downslope from top of scarp
DSC00049 20140507 LB seep		Seep	47.56730300000 -122.13794000000	2014/05/07 16:16:48	Left bank seep
DSC00050 20140507 Outfall OF-04	OF-04	Outfall	47.56705300000 -122.13806600000	2014/05/07 16:21:31	OF-04 Outfall
DSC00051 20140507 Outfall OF-05	OF-05	Outfall	47.56685300000 -122.13802500000	2014/05/07 16:25:59	OF-05 Outfall
DSC00052 20140507 Channel Bank Armoring PP-22	PP-22	Photo	47.56692200000 -122.13799400000	2014/05/07 16:27:29	Photo of channel bank armoring
DSC00053 20140507 Culvert Outlet PP-23	PP-23	Photo	47.56676300000 -122.13799900000	2014/05/07 16:31:01	Photo of culvert outlet
DSC00054 20140507 Outfall OF-06	OF-06	Outfall	47.56669000000 -122.13796700000	2014/05/07 16:36:29	OF-06 Outfall
DSC00055 20140507 Outfall OF-07	OF-07	Outfall	47.56629500000 -122.13777200000	2014/05/07 16:46:56	OF-07 Outfall
DSC00057 20140507 Culvert inlet and bank armoring PP-24	PP-24	Photo	47.56614400000 -122.13760400000	2014/05/07 16:52:01	Photo of culvert inlet and bank armoring
DSC00058 20140507 LB Seep		Seep	47.56590800000 -122.13769800000	2014/05/07 16:59:18	Left bank seep causing minor erosion
DSC00059 20140507 Outfall OF-08	OF-08	Outfall	47.56591200000 -122.13734700000	2014/05/07 17:04:10	OF-08 Outfall
DSC00062 20140507 Outfall OF-09	OF-09	Outfall	47.56555600000 -122.13730900000	2014/05/07 17:18:36	OF-09 Outfall
DSC00063 20140507 OF-09 Outfall on slope PP-25	PP-25	Photo	47.56554800000 -122.13730500000	2014/05/07 17:19:28	Sediment Staining at OF-09
DSC00065 20140507 LB seep		Seep	47.56543400000 -122.13742700000	2014/05/07 17:24:53	Left bank seep causing minor erosion
DSC00066 20140507 Scarp LS-07	LS-07	Landslide	47.56540300000 -122.13753000000	2014/05/07 17:31:04	Scarp
DSC00068 20140507 Foot Bridge 1		Foot Bridge	47.56521800000 -122.13741800000	2014/05/07 17:37:54	Foot Bridge
DSC00069 20140507 Outfall OF-10	OF-10	Outfall	47.56510400000 -122.13755600000	2014/05/07 17:42:33	OF-10 Outfall
DSC00073 20140507 Scarp LS-08	LS-08	Landslide	47.56463400000 -122.13765100000	2014/05/07 17:52:02	Scarp
DSC00075 20140507 Outfall OF-11	OF-11	Outfall	47.56421100000 -122.13730600000	2014/05/07 18:01:20	OF-11 Outfall
DSC00076 20140507 LB seep		Seep	47.56412500000 -122.13734000000	2014/05/07 18:02:55	Small scarp ~ 20 m upslope with no delivery

Photo Name	TT-ID	Point Type	Latitude Longitude	Time	Comments
DSC00077 20140507 Bank Erosion with Potential Instability PI-04	PI-04	Potential Instability	47.56374600000 -122.13690600000	2014/05/07 18:09:42	Bank Erosion with Potential Instability
DSC00078 20140507 Outfall OF-12	OF-12	Outfall	47.56371100000 -122.13701600000	2014/05/07 18:10:40	OF-12 Outfall
DSC00081 20140507 Old RB bank erosion IE-01	IE-01	Bank Erosion	47.56331400000 -122.13685000000	2014/05/07 18:16:58	Old Right bank erosion
DSC00082 20140507 Outfall OF-13	OF-13	Outfall	47.56323000000 -122.13688800000	2014/05/07 18:17:57	OF-13 Outfall
DSC00083 20140507 Seep		Seep	47.56308600000 -122.13663500000	2014/05/07 18:26:12	Small seep
DSC00084 20140507 Gabion Grade Control PP-26	PP-26	Photo	47.56290200000 -122.13679300000	2014/05/07 18:29:30	Photo of gabion grade control
DSC00085 20140507 Outfall OF-14	OF-14	Outfall	47.56264600000 -122.13668800000	2014/05/07 18:32:37	OF-14 Outfall
DSC00086 20140507 Outfall OF-15	OF-15	Outfall	47.56208300000 -122.13645200000	2014/05/07 18:55:28	OF-15 Outfall
DSC00087 20140507 Slope with Potential Instability PI-05	PI-05	Potential Instability	47.56199200000 -122.13674700000	2014/05/07 19:01:35	Slope with Potential Instability
DSC00089 20140507 Foot Bridge 2		Foot Bridge	47.56159200000 -122.13648700000	2014/05/07 19:07:40	Foot Bridge
DSC00090 20140507 LB seep		Seep	47.56139600000 -122.13653900000	2014/05/07 19:10:07	Small scarp ~ 20 m upslope with no delivery
DSC00091 20140507 RBBank Erosion IE-02	IE-02	Bank Erosion	47.56139600000 -122.13649500000	2014/05/07 19:12:52	Right Bank Erosion
DSC00092 20140507 LB seep		Seep	47.56132200000 -122.13652800000	2014/05/07 19:16:49	Small Left Bank seep
DSC00093 20140507 Outfall OF-16	OF-16	Outfall	47.56116000000 -122.13639400000	2014/05/07 19:19:38	OF-16 Outfall
DSC00094 20140507 Foot Bridge 3		Foot Bridge	47.56076900000 -122.13636100000	2014/05/07 19:21:44	Foot Bridge
DSC00095 20140507 LB Scarp LS-09	LS-09	Landslide	47.56088800000 -122.13630600000	2014/05/07 19:24:00	Left Bank Scarp
DSC00096 20140507 Deposit PP-29	PP-29	Photo	47.56069800000 -122.13633600000	2014/05/07 19:26:04	Deposit
DSC00097 20140507 RB Seep		Seep	47.56070500000 -122.13617000000	2014/05/07 19:30:45	Right Bank seep causing minor erosion
DSC00098 20140507 Outfall OF-17	OF-17	Outfall	47.56066800000 -122.13614300000	2014/05/07 19:32:38	OF-17 Outfall
DSC00099 20140507 RB erosion IE-03	IE-03	Bank Erosion	47.56000300000 -122.13600900000	2014/05/07 19:40:48	IE-03 Photo of Right Bank erosion
DSC00100 20140507 Gabion Grade Control PP-30	PP-30	Photo	47.55997800000 -122.13604700000	2014/05/07 19:44:28	Photo of gabion grade control (view) downstream

Photo Name	TT-ID	Point Type	Latitude Longitude	Time	Comments
DSC00103 20140507 RB bank IE-04	IE-04	Bank Erosion	47.55963800000 -122.13606800000	2014/05/07 19:50:22	IE-04 photo of Right Bank erosion
DSC00104 20140507 Gabion Grade Control PP-31	PP-31	Photo	47.55946900000 -122.13632000000	2014/05/07 19:58:19	Photo of downstream end of gabion wall
DSC00105 20140507 Outfall OF-18	OF-18	Outfall	47.55898600000 -122.13624600000	2014/05/07 20:08:23	OF-18 Outfall

2) List of the GIS data included in geodatabase:


Tt_Vasa_Assessment.gdb
Geology
Fault_Strands
Geology_Britton_2013
Geology_Troost_2012
Landslide_Debris_Troost_2012
Scarp_Troost_2012
Objects_Britton
Culvert
Drains
Gabian_Wall
Slope_Break
Transect_Location
Woody_Debris
SlopeStability_Britton
Erosional_Features
Landslide_Debris
Landslide_Scarp
Observed_Landslide_Location
Tetra_Tech
Bank_Erosion
Foot_Bridge
Gorge_Scarp
Landslide_Deposit
Observed_Landslide
OUtfall
Photo_Points
Potential_Instability
Revetment
Scarp_Gorge
Scarp_Landslide
Seeps
Tt_Use
basinslope_Britton
creekslope_Britton
LiDAR_dem
LiDAR_dem_HS
LiDAR_dem_SI