Exhibit E

KPFF6

Drainage Report

February 2024

KPFF6
173 pages

The Plateau at Liberty Bay PRD

Poulsbo, WA

Drainage Report

February 2024 | Planned Residential Development and Preliminary Plat Report

kpff Consulting Engineers

Drainage Report

February 2024

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I hereby state that this Drainage Report has been prepared by me or under my supervision and meets the standard of care and expertise which is usual and customary in this community of professional engineers. The analysis has been prepared utilizing procedures and practices specified by the City of Poulsbo and within the standard accepted practices of the industry. I understand that the City of Poulsbo does not and will not assume any liability for the sufficiency, suitability or performance of drainage facilities prepared by me.

02/14/2024

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Appendices

1. Executive Summary

The Plateau at Liberty Bay project proposes to develop approximately 26 acres into 63 single-family residential lots with associated tracts, roadway and utility infrastructure improvements and stormwater drainage facilities.

The project site is located at 19313 Viking Ave NW in the City of Poulsbo, Washington, and includes tax parcels 152601-3-023-2005, 152601-3-033-2003, 152601-3-055-2006, 152601-3-025-2003 and 152601-3-09-2012. The site abuts undeveloped parcels to the west, single-family residential parcels to the north and south, and undeveloped properties and Viking Ave NW to the east.

This Drainage Report is for the analysis of the pre- and post-development conditions of the Plateau at Liberty Bay subdivision to support the drainage system design. This report is intended to be reviewed in conjunction with the stormwater plans included with this report.

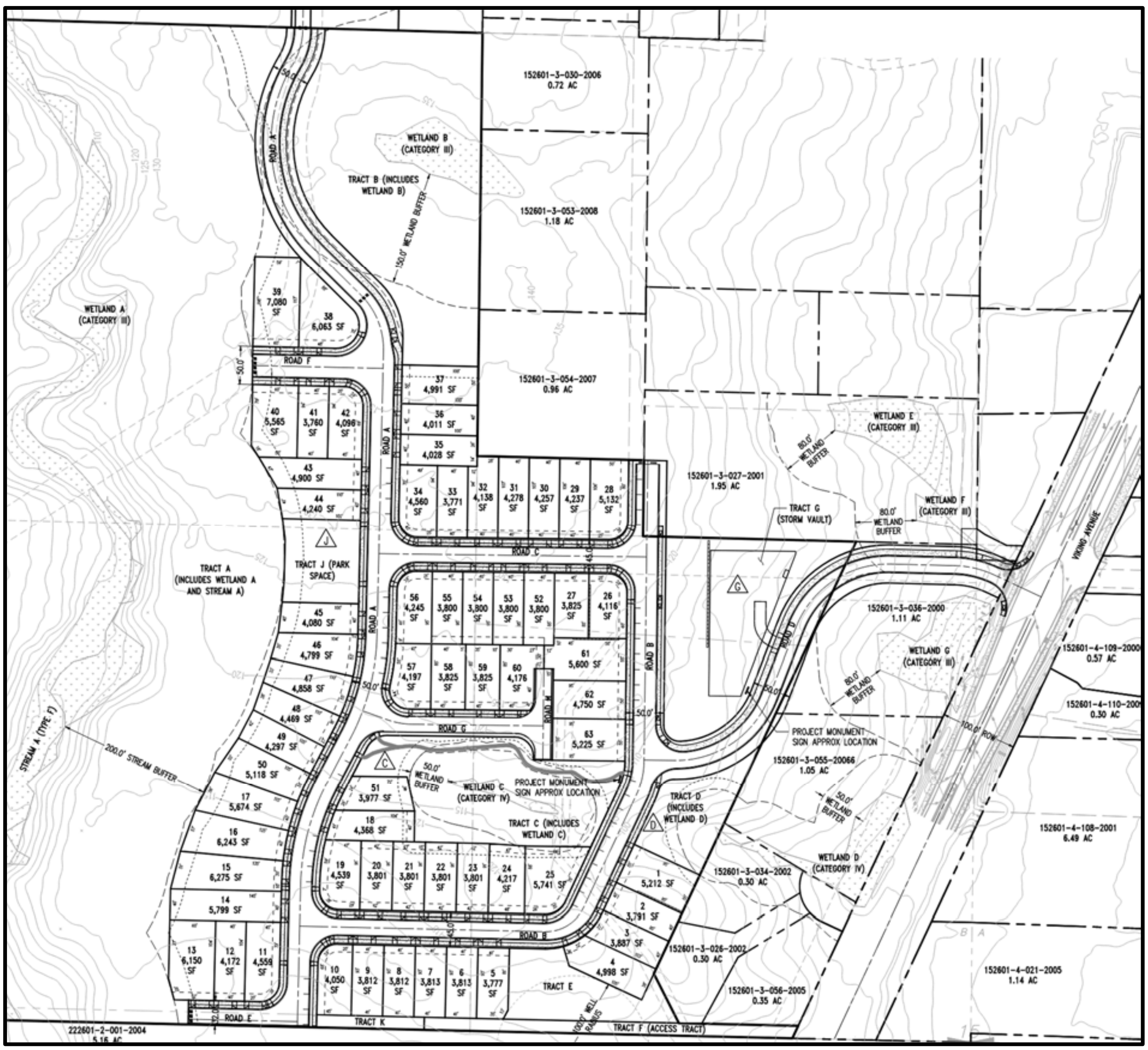


Figure 1-1: Proposed Subdivision Plan

2. Drainage Information Summary

A brief summary of the preliminary plat stormwater facilities design is provided to add context to the changes that have been made which will be further discussed in the following sections.

- The project is designed to the Department of Ecology's 2019 Stormwater Management Manual for Western Washington (SWMMWW).
- The project proposes to disperse stormwater from proposed rooftops to on-site wetland buffers to maintain existing wetland hydrology and to discharge detained stormwater to the existing City Stormwater System located in Viking Avenue. The receiving waters for the project have been identified as Liberty Bay (Puget Sound) and the site is located in the Liberty Bay Basin.
- Multiple wetlands and "Stream A" (Johnson Creek) are mapped on the project property. Impacts are not proposed to Stream A or its mapped buffer area. Direct wetland impacts are proposed to Wetland F for the project entry road and wetland buffer averaging is proposed for wetland buffers throughout the project. A critical area report and wetland buffer averaging plan was prepared by WRI and is included with the project submittal.
- Enhanced water quality treatment is proposed for the project and will be provided prior to discharge from the site using an enhanced treatment emerging technology approved for general use by the Department of Ecology.
- The proposed detention vault was modeled against predeveloped forested conditions for the existing threshold discharge (TDA) area. Developed basin discharge durations are designed to match pre-developed durations for the range of pre-developed discharge rates from 50% of the 2-year peak flow up to the full 50-year peak flow.

3. Minimum Requirements Summary

In compliance with the City of Poulsbo Municipal Code, the proposed development shall be in accordance with the Washington State Department of Ecology's 2019 Stormwater Management Manual for Western Washington, as amended in 2014 (SWMMWW).

MINIMUM REQUIREMENT NO. 1: PREPARATION OF STORMWATER SITE PLANS

Detailed grading and storm drainage plans depicting locations and sizes of stormwater elements have been prepared for this development. Complete storm drainage plans will be included in the construction permit submittal.

MINIMUM REQUIREMENT NO. 2: CONSTRUCTION STORMWATER POLLUTION PREVENTION

Construction stormwater will be managed per the requirements of Volume II of the 2019 Department of Ecology (DOE) Stormwater Management Manual for Western Washington. A detailed CSWPPP will be provided with the construction permit submittal.

MINIMUM REQUIREMENT NO. 3: SOURCE CONTROL OF POLLUTION

Generation of significant or specific stormwater pollutants or spill hazards from typical residential use or construction is not anticipated. No specific source control Best Management Practices (BMPs) or spill prevention plans are currently proposed.

MINIMUM REQUIREMENT NO. 4: PRESERVATION OF NATURAL DRAINAGE SYSTEMS AND OUTFALLS

Runoff from the project site will be either dispersed to on-site wetland buffer or routed through a piped, dedicated storm drain system to its outfall to an existing storm drain system in Viking Ave NW, matching the existing condition.

MINIMUM REQUIREMENT NO. 5: ON-SITE STORMWATER MANAGEMENT

The project is subject to Low-Impact Development (LID) Site Assessment in accordance with the SWMMWW. An LID Site Assessment is provided in Section 6 of this report.

MINIMUM REQUIREMENT NO. 6: RUNOFF TREATMENT

The project will result in more than 5,000 square feet of pollution-generating hard surface, triggering the requirement for runoff treatment for the new and replaced pollution-generating hard surface areas. To meet this requirement, runoff from the vault basin and bypass basin will be treated prior to discharge from the project site to the City's system in Viking Avenue. Stormwater treatment will be provided using emerging technologies for water quality treatment approved by the Department of Ecology for general use. Runoff treatment strategy is discussed in Section 6 of this report.

MINIMUM REQUIREMENT NO. 7: FLOW CONTROL

The project will result in more than 10,000 square feet of impervious surface, triggering the requirement for flow control. Stormwater discharges shall match developed discharge durations to pre-developed durations for the range of pre-developed discharge rates from 50% of the 2-year peak flow up to the full 50-year peak flow. The pre-developed condition to be matched shall be a forested land cover. This is achieved through stormwater detention in the proposed detention vault. See Section 6 of this report for discussion of proposed flow control.

MINIMUM REQUIREMENT NO. 8: WETLANDS PROTECTION

There are multiple wetlands on the project site and a wetland within the downstream flow path. Wetlands and their associated buffers will be protected when possible. Buffer averaging will be used to mitigate buffer impacts and buffer enhancement will be used to mitigate wetland impacts as recommended by Wetland Recources. Direct impacts to wetland areas are limited to required impacts to Wetland F at the project entry road. Rooftop runoff from lots along Wetland A and Wetland C Buffer areas will be dispersed to the wetland buffers to maintain wetland hydro-period. See Section 6 of this report for analysis of the wetland hydro-period modeling for both the on-site and off-site wetlands.

MINIMUM REQUIREMENT NO. 9: OPERATION AND MAINTENANCE

A stormwater facility operation and maintenance manual will be provided with the construction permit submittal.

4. Project Overview

PROJECT LOCATION

The project is located to the west of Viking Ave NW, southwest of the intersection of Viking Ave NW and NW Liberty Road in Poulsbo, Washington. Refer to Figure 4-1 for a site vicinity map.

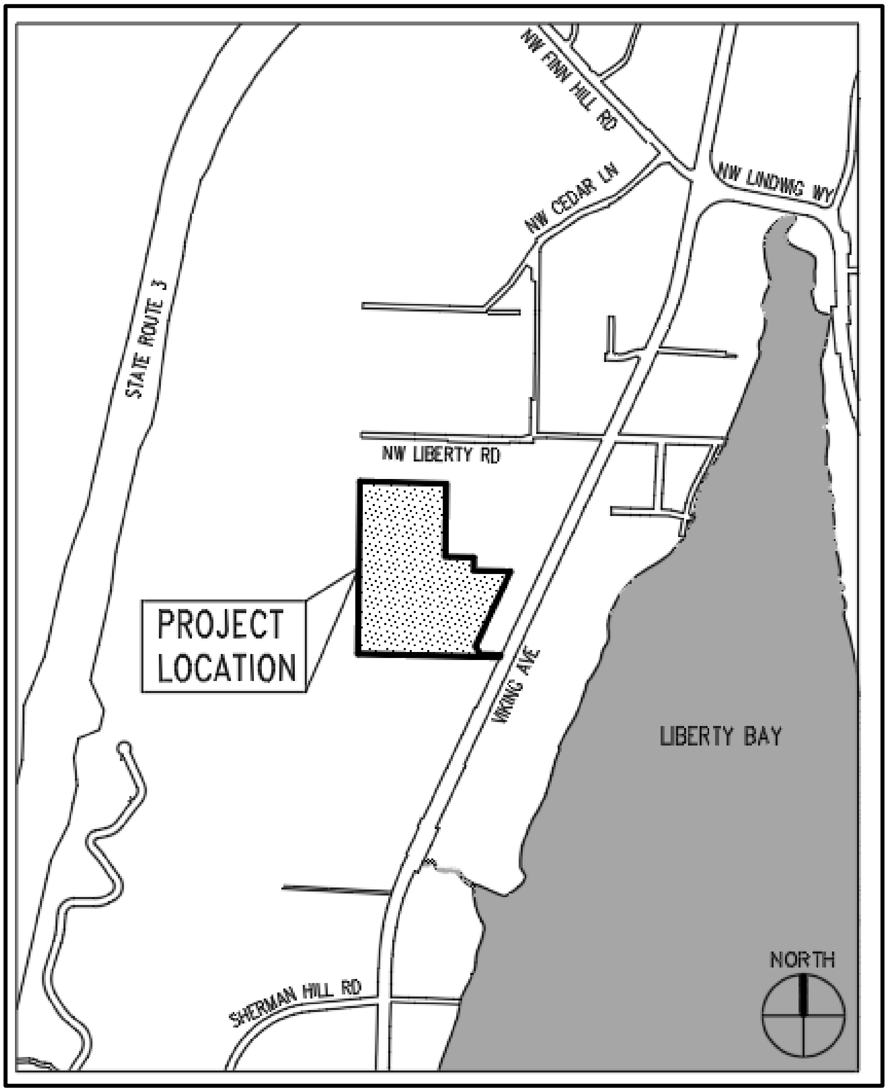


Figure 4-1: Site Vicinity Map

PROJECT DESCRIPTION

The approximately 26-acre site consists of five existing tax parcels. The parcels contain single-family residences with driveways, a number of outbuildings, and both grassy and vegetated areas. Most of the site is considered to be forested in the existing condition. The project proposes to construct 63 single-family residential lots with associated roadways, utilities, stormwater infrastructure, and open space. Open space will include critical areas and their buffers and both active and passive recreation areas. Figure 4-2 shows the project boundary.

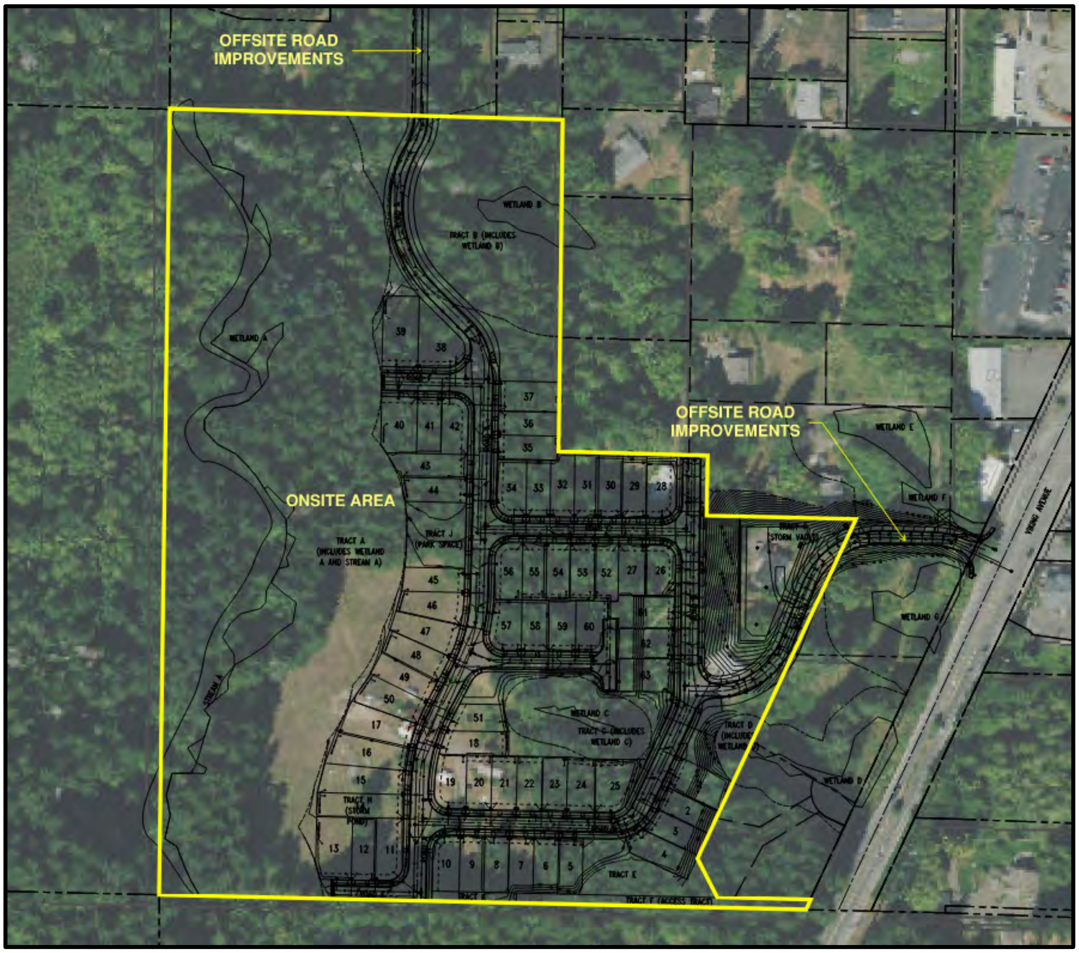


Figure 4-2: Site Map

5. Existing Conditions Summary

ON-SITE ANALYSIS

Review of available topographic information indicates that the project site is split into two separate basins and two separate TDAs.

The west TDA generally slopes to the west/southwest to Stream A (Johnson Creek), which is located near the west property boundary. The west TDA as relatively flat slopes on the west steeper slopes along Stream A. Runoff from this basin is assumed to infiltrate in the critical area buffer or collect in Stream A.

The east TDA is in the Liberty Bay basin and generally slopes to the east with relatively flat slopes in the center of the site and steeper slopes on the hillside down to Viking Avenue. There are existing underground pipes and bioretention swales in Viking Avenue to the east of the site. Flow into the City Stormwater System ultimately discharges to Liberty Bay (Puget Sound). See the Downstream Analysis below for additional information on the City Stormwater System.

See Figure 5-1 for a TDA Site Map.

Figure 5-1: TDA Site Map

OFF-SITE ANALYSIS

The project site is situated on a divide between two basins, one draining to Liberty Bay and one draining to Johnson Creek, which also drains to Liberty Bay. Upstream flows are not anticipated to impact the project due to the existing slopes and basin divide.

DOWNSTREAM ANALYSIS

The westernmost lots disperse rooftop runoff west to the Wetland/Stream A buffer in order to maintain the wetland hydro-period. This runoff is assumed to either infiltrate into the ground and travel as interflow to Stream A (Johnson Creek) or sheet flow to Stream A (Johnson Creek). Runoff directed to the wetland buffer will be fully dispersed across the 200 foot stream buffer and is not anticipated to become channelized prior to reaching Stream A. This matches the existing conditions where runoff from the west TDA sheet flows or moves as interflow to Stream A. Stream A flows south from the project site and eventually southeast/east to Liberty Bay.

The east TDA basin includes both the detention vault basin and road bypass basins which are designed to discharge to the existing City Stormwater System located in Viking Avenue. The Viking Avenue Storm System appears to consist of a series of bioretention swales and below grade catch basins and pipe that discharge to Liberty Bay. The project proposes to discharge stormwater from the project to an existing storm catch basin in Viking Avenue. From this existing structure, stormwater is conveyed via below grade storm pipe to a second structure to the southwest, and then east under Viking Avenue. This section of the City stormwater system discharges stormwater to an existing open air channel that conveys stormwater through offsite Wetland H, to an existing outlet to Liberty Bay. Additional information regarding the downstream system is provided in the Capacity and Backwater Analysis included in Appendix D and additional information regarding the Minimum Requirement 8 Analysis of this offsite wetland is included in both Appendix E and Section 6 of this report.

Figure 5-2 shows the 1/4 –mile downstream flow path for both TDAs.

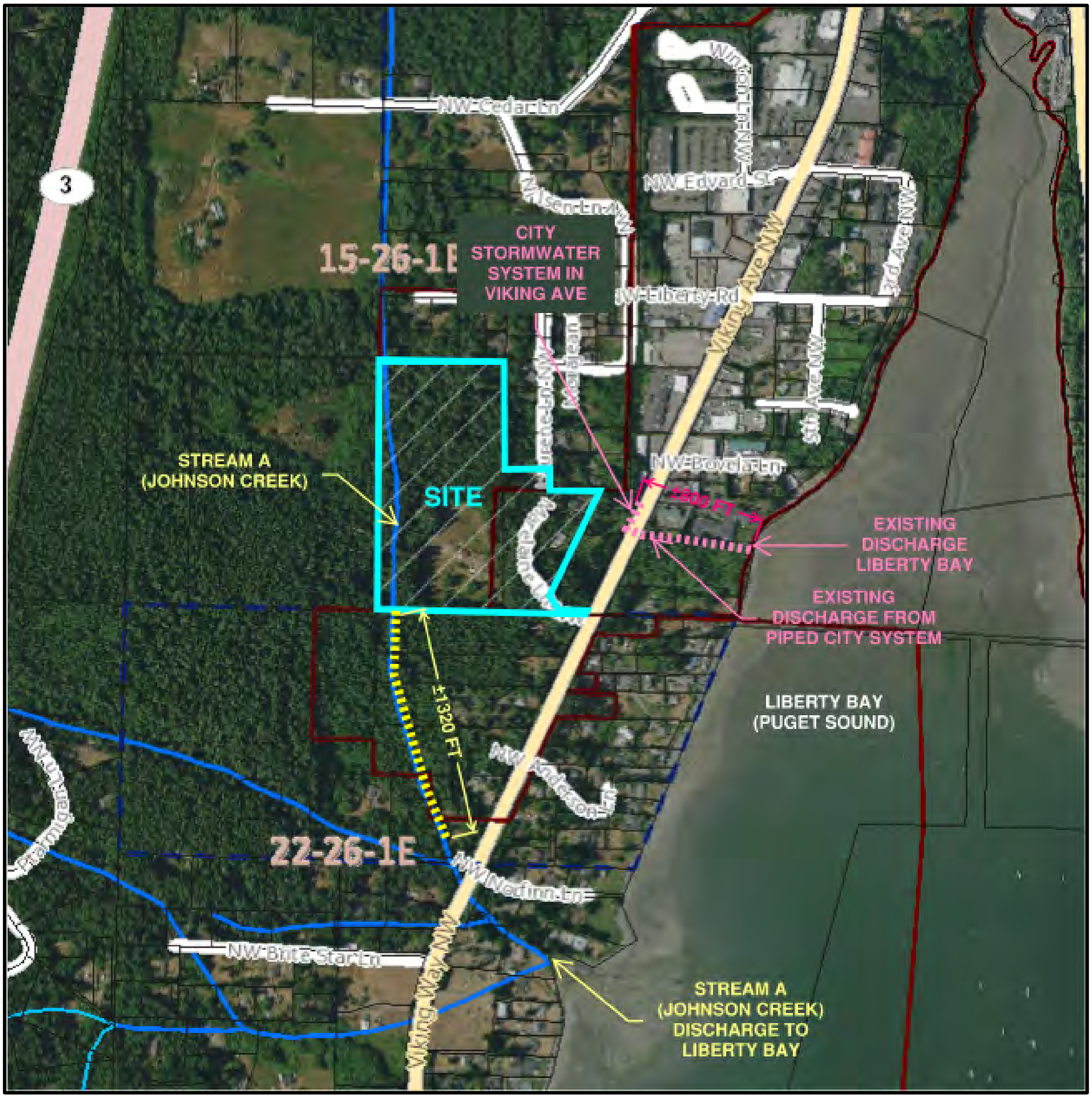


Figure 5-2: Downstream Analysis Map

SOILS AND SUBSURFACE INFORMATION

An Engineering Infiltration investigation was performed by Earth Solutions NW, LLC on July 14, 2022. According to their report (Appendix A), the subsurface conditions of the site include glacial till-like soils with localized areas of relatively clean sands. Eighteen test pits were excavated during a site visits performed in July of 2022 and groundwater seepage was encountered in three locations at depths of 10 feet to 25 feet below the ground surface.

SITE LIMITATIONS

A Wetland and Stream Reconnaissance Report, dated July 7, 2021, was prepared by Wetland Resources (see Appendix C). The June 2021 site investigation identified seven wetlands (six Category III and one Category IV) and one Type F1 stream on and adjacent to the project site. Standards and high intensity buffers for the wetlands range from 40 to 150 feet. The stream is a habitat for Coho salmon, Chum salmon, and Cutthroat Trout and has an intensity buffer of 200 feet.

No activities are proposed within the 200 foot stream buffer, however wetland buffer averaging will be used to modify wetland buffers within the plat. Modifications to the wetland buffers are discussed in the Critical Areas Report and Wetland Buffer Averaging Plan.

Additional site limitations include an existing well located just south of the project site. No grading or construction activities are proposed within the 100-foot well protective radius.

SITE REQUIREMENTS

All proposed plans and construction shall adhere to the following codes and requirements:

- Tree retention and landscape plans will adhere to the requirement of PMC 19.190.
- Existing septic systems will be demolished and removed in accordance with the Department of Health standards and regulations.
- New utilities will be provided in the proposed conditions and coordinated accordingly with the storm sewer design to meet the City of Poulsbo requirements.

6. Proposed Conditions Summary

PROPOSED CONDITIONS

The Plateau at Liberty Bay project proposes on-site work that includes construction of 63 single-family residential lots with associated tracts, utilities, stormwater drainage facilities, road, and open space. Off-site work will include construction on Viking Avenue NW to tie the new road and utilities into the existing conditions and construction of an emergency vehicle access to Liberty Road.

The project will be entitled as a single project through a Preliminary Plat and Planned Residential Development (PRD) and divided into two phases for construction, with up to 30 lots proposed to be constructed in Phase 1 prior to the start of construction on Phase 2.

There are a number of mapped wetlands, a mapped stream, and associated critical area buffers located on the site. The project is entitled through a PRD to allow for code flexibility with regards to zoning requirements to protect critical areas and their buffers in open space tracts. Additional open space tracts will be used for passive and active recreation and planting. Access tracts are proposed for neighboring property access and a shared driveway, and the stormwater detention vault is proposed to be located in an open space tract with passive recreation facilities located on top of the vault.

Off-site work will be limited to road and utility connections to Viking Avenue, minor stormwater improvements to the existing stormwater system in Viking Avenue, and emergency vehicle access to Liberty Road. Paving and road improvements to Liberty Road and Viking Avenue are not anticipated beyond restoration for utility trenching.

The project is divided into three sub-basins for stormwater compliance. One sub-basin includes roof and lot areas that are fully dispersed to adjacent wetlands. These areas are omitted from the flow control calculations, as the areas are fully dispersed, but have been included in the analysis for wetland hydro-period compliance. The detention vault sub-basin includes a majority of the project area. Stormwater from this basin is routed to a detention vault located on the east side of the site. Lastly, the bypass basin includes proposed road improvements that cannot be routed to the detention vault. The detention vault basin and bypass basin were evaluated for stormwater compliance together against the pre-developed east TDA.

Figure 6-1 shows the proposed conditions plan and sub-basin map. A summary of impervious and pervious areas for the project areas are provided in Table 6-1.

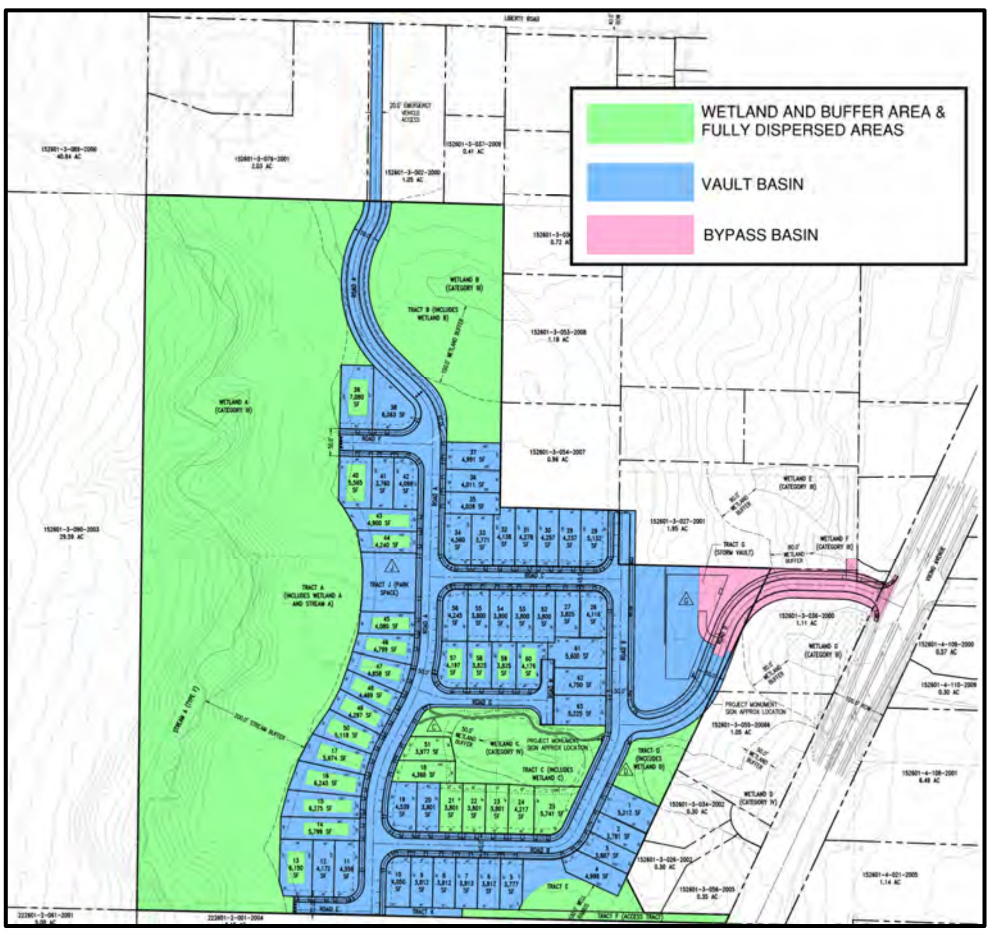


Figure 6-1: Proposed Sub-Basin Map

Table 6-1: Impervious and Pervious Summary Table

Area Type	Impervious Area (Acres)	Pervious Area (Acres)	Total Area (Acres)
Vault Basin	5.513	4.323	**9.836**
Bypass Basin	0.304	0.512	**0.816**
Area Dispersed to Wetland A	0.440	0.870	**1.310**
Area Dispersed to Wetland C	0.542	1.073	**1.615**
Total Area	**6.799**	**6.778**	**13.577**

[1]Lots are assumed to be 55% impervious for area calculations.
[2]Rooftops identified as dispersed to adjacent buffer are shown with a green box.
[3]Lot is highlighted in green where roof and site landscaping/yard is dispersed to adjacent buffer.
[4]On all lots with dispersion to adjacent buffer, a 400 sf driveway is assumed to be routed to the detention vault.
[5]Critical Areas, Critical Area Buffers, and Areas Outside of the Limits of Work are excluded from this summary table.

ON-SITE STORMWATER BMP REQUIREMENTS

As previously stated, On-Site Stormwater Management BMP's are required per Minimum Requirement 5. Please refer to Figure 6-2 below.

Project Location and Parcel Size	Minimum Requirement #5 Compliance Options
Projects inside the UGA, on any size parcel	• Use the LID BMPs from List #2 for all surfaces within each type of surface in List #2; or • Use any Flow Control BMPs desired to achieve the LID Performance Standard, and apply BMP T5.13: Post-Construction Soil Quality and Depth.
Projects outside the UGA, on a parcel smaller than 5 acres	
Projects outside the UGA, on a parcel 5 acres or larger	Use any Flow Control BMPs desired to achieve the LID Performance Standard, and apply BMP T5.13: Post-Construction Soil Quality and Depth.
Note: This text refers to the Urban Growth Area (UGA) as designated under the Growth Management Act (GMA) (Chapter 36.70A RCW) of the State of Washington. If the project is located in a county that is not subject to planning under the GMA, the city limits shall be used instead.	

Figure 6-2: Volume 1, Section 3-4.5 Table 3.1 from the 2019 DOE WMMWW

The project proposes to use the List Approach for Minimum Requirement 5 compliance. A summary of List 2 BMPs and project feasibility is provided in the sections below.

Per the Geotechnical Report, infiltration on-site is largely considered infeasible due to the widespread presence of glacially consolidated soils and the results of the on-site groundwater monitoring exploration. All infiltration BMPs are, therefore, evaluated as infeasible.

Lawn and Landscaped Areas

Post Construction Soil Quality and Depth (BMP T5.13) is required in accordance with the 2019 SWMMWW. This will be provided in landscaped areas on-site.

Roofs

Full Dispersion

Full dispersion is proposed for roof surfaces on lots abutting the Wetland A and Wetland C buffers. Dispersion of runoff from these rooftops is required to maintain existing wetland hydrology and meet Minimum Requirement 8. Design of the proposed dispersion trenches is discussed below.

Dispersion of roof surface on the remaining lots is not feasible because the minimum vegetated flow path is less than the required 100 feet.

Downspout Infiltration

Downspout Infiltration is infeasible due to infiltration infeasibility.

Bioretention

Infiltrating bioretention is infeasible due to infiltration infeasibility.

Non-infiltrating bioretention is infeasible due to proposed slopes on site in excess of 8% and overflow flow path requirements.

Downspout Dispersion Systems

Downspout dispersion systems will be used for full dispersion of select roof surfaces. Design of the proposed dispersion trenches is discussed below.

Perforated Stub-out Connections

Perforated stub-out connections are infeasible for the project due to infiltration infeasibility.

Other Hard Surfaces

Full Dispersion

Full dispersion is not feasible for hard surfaces (with the exception of lots abutting the Wetland A and Wetland C buffers) because the minimum vegetated flow path is less than the required 100 feet.

Permeable Pavement

Permeable pavement infeasible due to infiltration infeasibility.

Bioretention

Infiltrating Bioretention is infeasible due to infiltration infeasibility.

Non-infiltrating bioretention is infeasible due to proposed slopes on site in excess of 8% and overflow flow path requirements.

Sheet Flow Dispersion or Concentrated Flow Dispersion

Sheet flow and concentrated flow dispersion are both infeasible due to limitations on available dispersion flow path.

As noted above, rooftop dispersion will be used for select roof surfaces and all List #2 BMP’s for roof and road flows are infeasible due to site constraints. The project will provide both roof top dispersion and Post-Construction Soil Quality and Depth in accordance with Minimum Requirement 5.

Dispersion Trench Design Criteria

Dispersion trenches that are proposed to disperse rooftop runoff to the Wetland A and Wetland C buffers will be sized in accordance with the “Typical Downspout Dispersion Trench” guidance provided in Figure V-4.4 of the 20019 SWMMWW. This figure requires that the dispersion trench length be 10 feet per 700 square feet of roof area. See Table 6-2 for dispersion trench sizing per contribution roof area.

Table 6-2: Dispersion Trench Sizing

Roof Area	Trench Length
700-1400 SF	20 LF
1401-2100 SF	30 LF
2101-2800 SF	40 LF
2801-3500 SF[1]	50 LF[1]

[1]Lots dispersion trenches serving two lots shall be constructed at 50’ long with plat construction.

Dispersion trenches will be constructed per Figure V-4.5 of the 2019 SWMMWW (Figure 6-3) and will consist of a perforated pipe and catch basin placed in a 2-foot wide trench filled with clean washed rock. Each trench will have a notched grade board at the face of the trench to aid in dispersion.

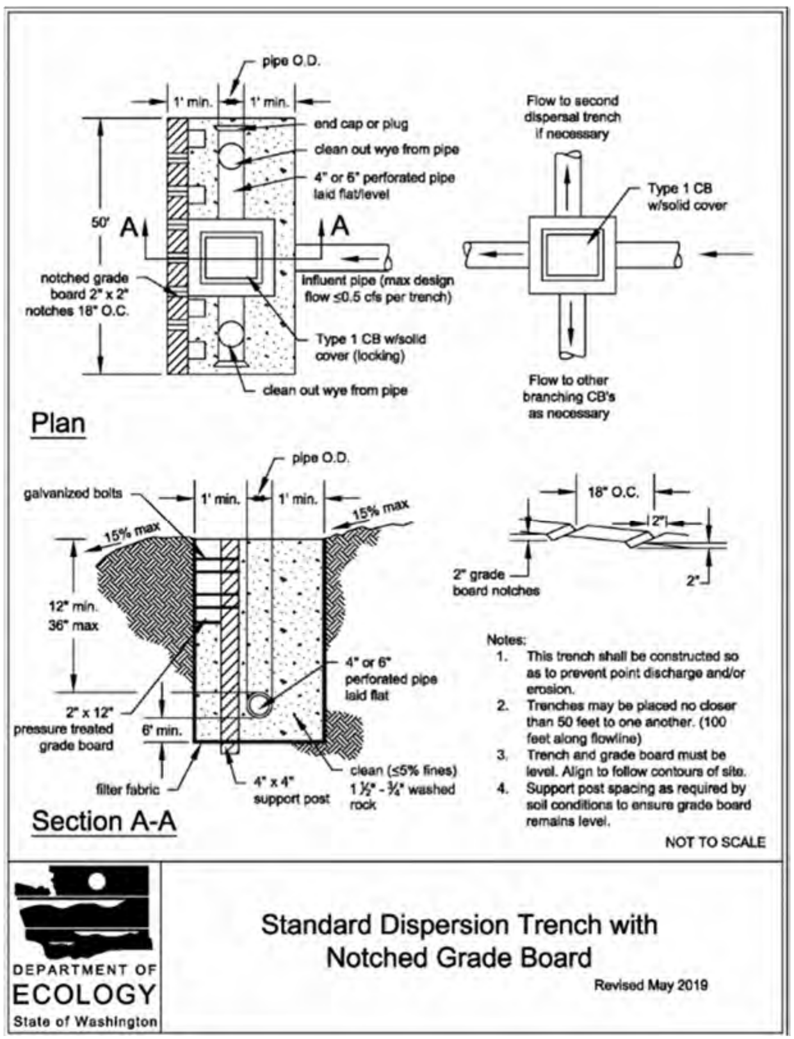


Figure 6-3: Dispersion Trench Design, Figure V-5.4 from the 2019 DOE WMMWW

Dispersion trenches shall be located at the back or side of the lots dispersing runoff, along the property line. There will be positive slope from the proposed homes to the dispersion trench and a maximum slope of 15% (per the 2019 SWMMWW) away from the face of the dispersion trench to the wetland buffer area to facilitate dispersion away from the lots while preventing erosion potential. Current proposed site grading accommodates these requirements.

WATER QUALITY REQUIREMENTS

Enhanced water quality treatment will be provided for runoff from pollution generating surfaces on the property.

Stormwater in the vault sub-basin will be treated using an emerging technology water quality vault that has been approved for general use by the Department of Ecology following discharge from the detention vault. The 2-year discharge rate from the vault will be used to size the water quality vault.

Stormwater in the bypass basin will also be treated with an emerging technology water quality vault that has been approved for general use by the Department of Ecology prior to discharging from the site and entering the City's Stormwater System.

Rooftop runoff that is dispersed to the adjacent wetlands to meet wetland hydro-period requirements from rooftop only and is considered non-pollution generating. Runoff from these areas do not require water quality treatment.

The water quality treatment facilities will be selected and sized during construction document preparation.

FLOW CONTROL REQUIREMENTS

Stormwater discharges shall match developed discharge durations to pre-developed durations for the range of pre-developed discharge rates from 50% of the 2-year peak flow up to the full 50-year peak flow. The pre-developed condition to be matched shall be a forested land cover.

Rooftop runoff fully dispersed to Wetland A or Wetland C to meet wetland hydro-period requirements is omitted from the flow control model, as fully dispersed areas are considered managed for flow control in the Drainage Manual. Fully dispersed areas within the East TDA are removed from both the predeveloped and developed model basins.

Runoff from the vault sub-basin will be collected and routed via sub-grade pipes to the detention vault located along the site access road on the east side of the site. The detention vault is designed to have a water storage depth of 10.25 feet and a footprint of 15,000 square feet. A control structure will be used to restrict flows from the detention vault.

Runoff from the bypass sub-basin will not receive flow control and is modeled with the vault sub-basin in MGS Flood model as bypass.

Full MGS Flood model output is provided in Appendix B, and the detention facility and the overall site stormwater compliance are detailed in Tables 6-3 and 6-4.

Table 6-3: Stormwater Detention Vault Summary Table

Component	Quantity
Vault Area	15,000 SF
Vault Volume (Top of Storage)	153,750 CF
Pond Water Storage Height	10.25 FT
Pond Freeboard	0.5 FT
Control Structure	Circular Standpipe with 3 Orifices

Table 6-4: Predeveloped and Mitigated Flow Duration Comparison

	Required	Performance
Excursion at Predeveloped 50% Q2	≤ 0%	0.0%
Maximum Excursion from 50% Q2 to Q2	≤ 0%	0.0%
Maximum Excursion from Q2 to Q50	< 10%	7.9%
Percent Excursion from Q2 to Q50	< 50%	11.1%

WETLAND PROTECTION – ONSITE WETLANDS

Wetland hydro-period modeling is required for Wetlands A, B, and D due to wetland rating and habitat points. The remaining wetlands on-site and adjacent to the site do not meet the threshold to require wetland modeling.

In the developed condition, Wetland A will receive runoff from the on-site wetland buffer, on site pervious area between the edge of the wetland buffer and the development area, and dispersed rooftop runoff from the lots adjacent to Wetland A. Dispersed rooftop areas are modeled as a lateral flow basin while the remaining pervious area is modeled a forest/lawn and steep/flat as appropriate.

Wetland B will receive runoff from only the on-site buffer. This buffer area is modeled appropriately in the developed condition as flat forest area.

Wetland D is a sloped wetland. Sloped wetlands typically receive water as both interflow and surface flow. Per the project wetland biologist, Wetland D is believed to be fed by both a small surface basin and interflow from Wetland C. For this reason, the predeveloped and developed wetland hydro-period model basins include both the flows from the Wetland C basin, passing through Wetland C to Wetland D and the flows from the Wetland D basin flowing to Wetland D. Rooftops dispersed to Wetland C are modeled as a lateral flow basin while the remaining areas are modeled as forest/lawn/wetland and steep/flat as appropriate.

Full Hydroperiod model results are included in Appendix C and schematics of the predeveloped and post developed wetland basins are provided below in Figures 6-4 and 6-5.

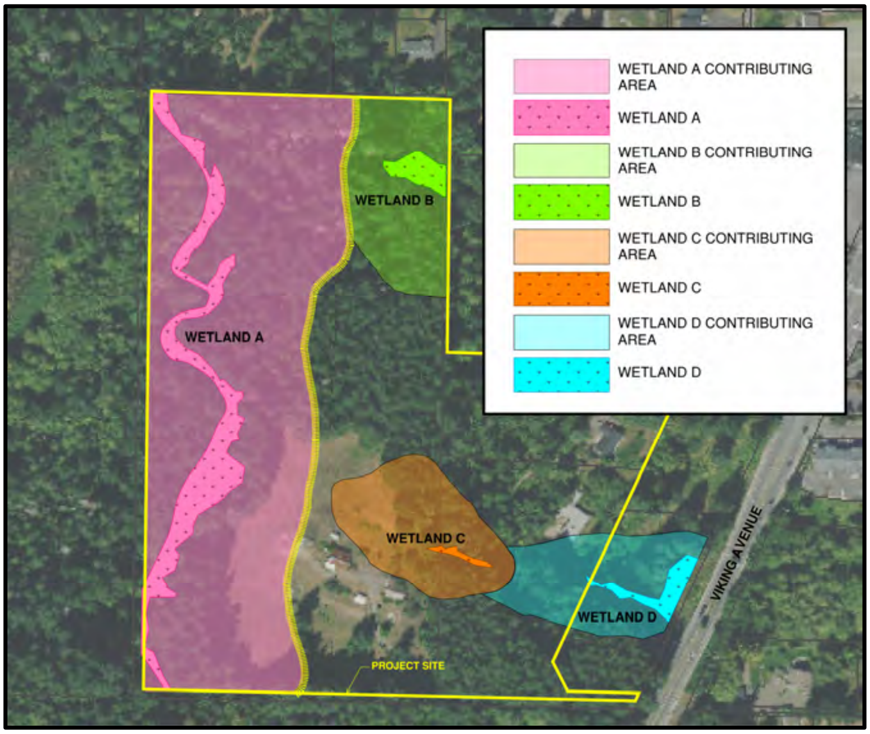


Figure 6-4: Existing Wetland Basin Map

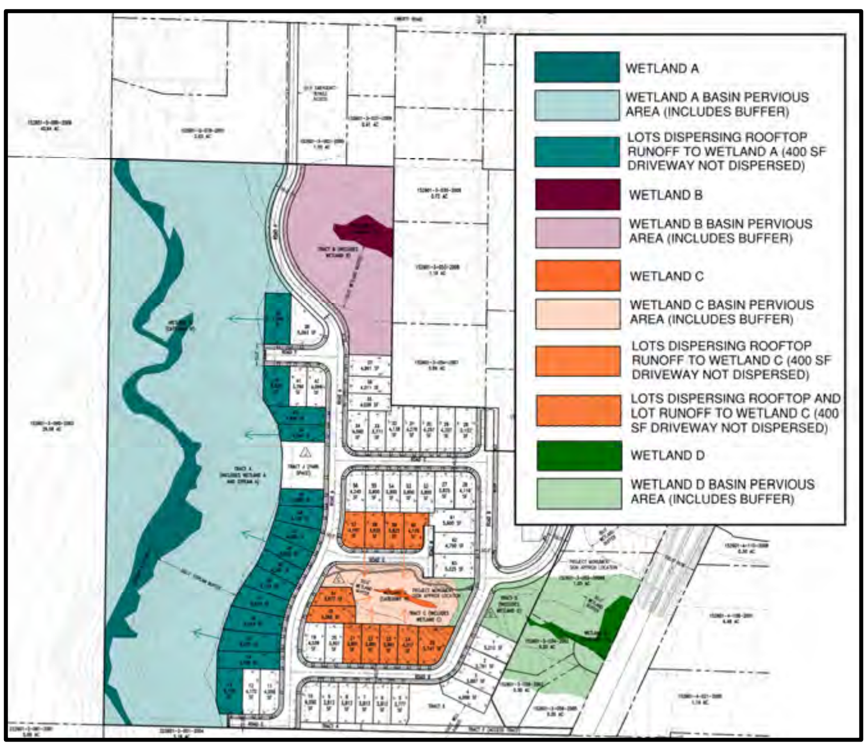


Figure 6-5: Proposed Wetland Basin Map

WETLAND PROTECTION – OFFSITE WETLANDS

Wetland hydro-period modeling analysis is required for offsite Wetland H, along the downstream stormwater flow path due to wetland rating and habitat points.

The project discharges stormwater to the public stormwater system, that discharges to a ditch-like channel that runs through Wetland H to Liberty Bay. See Figure 6-6 for ditch location relative to Wetland H.

Figure 6-6: Stormwater Ditch Through Offsite Wetland H

Following the requirements of the Department of Ecology's Method 2, the Project is able to match hydroperiod requirements for the months of December through August, which is the maximum extent feasible. Due to Wetland H characteristics described by Wetland Resources, the existing stormwater ditch through the wetland, proposed water quality treatment of project stormwater, and metered discharge of runoff from the project area, the hydrology of Wetland H is not anticipated to be impacted by the proposed project runoff.

Although the project team, including Wetland Resources, does not anticipate any impacts to Wetland H from the proposed development. In response to the City's concerns, Wetland Resources has suggested critical area buffer enhancement in the high value Stream/Wetland A buffer located on the Plateau at Liberty Bay project site in an area equal to the area of the stormwater ditch through Wetland H. Therefore, although not required, the project proposes an additional 5,200 square-feet of buffer enhancement in the Stream/Wetland A buffer.

Wetland Hydroperiod Modeling Analysis for Wetland H for the proposed project, analysis of alternative site plans with limited development, the project wetland biologist's professional opinion on impacts to Wetland H's hydrologic function, and proposed critical area buffer enhancement is discussed in the Wetland H memos included in Appendix E.

7. Conveyance

The conveyance system will be designed to convey the 100-year, 24-hour peak storm without overtopping. Conveyance calculations for the proposed on-site conveyance system will be provided with the construction permit submittal.

Preliminary conveyance and backwater calculations for the existing downstream storm drainage system located in Viking Avenue is included in Appendix D.

8. Temporary Erosion and Sedimentation Control

TESC will be installed to prevent transport of sediment-laden runoff from entering adjacent properties and sewer systems. Runoff will be collected and treated on site using a temporary sediment pond in the future detention vault location. TESC facilities will be provided for the project in accordance with Drainage Manual and PMC standards. TESC facilities to be used include temporary interceptor swales, rock check dams, silt fencing, construction fencing, inlet protection, construction entrances, and a temporary sediment pond. Additional TESC details will be provided as part of the engineering plans.

The project disturbance is greater than 1 acre, and therefore a Stormwater Pollution Prevention Plan (SWPPP) is required. A draft SWPPP will be provided with the construction permit submittal.

9. Operation and Maintenance

Operation and maintenance of the drainage facilities shall be accomplished per PMC 13.17.090. An operation and maintenance plan will be provided with the construction permit submittal.

Appendix A

Geotechnical Engineering Report

Submitted Separately at This Time

Appendix B

Drainage Calculations

PLATEAU AT LIBERTY BAY

OVERALL TDA MAP

Z:\2000001-2009999\2000505 Watts\CADD\Design\PPLAT\C1.00 WA PPLAT PLN.dwg

ellsec

Jun 05, 2023 – 1:50pm

THE PLATEAU AT LIBERTY BAY PRD / ENTITLE FUND TWO, LLC

POULSBO, WASHINGTON

PROPOSED CONDITIONS EXHIBIT

SHEET

MGS FLOOD
PROJECT REPORT

Program Version: MGSFlood 4.58
Program License Number: 200410007
Project Simulation Performed on: 09/12/2023 10:27 AM
Report Generation Date: 09/12/2023 10:27 AM

Input File Name:	2023-09-12 Vault Only - No Pond in Project Update.fld
Project Name:	Plateau at Liberty Bay Vault
Analysis Title:	
Comments:	Vault Only - Dispersed Areas Omitted

PRECIPITATION INPUT

Computational Time Step (Minutes): 5

Extended Precipitation Time Series Selected

Full Period of Record Available used for Routing

Climatic Region Number: 5
Precipitation Station : 95004805 Puget West 48 in_5min 10/01/1939-10/01/2097
Evaporation Station : 951048 Puget West 48 in MAP

Evaporation Scale Factor : 0.750

HSPF Parameter Region Number: 1
HSPF Parameter Region Name : Ecology Default

********** Default HSPF Parameters Used (Not Modified by User) ***************

********************** WATERSHED DEFINITION ***********************

Predevelopment/Post Development Tributary Area Summary

	Predeveloped	Post Developed
Total Subbasin Area (acres)	10.950	10.652
Area of Links that Include Precip/Evap (acres)	0.000	0.000
Total (acres)	10.950	10.652

EAST TDA AREA MINUS FULLY DISPERSED AND CRITICAL AREAS

VAULT AND BYPASS BASINS

----------------------SCENARIO: PREDEVELOPED
Number of Subbasins: 1

---------- Subbasin : Predeveloped ----------

	-------Area (Acres) --------
C, Forest, Mod	10.950

Subbasin Total 10.950

--------------------SCENARIO: POSTDEVELOPED
Number of Subbasins: 2

---------- Subbasin : East Vault Basin ----------

	-------Area (Acres) --------
C, Lawn, Flat	4.323
ROADS/FLAT	2.657
ROADS/MOD	0.819
ROOF TOPS/FLAT	1.735
DRIVEWAYS/FLAT	0.303
Subbasin Total	9.836

---------- Subbasin : Road Bypass ----------

	-------Area (Acres) --------
C, Lawn, Steep	0.512
ROADS/FLAT	0.076
ROADS/MOD	0.076
ROADS/STEEP	0.152
Subbasin Total	0.816

************************ **LINK DATA** ******************************

--------------------SCENARIO: PREDEVELOPED
Number of Links: 0

************************ **LINK DATA** ******************************

--------------------SCENARIO: POSTDEVELOPED
Number of Links: 2

--
Link Name: Vault ← **VAULT DESIGN INCLUDING CONTROL STRUCTURE**
Link Type: Structure
Downstream Link Name: New Copy Lnk2

Prismatic Pond Option Used
Pond Floor Elevation (ft) : 100.00
Riser Crest Elevation (ft) : 110.25
Max Pond Elevation (ft) : 111.25
Storage Depth (ft) : 10.25
Pond Bottom Length (ft) : 150.0
Pond Bottom Width (ft) : 100.0
Pond Side Slopes (ft/ft) : Z1= 0.00 Z2= 0.00 Z3= 0.00 Z4= 0.00
Bottom Area (sq-ft) : 15000.
Area at Riser Crest El (sq-ft) : 15,000.
(acres) : 0.344

Volume at Riser Crest (cu-ft) : 153,750.
(ac-ft) : 3.530
Area at Max Elevation (sq-ft) : 15000.
(acres) : 0.344
Vol at Max Elevation (cu-ft) : 168,750.
(ac-ft) : 3.874

Constant Infiltration Option Used
Infiltration Rate (in/hr): 0.00

Riser Geometry
Riser Structure Type : Circular
Riser Diameter (in) : 18.00
Common Length (ft) : 0.000
Riser Crest Elevation : 110.25 ft

Hydraulic Structure Geometry

Number of Devices: 3

---Device Number 1 ---
Device Type : Circular Orifice
Control Elevation (ft) : 100.00
Diameter (in) : 1.88
Orientation : Horizontal
Elbow : Yes

---Device Number 2 ---
Device Type : Circular Orifice
Control Elevation (ft) : 105.70
Diameter (in) : 2.50
Orientation : Horizontal
Elbow : Yes

---Device Number 3 ---
Device Type : Circular Orifice
Control Elevation (ft) : 107.60
Diameter (in) : 2.25
Orientation : Horizontal
Elbow : Yes

--
Link Name: New Copy Lnk2
Link Type: Copy
Downstream Link: None

***********************FLOOD FREQUENCY AND DURATION STATISTICS*********************

---------------------SCENARIO: PREDEVELOPED
Number of Subbasins: 1
Number of Links: 0

---------------------SCENARIO: POSTDEVELOPED

Number of Subbasins: 2
Number of Links: 2

***********Groundwater Recharge Summary *************
Recharge is computed as input to Perlnd Groundwater Plus Infiltration in Structures

Total Predeveloped Recharge During Simulation

Model Element	Recharge Amount (ac-ft)
Subbasin: Predeveloped	2226.389
Total:	2226.389

Total Post Developed Recharge During Simulation

Model Element	Recharge Amount (ac-ft)
Subbasin: East Vault Basin	576.929
Subbasin: Road Bypass	65.677
Link: Vault	Not Computed
Link: New Copy Lnk2	0.000
Total:	642.606

Total Predevelopment Recharge is Greater than Post Developed
Average Recharge Per Year, (Number of Years= 158)
Predeveloped: 14.091 ac-ft/year, Post Developed: 4.067 ac-ft/year

***********Water Quality Facility Data *************

----------------------SCENARIO: PREDEVELOPED

Number of Links: 0

----------------------SCENARIO: POSTDEVELOPED

Number of Links: 2

********** Link: New Copy Lnk2 **********

Infiltration/Filtration Statistics--------------------
Inflow Volume (ac-ft): 4710.84
Inflow Volume Including PPT-Evap (ac-ft): 4710.84
Total Runoff Infiltrated (ac-ft): 0.00, 0.00%
Total Runoff Filtered (ac-ft): 0.00, 0.00%
Primary Outflow To Downstream System (ac-ft): 4710.84
Secondary Outflow To Downstream System (ac-ft): 0.00
Volume Lost to ET (ac-ft): 0.00
Percent Treated (Infiltrated+Filtered+ET)/Total Volume: 0.00%

***********Compliance Point Results *************

Scenario Predeveloped Compliance Subbasin: Predeveloped

Scenario Postdeveloped Compliance Link: New Copy Lnk2

***** Point of Compliance Flow Frequency Data *****
Recurrence Interval Computed Using Gringorten Plotting Position

Predevelopment Runoff		Postdevelopment Runoff	
Tr (Years)	Discharge (cfs)	Tr (Years)	Discharge (cfs)
2-Year	0.437	2-Year	0.494
5-Year	0.770	5-Year	0.667
10-Year	1.081	10-Year	0.846
25-Year	1.397	25-Year	1.065
50-Year	1.545	50-Year	1.126
100-Year	2.034	100-Year	1.153
200-Year	3.453	200-Year	1.264
500-Year	5.348	500-Year	1.414

** Record too Short to Compute Peak Discharge for These Recurrence Intervals

****** Flow Duration Performance ******

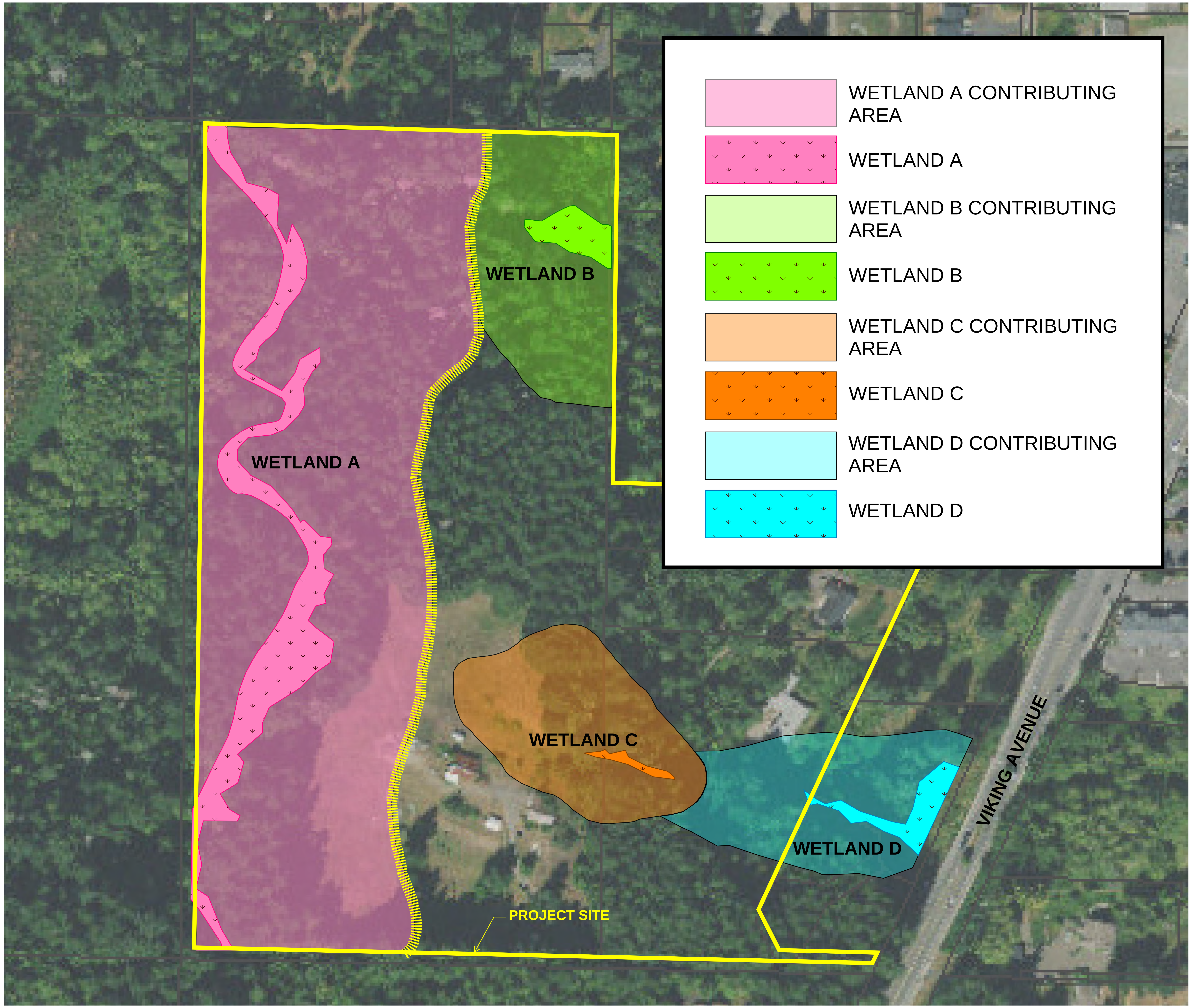
Excursion at Predeveloped 50%Q2 (Must be Less Than or Equal to 0%):	0.0%	PASS
Maximum Excursion from 50%Q2 to Q2 (Must be Less Than or Equal to 0%):	0.0%	PASS
Maximum Excursion from Q2 to Q50 (Must be less than 10%):	7.9%	PASS
Percent Excursion from Q2 to Q50 (Must be less than 50%):	11.1%	PASS

MEETS ALL FLOW DURATION DESIGN CRITERIA: PASS

DESIGN PASSES FLOW DURATION PERFORMANCE REQUIREMENTS

Appendix C

Onsite Wetland Hydroperiod Modeling



PLATEAU AT LIBERTY BAY

EXISTING WETLAND BASIN MAP


WETLAND A
WETLAND A BASIN PERVIOUS AREA (INCLUDES BUFFER)
LOTS DISPERSING ROOFTOP RUNOFF TO WETLAND A (400 SF DRIVEWAY NOT DISPERSED)
WETLAND B
WETLAND B BASIN PERVIOUS AREA (INCLUDES BUFFER)
WETLAND C
WETLAND C BASIN PERVIOUS AREA (INCLUDES BUFFER)
LOTS DISPERSING ROOFTOP RUNOFF TO WETLAND C (400 SF DRIVEWAY NOT DISPERSED)
LOTS DISPERSING ROOFTOP AND LOT RUNOFF TO WETLAND C (400 SF DRIVEWAY NOT DISPERSED)
WETLAND D
WETLAND D BASIN PERVIOUS AREA (INCLUDES BUFFER)
LIBERTY ROAD
WETLAND A (CATEGORY III)
WETLAND B (CATEGORY III)
TRACT B (INCLUDES WETLAND B)
150.0' WETLAND BUFFER
TRACT A (INCLUDES WETLAND A AND STREAM A)
TRACT J (PARK SPACE)
STREAM A (TYPE F)
200.0' STREAM BUFFER
WETLAND C (CATEGORY IV)
TRACT C (INCLUDES WETLAND C)
PROJECT MONUMENT SIGN APPROX LOCATION
TRACT D (INCLUDES WETLAND D)
WETLAND D (CATEGORY IV)
20.0' EMERGENCY VEHICLE ACCESS
ROAD A
ROAD B
ROAD C
ROAD E
ROAD F
ROAD G
TRACT E
TRACT K
TRACT F (ACCESS TRACT)
152601-3-089-2006 40.94 AC
152601-3-076-2001 2.03 AC
152601-3-002-2000 1.05 AC
152601-3-037-2009 0.41 AC
152601-3-030-2006 0.72 AC
152601-3-053-2008 1.18 AC
152601-3-054-2007 0.96 AC
152601-3-090-2003 29.59 AC
152601-4-110-2009 0.30 AC
152601-3-055-20066 1.05 AC
152601-4-108-2001 6.49 AC
152601-3-034-2002 0.30 AC
152601-3-026-2002 0.30 AC
152601-3-056-2005 0.35 AC
152601-4-021-2005 1.14 AC
222601-2-061-2001 5.00 AC
222601-2-001-2004 5.16 AC
N
0 40 80 160
1 inch = 80 feet
THE PLATEAU AT LIBERTY BAY PRD / ENTITLE FUND TWO, LLC
POULSBO, WASHINGTON
SHEET
WETLAND DISPERSION EXHIBIT

WWHM2012

PROJECT REPORT

WETLAND A HYDRO-PERIOD

General Model Information

Project Name:	WetlandA-Hydroperiod-Model
Site Name:	
Site Address:	
City:	
Report Date:	6/5/2023
Gage:	Quilcene
Data Start:	1948/10/01
Data End:	2009/09/30
Timestep:	15 Minute
Precip Scale:	0.80
Version Date:	2016/02/25
Version:	4.2.12

POC Thresholds

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

Landuse Basin Data

Predeveloped Land Use

Steep Forest

Bypass: No

GroundWater: No

Pervious Land Use	acre
C, Forest, Steep	4.5

Element Flows To:

Surface	Interflow	Groundwater

Flat Lawn

Bypass: No

GroundWater: No

Pervious Land Use	acre
C, Lawn, Flat	1.5

Element Flows To:

Surface	Interflow	Groundwater
Steep Forest	Steep Forest	Steep Forest

Flat Forest

Bypass:	No	
GroundWater:	No	
Pervious Land Use	acre	
C, Forest, Flat	3.9	
Element Flows To:		
Surface	Interflow	Groundwater
Steep Forest	Steep Forest	Steep Forest

Mitigated Land Use

BufferA

Bypass:	No	
GroundWater:	No	
Pervious Land Use	acre	
C, Forest, Mod	3.47	
Element Flows To:		
Surface	Interflow	Groundwater
Steep Forest A Buffer	Steep Forest A Buffer	Steep Forest A Buffer

Open Space (Lavn)

Bypass:	No	
GroundWater:	No	
Pervious Land Use	acre	
C, Forest, Mod	.44	
Element Flows To:		
Surface	Interflow	Groundwater
BufferA	BufferA	BufferA

Steep Forest A Buffer

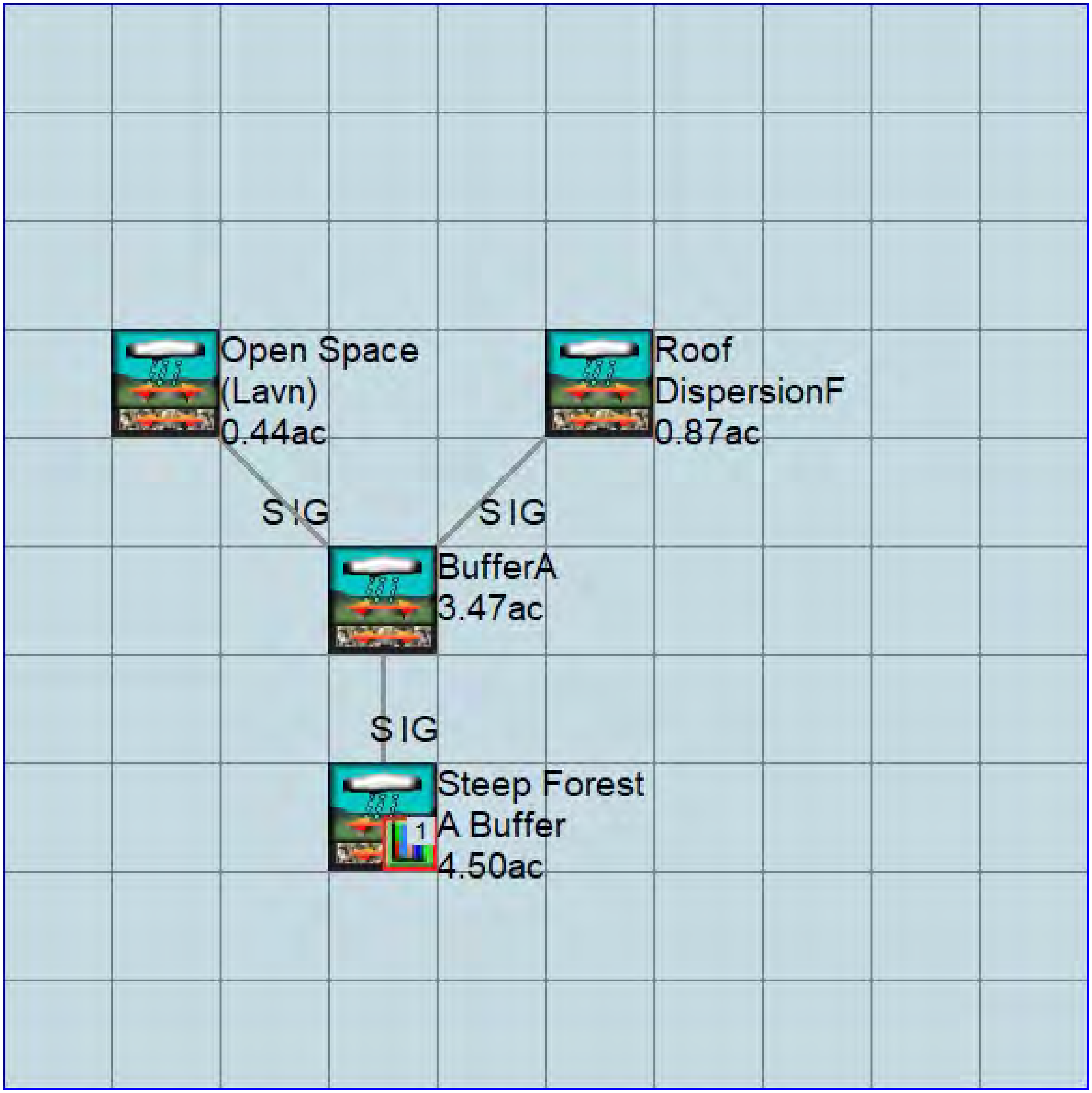
Bypass:	No	
GroundWater:	No	
Pervious Land Use	acre	
C, Forest, Steep	4.5	
Element Flows To:		
Surface	Interflow	Groundwater

Roof DispersionF

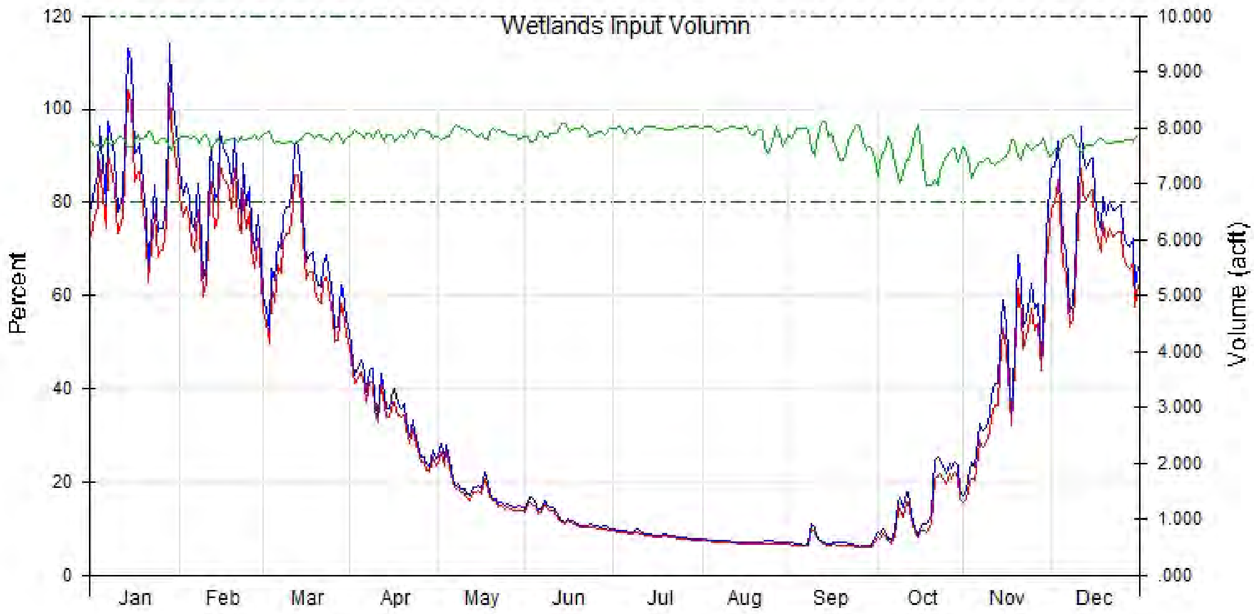
Bypass:	No	
GroundWater:	No	
Pervious Land Use	acre	
C IMP DISP FLAT	.87	
Element Flows To:		
Surface	Interflow	Groundwater
BufferA	BufferA	BufferA

Appendix
Predeveloped Schematic

Mitigated Schematic



Wetland Input Volumes



- Percent - Predeveloped - Mitigated

Wetlands Input Volumn for POC 1
Average Annual Volume (acft)
Series 1: 501 POC 1 Predeveloped flow
Series 2: 801 POC 1 Mitigated flow

Month	Series 1	Series 2	Percent	Pass/Fail
Jan	225.4630	209.7490	93.0	Pass
Feb	194.2370	181.5140	93.4	Pass
Mar	176.1869	165.0169	93.7	Pass
Apr	91.4934	86.4443	94.5	Pass
May	49.3050	46.6788	94.7	Pass
Jun	31.6916	30.0680	94.9	Pass
Jul	22.9137	21.9465	95.8	Pass
Aug	18.8849	17.9422	95.0	Pass
Sep	17.7142	16.5931	93.7	Pass
Oct	39.5065	34.9832	88.6	Pass
Nov	110.2723	99.8125	90.5	Pass
Dec	201.6245	186.4823	92.5	Pass

Day	Predevel	Mitigated	Percent	Pass/Fail
Jan1	6.5563	6.0905	92.9	Pass
2	6.9512	6.4013	92.1	Pass
3	7.1572	6.5984	92.2	Pass
4	8.0346	7.4141	92.3	Pass
5	7.3584	6.7589	91.9	Pass
6	6.6212	6.2004	93.6	Pass
7	8.1064	7.5460	93.1	Pass
8	7.8739	7.2817	92.5	Pass
9	7.4990	6.9589	92.8	Pass
10	6.5031	6.1026	93.8	Pass
11	6.5522	6.1723	94.2	Pass
12	6.8343	6.4006	93.7	Pass
13	8.4716	7.8569	92.7	Pass
14	9.4359	8.6679	91.9	Pass

15	9.2303	8.4818	91.9	Pass
16	7.5562	7.0332	93.1	Pass
17	7.6452	7.2216	94.5	Pass
18	7.7181	7.2193	93.5	Pass
19	6.9872	6.5626	93.9	Pass
20	6.4386	6.0698	94.3	Pass
21	5.4983	5.2356	95.2	Pass
22	6.1569	5.8421	94.9	Pass
23	6.9825	6.4770	92.8	Pass
24	6.1326	5.6849	92.7	Pass
25	6.2011	5.7984	93.5	Pass
26	6.2145	5.8165	93.6	Pass
27	6.7282	6.2888	93.5	Pass
28	9.5106	8.7493	92.0	Pass
29	8.8046	8.0309	91.2	Pass
30	8.1506	7.5754	92.9	Pass
31	7.7231	7.2267	93.6	Pass
Feb1	7.2476	6.8031	93.9	Pass
2	6.8051	6.4079	94.2	Pass
3	7.0060	6.5933	94.1	Pass
4	6.7404	6.3165	93.7	Pass
5	6.3088	5.9213	93.9	Pass
6	6.1644	5.7915	94.0	Pass
7	7.0003	6.5363	93.4	Pass
8	6.6070	6.1242	92.7	Pass
9	5.3001	4.9803	94.0	Pass
10	5.5108	5.2162	94.7	Pass
11	7.3266	6.8247	93.1	Pass
12	7.6684	7.0298	91.7	Pass
13	6.6961	6.2023	92.6	Pass
14	6.8355	6.3982	93.6	Pass
15	7.9451	7.3581	92.6	Pass
16	7.6748	7.0947	92.4	Pass
17	7.5477	7.0396	93.3	Pass
18	7.3377	6.8494	93.3	Pass
19	6.9989	6.5535	93.6	Pass
20	7.8027	7.2758	93.2	Pass
21	6.8272	6.3516	93.0	Pass
22	6.4837	6.1131	94.3	Pass
23	7.3677	6.8876	93.5	Pass
24	6.6189	6.1910	93.5	Pass
25	6.9493	6.5093	93.7	Pass
26	6.2385	5.8400	93.6	Pass
27	5.8081	5.4910	94.5	Pass
28	6.4525	6.0243	93.4	Pass
29	5.6679	5.3352	94.1	Pass
Mar1	4.9843	4.7110	94.5	Pass
2	4.7805	4.5349	94.9	Pass
3	4.3567	4.1484	95.2	Pass
4	5.4829	5.1591	94.1	Pass
5	5.2885	4.9021	92.7	Pass
6	5.9664	5.5470	93.0	Pass
7	5.8302	5.3984	92.6	Pass
8	6.4247	5.9629	92.8	Pass
9	6.5829	6.0999	92.7	Pass
10	6.5878	6.1269	93.0	Pass
11	7.1187	6.6002	92.7	Pass
12	7.7355	7.1703	92.7	Pass

13	7.6809	7.1487	93.1	Pass
14	7.1092	6.6343	93.3	Pass
15	6.4169	6.0334	94.0	Pass
16	5.5924	5.3112	95.0	Pass
17	5.7221	5.4355	95.0	Pass
18	5.7704	5.4213	93.9	Pass
19	5.4445	5.1098	93.9	Pass
20	5.1913	4.9046	94.5	Pass
21	5.1459	4.8561	94.4	Pass
22	5.5511	5.2034	93.7	Pass
23	5.7124	5.3266	93.2	Pass
24	5.3673	5.0022	93.2	Pass
25	4.9248	4.6300	94.0	Pass
26	4.4156	4.1763	94.6	Pass
27	4.4396	4.2052	94.7	Pass
28	5.1911	4.8719	93.9	Pass
29	5.1042	4.7323	92.7	Pass
30	4.6014	4.3139	93.8	Pass
31	4.3409	4.0921	94.3	Pass
Apr1	3.8233	3.6300	94.9	Pass
2	3.5915	3.4278	95.4	Pass
3	3.6907	3.5028	94.9	Pass
4	3.8410	3.6308	94.5	Pass
5	3.6225	3.4018	93.9	Pass
6	3.2698	3.1029	94.9	Pass
7	3.6604	3.4650	94.7	Pass
8	3.6924	3.4577	93.6	Pass
9	3.1637	2.9789	94.2	Pass
10	2.8613	2.7343	95.6	Pass
11	3.6095	3.4091	94.4	Pass
12	3.2615	3.0391	93.2	Pass
13	2.9902	2.8246	94.5	Pass
14	2.9845	2.8234	94.6	Pass
15	3.3122	3.1139	94.0	Pass
16	3.3283	3.1013	93.2	Pass
17	3.0630	2.8730	93.8	Pass
18	2.9871	2.8239	94.5	Pass
19	3.0637	2.8754	93.9	Pass
20	2.7789	2.6210	94.3	Pass
21	2.4597	2.3468	95.4	Pass
22	2.7636	2.6222	94.9	Pass
23	2.5980	2.4382	93.8	Pass
24	2.3435	2.2269	95.0	Pass
25	2.1041	2.0124	95.6	Pass
26	2.1165	2.0253	95.7	Pass
27	1.9891	1.8902	95.0	Pass
28	1.9355	1.8432	95.2	Pass
29	2.2488	2.1116	93.9	Pass
30	2.0875	1.9614	94.0	Pass
May1	2.1143	1.9918	94.2	Pass
2	2.3499	2.1989	93.6	Pass
3	2.0963	1.9635	93.7	Pass
4	2.3368	2.1965	94.0	Pass
5	2.0446	1.9209	94.0	Pass
6	1.7308	1.6590	95.9	Pass
7	1.6003	1.5491	96.8	Pass
8	1.6258	1.5650	96.3	Pass
9	1.5596	1.4932	95.7	Pass

10	1.5349	1.4655	95.5	Pass
11	1.4552	1.3876	95.4	Pass
12	1.4143	1.3512	95.5	Pass
13	1.5789	1.4953	94.7	Pass
14	1.5872	1.4961	94.3	Pass
15	1.6125	1.5151	94.0	Pass
16	1.5486	1.4688	94.8	Pass
17	1.8335	1.7180	93.7	Pass
18	1.6571	1.5499	93.5	Pass
19	1.4816	1.4084	95.1	Pass
20	1.3816	1.3250	95.9	Pass
21	1.3760	1.3112	95.3	Pass
22	1.2826	1.2251	95.5	Pass
23	1.3014	1.2374	95.1	Pass
24	1.2514	1.1921	95.3	Pass
25	1.2921	1.2224	94.6	Pass
26	1.2511	1.1827	94.5	Pass
27	1.2155	1.1490	94.5	Pass
28	1.2293	1.1617	94.5	Pass
29	1.2527	1.1706	93.4	Pass
30	1.2219	1.1467	93.9	Pass
31	1.1968	1.1262	94.1	Pass
Jun1	1.3107	1.2354	94.3	Pass
2	1.3959	1.3000	93.1	Pass
3	1.3539	1.2592	93.0	Pass
4	1.2929	1.2080	93.4	Pass
5	1.1710	1.1126	95.0	Pass
6	1.1973	1.1412	95.3	Pass
7	1.3529	1.2728	94.1	Pass
8	1.2556	1.1779	93.8	Pass
9	1.2082	1.1452	94.8	Pass
10	1.2105	1.1463	94.7	Pass
11	1.1383	1.0787	94.8	Pass
12	1.0340	0.9923	96.0	Pass
13	0.9685	0.9379	96.8	Pass
14	0.9507	0.9214	96.9	Pass
15	1.0108	0.9703	96.0	Pass
16	0.9921	0.9454	95.3	Pass
17	0.9702	0.9256	95.4	Pass
18	0.9272	0.8890	95.9	Pass
19	0.9038	0.8679	96.0	Pass
20	0.8836	0.8497	96.2	Pass
21	0.8851	0.8477	95.8	Pass
22	0.9045	0.8606	95.1	Pass
23	0.9141	0.8609	94.2	Pass
24	0.8968	0.8480	94.6	Pass
25	0.8808	0.8355	94.9	Pass
26	0.8660	0.8256	95.3	Pass
27	0.8680	0.8262	95.2	Pass
28	0.8945	0.8451	94.5	Pass
29	0.8572	0.8150	95.1	Pass
30	0.8333	0.7982	95.8	Pass
Jul1	0.8346	0.7998	95.8	Pass
2	0.8128	0.7789	95.8	Pass
3	0.7970	0.7660	96.1	Pass
4	0.7964	0.7628	95.8	Pass
5	0.8029	0.7619	94.9	Pass
6	0.7839	0.7478	95.4	Pass

7	0.7708	0.7394	95.9	Pass
8	0.7847	0.7517	95.8	Pass
9	0.8213	0.7752	94.4	Pass
10	0.7994	0.7569	94.7	Pass
11	0.7678	0.7344	95.7	Pass
12	0.7470	0.7190	96.3	Pass
13	0.7371	0.7101	96.3	Pass
14	0.7294	0.7015	96.2	Pass
15	0.7228	0.6947	96.1	Pass
16	0.7237	0.6939	95.9	Pass
17	0.7170	0.6873	95.9	Pass
18	0.7078	0.6799	96.1	Pass
19	0.7317	0.6997	95.6	Pass
20	0.7178	0.6853	95.5	Pass
21	0.7092	0.6776	95.5	Pass
22	0.7058	0.6755	95.7	Pass
23	0.6949	0.6662	95.9	Pass
24	0.6828	0.6563	96.1	Pass
25	0.6773	0.6511	96.1	Pass
26	0.6717	0.6448	96.0	Pass
27	0.6654	0.6394	96.1	Pass
28	0.6602	0.6346	96.1	Pass
29	0.6552	0.6297	96.1	Pass
30	0.6512	0.6258	96.1	Pass
31	0.6475	0.6214	96.0	Pass
Aug1	0.6426	0.6172	96.1	Pass
2	0.6383	0.6135	96.1	Pass
3	0.6340	0.6095	96.1	Pass
4	0.6299	0.6055	96.1	Pass
5	0.6264	0.6016	96.0	Pass
6	0.6295	0.5995	95.2	Pass
7	0.6281	0.5976	95.1	Pass
8	0.6211	0.5944	95.7	Pass
9	0.6158	0.5907	95.9	Pass
10	0.6107	0.5867	96.1	Pass
11	0.6054	0.5824	96.2	Pass
12	0.6010	0.5782	96.2	Pass
13	0.6003	0.5749	95.8	Pass
14	0.5978	0.5723	95.7	Pass
15	0.5933	0.5693	95.9	Pass
16	0.5886	0.5656	96.1	Pass
17	0.5889	0.5642	95.8	Pass
18	0.6027	0.5686	94.3	Pass
19	0.5979	0.5657	94.6	Pass
20	0.5895	0.5621	95.4	Pass
21	0.5850	0.5585	95.5	Pass
22	0.5829	0.5556	95.3	Pass
23	0.6136	0.5614	91.5	Pass
24	0.6309	0.5706	90.4	Pass
25	0.6198	0.5720	92.3	Pass
26	0.5988	0.5662	94.5	Pass
27	0.5802	0.5576	96.1	Pass
28	0.5858	0.5526	94.3	Pass
29	0.6005	0.5531	92.1	Pass
30	0.5968	0.5539	92.8	Pass
31	0.5830	0.5505	94.4	Pass
Sep1	0.5820	0.5465	93.9	Pass
2	0.5714	0.5420	94.9	Pass

3	0.5597	0.5360	95.8	Pass
4	0.5524	0.5299	95.9	Pass
5	0.5473	0.5248	95.9	Pass
6	0.5413	0.5201	96.1	Pass
7	0.5533	0.5289	95.6	Pass
8	0.9131	0.8378	91.8	Pass
9	0.8648	0.7767	89.8	Pass
10	0.7259	0.6740	92.9	Pass
11	0.6343	0.6081	95.9	Pass
12	0.5803	0.5653	97.4	Pass
13	0.5554	0.5389	97.0	Pass
14	0.5586	0.5261	94.2	Pass
15	0.5494	0.5205	94.7	Pass
16	0.5982	0.5526	92.4	Pass
17	0.5807	0.5342	92.0	Pass
18	0.5989	0.5328	89.0	Pass
19	0.6054	0.5405	89.3	Pass
20	0.5897	0.5370	91.1	Pass
21	0.5668	0.5302	93.5	Pass
22	0.5583	0.5279	94.6	Pass
23	0.5390	0.5167	95.9	Pass
24	0.5221	0.5048	96.7	Pass
25	0.5159	0.4972	96.4	Pass
26	0.5312	0.4948	93.1	Pass
27	0.5464	0.4978	91.1	Pass
28	0.5439	0.4999	91.9	Pass
29	0.5459	0.5005	91.7	Pass
30	0.6557	0.5857	89.3	Pass
Oct1	0.7865	0.6737	85.7	Pass
2	0.7457	0.6611	88.7	Pass
3	0.8206	0.7459	90.9	Pass
4	0.7476	0.6865	91.8	Pass
5	0.6476	0.6086	94.0	Pass
6	0.6104	0.5647	92.5	Pass
7	0.7948	0.7016	88.3	Pass
8	1.3168	1.1324	86.0	Pass
9	1.4071	1.1837	84.1	Pass
10	1.2124	1.0476	86.4	Pass
11	1.4823	1.3207	89.1	Pass
12	1.4796	1.3183	89.1	Pass
13	1.0995	1.0046	91.4	Pass
14	0.8543	0.8113	95.0	Pass
15	0.7189	0.6958	96.8	Pass
16	0.8346	0.7850	94.0	Pass
17	0.9200	0.8052	87.5	Pass
18	0.9182	0.7689	83.7	Pass
19	0.9496	0.7936	83.6	Pass
20	1.0868	0.9107	83.8	Pass
21	2.0519	1.7385	84.7	Pass
22	2.1081	1.7647	83.7	Pass
23	2.0901	1.8110	86.6	Pass
24	1.9636	1.7328	88.2	Pass
25	1.8053	1.6234	89.9	Pass
26	1.9930	1.8108	90.9	Pass
27	1.9076	1.7403	91.2	Pass
28	2.0214	1.8516	91.6	Pass
29	1.9664	1.7474	88.9	Pass
30	1.5115	1.3579	89.8	Pass

31	1.4151	1.3010	91.9	Pass
Nov1	1.5152	1.3762	90.8	Pass
2	1.8827	1.6575	88.0	Pass
3	2.0213	1.7210	85.1	Pass
4	1.9433	1.6855	86.7	Pass
5	2.4457	2.1545	88.1	Pass
6	2.7253	2.4176	88.7	Pass
7	2.5820	2.2954	88.9	Pass
8	2.6632	2.3827	89.5	Pass
9	2.8701	2.5584	89.1	Pass
10	3.2083	2.8397	88.5	Pass
11	3.4369	3.0302	88.2	Pass
12	3.4380	3.0499	88.7	Pass
13	4.1104	3.6474	88.7	Pass
14	4.9213	4.3991	89.4	Pass
15	4.4698	4.0108	89.7	Pass
16	3.4617	3.1628	91.4	Pass
17	2.8755	2.6841	93.3	Pass
18	3.9965	3.7147	92.9	Pass
19	5.7245	5.1347	89.7	Pass
20	5.2592	4.6905	89.2	Pass
21	4.4443	4.0436	91.0	Pass
22	4.5987	4.2634	92.7	Pass
23	4.9838	4.5724	91.7	Pass
24	5.2060	4.7566	91.4	Pass
25	4.7605	4.3834	92.1	Pass
26	4.8694	4.4895	92.2	Pass
27	3.9492	3.6675	92.9	Pass
28	4.4197	4.1414	93.7	Pass
29	6.0851	5.5721	91.6	Pass
30	6.9400	6.2344	89.8	Pass
Dec1	7.2640	6.5495	90.2	Pass
2	7.3008	6.6530	91.1	Pass
3	7.7525	7.0592	91.1	Pass
4	6.5568	6.0294	92.0	Pass
5	5.9522	5.5582	93.4	Pass
6	5.7739	5.4043	93.6	Pass
7	4.7174	4.4560	94.5	Pass
8	4.8614	4.5797	94.2	Pass
9	5.3535	4.9899	93.2	Pass
10	6.8494	6.3029	92.0	Pass
11	8.0136	7.2837	90.9	Pass
12	7.4973	6.8248	91.0	Pass
13	7.2657	6.6974	92.2	Pass
14	7.4208	6.8514	92.3	Pass
15	7.4640	6.8910	92.3	Pass
16	6.7873	6.3022	92.9	Pass
17	6.4251	5.9969	93.3	Pass
18	6.1670	5.7866	93.8	Pass
19	6.7756	6.3218	93.3	Pass
20	6.4418	5.9683	92.6	Pass
21	6.6744	6.1957	92.8	Pass
22	6.5301	6.0469	92.6	Pass
23	6.5440	6.0843	93.0	Pass
24	6.5890	6.1283	93.0	Pass
25	6.6124	6.1462	92.9	Pass
26	6.1597	5.7210	92.9	Pass
27	5.9261	5.5343	93.4	Pass

28	5.8656	5.4853	93.5	Pass
29	6.0139	5.5856	92.9	Pass
30	5.1298	4.8138	93.8	Pass
31	5.5543	5.2184	94.0	Pass

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WWHM2012

PROJECT REPORT

WETLAND B HYDRO-PERIOD

General Model Information

Project Name:	WetlandB-Hydroperiod-Model
Site Name:	
Site Address:	
City:	
Report Date:	6/5/2023
Gage:	Quilcene
Data Start:	1948/10/01
Data End:	2009/09/30
Timestep:	15 Minute
Precip Scale:	0.80
Version Date:	2016/02/25
Version:	4.2.12

POC Thresholds

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

Landuse Basin Data

Predeveloped Land Use

Lateral Basin 1

Bypass: No

GroundWater: No

Pervious Land Use	acre
C, Forest, Flat	1.44

Element Flows To:

Surface	Interflow	Groundwater

Mitigated Land Use

BufferWetlandB

Bypass: No

GroundWater: No

Pervious Land Use	acre
C, Forest, Flat	1.56

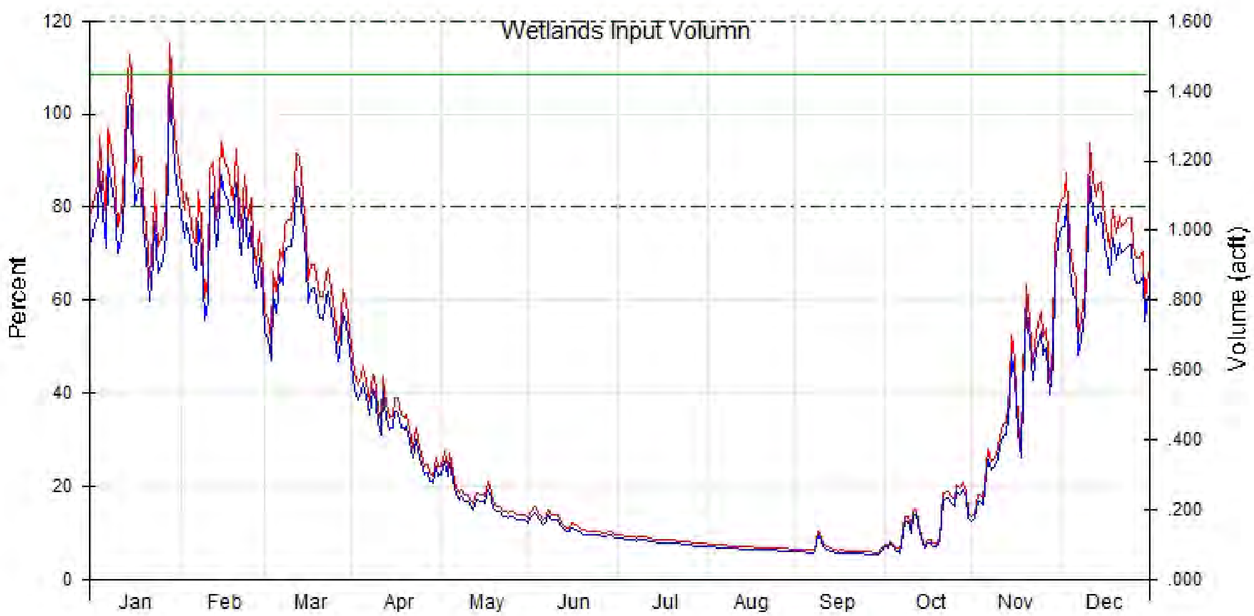
Element Flows To:

Surface	Interflow	Groundwater

Appendix
Predeveloped Schematic

Mitigated Schematic

Wetland Input Volumes



- Percent - Predeveloped - Mitigated

Wetlands Input Volumn for POC 1
Average Annual Volume (acft)
Series 1: 501 POC 1 Predeveloped flow
Series 2: 801 POC 1 Mitigated flow

Month	**Series 1**	**Series 2**	**Percent**	**Pass/Fail**
Jan	32.8456	35.5817	108.3	Pass
Feb	28.0230	30.3600	108.3	Pass
Mar	25.4437	27.5648	108.3	Pass
Apr	13.1736	14.2713	108.3	Pass
May	6.9686	7.5493	108.3	Pass
Jun	4.4468	4.8173	108.3	Pass
Jul	3.3123	3.5885	108.3	Pass
Aug	2.6835	2.9071	108.3	Pass
Sep	2.3953	2.5948	108.3	Pass
Oct	4.6696	5.0586	108.3	Pass
Nov	14.2515	15.4390	108.3	Pass
Dec	28.5524	30.9310	108.3	Pass

Day	**Predevel**	**Mitigated**	**Percent**	**Pass/Fail**
Jan1	0.9686	1.0494	108.3	Pass
2	1.0144	1.0989	108.3	Pass
3	1.0420	1.1288	108.3	Pass
4	1.1734	1.2712	108.3	Pass
5	1.0509	1.1385	108.3	Pass
6	0.9501	1.0293	108.3	Pass
7	1.1931	1.2926	108.3	Pass
8	1.1419	1.2371	108.3	Pass
9	1.0808	1.1708	108.3	Pass
10	0.9332	1.0109	108.3	Pass
11	0.9560	1.0356	108.3	Pass
12	1.0041	1.0878	108.3	Pass
13	1.2569	1.3617	108.3	Pass
14	1.3895	1.5053	108.3	Pass

15	1.3393	1.4509	108.3	Pass
16	1.0740	1.1635	108.3	Pass
17	1.1151	1.2080	108.3	Pass
18	1.1201	1.2135	108.3	Pass
19	1.0097	1.0938	108.3	Pass
20	0.9311	1.0087	108.3	Pass
21	0.7979	0.8644	108.3	Pass
22	0.9141	0.9902	108.3	Pass
23	1.0246	1.1099	108.3	Pass
24	0.8801	0.9534	108.3	Pass
25	0.9028	0.9780	108.3	Pass
26	0.9095	0.9853	108.3	Pass
27	0.9930	1.0757	108.3	Pass
28	1.4193	1.5375	108.3	Pass
29	1.2658	1.3712	108.3	Pass
30	1.1779	1.2761	108.3	Pass
31	1.1122	1.2048	108.3	Pass
Feb1	1.0459	1.1330	108.3	Pass
2	0.9784	1.0600	108.3	Pass
3	1.0212	1.1062	108.3	Pass
4	0.9758	1.0571	108.3	Pass
5	0.9083	0.9840	108.3	Pass
6	0.8891	0.9632	108.3	Pass
7	1.0281	1.1138	108.3	Pass
8	0.9511	1.0304	108.3	Pass
9	0.7457	0.8078	108.3	Pass
10	0.7966	0.8630	108.3	Pass
11	1.0819	1.1720	108.3	Pass
12	1.1063	1.1984	108.3	Pass
13	0.9525	1.0319	108.3	Pass
14	0.9900	1.0725	108.3	Pass
15	1.1579	1.2544	108.3	Pass
16	1.1006	1.1923	108.3	Pass
17	1.0874	1.1780	108.3	Pass
18	1.0567	1.1447	108.3	Pass
19	1.0058	1.0896	108.3	Pass
20	1.1363	1.2310	108.3	Pass
21	0.9685	1.0492	108.3	Pass
22	0.9312	1.0088	108.3	Pass
23	1.0706	1.1598	108.3	Pass
24	0.9495	1.0286	108.3	Pass
25	1.0094	1.0935	108.3	Pass
26	0.8925	0.9669	108.3	Pass
27	0.8327	0.9021	108.3	Pass
28	0.9217	0.9985	108.3	Pass
29	0.8104	0.8780	108.3	Pass
Mar1	0.7072	0.7662	108.3	Pass
2	0.6899	0.7474	108.3	Pass
3	0.6304	0.6829	108.3	Pass
4	0.8155	0.8835	108.3	Pass
5	0.7612	0.8246	108.3	Pass
6	0.8731	0.9459	108.3	Pass
7	0.8445	0.9149	108.3	Pass
8	0.9377	1.0158	108.3	Pass
9	0.9527	1.0321	108.3	Pass
10	0.9522	1.0315	108.3	Pass
11	1.0317	1.1177	108.3	Pass
12	1.1262	1.2201	108.3	Pass

13	1.1191	1.2124	108.3	Pass
14	1.0191	1.1041	108.3	Pass
15	0.9132	0.9893	108.3	Pass
16	0.7929	0.8590	108.3	Pass
17	0.8306	0.8998	108.3	Pass
18	0.8326	0.9019	108.3	Pass
19	0.7798	0.8448	108.3	Pass
20	0.7505	0.8130	108.3	Pass
21	0.7465	0.8087	108.3	Pass
22	0.8074	0.8747	108.3	Pass
23	0.8251	0.8938	108.3	Pass
24	0.7673	0.8312	108.3	Pass
25	0.7036	0.7622	108.3	Pass
26	0.6260	0.6781	108.3	Pass
27	0.6406	0.6940	108.3	Pass
28	0.7644	0.8280	108.3	Pass
29	0.7340	0.7952	108.3	Pass
30	0.6581	0.7130	108.3	Pass
31	0.6219	0.6738	108.3	Pass
Apr1	0.5439	0.5892	108.3	Pass
2	0.5167	0.5597	108.3	Pass
3	0.5371	0.5818	108.3	Pass
4	0.5642	0.6112	108.3	Pass
5	0.5236	0.5672	108.3	Pass
6	0.4727	0.5121	108.3	Pass
7	0.5415	0.5866	108.3	Pass
8	0.5366	0.5813	108.3	Pass
9	0.4518	0.4894	108.3	Pass
10	0.4131	0.4475	108.3	Pass
11	0.5369	0.5817	108.3	Pass
12	0.4666	0.5055	108.3	Pass
13	0.4288	0.4645	108.3	Pass
14	0.4327	0.4687	108.3	Pass
15	0.4810	0.5211	108.3	Pass
16	0.4778	0.5176	108.3	Pass
17	0.4360	0.4723	108.3	Pass
18	0.4270	0.4626	108.3	Pass
19	0.4370	0.4735	108.3	Pass
20	0.3940	0.4269	108.3	Pass
21	0.3488	0.3779	108.3	Pass
22	0.4013	0.4348	108.3	Pass
23	0.3679	0.3985	108.3	Pass
24	0.3328	0.3606	108.3	Pass
25	0.3007	0.3257	108.3	Pass
26	0.3029	0.3281	108.3	Pass
27	0.2814	0.3048	108.3	Pass
28	0.2748	0.2977	108.3	Pass
29	0.3219	0.3487	108.3	Pass
30	0.2976	0.3224	108.3	Pass
May1	0.3011	0.3262	108.3	Pass
2	0.3386	0.3668	108.3	Pass
3	0.2950	0.3196	108.3	Pass
4	0.3342	0.3620	108.3	Pass
5	0.2865	0.3104	108.3	Pass
6	0.2436	0.2639	108.3	Pass
7	0.2283	0.2474	108.3	Pass
8	0.2357	0.2554	108.3	Pass
9	0.2254	0.2442	108.3	Pass

10	0.2225	0.2411	108.3	Pass
11	0.2082	0.2255	108.3	Pass
12	0.2015	0.2183	108.3	Pass
13	0.2270	0.2460	108.3	Pass
14	0.2250	0.2438	108.3	Pass
15	0.2254	0.2442	108.3	Pass
16	0.2182	0.2364	108.3	Pass
17	0.2581	0.2796	108.3	Pass
18	0.2313	0.2505	108.3	Pass
19	0.2069	0.2241	108.3	Pass
20	0.1943	0.2105	108.3	Pass
21	0.1937	0.2099	108.3	Pass
22	0.1801	0.1951	108.3	Pass
23	0.1796	0.1946	108.3	Pass
24	0.1757	0.1903	108.3	Pass
25	0.1811	0.1962	108.3	Pass
26	0.1756	0.1903	108.3	Pass
27	0.1701	0.1843	108.3	Pass
28	0.1705	0.1847	108.3	Pass
29	0.1704	0.1846	108.3	Pass
30	0.1673	0.1812	108.3	Pass
31	0.1639	0.1775	108.3	Pass
Jun1	0.1801	0.1952	108.3	Pass
2	0.1917	0.2076	108.3	Pass
3	0.1800	0.1950	108.3	Pass
4	0.1721	0.1865	108.3	Pass
5	0.1588	0.1720	108.3	Pass
6	0.1647	0.1784	108.3	Pass
7	0.1854	0.2008	108.3	Pass
8	0.1720	0.1863	108.3	Pass
9	0.1698	0.1839	108.3	Pass
10	0.1714	0.1856	108.3	Pass
11	0.1591	0.1724	108.3	Pass
12	0.1456	0.1578	108.3	Pass
13	0.1382	0.1497	108.3	Pass
14	0.1379	0.1494	108.3	Pass
15	0.1479	0.1602	108.3	Pass
16	0.1436	0.1556	108.3	Pass
17	0.1400	0.1517	108.3	Pass
18	0.1336	0.1447	108.3	Pass
19	0.1305	0.1414	108.3	Pass
20	0.1279	0.1386	108.3	Pass
21	0.1285	0.1392	108.3	Pass
22	0.1284	0.1391	108.3	Pass
23	0.1282	0.1388	108.3	Pass
24	0.1270	0.1376	108.3	Pass
25	0.1250	0.1354	108.3	Pass
26	0.1235	0.1338	108.3	Pass
27	0.1240	0.1343	108.3	Pass
28	0.1264	0.1369	108.3	Pass
29	0.1216	0.1317	108.3	Pass
30	0.1196	0.1296	108.3	Pass
Jul1	0.1201	0.1302	108.3	Pass
2	0.1172	0.1270	108.3	Pass
3	0.1157	0.1253	108.3	Pass
4	0.1151	0.1247	108.3	Pass
5	0.1144	0.1239	108.3	Pass
6	0.1125	0.1219	108.3	Pass

7	0.1115	0.1208	108.3	Pass
8	0.1136	0.1231	108.3	Pass
9	0.1155	0.1251	108.3	Pass
10	0.1128	0.1222	108.3	Pass
11	0.1099	0.1191	108.3	Pass
12	0.1081	0.1171	108.3	Pass
13	0.1072	0.1161	108.3	Pass
14	0.1062	0.1150	108.3	Pass
15	0.1054	0.1142	108.3	Pass
16	0.1056	0.1144	108.3	Pass
17	0.1043	0.1130	108.3	Pass
18	0.1032	0.1118	108.3	Pass
19	0.1061	0.1150	108.3	Pass
20	0.1038	0.1124	108.3	Pass
21	0.1023	0.1108	108.3	Pass
22	0.1022	0.1107	108.3	Pass
23	0.1008	0.1092	108.3	Pass
24	0.0992	0.1075	108.3	Pass
25	0.0986	0.1068	108.3	Pass
26	0.0976	0.1058	108.3	Pass
27	0.0970	0.1050	108.3	Pass
28	0.0963	0.1043	108.3	Pass
29	0.0955	0.1035	108.3	Pass
30	0.0950	0.1029	108.3	Pass
31	0.0942	0.1021	108.3	Pass
Aug1	0.0936	0.1014	108.3	Pass
2	0.0931	0.1008	108.3	Pass
3	0.0925	0.1002	108.3	Pass
4	0.0919	0.0995	108.3	Pass
5	0.0913	0.0989	108.3	Pass
6	0.0909	0.0984	108.3	Pass
7	0.0902	0.0977	108.3	Pass
8	0.0895	0.0970	108.3	Pass
9	0.0890	0.0964	108.3	Pass
10	0.0885	0.0959	108.3	Pass
11	0.0879	0.0953	108.3	Pass
12	0.0874	0.0947	108.3	Pass
13	0.0869	0.0941	108.3	Pass
14	0.0864	0.0936	108.3	Pass
15	0.0859	0.0931	108.3	Pass
16	0.0854	0.0925	108.3	Pass
17	0.0852	0.0923	108.3	Pass
18	0.0853	0.0924	108.3	Pass
19	0.0845	0.0916	108.3	Pass
20	0.0840	0.0910	108.3	Pass
21	0.0835	0.0905	108.3	Pass
22	0.0831	0.0900	108.3	Pass
23	0.0835	0.0905	108.3	Pass
24	0.0830	0.0899	108.3	Pass
25	0.0824	0.0893	108.3	Pass
26	0.0816	0.0884	108.3	Pass
27	0.0811	0.0878	108.3	Pass
28	0.0810	0.0878	108.3	Pass
29	0.0806	0.0873	108.3	Pass
30	0.0802	0.0869	108.3	Pass
31	0.0797	0.0863	108.3	Pass
Sep1	0.0793	0.0859	108.3	Pass
2	0.0787	0.0853	108.3	Pass

3	0.0783	0.0848	108.3	Pass
4	0.0779	0.0844	108.3	Pass
5	0.0775	0.0840	108.3	Pass
6	0.0771	0.0836	108.3	Pass
7	0.0781	0.0846	108.3	Pass
8	0.1265	0.1370	108.3	Pass
9	0.1156	0.1252	108.3	Pass
10	0.0970	0.1051	108.3	Pass
11	0.0866	0.0938	108.3	Pass
12	0.0810	0.0877	108.3	Pass
13	0.0782	0.0847	108.3	Pass
14	0.0766	0.0830	108.3	Pass
15	0.0758	0.0821	108.3	Pass
16	0.0777	0.0842	108.3	Pass
17	0.0762	0.0825	108.3	Pass
18	0.0755	0.0818	108.3	Pass
19	0.0748	0.0811	108.3	Pass
20	0.0740	0.0801	108.3	Pass
21	0.0736	0.0798	108.3	Pass
22	0.0744	0.0806	108.3	Pass
23	0.0735	0.0796	108.3	Pass
24	0.0727	0.0787	108.3	Pass
25	0.0724	0.0785	108.3	Pass
26	0.0722	0.0782	108.3	Pass
27	0.0719	0.0779	108.3	Pass
28	0.0713	0.0772	108.3	Pass
29	0.0712	0.0772	108.3	Pass
30	0.0817	0.0885	108.3	Pass
Oct1	0.0934	0.1012	108.3	Pass
2	0.0882	0.0955	108.3	Pass
3	0.1025	0.1111	108.3	Pass
4	0.0936	0.1014	108.3	Pass
5	0.0826	0.0895	108.3	Pass
6	0.0772	0.0836	108.3	Pass
7	0.1002	0.1085	108.3	Pass
8	0.1664	0.1803	108.3	Pass
9	0.1680	0.1819	108.3	Pass
10	0.1350	0.1463	108.3	Pass
11	0.1821	0.1973	108.3	Pass
12	0.1841	0.1994	108.3	Pass
13	0.1314	0.1424	108.3	Pass
14	0.1026	0.1112	108.3	Pass
15	0.0885	0.0959	108.3	Pass
16	0.1034	0.1120	108.3	Pass
17	0.1060	0.1149	108.3	Pass
18	0.0965	0.1045	108.3	Pass
19	0.0941	0.1019	108.3	Pass
20	0.1090	0.1181	108.3	Pass
21	0.2291	0.2482	108.3	Pass
22	0.2282	0.2473	108.3	Pass
23	0.2330	0.2524	108.3	Pass
24	0.2197	0.2381	108.3	Pass
25	0.2114	0.2290	108.3	Pass
26	0.2500	0.2708	108.3	Pass
27	0.2420	0.2622	108.3	Pass
28	0.2565	0.2778	108.3	Pass
29	0.2377	0.2575	108.3	Pass
30	0.1755	0.1901	108.3	Pass

31	0.1669	0.1809	108.3	Pass
Nov1	0.1771	0.1918	108.3	Pass
2	0.2260	0.2449	108.3	Pass
3	0.2258	0.2447	108.3	Pass
4	0.2134	0.2312	108.3	Pass
5	0.2984	0.3232	108.3	Pass
6	0.3437	0.3723	108.3	Pass
7	0.3127	0.3388	108.3	Pass
8	0.3230	0.3500	108.3	Pass
9	0.3490	0.3781	108.3	Pass
10	0.3794	0.4110	108.3	Pass
11	0.4111	0.4454	108.3	Pass
12	0.4153	0.4499	108.3	Pass
13	0.5086	0.5510	108.3	Pass
14	0.6452	0.6990	108.3	Pass
15	0.5789	0.6272	108.3	Pass
16	0.4203	0.4554	108.3	Pass
17	0.3457	0.3745	108.3	Pass
18	0.5365	0.5812	108.3	Pass
19	0.7795	0.8444	108.3	Pass
20	0.6832	0.7401	108.3	Pass
21	0.5740	0.6219	108.3	Pass
22	0.6229	0.6748	108.3	Pass
23	0.6776	0.7340	108.3	Pass
24	0.7104	0.7696	108.3	Pass
25	0.6418	0.6953	108.3	Pass
26	0.6651	0.7205	108.3	Pass
27	0.5290	0.5731	108.3	Pass
28	0.6218	0.6736	108.3	Pass
29	0.8685	0.9409	108.3	Pass
30	0.9684	1.0491	108.3	Pass
Dec1	1.0046	1.0883	108.3	Pass
2	1.0114	1.0957	108.3	Pass
3	1.0738	1.1633	108.3	Pass
4	0.8945	0.9690	108.3	Pass
5	0.8195	0.8878	108.3	Pass
6	0.8016	0.8684	108.3	Pass
7	0.6447	0.6984	108.3	Pass
8	0.6866	0.7438	108.3	Pass
9	0.7633	0.8269	108.3	Pass
10	0.9917	1.0743	108.3	Pass
11	1.1558	1.2521	108.3	Pass
12	1.0550	1.1430	108.3	Pass
13	1.0139	1.0984	108.3	Pass
14	1.0442	1.1313	108.3	Pass
15	1.0521	1.1397	108.3	Pass
16	0.9531	1.0325	108.3	Pass
17	0.9090	0.9847	108.3	Pass
18	0.8750	0.9479	108.3	Pass
19	0.9770	1.0585	108.3	Pass
20	0.9168	0.9932	108.3	Pass
21	0.9618	1.0419	108.3	Pass
22	0.9348	1.0127	108.3	Pass
23	0.9425	1.0210	108.3	Pass
24	0.9548	1.0344	108.3	Pass
25	0.9578	1.0376	108.3	Pass
26	0.8830	0.9566	108.3	Pass
27	0.8511	0.9220	108.3	Pass

28	0.8484	0.9191	108.3	Pass
29	0.8682	0.9405	108.3	Pass
30	0.7375	0.7989	108.3	Pass
31	0.8161	0.8841	108.3	Pass

Disclaimer

Legal Notice

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Local (360)943-0304

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WWHM2012

PROJECT REPORT

WETLAND D HYDRO-PERIOD (ROUTED THROUGH WETLAND C)

General Model Information

WWHM2012 Project Name: WetlandDthroughC redo-Hydroperiod-Model

Site Name:	
Site Address:	
City:	
Report Date:	9/12/2023
Gage:	Quilcene
Data Start:	1948/10/01
Data End:	2009/09/30
Timestep:	15 Minute
Precip Scale:	0.800
Version Date:	2023/01/27
Version:	4.2.19

POC Thresholds

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

Landuse Basin Data
Predeveloped Land Use

Predev Lawn

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
C, Lawn, Flat	.9

Predev Forest

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
C, Forest, Flat	.969

C

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
SAT, Forest, Mod	.038

D Buffer

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
C, Forest, Steep	1.25

Mitigated Land Use

Pervious

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
C, Lawn, Flat	.59485

Lots Dispersed

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
C IMP DISP FLAT	.4785

C Buffer

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
C, Forest, Mod	.542

C

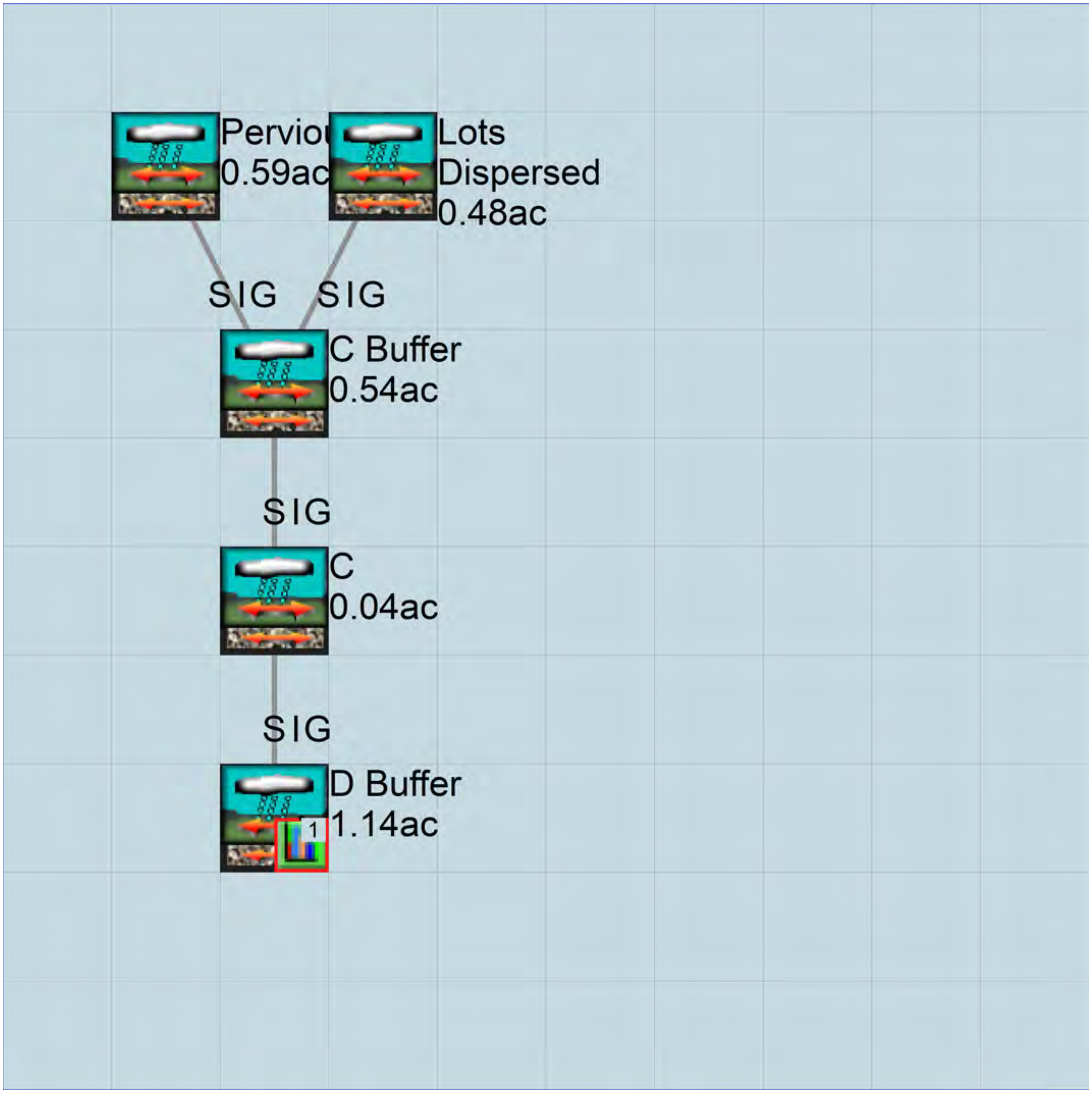
Bypass:	No
GroundWater:	No
Pervious Land Use	acre
SAT, Forest, Mod	.038

D Buffer

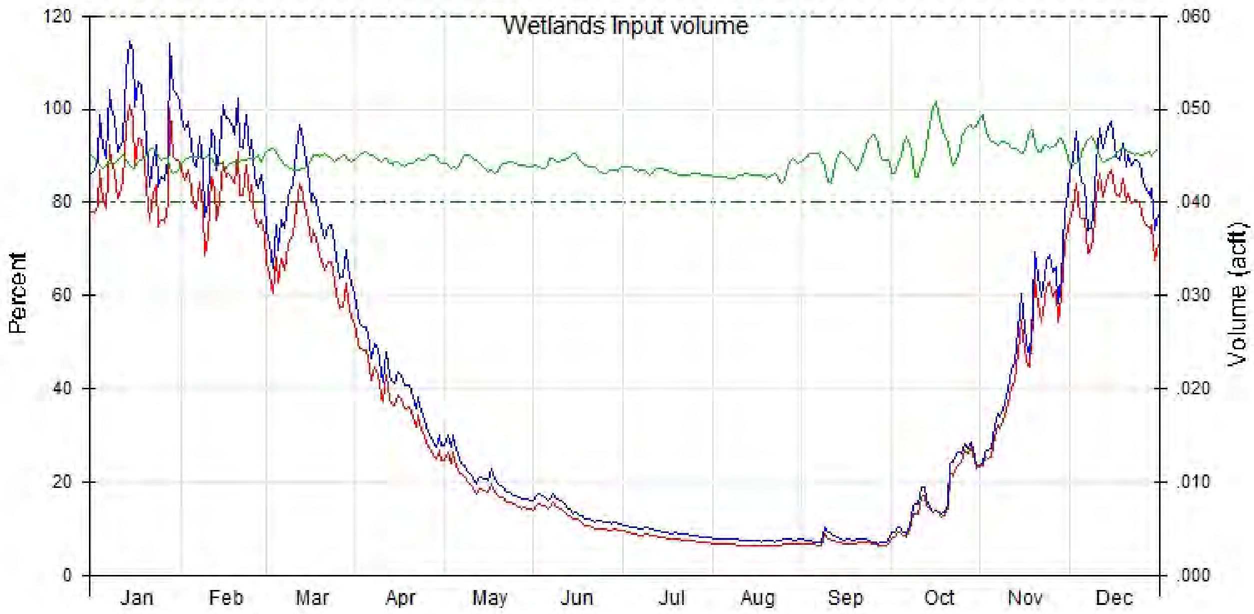
Bypass:	No
GroundWater:	No
Pervious Land Use	acre
C, Forest, Steep	1.14

Appendix
Predeveloped Schematic

Mitigated Schematic



Wetland Input Volumes



Wetlands Input Volume for POC 1
Average Annual Volume (acft)
Series 1: 501 POC 1 Predeveloped flow
Series 2: 801 POC 1 Mitigated flow

Month	Series 1	Series 2	Percent	Pass/Fail
Jan	1.4831	1.3185	88.9	Pass
Feb	1.3082	1.1636	88.9	Pass
Mar	1.1875	1.0579	89.1	Pass
Apr	0.6332	0.5653	89.3	Pass
May	0.3312	0.2919	88.1	Pass
Jun	0.2091	0.1844	88.2	Pass
Jul	0.1458	0.1263	86.6	Pass
Aug	0.1178	0.1013	86.0	Pass
Sep	0.1150	0.1029	89.5	Pass
Oct	0.2672	0.2477	92.7	Pass
Nov	0.7416	0.6867	92.6	Pass
Dec	1.3495	1.2200	90.4	Pass

Day	Predevel	Mitigated	Percent	Pass/Fail
Jan1	0.0432	0.0390	90.2	Pass
2	0.0435	0.0389	89.3	Pass
3	0.0446	0.0395	88.5	Pass
4	0.0493	0.0435	88.2	Pass
5	0.0460	0.0402	87.4	Pass
6	0.0448	0.0394	88.0	Pass
7	0.0521	0.0461	88.4	Pass
8	0.0502	0.0443	88.3	Pass
9	0.0490	0.0433	88.3	Pass
10	0.0454	0.0404	89.0	Pass
11	0.0461	0.0414	89.9	Pass
12	0.0468	0.0422	90.2	Pass
13	0.0540	0.0482	89.3	Pass
14	0.0573	0.0504	87.9	Pass

15	0.0562	0.0490	87.2	Pass
16	0.0502	0.0438	87.2	Pass
17	0.0530	0.0470	88.6	Pass
18	0.0526	0.0468	89.0	Pass
19	0.0491	0.0439	89.5	Pass
20	0.0463	0.0418	90.2	Pass
21	0.0417	0.0382	91.4	Pass
22	0.0446	0.0409	91.8	Pass
23	0.0462	0.0419	90.7	Pass
24	0.0417	0.0373	89.6	Pass
25	0.0427	0.0382	89.3	Pass
26	0.0424	0.0379	89.5	Pass
27	0.0446	0.0399	89.4	Pass
28	0.0570	0.0501	87.8	Pass
29	0.0521	0.0450	86.2	Pass
30	0.0516	0.0446	86.4	Pass
31	0.0509	0.0444	87.3	Pass
Feb1	0.0492	0.0435	88.4	Pass
2	0.0477	0.0425	89.0	Pass
3	0.0486	0.0436	89.6	Pass
4	0.0465	0.0417	89.8	Pass
5	0.0443	0.0399	89.9	Pass
6	0.0438	0.0393	89.9	Pass
7	0.0470	0.0422	89.7	Pass
8	0.0440	0.0392	89.1	Pass
9	0.0385	0.0344	89.5	Pass
10	0.0401	0.0362	90.3	Pass
11	0.0478	0.0428	89.6	Pass
12	0.0470	0.0415	88.5	Pass
13	0.0434	0.0381	87.8	Pass
14	0.0454	0.0401	88.3	Pass
15	0.0504	0.0444	87.9	Pass
16	0.0490	0.0428	87.4	Pass
17	0.0491	0.0432	88.0	Pass
18	0.0484	0.0428	88.3	Pass
19	0.0473	0.0420	88.8	Pass
20	0.0512	0.0455	88.8	Pass
21	0.0460	0.0408	88.6	Pass
22	0.0457	0.0408	89.2	Pass
23	0.0493	0.0440	89.3	Pass
24	0.0451	0.0403	89.4	Pass
25	0.0468	0.0419	89.6	Pass
26	0.0429	0.0385	89.6	Pass
27	0.0415	0.0374	90.1	Pass
28	0.0430	0.0381	88.7	Pass
29	0.0403	0.0364	90.5	Pass
Mar1	0.0369	0.0335	90.7	Pass
2	0.0356	0.0324	91.1	Pass
3	0.0329	0.0302	91.8	Pass
4	0.0375	0.0341	91.0	Pass
5	0.0348	0.0313	89.9	Pass
6	0.0382	0.0340	89.1	Pass
7	0.0371	0.0327	88.1	Pass
8	0.0404	0.0354	87.5	Pass
9	0.0411	0.0359	87.2	Pass
10	0.0419	0.0364	87.0	Pass
11	0.0454	0.0395	87.0	Pass
12	0.0482	0.0420	87.1	Pass

13	0.0477	0.0416	87.2	Pass
14	0.0455	0.0398	87.4	Pass
15	0.0434	0.0382	87.9	Pass
16	0.0403	0.0359	89.0	Pass
17	0.0410	0.0369	90.1	Pass
18	0.0402	0.0362	90.0	Pass
19	0.0381	0.0343	89.8	Pass
20	0.0369	0.0333	90.2	Pass
21	0.0362	0.0327	90.4	Pass
22	0.0375	0.0337	90.0	Pass
23	0.0376	0.0336	89.3	Pass
24	0.0357	0.0317	88.8	Pass
25	0.0341	0.0303	89.0	Pass
26	0.0319	0.0286	89.6	Pass
27	0.0319	0.0288	90.1	Pass
28	0.0349	0.0314	89.9	Pass
29	0.0331	0.0295	89.0	Pass
30	0.0312	0.0277	88.8	Pass
31	0.0302	0.0270	89.3	Pass
Apr1	0.0278	0.0250	89.9	Pass
2	0.0269	0.0243	90.2	Pass
3	0.0266	0.0241	90.7	Pass
4	0.0266	0.0241	90.7	Pass
5	0.0248	0.0224	90.2	Pass
6	0.0233	0.0210	90.0	Pass
7	0.0249	0.0224	90.0	Pass
8	0.0243	0.0217	89.2	Pass
9	0.0218	0.0193	88.7	Pass
10	0.0208	0.0185	89.2	Pass
11	0.0239	0.0214	89.4	Pass
12	0.0214	0.0189	88.4	Pass
13	0.0207	0.0182	88.2	Pass
14	0.0205	0.0182	88.6	Pass
15	0.0219	0.0194	88.7	Pass
16	0.0215	0.0189	87.9	Pass
17	0.0204	0.0179	87.7	Pass
18	0.0203	0.0179	88.2	Pass
19	0.0204	0.0181	88.3	Pass
20	0.0191	0.0169	88.3	Pass
21	0.0178	0.0158	89.0	Pass
22	0.0191	0.0171	89.4	Pass
23	0.0176	0.0157	89.0	Pass
24	0.0166	0.0148	89.3	Pass
25	0.0153	0.0138	89.8	Pass
26	0.0153	0.0138	90.2	Pass
27	0.0142	0.0128	90.1	Pass
28	0.0138	0.0125	90.0	Pass
29	0.0151	0.0134	88.7	Pass
30	0.0139	0.0123	88.5	Pass
May1	0.0140	0.0124	88.4	Pass
2	0.0150	0.0132	88.0	Pass
3	0.0137	0.0120	87.3	Pass
4	0.0151	0.0132	87.5	Pass
5	0.0136	0.0118	87.3	Pass
6	0.0124	0.0109	88.1	Pass
7	0.0119	0.0106	89.5	Pass
8	0.0117	0.0106	90.2	Pass
9	0.0111	0.0100	90.1	Pass

10	0.0107	0.0096	89.7	Pass
11	0.0102	0.0091	89.2	Pass
12	0.0099	0.0088	88.9	Pass
13	0.0105	0.0093	88.3	Pass
14	0.0103	0.0090	87.7	Pass
15	0.0103	0.0090	87.1	Pass
16	0.0102	0.0089	86.8	Pass
17	0.0114	0.0099	86.9	Pass
18	0.0104	0.0090	86.1	Pass
19	0.0099	0.0086	86.6	Pass
20	0.0096	0.0084	87.6	Pass
21	0.0095	0.0083	88.3	Pass
22	0.0089	0.0079	88.4	Pass
23	0.0089	0.0079	88.7	Pass
24	0.0086	0.0076	88.6	Pass
25	0.0086	0.0076	88.4	Pass
26	0.0084	0.0074	88.1	Pass
27	0.0082	0.0072	87.9	Pass
28	0.0082	0.0072	87.9	Pass
29	0.0082	0.0072	87.7	Pass
30	0.0081	0.0071	87.5	Pass
31	0.0080	0.0070	87.7	Pass
Jun1	0.0086	0.0076	88.1	Pass
2	0.0088	0.0077	87.7	Pass
3	0.0086	0.0075	87.4	Pass
4	0.0085	0.0074	87.4	Pass
5	0.0081	0.0071	88.2	Pass
6	0.0082	0.0073	89.4	Pass
7	0.0088	0.0078	89.4	Pass
8	0.0082	0.0073	88.7	Pass
9	0.0081	0.0072	88.8	Pass
10	0.0080	0.0071	89.0	Pass
11	0.0077	0.0068	89.0	Pass
12	0.0072	0.0064	89.3	Pass
13	0.0069	0.0062	90.0	Pass
14	0.0067	0.0060	90.4	Pass
15	0.0068	0.0061	90.0	Pass
16	0.0065	0.0058	89.1	Pass
17	0.0064	0.0056	88.3	Pass
18	0.0061	0.0054	87.9	Pass
19	0.0060	0.0053	87.8	Pass
20	0.0059	0.0051	87.7	Pass
21	0.0058	0.0051	87.5	Pass
22	0.0058	0.0051	87.1	Pass
23	0.0058	0.0050	86.5	Pass
24	0.0057	0.0049	86.2	Pass
25	0.0057	0.0049	86.3	Pass
26	0.0056	0.0049	86.7	Pass
27	0.0056	0.0049	87.0	Pass
28	0.0057	0.0050	86.9	Pass
29	0.0055	0.0048	86.8	Pass
30	0.0055	0.0048	87.2	Pass
Jul1	0.0054	0.0048	87.6	Pass
2	0.0053	0.0046	87.6	Pass
3	0.0052	0.0046	87.6	Pass
4	0.0051	0.0045	87.5	Pass
5	0.0051	0.0045	87.1	Pass
6	0.0050	0.0044	86.7	Pass

7	0.0050	0.0043	86.9	Pass
8	0.0050	0.0044	87.0	Pass
9	0.0051	0.0044	86.6	Pass
10	0.0050	0.0043	86.1	Pass
11	0.0049	0.0042	86.3	Pass
12	0.0048	0.0042	86.8	Pass
13	0.0048	0.0042	87.2	Pass
14	0.0047	0.0041	87.2	Pass
15	0.0046	0.0040	87.1	Pass
16	0.0046	0.0040	86.8	Pass
17	0.0045	0.0039	86.5	Pass
18	0.0045	0.0039	86.4	Pass
19	0.0046	0.0039	86.3	Pass
20	0.0045	0.0038	85.9	Pass
21	0.0044	0.0038	85.7	Pass
22	0.0044	0.0038	85.8	Pass
23	0.0044	0.0038	85.9	Pass
24	0.0043	0.0037	86.0	Pass
25	0.0043	0.0037	86.2	Pass
26	0.0042	0.0036	86.1	Pass
27	0.0042	0.0036	86.1	Pass
28	0.0041	0.0036	86.0	Pass
29	0.0041	0.0035	86.0	Pass
30	0.0041	0.0035	85.9	Pass
31	0.0040	0.0035	85.8	Pass
Aug1	0.0040	0.0034	85.7	Pass
2	0.0040	0.0034	85.7	Pass
3	0.0039	0.0034	85.7	Pass
4	0.0039	0.0033	85.6	Pass
5	0.0039	0.0033	85.6	Pass
6	0.0039	0.0033	85.3	Pass
7	0.0039	0.0033	85.1	Pass
8	0.0039	0.0033	85.2	Pass
9	0.0038	0.0033	85.6	Pass
10	0.0038	0.0033	85.8	Pass
11	0.0038	0.0032	86.0	Pass
12	0.0037	0.0032	86.1	Pass
13	0.0037	0.0032	86.0	Pass
14	0.0037	0.0032	85.8	Pass
15	0.0037	0.0032	85.8	Pass
16	0.0036	0.0031	85.8	Pass
17	0.0036	0.0031	85.9	Pass
18	0.0037	0.0031	85.4	Pass
19	0.0037	0.0031	85.0	Pass
20	0.0037	0.0031	85.4	Pass
21	0.0036	0.0031	85.9	Pass
22	0.0036	0.0031	86.2	Pass
23	0.0037	0.0032	85.6	Pass
24	0.0038	0.0032	84.3	Pass
25	0.0039	0.0033	84.8	Pass
26	0.0039	0.0034	86.6	Pass
27	0.0039	0.0034	88.6	Pass
28	0.0038	0.0034	89.6	Pass
29	0.0038	0.0034	88.7	Pass
30	0.0038	0.0034	88.3	Pass
31	0.0038	0.0034	88.9	Pass
Sep1	0.0038	0.0034	89.5	Pass
2	0.0038	0.0034	89.8	Pass

3	0.0037	0.0033	90.4	Pass
4	0.0036	0.0033	90.7	Pass
5	0.0036	0.0032	90.5	Pass
6	0.0035	0.0032	90.2	Pass
7	0.0035	0.0031	89.6	Pass
8	0.0051	0.0045	87.7	Pass
9	0.0047	0.0040	84.4	Pass
10	0.0044	0.0037	84.1	Pass
11	0.0042	0.0037	86.4	Pass
12	0.0041	0.0036	89.1	Pass
13	0.0039	0.0035	90.8	Pass
14	0.0038	0.0034	90.6	Pass
15	0.0037	0.0033	90.1	Pass
16	0.0038	0.0034	89.5	Pass
17	0.0037	0.0033	88.5	Pass
18	0.0038	0.0033	87.5	Pass
19	0.0039	0.0034	87.0	Pass
20	0.0039	0.0035	88.0	Pass
21	0.0039	0.0035	90.1	Pass
22	0.0039	0.0036	92.0	Pass
23	0.0038	0.0035	93.4	Pass
24	0.0036	0.0034	94.3	Pass
25	0.0035	0.0033	94.3	Pass
26	0.0034	0.0032	92.9	Pass
27	0.0035	0.0031	90.5	Pass
28	0.0035	0.0031	89.2	Pass
29	0.0035	0.0032	89.2	Pass
30	0.0040	0.0036	88.7	Pass
Oct1	0.0045	0.0039	86.3	Pass
2	0.0047	0.0040	86.1	Pass
3	0.0052	0.0046	88.4	Pass
4	0.0049	0.0045	90.0	Pass
5	0.0046	0.0043	92.3	Pass
6	0.0044	0.0042	94.2	Pass
7	0.0052	0.0048	92.8	Pass
8	0.0074	0.0066	89.0	Pass
9	0.0077	0.0066	85.5	Pass
10	0.0076	0.0065	85.6	Pass
11	0.0094	0.0084	88.5	Pass
12	0.0095	0.0085	89.7	Pass
13	0.0081	0.0075	92.3	Pass
14	0.0074	0.0071	96.5	Pass
15	0.0067	0.0067	100.7	Pass
16	0.0069	0.0070	101.6	Pass
17	0.0067	0.0067	99.5	Pass
18	0.0066	0.0063	96.2	Pass
19	0.0069	0.0064	94.0	Pass
20	0.0077	0.0071	92.9	Pass
21	0.0121	0.0109	90.5	Pass
22	0.0121	0.0107	88.2	Pass
23	0.0131	0.0116	89.0	Pass
24	0.0132	0.0120	91.1	Pass
25	0.0130	0.0122	93.8	Pass
26	0.0141	0.0134	95.4	Pass
27	0.0136	0.0130	96.3	Pass
28	0.0142	0.0137	96.5	Pass
29	0.0137	0.0131	95.7	Pass
30	0.0119	0.0115	96.4	Pass

31	0.0118	0.0115	97.9	Pass
Nov1	0.0120	0.0118	98.6	Pass
2	0.0131	0.0127	96.8	Pass
3	0.0134	0.0126	94.0	Pass
4	0.0136	0.0127	93.2	Pass
5	0.0161	0.0149	92.8	Pass
6	0.0174	0.0161	92.5	Pass
7	0.0169	0.0157	92.6	Pass
8	0.0180	0.0167	92.9	Pass
9	0.0191	0.0177	92.9	Pass
10	0.0209	0.0193	92.2	Pass
11	0.0222	0.0203	91.5	Pass
12	0.0227	0.0208	91.6	Pass
13	0.0262	0.0240	91.4	Pass
14	0.0303	0.0274	90.5	Pass
15	0.0283	0.0257	90.7	Pass
16	0.0251	0.0232	92.4	Pass
17	0.0235	0.0224	95.3	Pass
18	0.0289	0.0276	95.4	Pass
19	0.0347	0.0321	92.6	Pass
20	0.0321	0.0292	91.0	Pass
21	0.0299	0.0273	91.1	Pass
22	0.0320	0.0295	92.2	Pass
23	0.0336	0.0310	92.2	Pass
24	0.0344	0.0316	91.7	Pass
25	0.0325	0.0299	92.1	Pass
26	0.0332	0.0306	92.3	Pass
27	0.0291	0.0272	93.3	Pass
28	0.0319	0.0299	93.7	Pass
29	0.0388	0.0356	91.8	Pass
30	0.0412	0.0370	89.8	Pass
Dec1	0.0432	0.0381	88.3	Pass
2	0.0447	0.0394	88.1	Pass
3	0.0476	0.0420	88.3	Pass
4	0.0435	0.0386	88.8	Pass
5	0.0422	0.0382	90.5	Pass
6	0.0418	0.0384	91.8	Pass
7	0.0370	0.0345	93.4	Pass
8	0.0372	0.0351	94.2	Pass
9	0.0386	0.0361	93.6	Pass
10	0.0441	0.0406	92.1	Pass
11	0.0480	0.0432	90.0	Pass
12	0.0458	0.0406	88.6	Pass
13	0.0466	0.0413	88.8	Pass
14	0.0480	0.0429	89.3	Pass
15	0.0487	0.0435	89.3	Pass
16	0.0461	0.0415	89.9	Pass
17	0.0450	0.0408	90.7	Pass
18	0.0446	0.0407	91.2	Pass
19	0.0464	0.0426	91.7	Pass
20	0.0439	0.0401	91.3	Pass
21	0.0450	0.0409	90.9	Pass
22	0.0440	0.0398	90.4	Pass
23	0.0445	0.0402	90.2	Pass
24	0.0443	0.0401	90.4	Pass
25	0.0442	0.0399	90.3	Pass
26	0.0423	0.0381	90.1	Pass
27	0.0414	0.0375	90.6	Pass

28	0.0409	0.0372	91.0	Pass
29	0.0415	0.0375	90.4	Pass
30	0.0371	0.0337	91.1	Pass
31	0.0389	0.0356	91.5	Pass

Disclaimer

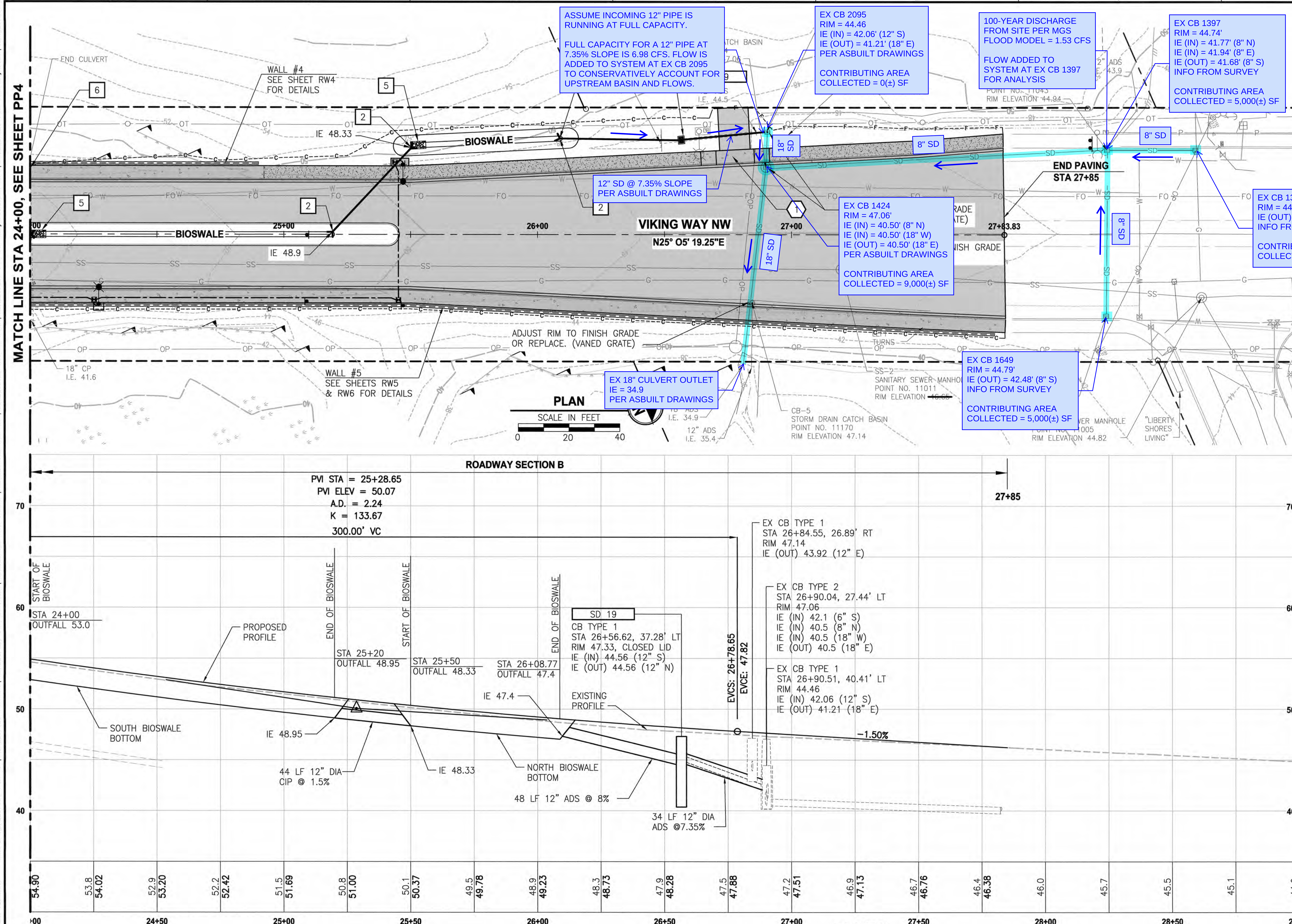
Legal Notice

Clear Creek Solutions, Inc.
6200 Capitol Blvd. Ste F
Olympia, WA. 98501
Toll Free 1(866)943-0304
Local (360)943-0304

www.clearcreeksolutions.com

Appendix D

Preliminary Downstream Conveyance Analysis



ROADWAY NOTES:

1. DRIVEWAY, SEE DRIVEWAY PLAN AND PROFILES FOR DETAILS
2. ASPHALT RAMP, SEE SHEET RS2 FOR DETAILS.

SANITARY SEWER NOTES:

1. ADJUST RIM TO FINISHED GRADE
2. SIDE SEWER, SEE PROFILE A/PP6
3. SIDE SEWER, SEE PROFILE B/PP6
4. SIDE SEWER, SEE PROFILE C/PP6
5. SIDE SEWER, SEE PROFILE D/PP6
6. SIDE SEWER, SEE PROFILE G/PP6

WATER NOTES:

1. ADJUST VALVE COVERS TO FINISHED GRADE.
2. RELOCATE HYDRANT BEHIND SIDEWALK. HYDRANT TO BE LOCATED BY CITY, SEE SHEET W1 FOR DETAILS.

STORM DRAINAGE NOTES:

1. ALL NEW CB's LOCATED IN ROAD IN FLOWLINE ARE COMBINATION INLETS PER WSDOT STANDARD PLAN B-25.20-00.
2. BEVEL END OF CULVERT PER WSDOT STANDARD PLANS B-70.20-00.
3. EXTEND EXISTING CULVERT TO TYPE 2 CB WITH SAME SIZE RCP PIPE, STARTING AT NEXT COMPLETE END SECTION.
4. CONNECT FOOTING DRAIN TO CB WITH 6" MINIMUM DIA. PVC PIPE @ MINIMUM 2% SLOPE.
5. ROCKERY OUTFALL
6. EXTEND EXISTING 18" CP CULVERT PAST BASE OF GABION WALL, MATCH EXISTING SLOPE.

GENERAL NOTES:

1. ADJUST GAS VALVES TO FINISHED GRADE.

LEGEND

ASPHALT
CEMENT CONCRETE
PERVIOUS CONCRETE
GABION WALL
ROCKERY WALL

VIKING AVE NW PHASE 3 CORRIDOR
PP1 PP2 PP3 PP4 **PP5**
NW FINN HILL RD
NW LINDVIG WAY

KEYMAP
PLAN
NO SCALE

RECORD DRAWINGS

THIS DRAWING AND OR SPECIFICATION DOCUMENT HAS BEEN REVISED TO REFLECT INFORMATION PROVIDED BY THE CONSTRUCTION CONTRACTOR (AND OTHERS) DEFINING KNOWN DIFFERENCES BETWEEN THE FACILITIES SHOWN ON THE ORIGINAL CONSTRUCTION DOCUMENTS TO THOSE CONSTRUCTED. THE INFORMATION PROVIDED ON THESE RECORDS, HAS BEEN ASSUMED TO BE CORRECT AND HAS NOT BEEN VERIFIED BY THE ENGINEER, WHO IS UNDER NO OBLIGATION OR DUTY TO VERIFY SUCH ACCURACY AND/OR COMPLETENESS. SAID ENGINEER, BY PLACING HER/HIS PROFESSIONAL SEAL ON THIS DRAWING, HAS REVIEWED THE REVISION(S) TO VERIFY THAT THE CHANGES AS DEFINED BY THESE RECORDS DO NOT APPEAR TO BE ADVERSE TO THE PLANNED USE AND/OR INTENT OF THE ORIGINAL DESIGN. THERE IS NO WARRANTY HEREIN FOR THE ACCURACY OF THE CHANGES SHOWN, NOR ASSURANCE THAT ALL DIFFERENCES TO THE ORIGINAL DRAWING AND OR SPECIFICATION DOCUMENT HAVE BEEN IDENTIFIED.

△	REVISIONS	DATE	BY
1	REVISED UTILITIES PER RECORD DWG INFO	01/11	BP

DESIGNED K. BROWN
DRAWN S. RASMUSSEN
CADD CHECKED
CHECKED
APPROVED

ONE INCH AT FULL SCALE. IF NOT, SCALE ACCORDINGLY
FILE NAME BR2237028-P3A-C01
JOB No. 234-2237-028
DATE JANUARY 2011

GREGORY G. HANNAH
STATE OF WASHINGTON
37369
REGISTERED PROFESSIONAL ENGINEER
21 FEB 11

Parametrix
ENGINEERING . PLANNING . ENVIRONMENTAL SCIENCES
4660 KITSAP WAY, SUITE A
BREMERTON, WASHINGTON 98312
T. 360.377.0014 F. 360.479.5961
www.parametrix.com

PROJECT NAME
CITY OF POULSBO
VIKING AVENUE IMPROVEMENTS
PHASE 3 RECORD DRAWINGS
POULSBO, WASHINGTON

STREET, STORM, SANITARY, AND WATER PLAN & PROFILE, PHASE 3A
STA 24+00 TO STA 27+85

DRAWING NO.
6 OF 7
PP5

DATE: Feb 21, 2011 - 3:29pm PLOTTED BY: rosmuste
XREFS: XBR2237028-P3A-TB | XBR2237028-P3A-BA | XBR2237028-P3A-KYMAP | XBR2237028-P3A-DE ROAD | XBR2237028-P3A-HA | XBR2237028-P3A-DE Illum | XBR2237028-P3A-DE Utility-Profiles & Text | XBR2237028-P3A-DE Utility-Plan | XBR2237028-P3A-DE

Worksheet for Circular Pipe - 1

Project Description

Friction Method	Manning Formula
Solve For	Full Flow Capacity

Input Data

Roughness Coefficient	0.018	
Channel Slope	7.35000	%
Normal Depth	1.00	ft
Diameter	1.00	ft
Discharge	6.98	ft³/s

FULL FLOW CAPACITY OF A 12" CPEP PIPE AT 7.35% SLOPE.

Results

Discharge	6.98	ft³/s
Normal Depth	1.00	ft
Flow Area	0.79	ft²
Wetted Perimeter	3.14	ft
Hydraulic Radius	0.25	ft
Top Width	0.00	ft
Critical Depth	0.97	ft
Percent Full	100.0	%
Critical Slope	0.06518	ft/ft
Velocity	8.88	ft/s
Velocity Head	1.23	ft
Specific Energy	2.23	ft
Froude Number	0.00	
Maximum Discharge	7.50	ft³/s
Discharge Full	6.98	ft³/s
Slope Full	0.07350	ft/ft
Flow Type	SubCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%

Plateau at Liberty Bay Downstream Capacity
KPFF Consulting Engineers
September 2023

Drainage Calculations - Conveyance Check for the 100-year Storm Event

ASSUMPTIONS AND CONSTANTS (Constant values from the King County Manual are used when Kitsap Manual does not provide values.)

Manning's n = 0.014 (per KCSWDM Table 4.2.1 D for Conc. Pipe - Uniform Flow Analysis)
Pr = 4.65 in. (for 100-yr 24-hr event per KCSWDM Figure 3.2.1.B)
ar = 2.66 (for 100-year event per KCSWDM Table 3.2.1.B)
br = 0.65 (for 100-year event per KCSWDM Table 3.2.1.B)
Tc = 6.3 minutes (minimum Tc per KCSWDM pg. 3-12)
C impervious = 0.90 (per Kitsap County Drainage Manual Table 4.1 for Pavement and Roofs)
C pervious = 0.25 (per Kitsap County Drainage Manual Table 4.1 for Lawns)
V min. allow. = 3.0 ft/s (for Pipes, cleaning velocity)
V max. allow. = 5.0 ft/s (for Bioswales and Ditches with less than 6% longitudinal slope, to prevent scouring)
Min. Cover = 24 in.

ASSUMPTIONS AND CONSTANTS cont.

8 in Pipe Wall Thickness = 2.0 in. (per WSDOT Hydraulics Manual Table 8-11.2 (English))
12 in Pipe Wall Thickness = 2.0 in. (per WSDOT Hydraulics Manual Table 8-11.2 (English))
18 in Pipe Wall Thickness = 2.5 in. (per WSDOT Hydraulics Manual Table 8-11.2 (English))
24 in Pipe Wall Thickness = 3.0 in. (per WSDOT Hydraulics Manual Table 8-11.2 (English))
30 in Pipe Wall Thickness = 4.0 in. (per WSDOT Hydraulics Manual Table 8-11.2 (English))
Min Cover for Plain Conc. Pipe = 1.5 ft. (per WSDOT Hydraulics Manual Table 8-11.2 (English))
Min Cover for Class IV Conc. Pipe = 1.0 ft. (per WSDOT Hydraulics Manual Table 8-11.2 (English))
Min Cover for Class V Conc. Pipe = 0.5 ft. (per WSDOT Hydraulics Manual Table 8-11.2 (English))
Project Pavement Thickness = 0.875 ft. (per XXXXX)

Layout	Contributing Flow Calculations (Rational Method)										
Structure Number	Impervious Area (sf)	Pervious Area (sf)	Area (acres)	C	Tc (min)	Tf (min)	Tc_{END} (min)	$i_{25\text{-}yr}$ (in/hr/in)	$I_{25\text{-}yr}$ (in/hr)	Contributing Q (cfs)	Q_{Total} (cfs)
Downstream Capacity Check: Plateau at Liberty Bay											
Viking Avenue System											
0											
EX CB 1649	5,000 sf	0 sf	0.11 ac	0.90	6.3	0.37	6.67	0.77	3.60 in/hr	0.37 cfs	0.37 cfs
EX CB 2095	0 sf	0 sf	0.00 ac	0.00	6.3	0.03	6.33	0.80	3.73 in/hr	6.98 cfs	6.98 cfs
EX CB 1352	2,000 sf	0 sf	0.05 ac	0.90	6.3	0.17	6.47	0.79	3.68 in/hr	0.15 cfs	0.15 cfs
EX CB 1397	5,000 sf	0 sf	0.11 ac	0.90	6.3	0.73	7.40	0.72	3.37 in/hr	1.83 cfs	2.35 cfs
EX CB 1424	9,000 sf	0 sf	0.21 ac	0.90	6.3	0.09	7.49	0.72	3.34 in/hr	0.62 cfs	9.96 cfs

Layout	Pipe Capacity Calculations												
Structure Number	Inlet Rim Elevation	Outlet Rim Elevation	Inlet Invert Elevation	Outlet Invert Elevation	Pipe Diameter (inches)	Length (feet)	Slope (%)	Velocity, V (ft/s)	Pipe Flow Capacity, Q (cfs)	Inlet Cover (ft)	Outlet Cover (ft)	Rim to Invert (ft)	Pipe Capacity Used (%)
EX CB 1649	44.79	44.74	42.48	41.94	8 in	65.0 ft	0.83%	2.93 ft/s	1.02 cfs	1.5 ft	2.0 ft	2.3 ft	36.4%
EX CB 2095	44.46	47.06	41.21	40.50	18 in	18.0 ft	3.94%	10.96 ft/s	19.37 cfs	1.5 ft	4.9 ft	3.3 ft	36.0%
EX CB 1352	44.26	44.74	42.12	41.77	8 in	33.0 ft	1.06%	3.31 ft/s	1.16 cfs	1.3 ft	2.1 ft	2.1 ft	13.1%
EX CB 1397	44.74	47.06	41.68	41.00	12 in	132.0 ft	0.52%	3.02 ft/s	2.37 cfs	1.9 ft	4.9 ft	3.1 ft	99.1%
EX CB 1424	47.06	40.00	40.50	34.90	18 in	78.0 ft	7.18%	14.79 ft/s	26.14 cfs	4.9 ft	3.4 ft	6.6 ft	38.1%

Layout	Conveyance Checks				Notes
Structure Number	V_{Full} Check	Q Check	Inlet Cover	Outlet Cover	Comments
EX CB 1649	Check	OK	Check	Check	Capacity Good. Assumed contributing area of 5000 SF Road and Sidewalk
EX CB 2095	OK	OK	Check	OK	Capacity Good. Assumed contributing flow of 6.98 CFS
EX CB 1352	OK	OK	Check	OK	Capacity Good. Assumed contributing area of 2000 SF Road and Sidewalk.
EX CB 1397	OK	OK	Check	OK	Capacity Good. Assumed contributing area of 5000 SF Road and Sidewalk + 1.53 CFS from Site.
EX CB 1424	OK	OK	OK	OK	Capacity Good. Assumed contributing area of 9000 SF Road and Sidewalk

Plateau at Liberty Bay Downstream Capacity
KPFF Consulting Engineers
September 2023

Drainage Calculations - Backwater Analysis for the 100-year Storm Event

ASSUMPTIONS AND CONSTANTS (Note: Constant values from the King County Manual are used when the Kitsap Manual does not provide values.)

Manning's n = 0.009 (per KCSWDM Table 4.2.1 D for PVC Pipe - Backwater Flow Anaysis)
Inlet Control Analysis = Assumed concrete pipe, square edge with headwall
*If Q/(AD^0.5)<=3.5, unsubmerged inlet conditions. If Q/(AD^0.5)>=4.0, submerged conditions (See KCSWDM pg.4-37)
Unsubmerged : Submerged :
K = 0.0098 c = 0.0398 (per KCSWDM Table 4.3.1.A for Circular Concrete Pipe - Square Edge with Headwall Equation Form 1)
M = 2.0 Y = 0.67 (per KCSWDM Table 4.3.1.A for Circular Concrete Pipe - Square Edge with Headwall Equation Form 1)
Bend Head Loss Coeff., Kb = 1.23 (per KCSWDM Figure 4.2.1.K for 90° Bend at a Manhole, no Special Shaping)
Entrance Loss Coef., Ke = 0.5 (per KCSWDM Table 4.3.1.B for Square-Cut End Concrete Pipe)
g = 32.2 ft/s^2 - acceleration due to gravity

Drainage Calculations - Backwater Analysis for the 100-year Storm Event

ASSUMPTIONS AND CONSTANTS

Manning's n = 0.009 (per KCSWDM Table 4.2.1 D for PVC Pipe - Backwater Flow Anaysis)
Inlet Control Analysis = Assumed concrete pipe, square edge with headwall
*If Q/(AD^0.5)<=3.5, unsubmerged inlet conditions. If Q/(AD^0.5)>=4.0, submerged conditions (See KCSWDM pg.4-37)
Unsubmerged : Submerged :
K = 0.0098 c = 0.0398
M = 2.0 Y = 0.67 (per KCSWDM Table 4.3.1.A for Circular Concrete Pipe - Square Edge with Headwall Equation Form 1)
Bend Head Loss Coeff., Kb = 1.23 (per KCSWDM Figure 4.:(per KCSWDM Table 4.3.1.A for Circular Concrete Pipe - Square Edge with Headwall Equation Form 1)
Entrance Loss Coef., Ke = 0.5 (per KCSWDM Table 4.3.1.B for Square-Cut End Concrete Pipe)
g = 32.2 ft/s2 - acceleration due to gravity

Layout	Pipe Sytem Design						
Structure Number	Design Flow, Q (cfs)	Length (ft)	Pipe Size (in)	"n" Value	Slope (%)	Outlet El (ft)	Inlet Elev (ft)
Downstream Capacity Check: Plateau at Liberty Bay							
Viking Avenue System							
0							
EX CB 1649	0.37	65.00	8.00	0.009	0.83%	41.94	42.48
EX CB 2095	6.98	18.00	18.00	0.009	3.94%	40.50	41.21
EX CB 1352	0.15	33.00	8.00	0.009	1.06%	41.77	42.12
EX CB 1397	2.35	132.00	12.00	0.009	0.52%	41.00	41.68
EX CB 1424	9.96	78.00	18.00	0.009	7.18%	34.90	40.50

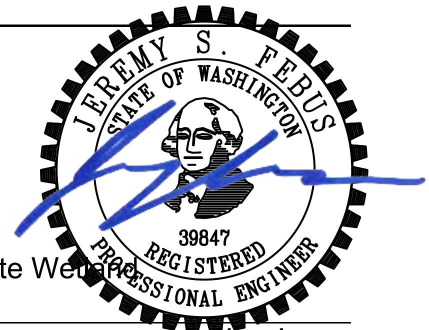
Layout	Backwater Calculation										
Structure Number	Q/(AD^0.5)*	$Q^2B_c/(gA_c^3)$	Critical Depth (ft)	Critical Velocity (fps)	Barrel Area (sf)	Barrel Velocity (fps)	Barrel Vel Head (ft)	TW Elev (ft)	Hydraulic Radius (ft)	Friction Loss (ft)	Entrance HGL Elev (ft)
EX CB 1649	1.306	1.00	0.28	2.63	0.349	1.066	0.0177	43.51	0.167	0.0292	43.54
EX CB 2095	3.225	1.00	1.02	5.44	1.767	3.950	0.2423	43.01	0.375	0.0378	43.04
EX CB 1352	0.533	1.00	0.18	2.02	0.349	0.435	0.0029	43.51	0.167	0.0025	43.51
EX CB 1397	2.997	1.00	0.66	4.31	0.785	2.997	0.1395	43.01	0.250	0.2735	43.28
EX CB 1424	4.600	1.00	1.22	6.49	1.767	5.634	0.4928	34.90	0.375	0.3329	35.23

Layout	Backwater Calculation										Checks	
Structure Number	Entrance Head Loss (ft)	Exit Head Loss (ft)	Outlet Control Elev (ft)	Inlet Control Elev* (ft)	Approach Velocity Head (ft)	Bend Head Loss (ft)	Junction Loss Coeff., Kj	Junction Head Loss (ft)	HW Elev (ft)	CB Rim Elev (ft)	Overtopping Check	Clearance btwn Rim and HGL (ft)
EX CB 1649	0.0088	0.0177	43.56	42.88	0.000	0.0000	0.00	0.0000	43.56	44.79	OK	1.23
EX CB 2095	0.1211	0.2423	43.41	42.82	0.000	0.0000	0.00	0.0000	43.41	44.46	OK	1.05
EX CB 1352	0.0015	0.0029	43.52	42.36	0.000	0.0000	0.00	0.0000	43.52	44.26	OK	0.74
EX CB 1397	0.0698	0.1395	43.49	42.71	0.018	0.0217	0.90	0.0159	43.51	44.74	OK	1.23
EX CB 1424	0.2464	0.4928	35.97	42.71	0.242	0.2980	0.97	0.2357	43.01	47.06	OK	4.05

Appendix E

Offsite Wetland H Hydro-Period Analysis Memo

TECHNICAL MEMORANDUM



01/03/2024

Date:	January 3, 2024
To:	City of Poulsbo
From:	KPFF Consulting Engineers - Jeremy Febus, PE
Subject:	Plateau at Liberty Bay - Minimum Requirement 8 for Offsite Wetland

1. Offsite Wetland H Introduction

The proposed subdivision of the Plateau at Liberty Bay (Project) will discharge water off-site to the municipal storm drainage system in Viking Avenue, which is it's natural point of discharge. The downstream flow path includes a wetland which has been labeled for study purposes as "Wetland H".

According to the *Wetland H Memo*, prepared by Wetland Resources (Attachment A), this wetland is a Category II, sloped-wetland located between Viking Avenue and Liberty Bay. Stormwater enters the wetland at several locations, and due to the wetland's location and surrounding topography, water appears to pass through the wetland without impounding. The east side of the wetland is influenced by the tide cycle of Liberty Bay, with water levels rising and falling regularly regardless of storm events. Stormwater from the public stormwater system is discharged to the wetland via a culvert to a ditch-like channel that runs through the wetland to Liberty Bay, with limited influence on wetland hydrology. See Figure 1 below for a surface water flow path analysis of Wetland H.

Figure 1 – Wetland H Inlets and Surface Water Flow Paths

Minimum Requirement 8, Wetland Protection, requires both stormwater pollution controls and hydroperiod protection for Wetland H.

All project stormwater proposed to be discharged to Wetland H, via the City's Public Storm Drainage System will receive enhanced water quality treatment. Water quality treatment will be achieved using two water quality vaults, one located following the large on-site detention vault and a second located just before the connection to the City's public system, to treat roadway runoff that bypasses the onsite detention vault.

Following the requirements of the Department of Ecology's Method 2, the Project is able to match hydroperiod requirements for the months of December through August, which is the maximum extent feasible. This technical memorandum details the design process, as well as the project wetland biologist's professional opinion on the impacts the proposed project will have on Wetland H's hydrologic function.

2. Strategies to Meet Wetland Hydroperiod Protection Criteria

The 2019 Department of Ecology Stormwater Management Manual for Western Washington provides guidance for six strategies that can be used to meet the Wetland Hydroperiod Protection Criteria (DOE Manual Volume I, Appendix C). These six strategies were evaluated, and an analysis of how these strategies are implemented or infeasible is provided below.

INCREASING THE RETENTION OF NATURAL PERVIOUS COVER

The project site is highly encumbered by critical areas with approximately 12.72 acres or 48.87% of the overall site consisting of critical areas and their associated buffers. These areas will be protected, replaced (through buffer averaging), or enhanced through this project. Protection of these critical areas and the natural pervious cover in these areas will be achieved through site plan layout and restricting grading and clearing on-site.

See Attachment B for a plan sheet showing all of the areas of retained natural pervious cover.

REDUCING THE LEVEL OF DEVELOPMENT

The proposed development of the project site results in 63 single-family lots.

Per Poulsbo Municipal Code (PMC) Section 18.260, the maximum gross density for this site is 5 units per gross acre, or 130 total lots. The proposed 63 lots make up only 48% of the zoning allowed maximum density for this site.

Additionally, proposed lot sizes have been limited to reduce the level of development. The minimum lot size proposed is 3,770 square-feet (zoning minimum lot size allowed is 3,750 square-feet), and the proposed minimum average lot area is 4,502 square-feet (zoning minimum average lot area allowed is 4,500 square-feet).

Overall, including both the critical areas to be protected and proposed open space, approximately 14.87 acres or 57.10% of the total site are proposed to be open space. 12.72 acres of the proposed open space will be protected forested space.

See Attachment B for a plan sheet showing overall open space and zoning calculations.

REDUCING THE TOTAL AMOUNT OF IMPERVIOUS SURFACE

The project proposes to limit the total amount of impervious surface on the project by limiting both the impervious area in the proposed right-of-way and on the proposed lots.

The proposed roadway sections in areas where there is no street parking have been decreased to remove the paved parking lane. This is applicable for Road A north of the proposed lots, Road B along lots 19-25, Road C, Road D, Road G and Road H. Additionally, sidewalk paving is limited to one side of the road on the north end of Road A and for the full length of Roads D and G, to reduce the amount of proposed impervious surface.

Impervious area on the proposed lots is limited to 55% of the lot area for building and paving lot coverage.

INCREASING INFILTRATION USING ON-SITE LID TECHNIQUES

According to the *Geotechnical Engineering Study* report prepared by Earth Solutions NW, infiltration on the project is considered infeasible due to the presence of glacially consolidated soils and the results of groundwater monitoring on the site. For this reason, no infiltration facilities are proposed.

Dispersion trenches are proposed on 26 of the proposed lots to disperse roof runoff to the adjacent onsite wetlands (Wetlands A and C). See Attachment C for a plan showing which lots will disperse roof runoff to adjacent wetland areas.

INCREASING OR MAINTAINING LARGER WETLAND BUFFER ZONES

All critical area buffers for on-site critical areas are maintained as part of the project. Where buffer impacts are proposed, buffer averaging is proposed to mitigate the impacts and maintain the overall buffer area.

Wetland H is an offsite wetland, and the project is unable to increase or maintain the buffer areas for a wetland on private property. Currently, Wetland H appears to have minimal buffer due to the location of a single-family residence south of the wetland, Viking Avenue west of the wetland, and the Liberty Shores Retirement Community Complex north of the wetland. See Figure 1 on Sheet 1 of this Technical Memorandum for aerial imagery showing the proximity of existing structures to Wetland H.

INCREASING INFILTRATION AND/OR STORAGE CAPACITY OF FLOW CONTROL BMPS

As discussed above, infiltration onsite is not feasible. For this reason, only increasing storage for the detention vault was evaluated.

Usable space in the proposed storm detention tract is limited due to the existing grades in the area. The current proposed detention vault design maximizes this usable space. The current proposed detention vault provides 15,000 square-feet of water storage area in a vault with irregular geometry. An irregular geometry vault comes at a cost premium and is above-and-beyond typical project requirements. The proposed detention vault is shown in the Proposed Conditions map in Attachment D. Please note that the vault shape and orientation in Attachment D differs slightly from the detention vault in the preliminary plat documents. This is due to structural design progression on the detention vault. The detention vault shown in Attachment D reflects the detention vault shape and orientation that is further developed and will be included on the engineering construction drawings.

The project team evaluated what impact a 50% increase in stormwater detention vault footprint would have on the wetland hydroperiod modeling results and found that a large increase in detention vault storage capacity did not greatly improve the hydroperiod modeling results. See Attachment E and Section 3 for the model results from this increased detention scenario.

As increasing detention does not improve the wetland hydroperiod modeling results and the currently proposed detention vault maximizes the usable space in the storm tract, changes to the detention vault volume are not proposed.

3. Hydroperiod Modeling Results

A wetland hydroperiod model was developed for offsite Wetland H. The pre and post developed east threshold discharge areas were included in this model.

See Attachment D for complete model outputs and pre and post developed basin maps.

The proposed plan implemented all applicable strategies discussed in the previous section of this technical memorandum to improve the Wetland H hydroperiod model. The monthly modeling results indicate that all months pass the hydroperiod criteria (no more than a 15% increase or decrease of total water volume discharged in a month to the wetland) with the exception of the months of September through November. See below for the model output.

Table 1: Wetland H Hydroperiod Model Output (Monthly Data) for Proposed Site Plan

Month	Predeveloped Volume (Acre Feet)	Developed Volume (Acre Feet)	% Change	Pass/Fail
January	7.4218	7.5168	101.3	PASS
February	6.2582	6.4022	102.3	PASS
March	5.6300	5.6979	101.2	PASS
April	2.8402	2.8611	100.7	PASS
May	1.5117	1.5400	101.9	PASS
June	0.9625	0.9595	99.7	PASS
July	0.6756	0.5765	85.3	PASS
August	0.5796	0.5859	101.1	PASS
September	0.5919	0.8145	137.6	FAIL
October	1.5214	2.5237	165.9	FAIL
November	3.9759	5.3290	134.0	FAIL
December	6.7510	7.6112	112.7	PASS

As discussed in the previous section, increasing the detention vault footprint of the onsite detention vault by 50% does not greatly improve the hydroperiod model results. See Table 2 for monthly modeling results for a scenario with an increased detention vault storage volume. The results indicate that, as with the proposed detention vault design, the months of September through November are not able to meet hydroperiod modeling criteria.

Table 2: Wetland H Hydroperiod Model Output (Monthly Data) for Increased Detention Vault Size

Month	Predeveloped Volume (Acre Feet)	Developed Volume (Acre Feet)	% Change	Pass/Fail
January	7.4218	7.4809	100.8	PASS
February	6.2582	6.4379	102.9	PASS
March	5.6300	5.7876	102.8	PASS
April	2.8402	2.9418	103.6	PASS
May	1.5117	1.5540	102.8	PASS
June	0.9625	0.9666	100.4	PASS
July	0.6756	0.5796	85.8	PASS
August	0.5796	0.5801	100.1	PASS
September	0.5919	0.8131	137.4	FAIL
October	1.5214	2.4422	160.5	FAIL
November	3.9759	5.2432	131.9	FAIL
December	6.7510	7.5911	112.4	PASS

4. Anticipated Hydroperiod Modification Impacts

Per the Wetland H Memo prepared by Wetland Resources (Attachment A):

> *"After construction of the Plateau at Liberty Bay development, Wetland H will continue to receive hydrology from the same sources as it does under current conditions. Stormwater runoff from the project site will be collected, detained, and treated prior to entering the existing municipal stormwater infrastructure. This will meter the volume of water exiting the project site and ensure the stormwater leaving the site is clean. Controlling the volume water leaving the site and only contributing clean water to the existing stormwater system will not impact water quality within Wetland H since sediment and pollutants from the project site runoff will have been filtered out.*
>
> *The volume of water leaving the project site is projected to be slightly higher from September through November, which is within the transitional period from the dry season to the wet season. Precipitation, and subsequently wetland hydrology, fluctuates greatly at this time of year. By providing a more consistent, metered amount of water leaving the project site, the proposed stormwater systems will not impact Wetland H hydrology."*

Due to the Wetland H characteristics described by Wetland Resources, existing stormwater ditch through the wetland, proposed water quality treatment of project stormwater runoff, and metered discharge of runoff from the project area, the hydrology of Wetland H is not anticipated to be impacted by the proposed project runoff as proposed.

Attachment A – Wetland Resources Wetland H Memo

December 15, 2023

Entitle Fund Two, LLC
Attn: Geoff Sherwin
PO Box 188
Puyallup, WA 98371

**Re: Plateau at Liberty Bay (P-1-12-06-22-02) Stormwater Outfall –
Off-site Wetland Hydroperiod Protection**

Wetland Resources, Inc. (WRI) has reviewed the stormwater flow calculations for pre-developed and mitigated conditions as well as the proposed stormwater management plan for the Plateau at Liberty Bay development project. The purpose of this memo is to provide a discussion of potential impacts to the hydroperiod of and off-site wetland (Wetland H) from the proposed project stormwater outfall.

Proposed Stormwater Management System
Runoff from the proposed subdivision will be collected and routed to the stormwater vault located in the eastern portion of the site, where it will be detained and treated. The vault outfall, along with a small amount of collected runoff that bypasses the vault, discharges to existing stormwater infrastructure in Viking Avenue. The existing infrastructure carries stormwater through the municipal stormwater system, via a series of existing pipes and catch basins, and outlets to a ditch on the east side of Viking Avenue. This ditch conveys water through an off-site wetland (Wetland H) and eventually into Liberty Bay. As part of the requirements for stormwater management design, flow rates from the project site were calculated for pre- and post-development conditions. The flow volume model shows that there will be a total water volume increase of more than 20 percent post-development in September, October, and November. If site plan changes were implemented to reduce the stormwater volume discharged, the September – November period deviation would be reduced. However, this would create an increase in the deviation from normal in the drier months, reducing the volume of runoff exiting the site. Therefore, it is not possible to maintain the existing flow rate for all months utilizing the existing model.

Wetland H
Please note that Wetland H is located off-site and information about this wetland was collected from publicly available resources, aerial photographs, and observations from public rights-of-way.

Wetland H is a Category II, slope wetland located between Viking Avenue and Liberty Bay. This wetland is documented on several public resources, including the City of Poulsbo's wetland map. Site plans and figures associated with previously approved development projects in the area show multiple stormwater discharges within or adjacent to Wetland H. These discharges stormwater runoff into the wetland at several locations.

Existing sources of hydrology for the off-site wetland include high groundwater, precipitation, and stormwater runoff from adjacent, existing developments. Hydrology on the eastern side of the wetland is also influenced by the tide cycle of Liberty Bay. The wetland's location and surrounding topography allow water from these sources to pass through the wetland, especially during large storm events. Since this wetland is a slope wetland, it does not impound or retain water for long periods of time. As such, the water level in the wetland rises and falls regularly, particularly during the wet season when water levels peak during large rain events and subside between events. Additionally, the existing culvert that will convey stormwater from the project site into the wetland enters a ditch-like channel. This channel directs stormwater straight through the wetland, limiting the influence of the stormwater from this input on the wetland hydrology.

Hydrologic Functions and Values
Currently, Wetland H provides a moderate value for water quality functions and a low value for hydrological functions. The hydrology within Wetland H is influenced by the multiple stormwater inputs and runoff entering the wetland. The vegetation within this wetland does slow stormwater runoff, allowing filtration of sediments and pollutants, but the value of these functions is limited by the sloped nature of the wetland, which is not conducive to retaining water for a long duration of time.

After construction of the Plateau at Liberty Bay development, Wetland H will continue to receive hydrology from the same sources as it does under current conditions. Stormwater runoff from the project site will be collected, detained, and treated prior to entering the existing municipal stormwater infrastructure. This will meter the volume of water exiting the project site and ensure the stormwater leaving the site is clean. Controlling the volume of water leaving the site and only contributing clean water to the existing stormwater system will not impact water quality within Wetland H since sediment and pollutants from the project site runoff will have been filtered out.

The volume of water leaving the project site is projected to be slightly higher from September through November, which is within the transitional period from the dry season to the wet season. Precipitation, and subsequently wetland hydrology, fluctuates greatly at this time of year. By providing a more consistent, metered amount of water leaving the project site, the proposed stormwater system will not impact wetland hydrology.

Conclusion
The difference in water volumes leaving the project site under current and proposed conditions for September through November will not have a detrimental effect on the functions provided by Wetland H. The proposed stormwater system design will support wetland hydrology and will result in improving the water quality within the off-site wetland.

If you have any further questions, please feel free to contact me at (425) 337-3174.

Wetland Resources, Inc.

Meryl A. Kamowski

Meryl Kamowski, PWS
Senior Ecologist

Enclosures: Wetland H rating form and figures
Proposed Stormwater Discharge Location figure

Wetland name or number H

RATING SUMMARY – Western Washington

Name of wetland (or ID #): PLB - Wetland H (off-site) Date of site visit: 10/7/2022

Rated by M.Kamowski Trained by Ecology? ✔ Yes ___No Date of training 03/2015

HGM Class used for rating Slope Wetland has multiple HGM classes? ___Y ✔ N

NOTE: **Form is not complete without the required figures** (figures can be combined).
Source of base aerial photo/map ESRI

OVERALL WETLAND CATEGORY III (based on functions ✔ or special characteristics__)

1. Category of wetland based on FUNCTIONS

_______**Category I** – Total score = 23 - 27

_______**Category II** – Total score = 20 - 22

✔ **Category III** – Total score = 16 - 19

_______**Category IV** – Total score = 9 - 15

FUNCTION	Improving Water Quality	Hydrologic	Habitat	
Circle the appropriate ratings				
Site Potential	H M L	H M L	H $\boxed{M}$ L	
Landscape Potential	H M L	H M L	H M $\boxed{L}$	
Value	H M L	H M L	$\boxed{H}$ M L	**TOTAL**
Score Based on Ratings	**6**	**5**	**6**	**17**

Score for each function based on three ratings
(order of ratings is not important)

9 = H, H, H
8 = H, H, M
7 = H, H, L
7 = H, M, M
6 = H, M, L
6 = M, M, M
5 = H, L, L
5 = M, M, L
4 = M, L, L
3 = L, L, L

2. Category based on SPECIAL CHARACTERISTICS of wetland

CHARACTERISTIC	CATEGORY
Estuarine	I II
Wetland of High Conservation Value	I
Bog	I
Mature Forest	I
Old Growth Forest	I
Coastal Lagoon	I II
Interdunal	I II III IV
None of the above	✔

Wetland name or number H

Maps and figures required to answer questions correctly for Western Washington

Depressional Wetlands

Map of:	To answer questions:	Figure #
Cowardin plant classes	D 1.3, H 1.1, H 1.4	
Hydroperiods	D 1.4, H 1.2	
Location of outlet (*can be added to map of hydroperiods)*	D 1.1, D 4.1	
Boundary of area within 150 ft of the wetland *(can be added to another figure)*	D 2.2, D 5.2	
Map of the contributing basin	D 4.3, D 5.3	
1 km Polygon: Area that extends 1 km from entire wetland edge - including polygons for accessible habitat and total habitat	H 2.1, H 2.2, H 2.3	
Screen capture of map of 303(d) listed waters in basin (from Ecology website)	D 3.1, D 3.2	
Screen capture of list of TMDLs for WRIA in which unit is found (from web)	D 3.3	

Riverine Wetlands

Map of:	To answer questions:	Figure #
Cowardin plant classes	H 1.1, H 1.4	
Hydroperiods	H 1.2	
Ponded depressions	R 1.1	
Boundary of area within 150 ft of the wetland *(can be added to another figure)*	R 2.4	
Plant cover of trees, shrubs, and herbaceous plants	R 1.2, R 4.2	
Width of unit vs. width of stream *(can be added to another figure)*	R 4.1	
Map of the contributing basin	R 2.2, R 2.3, R 5.2	
1 km Polygon: Area that extends 1 km from entire wetland edge - including polygons for accessible habitat and total habitat	H 2.1, H 2.2, H 2.3	
Screen capture of map of 303(d) listed waters in basin (from Ecology website)	R 3.1	
Screen capture of list of TMDLs for WRIA in which unit is found (from web)	R 3.2, R 3.3	

Lake Fringe Wetlands

Map of:	To answer questions:	Figure #
Cowardin plant classes	L 1.1, L 4.1, H 1.1, H 1.4	
Plant cover of trees, shrubs, and herbaceous plants	L 1.2	
Boundary of area within 150 ft of the wetland *(can be added to another figure)*	L 2.2	
1 km Polygon: Area that extends 1 km from entire wetland edge - including polygons for accessible habitat and total habitat	H 2.1, H 2.2, H 2.3	
Screen capture of map of 303(d) listed waters in basin (from Ecology website)	L 3.1, L 3.2	
Screen capture of list of TMDLs for WRIA in which unit is found (from web)	L 3.3	

Slope Wetlands

Map of:	To answer questions:	Figure #
Cowardin plant classes	H 1.1, H 1.4	1
Hydroperiods	H 1.2	1
Plant cover of **dense** trees, shrubs, and herbaceous plants	S 1.3	5
Plant cover of **dense, rigid** trees, shrubs, and herbaceous plants (*can be added to figure above)*	S 4.1	5
Boundary of 150 ft buffer (can be added to another figure)	S 2.1, S 5.1	1
1 km Polygon: Area that extends 1 km from entire wetland edge - including polygons for accessible habitat and total habitat	H 2.1, H 2.2, H 2.3	2
Screen capture of map of 303(d) listed waters in basin (from Ecology website)	S 3.1, S 3.2	3
Screen capture of list of TMDLs for WRIA in which unit is found (from web)	S 3.3	4

Wetland name or number H

HGM Classification of Wetlands in Western Washington

For questions 1-7, the criteria described must apply to the entire unit being rated.

If the hydrologic criteria listed in each question do not apply to the entire unit being rated, you probably have a unit with multiple HGM classes. In this case, identify which hydrologic criteria in questions 1-7 apply, and go to Question 8.

1. Are the water levels in the entire unit usually controlled by tides except during floods?

   NO – go to 2 **YES** – the wetland class is **Tidal Fringe** – go to 1.1

   1.1 Is the salinity of the water during periods of annual low flow below 0.5 ppt (parts per thousand)?

   NO – Saltwater Tidal Fringe (Estuarine) **YES – Freshwater Tidal Fringe**

   If your wetland can be classified as a Freshwater Tidal Fringe use the forms for **Riverine** wetlands. If it is Saltwater Tidal Fringe, it is an **Estuarine** wetland and is not scored. This method **cannot** be used to score functions for estuarine wetlands.

2. The entire wetland unit is flat, and precipitation is the only source (>90%) of water to it. Groundwater and surface water runoff are NOT sources of water to the unit.

   NO – go to 3 **YES** – The wetland class is **Flats**

   If your wetland can be classified as a Flats wetland, use the form for **Depressional** wetlands.

3. Does the entire wetland unit **meet all** of the following criteria?

   The vegetated part of the wetland is on the shores of a body of permanent open water (without any plants on the surface at any time of the year) at least 20 ac (8 ha) in size,

   At least 30% of the open water area is deeper than 6.6 ft (2 m).

   NO – go to 4 **YES –** The wetland class is **Lake Fringe** (Lacustrine Fringe)

4. Does the entire wetland unit **meet all** of the following criteria?

   ✔ The wetland is on a slope (slope can be very gradual),

   ✔ The water flows through the wetland in one direction (unidirectional) and usually comes from seeps. It may flow subsurface, as sheet flow, or in a swale without distinct banks,

   ✔ The water leaves the wetland **without being impounded**.

   NO – go to 5 **YES –** The wetland class is **Slope**

   NOTE: Surface water does not pond in these type of wetlands except occasionally in very small and shallow depressions or behind hummocks (depressions are usually <3 ft diameter and less than 1 ft deep).

Wetland name or number H

5. Does the entire wetland unit **meet all** of the following criteria?
   ____The unit is in a valley, or stream channel, where it gets inundated by overbank flooding from that stream or river,
   ____The overbank flooding occurs at least once every 2 years.

   NO – go to 6 **YES** – The wetland class is **Riverine**
   NOTE: The Riverine unit can contain depressions that are filled with water when the river is not flooding

6. Is the entire wetland unit in a topographic depression in which water ponds, or is saturated to the surface, at some time during the year? This means that any outlet, if present, is higher than the interior of the wetland.

   NO – go to 7 **YES** – The wetland class is **Depressional**

7. Is the entire wetland unit located in a very flat area with no obvious depression and no overbank flooding? The unit does not pond surface water more than a few inches. The unit seems to be maintained by high groundwater in the area. The wetland may be ditched but has no obvious natural outlet.

   NO – go to 8 **YES** – The wetland class is **Depressional**

8. Your wetland unit seems to be difficult to classify and probably contains several different HGM classes. For example, seeps at the base of a slope may grade into a riverine floodplain, or a small stream within a Depressional wetland has a zone of flooding along its sides. GO BACK AND IDENTIFY WHICH OF THE HYDROLOGIC REGIMES DESCRIBED IN QUESTIONS 1-7 APPLY TO DIFFERENT AREAS IN THE UNIT (make a rough sketch to help you decide). Use the following table to identify the appropriate class to use for the rating system if you have several HGM classes present within the wetland unit being scored.

   NOTE: Use this table only if the class that is recommended in the second column represents 10% or more of the total area of the wetland unit being rated. If the area of the HGM class listed in column 2 is less than 10% of the unit; classify the wetland using the class that represents more than 90% of the total area.

HGM classes within the wetland unit being rated		HGM class to use in rating
Slope + Riverine	☐	Riverine
Slope + Depressional	☐	Depressional
Slope + Lake Fringe	☐	Lake Fringe
Depressional + Riverine along stream within boundary of depression	☐	Depressional
Depressional + Lake Fringe	☐	Depressional
Riverine + Lake Fringe	☐	Riverine
Salt Water Tidal Fringe and any other class of freshwater wetland	☐	Treat as ESTUARINE

If you are still unable to determine which of the above criteria apply to your wetland, or if you have **more than 2 HGM classes** within a wetland boundary, classify the wetland as Depressional for the rating.

Wetland name or number H

SLOPE WETLANDS **Water Quality Functions** - Indicators that the site functions to improve water quality	
S 1.0. Does the site have the potential to improve water quality?	
S 1.1. Characteristics of the average slope of the wetland: (A 1% slope has a 1 ft vertical change in elevation for every 100 ft of horizontal distance.) ☐ Slope is 1% or less points = 3 ☐ Slope is > 1%-2% points = 2 ☑ Slope is > 2%-5% points = 1 ☐ Slope is greater than 5% points = 0	**1**
S 1.2. The soil 2 in. below the surface (or duff layer) is true clay or true organic *(use NRCS definitions)*: Yes = 3 $\boxed{\text{No = 0}}$	**0**
S 1.3. Characteristics of the plants in the wetland that trap sediments and pollutants: Choose the points appropriate for the description that best fits the plants in the wetland. Dense means you have trouble seeing the soil surface (>75% cover), and uncut means not grazed or mowed, and plants are higher than 6 in. ☐ Dense, uncut, herbaceous plants > 90% of the wetland area points = 6 ☐ Dense, uncut, herbaceous plants > ½ of area points = 3 ☑ Dense, woody, plants > ½ of area points = 2 ☐ Dense, uncut, herbaceous plants > ¼ of area points = 1 ☐ Does not meet any of the criteria above for plants points = 0	**2**
Total for S 1 Add the points in the boxes above	**3**

Rating of Site Potential If score is: __**12 = H** ___**6-11 = M** ✔**0-5 = L** *Record the rating on the first page*

S 2.0. Does the landscape have the potential to support the water quality function of the site?	
S 2.1. Is > 10% of the area within 150 ft on the uphill side of the wetland in land uses that generate pollutants? $\boxed{\text{Yes = 1}}$ No = 0	**1**
S 2.2. Are there other sources of pollutants coming into the wetland that are not listed in question S 2.1? Other sources ________________ $\boxed{\text{Yes = 1}}$ No = 0	**1**
Total for S 2 Add the points in the boxes above	**2**

Rating of Landscape Potential If score is: ✔**1-2 = M** ___**0 = L** *Record the rating on the first page*

S 3.0. Is the water quality improvement provided by the site valuable to society?	
S 3.1. Does the wetland discharge directly (i.e., within 1 mi) to a stream, river, lake, or marine water that is on the 303(d) list? $\boxed{\text{Yes = 1}}$ No = 0	**1**
S 3.2. Is the wetland in a basin or sub-basin where water quality is an issue? (At least one aquatic resource in the basin is on the 303(d) list.) $\boxed{\text{Yes = 1}}$ No = 0	**1**
S 3.3. Has the site been identified in a watershed or local plan as important for maintaining water quality? (Answer YES if there is a TMDL in development or in effect for the basin in which unit is found.) $\boxed{\text{Yes = 2}}$ No = 0	**2**
Total for S 3 Add the points in the boxes above	**4**

Rating of Value If score is: ✔**2-4 = H** ___**1 = M** ___**0 = L** *Record the rating on the first page*

SLOPE WETLANDS

Hydrologic Functions - Indicators that the site functions to reduce flooding and stream erosion

S 4.0. Does the site have the potential to reduce flooding and stream erosion?	
S 4.1. Characteristics of plants that reduce the velocity of surface flows during storms: Choose the points appropriate for the description that best fits conditions in the wetland. Stems of plants should be thick enough (usually > $^1/_8$ in), or dense enough, to remain erect during surface flows. ☑ Dense, uncut, **rigid** plants cover > 90% of the area of the wetland points = 1 ☐ All other conditions points = 0	1

Rating of Site Potential If score is: **✔ 1 = M ___0 = L** *Record the rating on the first page*

S 5.0. Does the landscape have the potential to support the hydrologic functions of the site?	
S 5.1. Is more than 25% of the area within 150 ft upslope of wetland in land uses or cover that generate excess surface runoff? Yes = 1 No = 0	1

Rating of Landscape Potential If score is: **✔ 1 = M ___0 = L** *Record the rating on the first page*

S 6.0. Are the hydrologic functions provided by the site valuable to society?	
S 6.1. Distance to the nearest areas downstream that have flooding problems: ☐ The sub-basin immediately downgradient of site has flooding problems that result in damage to human or natural resources (e.g., houses or salmon redds) points = 2 ☐ Surface flooding problems are in a sub-basin farther downgradient points = 1 ☑ No flooding problems anywhere downstream points = 0	0
S 6.2. Has the site been identified as important for flood storage or flood conveyance in a regional flood control plan? Yes = 2 No = 0	0
Total for S 6 Add the points in the boxes above	0

Rating of Value If score is: **__2-4 = H ___1 = M ✔ 0 = L** *Record the rating on the first page*

NOTES and FIELD OBSERVATIONS:

Wetland name or number H

These questions apply to wetlands of all HGM classes.

HABITAT FUNCTIONS - Indicators that site functions to provide important habitat

H 1.0. Does the site have the potential to provide habitat?

H 1.1. Structure of plant community: Indicators are Cowardin classes and strata within the Forested class. Check the Cowardin plant classes in the wetland. Up to 10 patches may be combined for each class to meet the threshold of ¼ ac if the unit is at least 2.5 ac, or more than 10% of the unit if it is smaller than 2.5 ac.

____Aquatic bed	4 structures or more: points = 4
✔ Emergent	3 structures: points = 2
____Scrub-shrub (areas where shrubs have > 30% cover)	2 structures: points = 1
✔ Forested (areas where trees have > 30% cover)	1 structure: points = 0

If the unit has a Forested class, check if:

✔ The Forested class has 3 out of 5 strata (canopy, sub-canopy, shrubs, herbaceous, moss/groundcover) that each cover 20% within the Forested polygon

2

H 1.2. Hydroperiods

Check the types of water regimes (hydroperiods) present within the wetland. The water regime has to cover more than 10% of the wetland if the unit is < 2.5 ac, or ¼ ac if the unit is at least 2.5 ac to count (see text for descriptions of hydroperiods).

____Permanently flooded or inundated	4 or more types present: points = 3
____Seasonally flooded or inundated	3 types present: points = 2
✔ Occasionally flooded or inundated	2 types present: points = 1
✔ Saturated only	1 type present: points = 0
____Permanently flowing stream or river in, or adjacent to, the wetland	
✔ Intermittently or seasonally flowing stream in, or adjacent to, the wetland	
____**Lake Fringe wetland**	**2 points**
____**Freshwater tidal wetland**	**2 points**

2

H 1.3. Richness of plant species

Count the number of plant species in the wetland that cover at least 10 ft^2.

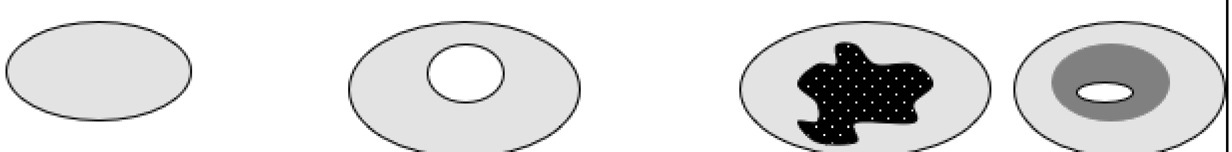
Different patches of the same species can be combined to meet the size threshold and you do not have to name the species. **Do not include Eurasian milfoil, reed canarygrass, purple loosestrife, Canada thistle**

If you counted: > 19 species	points = 2
5 - 19 species	points = 1
< 5 species	points = 0

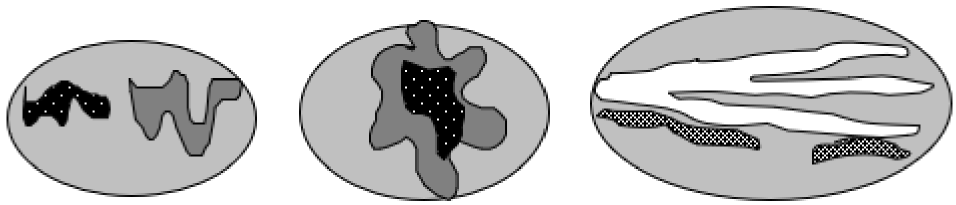
1

H 1.4. Interspersion of habitats

Decide from the diagrams below whether interspersion among Cowardin plants classes (described in H 1.1), or the classes and unvegetated areas (can include open water or mudflats) is high, moderate, low, or none. If you have four or more plant classes or three classes and open water, the rating is always high.



None = 0 points   **Low** = 1 point   **Moderate** = 2 points



All three diagrams in this row are **High** = 3 points

0

H 1.5. Special habitat features: Check the habitat features that are present in the wetland. The number of checks is the number of points. ✔ Large, downed, woody debris within the wetland (> 4 in. diameter and 6 ft long). ✔ Standing snags (dbh > 4 in.) within the wetland ____Undercut banks are present for at least 6.6 ft (2 m) **and/or** overhanging plants extend at least 3.3 ft (1 m) over open water or a stream (or ditch) in, or contiguous with the wetland, for at least 33 ft (10 m) ____Stable steep banks of fine material that might be used by beaver or muskrat for denning (> 30 degree slope) OR signs of recent beaver activity are present (cut shrubs or trees that have not yet weathered where wood is exposed) ____At least ¼ ac of thin-stemmed persistent plants or woody branches are present in areas that are permanently or seasonally inundated (structures for egg-laying by amphibians) ____Invasive plants cover less than 25% of the wetland area in every stratum of plants (see H 1.1 above for the list of strata and H 1.5 in the manual for the list of aggressive plant species)	**2**
Total for H 1 — Add the points in the boxes above	**7**

Rating of Site Potential If score is: __**15-18 = H** ✔**7-14 = M** ___**0-6 = L** *Record the rating on the first page*

H 2.0. Does the landscape have the potential to support the habitat functions of the site?

H 2.1. Accessible habitat (include only habitat polygons accessible from the wetland. *Calculate:* % relatively undisturbed habitat 0 + [(% moderate and low intensity land uses)/2] 0 = 0 % Total accessible habitat is: ☐ > $^1/_3$ (33.3%) of 1 km Polygon — points = 3 ☐ 20-33% of 1 km Polygon — points = 2 ☐ 10-19% of 1 km Polygon — points = 1 ☑ < 10% of 1 km Polygon — points = 0	**0**
H 2.2. Total habitat in 1 km Polygon around the wetland. *Calculate:* % relatively undisturbed habitat 14 + [(% moderate and low intensity land uses)/2] 12 = 27 % ☐ Total habitat > 50% of Polygon — points = 3 ☑ Total habitat 10-50% and in 1-3 patches — points = 2 ☐ Total habitat 10-50% and > 3 patches — points = 1 ☐ Total habitat < 10% of 1 km Polygon — points = 0	**2**
H 2.3. Land use intensity in 1 km Polygon: ☑ > 50% of 1 km Polygon is high intensity land use — points = (- 2) ☐ ≤ 50% of 1 km Polygon is high intensity — points = 0	**-2**
Total for H 2 — Add the points in the boxes above	**0**

Rating of Landscape Potential If score is: __**4-6 = H** ___**1-3 = M** ✔**< 1 = L** *Record the rating on the first page*

H 3.0. Is the habitat provided by the site valuable to society?

H 3.1. Does the site provide habitat for species valued in laws, regulations, or policies? *Choose only the highest score that applies to the wetland being rated.* Site meets ANY of the following criteria: — points = 2 ☑ It has 3 or more Priority Habitats within 100 m (see next page) ☐ It provides habitat for Threatened or Endangered species (any plant or animal on the state or federal lists) ☐ It is mapped as a location for an individual WDFW Priority Species ☐ It is a Wetland of High Conservation Value as determined by the Department of Natural Resources data ☐ It has been categorized as an important habitat site in a local or regional comprehensive plan, in a Shoreline Master Plan, or in a watershed plan ☐ Site has 1 or 2 Priority Habitats (listed on next page) within 100 m — points = 1 ☐ Site does not meet any of the criteria above — points = 0	**2**

Rating of Value If score is: ✔**2 = H** ___**1 = M** ___**0 = L** *Record the rating on the first page*

WDFW Priority Habitats

See complete descriptions of Priority Habitats listed by WDFW, and the counties in which they can be found, in: Washington Department of Fish and Wildlife. 2008 (current year, as revised). Priority Habitat and Species List.[133] This list was updated for consistency with guidance from WDFW.

This question is independent of the land use between the wetland unit and the Priority Habitat. All vegetated wetlands are by definition a Priority Habitat but are not included in this list because they are addressed by this rating system.

Count how many of the following Priority Habitats are within 330 ft (100 m) of the wetland unit:

☐ **Aspen Stands:** Pure or mixed stands of aspen greater than 1 ac (0.4 ha).

☐ **Biodiversity Areas and Corridors**: Areas of habitat that are relatively important to various species of native fish and wildlife. This habitat automatically counts if mapped on the PHS online map within 100m of the wetland. If not mapped, a determination can be made in the field.

☐ **Caves:** A naturally occurring cavity, recess, void, or system of interconnected passages under the earth in soils, rock, ice, or other geological formations and is large enough to contain a human.

☐ **Cliffs:** Greater than 25 ft (7.6 m) high and occurring below 5000 ft elevation.

☐ **Fresh Deepwater:** Lands permanently flooded with freshwater, including environments where surface water is permanent and often deep, so that water, rather than air, is the principal medium within which the dominant organisms live. Substrate does not support emergent vegetation. Do not select if Instream habitat is also present, or if the entire Deepwater feature is included in the wetland unit being rated (such as a pond with a vegetated fringe).

☐ **Herbaceous Balds:** Variable size patches of grass and forbs on shallow soils over bedrock.

☐ **Instream:** The combination of physical, biological, and chemical processes and conditions that interact to provide functional life history requirements for instream fish and wildlife resources. Do not select if Fresh Deepwater habitat is also present.

☑ **Nearshore:** Relatively undisturbed nearshore habitats. These include Coastal Nearshore, Open Coast Nearshore, and Puget Sound Nearshore.

☑ **Old-growth/Mature forests:** Old-growth west of Cascade crest – Stands of at least 2 tree species, forming a multi-layered canopy with occasional small openings; with at least 8 trees/ac (20 trees/ha) > 32 in. (81 cm) diameter at breast height (dbh) or > 200 years of age. Mature forests – Stands with average diameters exceeding 21 in. (53 cm) dbh; crown cover may be less than 100%; decay, decadence, numbers of snags, and quantity of large downed material is generally less than that found in old-growth; 80-200 years old west of the Cascade crest.

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[133] http://wdfw.wa.gov/publications/00165/wdfw00165.pdf

☐ **Oregon White Oak:** Woodland stands of pure oak or oak/conifer associations where canopy coverage of the oak component is important. For single oaks or oak stands <0.4 ha in urban areas, WDFW's Management Recommendations for Oregon White Oak[134] provides more detail for determining if they are Priority Habitats

☐ **Riparian:** The area adjacent to freshwater aquatic systems with flowing or standing water that contains elements of both aquatic and terrestrial ecosystems which mutually influence each other.

☑ **Snags and Logs:** Trees are considered snags if they are dead or dying and exhibit sufficient decay characteristics to enable cavity excavation/use by wildlife. Priority snags have a diameter at breast height of > 20 in. (51 cm) in western Washington and are > 6.5 ft (2 m) in height. Priority logs are > 12 in. (30 cm) in diameter at the largest end, and > 20 ft (6 m) long.

☐ **Talus:** Homogenous areas of rock rubble ranging in average size 0.5 - 6.5 ft (0.15 - 2.0 m), composed of basalt, andesite, and/or sedimentary rock, including riprap slides and mine tailings. May be associated with cliffs.

☐ **Westside Prairies:** Herbaceous, non-forested plant communities that can either take the form of a dry prairie or a wet prairie.

[134] https://wdfw.wa.gov/publications/00030/wdfw00030.pdf

Wetland name or number H

CATEGORIZATION BASED ON SPECIAL CHARACTERISTICS

Wetland Type *Check off any criteria that apply to the wetland. Circle the category when the appropriate criteria are met.*	**Category**
SC 1.0. Estuarine wetlands Does the wetland meet the following criteria for Estuarine wetlands? ☐ The dominant water regime is tidal, ☐ Vegetated, and ☐ With a salinity greater than 0.5 ppt Yes **–** Go to **SC 1.1** No= **Not an estuarine wetland**	
SC 1.1. Is the wetland within a National Wildlife Refuge, National Park, National Estuary Reserve, Natural Area Preserve, State Park or Educational, Environmental, or Scientific Reserve designated under WAC 332-30-151? Yes = **Category I** No – Go to **SC 1.2**	**Cat. I**
SC 1.2. Is the wetland unit at least 1 ac in size and meets at least two of the following three conditions? ☐ The wetland is relatively undisturbed (has no diking, ditching, filling, cultivation, grazing), and has less than 10% cover of non-native plant species. If non-native species are *Spartina*, see chapter 4.8 in the manual. ☐ At least ¾ of the landward edge of the wetland has a 100 ft buffer of shrub, forest, or un-grazed or un-mowed grassland. ☐ The wetland has at least two of the following features: tidal channels, depressions with open water, or contiguous freshwater wetlands. Yes = **Category I** No = **Category II**	**Cat. I** **Cat. II**
SC 2.0. Wetlands of High Conservation Value (WHCV) SC 2.1. Does the wetland overlap with any known or historical rare plant or rare & high-quality ecosystem polygons on the WNHP Data Explorer?[135] Yes **= Category I** No – Go to **SC 2.2** SC 2.2. Does the wetland have a rare plant species, rare ecosystem (e.g., plant community), or high-quality common ecosystem that may qualify the site as a WHCV? Contact WNHP for resources to help determine the presence of these elements. Yes – Submit data to WA Natural Heritage Program for determination,[136] Go to **SC 2.3** No **= Not a WHCV** SC 2.3. Did WNHP review the site within 30 days and determine that it has a rare plant or ecosystem that meets their criteria? Yes **= Category I** No **= Not a WHCV**	**Cat. I**
SC 3.0. Bogs Does the wetland (or any part of the unit) meet both the criteria for soils and vegetation in bogs? *Use the key below.* ***If you answer YES, you will still need to rate the wetland based on its functions.*** SC 3.1. Does an area within the wetland unit have organic soil horizons, either peats or mucks, that compose 16 in. or more of the first 32 in. of the soil profile? Yes – Go to **SC 3.3** No – Go to **SC 3.2** SC 3.2. Does an area within the wetland unit have organic soils, either peats or mucks, that are less than 16 in. deep over bedrock, or an impermeable hardpan such as clay or volcanic ash, or that are floating on top of a lake or pond? Yes – Go to **SC 3.3** No = **Not a bog** SC 3.3. Does an area with peats or mucks have more than 70% cover of mosses at ground level, AND at least a 30% cover of plant species listed in Table 4? Yes = **Category I bog** No – Go to **SC 3.4** **NOTE:** If you are uncertain about the extent of mosses in the understory, you may substitute that criterion by measuring the pH of the water that seeps into a hole dug at least 16 in. deep. If the pH is less than 5.0 and the plant species in Table 4 are present, the wetland is a bog. SC 3.4. Is an area with peats or mucks forested (> 30% cover) with Sitka spruce, subalpine fir, western red cedar, western hemlock, lodgepole pine, quaking aspen, Engelmann spruce, or western white pine, AND any of the species (or combination of species) listed in Table 4 provide more than 30% of the cover under the canopy? Yes = **Category I bog** No **= Not a bog**	**Cat. I**

[135] https://www.dnr.wa.gov/NHPdata
[136] https://www.dnr.wa.gov/Publications/amp_nh_sighting_form.pdf

Wetland name or number H

SC 4.0. Forested Wetlands Does the wetland have at least <u>1 contiguous acre</u> of forest that meets one of these criteria for the WA Department of Fish and Wildlife's forests as Priority Habitats? ***If you answer YES, you will still need to rate the wetland based on its functions.*** ☐ **Old-growth forests** (west of Cascade crest): Stands of at least two tree species, forming a multi-layered canopy with occasional small openings; with at least 8 trees/ac (20 trees/ha) that are at least 200 years of age OR have a diameter at breast height (dbh) of 32 in. (81 cm) or more. ☐ **Mature forests** (west of the Cascade Crest): Stands where the largest trees are 80- 200 years old OR the species that make up the canopy have an average diameter (dbh) exceeding 21 in. (53 cm). Yes = **Category I** $\boxed{\text{No = Not a forested wetland for this section}}$	**Cat. I**
SC 5.0. Wetlands in Coastal Lagoons Does the wetland meet all of the following criteria of a wetland in a coastal lagoon? ☐ The wetland lies in a depression adjacent to marine waters that is wholly or partially separated from marine waters by sandbanks, gravel banks, shingle, or, less frequently, rocks ☐ The lagoon in which the wetland is located contains ponded water that is saline or brackish (> 0.5 ppt) during most of the year in at least a portion of the lagoon *(needs to be measured near the bottom)* ☐ The lagoon retains some of its surface water at low tide during spring tides Yes – Go to **SC 5.1** $\boxed{\text{No = Not a wetland in a coastal lagoon}}$ SC 5.1. Does the wetland meet all of the following three conditions? ☐ The wetland is relatively undisturbed (has no diking, ditching, filling, cultivation, grazing), and has less than 20% cover of aggressive, opportunistic plant species (see list of species in H 1.5 in the manual). ☐ At least ¾ of the landward edge of the wetland has a 100 ft buffer of shrub, forest, or un-grazed or un-mowed grassland. ☐ The wetland is larger than $^1/_{10}$ ac (4350 ft^2) Yes = **Category I** No = **Category II**	**Cat. I** **Cat. II**
SC 6.0. Interdunal Wetlands Is the wetland west of the 1889 line (also called the Western Boundary of Upland Ownership or WBUO)? ***If you answer YES, you will still need to rate the wetland based on its habitat functions.*** In practical terms that means the following geographic areas: ☐ Long Beach Peninsula: Lands west of SR 103 ☐ Grayland-Westport: Lands west of SR 105 ☐ Ocean Shores-Copalis: Lands west of SR 115 and SR 109 and Ocean Shores Blvd SW, including lands west of E. Oceans Shores Blvd SW. Yes – Go to **SC 6.1** $\boxed{\text{No = Not an interdunal wetland for rating}}$ SC 6.1. Is the wetland 1 ac or larger and scores an 8 or 9 for the habitat functions on the form (rates H,H,H or H,H,M for the three aspects of function)? Yes = **Category I** No – Go to **SC 6.2** SC 6.2. Is the wetland 1 ac or larger, or is it in a mosaic of wetlands that is 1 ac or larger? Yes = **Category II** No – Go to **SC 6.3** SC 6.3. Is the unit between 0.1 and 1 ac, or is it in a mosaic of wetlands that is between 0.1 and 1 ac? Yes = **Category III** No = **Category IV**	**Cat I** **Cat. II** **Cat. III** **Cat. IV**
Category of wetland based on Special Characteristics If you answered No for all types, enter "Not Applicable" on Summary Form	**N/A**

ENTITLE FUND TWO - VIKING AVE NW
WETLAND RATING FIGURE 1- WETLAND H

LEGEND
- 150' FROM WL BOUNDARY
- EMERGENT VEGETATION
- FORESTED VEGETATION
- SATURATED ONLY
- OCCASIONALLY FLOODED
- INTERMITTENT STREAM

Scale 1" = 200'

0 100 200 300 400

Wetland Resources, Inc.
Delineation / Mitigation / Restoration / Habitat Creation / Permit Assistance
9505 19th Avenue S.E. Suite 106 Everett, Washington 98208
Phone: (425) 337-3174
Fax: (425) 337-3045
Email: mailbox@wetlandresources.com

WETLAND RATING
Wetland H

Figure H-1
WRI Job # 22210
Rated by: AJW

ENTITLE FUND TWO - VIKING AVE NW

WETLAND RATING FIGURE 2- WETLAND H

LEGEND

RELATIVELY UNDISTURBED

LOW/MOD. INTENSITY

HIGH INTENSITY

ACCESSIBLE HABITAT

WETLAND

1 KM FROM WETLAND

Scale 1" = 1,000'

0 1,000 2,000

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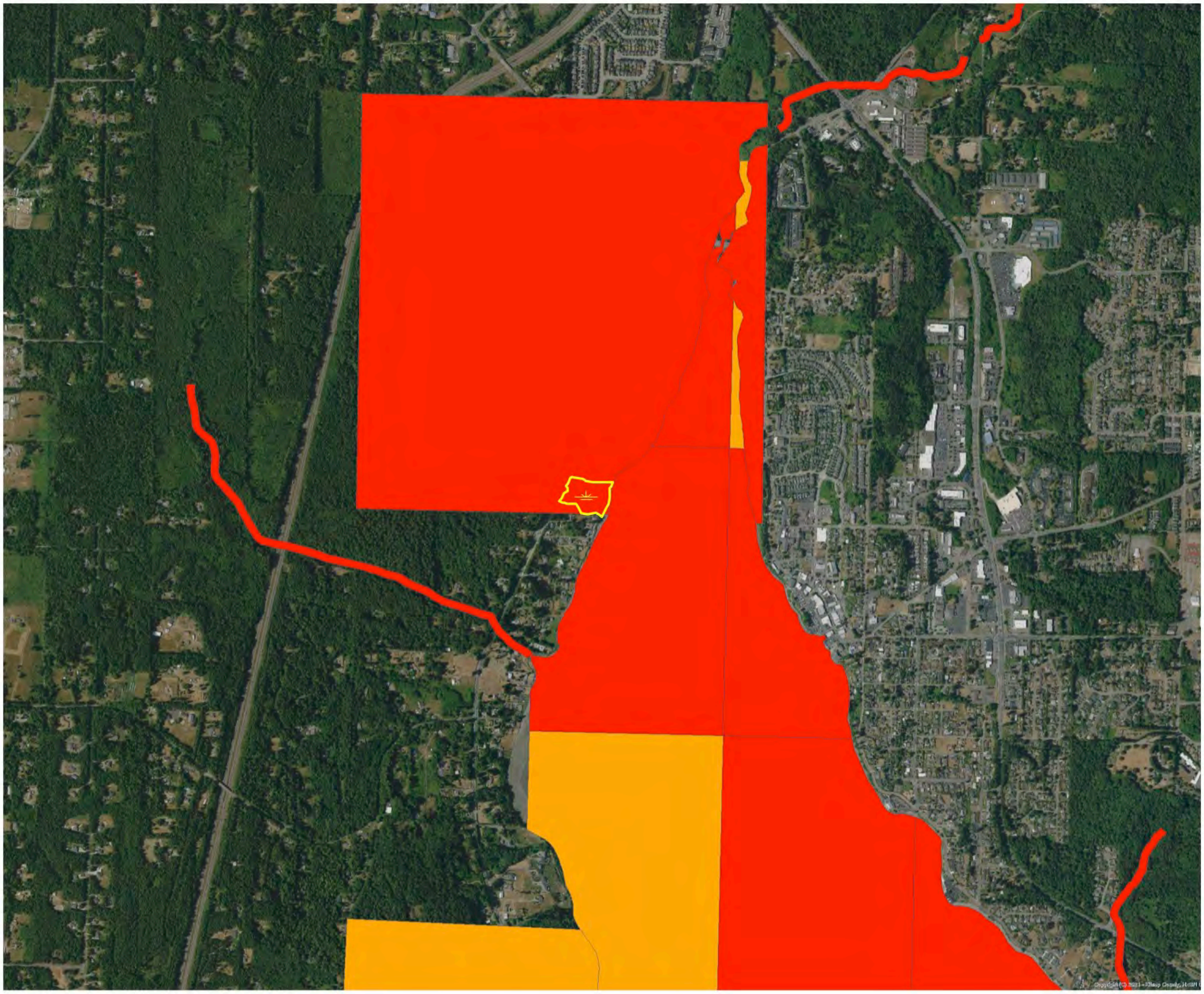
WETLAND RATING
Wetland H

Figure H-2
WRI Job # 22210
Rated by: AJW

ENTITLE FUND TWO - VIKING AVE NW

WETLAND RATING FIGURE 3- WETLAND H



LEGEND

WETLAND

AQUATIC RESOURCES ON THE 303(d) LIST

CONTAINS TMDL

Scale 1" = 2,000'

0 2,000 4,000

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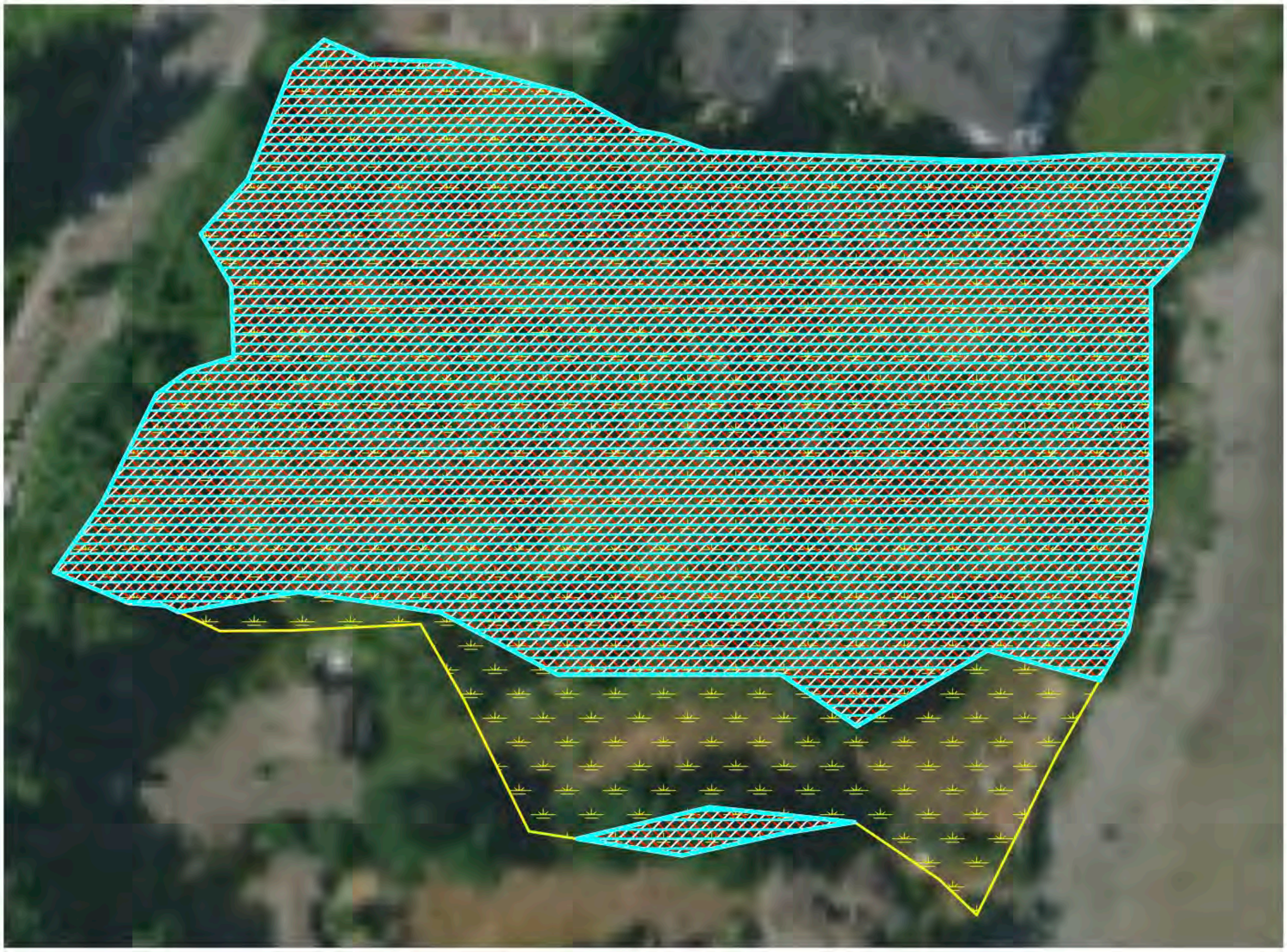
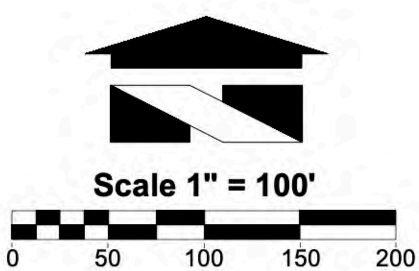
WETLAND RATING
Wetland H

Figure H-3
WRI Job # 22210
Rated by: AJW

ENTITLE FUND TWO - VIKING AVE NW

WETLAND RATING FIGURE 4- WETLAND H





LEGEND

WETLAND

DENSE WOODY

DENSE UNCUT HERBACEOUS

DENSE UNCUT RIDGID

Wetland Resources, Inc.

Delineation / Mitigation / Restoration / Habitat Creation / Permit Assistance

9505 19th Avenue S.E. Suite 106 Everett, Washington 98208

Phone: (425) 337-3174

Fax: (425) 337-3045

Email: mailbox@wetlandresources.com

WETLAND RATING

Wetland H

Figure H-4

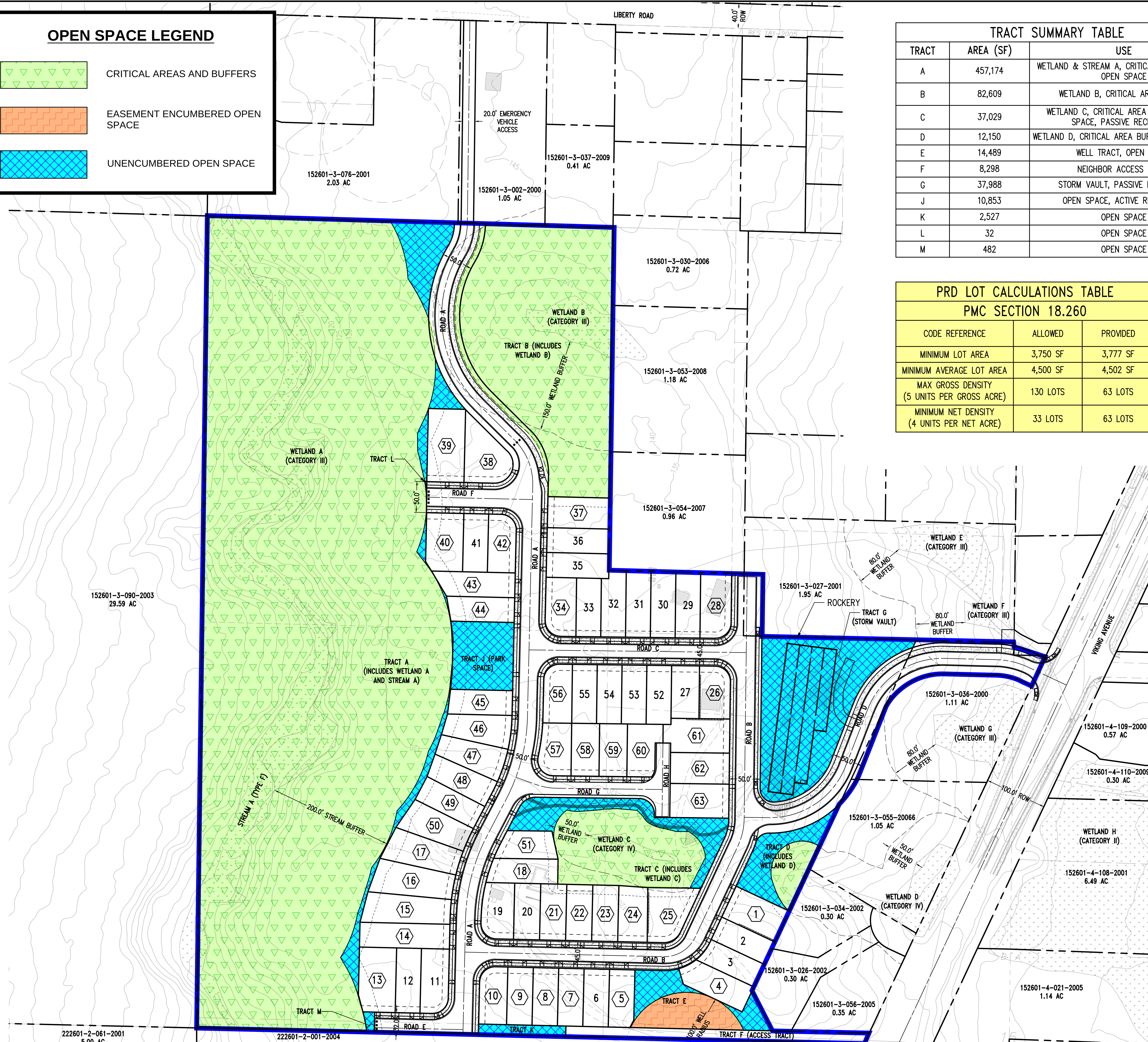
WRI Job # 22210

Rated by: AJW

Attachment B – Open Space Exhibit

OPEN SPACE LEGEND

- CRITICAL AREAS AND BUFFERS
- EASEMENT ENCUMBERED OPEN SPACE
- UNENCUMBERED OPEN SPACE



TRACT SUMMARY TABLE

TRACT	AREA (SF)	USE
A	457,174	WETLAND & STREAM A, CRITICAL AREA BUFFER, OPEN SPACE
B	82,609	WETLAND B, CRITICAL AREA BUFFER
C	37,029	WETLAND C, CRITICAL AREA BUFFER, OPEN SPACE, PASSIVE RECREATION
D	12,150	WETLAND D, CRITICAL AREA BUFFER, OPEN SPACE
E	14,489	WELL TRACT, OPEN SPACE
F	8,298	NEIGHBOR ACCESS TRACT
G	37,988	STORM VAULT, PASSIVE RECREATION
J	10,853	OPEN SPACE, ACTIVE RECREATION
K	2,527	OPEN SPACE
L	32	OPEN SPACE
M	482	OPEN SPACE

TRACT UNENCUMBERED OPEN SPACE SUMMARY

TRACT	AREA (SF)	USE
A	15,887	OPEN SPACE OUTSIDE OF CRITICAL AREAS AND BUFFERS
C	11,789	OPEN SPACE OUTSIDE OF CRITICAL AREAS AND BUFFERS, PASSIVE RECREATION
D	7,082	OPEN SPACE OUTSIDE OF CRITICAL AREAS AND BUFFERS
E	6,735	OPEN SPACE OUTSIDE OF WELL TRACT
G	37,988	OPEN SPACE AND PASSIVE RECREATION OVER STORM VAULT
J	10,853	OPEN SPACE AND ACTIVE RECREATION
K	2,527	OPEN SPACE
L	32	OPEN SPACE
M	482	OPEN SPACE

PRD LOT CALCULATIONS TABLE
PMC SECTION 18.260

CODE REFERENCE	ALLOWED	PROVIDED
MINIMUM LOT AREA	3,750 SF	3,777 SF
MINIMUM AVERAGE LOT AREA	4,500 SF	4,502 SF
MAX GROSS DENSITY (5 UNITS PER GROSS ACRE)	130 LOTS	63 LOTS
MINIMUM NET DENSITY (4 UNITS PER NET ACRE)	33 LOTS	63 LOTS

PRD OPEN SPACE CALCULATIONS TABLE
PMC SECTION 18.260

CODE REFERENCE	ALLOWED/ REQUIRED	PROVIDED
TOTAL SITE AREA	---	1,134,110 SF
ROW AREA	---	187,212 SF
OPEN SPACE[1,4]	170,117 SF	647,578 SF
CRITICAL AREAS[2]	---	557,586 SF (49%)
UNENCUMBERED OPEN SPACE[3,4]	68,047 SF	93,375 SF

[1] 15% OPEN SPACE IS REQUIRED FOR AVERAGE LOT SIZE OF 4,500–5,499 SF
[2] 60% OF REQUIRED OPEN SPACE IS PROPOSED TO BE CRITICAL AREA, AS OVER 41% OF THE TOTAL SITE AREA IS CRITICAL AREA
[3] 40% OF THE REQUIRED OPEN SPACE MUST BE UNENCUMBERED
[4] VAULT TRACT AREA IS INCLUDED IN THE OPEN SPACE/UNENCUMBERED OPEN SPACE AREA DUE TO DUAL USE AS PASSIVE RECREATION.

LEGEND

- PROPOSED PROPERTY LINE
- PROPERTY LINE
- PLAT BOUNDARY
- CENTERLINE
- PROPOSED UTILITY EASEMENT (TYP) (6)
- WETLAND BUFFER (EXISTING AND PROPOSED WITH BUFFER AVERAGING)
- (#) LOT WITH DIRECT VISIBILITY TO OPEN SPACE
- CRITICAL AREA BSBL (5)
- PROPOSED TRAIL

NOTES:

1. UNENCUMBERED OPEN SPACE IDENTIFIED IN THE TRACT UNENCUMBERED OPEN SPACE SUMMARY TABLE IS HIGHLIGHTED IN BLUE/CYAN IN THE PLAN.
2. GIS DATA IS USED FOR ALL GRADING INFORMATION AND CITY RECORDS ARE USED FOR ALL SHOWN EXISTING UTILITIES. THE PROJECT SURVEYOR SHALL PROVIDE A FULL SITE SURVEY DURING CONSTRUCTION DOCUMENT PREPARATION.
3. EXISTING LOT LINES AND EASEMENTS SHOWN ARE PROVIDED BY THE PROJECT SURVEYOR.
4. WETLAND AND STREAM LIMITS ARE FLAGGED IN THE FIELD BY THE WETLAND BIOLOGIST AND SURVEYED LOCATION IS SHOWN ON THESE PLANS.
5. 25 FOOT STREAM BUFFER BSBL IS SHOWN FROM THE STREAM A BUFFER. 15 FOOT WETLAND BUFFER BSBL IS SHOWN FROM WETLANDS B, C, AND D.

N

0 40 80 160
1 inch = 80 feet

Z:\2000001-2009999\2000505 Watts\CADD\Exhibits\Open Space Exhibit.dwg
Dec 29, 2023 – 11:58am ellsec

NO.	DATE	BY	CHD.	APPR.	REVISION

DRAWN BY RAG | DESIGNED BY EKC | CHECKED BY EKC | APPROVED BY JSF
DATE DECEMBER 29, 2023
JOB No.: 2000505

CALL TWO BUSINESS DAYS BEFORE YOU DIG 1-800-424-5555
SCALE: AS NOTED

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Seattle, WA 98101
206.622.5822
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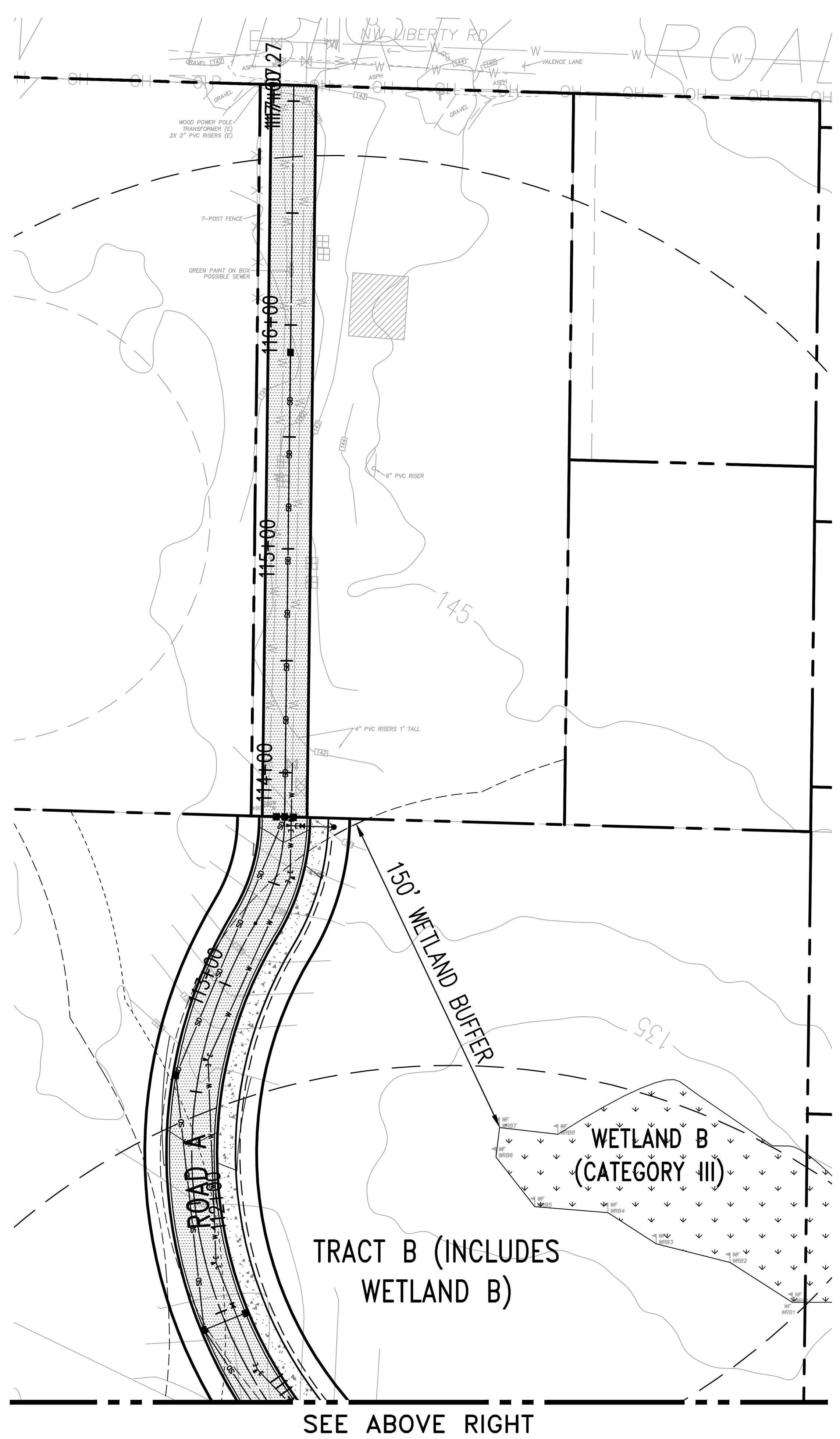
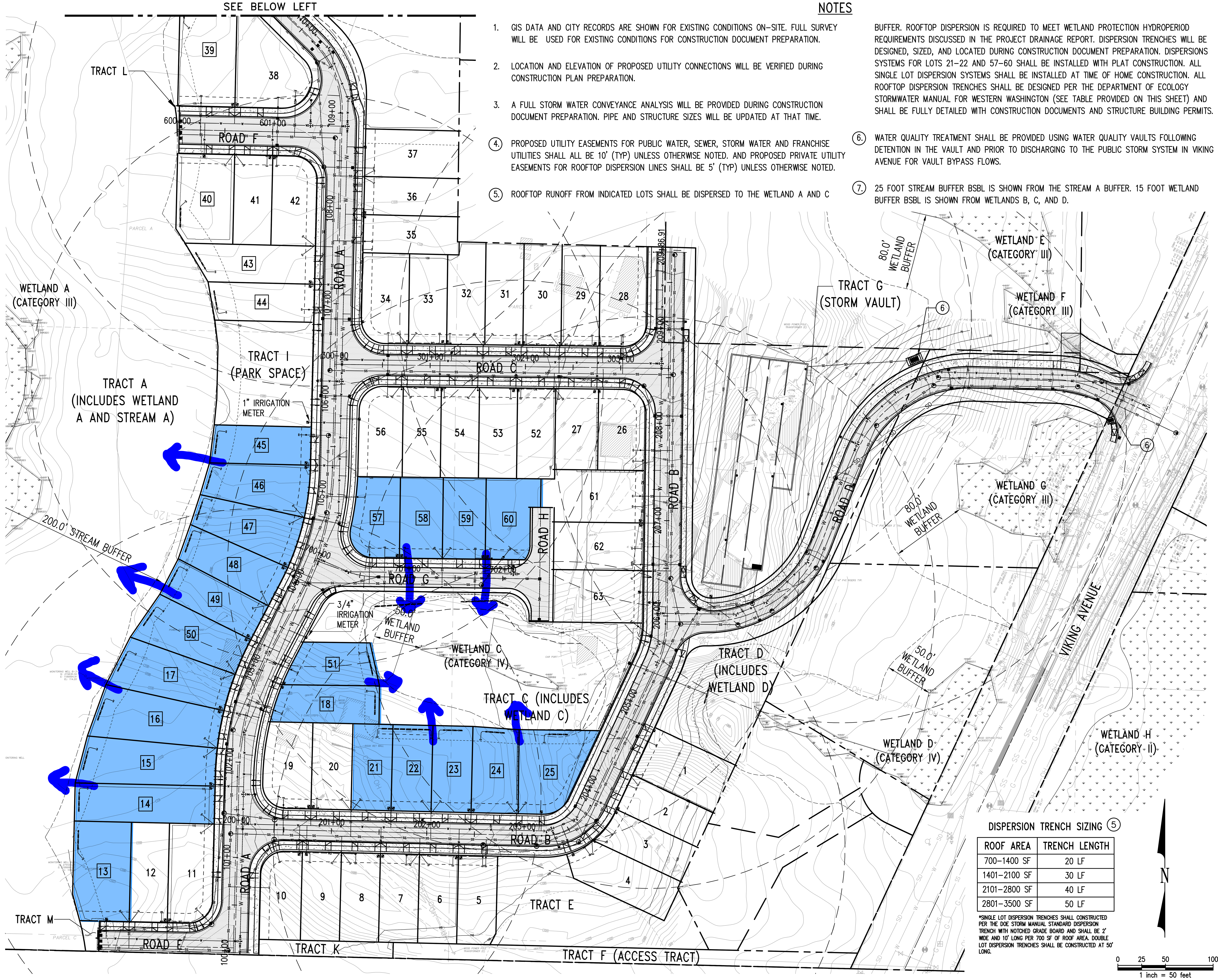
THE PLATEAU AT LIBERTY BAY PRD / ENTITLE FUND TWO, LLC
POULSBO, WASHINGTON

OPEN SPACE AND CRITICAL AREA EXHIBIT

SHEET
B

Attachment C – Lot Dispersion Exhibit





NOTES

1. GIS DATA AND CITY RECORDS ARE SHOWN FOR EXISTING CONDITIONS ON-SITE. FULL SURVEY WILL BE USED FOR EXISTING CONDITIONS FOR CONSTRUCTION DOCUMENT PREPARATION.
2. LOCATION AND ELEVATION OF PROPOSED UTILITY CONNECTIONS WILL BE VERIFIED DURING CONSTRUCTION PLAN PREPARATION.
3. A FULL STORM WATER CONVEYANCE ANALYSIS WILL BE PROVIDED DURING CONSTRUCTION DOCUMENT PREPARATION. PIPE AND STRUCTURE SIZES WILL BE UPDATED AT THAT TIME.
4. PROPOSED UTILITY EASEMENTS FOR PUBLIC WATER, SEWER, STORM WATER AND FRANCHISE UTILITIES SHALL ALL BE 10' (TYP) UNLESS OTHERWISE NOTED. AND PROPOSED PRIVATE UTILITY EASEMENTS FOR ROOFTOP DISPERSION LINES SHALL BE 5' (TYP) UNLESS OTHERWISE NOTED.
5. ROOFTOP RUNOFF FROM INDICATED LOTS SHALL BE DISPERSED TO THE WETLAND A AND C BUFFER. ROOFTOP DISPERSION IS REQUIRED TO MEET WETLAND PROTECTION HYDROPERIOD REQUIREMENTS DISCUSSED IN THE PROJECT DRAINAGE REPORT. DISPERSION TRENCHES WILL BE DESIGNED, SIZED, AND LOCATED DURING CONSTRUCTION DOCUMENT PREPARATION. DISPERSIONS SYSTEMS FOR LOTS 21-22 AND 57-60 SHALL BE INSTALLED WITH PLAT CONSTRUCTION. ALL SINGLE LOT DISPERSION SYSTEMS SHALL BE INSTALLED AT TIME OF HOME CONSTRUCTION. ALL ROOFTOP DISPERSION TRENCHES SHALL BE DESIGNED PER THE DEPARTMENT OF ECOLOGY STORMWATER MANUAL FOR WESTERN WASHINGTON (SEE TABLE PROVIDED ON THIS SHEET) AND SHALL BE FULLY DETAILED WITH CONSTRUCTION DOCUMENTS AND STRUCTURE BUILDING PERMITS.
6. WATER QUALITY TREATMENT SHALL BE PROVIDED USING WATER QUALITY VAULTS FOLLOWING DETENTION IN THE VAULT AND PRIOR TO DISCHARGING TO THE PUBLIC STORM SYSTEM IN VIKING AVENUE FOR VAULT BYPASS FLOWS.
7. 25 FOOT STREAM BUFFER BSBL IS SHOWN FROM THE STREAM A BUFFER. 15 FOOT WETLAND BUFFER BSBL IS SHOWN FROM WETLANDS B, C, AND D.

LEGEND

- PROPOSED PROPERTY LINE
- PROPERTY LINE
- CENTERLINE
- PROPOSED UTILITY EASEMENT (4)
- WETLAND BUFFER (EX & PROP)
- FINISHED GRADE CONTOUR
- EXISTING GRADE CONTOUR
- STORM DRAIN LINE
- ROOF DRAIN
- SEWER MAIN
- WATER MAIN
- SANITARY SEWER MANHOLE
- WATER METER
- FIRE HYDRANT
- BLOW OFF VALVE
- AIR RELEASE VALVE
- TYPE 1 CATCH BASIN
- TYPE 2 CATCH BASIN
- # ROOFTOP DISPERSED TO WETLAND BUFFER (5)
- DISPERSION TRENCH (5)
- CRITICAL AREA BSBL (7)

DISPERSION TRENCH SIZING (5)

ROOF AREA	TRENCH LENGTH
700-1400 SF	20 LF
1401-2100 SF	30 LF
2101-2800 SF	40 LF
2801-3500 SF	50 LF

*SINGLE LOT DISPERSION TRENCHES SHALL CONSTRUCTED PER THE DOE STORM MANUAL STANDARD DISPERSION TRENCH WITH NOTCHED GRADE BOARD AND SHALL BE 2' WIDE AND 10' LONG PER 700 SF OF ROOF AREA. DOUBLE LOT DISPERSION TRENCHES SHALL BE CONSTRUCTED AT 50' LONG.

0 25 50 100
1 inch = 50 feet

N

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Dec 29, 2023 - 12:39pm ellsec

NO.	DATE	BY	CHD.	APPR.	REVISION

DRAWN BY RAG | DESIGNED BY EKC | CHECKED BY EKC | APPROVED BY JSF

DATE DECEMBER 29, 2023

JOB No.: 2000505

CALL TWO BUSINESS DAYS BEFORE YOU DIG 1-800-424-5555

SCALE: AS NOTED

kpff
1601 5th Avenue, Suite 1600
Seattle, WA 98101
206.622.5822
www.kpff.com

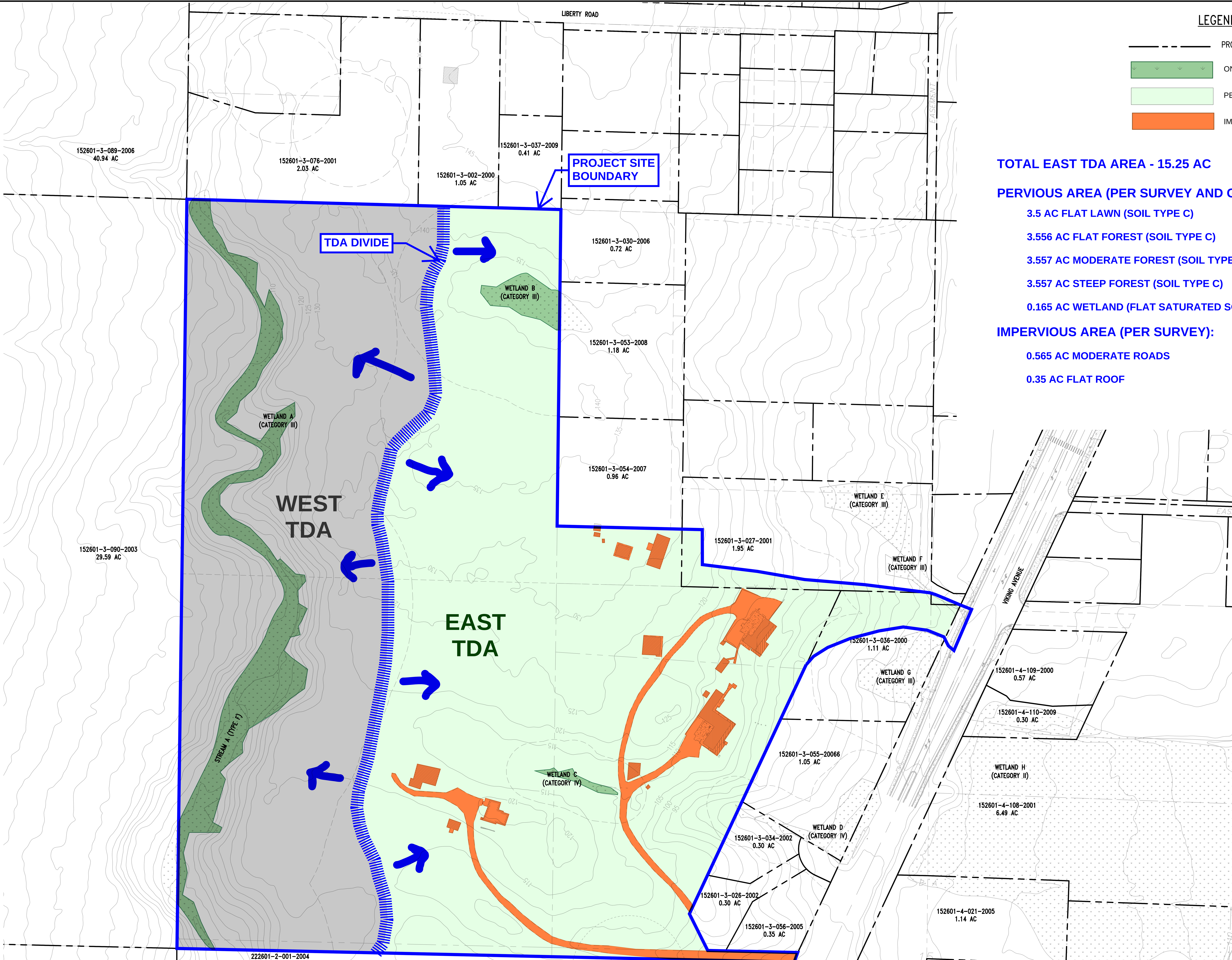
LOTS HIGHLIGHTED IN BLUE DISPERSE ROOF RUNOFF TO ADJACENT WETLAND BUFFER

THE PLATEAU AT LIBERTY BAY PRD / ENTITLE FUND TWO, LLC
POULSBO, WASHINGTON

DISPERSION EXHIBIT

SHEET
C

Attachment D – Wetland H Hydroperiod Modeling Report and Land Use Area Exhibits



LEGEND

- PROPOSED PROPERTY LINE
- ONSITE WETLAND
- PERVIOUS AREA (SEE BELOW FOR BREAKDOWN)
- IMPERVIOUS AREA (SEE BELOW FOR BREAKDOWN)

TOTAL EAST TDA AREA - 15.25 AC

PERVIOUS AREA (PER SURVEY AND GOOGLE EARTH IMAGERY):

- 3.5 AC FLAT LAWN (SOIL TYPE C)
- 3.556 AC FLAT FOREST (SOIL TYPE C)
- 3.557 AC MODERATE FOREST (SOIL TYPE C)
- 3.557 AC STEEP FOREST (SOIL TYPE C)
- 0.165 AC WETLAND (FLAT SATURATED SOIL)

IMPERVIOUS AREA (PER SURVEY):

- 0.565 AC MODERATE ROADS
- 0.35 AC FLAT ROOF

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elisec Dec 29, 2023 - 3:35pm

NO.	DATE	BY	CHD.	APPR.	REVISION

DRAWN BY RAG	DESIGNED BY EKC
CHECKED BY EKC	APPROVED BY JSF
DATE DECEMBER 29, 2023	
JOB No.: 2000505	

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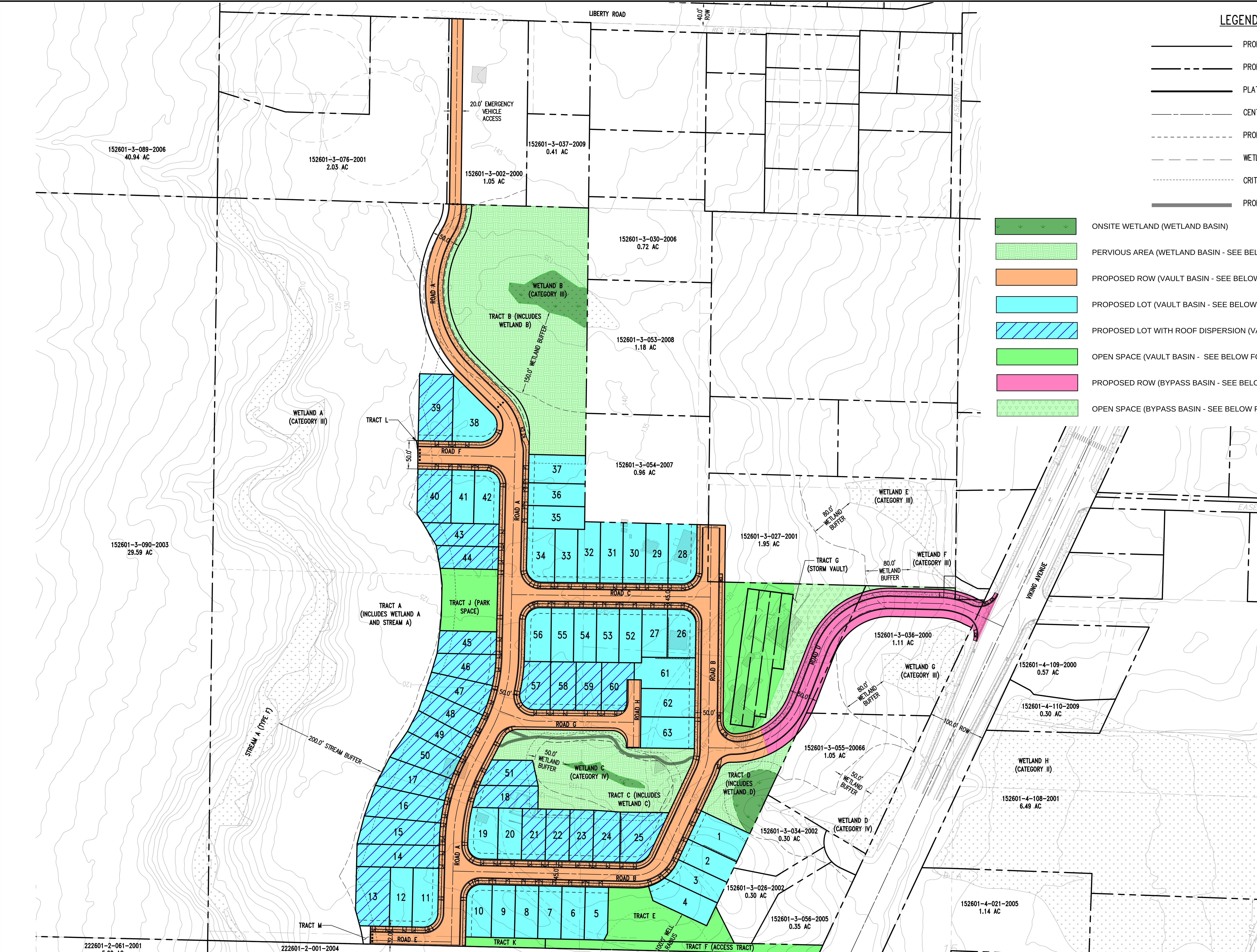
THE PLATEAU AT LIBERTY BAY PRD / ENTITLE FUND TWO, LLC
POULSBO, WASHINGTON

EAST TDA PREDEVELOPED LAND USE AREAS EXHIBIT

SHEET D



LEGEND

- PROPOSED PROPERTY LINE
- PROPERTY LINE
- PLAT BOUNDARY
- CENTERLINE
- PROPOSED UTILITY EASEMENT (TYP)
- WETLAND BUFFER (EXISTING AND PROPOSED WITH BUFFER AVERAGING)
- CRITICAL AREA BSBL
- PROPOSED TRAIL
- ONSITE WETLAND (WETLAND BASIN)
- PERVIOUS AREA (WETLAND BASIN - SEE BELOW FOR BREAKDOWN)
- PROPOSED ROW (VAULT BASIN - SEE BELOW FOR PERVIOUS/IMPERVIOUS BREAKDOWN)
- PROPOSED LOT (VAULT BASIN - SEE BELOW FOR PERVIOUS/IMPERVIOUS BREAKDOWN)
- PROPOSED LOT WITH ROOF DISPERSION (VAULT BASIN - SEE BELOW FOR PERVIOUS/IMPERVIOUS BREAKDOWN)
- OPEN SPACE (VAULT BASIN - SEE BELOW FOR PERVIOUS/IMPERVIOUS BREAKDOWN)
- PROPOSED ROW (BYPASS BASIN - SEE BELOW FOR PERVIOUS/IMPERVIOUS BREAKDOWN)
- OPEN SPACE (BYPASS BASIN - SEE BELOW FOR PERVIOUS/IMPERVIOUS BREAKDOWN)

TOTAL DEVELOPED EAST TDA AREA - 14.40 AC

POND BASIN:

- 4.323 AC FLAT LAWN (SOIL TYPE C)
- 2.657 AC FLAT ROADS
- 0.819 AC MODERATE ROADS
- 1.735 FLAT ROOF
- 0.303 AC FLAT DRIVEWAYS

WETLAND BASIN:

- 0.165 AC FLAT WETLANDS (SATURATED SOIL)
- 1.56 AC FLAT FOREST (SOIL TYPE C)
- 1.07335 AC FLAT LAWN (SOIL TYPE C)
- 0.949 AC MODERATE FOREST (SOIL TYPE C)

VAULT BYPASS BASIN:

- 0.512 AC FLAT LAWN (SOIL TYPE C)
- 0.076 AC FLAT ROADS
- 0.076 AC MODERATE ROADS
- 0.152 AC STEEP ROADS

Z:\2000001-2009999\2000505 Watts\CADD\Exhibits\Predev and Dev for Wetland H.dwg
Dec 29, 2023 - 3:35pm ebsec

NO.	DATE	BY	CHD.	APPR.	REVISION

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DATE DECEMBER 29, 2023
JOB No.: 2000505

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206.622.5822
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THE PLATEAU AT LIBERTY BAY PRD / ENTITLE FUND TWO, LLC
POULSBO, WASHINGTON

EAST TDA DEVELOPED LAND USE AREAS EXHIBIT

SHEET D

WWHM2012

PROJECT REPORT

WETLAND H HYDROPERIOD MODEL REPORT RUN FOR PROPOSED PLAN

General Model Information

WWHM2012 Project Name: Offsite PLB Wetland Model

Site Name:	PLB Offsite Wetland
Site Address:	
City:	
Report Date:	12/6/2023
Gage:	Quilcene
Data Start:	1948/10/01
Data End:	2009/09/30
Timestep:	15 Minute
Precip Scale:	0.800
Version Date:	2023/01/27
Version:	4.2.19

WETLAND H HYDROPERIOD MODEL REPORT RUN FOR PROPOSED PLAN

Landuse Basin Data
Predeveloped Land Use

Basin 1

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
C, Forest, Flat	3.556
C, Forest, Mod	3.557
C, Forest, Steep	3.557
C, Lawn, Flat	3.5
SAT, Forest, Flat	0.165
Pervious Total	14.335
Impervious Land Use	acre
ROADS MOD	0.565
ROOF TOPS FLAT	0.35
Impervious Total	0.915
Basin Total	15.25

PREDEVELOPED LAND USE AREAS SEE EXHIBIT FOR DETAIL

Mitigated Land Use

Pond Basin

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
C, Lawn, Flat	4.323
Pervious Total	4.323
Impervious Land Use	acre
ROADS FLAT	2.657
ROADS MOD	0.819
ROOF TOPS FLAT	1.735
DRIVEWAYS FLAT	0.303
Impervious Total	5.514
Basin Total	9.837

Wetland Basins

Bypass:	Yes
GroundWater:	No
Pervious Land Use	acre
SAT, Forest, Flat	0.165
C, Forest, Flat	1.56
C, Lawn, Flat	1.07335
C, Forest, Mod	0.949
Pervious Total	3.74735
Impervious Land Use	acre
Impervious Total	0
Basin Total	3.74735

Bypass

Bypass:	Yes
GroundWater:	No
Pervious Land Use	acre
C, Lawn, Steep	0.512
Pervious Total	0.512
Impervious Land Use	acre
ROADS FLAT	0.076
ROADS MOD	0.076
ROADS STEEP	0.152
Impervious Total	0.304
Basin Total	0.816

MITIGATED LAND USE AREAS SEE EXHIBIT FOR DETAILS

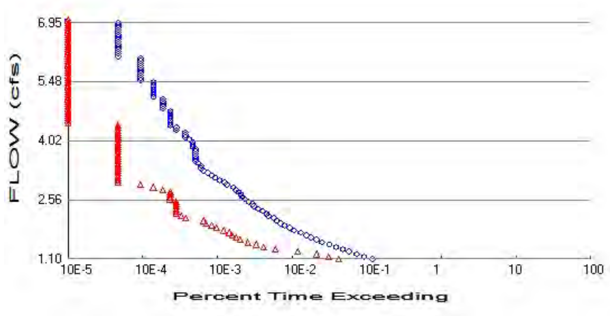
Mitigated Routing

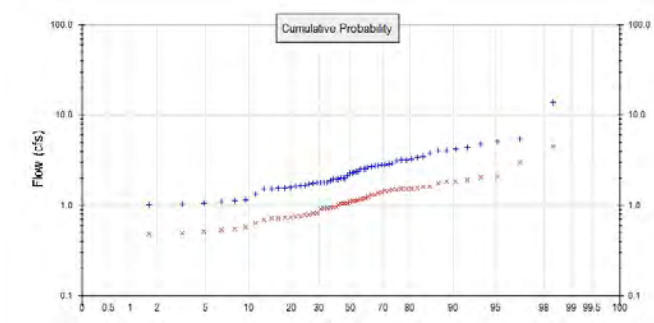
Trapezoidal Pond 1

Bottom Length:	100.00 ft.
Bottom Width:	150.00 ft.
Depth:	11.25 ft.
Volume at riser head:	3.5296 acre-feet.
Side slope 1:	0 To 1
Side slope 2:	0 To 1
Side slope 3:	0 To 1
Side slope 4:	0 To 1
Discharge Structure	
Riser Height:	10.25 ft.
Riser Diameter:	18 in.
Orifice 1 Diameter:	1.875 in. Elevation:0 ft.
Orifice 2 Diameter:	2.500 in. Elevation:5.7 ft.
Orifice 3 Diameter:	2.250 in. Elevation:7.6 ft.
Element Flows To:	
Outlet 1	Outlet 2

PROPOSED DETENTION VAULT PARAMETERS

Analysis Results
POC 1





+ Predeveloped x Mitigated

Predeveloped Landuse Totals for POC #1
Total Pervious Area: 14.335
Total Impervious Area: 0.915

Mitigated Landuse Totals for POC #1
Total Pervious Area: 8.58235
Total Impervious Area: 5.818

Flow Frequency Method: Log Pearson Type III 17B

Flow Frequency Return Periods for Predeveloped. POC #1

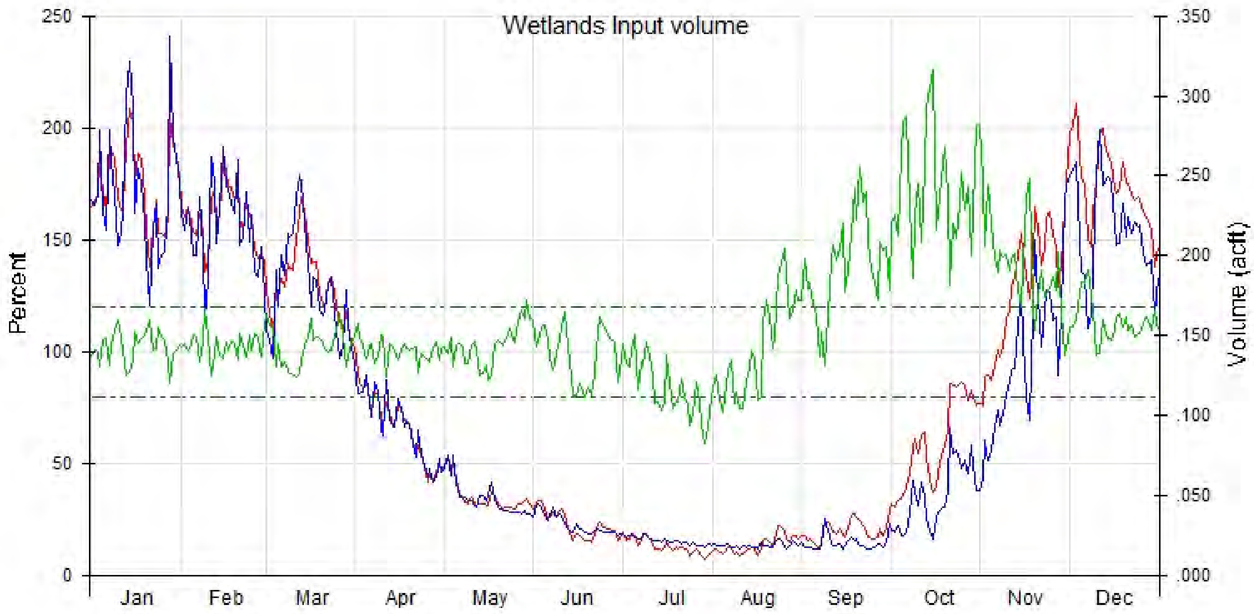
Return Period	Flow(cfs)
2 year	2.196322
5 year	3.399008
10 year	4.35341
25 year	5.753279
50 year	6.946184
100 year	8.275666

Flow Frequency Return Periods for Mitigated. POC #1

Return Period	Flow(cfs)
2 year	1.066527
5 year	1.576358
10 year	1.950349
25 year	2.463697
50 year	2.875652
100 year	3.312925

PEAK FLOW RATES ARE DECREASED BY OVER 50% FOR ALL STORMS AS STORMWATER FLOWS THROUGH THE DETENTION VAULT ARE METERED AND DISCHARGED AT A LOWER FLOWRATE.

Wetland Input Volumes



- Percent - Predeveloped - Mitigated

Wetlands Input Volume for POC 1
Average Annual Volume (acft)
Series 1: 501 POC 1 Predeveloped flow
Series 2: 801 POC 1 Mitigated flow

Month	Series 1	Series 2	Percent	Pass/Fail
Jan	7.4218	7.5168	101.3	Pass
Feb	6.2582	6.4022	102.3	Pass
Mar	5.6300	5.6979	101.2	Pass
Apr	2.8402	2.8611	100.7	Pass
May	1.5117	1.5400	101.9	Pass
Jun	0.9625	0.9595	99.7	Pass
Jul	0.6756	0.5765	85.3	Pass
Aug	0.5796	0.5859	101.1	Pass
Sep	0.5919	0.8145	137.6	Fail
Oct	1.5214	2.5237	165.9	Fail
Nov	3.9759	5.3290	134.0	Fail
Dec	6.7510	7.6112	112.7	Pass

WETLAND HYDROPERIOD CRITERIA FAILS FOR SEPTEMBER, OCTOBER, AND NOVEMBER

Day	Predevel	Mitigated	Percent	Pass/Fail
Jan1	0.2353	0.2304	97.9	Pass
2	0.2320	0.2337	100.8	Pass
3	0.2377	0.2376	100.0	Pass
4	0.2787	0.2589	92.9	Pass
5	0.2279	0.2402	105.4	Pass
6	0.2163	0.2282	105.5	Pass
7	0.2790	0.2624	94.1	Pass
8	0.2585	0.2660	102.9	Pass
9	0.2392	0.2616	109.4	Pass
10	0.2065	0.2358	114.2	Pass
11	0.2143	0.2286	106.7	Pass
12	0.2301	0.2315	100.6	Pass
13	0.2991	0.2669	89.2	Pass
14	0.3214	0.2921	90.9	Pass

15	0.2930	0.2826	96.4	Pass
16	0.2262	0.2454	108.5	Pass
17	0.2550	0.2641	103.6	Pass
18	0.2464	0.2606	105.7	Pass
19	0.2217	0.2373	107.1	Pass
20	0.1979	0.2164	109.3	Pass
21	0.1691	0.1935	114.4	Pass
22	0.2166	0.2172	100.3	Pass
23	0.2317	0.2353	101.6	Pass
24	0.1925	0.2137	111.0	Pass
25	0.2006	0.2139	106.6	Pass
26	0.2025	0.2124	104.9	Pass
27	0.2330	0.2237	96.0	Pass
28	0.3372	0.2885	85.6	Pass
29	0.2730	0.2698	98.8	Pass
30	0.2620	0.2634	100.5	Pass
31	0.2440	0.2502	102.5	Pass
Feb1	0.2262	0.2310	102.1	Pass
2	0.2158	0.2243	103.9	Pass
3	0.2299	0.2305	100.2	Pass
4	0.2146	0.2211	103.1	Pass
5	0.2002	0.2151	107.5	Pass
6	0.2005	0.2130	106.2	Pass
7	0.2370	0.2260	95.4	Pass
8	0.2048	0.2146	104.8	Pass
9	0.1595	0.1904	119.4	Pass
10	0.1843	0.1978	107.3	Pass
11	0.2623	0.2354	89.8	Pass
12	0.2466	0.2420	98.1	Pass
13	0.2081	0.2216	106.5	Pass
14	0.2293	0.2254	98.3	Pass
15	0.2680	0.2600	97.0	Pass
16	0.2439	0.2538	104.0	Pass
17	0.2425	0.2435	100.4	Pass
18	0.2327	0.2433	104.5	Pass
19	0.2263	0.2340	103.4	Pass
20	0.2598	0.2500	96.2	Pass
21	0.2068	0.2230	107.8	Pass
22	0.2105	0.2161	102.7	Pass
23	0.2399	0.2333	97.3	Pass
24	0.2089	0.2248	107.6	Pass
25	0.2252	0.2259	100.3	Pass
26	0.1900	0.2050	107.9	Pass
27	0.1866	0.1984	106.3	Pass
28	0.2059	0.2007	97.4	Pass
29	0.1750	0.1968	112.4	Pass
Mar1	0.1530	0.1785	116.6	Pass
2	0.1469	0.1640	111.6	Pass
3	0.1361	0.1522	111.8	Pass
4	0.1907	0.1780	93.4	Pass
5	0.1683	0.1741	103.5	Pass
6	0.2003	0.1858	92.8	Pass
7	0.1881	0.1801	95.7	Pass
8	0.2138	0.1957	91.5	Pass
9	0.2117	0.1916	90.5	Pass
10	0.2144	0.1915	89.3	Pass
11	0.2374	0.2113	89.0	Pass
12	0.2502	0.2262	90.4	Pass

13	0.2467	0.2371	96.1	Pass
14	0.2206	0.2273	103.0	Pass
15	0.1966	0.2097	106.7	Pass
16	0.1696	0.1948	114.9	Pass
17	0.1871	0.1964	105.0	Pass
18	0.1843	0.1964	106.5	Pass
19	0.1667	0.1762	105.7	Pass
20	0.1633	0.1703	104.3	Pass
21	0.1653	0.1671	101.1	Pass
22	0.1820	0.1824	100.2	Pass
23	0.1863	0.1868	100.2	Pass
24	0.1653	0.1779	107.6	Pass
25	0.1534	0.1684	109.8	Pass
26	0.1360	0.1596	117.3	Pass
27	0.1427	0.1532	107.4	Pass
28	0.1780	0.1661	93.3	Pass
29	0.1575	0.1550	98.4	Pass
30	0.1427	0.1475	103.4	Pass
31	0.1327	0.1428	107.7	Pass
Apr1	0.1134	0.1273	112.3	Pass
2	0.1133	0.1204	106.3	Pass
3	0.1146	0.1178	102.7	Pass
4	0.1247	0.1206	96.7	Pass
5	0.1086	0.1106	101.9	Pass
6	0.0994	0.1031	103.7	Pass
7	0.1212	0.1149	94.7	Pass
8	0.1150	0.1124	97.8	Pass
9	0.0922	0.0988	107.2	Pass
10	0.0880	0.0939	106.7	Pass
11	0.1222	0.1083	88.6	Pass
12	0.0982	0.1016	103.4	Pass
13	0.0924	0.0941	101.9	Pass
14	0.0931	0.0940	101.0	Pass
15	0.1105	0.1059	95.8	Pass
16	0.1045	0.1053	100.8	Pass
17	0.0930	0.0966	103.9	Pass
18	0.0958	0.0974	101.6	Pass
19	0.0940	0.0945	100.6	Pass
20	0.0825	0.0836	101.4	Pass
21	0.0742	0.0757	102.0	Pass
22	0.0908	0.0818	90.1	Pass
23	0.0764	0.0755	98.9	Pass
24	0.0689	0.0674	97.9	Pass
25	0.0610	0.0588	96.3	Pass
26	0.0671	0.0641	95.5	Pass
27	0.0585	0.0598	102.3	Pass
28	0.0615	0.0643	104.7	Pass
29	0.0727	0.0698	96.0	Pass
30	0.0643	0.0651	101.2	Pass
May1	0.0672	0.0686	102.2	Pass
2	0.0750	0.0744	99.2	Pass
3	0.0630	0.0670	106.3	Pass
4	0.0753	0.0699	92.8	Pass
5	0.0586	0.0604	102.9	Pass
6	0.0488	0.0506	103.7	Pass
7	0.0475	0.0486	102.4	Pass
8	0.0487	0.0463	95.0	Pass
9	0.0472	0.0445	94.3	Pass

10	0.0474	0.0489	103.2	Pass
11	0.0436	0.0455	104.5	Pass
12	0.0429	0.0436	101.6	Pass
13	0.0499	0.0447	89.6	Pass
14	0.0502	0.0451	89.9	Pass
15	0.0464	0.0435	93.7	Pass
16	0.0501	0.0437	87.1	Pass
17	0.0586	0.0526	89.7	Pass
18	0.0477	0.0495	103.7	Pass
19	0.0431	0.0454	105.2	Pass
20	0.0417	0.0434	104.2	Pass
21	0.0411	0.0421	102.5	Pass
22	0.0401	0.0425	106.1	Pass
23	0.0390	0.0430	110.1	Pass
24	0.0393	0.0415	105.6	Pass
25	0.0395	0.0412	104.3	Pass
26	0.0392	0.0444	113.4	Pass
27	0.0381	0.0453	118.7	Pass
28	0.0409	0.0468	114.4	Pass
29	0.0385	0.0474	123.3	Fail
30	0.0389	0.0446	114.7	Pass
31	0.0360	0.0411	114.2	Pass
Jun1	0.0436	0.0447	102.4	Pass
2	0.0453	0.0472	104.3	Pass
3	0.0423	0.0469	110.7	Pass
4	0.0377	0.0421	111.5	Pass
5	0.0341	0.0359	105.3	Pass
6	0.0374	0.0366	97.8	Pass
7	0.0428	0.0393	91.7	Pass
8	0.0368	0.0364	98.9	Pass
9	0.0389	0.0409	104.9	Pass
10	0.0378	0.0420	111.1	Pass
11	0.0330	0.0389	117.8	Pass
12	0.0292	0.0299	102.2	Pass
13	0.0273	0.0242	88.7	Pass
14	0.0274	0.0221	80.8	Pass
15	0.0317	0.0255	80.4	Pass
16	0.0290	0.0248	85.4	Pass
17	0.0279	0.0228	81.9	Pass
18	0.0268	0.0214	79.7	Fail
19	0.0264	0.0221	83.9	Pass
20	0.0259	0.0208	80.2	Pass
21	0.0276	0.0250	90.4	Pass
22	0.0295	0.0296	100.4	Pass
23	0.0284	0.0328	115.3	Pass
24	0.0273	0.0306	112.3	Pass
25	0.0270	0.0295	109.3	Pass
26	0.0265	0.0287	108.1	Pass
27	0.0270	0.0284	105.3	Pass
28	0.0270	0.0280	104.0	Pass
29	0.0247	0.0213	86.2	Pass
30	0.0255	0.0233	91.3	Pass
Jul1	0.0257	0.0266	103.4	Pass
2	0.0236	0.0223	94.5	Pass
3	0.0246	0.0229	93.1	Pass
4	0.0255	0.0256	100.4	Pass
5	0.0234	0.0250	107.2	Pass
6	0.0227	0.0189	83.1	Pass

7	0.0227	0.0217	95.6	Pass
8	0.0264	0.0248	94.0	Pass
9	0.0249	0.0259	104.1	Pass
10	0.0233	0.0230	98.7	Pass
11	0.0218	0.0194	89.3	Pass
12	0.0213	0.0164	77.0	Fail
13	0.0214	0.0165	77.3	Fail
14	0.0208	0.0153	73.5	Fail
15	0.0224	0.0172	77.0	Fail
16	0.0214	0.0211	98.6	Pass
17	0.0204	0.0176	86.2	Pass
18	0.0203	0.0151	74.3	Fail
19	0.0220	0.0172	78.3	Fail
20	0.0215	0.0167	77.4	Fail
21	0.0200	0.0175	87.6	Pass
22	0.0206	0.0164	79.4	Fail
23	0.0198	0.0151	76.6	Fail
24	0.0189	0.0126	66.7	Fail
25	0.0208	0.0149	71.9	Fail
26	0.0192	0.0165	86.3	Pass
27	0.0188	0.0148	78.6	Fail
28	0.0186	0.0125	67.4	Fail
29	0.0181	0.0107	58.9	Fail
30	0.0194	0.0129	66.6	Fail
31	0.0185	0.0147	79.4	Fail
Aug1	0.0192	0.0160	83.1	Pass
2	0.0186	0.0166	89.6	Pass
3	0.0182	0.0143	78.3	Fail
4	0.0183	0.0134	73.1	Fail
5	0.0189	0.0149	78.7	Fail
6	0.0196	0.0180	91.4	Pass
7	0.0176	0.0169	96.2	Pass
8	0.0177	0.0137	77.0	Fail
9	0.0181	0.0149	82.0	Pass
10	0.0169	0.0126	74.7	Fail
11	0.0182	0.0136	74.6	Fail
12	0.0181	0.0157	87.0	Pass
13	0.0183	0.0169	92.6	Pass
14	0.0176	0.0178	100.9	Pass
15	0.0172	0.0167	97.0	Pass
16	0.0163	0.0128	78.3	Fail
17	0.0203	0.0162	80.0	Fail
18	0.0188	0.0213	113.2	Pass
19	0.0184	0.0225	122.7	Fail
20	0.0178	0.0206	115.3	Pass
21	0.0175	0.0177	101.1	Pass
22	0.0207	0.0219	105.8	Pass
23	0.0232	0.0312	134.4	Fail
24	0.0219	0.0305	139.6	Fail
25	0.0191	0.0279	145.8	Fail
26	0.0170	0.0231	136.0	Fail
27	0.0183	0.0210	115.1	Pass
28	0.0215	0.0254	118.3	Pass
29	0.0193	0.0246	127.6	Fail
30	0.0183	0.0224	122.7	Fail
31	0.0204	0.0251	122.8	Fail
Sep1	0.0178	0.0252	141.7	Fail
2	0.0172	0.0220	128.2	Fail

3	0.0176	0.0231	130.8	Fail
4	0.0168	0.0204	121.4	Fail
5	0.0163	0.0190	116.6	Pass
6	0.0167	0.0162	97.3	Pass
7	0.0200	0.0218	108.9	Pass
8	0.0351	0.0330	94.1	Pass
9	0.0284	0.0329	116.1	Pass
10	0.0211	0.0297	140.9	Fail
11	0.0186	0.0275	147.6	Fail
12	0.0182	0.0257	141.2	Fail
13	0.0202	0.0294	146.0	Fail
14	0.0168	0.0264	157.3	Fail
15	0.0187	0.0236	126.4	Fail
16	0.0219	0.0299	136.4	Fail
17	0.0243	0.0371	152.5	Fail
18	0.0222	0.0384	173.2	Fail
19	0.0228	0.0362	159.2	Fail
20	0.0188	0.0344	182.4	Fail
21	0.0185	0.0309	167.4	Fail
22	0.0165	0.0284	171.5	Fail
23	0.0163	0.0242	148.9	Fail
24	0.0164	0.0224	136.6	Fail
25	0.0171	0.0225	131.2	Fail
26	0.0197	0.0242	122.8	Fail
27	0.0197	0.0295	149.3	Fail
28	0.0173	0.0252	145.7	Fail
29	0.0207	0.0303	146.7	Fail
30	0.0323	0.0411	127.3	Fail
Oct1	0.0285	0.0448	157.2	Fail
2	0.0267	0.0430	160.8	Fail
3	0.0309	0.0472	152.4	Fail
4	0.0252	0.0477	188.9	Fail
5	0.0246	0.0497	202.3	Fail
6	0.0268	0.0549	204.8	Fail
7	0.0387	0.0645	166.5	Fail
8	0.0594	0.0791	133.0	Fail
9	0.0532	0.0852	160.2	Fail
10	0.0436	0.0763	175.1	Fail
11	0.0586	0.0874	149.1	Fail
12	0.0492	0.0899	182.7	Fail
13	0.0355	0.0741	208.6	Fail
14	0.0276	0.0601	217.5	Fail
15	0.0232	0.0525	226.0	Fail
16	0.0360	0.0557	154.6	Fail
17	0.0396	0.0641	162.1	Fail
18	0.0421	0.0747	177.5	Fail
19	0.0424	0.0812	191.3	Fail
20	0.0529	0.0901	170.4	Fail
21	0.0925	0.1197	129.4	Fail
22	0.0757	0.1192	157.4	Fail
23	0.0784	0.1178	150.4	Fail
24	0.0721	0.1200	166.4	Fail
25	0.0669	0.1207	180.5	Fail
26	0.0724	0.1184	163.5	Fail
27	0.0633	0.1099	173.7	Fail
28	0.0814	0.1163	142.9	Fail
29	0.0686	0.1119	163.0	Fail
30	0.0528	0.1064	201.4	Fail

31	0.0532	0.1074	201.7	Fail
Nov1	0.0604	0.1066	176.6	Fail
2	0.0844	0.1242	147.2	Fail
3	0.0717	0.1251	174.5	Fail
4	0.0779	0.1222	157.0	Fail
5	0.0925	0.1314	142.1	Fail
6	0.1032	0.1404	136.0	Fail
7	0.0940	0.1366	145.3	Fail
8	0.1008	0.1431	142.0	Fail
9	0.1129	0.1612	142.8	Fail
10	0.1214	0.1653	136.2	Fail
11	0.1280	0.1810	141.4	Fail
12	0.1299	0.1865	143.6	Fail
13	0.1569	0.2004	127.8	Fail
14	0.1782	0.2144	120.3	Fail
15	0.1460	0.2027	138.9	Fail
16	0.1113	0.1881	169.0	Fail
17	0.0972	0.1728	177.7	Fail
18	0.1639	0.1968	120.1	Fail
19	0.2102	0.2309	109.8	Pass
20	0.1748	0.2182	124.9	Fail
21	0.1428	0.1945	136.1	Fail
22	0.1639	0.2044	124.7	Fail
23	0.1783	0.2231	125.1	Fail
24	0.1770	0.2272	128.3	Fail
25	0.1594	0.2127	133.4	Fail
26	0.1614	0.2053	127.2	Fail
27	0.1251	0.1808	144.5	Fail
28	0.1633	0.1929	118.1	Pass
29	0.2358	0.2320	98.4	Pass
30	0.2481	0.2612	105.3	Pass
Dec1	0.2492	0.2762	110.9	Pass
2	0.2540	0.2815	110.8	Pass
3	0.2584	0.2958	114.4	Pass
4	0.2098	0.2641	125.8	Fail
5	0.1903	0.2499	131.4	Fail
6	0.1882	0.2452	130.3	Fail
7	0.1540	0.2105	136.7	Fail
8	0.1642	0.2057	125.3	Fail
9	0.1925	0.2278	118.3	Pass
10	0.2508	0.2474	98.7	Pass
11	0.2788	0.2756	98.9	Pass
12	0.2444	0.2795	114.4	Pass
13	0.2451	0.2713	110.7	Pass
14	0.2490	0.2629	105.6	Pass
15	0.2464	0.2581	104.7	Pass
16	0.2214	0.2417	109.2	Pass
17	0.2064	0.2387	115.7	Pass
18	0.2074	0.2421	116.7	Pass
19	0.2332	0.2590	111.1	Pass
20	0.2117	0.2449	115.7	Pass
21	0.2244	0.2452	109.2	Pass
22	0.2141	0.2390	111.6	Pass
23	0.2211	0.2352	106.4	Pass
24	0.2185	0.2365	108.2	Pass
25	0.2189	0.2361	107.8	Pass
26	0.2015	0.2275	112.9	Pass
27	0.1939	0.2241	115.5	Pass

28	0.1947	0.2193	112.6	Pass
29	0.1976	0.2160	109.3	Pass
30	0.1633	0.1932	118.3	Pass
31	0.1871	0.2052	109.7	Pass

Appendix
Predeveloped Schematic

Mitigated Schematic

Disclaimer

Legal Notice

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Attachment E – Wetland H Hydroperiod Modeling Report for Alternative Increased Detention Scenario

WWHM2012

PROJECT REPORT

WETLAND H HYDROPERIOD MODEL REPORT RUN FOR SCENARIO WITH 50% INCREASE IN DETENTION VAULT FOOTPRINT

General Model Information

WWHM2012 Project Name: Offsite PLB Wetland Model Bigger Vault

Site Name:	PLB Offsite Wetland - Larger Vault
Site Address:	
City:	
Report Date:	12/29/2023
Gage:	Quilcene
Data Start:	1948/10/01
Data End:	2009/09/30
Timestep:	15 Minute
Precip Scale:	0.800
Version Date:	2023/01/27
Version:	4.2.19

WETLAND H HYDROPERIOD MODEL REPORT RUN FOR SCENARIO WITH 50% INCREASE IN DETENTION VAULT FOOTPRINT

Landuse Basin Data
Predeveloped Land Use

Basin 1

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
C, Forest, Flat	3.556
C, Forest, Mod	3.557
C, Forest, Steep	3.557
C, Lawn, Flat	3.5
SAT, Forest, Flat	0.165
Pervious Total	14.335
Impervious Land Use	acre
ROADS MOD	0.565
ROOF TOPS FLAT	0.35
Impervious Total	0.915
Basin Total	15.25

PREDEVELOPED LAND USE AREAS MATCH PREDEVELOPED LAND USE AREAS OF PROPOSED SCENARIO MODEL

Mitigated Land Use

Pond Basin

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
C, Lawn, Flat	4.323
Pervious Total	4.323
Impervious Land Use	acre
ROADS FLAT	2.657
ROADS MOD	0.819
ROOF TOPS FLAT	1.735
DRIVEWAYS FLAT	0.303
Impervious Total	5.514
Basin Total	9.837

Wetland Basins

Bypass:	Yes
GroundWater:	No
Pervious Land Use	acre
SAT, Forest, Flat	0.165
C, Forest, Flat	1.56
C, Lawn, Flat	1.07335
C, Forest, Mod	0.949
Pervious Total	3.74735
Impervious Land Use	acre
Impervious Total	0
Basin Total	3.74735

Bypass

Bypass:	Yes
GroundWater:	No
Pervious Land Use	acre
C, Lawn, Steep	0.512
Pervious Total	0.512
Impervious Land Use	acre
ROADS FLAT	0.076
ROADS MOD	0.076
ROADS STEEP	0.152
Impervious Total	0.304
Basin Total	0.816

MITIGATED LAND USE AREAS MATCH MITIGATED LAND USE AREAS OF PROPOSED SCENARIO MODEL

Mitigated Routing

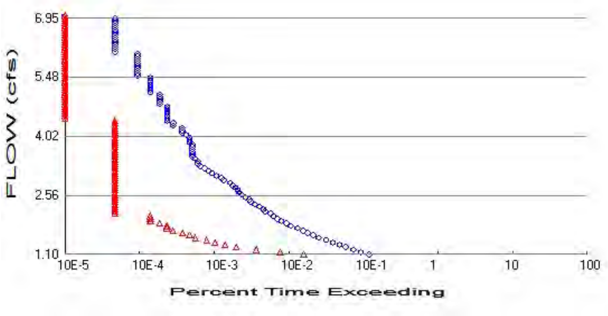
INCREASED FROM
100 FT TO 150 FT

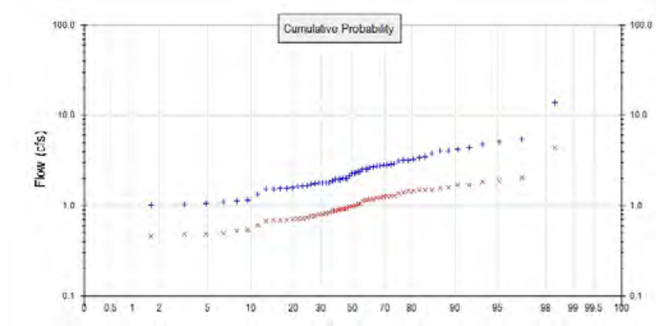
Trapezoidal Pond 1

Bottom Length:	150.00 ft.
Bottom Width:	150.00 ft.
Depth:	11.25 ft.
Volume at riser head:	5.2944 acre-feet.
Side slope 1:	0 To 1
Side slope 2:	0 To 1
Side slope 3:	0 To 1
Side slope 4:	0 To 1
Discharge Structure	
Riser Height:	10.25 ft.
Riser Diameter:	18 in.
Orifice 1 Diameter:	1.875 in. Elevation:0 ft.
Orifice 2 Diameter:	2.500 in. Elevation:5.7 ft.
Orifice 3 Diameter:	2.250 in. Elevation:7.6 ft.
Element Flows To:	
Outlet 1	Outlet 2

DETENTION VAULT
FOOTPRINT
INCREASED BY 50%

Analysis Results
POC 1





+ Predeveloped   x Mitigated

Predeveloped Landuse Totals for POC #1
Total Pervious Area: 14.335
Total Impervious Area: 0.915

Mitigated Landuse Totals for POC #1
Total Pervious Area: 8.58235
Total Impervious Area: 5.818

Flow Frequency Method: Log Pearson Type III 17B

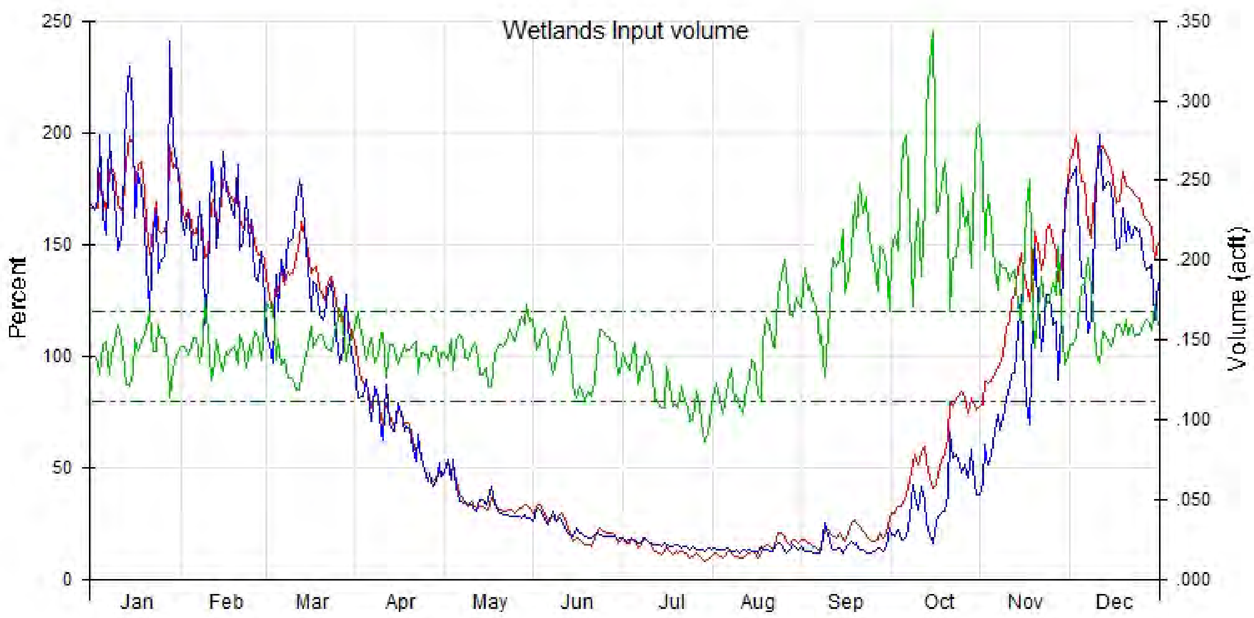
Flow Frequency Return Periods for Predeveloped. POC #1

Return Period	**Flow(cfs)**
2 year	2.196322
5 year	3.399008
10 year	4.35341
25 year	5.753279
50 year	6.946184
100 year	8.275666

Flow Frequency Return Periods for Mitigated. POC #1

Return Period	**Flow(cfs)**
2 year	0.972444
5 year	1.419603
10 year	1.751797
25 year	2.213384
50 year	2.588238
100 year	2.990207

Wetland Input Volumes



- Percent - Predeveloped - Mitigated

Wetlands Input Volume for POC 1
Average Annual Volume (acft)
Series 1: 501 POC 1 Predeveloped flow
Series 2: 801 POC 1 Mitigated flow

Month	Series 1	Series 2	Percent	Pass/Fail
Jan	7.4218	7.4809	100.8	Pass
Feb	6.2582	6.4379	102.9	Pass
Mar	5.6300	5.7876	102.8	Pass
Apr	2.8402	2.9418	103.6	Pass
May	1.5117	1.5540	102.8	Pass
Jun	0.9625	0.9666	100.4	Pass
Jul	0.6756	0.5796	85.8	Pass
Aug	0.5796	0.5801	100.1	Pass
Sep	0.5919	0.8131	137.4	Fail
Oct	1.5214	2.4422	160.5	Fail
Nov	3.9759	5.2432	131.9	Fail
Dec	6.7510	7.5911	112.4	Pass

MITIGATED WETLAND INPUT VOLUMES AND % DIFFERENCE IS SIMILIAR TO THE VAULTS IN THE PROPOSED SCENARIO MODEL

Day	Predevel	Mitigated	Percent	Pass/Fail
Jan1	0.2353	0.2325	98.8	Pass
2	0.2320	0.2320	100.0	Pass
3	0.2377	0.2326	97.9	Pass
4	0.2787	0.2544	91.3	Pass
5	0.2279	0.2402	105.4	Pass
6	0.2163	0.2309	106.7	Pass
7	0.2790	0.2547	91.3	Pass
8	0.2585	0.2587	100.1	Pass
9	0.2392	0.2543	106.3	Pass
10	0.2065	0.2360	114.3	Pass
11	0.2143	0.2320	108.3	Pass
12	0.2301	0.2340	101.7	Pass
13	0.2991	0.2615	87.4	Pass
14	0.3214	0.2772	86.3	Pass

15	0.2930	0.2739	93.5	Pass
16	0.2262	0.2432	107.5	Pass
17	0.2550	0.2601	102.0	Pass
18	0.2464	0.2619	106.3	Pass
19	0.2217	0.2430	109.6	Pass
20	0.1979	0.2221	112.2	Pass
21	0.1691	0.2035	120.3	Fail
22	0.2166	0.2205	101.8	Pass
23	0.2317	0.2365	102.1	Pass
24	0.1925	0.2192	113.9	Pass
25	0.2006	0.2175	108.4	Pass
26	0.2025	0.2183	107.8	Pass
27	0.2330	0.2267	97.3	Pass
28	0.3372	0.2729	80.9	Pass
29	0.2730	0.2581	94.5	Pass
30	0.2620	0.2611	99.6	Pass
31	0.2440	0.2526	103.5	Pass
Feb1	0.2262	0.2365	104.6	Pass
2	0.2158	0.2257	104.6	Pass
3	0.2299	0.2313	100.6	Pass
4	0.2146	0.2245	104.6	Pass
5	0.2002	0.2165	108.1	Pass
6	0.2005	0.2170	108.2	Pass
7	0.2370	0.2300	97.0	Pass
8	0.2048	0.2184	106.6	Pass
9	0.1595	0.2011	126.1	Fail
10	0.1843	0.2044	110.9	Pass
11	0.2623	0.2353	89.7	Pass
12	0.2466	0.2396	97.2	Pass
13	0.2081	0.2227	107.0	Pass
14	0.2293	0.2271	99.1	Pass
15	0.2680	0.2504	93.4	Pass
16	0.2439	0.2496	102.3	Pass
17	0.2425	0.2438	100.6	Pass
18	0.2327	0.2392	102.8	Pass
19	0.2263	0.2363	104.4	Pass
20	0.2598	0.2499	96.2	Pass
21	0.2068	0.2261	109.3	Pass
22	0.2105	0.2205	104.8	Pass
23	0.2399	0.2270	94.6	Pass
24	0.2089	0.2200	105.3	Pass
25	0.2252	0.2258	100.3	Pass
26	0.1900	0.2103	110.7	Pass
27	0.1866	0.2030	108.8	Pass
28	0.2059	0.2032	98.7	Pass
29	0.1750	0.2015	115.1	Pass
Mar1	0.1530	0.1893	123.7	Fail
2	0.1469	0.1779	121.1	Fail
3	0.1361	0.1669	122.6	Fail
4	0.1907	0.1871	98.1	Pass
5	0.1683	0.1809	107.5	Pass
6	0.2003	0.1929	96.3	Pass
7	0.1881	0.1844	98.0	Pass
8	0.2138	0.1931	90.3	Pass
9	0.2117	0.1906	90.0	Pass
10	0.2144	0.1916	89.4	Pass
11	0.2374	0.2022	85.2	Pass
12	0.2502	0.2133	85.3	Pass

13	0.2467	0.2239	90.8	Pass
14	0.2206	0.2160	97.9	Pass
15	0.1966	0.2053	104.4	Pass
16	0.1696	0.1925	113.5	Pass
17	0.1871	0.1944	103.9	Pass
18	0.1843	0.1962	106.4	Pass
19	0.1667	0.1827	109.6	Pass
20	0.1633	0.1773	108.6	Pass
21	0.1653	0.1752	106.0	Pass
22	0.1820	0.1868	102.6	Pass
23	0.1863	0.1903	102.1	Pass
24	0.1653	0.1819	110.0	Pass
25	0.1534	0.1736	113.2	Pass
26	0.1360	0.1653	121.5	Fail
27	0.1427	0.1616	113.2	Pass
28	0.1780	0.1744	98.0	Pass
29	0.1575	0.1639	104.1	Pass
30	0.1427	0.1545	108.3	Pass
31	0.1327	0.1498	112.9	Pass
Apr1	0.1134	0.1362	120.2	Fail
2	0.1133	0.1290	113.9	Pass
3	0.1146	0.1230	107.3	Pass
4	0.1247	0.1227	98.4	Pass
5	0.1086	0.1149	105.8	Pass
6	0.0994	0.1073	107.9	Pass
7	0.1212	0.1170	96.5	Pass
8	0.1150	0.1148	99.8	Pass
9	0.0922	0.1019	110.6	Pass
10	0.0880	0.0973	110.6	Pass
11	0.1222	0.1105	90.4	Pass
12	0.0982	0.1035	105.4	Pass
13	0.0924	0.0974	105.3	Pass
14	0.0931	0.0961	103.2	Pass
15	0.1105	0.1061	96.0	Pass
16	0.1045	0.1051	100.6	Pass
17	0.0930	0.0974	104.8	Pass
18	0.0958	0.0982	102.5	Pass
19	0.0940	0.0965	102.7	Pass
20	0.0825	0.0866	105.1	Pass
21	0.0742	0.0788	106.3	Pass
22	0.0908	0.0840	92.5	Pass
23	0.0764	0.0773	101.1	Pass
24	0.0689	0.0692	100.4	Pass
25	0.0610	0.0615	100.8	Pass
26	0.0671	0.0655	97.6	Pass
27	0.0585	0.0611	104.5	Pass
28	0.0615	0.0640	104.0	Pass
29	0.0727	0.0692	95.2	Pass
30	0.0643	0.0650	101.0	Pass
May1	0.0672	0.0682	101.5	Pass
2	0.0750	0.0735	98.1	Pass
3	0.0630	0.0676	107.2	Pass
4	0.0753	0.0708	94.1	Pass
5	0.0586	0.0624	106.5	Pass
6	0.0488	0.0534	109.3	Pass
7	0.0475	0.0508	107.1	Pass
8	0.0487	0.0484	99.4	Pass
9	0.0472	0.0463	98.1	Pass

10	0.0474	0.0487	102.8	Pass
11	0.0436	0.0461	105.6	Pass
12	0.0429	0.0447	104.3	Pass
13	0.0499	0.0458	91.8	Pass
14	0.0502	0.0462	92.0	Pass
15	0.0464	0.0438	94.3	Pass
16	0.0501	0.0434	86.5	Pass
17	0.0586	0.0507	86.5	Pass
18	0.0477	0.0479	100.4	Pass
19	0.0431	0.0449	104.1	Pass
20	0.0417	0.0439	105.3	Pass
21	0.0411	0.0429	104.4	Pass
22	0.0401	0.0429	106.9	Pass
23	0.0390	0.0435	111.5	Pass
24	0.0393	0.0424	107.8	Pass
25	0.0395	0.0420	106.3	Pass
26	0.0392	0.0441	112.6	Pass
27	0.0381	0.0449	117.8	Pass
28	0.0409	0.0466	114.0	Pass
29	0.0385	0.0472	122.8	Fail
30	0.0389	0.0451	115.8	Pass
31	0.0360	0.0418	116.1	Pass
Jun1	0.0436	0.0450	103.1	Pass
2	0.0453	0.0469	103.5	Pass
3	0.0423	0.0462	109.0	Pass
4	0.0377	0.0420	111.5	Pass
5	0.0341	0.0367	107.8	Pass
6	0.0374	0.0371	99.0	Pass
7	0.0428	0.0391	91.3	Pass
8	0.0368	0.0365	99.2	Pass
9	0.0389	0.0403	103.5	Pass
10	0.0378	0.0413	109.2	Pass
11	0.0330	0.0390	118.0	Pass
12	0.0292	0.0322	110.0	Pass
13	0.0273	0.0268	98.1	Pass
14	0.0274	0.0236	86.3	Pass
15	0.0317	0.0258	81.3	Pass
16	0.0290	0.0251	86.4	Pass
17	0.0279	0.0232	83.2	Pass
18	0.0268	0.0216	80.8	Pass
19	0.0264	0.0223	84.4	Pass
20	0.0259	0.0212	81.7	Pass
21	0.0276	0.0244	88.5	Pass
22	0.0295	0.0287	97.3	Pass
23	0.0284	0.0318	111.7	Pass
24	0.0273	0.0302	110.7	Pass
25	0.0270	0.0293	108.5	Pass
26	0.0265	0.0288	108.7	Pass
27	0.0270	0.0288	106.6	Pass
28	0.0270	0.0285	105.7	Pass
29	0.0247	0.0226	91.3	Pass
30	0.0255	0.0236	92.4	Pass
Jul1	0.0257	0.0261	101.4	Pass
2	0.0236	0.0227	96.5	Pass
3	0.0246	0.0231	93.7	Pass
4	0.0255	0.0253	99.2	Pass
5	0.0234	0.0248	106.0	Pass
6	0.0227	0.0198	87.2	Pass

7	0.0227	0.0216	95.2	Pass
8	0.0264	0.0245	93.0	Pass
9	0.0249	0.0253	101.8	Pass
10	0.0233	0.0230	98.7	Pass
11	0.0218	0.0199	91.4	Pass
12	0.0213	0.0172	80.5	Pass
13	0.0214	0.0170	79.5	Fail
14	0.0208	0.0159	76.4	Fail
15	0.0224	0.0172	76.7	Fail
16	0.0214	0.0204	95.5	Pass
17	0.0204	0.0178	86.9	Pass
18	0.0203	0.0157	77.3	Fail
19	0.0220	0.0172	78.0	Fail
20	0.0215	0.0165	76.9	Fail
21	0.0200	0.0173	86.6	Pass
22	0.0206	0.0164	79.4	Fail
23	0.0198	0.0154	77.8	Fail
24	0.0189	0.0134	70.7	Fail
25	0.0208	0.0149	71.8	Fail
26	0.0192	0.0161	83.9	Pass
27	0.0188	0.0149	79.1	Fail
28	0.0186	0.0130	70.0	Fail
29	0.0181	0.0112	61.7	Fail
30	0.0194	0.0127	65.6	Fail
31	0.0185	0.0143	77.0	Fail
Aug1	0.0192	0.0157	81.4	Pass
2	0.0186	0.0163	88.0	Pass
3	0.0182	0.0146	80.2	Pass
4	0.0183	0.0137	74.6	Fail
5	0.0189	0.0147	78.0	Fail
6	0.0196	0.0172	87.6	Pass
7	0.0176	0.0166	94.3	Pass
8	0.0177	0.0141	79.5	Fail
9	0.0181	0.0150	82.6	Pass
10	0.0169	0.0132	77.8	Fail
11	0.0182	0.0136	74.8	Fail
12	0.0181	0.0155	85.6	Pass
13	0.0183	0.0165	90.2	Pass
14	0.0176	0.0174	98.7	Pass
15	0.0172	0.0167	97.0	Pass
16	0.0163	0.0135	83.1	Pass
17	0.0203	0.0163	80.1	Pass
18	0.0188	0.0201	106.9	Pass
19	0.0184	0.0215	117.3	Pass
20	0.0178	0.0203	113.9	Pass
21	0.0175	0.0183	104.2	Pass
22	0.0207	0.0214	103.7	Pass
23	0.0232	0.0295	127.1	Fail
24	0.0219	0.0296	135.3	Fail
25	0.0191	0.0273	143.1	Fail
26	0.0170	0.0234	137.5	Fail
27	0.0183	0.0217	118.5	Pass
28	0.0215	0.0253	117.6	Pass
29	0.0193	0.0243	125.8	Fail
30	0.0183	0.0226	123.6	Fail
31	0.0204	0.0248	121.3	Fail
Sep1	0.0178	0.0248	139.7	Fail
2	0.0172	0.0223	130.0	Fail

3	0.0176	0.0232	131.4	Fail
4	0.0168	0.0209	124.6	Fail
5	0.0163	0.0199	122.3	Fail
6	0.0167	0.0176	105.7	Pass
7	0.0200	0.0219	109.6	Pass
8	0.0351	0.0317	90.5	Pass
9	0.0284	0.0314	110.6	Pass
10	0.0211	0.0285	135.2	Fail
11	0.0186	0.0268	143.8	Fail
12	0.0182	0.0255	140.4	Fail
13	0.0202	0.0290	143.9	Fail
14	0.0168	0.0263	156.6	Fail
15	0.0187	0.0240	128.3	Fail
16	0.0219	0.0294	134.1	Fail
17	0.0243	0.0359	147.4	Fail
18	0.0222	0.0375	169.2	Fail
19	0.0228	0.0358	157.4	Fail
20	0.0188	0.0335	177.6	Fail
21	0.0185	0.0304	164.2	Fail
22	0.0165	0.0284	171.5	Fail
23	0.0163	0.0256	157.7	Fail
24	0.0164	0.0243	147.9	Fail
25	0.0171	0.0240	140.2	Fail
26	0.0197	0.0253	128.9	Fail
27	0.0197	0.0295	149.4	Fail
28	0.0173	0.0256	147.8	Fail
29	0.0207	0.0293	141.8	Fail
30	0.0323	0.0387	119.8	Pass
Oct1	0.0285	0.0419	147.0	Fail
2	0.0267	0.0413	154.3	Fail
3	0.0309	0.0456	147.3	Fail
4	0.0252	0.0459	181.8	Fail
5	0.0246	0.0478	194.5	Fail
6	0.0268	0.0535	199.4	Fail
7	0.0387	0.0622	160.7	Fail
8	0.0594	0.0725	122.1	Fail
9	0.0532	0.0782	147.0	Fail
10	0.0436	0.0720	165.2	Fail
11	0.0586	0.0797	135.9	Fail
12	0.0492	0.0833	169.3	Fail
13	0.0355	0.0743	209.3	Fail
14	0.0276	0.0638	230.8	Fail
15	0.0232	0.0571	245.7	Fail
16	0.0360	0.0591	163.8	Fail
17	0.0396	0.0653	165.0	Fail
18	0.0421	0.0740	175.8	Fail
19	0.0424	0.0796	187.4	Fail
20	0.0529	0.0887	167.7	Fail
21	0.0925	0.1113	120.3	Fail
22	0.0757	0.1089	143.8	Fail
23	0.0784	0.1134	144.7	Fail
24	0.0721	0.1160	160.8	Fail
25	0.0669	0.1175	175.7	Fail
26	0.0724	0.1144	158.0	Fail
27	0.0633	0.1042	164.7	Fail
28	0.0814	0.1133	139.3	Fail
29	0.0686	0.1119	163.0	Fail
30	0.0528	0.1069	202.3	Fail

31	0.0532	0.1085	203.8	Fail
Nov1	0.0604	0.1097	181.7	Fail
2	0.0844	0.1244	147.4	Fail
3	0.0717	0.1232	171.9	Fail
4	0.0779	0.1240	159.2	Fail
5	0.0925	0.1288	139.3	Fail
6	0.1032	0.1338	129.6	Fail
7	0.0940	0.1342	142.7	Fail
8	0.1008	0.1408	139.7	Fail
9	0.1129	0.1576	139.7	Fail
10	0.1214	0.1619	133.4	Fail
11	0.1280	0.1742	136.1	Fail
12	0.1299	0.1799	138.5	Fail
13	0.1569	0.1942	123.8	Fail
14	0.1782	0.2049	115.0	Pass
15	0.1460	0.1938	132.8	Fail
16	0.1113	0.1848	166.0	Fail
17	0.0972	0.1741	179.0	Fail
18	0.1639	0.1963	119.8	Pass
19	0.2102	0.2182	103.8	Pass
20	0.1748	0.2102	120.3	Fail
21	0.1428	0.1942	135.9	Fail
22	0.1639	0.2026	123.6	Fail
23	0.1783	0.2178	122.1	Fail
24	0.1770	0.2225	125.7	Fail
25	0.1594	0.2115	132.7	Fail
26	0.1614	0.2060	127.6	Fail
27	0.1251	0.1864	149.0	Fail
28	0.1633	0.1966	120.4	Fail
29	0.2358	0.2273	96.4	Pass
30	0.2481	0.2466	99.4	Pass
Dec1	0.2492	0.2621	105.2	Pass
2	0.2540	0.2667	105.0	Pass
3	0.2584	0.2789	107.9	Pass
4	0.2098	0.2586	123.3	Fail
5	0.1903	0.2493	131.0	Fail
6	0.1882	0.2479	131.7	Fail
7	0.1540	0.2212	143.7	Fail
8	0.1642	0.2138	130.2	Fail
9	0.1925	0.2309	119.9	Pass
10	0.2508	0.2539	101.2	Pass
11	0.2788	0.2701	96.9	Pass
12	0.2444	0.2716	111.1	Pass
13	0.2451	0.2698	110.1	Pass
14	0.2490	0.2654	106.6	Pass
15	0.2464	0.2577	104.6	Pass
16	0.2214	0.2430	109.8	Pass
17	0.2064	0.2354	114.1	Pass
18	0.2074	0.2368	114.2	Pass
19	0.2332	0.2561	109.8	Pass
20	0.2117	0.2459	116.1	Pass
21	0.2244	0.2462	109.7	Pass
22	0.2141	0.2443	114.1	Pass
23	0.2211	0.2406	108.8	Pass
24	0.2185	0.2387	109.2	Pass
25	0.2189	0.2393	109.3	Pass
26	0.2015	0.2301	114.2	Pass
27	0.1939	0.2255	116.3	Pass

28	0.1947	0.2236	114.8	Pass
29	0.1976	0.2205	111.6	Pass
30	0.1633	0.2006	122.9	Fail
31	0.1871	0.2115	113.1	Pass

Appendix
Predeveloped Schematic

Mitigated Schematic

Disclaimer

Legal Notice

Clear Creek Solutions, Inc.
6200 Capitol Blvd. Ste F
Olympia, WA. 98501
Toll Free 1(866)943-0304
Local (360)943-0304

www.clearcreeksolutions.com

TECHNICAL MEMORANDUM

Date:	January 15, 2024
To:	City of Poulsbo
From:	KPFF Consulting Engineers - Jeremy Febus, PE
Subject:	Plateau at Liberty Bay - Minimum Requirement 8 for Offsite Wetland Response

01/15/2024

1. Introduction

The purpose of the technical memo is to support the *Plateau at Liberty Bay – Minimum Requirement 8 for Offsite Wetland Technical Memo* prepared by KPFF Consulting Engineers and dated January 3, 2024.

This technical memo includes an analysis of Wetland H hydroperiod modeling for an alternative Plateau at Liberty Bay site plan with a reduced number of proposed lots and Wetland Resources recommendations for proposed additional wetland buffer enhancement as mitigation for potential impacts to Wetland H.

2. Wetland H Hydroperiod Analysis for Lot Reduction Plan

The project team analyzed a number of alternative site plans with a reduced number of lots and proposed roadways. The alternate site plan, shown in Attachment A, that came closest to meeting the wetland hydroperiod modeling requirements in Minimum Requirement 8 includes the following:

- Modified North Extents of Road A
- Removal of Roads B, C, G and H
- Modified Alignment of Road D
- Road E and F per the Proposed Site Plan
- 16 Total Lots Dispersing Runoff to Wetland A
- Oversized Stormwater Detention Vault

This alternative site plan attempts to extend the proposed roadway network as far across the site as possible, while prioritizing attempting to meet the hydroperiod modeling requirements in Minimum Requirement 8. KPFF found that road improvements required to develop the site (all lots in this alternative site plan disperse rooftop runoff to adjacent Wetland A and are excluded from the Offsite Wetland H Hydroperiod Model) exceed the amount of development that can feasibly pass all monthly and daily wetland hydroperiod modeling criteria. In addition to this, the minimum density allowed by code for this site is 33 lots. This greatly reduced site plan only includes 16 lots, which is less than 50% of the proposed lots required by code.

Per Table 1 (below) the hydroperiod model for this alternative reduced site plan passes for all monthly data, but per Table 2 (below) there remains four days in September and October that fail the hydroperiod modeling requirements.

Full hydroperiod model output is included in Attachment B.

Table 1: Wetland H Hydroperiod Model Output (Monthly Data) for Alternative Site Plan with Reduced Number of Lots

Month	Predeveloped Volume (Acre Feet)	Developed Volume (Acre Feet)	% Change	Pass/Fail
January	7.4218	7.1137	95.8	PASS
February	6.2582	6.1651	98.5	PASS
March	5.6300	5.6307	100.0	PASS
April	2.8402	3.0892	108.8	PASS
May	1.5117	1.5594	103.2	PASS
June	0.9625	0.9598	99.7	PASS
July	0.6756	0.6491	96.1	PASS
August	0.5796	0.5561	96.0	PASS
September	0.5919	1.4903	105.0	PASS
October	1.5214	1.4903	98.0	PASS
November	3.9759	3.7657	94.7	PASS
December	6.7510	6.5451	96.9	PASS

Table 2: Wetland H Hydroperiod Model Output (Failing Daily Data) for Alternative Site Plan with Reduced Number of Lots

Day	Predeveloped Volume (Acre Feet)	Developed Volume (Acre Feet)	% Change	Pass/Fail
September 22	0.0165	0.0199	120.1	FAIL
October 14	0.0276	0.0369	133.5	FAIL
October 15	0.0232	0.0338	145.4	FAIL
October 21	0.0925	0.0704	76.2	FAIL

3. Additional On-site Wetland Buffer Mitigation

Per the *Plateau at Liberty Bay – Minimum Requirement 8 for Offsite Wetland Technical Memo* prepared by KPFF Consulting Engineers and dated January 3, 2024, the project team anticipates no impacts to offsite Wetland H, from to the proposed Plateau at Liberty Bay project's stormwater discharge.

As proposed, project stormwater volumes are unable to pass the hydroperiod targets for all days/months and are proposed to be discharged from the public system to the existing stormwater ditch passing through Wetland H.

Wetland Resources has estimated the area of the existing stormwater ditch using 2-foot LIDAR contours, visual inspection from Viking Avenue, and aerial photos. The ditch appears to range from 5 feet in width near Viking Avenue to approximately 22 feet at Liberty Bay. The ditch area is calculated at 5,030 square feet. See Attachment C for a figure prepared by Wetland Resources showing the calculated ditch area.

Although the project team, including Wetland Resources, does not anticipate any impacts to Wetland H from the proposed development. In response to the City's concerns, Wetland Resources has suggested critical area buffer enhancement in the high value Stream/Wetland A buffer located on the Plateau at Liberty Bay project site in an area equal to the area of the stormwater ditch through Wetland H. Therefore, although not required, the project proposes an additional 5,200 square-feet of buffer enhancement in the Stream/Wetland A buffer. See Attachment D for the additional enhancement area.

Attachment A – Reduced Lot Site Plan


LIBERTY ROAD
LEGEND
PROPOSED PROPERTY LINE
PROPERTY LINE
PLAT BOUNDARY
CENTERLINE
PROPOSED UTILITY EASEMENT (TYP)
WETLAND BUFFER (EXISTING AND PROPOSED WITH BUFFER AVERAGING)
CRITICAL AREA BSBL
PROPOSED TRAIL
152601-3-089-2006 40.94 AC
152601-3-076-2001 2.03 AC
152601-3-002-2000 1.05 AC
152601-3-037-2009 0.41 AC
152601-3-030-2006 0.72 AC
WETLAND B (CATEGORY III)
TRACT B (INCLUDES WETLAND B)
PROTECT OR RESTORE FORESTED AREA
PROPOSED ROW (STORMWATER TO DETENTION VAULT WHERE GRADES ALLOW)
OVERSIZED DETENTION VAULT IN STORM TRACT (ASSUME LAWN)
WETLAND A (CATEGORY III)
TRACT L
ROAD F
ROAD A
152601-3-054-2007 0.96 AC
WETLAND C (CATEGORY II)
152601-3-027-2001 1.95 AC
TRACT G (STORM VAULT)
WETLAND F (CATEGORY III)
152601-3-090-2003 29.59 AC
PARK SPACE (ASSUME LAWN)
TRACT A (INCLUDES WETLAND A AND STREAM A)
TRACT J (PARK SPACE)
VIKING AVENUE
152601-3-036-2000 1.11 AC
WETLAND G (CATEGORY III)
ROAD D
152601-4-109-2000 0.57 AC
152601-4-110-2009 0.30 AC
100.0' ROW
ALL 16 LOTS DISPERSE ROOF RUNOFF TO WETLAND A. RUNOFF FROM DRIVEWAY AND REMAINING LOT AREA ROUTED TO DETENTION VAULT
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
152601-3-055-20066 1.05 AC
WETLAND C (CATEGORY IV)
TRACT C (INCLUDES WETLAND C)
TRACT D (INCLUDES WETLAND D)
WETLAND H (CATEGORY II)
152601-4-108-2001 6.49 AC
WETLAND D (CATEGORY IV)
152601-3-034-2002 0.30 AC
152601-3-026-2002 0.30 AC
152601-3-056-2005 0.35 AC
152601-4-021-2005 1.14 AC
N
0 40 80 160
1 inch = 80 feet
TRACT M
222601-2-061-2001 5.00 AC
222601-2-001-2004 5.16 AC
ROAD E
TRACT K
TRACT F (ACCESS TRACT)
PROTECT OR RESTORE FORESTED AREA
NO. DATE BY CHD. APPR. REVISION
DRAWN BY RAG
DESIGNED BY EKC
CHECKED BY EKC
APPROVED BY JSF
DATE DECEMBER 29, 2023
JOB No.: 2000505
CALL TWO BUSINESS DAYS BEFORE YOU DIG 1-800-424-5555
SCALE: AS NOTED
kpff
1601 5th Avenue, Suite 1600 Seattle, WA 98101
206.622.5822
www.kpff.com
THE PLATEAU AT LIBERTY BAY PRD / ENTITLE FUND TWO, LLC
POULSBO, WASHINGTON
DEVELOPED LAND USE FOR MEF HYDROPERIOD COMPLIANCE EXHIBIT
SHEET
A
Jan 10, 2024 - 3:33pm

Attachment B – Wetland H Hydroperiod Model Results for Reduced Lot Site Plan

WWHM2012

PROJECT REPORT

WETLAND H HYDROPERIOD MODEL REPORT RUN FOR ALTERNATE SITE PLAN WITH 16 LOTS AND MODIFIED ROAD ALIGNMENTS

General Model Information

WWHM2012 Project Name: Offsite PLB Wetland Model Passing Hydroperiod

Site Name:	PLB Offsite Wetland - Passing Hydroperiod
Site Address:	
City:	
Report Date:	1/10/2024
Gage:	Quilcene
Data Start:	1948/10/01
Data End:	2009/09/30
Timestep:	15 Minute
Precip Scale:	0.800
Version Date:	2023/01/27
Version:	4.2.19

WETLAND H HYDROPERIOD MODEL REPORT RUN FOR ALTERNATE SITE PLAN WITH 16 LOTS AND MODIFIED ROAD ALIGNMENTS

POC Thresholds

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

Landuse Basin Data

Predeveloped Land Use

Basin 1

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
C, Forest, Flat	3.556
C, Forest, Mod	3.557
C, Forest, Steep	3.557
C, Lawn, Flat	3.5
SAT, Forest, Flat	0.165
Pervious Total	14.335
Impervious Land Use	acre
ROADS MOD	0.565
ROOF TOPS FLAT	0.35
Impervious Total	0.915
Basin Total	15.25

SEE JANUARY 3, 2024 TECHNICAL MEMO FOR PREDEVELOPED LAND USE AREAS DETAIL

Mitigated Land Use

Pond Basin

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
C, Lawn, Flat	2.46132
Pervious Total	2.46132
Impervious Land Use	acre
ROADS FLAT	1.34054
ROADS MOD	0.5997
Impervious Total	1.94024
Basin Total	4.40156

Wetland Basins

Bypass:	Yes
GroundWater:	No
Pervious Land Use	acre
SAT, Forest, Flat	0.165
C, Forest, Flat	5.98302
C, Forest, Mod	2.86999
C, Lawn, Flat	0.282
Pervious Total	9.30001
Impervious Land Use	acre
Impervious Total	0
Basin Total	9.30001

Bypass

Bypass:	Yes
GroundWater:	No
Pervious Land Use	acre
C, Lawn, Steep	0.512
Pervious Total	0.512
Impervious Land Use	acre
ROADS FLAT	0.076
ROADS MOD	0.076
ROADS STEEP	0.152
Impervious Total	0.304
Basin Total	0.816

MITIGATED LAND USE AREAS SEE ATTACHMENT A FOR DETAILS

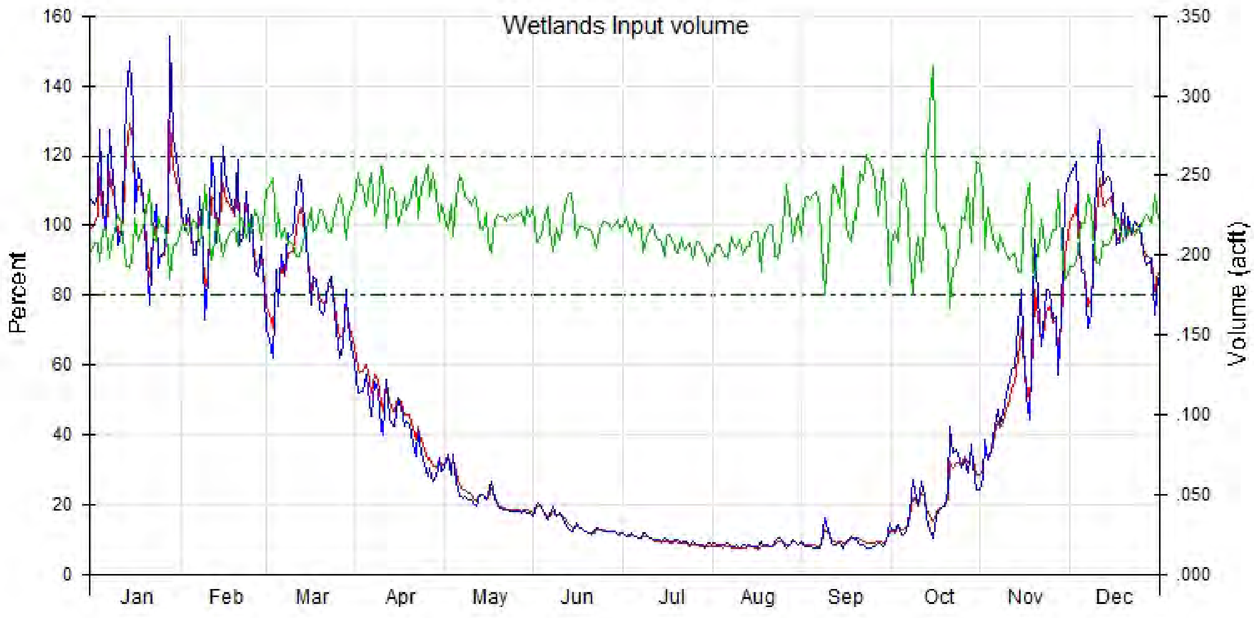
Mitigated Routing

Trapezoidal Pond 1

Bottom Length:	150.00 ft.
Bottom Width:	100.00 ft.
Depth:	11.25 ft.
Volume at riser head:	3.5296 acre-feet.
Side slope 1:	0 To 1
Side slope 2:	0 To 1
Side slope 3:	0 To 1
Side slope 4:	0 To 1
Discharge Structure	
Riser Height:	10.25 ft.
Riser Diameter:	18 in.
Orifice 1 Diameter:	1.000 in. Elevation:0 ft.
Orifice 2 Diameter:	1.250 in. Elevation:5.7 ft.
Element Flows To:	
Outlet 1	Outlet 2

PROPOSED DETENTION VAULT PARAMETERS (OVERSIZED FOR LIMITED DEVELOPMENT PLAN

Wetland Input Volumes



- Percent - Predeveloped - Mitigated

Wetlands Input Volume for POC 1
Average Annual Volume (acft)
Series 1: 501 POC 1 Predeveloped flow
Series 2: 801 POC 1 Mitigated flow

Month	Series 1	Series 2	Percent	Pass/Fail
Jan	7.4218	7.1137	95.8	Pass
Feb	6.2582	6.1651	98.5	Pass
Mar	5.6300	5.6307	100.0	Pass
Apr	2.8402	3.0892	108.8	Pass
May	1.5117	1.5594	103.2	Pass
Jun	0.9625	0.9598	99.7	Pass
Jul	0.6756	0.6491	96.1	Pass
Aug	0.5796	0.5561	96.0	Pass
Sep	0.5919	0.6214	105.0	Pass
Oct	1.5214	1.4903	98.0	Pass
Nov	3.9759	3.7657	94.7	Pass
Dec	6.7510	6.5415	96.9	Pass

Day	Predevel	Mitigated	Percent	Pass/Fail
Jan1	0.2353	0.2175	92.4	Pass
2	0.2320	0.2206	95.1	Pass
3	0.2377	0.2259	95.0	Pass
4	0.2787	0.2497	89.6	Pass
5	0.2279	0.2250	98.7	Pass
6	0.2163	0.2137	98.8	Pass
7	0.2790	0.2522	90.4	Pass
8	0.2585	0.2445	94.6	Pass
9	0.2392	0.2349	98.2	Pass
10	0.2065	0.2131	103.2	Pass
11	0.2143	0.2157	100.6	Pass
12	0.2301	0.2234	97.1	Pass
13	0.2991	0.2641	88.3	Pass
14	0.3214	0.2828	88.0	Pass

WETLAND HYDROPERIOD CRITERIA PASSES FOR ALL MONTHS. SEE FOLLOWING PAGES FOR 4 DAYS IN FOR SEPTEMBER AND OCTOBER WITH FAILING PERCENTAGES

15	0.2930	0.2724	93.0	Pass
16	0.2262	0.2314	102.3	Pass
17	0.2550	0.2430	95.3	Pass
18	0.2464	0.2417	98.1	Pass
19	0.2217	0.2240	101.0	Pass
20	0.1979	0.2080	105.1	Pass
21	0.1691	0.1866	110.4	Pass
22	0.2166	0.2092	96.6	Pass
23	0.2317	0.2214	95.5	Pass
24	0.1925	0.1971	102.4	Pass
25	0.2006	0.2000	99.7	Pass
26	0.2025	0.2009	99.2	Pass
27	0.2330	0.2172	93.2	Pass
28	0.3372	0.2840	84.2	Pass
29	0.2730	0.2562	93.8	Pass
30	0.2620	0.2478	94.6	Pass
31	0.2440	0.2372	97.2	Pass
Feb1	0.2262	0.2259	99.8	Pass
2	0.2158	0.2167	100.4	Pass
3	0.2299	0.2233	97.1	Pass
4	0.2146	0.2146	100.0	Pass
5	0.2002	0.2039	101.8	Pass
6	0.2005	0.2020	100.8	Pass
7	0.2370	0.2241	94.6	Pass
8	0.2048	0.2078	101.4	Pass
9	0.1595	0.1779	111.5	Pass
10	0.1843	0.1881	102.0	Pass
11	0.2623	0.2365	90.2	Pass
12	0.2466	0.2352	95.4	Pass
13	0.2081	0.2117	101.7	Pass
14	0.2293	0.2209	96.4	Pass
15	0.2680	0.2449	91.4	Pass
16	0.2439	0.2341	96.0	Pass
17	0.2425	0.2339	96.5	Pass
18	0.2327	0.2292	98.5	Pass
19	0.2263	0.2241	99.0	Pass
20	0.2598	0.2437	93.8	Pass
21	0.2068	0.2134	103.2	Pass
22	0.2105	0.2119	100.7	Pass
23	0.2399	0.2313	96.4	Pass
24	0.2089	0.2121	101.6	Pass
25	0.2252	0.2199	97.6	Pass
26	0.1900	0.1989	104.7	Pass
27	0.1866	0.1906	102.2	Pass
28	0.2059	0.1973	95.8	Pass
29	0.1750	0.1837	105.0	Pass
Mar1	0.1530	0.1683	110.0	Pass
2	0.1469	0.1635	111.4	Pass
3	0.1361	0.1543	113.4	Pass
4	0.1907	0.1844	96.7	Pass
5	0.1683	0.1743	103.6	Pass
6	0.2003	0.1928	96.3	Pass
7	0.1881	0.1863	99.0	Pass
8	0.2138	0.2016	94.3	Pass
9	0.2117	0.2019	95.4	Pass
10	0.2144	0.2027	94.5	Pass
11	0.2374	0.2160	91.0	Pass
12	0.2502	0.2284	91.3	Pass

13	0.2467	0.2293	92.9	Pass
14	0.2206	0.2144	97.2	Pass
15	0.1966	0.1981	100.7	Pass
16	0.1696	0.1783	105.2	Pass
17	0.1871	0.1843	98.5	Pass
18	0.1843	0.1827	99.1	Pass
19	0.1667	0.1740	104.4	Pass
20	0.1633	0.1697	104.0	Pass
21	0.1653	0.1687	102.1	Pass
22	0.1820	0.1792	98.4	Pass
23	0.1863	0.1820	97.7	Pass
24	0.1653	0.1710	103.4	Pass
25	0.1534	0.1608	104.8	Pass
26	0.1360	0.1482	108.9	Pass
27	0.1427	0.1503	105.3	Pass
28	0.1780	0.1705	95.7	Pass
29	0.1575	0.1611	102.3	Pass
30	0.1427	0.1498	105.0	Pass
31	0.1327	0.1432	107.9	Pass
Apr1	0.1134	0.1302	114.8	Pass
2	0.1133	0.1267	111.8	Pass
3	0.1146	0.1274	111.1	Pass
4	0.1247	0.1314	105.4	Pass
5	0.1086	0.1223	112.6	Pass
6	0.0994	0.1142	114.8	Pass
7	0.1212	0.1252	103.3	Pass
8	0.1150	0.1221	106.1	Pass
9	0.0922	0.1075	116.7	Pass
10	0.0880	0.1020	115.9	Pass
11	0.1222	0.1211	99.1	Pass
12	0.0982	0.1082	110.2	Pass
13	0.0924	0.1024	110.8	Pass
14	0.0931	0.1019	109.4	Pass
15	0.1105	0.1108	100.2	Pass
16	0.1045	0.1082	103.6	Pass
17	0.0930	0.1005	108.1	Pass
18	0.0958	0.1003	104.7	Pass
19	0.0940	0.0998	106.2	Pass
20	0.0825	0.0918	111.3	Pass
21	0.0742	0.0846	114.0	Pass
22	0.0908	0.0928	102.2	Pass
23	0.0764	0.0847	110.8	Pass
24	0.0689	0.0781	113.4	Pass
25	0.0610	0.0715	117.2	Pass
26	0.0671	0.0728	108.5	Pass
27	0.0585	0.0672	115.0	Pass
28	0.0615	0.0669	108.9	Pass
29	0.0727	0.0734	101.0	Pass
30	0.0643	0.0682	106.1	Pass
May1	0.0672	0.0688	102.5	Pass
2	0.0750	0.0740	98.7	Pass
3	0.0630	0.0667	105.8	Pass
4	0.0753	0.0728	96.8	Pass
5	0.0586	0.0633	107.9	Pass
6	0.0488	0.0558	114.3	Pass
7	0.0475	0.0532	112.0	Pass
8	0.0487	0.0527	108.2	Pass
9	0.0472	0.0506	107.2	Pass

10	0.0474	0.0501	105.7	Pass
11	0.0436	0.0471	108.1	Pass
12	0.0429	0.0461	107.4	Pass
13	0.0499	0.0496	99.5	Pass
14	0.0502	0.0497	99.0	Pass
15	0.0464	0.0480	103.4	Pass
16	0.0501	0.0480	95.9	Pass
17	0.0586	0.0538	91.9	Pass
18	0.0477	0.0484	101.4	Pass
19	0.0431	0.0445	103.3	Pass
20	0.0417	0.0428	102.7	Pass
21	0.0411	0.0421	102.4	Pass
22	0.0401	0.0406	101.3	Pass
23	0.0390	0.0403	103.3	Pass
24	0.0393	0.0402	102.3	Pass
25	0.0395	0.0405	102.4	Pass
26	0.0392	0.0403	102.9	Pass
27	0.0381	0.0397	104.1	Pass
28	0.0409	0.0410	100.2	Pass
29	0.0385	0.0405	105.4	Pass
30	0.0389	0.0399	102.5	Pass
31	0.0360	0.0380	105.5	Pass
Jun1	0.0436	0.0416	95.4	Pass
2	0.0453	0.0432	95.4	Pass
3	0.0423	0.0413	97.5	Pass
4	0.0377	0.0387	102.6	Pass
5	0.0341	0.0359	105.4	Pass
6	0.0374	0.0369	98.6	Pass
7	0.0428	0.0397	92.6	Pass
8	0.0368	0.0365	99.0	Pass
9	0.0389	0.0373	95.8	Pass
10	0.0378	0.0374	98.9	Pass
11	0.0330	0.0349	105.6	Pass
12	0.0292	0.0318	108.9	Pass
13	0.0273	0.0298	109.2	Pass
14	0.0274	0.0289	105.5	Pass
15	0.0317	0.0306	96.4	Pass
16	0.0290	0.0289	99.7	Pass
17	0.0279	0.0278	99.6	Pass
18	0.0268	0.0265	99.1	Pass
19	0.0264	0.0260	98.8	Pass
20	0.0259	0.0254	98.1	Pass
21	0.0276	0.0264	95.6	Pass
22	0.0295	0.0277	93.7	Pass
23	0.0284	0.0282	99.0	Pass
24	0.0273	0.0276	101.2	Pass
25	0.0270	0.0272	100.7	Pass
26	0.0265	0.0267	100.8	Pass
27	0.0270	0.0268	99.4	Pass
28	0.0270	0.0270	100.2	Pass
29	0.0247	0.0251	101.7	Pass
30	0.0255	0.0253	99.1	Pass
Jul1	0.0257	0.0256	99.7	Pass
2	0.0236	0.0242	102.6	Pass
3	0.0246	0.0243	98.8	Pass
4	0.0255	0.0248	97.4	Pass
5	0.0234	0.0238	101.8	Pass
6	0.0227	0.0225	99.0	Pass

7	0.0227	0.0226	99.7	Pass
8	0.0264	0.0243	92.3	Pass
9	0.0249	0.0240	96.5	Pass
10	0.0233	0.0230	98.7	Pass
11	0.0218	0.0218	100.3	Pass
12	0.0213	0.0208	97.8	Pass
13	0.0214	0.0205	95.9	Pass
14	0.0208	0.0199	95.5	Pass
15	0.0224	0.0204	91.2	Pass
16	0.0214	0.0207	97.0	Pass
17	0.0204	0.0199	97.4	Pass
18	0.0203	0.0194	95.5	Pass
19	0.0220	0.0203	92.0	Pass
20	0.0215	0.0198	91.9	Pass
21	0.0200	0.0193	96.5	Pass
22	0.0206	0.0192	93.2	Pass
23	0.0198	0.0186	94.3	Pass
24	0.0189	0.0179	94.8	Pass
25	0.0208	0.0187	90.0	Pass
26	0.0192	0.0183	95.4	Pass
27	0.0188	0.0179	94.9	Pass
28	0.0186	0.0173	93.3	Pass
29	0.0181	0.0167	92.2	Pass
30	0.0194	0.0172	88.6	Pass
31	0.0185	0.0171	92.2	Pass
Aug1	0.0192	0.0175	91.2	Pass
2	0.0186	0.0176	94.6	Pass
3	0.0182	0.0172	94.4	Pass
4	0.0183	0.0170	92.6	Pass
5	0.0189	0.0172	91.3	Pass
6	0.0196	0.0178	90.6	Pass
7	0.0176	0.0171	97.0	Pass
8	0.0177	0.0167	94.1	Pass
9	0.0181	0.0169	93.3	Pass
10	0.0169	0.0162	96.0	Pass
11	0.0182	0.0166	91.4	Pass
12	0.0181	0.0170	93.9	Pass
13	0.0183	0.0172	93.9	Pass
14	0.0176	0.0172	97.5	Pass
15	0.0172	0.0170	98.4	Pass
16	0.0163	0.0160	98.5	Pass
17	0.0203	0.0177	87.0	Pass
18	0.0188	0.0179	95.5	Pass
19	0.0184	0.0181	98.5	Pass
20	0.0178	0.0179	100.1	Pass
21	0.0175	0.0175	99.8	Pass
22	0.0207	0.0189	91.3	Pass
23	0.0232	0.0211	90.7	Pass
24	0.0219	0.0209	95.7	Pass
25	0.0191	0.0201	105.0	Pass
26	0.0170	0.0190	111.5	Pass
27	0.0183	0.0191	104.4	Pass
28	0.0215	0.0205	95.3	Pass
29	0.0193	0.0195	101.1	Pass
30	0.0183	0.0188	103.1	Pass
31	0.0204	0.0199	97.4	Pass
Sep1	0.0178	0.0192	107.8	Pass
2	0.0172	0.0186	108.3	Pass

3	0.0176	0.0189	107.3	Pass
4	0.0168	0.0182	108.8	Pass
5	0.0163	0.0179	109.7	Pass
6	0.0167	0.0176	105.6	Pass
7	0.0200	0.0192	95.9	Pass
8	0.0351	0.0281	80.1	Pass
9	0.0284	0.0259	91.4	Pass
10	0.0211	0.0224	106.2	Pass
11	0.0186	0.0208	111.5	Pass
12	0.0182	0.0201	110.3	Pass
13	0.0202	0.0212	105.2	Pass
14	0.0168	0.0196	116.8	Pass
15	0.0187	0.0195	104.4	Pass
16	0.0219	0.0212	96.8	Pass
17	0.0243	0.0232	95.5	Pass
18	0.0222	0.0230	103.8	Pass
19	0.0228	0.0231	101.5	Pass
20	0.0188	0.0217	115.3	Pass
21	0.0185	0.0209	113.1	Pass
22	0.0165	0.0199	120.1	Fail
23	0.0163	0.0193	118.9	Pass
24	0.0164	0.0193	117.4	Pass
25	0.0171	0.0194	113.2	Pass
26	0.0197	0.0203	103.2	Pass
27	0.0197	0.0213	107.8	Pass
28	0.0173	0.0200	115.9	Pass
29	0.0207	0.0216	104.5	Pass
30	0.0323	0.0268	83.0	Pass
Oct1	0.0285	0.0270	94.5	Pass
2	0.0267	0.0263	98.4	Pass
3	0.0309	0.0296	95.6	Pass
4	0.0252	0.0280	111.1	Pass
5	0.0246	0.0278	113.3	Pass
6	0.0268	0.0294	109.8	Pass
7	0.0387	0.0359	92.6	Pass
8	0.0594	0.0476	80.1	Pass
9	0.0532	0.0474	89.1	Pass
10	0.0436	0.0423	97.0	Pass
11	0.0586	0.0509	86.8	Pass
12	0.0492	0.0492	99.9	Pass
13	0.0355	0.0419	117.9	Pass
14	0.0276	0.0369	133.5	Fail
15	0.0232	0.0338	145.4	Fail
16	0.0360	0.0383	106.2	Pass
17	0.0396	0.0401	101.4	Pass
18	0.0421	0.0415	98.6	Pass
19	0.0424	0.0425	100.1	Pass
20	0.0529	0.0483	91.3	Pass
21	0.0925	0.0704	76.2	Fail
22	0.0757	0.0667	88.0	Pass
23	0.0784	0.0695	88.7	Pass
24	0.0721	0.0686	95.2	Pass
25	0.0669	0.0687	102.7	Pass
26	0.0724	0.0736	101.6	Pass
27	0.0633	0.0700	110.6	Pass
28	0.0814	0.0772	94.9	Pass
29	0.0686	0.0717	104.5	Pass
30	0.0528	0.0625	118.2	Pass

CRITERIA CONTINUES TO FAIL FOR 4 DAYS

31	0.0532	0.0625	117.3	Pass
Nov1	0.0604	0.0659	109.1	Pass
2	0.0844	0.0788	93.3	Pass
3	0.0717	0.0753	105.0	Pass
4	0.0779	0.0766	98.4	Pass
5	0.0925	0.0878	95.0	Pass
6	0.1032	0.0957	92.7	Pass
7	0.0940	0.0914	97.2	Pass
8	0.1008	0.0952	94.5	Pass
9	0.1129	0.1033	91.5	Pass
10	0.1214	0.1092	90.0	Pass
11	0.1280	0.1165	91.0	Pass
12	0.1299	0.1195	92.0	Pass
13	0.1569	0.1360	86.7	Pass
14	0.1782	0.1548	86.9	Pass
15	0.1460	0.1413	96.8	Pass
16	0.1113	0.1195	107.3	Pass
17	0.0972	0.1090	112.1	Pass
18	0.1639	0.1439	87.8	Pass
19	0.2102	0.1784	84.9	Pass
20	0.1748	0.1619	92.7	Pass
21	0.1428	0.1448	101.4	Pass
22	0.1639	0.1550	94.6	Pass
23	0.1783	0.1647	92.4	Pass
24	0.1770	0.1681	94.9	Pass
25	0.1594	0.1577	98.9	Pass
26	0.1614	0.1597	99.0	Pass
27	0.1251	0.1379	110.2	Pass
28	0.1633	0.1566	95.9	Pass
29	0.2358	0.1989	84.4	Pass
30	0.2481	0.2133	86.0	Pass
Dec1	0.2492	0.2204	88.4	Pass
2	0.2540	0.2243	88.3	Pass
3	0.2584	0.2315	89.6	Pass
4	0.2098	0.2036	97.0	Pass
5	0.1903	0.1916	100.7	Pass
6	0.1882	0.1898	100.8	Pass
7	0.1540	0.1677	108.9	Pass
8	0.1642	0.1731	105.4	Pass
9	0.1925	0.1879	97.6	Pass
10	0.2508	0.2243	89.4	Pass
11	0.2788	0.2480	89.0	Pass
12	0.2444	0.2331	95.4	Pass
13	0.2451	0.2311	94.3	Pass
14	0.2490	0.2353	94.5	Pass
15	0.2464	0.2365	96.0	Pass
16	0.2214	0.2215	100.1	Pass
17	0.2064	0.2124	102.9	Pass
18	0.2074	0.2072	99.9	Pass
19	0.2332	0.2225	95.4	Pass
20	0.2117	0.2110	99.7	Pass
21	0.2244	0.2179	97.1	Pass
22	0.2141	0.2128	99.4	Pass
23	0.2211	0.2150	97.2	Pass
24	0.2185	0.2159	98.8	Pass
25	0.2189	0.2159	98.6	Pass
26	0.2015	0.2045	101.5	Pass
27	0.1939	0.1995	102.8	Pass

28	0.1947	0.1983	101.9	Pass
29	0.1976	0.1987	100.5	Pass
30	0.1633	0.1772	108.6	Pass
31	0.1871	0.1900	101.6	Pass

Appendix
Predeveloped Schematic

Mitigated Schematic

Disclaimer

Legal Notice

Clear Creek Solutions, Inc.
6200 Capitol Blvd. Ste F
Olympia, WA. 98501
Toll Free 1(866)943-0304
Local (360)943-0304

www.clearcreeksolutions.com

Attachment C – Wetland H Stormwater Ditch Area

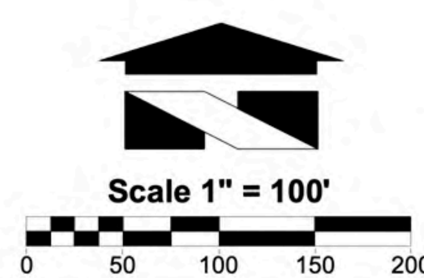
PROPOSED STORMWATER DISCHARGE LOCATION

THE PLATEAU AT LIBERTY BAY

PORTION OF SECTION 15, TOWNSHIP 26N, RANGE 1E, W.M.

LEGEND

WETLAND	PROPOSED STORMWATER PIPE
DITCH	PROPOSED CATCH BASIN
PROJECT SITE	EXISTING STORMWATER PIPE
EXISTING CULVERT	



Wetland Resources, Inc.
Delineation / Mitigation / Restoration / Habitat Creation / Permit Assistance
9505 19th Avenue S.E. Suite 106 Everett,Washington 98208
Phone: (425) 337-3174
Fax: (425) 337-3045
Email: mailbox@wetlandresources.com

Proposed Stormwater Discharge Location
THE PLATEAU AT LIBERTY BAY
Poulsbo, WA

Sheet 1/1
WRI #: 22210
Drawn by:MK
Date: 12/19/2023
REV.#1: 01/12/2024

Entitle Fund II, LLC
Attn: Geoff Sherwin
PO Box 188
Puyallup, WA 98371

TECHNICAL MEMORANDUM

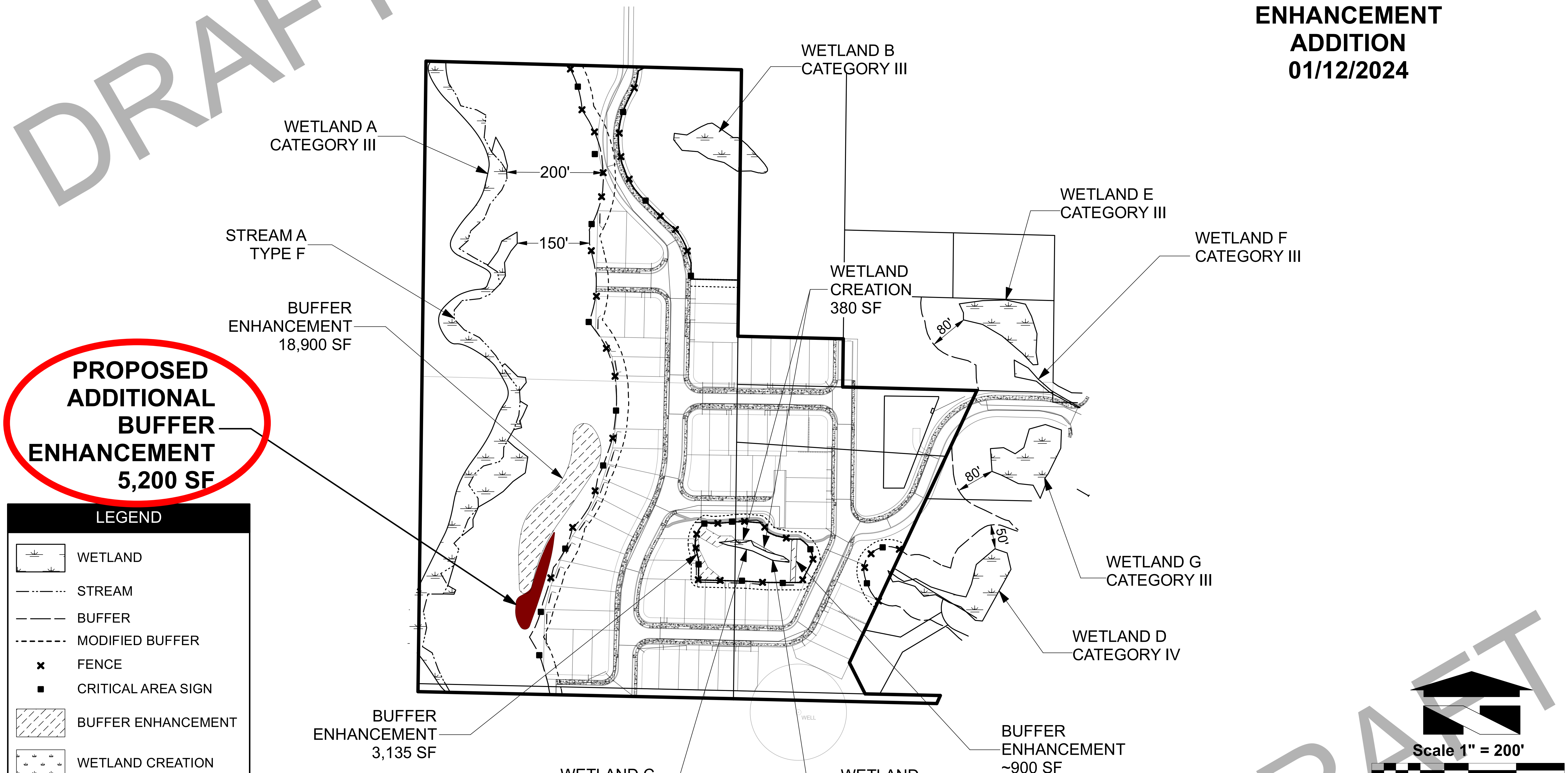
Attachment D – Mitigation Plan for Additional Buffer Enhancement in Wetland A Buffer

DEVELOPMENT AND MITIGATION PLANTING PLAN

THE PLATEAU AT LIBERTY BAY

PORTION OF SECTION 15, TOWNSHIP 26N, RANGE 1E, W.M.

MARK UP OF BUFFER ENHANCEMENT ADDITION 01/12/2024



LEGEND

- WETLAND
- STREAM
- BUFFER
- MODIFIED BUFFER
- FENCE
- CRITICAL AREA SIGN
- BUFFER ENHANCEMENT
- WETLAND CREATION
- WETLAND ENHANCMENT
- WETLAND BUFFER SETBACK
- FWHCA (STREAM) BUFFER SETBACK

Wetland Resources, Inc.
Delineation / Mitigation / Restoration / Habitat Creation / Permit Assistance
9505 19th Avenue S.E. Suite 106 Everett,Washington 98208
Phone: (425) 337-3174
Fax: (425) 337-3045
Email: mailbox@wetlandresources.com

Development and Mitigation Planting Plan
THE PLATEAU AT LIBERTY BAY
Poulsbo, WA

Entitle Fund II, LLC
Attn: Geoff Sherwin
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Sheet 3/4
WRI #: 22210
Drawn by:MK
REV.#1: 06/15/2023
REV.#2: 09/22/2023

<u>Exhibit E</u>

ESNW1

Geotechnical Engineering Study

June 6, 2023

ESNW1
55 pages

Earth Solutions NW LLC

Geotechnical Engineering
Construction Observation/Testing
Environmental Services

GEOTECHNICAL ENGINEERING STUDY
THE PLATEAU AT LIBERTY BAY
19321 VIKING AVENUE NORTHWEST
POULSBO, WASHINGTON

ES-8578

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PREPARED FOR

ENTITLE FUND TWO, LLC

September 21, 2022
Updated June 6, 2023

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Licensed Geologist
06/06/2023

Chase G. Halsen

Chase G. Halsen, L.G., L.E.G.
Senior Project Geologist

KEVEN D. HOFFMANN
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53734
REGISTERED
PROFESSIONAL ENGINEER
06/06/2023

Keven D. Hoffmann, P.E.
Associate Principal Engineer

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Important Information about This

Geotechnical-Engineering Report

Subsurface problems are a principal cause of construction delays, cost overruns, claims, and disputes.

While you cannot eliminate all such risks, you can manage them. The following information is provided to help.

The Geoprofessional Business Association (GBA) has prepared this advisory to help you – assumedly a client representative – interpret and apply this geotechnical-engineering report as effectively as possible. In that way, you can benefit from a lowered exposure to problems associated with subsurface conditions at project sites and development of them that, for decades, have been a principal cause of construction delays, cost overruns, claims, and disputes. If you have questions or want more information about any of the issues discussed herein, contact your GBA-member geotechnical engineer. Active engagement in GBA exposes geotechnical engineers to a wide array of risk-confrontation techniques that can be of genuine benefit for everyone involved with a construction project.

Understand the Geotechnical-Engineering Services Provided for this Report

Geotechnical-engineering services typically include the planning, collection, interpretation, and analysis of exploratory data from widely spaced borings and/or test pits. Field data are combined with results from laboratory tests of soil and rock samples obtained from field exploration (if applicable), observations made during site reconnaissance, and historical information to form one or more models of the expected subsurface conditions beneath the site. Local geology and alterations of the site surface and subsurface by previous and proposed construction are also important considerations. Geotechnical engineers apply their engineering training, experience, and judgment to adapt the requirements of the prospective project to the subsurface model(s). Estimates are made of the subsurface conditions that will likely be exposed during construction as well as the expected performance of foundations and other structures being planned and/or affected by construction activities.

The culmination of these geotechnical-engineering services is typically a geotechnical-engineering report providing the data obtained, a discussion of the subsurface model(s), the engineering and geologic engineering assessments and analyses made, and the recommendations developed to satisfy the given requirements of the project. These reports may be titled investigations, explorations, studies, assessments, or evaluations. Regardless of the title used, the geotechnical-engineering report is an engineering interpretation of the subsurface conditions within the context of the project and does not represent a close examination, systematic inquiry, or thorough investigation of all site and subsurface conditions.

Geotechnical-Engineering Services are Performed for Specific Purposes, Persons, and Projects, and At Specific Times

Geotechnical engineers structure their services to meet the specific needs, goals, and risk management preferences of their clients. A geotechnical-engineering study conducted for a given civil engineer will <u>not</u> likely meet the needs of a civil-works constructor or even a different civil engineer. Because each geotechnical-engineering study is unique, each geotechnical-engineering report is unique, prepared *solely* for the client.

Likewise, geotechnical-engineering services are performed for a specific project and purpose. For example, it is unlikely that a geotechnical-engineering study for a refrigerated warehouse will be the same as one prepared for a parking garage; and a few borings drilled during a preliminary study to evaluate site feasibility will <u>not</u> be adequate to develop geotechnical design recommendations for the project.

Do <u>not</u> rely on this report if your geotechnical engineer prepared it:

- for a different client;
- for a different project or purpose;
- for a different site (that may or may not include all or a portion of the original site); or
- before important events occurred at the site or adjacent to it; e.g., man-made events like construction or environmental remediation, or natural events like floods, droughts, earthquakes, or groundwater fluctuations.

Note, too, the reliability of a geotechnical-engineering report can be affected by the passage of time, because of factors like changed subsurface conditions; new or modified codes, standards, or regulations; or new techniques or tools. *If you are the least bit uncertain* about the continued reliability of this report, contact your geotechnical engineer before applying the recommendations in it. A minor amount of additional testing or analysis after the passage of time – if any is required at all – could prevent major problems.

Read this Report in Full

Costly problems have occurred because those relying on a geotechnical-engineering report did not read the report in its entirety. Do <u>not</u> rely on an executive summary. Do <u>not</u> read selective elements only. *Read and refer to the report in full.*

You Need to Inform Your Geotechnical Engineer About Change

Your geotechnical engineer considered unique, project-specific factors when developing the scope of study behind this report and developing the confirmation-dependent recommendations the report conveys. Typical changes that could erode the reliability of this report include those that affect:

- the site's size or shape;
- the elevation, configuration, location, orientation, function or weight of the proposed structure and the desired performance criteria;
- the composition of the design team; or
- project ownership.

As a general rule, *always* inform your geotechnical engineer of project or site changes – even minor ones – and request an assessment of their impact. *The geotechnical engineer who prepared this report cannot accept* *responsibility or liability for problems that arise because the geotechnical engineer was not informed about developments the engineer otherwise would have considered.*

Most of the "Findings" Related in This Report Are Professional Opinions

Before construction begins, geotechnical engineers explore a site's subsurface using various sampling and testing procedures. *Geotechnical engineers can observe actual subsurface conditions only at those specific locations where sampling and testing is performed.* The data derived from that sampling and testing were reviewed by your geotechnical engineer, who then applied professional judgement to form opinions about subsurface conditions throughout the site. Actual sitewide-subsurface conditions may differ – maybe significantly – from those indicated in this report. Confront that risk by retaining your geotechnical engineer to serve on the design team through project completion to obtain informed guidance quickly, whenever needed.

This Report's Recommendations Are Confirmation-Dependent

The recommendations included in this report – including any options or alternatives – are confirmation-dependent. In other words, they are not final, because the geotechnical engineer who developed them relied heavily on judgement and opinion to do so. Your geotechnical engineer can finalize the recommendations *only after observing actual subsurface conditions* exposed during construction. If through observation your geotechnical engineer confirms that the conditions assumed to exist actually do exist, the recommendations can be relied upon, assuming no other changes have occurred. *The geotechnical engineer who prepared this report cannot assume responsibility or liability for confirmation-dependent recommendations if you fail to retain that engineer to perform construction observation.*

This Report Could Be Misinterpreted

Other design professionals' misinterpretation of geotechnical-engineering reports has resulted in costly problems. Confront that risk by having your geotechnical engineer serve as a continuing member of the design team, to:

- confer with other design-team members;
- help develop specifications;
- review pertinent elements of other design professionals' plans and specifications; and
- be available whenever geotechnical-engineering guidance is needed.

You should also confront the risk of constructors misinterpreting this report. Do so by retaining your geotechnical engineer to participate in prebid and preconstruction conferences and to perform construction-phase observations.

Give Constructors a Complete Report and Guidance

Some owners and design professionals mistakenly believe they can shift unanticipated-subsurface-conditions liability to constructors by limiting the information they provide for bid preparation. To help prevent the costly, contentious problems this practice has caused, include the complete geotechnical-engineering report, along with any attachments or appendices, with your contract documents, *but be certain to note conspicuously that you've included the material for information purposes only.* To avoid misunderstanding, you may also want to note that "informational purposes" means constructors have no right to rely on the interpretations, opinions, conclusions, or recommendations in the report. Be certain that constructors know they may learn about specific project requirements, including options selected from the report, *only* from the design drawings and specifications. Remind constructors that they may perform their own studies if they want to, and *be sure to allow enough time* to permit them to do so. Only then might you be in a position to give constructors the information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions. Conducting prebid and preconstruction conferences can also be valuable in this respect.

Read Responsibility Provisions Closely

Some client representatives, design professionals, and constructors do not realize that geotechnical engineering is far less exact than other engineering disciplines. This happens in part because soil and rock on project sites are typically heterogeneous and not manufactured materials with well-defined engineering properties like steel and concrete. That lack of understanding has nurtured unrealistic expectations that have resulted in disappointments, delays, cost overruns, claims, and disputes. To confront that risk, geotechnical engineers commonly include explanatory provisions in their reports. Sometimes labeled "limitations," many of these provisions indicate where geotechnical engineers' responsibilities begin and end, to help others recognize their own responsibilities and risks. *Read these provisions closely.* Ask questions. Your geotechnical engineer should respond fully and frankly.

Geoenvironmental Concerns Are Not Covered

The personnel, equipment, and techniques used to perform an environmental study – e.g., a "phase-one" or "phase-two" environmental site assessment – differ significantly from those used to perform a geotechnical-engineering study. For that reason, a geotechnical-engineering report does not usually provide environmental findings, conclusions, or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. *Unanticipated subsurface environmental problems have led to project failures.* If you have not obtained your own environmental information about the project site, ask your geotechnical consultant for a recommendation on how to find environmental risk-management guidance.

Obtain Professional Assistance to Deal with Moisture Infiltration and Mold

While your geotechnical engineer may have addressed groundwater, water infiltration, or similar issues in this report, the engineer's services were not designed, conducted, or intended to prevent migration of moisture – including water vapor – from the soil through building slabs and walls and into the building interior, where it can cause mold growth and material-performance deficiencies. Accordingly, ***proper implementation of the geotechnical engineer's recommendations will not of itself be sufficient to prevent moisture infiltration. Confront the risk of moisture infiltration*** by including building-envelope or mold specialists on the design team. ***Geotechnical engineers are not building-envelope or mold specialists.***

GEOPROFESSIONAL
BUSINESS
ASSOCIATION

Telephone: 301/565-2733
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Earth Solutions NW LLC

Geotechnical Engineering, Construction
Observation/Testing and Environmental Services

September 21, 2022
Updated June 6, 2023
ES-8578

Entitle Fund Two, LLC
P.O. Box 188
Puyallup, Washington 98371

Attention: Geoffrey Sherwin, P.E.

Greetings:

Earth Solutions NW, LLC (ESNW) is pleased to present this geotechnical report to support the proposed project. Based on the results of our investigation, the construction of a residential development is feasible from a geotechnical standpoint. Our study indicates the site is underlain primarily by consolidated ice-contact deposits with localized areas of relatively clean sands. Perched groundwater seepage was exposed at two test pit locations and at each of the boring locations, generally at depths of about 10 feet and 25 feet below the ground surface.

Based on our findings, the proposed single-family residences may be constructed on conventional continuous and spread footing foundations bearing upon competent native soil, recompacted native soil, or new structural fill placed directly on competent native soil. Native soil conditions considered suitable for support of the proposed structures will likely be encountered beginning at depths of about two to three feet below existing grades. Where loose or unsuitable soil conditions are exposed at foundation subgrade elevations, compaction of the soil to the specifications of structural fill or overexcavation and replacement with suitable structural fill will be necessary.

From a geotechnical standpoint, infiltration on the subject project is largely considered infeasible. This opinion is based on the widespread presence of glacially consolidated soils (with cemented interbeds at varying depths) across the development area and the results of our recently completed groundwater monitoring program, which was targeted to the proposed infiltration pond location (Tract H). Further discussion of site infiltration feasibility, a summary of the groundwater monitoring program, and recommendations to aid in stormwater management designs are presented in this report.

Pertinent geotechnical recommendations are provided in this study. We appreciate the opportunity to be of service to you on this project. If you have any questions regarding the content of this geotechnical engineering study, please call.

Sincerely,

EARTH SOLUTIONS NW, LLC

Chase G. Halsen, L.G., L.E.G.
Senior Project Geologist

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Cont'd

ES-8578

GEOTECHNICAL ENGINEERING STUDY
THE PLATEAU AT LIBERTY BAY
19321 VIKING AVENUE NORTHWEST
POULSBO, WASHINGTON

ES-8578

INTRODUCTION

General

This geotechnical engineering study was prepared for the proposed residential development project that will encompass the properties located at 19313, 19321, and 19379 Viking Avenue Northwest, as well as at 19521 Laurene Lane Northwest, in Poulsbo, Washington. This study has been prepared to provide geotechnical recommendations and has subsequently been updated to reflect current proposed development plans. The preparation of this report included the following geotechnical services:

- Test pits and borings to characterize soil and groundwater conditions.
- Laboratory testing of representative soil samples collected at the exploration locations.
- Completion of targeted seasonal groundwater monitoring.
- Geotechnical engineering analyses.

The following documents and maps were reviewed as part of the preparation of this report:

- Site Plan (with markups), prepared by KPFF, Inc., dated April 18, 2022.
- Online Web Soil Survey (WSS) resource, maintained by the Natural Resources Conservation Service under the United States Department of Agriculture (USDA).
- Geologic Map of the Seabeck and Poulsbo 7.5-minute quadrangles, Kitsap and Jefferson Counties, Washington, by Michael Polenz et al., 2013.
- Poulsbo Municipal Code, Chapter 16.20.
- Washington State Coastal Atlas Map, maintained by the Washington State Department of Ecology.

Project Description

Currently referred to as The Plateau at Liberty Bay, the subject project is currently pursuing the construction of 60 single-family residences and associated infrastructure improvements. Site ingress and egress will be provided via a local access road that connects to Viking Avenue Northwest. Stormwater management is currently proposed via a stormwater detention vault (vault) located in Tract G (east-central site area). Lots along the western development margin will likely utilize dispersion designs, to the extent feasible.

At the time of report submission, specific building load plans were not available for review; however, based on our experience with similar developments, the proposed residential structures will likely be two stories in height and constructed using relatively lightly loaded wood framing supported on conventional foundations. Perimeter footing loads will likely be about 2 to 3 kips per lineal foot. Slab-on-grade loading is anticipated to be approximately 150 pounds per square foot (psf). Grade cuts and/or fills of up to about 10 feet are expected to achieve the design elevation of most lots. More extensive earthwork operations will likely be required to install site utilities and construct the stormwater facilities.

If the above design assumptions either change or are incorrect, ESNW should be contacted to review the recommendations provided in this report. ESNW should review the final designs to confirm that appropriate geotechnical recommendations have been incorporated into the plans.

SITE CONDITIONS

Surface

The subject site is located directly west of the Marelaine Lane Northwest and Viking Avenue Northwest intersection, in Poulsbo, Washington. The approximate site location is depicted on Plate 1 (Vicinity Map). The irregularly shaped site consists of adjoining Kitsap County parcel numbers 152601-3-023-2005, -025-2003, -033-2003, -040-2004, and -090-2102, totaling a gross site area of about 26.1 acres. Most of the current site parcels are developed with a single-family residence and associated infrastructure improvements. However, the majority of the total site area is surfaced with forest-like growth or grass. The proposed site area is situated on a relatively level ridgeback that gently descends to the south; grades descend mildly along the eastern site margin while steeper gradients are present along the western site margin, in association with a local drainage ravine. In total, about 75 feet of elevation change occurs across the gross site area, and about 50 feet of elevation change occurs within the proposed development envelope.

Four wetland areas have been identified and delineated (by others) within the confines of the site. We understand that current designs have already incorporated applicable wetland buffers and setbacks into the site layout.

Subsurface

An ESNW representative observed, logged, and sampled the excavation of 15 test pits within readily accessible areas of the site on July 14, 2022. Three additional test pits and three borings were completed on July 21, 2022. The test pits ranged in depths from about 8 to 18 feet below the existing ground surface (bgs), and the borings were advanced to depths between about 21 feet bgs and 26.5 feet bgs. A groundwater monitoring well was installed at each boring location in preparation for completing a wet season groundwater monitoring program. Concurrent with the July 21, 2022 exploration, one large-scale Pilot Infiltration Test (PIT) was performed within the proposed western pond facility and corresponds to TP-17. The explorations were completed using exploratory equipment and operators retained by ESNW.

The approximate locations of the explorations are depicted on Plate 2 (Exploration Location Plan). Please refer to the exploration logs provided in Appendix A for a more detailed description of the encountered subsurface conditions. Representative soil samples collected at the exploration locations were analyzed following both the Unified Soil Classification System (USCS) and USDA methods and procedures.

Topsoil and Fill

Topsoil was encountered in the upper approximately 6 to 12 inches of existing grades at the test pit locations. The topsoil was characterized by a dark brown color, the presence of fine organic material, and small root intrusions. Based on our observations, an average topsoil thickness of about six inches was encountered at the exploration locations during the field exploration.

Fill was not encountered at the subsurface exploration locations during the July 2022 fieldwork.

Native Soil and Geologic Setting

Underlying topsoil, native soils were classified primarily as the following:

- *Silty sand with or without gravel (USCS: SM):* Silty sand is considered the predominant underlying site soil type given that it was exposed at the majority of the exploration locations. The silty sand was generally encountered in a loose to medium dense condition within the upper few feet of existing grades and is considered the weathered section of the soil horizon. Thereafter, in-situ soil density was characterized as dense to very dense and extended to the terminus of the exploration locations (where exposed).

- *Poorly graded sand with or without silt and gravel (USCS: SP and SP-SM):* The poorly graded sand appeared to be localized to the northern-most and southwestern site areas. Similar to the silty sand, the poorly graded sand deposit was characterized as loose to medium dense near the surface and became dense to very dense at depth. Erratic lensing and layers of cemented silty sand were commonly observed within the sand deposit with little to no predictable (observable) patterns concerning presence, extent, and thickness.

The referenced geologic map resource indicates the site is underlain by Vashon ice-contact deposits (Qgic), which are characterized as cobble and pebble gravel, sand, ablation till, flow till, lodgment till, and lacustrine mud. The referenced WSS resource indicates the east, south, and west site areas are underlain by Alderwood gravelly sandy loam, while the northern site area is underlain by Poulsbo gravelly sandy loam. The Alderwood series is generally associated with ridge and hill landforms, and the Poulsbo series is associated with terraces and moraines.

Based on our explorations and review of readily available geologic map resources, it is our opinion that the site is underlain by glacial ice-contact deposits. This deposition can be somewhat variable concerning soil gradation, lensing, and layering, and based on our experience, the presence of silty sand and sand is common with this deposit.

Groundwater

Perched groundwater seepage was exposed at TP-5, TP-17, and B-1 to B-3, at depths between about 10 feet to 25 feet bgs. In general, the seepage was characterized as being minor to heavy at the time of the exploration. Based on our observations, the heavier flows are associated with the deeper exposed seepage zones.

Seasonal groundwater monitoring was performed within the monitoring wells installed at B-1 to B-3 and was targeted to the southwest site corner. The monitoring began on October 5, 2022 and continued through April 30, 2023. Groundwater depths and fluctuations were recorded daily via dataloggers that were installed at each well location. Hand measurements were taken using a depth-to-groundwater meter on a periodic basis as well.

Based on the results of the monitoring program, the peak groundwater condition (GWC) elevation occurred in mid-January 2023 at the subject site. The following table depicts the approximate surface elevation of each well, peak GWC, corresponding approximate groundwater elevation, and occurrence date.

Monitoring Well Location	**Peak GWC Depth (ft bgs)**	**Approximate Surface Elevation (ft)**	**Approximate GWC Elevation (ft)**	**Peak Date**
B-1	13.2	112.8	99.7	1/18/2023
B-2	11.2	108.8	97.6	01/21/2023*
B-3	7.0	114.2	107.2	01/15/2023

* *Peak GWC elevation occurred on multiple dates.*

<u>Review of Geologically Hazardous Areas</u>

Poulsbo Municipal Code (PMC) 16.20.410 classifies potentially geologically hazardous areas as geologically hazardous areas or areas of geologic concern. Based on our review and evaluation, the majority of the site area does not contain geologically hazardous areas or areas of geologic concern.

A drainage feature is present along the western property margin and trends north-south. Ravine sidewalls extend to a height of about 35 feet, with representative slope gradient measurements generally over 30 percent. Although direct evidence of daylighting groundwater or seepages along the slope face was not observed during the July 2022 fieldwork, groundwater is present within direct vicinity to the subject sloping areas, as indicated by the conditions observed at B-1. As such, in association with current slope gradients, the ravine sidewall may be considered an area of geologic concern, per PMC 16.20.410.B.4. At the time of our fieldwork, the slope was characterized as stable due to the presence of dense to very dense soils in the area and the absence of obvious indications of surficial instability.

PMC 16.20.420.C and D indicate a typical buffer of 25 feet, in addition to a building setback, should be applied to the edges of areas of geologic concern. Based on the information provided on the referenced site plan, the setback and buffer associated with Wetland A is greater than the code requirements for setbacks and buffers associated with areas of geologic concern. On this basis, no additional setback or buffer distances are recommended in relation to potential geologically hazardous areas on site.

DISCUSSION AND RECOMMENDATIONS

General

Based on the results of our investigation, the construction of the proposed residential development is feasible from a geotechnical standpoint. The primary geotechnical considerations for the proposed development concern structural fill placement and compaction, foundation design, and stormwater management design.

Site Preparation and Earthwork

Initial site preparation activities will consist of installing temporary erosion control measures, establishing grading limits, and demolition, site clearing and stripping activities. Subsequent earthwork activities will involve mass site grading and installation of infrastructure and stormwater management improvements.

Temporary Erosion Control

The following temporary erosion and sediment control Best Management Practices (TESC BMPs) are offered:

- Temporary construction entrances and drive lanes should be constructed with at least six inches of quarry spalls to both minimize off-site soil tracking and provide a stable access entrance surface. A woven geotextile fabric can be placed beneath the quarry spalls to provide greater stability, if needed.

- Silt fencing should be placed around the site perimeter.

- When not in use, soil stockpiles should be covered or otherwise protected.

- Temporary measures for controlling surface water runoff, such as interceptor trenches, sumps, or interceptor swales, should be installed before beginning earthwork activities.

- Dry soils disturbed during construction should be wetted to reduce dust.

- When appropriate, permanent planting or hydroseeding will help to stabilize site soils.

Additional TESC BMPs, as specified by the project civil engineer on the plans, should be incorporated into construction activities. TESC measures will require upkeep and potential modification during construction to ensure proper function; such upkeep should be coordinated with the site erosion control lead, where applicable.

Stripping

Topsoil was generally encountered in the upper approximately 6 to 12 inches of existing grades at the test pit locations. For stripping estimations, an average topsoil thickness of about six inches can be assumed, based on our field observations. Where encountered, organic-rich topsoil should be stripped and segregated into a stockpile for later use on site or to be exported.

Excavations and Slopes

Based on the soil conditions observed at the test pit locations, the following allowable temporary slope inclinations, as a function of horizontal to vertical (H:V) inclination, may be used. The applicable Federal Occupation Safety and Health Administration (OSHA) and Washington Industrial Safety and Health Act (WISHA) soil classifications are also provided:

- Loose to medium dense soil 1.5H:1V (Type C)

- Areas exposing groundwater seepage 1.5H:1V (Type C)

- Dense to very dense, undisturbed native soil 0.75H:1V (Type A)

Steeper temporary slope inclinations within undisturbed, very dense native soil may be feasible based on the soil and groundwater conditions exposed within the excavations. ESNW can evaluate the feasibility of utilizing steeper temporary slopes at the time of construction. In any case, an ESNW representative should observe temporary slopes to confirm inclinations are suitable for the exposed soil conditions and to provide additional excavation and slope stability recommendations, as necessary.

If the recommended temporary slope inclinations cannot be achieved, temporary shoring may be necessary to support excavations. Permanent slopes should be graded to 2H:1V (or flatter) and planted with vegetation to enhance stability and minimize erosion potential. Permanent slopes should be observed by ESNW before vegetation and landscaping.

In-situ and Imported Soil

Successful use of the on-site soil as structural fill will largely be dictated by the moisture content at the time of placement and compaction. Based on the conditions observed during the subsurface exploration, the native silty sand possesses a high moisture sensitivity while the poorly graded sand possesses a moderate moisture sensitivity. Depending on the time of year construction occurs, remedial measures (such as soil aeration) may be necessary as part of site grading and earthwork activities. If the on-site soil cannot be successfully compacted, the use of imported soil may be necessary. In our opinion, a contingency should be provided in the project budget for the export of soil that cannot be successfully compacted as structural fill, particularly if grading activities take place during periods of extended rainfall activity. In general, soils with fines contents greater than 5 percent typically degrade rapidly when exposed to periods of rainfall.

Imported structural fill soil should consist of well-graded, granular soil that can achieve a suitable working moisture content. During wet weather conditions, imported soil intended for use as structural fill should consist of a well-graded, granular soil with a fines content of 5 percent or less (where the fines content is defined as the percent passing the Number 200 sieve, based on the minus three-quarter-inch fraction).

Subgrade Preparation

Foundation and slab subgrade surfaces should consist of competent, undisturbed native soil or structural fill placed and compacted atop competent native soil. ESNW should be contacted to observe subgrade areas before placing formwork. Supplementary recommendations for subgrade improvement may be provided at the time of construction; such recommendations would likely include further mechanical compaction effort or overexcavation and replacement with suitable structural fill.

Structural Fill

Structural fill is defined as compacted soil placed in foundation, slab-on-grade, roadway, permanent slope, retaining wall, and utility trench backfill areas. The following recommendations are provided for soils intended for use as structural fill:

• Moisture content	At or slightly above optimum
• Relative compaction (minimum)	95 percent (per ASTM D1557)
• Loose lift thickness (maximum)	12 inches

Existing site soil may only be considered suitable for use as structural fill if a suitable moisture content is achieved at the time of placement and compaction. If the on-site soil cannot achieve these specifications, the use of imported structural fill material will likely be necessary. Concerning underground utility installations and backfill, local jurisdictions will likely dictate soil type(s) and compaction requirements.

Slope Fill

Structural fill within sloping areas (where a “sloping area” is defined as an area inclined at 15 percent or steeper) should be placed on a level bench as depicted on Plate 3 (Slope Fill Detail). Benches must be “keyed” into the slope and subsequently filled and compacted with suitable structural fill before continuing to the next bench. Sloping finish grades should be “overbuilt” using a bench-style fill and cut to the design gradient to ensure a compacted slope face is maintained. ESNW should observe structural fill placement to confirm subgrade conditions and provide additional drainage recommendations, as necessary.

Foundations

In our opinion, the proposed single-family residences may be constructed on conventional continuous and spread footing foundations bearing upon competent native soil, recompacted native soil, or new structural fill placed directly on competent native soil. Competent native soil suitable for support of foundations will likely be encountered beginning at depths of about two to three feet bgs. Where loose or unsuitable soil conditions are exposed at foundation subgrade elevations, compaction of the soil to the specifications of structural fill or overexcavation and replacement with suitable structural fill will be necessary.

Provided the foundations will be supported as prescribed, the following parameters may be used for the design:

• Allowable soil bearing capacity	2,500 psf
• Passive earth pressure	300 pcf (equivalent fluid)
• Coefficient of friction	0.40

The above passive pressure and friction values include a factor-of-safety (FOS) of 1.5. A one-third increase in the allowable soil bearing capacity may be assumed for short-term wind and seismic loading conditions. With structural loading as expected, total settlement in the range of one inch and differential settlement of about one-half inch is anticipated. Most settlements should occur during construction when dead loads are applied.

Seismic Design

The 2018 International Building Code (2018 IBC) recognizes the most recent edition of the Minimum Design Loads for Buildings and Other Structures manual (ASCE 7-16) for seismic design, specifically concerning earthquake loads. Based on the soil conditions encountered at the test locations, the parameters and values provided below are recommended for seismic design per the 2018 IBC.

Parameter	**Value**
Site Class	C*
Mapped short-period spectral response acceleration, S_S (g)	1.373
Mapped 1-second period spectral response acceleration, S_1 (g)	0.486
Short period site coefficient, F_a	1.2
Long-period site coefficient, F_v	1.5
Adjusted short-period spectral response acceleration, S_{MS} (g)	1.648
Adjusted 1-second period spectral response acceleration, S_{M1} (g)	0.729
Design short-period spectral response acceleration, S_{DS} (g)	1.099
Design 1-second period spectral response acceleration, S_{D1} (g)	0.486

* *Assumes very dense soil conditions, encountered to a maximum depth of 25 feet bgs during the July 2022 field exploration, remain very dense to at least 100 feet bgs. Based on our experience with the project geologic setting (glacial ice-contact deposits) across the Puget Sound region, soil conditions are likely consistent with this assumption.*

Further discussion between the project structural engineer, the project owner (or their representative), and ESNW may be prudent to determine the possible impacts on the structural design due to increased earthquake load requirements under the 2018 IBC. ESNW can provide additional consulting services to aid with design efforts, including supplementary geotechnical and geophysical investigation, upon request.

Liquefaction is a phenomenon where saturated or loose soil suddenly loses internal strength and behaves as a fluid. This behavior is in response to increased pore water pressures resulting from an earthquake or another intense ground shaking. In our opinion, site susceptibility to liquefaction may be considered negligible. The absence of a shallow groundwater table and the dense to very dense characteristics of the native soil were the primary bases for this opinion.

Slab-on-Grade Floors

Slab-on-grade floors for the proposed residential structures should be supported by competent, firm, and unyielding subgrades. Unstable or yielding subgrade areas should be recompacted or overexcavated and replaced with suitable structural fill before slab construction. A capillary break consisting of at least four inches of free-draining crushed rock or gravel should be placed below each slab. The free-draining material should have a fines content of 5 percent or less (where the fines content is defined as the percent passing the Number 200 sieve, based on the minus three-quarter-inch fraction). In areas where slab moisture is undesirable, installation of a vapor barrier below the slab should be considered. Vapor barriers should be made from material specifically designed for use as a vapor barrier and should be installed by the manufacturer's recommendations.

Retaining Walls

Retaining walls must be designed to resist earth pressures and applicable surcharge loads. The following parameters may be used for the design:

- Active earth pressure (unrestrained condition) 35 pcf (equivalent fluid)
- At-rest earth pressure (restrained condition) 55 pcf
- Traffic surcharge* (passenger vehicles) 70 psf (rectangular distribution)
- Passive earth pressure 350 pcf (equivalent fluid)
- Coefficient of friction 0.40
- Seismic surcharge 8H psf†

* *Where applicable.*
† *Where H equals the retained height (in feet).*

The above passive pressure and friction values include a FOS of 1.5 and are based on a level backfill condition and level grade at the wall toe. Revised design values will be necessary if sloping grades are to be used above or below retaining walls. Additional surcharge loading from adjacent foundations, sloped backfill, or other relevant loads should be included in the retaining wall design.

Retaining walls should be backfilled with free-draining material that extends along with the height of the wall and a distance of at least 18 inches behind the wall. The upper 12 inches of the wall backfill may consist of less permeable soil, if desired. A sheet drain may be considered instead of free-draining backfill. A perforated drainpipe should be placed along the base of the wall and connected to an approved discharge location. A typical retaining wall drainage detail is provided on Plate 4. If drainage is not provided, hydrostatic pressures should be included in the wall design.

Drainage

Zones of perched groundwater seepage could develop in site excavations depending on the time of year grading operations take place, particularly within deeper excavations for utilities and stormwater facilities. Temporary measures to control surface water runoff and groundwater during construction would likely involve interceptor trenches, interceptor swales, and sumps. ESNW should be consulted during preliminary grading to both identify areas of seepage and provide recommendations to reduce the potential for seepage-related instability.

Finish grades must be designed to direct surface drain water away from structures and slopes. Water must not be allowed to pond adjacent to structures or slopes. In our opinion, foundation drains should be installed along building perimeter footings. A typical foundation drain detail is provided on Plate 5.

Infiltration Feasibility

ESNW evaluated the infiltration potential of the native site soils via field observations, completion of a targeted large-scale Pilot Infiltration Test (PIT), and representative sieve analyses. From a geotechnical standpoint, infiltration is considered infeasible across most of the site area due to the presence of consolidated ice-contact deposits. However, due to the presence of relatively clean sands, and as confirmed with the PIT, infiltration was (initially) pursued within the southwestern-most site area. The following table summarizes the infiltration test location, encountered soil type, test depth, measured rate, appropriate safety factors, and recommended design rate.

Location	Soil Type	Test Depth (ft bgs)	Measured Rate (in/hr)	Reduction Factors			Recommended Design Rate (in/hr)
				CF_v	CF_t	CF_m	
TP-17	SP	10	6.25	0.33	0.75	0.9	1.4

Following the completion of the wet season groundwater monitoring program (as detailed in the *Groundwater* section of this report), it was determined that this site area possesses a relatively shallow groundwater condition. Based on our discussions with the project design team and the preliminary results of a groundwater mounding analysis, it was determined that sufficient vertical separation between the proposed facility base and seasonal high groundwater condition could not be achieved. As such, large-scale infiltration is considered infeasible for this site area and is no longer being pursued.

Relatively small-scale, lot-specific infiltration facilities (e.g., drywells or gravel-filled trenches) may be feasible for the lots in direct vicinity of the formerly proposed infiltration facility, within the southwestern site corner. ESNW would be pleased to assist in determining which lots may feasibly utilize infiltration designs from a geotechnical standpoint, if requested. Furthermore, it may be feasible to utilize dispersion on lots where minimum horizontal setback and flow path requirements can be achieved. Based on our discussions with the project team, dispersion may be most prudent along the western lots.

Water Quality Treatment

Five representative samples from the southwestern site area were tested for cation exchange capacity (CEC) and organic content (OC). The following table depicts each sample location, approximate depth, and CEC and OC test results.

Location	Depth (ft bgs)	CEC (meq/100 g)	OC (%)
TP-13	12.0	1.6	0.6
TP-14	6.0	1.5	0.8
TP-15	8.5	1.9	0.8
TP-17	12.0	2.4	0.7
TP-18	12.0	1.1	0.5

Preliminary Pavement Sections

The performance of site pavements is largely related to the condition of the underlying subgrade. To ensure adequate pavement performance, the subgrade should be in a firm and unyielding condition when subjected to proofrolling with a loaded dump truck. Structural fill in pavement areas should be compacted to the specifications previously detailed in this report. Soft, wet, or otherwise unsuitable subgrade areas may still exist after base grading activities. Areas containing unsuitable or yielding subgrade conditions will require remedial measures, such as overexcavation and/or placement of thicker crushed rock or structural fill sections, before pavement.

We anticipate new pavement sections will be subjected primarily to passenger vehicle traffic. For lightly loaded pavement areas subjected primarily to passenger vehicles, the following preliminary pavement sections may be considered:

- A minimum of three inches of HMA placed over four inches of CRB, underlain by a competent soil subgrade.

Heavier traffic areas generally require thicker pavement sections depending on site usage, pavement life expectancy, and site traffic. For preliminary design purposes, the following pavement sections for occasional truck traffic and access roadways areas may be considered:

- Three inches of HMA placed over six inches of CRB.
- Three inches of HMA placed over four-and-one-half inches of ATB.

An ESNW representative should be requested to observe subgrade conditions before placement of CRB or ATB. As necessary, supplemental recommendations for achieving subgrade stability and drainage can be provided. If the on-site roads will be constructed with an inverted crown, additional drainage measures may be recommended to assist in maintaining road subgrade and pavement stability.

Final pavement design recommendations, including recommendations for heavy traffic areas, access roads, and frontage improvement areas, can be provided once final traffic loading has been determined. Road standards utilized by the governing jurisdiction may supersede the recommendations provided in this report. The HMA, ATB, and CRB materials should conform to WSDOT specifications. All soil base material should be compacted to a relative compaction of 95 percent, based on the laboratory maximum dry density as determined by ASTM D1557.

Utility Support and Trench Backfill

In our opinion, the native soil will generally be suitable for support of utilities. Remedial measures may be necessary for some areas to provide support for utilities, such as overexcavation and replacement with structural fill and/or placement of geotextile fabric. Groundwater seepage may be encountered within utility excavations, and caving of trench walls may occur where groundwater is encountered. Depending on the time of year and conditions encountered, dewatering or temporary trench shoring may be necessary during utility excavation and installation.

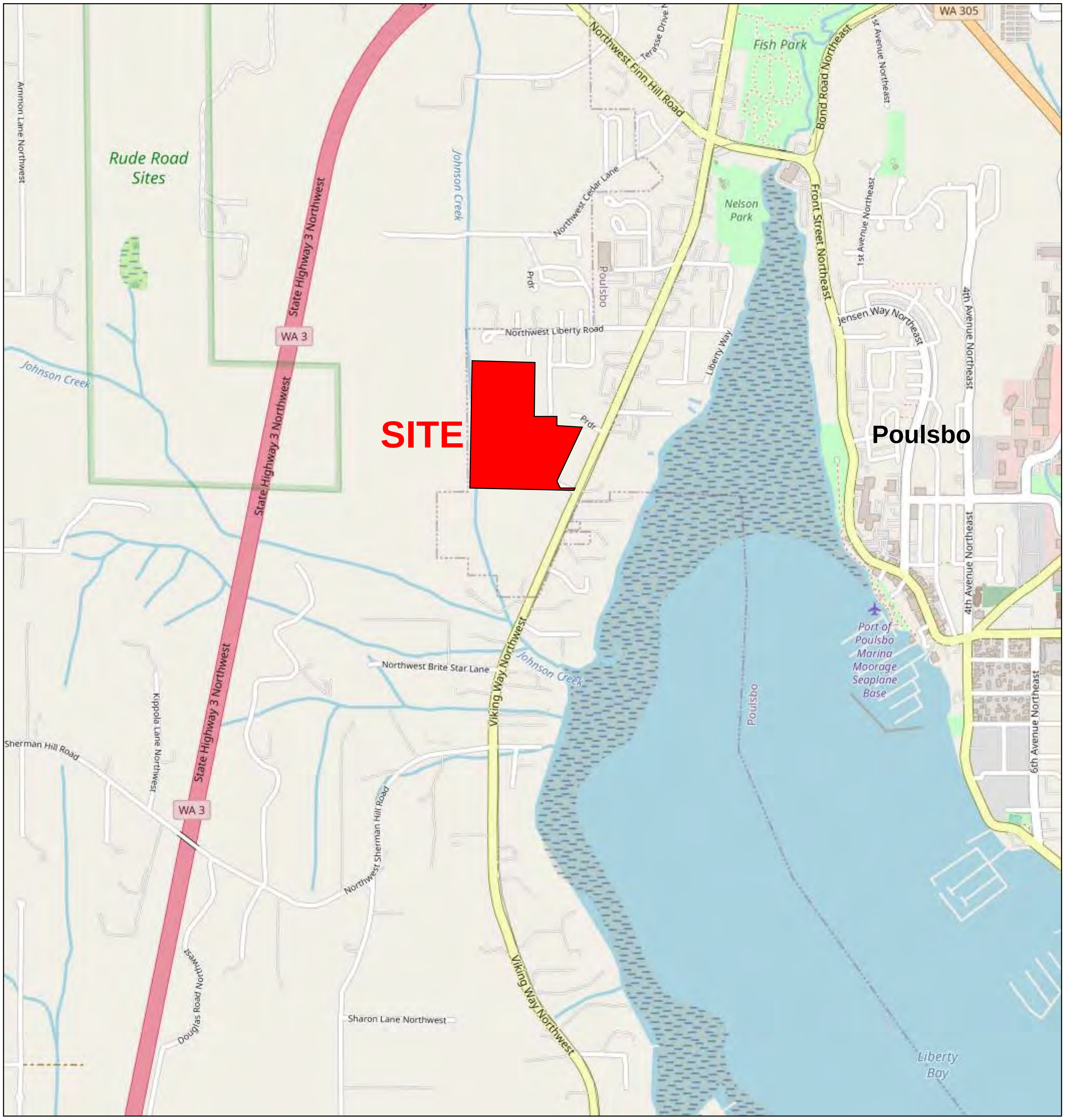
The on-site soil is not considered suitable for use as structural backfill throughout the utility trench excavations unless the soil is at (or slightly above) the optimum moisture content at the time of placement and compaction. Moisture conditioning of the soil may be necessary at some locations before use as structural fill. Each section of the utility lines must be adequately supported by the bedding material. Utility trench backfill should be placed and compacted to the structural fill specifications previously detailed in this report or to the applicable specifications of the presiding jurisdiction.

LIMITATIONS

This study has been prepared for the exclusive use of Entitle Fund Two, LLC and its representatives. The recommendations and conclusions provided in this study are professional opinions consistent with the level of care and skill that is typical of other members in the profession currently practicing under similar conditions in this area. No warranty, express or implied, is made. Variations in the soil and groundwater conditions observed at the test locations may exist and may not become evident until construction. ESNW should reevaluate the conclusions provided in this study if variations are encountered.

Additional Services

ESNW should have an opportunity to review the final project plans concerning the geotechnical recommendations provided in this report. ESNW should also be retained to provide testing and consultation services during construction.



Reference:
Kitsap County, Washington
OpenStreetMap.org

NORTH

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

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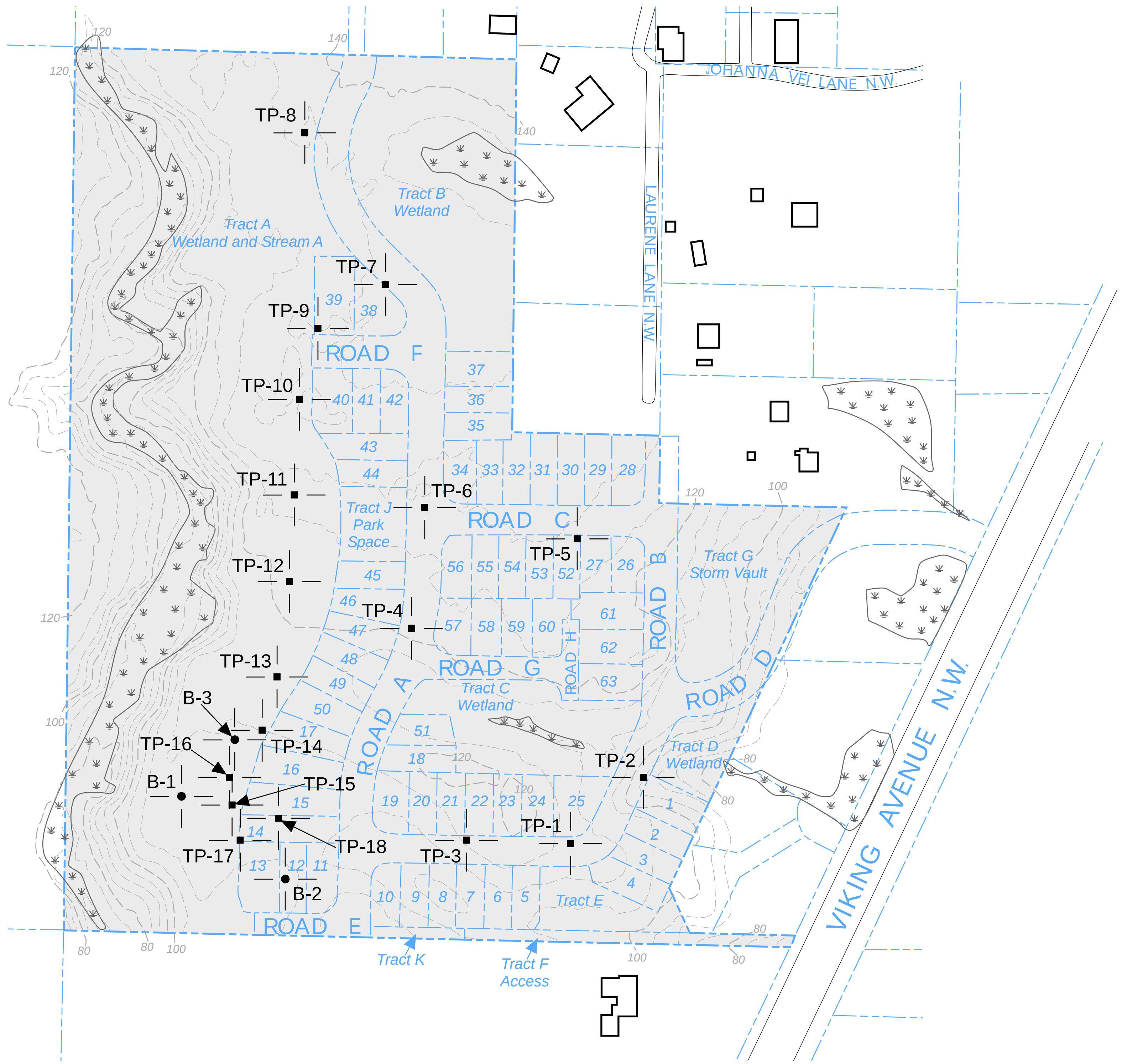
Vicinity Map
The Plateau at Liberty Bay
Poulsbo, Washington

Drwn. CAM	Date 11/08/2022	Proj. No. 8578
Checked CGH	Date Nov. 2022	Plate 1



LEGEND

B-1 — Approximate Location of ESNW Boring, Proj. No. ES-8578, July 2022

TP-1 — Approximate Location of ESNW Test Pit, Proj. No. ES-8578, July 2022

Subject Site

Existing Building

21 — Proposed Lot Number

Wetland (Delineated by Others)

NORTH

0 100 200 400

1"=200'

Scale in Feet

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

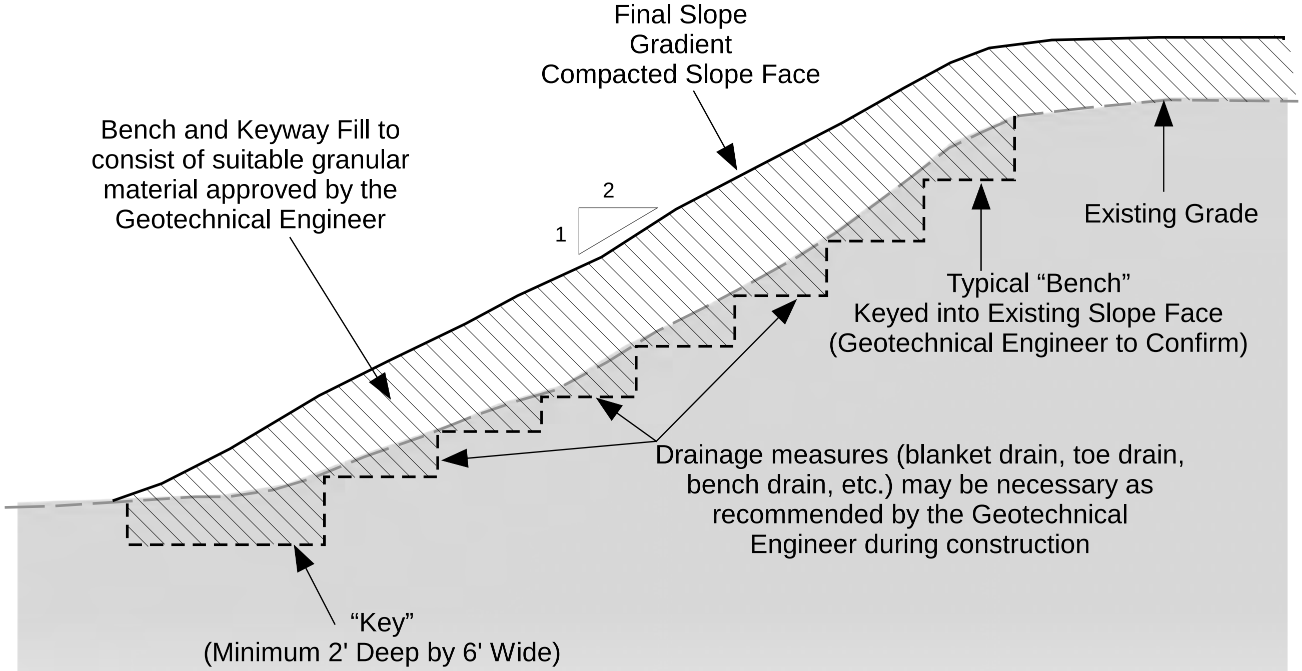
NOTE: This plate may contain areas of color. ESNW cannot be responsible for any subsequent misinterpretation of the information resulting from black & white reproductions of this plate.

Subsurface Exploration Plan
The Plateau at Liberty Bay
Poulsbo, Washington

Earth Solutions NW LLC
Geotechnical Engineering, Construction Observation/Testing and Environmental Services

Drwn. By	CAM
Checked By	CGH
Date	06/06/2023
Proj. No.	8578
Plate	2

SCHEMATIC ONLY - NOT TO SCALE
NOT A CONSTRUCTION DRAWING



NOTES:

- Slope should be stripped of topsoil and unsuitable materials prior to excavating Keyway or benches.
- Benches will typically be equal to a bulldozer blade width of approximately 8 feet but shall be at least 4 feet.
- Final slope gradient should be 2H : 1V.
- Final slope face should be densified by over-building with compacted fill and trimming back to shape or by compaction with a bulldozer or vibratory drum roller.
- Planting or hydroseeding slope face with a rapid growth deep-rooted vegetative mat will reduce erosion potential of slope area.
- Use of pegged-in-place jute matting or geotechnical fabric will help maintain the seed and mulch in place until the root system has an opportunity to germinate.
- Structural fill should be placed in thin loose lifts not exceeding 12 inches in thickness. Each lift should be compacted to no less than the degree specified in the "Site Preparation and Earthwork" section of this report. No additional lift should be placed until compaction is achieved.

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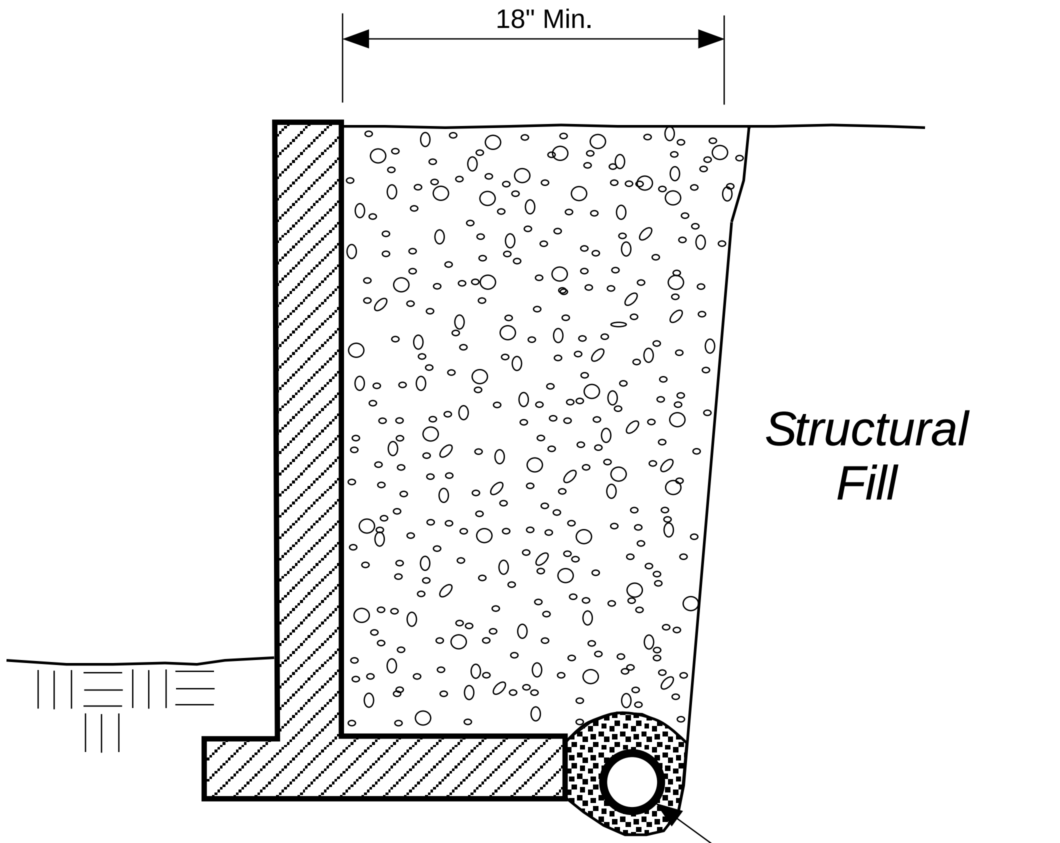
Slope Fill Detail
The Plateau at Liberty Bay
Poulsbo, Washington

Drwn. CAM	Date 11/08/2022	Proj. No. 8578
Checked CGH	Date Nov. 2022	Plate 3



NOTES:

- Free-draining Backfill should consist of soil having less than 5 percent fines. Percent passing No. 4 sieve should be 25 to 75 percent.
- Sheet Drain may be feasible in lieu of Free-draining Backfill, per ESNW recommendations.
- Drain Pipe should consist of perforated, rigid PVC Pipe surrounded with 1-inch Drain Rock.

SCHEMATIC ONLY - NOT TO SCALE
NOT A CONSTRUCTION DRAWING

LEGEND:

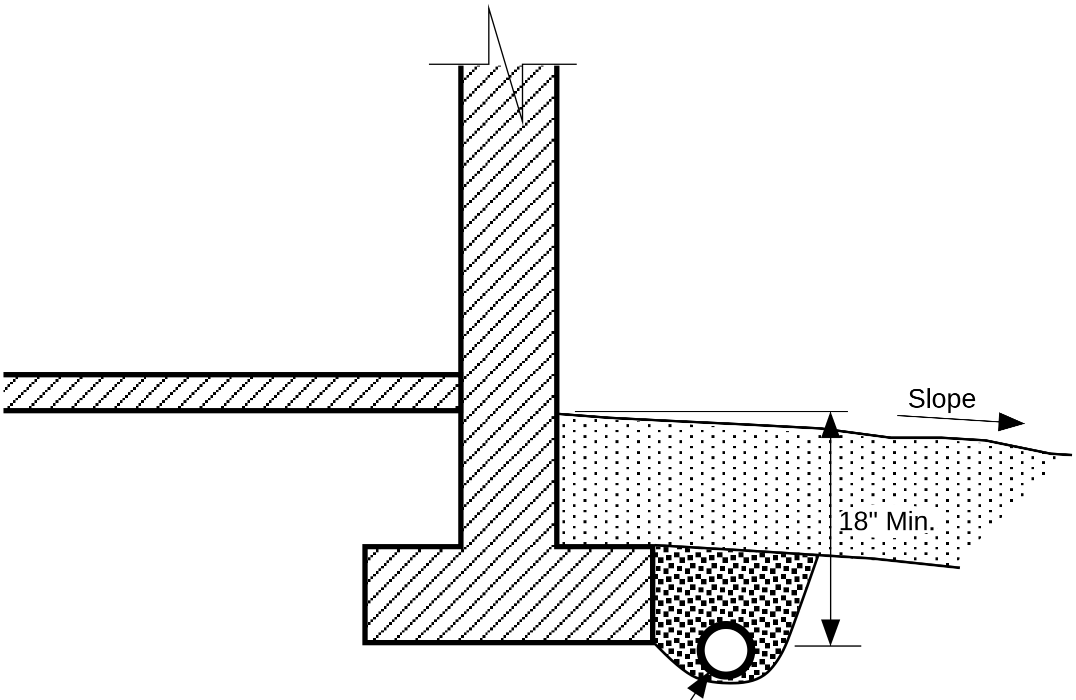
Free-draining Structural Backfill

1-inch Drain Rock

Earth Solutions NW LLC
Geotechnical Engineering, Construction Observation/Testing and Environmental Services

Retaining Wall Drainage Detail
The Plateau at Liberty Bay
Poulsbo, Washington

Drwn. CAM	Date 11/08/2022	Proj. No. 8578
Checked CGH	Date Nov. 2022	Plate 4



Perforated Rigid Drain Pipe
(Surround in Drain Rock)

NOTES:

- Do NOT tie roof downspouts to Footing Drain.
- Surface Seal to consist of 12" of less permeable, suitable soil. Slope away from building.

SCHEMATIC ONLY - NOT TO SCALE
NOT A CONSTRUCTION DRAWING

LEGEND:

Surface Seal: native soil or other low-permeability material.

1-inch Drain Rock

Earth Solutions NWLLC
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Footing Drain Detail
The Plateau at Liberty Bay
Poulsbo, Washington

Drwn. CAM	Date 11/08/2022	Proj. No. 8578
Checked CGH	Date Nov. 2022	Plate 5

Appendix A

Subsurface Exploration
Boring and Test Pit Logs

ES-8578

Subsurface conditions at the subject site were explored on July 14 and 21, 2022. Eighteen test pits and three borings were advanced using operators and exploratory equipment retained by ESNW. The approximate locations of the explorations are illustrated on Plate 2 of this study. The exploration logs are provided in this Appendix. The test pits and borings were advanced to a maximum depth of approximately 18 feet and 26.5 feet bgs, respectively.

The final logs represent the interpretations of the field logs and the results of laboratory analyses. The stratification lines on the logs represent the approximate boundaries between soil types. In actuality, the transitions may be more gradual.

Major Divisions			Group Symbol	Description
Coarse-Grained Soils - More Than 50% Retained on No. 200 Sieve	Gravels - More Than 50% of Coarse Fraction Retained on No. 4 Sieve	< 5% Fines	GW	Well-graded gravel with or without sand, little to no fines
			GP	Poorly graded gravel with or without sand, little to no fines
		> 12% Fines	GM	Silty gravel with or without sand
			GC	Clayey gravel with or without sand
	Sands - 50% or More of Coarse Fraction Passes No. 4 Sieve	< 5% Fines	SW	Well-graded sand with or without gravel, little to no fines
			SP	Poorly graded sand with or without gravel, little to no fines
		> 12% Fines	SM	Silty sand with or without gravel
			SC	Clayey sand with or without gravel
Fine-Grained Soils - 50% or More Passes No. 200 Sieve	Silts and Clays Liquid Limit Less Than 50		ML	Silt with or without sand or gravel; sandy or gravelly silt
			CL	Clay of low to medium plasticity; lean clay with or without sand or gravel; sandy or gravelly lean clay
			OL	Organic clay or silt of low plasticity
	Silts and Clays Liquid Limit 50 or More		MH	Elastic silt with or without sand or gravel; sandy or gravelly elastic silt
			CH	Clay of high plasticity; fat clay with or without sand or gravel; sandy or gravelly fat clay
			OH	Organic clay or silt of medium to high plasticity
Highly Organic Soils			PT	Peat, muck, and other highly organic soils
Fill			FILL	Made Ground

Moisture Content

Dry - Absence of moisture, dusty, dry to the touch

Damp - Perceptible moisture, likely below optimum MC

Moist - Damp but no visible water, likely at/near optimum MC

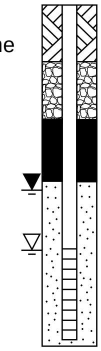
Wet - Water visible but not free draining, likely above optimum MC

Saturated/Water Bearing - Visible free water, typically below groundwater table

Symbols

ATD = At time of drilling

Static water level (date)



Cement grout surface seal

Bentonite chips

Grout seal

Filter pack with blank casing section

Screened casing or Hydrotip with filter pack

End cap

Terms Describing Relative Density and Consistency

Coarse-Grained Soils:

Density	SPT blows/foot
Very Loose	< 4
Loose	4 to 9
Medium Dense	10 to 29
Dense	30 to 49
Very Dense	≥ 50

Fine-Grained Soils:

Consistency	SPT blows/foot
Very Soft	< 2
Soft	2 to 3
Medium Stiff	4 to 7
Stiff	8 to 14
Very Stiff	15 to 29
Hard	≥ 30

Test Symbols & Units

Fines = Fines Content (%)

MC = Moisture Content (%)

DD = Dry Density (pcf)

Str = Shear Strength (tsf)

PID = Photoionization Detector (ppm)

OC = Organic Content (%)

CEC = Cation Exchange Capacity (meq/100 g)

LL = Liquid Limit (%)

PL = Plastic Limit (%)

PI = Plasticity Index (%)

Component Definitions

Descriptive Term	Size Range and Sieve Number
Boulders	Larger than 12"
Cobbles	3" to 12"
Gravel	3" to No. 4 (4.75 mm)
Coarse Gravel	3" to 3/4"
Fine Gravel	3/4" to No. 4 (4.75 mm)
Sand	No. 4 (4.75 mm) to No. 200 (0.075 mm)
Coarse Sand	No. 4 (4.75 mm) to No. 10 (2.00 mm)
Medium Sand	No. 10 (2.00 mm) to No. 40 (0.425 mm)
Fine Sand	No. 40 (0.425 mm) to No. 200 (0.075 mm)
Silt and Clay	Smaller than No. 200 (0.075 mm)

Modifier Definitions

Percentage by Weight (Approx.)	Modifier
< 5	Trace (sand, silt, clay, gravel)
5 to 14	Slightly (sandy, silty, clayey, gravelly)
15 to 29	Sandy, silty, clayey, gravelly
≥ 30	Very (sandy, silty, clayey, gravelly)

Classifications of soils in this geotechnical report and as shown on the exploration logs are based on visual field and/or laboratory observations, which include density/consistency, moisture condition, grain size, and plasticity estimates, and should not be construed to imply field or laboratory testing unless presented herein. Visual-manual and/or laboratory classification methods of ASTM D2487 and D2488 were used as an identification guide for the Unified Soil Classification System.

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Geotechnical Engineering, Construction Observation/Testing and Environmental Services

EXPLORATION LOG KEY

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

BORING NUMBER B-1

PROJECT NUMBER ES-8578
PROJECT NAME The Plateau at Liberty Bay
DATE STARTED 7/21/22 **COMPLETED** 7/21/22
GROUND ELEVATION 110 ft
DRILLING CONTRACTOR Boretec1, Inc.
LATITUDE 47.73794 **LONGITUDE** -122.66422
LOGGED BY CGH **CHECKED BY** KDH
GROUND WATER LEVEL:
NOTES
AT TIME OF DRILLING
SURFACE CONDITIONS Grass
AFTER DRILLING

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	TESTS	U.S.C.S.	MATERIAL DESCRIPTION
0					SM	Brown silty SAND, loose, moist
	SS	100	2-5-21 (26)	MC = 5.1		-silt lens ~3" thick
3.5						106.5
					SP	Gray poorly graded SAND, medium dense, moist
5	SS	100	14-23-21 (44)	MC = 3.7		-becomes dense -trace gravels
7.0						103.0
					SM	Gray silty SAND with gravel, dense, moist
	SS	100	16-17-27 (44)	MC = 6.2		
10	SS	100	50/5"	MC = 4.9		-lenses of wet soil, moderately oxidized
						-heavy drilling chatter to ~15'
12.0						98.0
					SP-SM	Gray poorly graded SAND with silt and gravel, dense, moist
15						[USDA Classification: gravelly SAND]
	SS	67	15-21-28 (49)	MC = 2.9 Fines = 6.7		
20 / 20.0						90.0

(Continued Next Page)

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

BORING NUMBER B-1

PROJECT NUMBER ES-8578
PROJECT NAME The Plateau at Liberty Bay
DATE STARTED 7/21/22 **COMPLETED** 7/21/22
GROUND ELEVATION 110 ft
DRILLING CONTRACTOR Boretec1, Inc.
LATITUDE 47.73794 **LONGITUDE** -122.66422
LOGGED BY CGH **CHECKED BY** KDH
GROUND WATER LEVEL:
NOTES
▽ **AT TIME OF DRILLING**
SURFACE CONDITIONS Grass
AFTER DRILLING

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	
20	SS	100	20-50/6"	MC = 15.4	SP	20.5	Gray poorly graded SAND, very dense, wet	89.5
					SM	22.5	Gray silty SAND, very dense, moist -minor to moderate perched groundwater seepage at 20.5' (contact)	87.5
25					SP	25.5	Gray poorly graded SAND, very dense, wet -heavy groundwater seepage	84.5
	SS	100	13-28-50/6"	MC = 15.7	SM	26.5	Gray silty SAND, very dense, moist	83.5

Boring terminated at 26.5 feet below existing grade. Groundwater seepage encountered at 20.5 and 25.0 feet during drilling. Well ID: BMJ566. Boring backfilled with bentonite/sand.

LIMITATIONS: Ground elevation (if listed) is approximate; the test location was not surveyed. Coordinates are approximate and based on the WGS84 datum. Do not rely on this test log as a standalone document. Refer to the text of the geotechnical report for a complete understanding of subsurface conditions.

Earth Solutions NW, LLC
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Redmond, Washington 98052
Telephone: 425-449-4704
Fax: 425-449-4711

BORING NUMBER B-2

PROJECT NUMBER ES-8578
PROJECT NAME The Plateau at Liberty Bay
DATE STARTED 7/21/22 **COMPLETED** 7/21/22
GROUND ELEVATION 110 ft
DRILLING CONTRACTOR Boretec1, Inc.
LATITUDE 47.73767 **LONGITUDE** -122.66383
LOGGED BY CGH **CHECKED BY** KDH
GROUND WATER LEVEL:
NOTES
∇ **AT TIME OF DRILLING**
SURFACE CONDITIONS Grass
AFTER DRILLING

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
0					SP		Brown poorly graded SAND, loose, moist
5	SS	100	5-5-6 (11)	MC = 3.2			-becomes gray, medium dense -grades fines
10							10.0 — 100.0
	SS	67	17-17-18 (35)	MC = 9.0	SM		Gray silty SAND with gravel, dense, moist
	SS	100	16-14-12 (26)	MC = 12.5			-grades fines -sand lensing erratic 1"> -lens of increased moisture content -moist to wet 3">
15	SS	67	9-16-24 (40)	MC = 8.6			-sand lens ~10" thick -lens of increased moisture content -moist to wet 3">
							17.5 — 92.5
	SS	100	13-15-16 (31)	MC = 14.4	SP-SM		Gray poorly graded SAND with silt, dense, wet -moderate perched groundwater seepage
20							20.0 — 90.0

(Continued Next Page)

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

BORING NUMBER B-2

PROJECT NUMBER ES-8578
PROJECT NAME The Plateau at Liberty Bay
DATE STARTED 7/21/22 **COMPLETED** 7/21/22
GROUND ELEVATION 110 ft
DRILLING CONTRACTOR Boretec1, Inc.
LATITUDE 47.73767 **LONGITUDE** -122.66383
LOGGED BY CGH **CHECKED BY** KDH
GROUND WATER LEVEL:
NOTES
∇ **AT TIME OF DRILLING**
SURFACE CONDITIONS Grass
AFTER DRILLING

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
20	SS	100	9-10-13 (23)	MC = 13.8	SP-SM		Gray poorly graded SAND with silt, medium dense, wet -moderate perched groundwater seepage
						23.0	87.0
25					SP		Gray poorly graded SAND, very dense, wet
	SS		11-29-49 (78)	MC = 18.2			-heavy perched groundwater seepage
						26.0	84.0
					SM		Gray silty SAND, very dense, moist
						26.5	83.5

Boring terminated at 26.5 feet below existing grade. Groundwater seepage encountered from 17.5 feet to BOH during drilling. 2" PVC standpipe installed to bottom of boring. Lower 10.0 feet slotted. Well ID: BMJ507.

LIMITATIONS: Ground elevation (if listed) is approximate; the test location was not surveyed. Coordinates are approximate and based on the WGS84 datum. Do not rely on this test log as a standalone document. Refer to the text of the geotechnical report for a complete understanding of subsurface conditions.

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Redmond, Washington 98052
Telephone: 425-449-4704
Fax: 425-449-4711

BORING NUMBER B-3

PROJECT NUMBER ES-8578
PROJECT NAME The Plateau at Liberty Bay
DATE STARTED 7/21/22 **COMPLETED** 7/21/22
GROUND ELEVATION 115 ft
DRILLING CONTRACTOR Boretec1, Inc.
LATITUDE 47.73825 **LONGITUDE** -122.66402
LOGGED BY CGH **CHECKED BY** KDH
GROUND WATER LEVEL:
NOTES
AT TIME OF DRILLING
SURFACE CONDITIONS Grass
AFTER DRILLING

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
0					SM		Brown silty SAND, loose, moist
3.5							(111.5)
							Gray poorly graded SAND, medium dense, moist
5	SS	67	9-9-11 (20)	MC = 10.2	SP		
8.0							-heavy driller chatter (107.0)
							Gray silty SAND, very dense, moist
10	SS	75	21-44-50/4"	MC = 10.8			-lens of increased moisture content -moist to wet 3">
							-variable sand lenses throughout
					SM		
15	SS		50/6"				-no recovery, rock in sample
20.0							(95.0)

(Continued Next Page)

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Redmond, Washington 98052
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Fax: 425-449-4711

BORING NUMBER B-3

PROJECT NUMBER ES-8578
PROJECT NAME The Plateau at Liberty Bay
DATE STARTED 7/21/22 **COMPLETED** 7/21/22
GROUND ELEVATION 115 ft
DRILLING CONTRACTOR Boretec1, Inc.
LATITUDE 47.73825 **LONGITUDE** -122.66402
LOGGED BY CGH **CHECKED BY** KDH
GROUND WATER LEVEL:
NOTES
AT TIME OF DRILLING
SURFACE CONDITIONS Grass
AFTER DRILLING

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
20							
	SS	100	27-50/6"	MC = 18.0	SM	21.0	Gray silty SAND, very dense, moist -moderate perched groundwater seepage at 20' -sand lens ~6" thick at 20' 94.0

Boring terminated at 21.0 feet below existing grade. Groundwater seepage encountered at 20.0 feet during drilling. 2" PVC standpipe installed to bottom of boring. Lower 10.0 feet slotted. Well ID: BMJ558. Boring backfilled with bentonite/sand.

LIMITATIONS: Ground elevation (if listed) is approximate; the test location was not surveyed. Coordinates are approximate and based on the WGS84 datum. Do not rely on this test log as a standalone document. Refer to the text of the geotechnical report for a complete understanding of subsurface conditions.

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TEST PIT NUMBER TP-1

PROJECT NUMBER ES-8578
PROJECT NAME The Plateau at Liberty Bay
DATE STARTED 7/14/22 **COMPLETED** 7/14/22
GROUND ELEVATION 115 ft
EXCAVATION CONTRACTOR NW Excavating
LATITUDE 47.73783 **LONGITUDE** -122.66218
LOGGED BY CGH **CHECKED BY** KDH
GROUND WATER LEVEL:
NOTES
AT TIME OF EXCAVATION
SURFACE CONDITIONS Brush
AFTER EXCAVATION

DEPTH (ft)	SAMPLE TYPE NUMBER	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	
0			TPSL	0.5	Dark brown TOPSOIL, roots to 3'	114.5
			SM		Brown silty SAND, medium dense, moist	
	GB	MC = 8.8			-becomes gray silty sand with gravel	
					-becomes dense	
5					-increased fines content	
	GB	MC = 9.6 Fines = 30.9			-becomes dense to very dense [USDA Classification: gravelly sandy LOAM]	
	GB	MC = 8.7				
10						
	GB	MC = 9.8		12.0		103.0

Test pit terminated at 12.0 feet below existing grade. No groundwater encountered during excavation. No caving observed.

LIMITATIONS: Ground elevation (if listed) is approximate; the test location was not surveyed. Coordinates are approximate and based on the WGS84 datum. Do not rely on this test log as a standalone document. Refer to the text of the geotechnical report for a complete understanding of subsurface conditions.

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TEST PIT NUMBER TP-2

PROJECT NUMBER ES-8578
PROJECT NAME The Plateau at Liberty Bay
DATE STARTED 7/14/22 **COMPLETED** 7/14/22
GROUND ELEVATION 95 ft
EXCAVATION CONTRACTOR NW Excavating
LATITUDE 47.73811 **LONGITUDE** -122.66165
LOGGED BY CGH **CHECKED BY** KDH
GROUND WATER LEVEL:
NOTES
∇ **AT TIME OF EXCAVATION**
SURFACE CONDITIONS Brush
AFTER EXCAVATION

DEPTH (ft)	SAMPLE TYPE NUMBER	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	
0			TPSL		Dark brown TOPSOIL, roots to 7'	
1.0			SM		Brown silty SAND, loose to medium dense, moist	94.0
	GB	MC = 22.1 Fines = 22.6			[USDA Classification: gravelly sandy LOAM] -becomes gray silty sand with gravel, dense to very dense	
5						
	GB	MC = 18.0				
7.5	GB	MC = 6.4	SW-SM		Gray well-graded SAND with silt, dense, wet	87.5
9.0	GB	MC = 9.4	SM		Gray silty SAND, very dense, moist	86.0
10						
	GB	MC = 8.5				
12.0	GB	MC = 8.9				83.0

Test pit terminated at 12.0 feet below existing grade. No groundwater encountered during excavation. No caving observed.

LIMITATIONS: Ground elevation (if listed) is approximate; the test location was not surveyed. Coordinates are approximate and based on the WGS84 datum. Do not rely on this test log as a standalone document. Refer to the text of the geotechnical report for a complete understanding of subsurface conditions.

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TEST PIT NUMBER TP-3

PROJECT NUMBER ES-8578
PROJECT NAME The Plateau at Liberty Bay
DATE STARTED 7/14/22 **COMPLETED** 7/14/22
GROUND ELEVATION 115 ft
EXCAVATION CONTRACTOR NW Excavating
LATITUDE 47.73787 **LONGITUDE** -122.66285
LOGGED BY CGH **CHECKED BY** KDH
GROUND WATER LEVEL:
NOTES
AT TIME OF EXCAVATION
SURFACE CONDITIONS Grass
AFTER EXCAVATION

DEPTH (ft)	SAMPLE TYPE NUMBER	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	
0			TPSL	0.5	Dark brown TOPSOIL, roots to 3'	114.5
			SM		Brown silty SAND, loose, moist	
	GB	MC = 8.1			-becomes gray, very dense	
	GB	MC = 10.5			-minor iron oxide staining, moderate cementation	
5				6.0		109.0
			SP-SM		Gray poorly graded SAND with silt, dense to very dense, moist	
	GB	MC = 12.2				
					-moderately cemented silty sand inclusions	
10						
	GB	MC = 9.5		11.0		104.0

Test pit terminated at 11.0 feet below existing grade. No groundwater encountered during excavation. No caving observed.

LIMITATIONS: Ground elevation (if listed) is approximate; the test location was not surveyed. Coordinates are approximate and based on the WGS84 datum. Do not rely on this test log as a standalone document. Refer to the text of the geotechnical report for a complete understanding of subsurface conditions.

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TEST PIT NUMBER TP-4

PROJECT NUMBER ES-8578
PROJECT NAME The Plateau at Liberty Bay
DATE STARTED 7/14/22 **COMPLETED** 7/14/22
GROUND ELEVATION 120 ft
EXCAVATION CONTRACTOR NW Excavating
LATITUDE 47.73861 **LONGITUDE** -122.66305
LOGGED BY CGH **CHECKED BY** KDH
GROUND WATER LEVEL:
NOTES
AT TIME OF EXCAVATION
SURFACE CONDITIONS Grass
AFTER EXCAVATION

DEPTH (ft)	SAMPLE TYPE NUMBER	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	
0			TPSL	0.5	Dark brown TOPSOIL, roots to 2.5'	119.5
			SM		Brown silty SAND, loose to medium dense, moist	
	GB	MC = 11.1				
					-becomes gray, very dense	
	GB	MC = 9.4			-weak cementation	
5						
	GB	MC = 10.0			-increased fines content	
10						
	GB	MC = 9.3		11.0		109.0

Test pit terminated at 11.0 feet below existing grade. No groundwater encountered during excavation. No caving observed.

LIMITATIONS: Ground elevation (if listed) is approximate; the test location was not surveyed. Coordinates are approximate and based on the WGS84 datum. Do not rely on this test log as a standalone document. Refer to the text of the geotechnical report for a complete understanding of subsurface conditions.

GENERAL BH / TP / WELL - 8578.GPJ - GINT US.GDT - 6/1/23

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TEST PIT NUMBER TP-5

PROJECT NUMBER ES-8578
PROJECT NAME The Plateau at Liberty Bay
DATE STARTED 7/14/22 **COMPLETED** 7/14/22
GROUND ELEVATION 130 ft
EXCAVATION CONTRACTOR NW Excavating
LATITUDE 47.73904 **LONGITUDE** -122.66221
LOGGED BY CGH **CHECKED BY** KDH
GROUND WATER LEVEL:
NOTES
AT TIME OF EXCAVATION
SURFACE CONDITIONS Brush
AFTER EXCAVATION

DEPTH (ft)	SAMPLE TYPE NUMBER	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	
0			TPSL	0.5	Dark brown TOPSOIL, roots to 2.5'	129.5
			SM		Brown silty SAND, loose to medium dense, moist	
	GB	MC = 13.3				
					-moderate iron oxide staining	
					-becomes gray, dense to very dense	
	GB	MC = 15.9			-weak cementation	
5						
	GB	MC = 9.9				
	GB	MC = 13.2			-increased sand content	
10					-minor perched groundwater seepage	
	GB	MC = 9.7 Fines = 25.7		12.0	[USDA Classification: gravelly sandy LOAM]	118.0

Test pit terminated at 12.0 feet below existing grade. Groundwater seepage encountered at 10.0 feet during excavation. No caving observed.

LIMITATIONS: Ground elevation (if listed) is approximate; the test location was not surveyed. Coordinates are approximate and based on the WGS84 datum. Do not rely on this test log as a standalone document. Refer to the text of the geotechnical report for a complete understanding of subsurface conditions.

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TEST PIT NUMBER TP-6

PROJECT NUMBER ES-8578
PROJECT NAME The Plateau at Liberty Bay
DATE STARTED 7/14/22 **COMPLETED** 7/14/22
GROUND ELEVATION 130 ft
EXCAVATION CONTRACTOR NW Excavating
LATITUDE 47.7393 **LONGITUDE** -122.66301
LOGGED BY CGH **CHECKED BY** KDH
GROUND WATER LEVEL:
NOTES
AT TIME OF EXCAVATION
SURFACE CONDITIONS Brush
AFTER EXCAVATION

DEPTH (ft)	SAMPLE TYPE NUMBER	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
0			TPSL	0.7	Dark brown TOPSOIL, roots to 3' — 129.3
			SM		Brown silty SAND, loose to medium dense, moist
	GB	MC = 14.3			
					-becomes gray silty sand with gravel, dense to very dense
	GB	MC = 10.9			-weak cementation
5					
					-sand pocket (west edge of TP ~1' thick)
10					
					-erratic sand lens ~6" thick
	GB	MC = 15.2		12.0	118.0

Test pit terminated at 12.0 feet below existing grade. No groundwater encountered during excavation. No caving observed.

LIMITATIONS: Ground elevation (if listed) is approximate; the test location was not surveyed. Coordinates are approximate and based on the WGS84 datum. Do not rely on this test log as a standalone document. Refer to the text of the geotechnical report for a complete understanding of subsurface conditions.

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TEST PIT NUMBER TP-7

PROJECT NUMBER ES-8578
PROJECT NAME The Plateau at Liberty Bay
DATE STARTED 7/14/22 **COMPLETED** 7/14/22
GROUND ELEVATION 135 ft
EXCAVATION CONTRACTOR NW Excavating
LATITUDE 47.73998 **LONGITUDE** -122.66325
LOGGED BY CGH **CHECKED BY** KDH
GROUND WATER LEVEL:
NOTES
▽ **AT TIME OF EXCAVATION**
SURFACE CONDITIONS Brush
AFTER EXCAVATION

DEPTH (ft)	SAMPLE TYPE NUMBER	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	
0			TPSL	0.5	Dark brown TOPSOIL, roots to 2.5'	134.5
			SM	1.5	Brown silty SAND, loose to medium dense, moist	133.5
	GB	MC = 5.1	SP	3.5	Gray poorly graded SAND, loose to medium dense, moist -moderate iron oxide staining	131.5
5	GB	MC = 7.0 Fines = 30.2	SM	12.0	Gray silty SAND with gravel, very dense, moist [USDA Classification: gravelly sandy LOAM]	123.0
10	GB	MC = 12.3				

Test pit terminated at 12.0 feet below existing grade. No groundwater encountered during excavation. No caving observed.

LIMITATIONS: Ground elevation (if listed) is approximate; the test location was not surveyed. Coordinates are approximate and based on the WGS84 datum. Do not rely on this test log as a standalone document. Refer to the text of the geotechnical report for a complete understanding of subsurface conditions.

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TEST PIT NUMBER TP-8

PROJECT NUMBER ES-8578
PROJECT NAME The Plateau at Liberty Bay
DATE STARTED 7/14/22 **COMPLETED** 7/14/22
GROUND ELEVATION 135 ft
EXCAVATION CONTRACTOR NW Excavating
LATITUDE 47.7405 **LONGITUDE** -122.66387
LOGGED BY CGH **CHECKED BY** KDH
GROUND WATER LEVEL:
NOTES
AT TIME OF EXCAVATION
SURFACE CONDITIONS Brush
AFTER EXCAVATION

DEPTH (ft)	SAMPLE TYPE NUMBER	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
0			TPSL		Dark brown TOPSOIL, roots to 2.5'
0.7			SP		Brown poorly graded SAND, loose to medium dense, moist (134.3)
	GB	MC = 7.2			
					-becomes gray poorly graded sand with gravel, dense, moist
	GB	MC = 3.9			
5					
	GB	MC = 9.4			-erratic cemented silty sand inclusions to BOH
					-becomes moist to wet
10					
					-minor perched groundwater seepage
13.0	GB	MC = 17.4			(122.0)

Test pit terminated at 13.0 feet below existing grade. Groundwater seepage encountered at 11.0 feet during excavation. No caving observed.

LIMITATIONS: Ground elevation (if listed) is approximate; the test location was not surveyed. Coordinates are approximate and based on the WGS84 datum. Do not rely on this test log as a standalone document. Refer to the text of the geotechnical report for a complete understanding of subsurface conditions.

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TEST PIT NUMBER TP-9

PROJECT NUMBER ES-8578
PROJECT NAME The Plateau at Liberty Bay
DATE STARTED 7/14/22 **COMPLETED** 7/14/22
GROUND ELEVATION 135 ft
EXCAVATION CONTRACTOR NW Excavating
LATITUDE 47.73979 **LONGITUDE** -122.66362
LOGGED BY CGH **CHECKED BY** KDH
GROUND WATER LEVEL:
NOTES
AT TIME OF EXCAVATION
SURFACE CONDITIONS Brush
AFTER EXCAVATION

DEPTH (ft)	SAMPLE TYPE NUMBER	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	
0			TPSL	0.5	Dark brown TOPSOIL, roots to 2'	134.5
			SM		Brown silty SAND, loose to medium dense, moist	
	GB	MC = 7.2			-becomes gray, dense, minor iron oxide staining	
5						
	GB	MC = 10.3			-becomes moist to wet	
	GB	MC = 8.4		9.5		125.5

Test pit terminated at 9.5 feet below existing grade. No groundwater encountered during excavation. No caving observed.

LIMITATIONS: Ground elevation (if listed) is approximate; the test location was not surveyed. Coordinates are approximate and based on the WGS84 datum. Do not rely on this test log as a standalone document. Refer to the text of the geotechnical report for a complete understanding of subsurface conditions.

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TEST PIT NUMBER TP-10

PROJECT NUMBER ES-8578
PROJECT NAME The Plateau at Liberty Bay
DATE STARTED 7/14/22 **COMPLETED** 7/14/22
GROUND ELEVATION 135 ft
EXCAVATION CONTRACTOR NW Excavating
LATITUDE 47.73954 **LONGITUDE** -122.66382
LOGGED BY CGH **CHECKED BY** KDH
GROUND WATER LEVEL:
NOTES
AT TIME OF EXCAVATION
SURFACE CONDITIONS Brush
AFTER EXCAVATION

DEPTH (ft)	SAMPLE TYPE NUMBER	TESTS	U.S.C.S.	GRAPHIC LOG		MATERIAL DESCRIPTION	Elev.
0			TPSL		0.5	Dark brown TOPSOIL, roots to 2.5'	134.5
			SM			Brown silty SAND, medium dense, moist	
	GB	MC = 6.8				-becomes gray silty sand with gravel	
						-increased sand content	
						-becomes dense to very dense	
5						-weak cementation	
	GB	MC = 9.2					
10	GB	MC = 10.9			10.0		125.0

Test pit terminated at 10.0 feet below existing grade. No groundwater encountered during excavation. No caving observed.

LIMITATIONS: Ground elevation (if listed) is approximate; the test location was not surveyed. Coordinates are approximate and based on the WGS84 datum. Do not rely on this test log as a standalone document. Refer to the text of the geotechnical report for a complete understanding of subsurface conditions.

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TEST PIT NUMBER TP-11

PROJECT NUMBER ES-8578
PROJECT NAME The Plateau at Liberty Bay
DATE STARTED 7/14/22 **COMPLETED** 7/14/22
GROUND ELEVATION 125 ft
EXCAVATION CONTRACTOR NW Excavating
LATITUDE 47.73931 **LONGITUDE** -122.66374
LOGGED BY CGH **CHECKED BY** KDH
GROUND WATER LEVEL:
NOTES
▽ **AT TIME OF EXCAVATION**
SURFACE CONDITIONS Brush
AFTER EXCAVATION

DEPTH (ft)	SAMPLE TYPE NUMBER	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	Elevation
0			TPSL	0.7	Dark brown TOPSOIL, roots to 4'	124.3
			SM		Brown silty SAND, loose to medium dense, moist	
					-becomes gray silty sand with gravel, very dense	
	GB	MC = 10.6 Fines = 26.5			-moderate cementation [USDA Classification: gravelly sandy LOAM]	
5						
	GB	MC = 12.9		9.0		116.0

Test pit terminated at 9.0 feet below existing grade. No groundwater encountered during excavation. No caving observed.

LIMITATIONS: Ground elevation (if listed) is approximate; the test location was not surveyed. Coordinates are approximate and based on the WGS84 datum. Do not rely on this test log as a standalone document. Refer to the text of the geotechnical report for a complete understanding of subsurface conditions.

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TEST PIT NUMBER TP-12

PROJECT NUMBER ES-8578 | **PROJECT NAME** The Plateau at Liberty Bay

DATE STARTED 7/14/22 **COMPLETED** 7/14/22 | **GROUND ELEVATION** 120 ft

EXCAVATION CONTRACTOR NW Excavating | **LATITUDE** 47.73886 **LONGITUDE** -122.66374

LOGGED BY CGH **CHECKED BY** KDH | **GROUND WATER LEVEL:**

NOTES | **AT TIME OF EXCAVATION**

SURFACE CONDITIONS Grass | **AFTER EXCAVATION**

DEPTH (ft)	SAMPLE TYPE NUMBER	TESTS	U.S.C.S.	Depth to base (ft)	MATERIAL DESCRIPTION	Elevation (ft)
0			TPSL	0.7	Dark brown TOPSOIL, roots to 3'	119.3
	GB	MC = 9.6	SP-SM	3.0	Brown poorly graded SAND with silt, medium dense, moist	117.0
	GB	MC = 7.5	SM		Gray silty SAND with gravel, very dense, moist -weak cementation	
5	GB	MC = 8.6		8.0		112.0

Test pit terminated at 8.0 feet below existing grade. No groundwater encountered during excavation. No caving observed.

LIMITATIONS: Ground elevation (if listed) is approximate; the test location was not surveyed. Coordinates are approximate and based on the WGS84 datum. Do not rely on this test log as a standalone document. Refer to the text of the geotechnical report for a complete understanding of subsurface conditions.

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TEST PIT NUMBER TP-13

PROJECT NUMBER ES-8578
PROJECT NAME The Plateau at Liberty Bay
DATE STARTED 7/14/22 **COMPLETED** 7/14/22
GROUND ELEVATION 115 ft
EXCAVATION CONTRACTOR NW Excavating
LATITUDE 47.73856 **LONGITUDE** -122.66375
LOGGED BY CGH **CHECKED BY** KDH
GROUND WATER LEVEL:
NOTES
AT TIME OF EXCAVATION
SURFACE CONDITIONS Grass
AFTER EXCAVATION

DEPTH (ft)	SAMPLE TYPE NUMBER	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	
0			TPSL	0.5	Dark brown TOPSOIL, roots to 4'	114.5
			SM		Brown silty SAND, loose, moist	
	GB	MC = 5.2				
					-becomes gray, dense	
5					-decreased fines content	
	GB	MC = 5.3 Fines = 13.0			[USDA Classification: slightly gravelly SAND]	
10						
	GB	MC = 9.8 OC = 0.6%		12.0		103.0

Test pit terminated at 12.0 feet below existing grade. No groundwater encountered during excavation. No caving observed.

LIMITATIONS: Ground elevation (if listed) is approximate; the test location was not surveyed. Coordinates are approximate and based on the WGS84 datum. Do not rely on this test log as a standalone document. Refer to the text of the geotechnical report for a complete understanding of subsurface conditions.

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TEST PIT NUMBER TP-14

PROJECT NUMBER ES-8578
PROJECT NAME The Plateau at Liberty Bay
DATE STARTED 7/14/22 **COMPLETED** 7/14/22
GROUND ELEVATION 115 ft
EXCAVATION CONTRACTOR NW Excavating
LATITUDE 47.73837 **LONGITUDE** -122.66391
LOGGED BY CGH **CHECKED BY** KDH
GROUND WATER LEVEL:
NOTES
∇ **AT TIME OF EXCAVATION**
SURFACE CONDITIONS Grass
AFTER EXCAVATION

DEPTH (ft)	SAMPLE TYPE NUMBER	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	Elevation
0			TPSL	0.5	Dark brown TOPSOIL, roots to 3'	114.5
	GB	MC = 9.4	SM		Brown silty SAND, loose to medium dense, damp	
5					-becomes gray, dense	
				6.0		109.0
	GB	MC = 5.4 OC = 0.8%	SP		Gray poorly graded SAND, dense, moist	
					-erratic cemented silty sand inclusions	
10	GB	MC = 11.7				
	GB	MC = 15.5		11.5		103.5

Test pit terminated at 11.5 feet below existing grade. No groundwater encountered during excavation. No caving observed.

LIMITATIONS: Ground elevation (if listed) is approximate; the test location was not surveyed. Coordinates are approximate and based on the WGS84 datum. Do not rely on this test log as a standalone document. Refer to the text of the geotechnical report for a complete understanding of subsurface conditions.

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TEST PIT NUMBER TP-15

PROJECT NUMBER ES-8578
PROJECT NAME The Plateau at Liberty Bay
DATE STARTED 7/14/22 **COMPLETED** 7/14/22
GROUND ELEVATION 110 ft
EXCAVATION CONTRACTOR NW Excavating
LATITUDE 47.73792 **LONGITUDE** -122.66407
LOGGED BY CGH **CHECKED BY** KDH
GROUND WATER LEVEL:
NOTES
∇ **AT TIME OF EXCAVATION**
SURFACE CONDITIONS Grass
AFTER EXCAVATION

DEPTH (ft)	SAMPLE TYPE NUMBER	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	Elevation
0–0.5			TPSL		Dark brown TOPSOIL, roots to 3'	109.5
0.5–2.0			SM		Brown silty SAND, loose to medium dense, moist	108.0
2.0–5.5	GB	MC = 3.4	SP		Gray poorly graded SAND, medium dense, moist	104.5
5.5–7.0	GB	MC = 25.5	SM		Gray silty SAND, dense, moist	103.0
7.0–17.0	GB GB GB	MC = 6.3 OC = 0.8% MC = 4.8 MC = 11.0	SP		Gray poorly graded SAND, dense, moist -becomes coarse grained sand with trace gravel -erratic cemented silty sand inclusions -increased moisture content, still moist	93.0

Test pit terminated at 17.0 feet below existing grade. No groundwater encountered during excavation. No caving observed.

LIMITATIONS: Ground elevation (if listed) is approximate; the test location was not surveyed. Coordinates are approximate and based on the WGS84 datum. Do not rely on this test log as a standalone document. Refer to the text of the geotechnical report for a complete understanding of subsurface conditions.

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TEST PIT NUMBER TP-16

PROJECT NUMBER ES-8578
PROJECT NAME The Plateau at Liberty Bay
DATE STARTED 7/21/22 **COMPLETED** 7/21/22
GROUND ELEVATION 110 ft
EXCAVATION CONTRACTOR NW Excavating
LATITUDE 47.73797 **LONGITUDE** -122.66405
LOGGED BY CGH **CHECKED BY** KDH
GROUND WATER LEVEL:
NOTES
AT TIME OF EXCAVATION
SURFACE CONDITIONS Grass
AFTER EXCAVATION

DEPTH (ft)	SAMPLE TYPE NUMBER	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	
0			TPSL	0.5	Dark brown TOPSOIL, roots to 4'	109.5
			SP-SM	3.0	Brown poorly graded SAND with silt, medium dense, moist	107.0
	GB	MC = 17.7	SM	5.0	Gray silty SAND, medium dense, moist	105.0
5			ML	6.0	Gray SILT with sand, medium dense to dense, moist	104.0
	GB	MC = 8.5	SP	9.5	Gray poorly graded SAND, medium dense to dense, moist -erratic cemented silty sand inclusions	100.5
10	GB	MC = 8.3	SM	12.0	Gray silty SAND, very dense, moist	98.0
15	GB GB	MC = 8.8 MC = 13.6	SP	16.0	Gray poorly graded SAND with gravel, very dense, moist	94.0

Test pit terminated at 16.0 feet below existing grade. No groundwater encountered during excavation. No caving observed.

LIMITATIONS: Ground elevation (if listed) is approximate; the test location was not surveyed. Coordinates are approximate and based on the WGS84 datum. Do not rely on this test log as a standalone document. Refer to the text of the geotechnical report for a complete understanding of subsurface conditions.

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

TEST PIT NUMBER TP-17

PROJECT NUMBER ES-8578 **PROJECT NAME** The Plateau at Liberty Bay
DATE STARTED 7/21/22 **COMPLETED** 7/21/22 **GROUND ELEVATION** 110 ft
EXCAVATION CONTRACTOR NW Excavating **LATITUDE** 47.73785 **LONGITUDE** -122.66406
LOGGED BY CGH **CHECKED BY** KDH **GROUND WATER LEVEL:**
NOTES **AT TIME OF EXCAVATION**
SURFACE CONDITIONS Grass **AFTER EXCAVATION**

DEPTH (ft)	SAMPLE TYPE NUMBER	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	Elev.
0 – 0.5			TPSL		Dark brown TOPSOIL, roots to 3'	109.5
0.5 – 4.0			SP-SM		Brown poorly graded SAND with silt, medium dense, moist	106.0
4.0 – 7.0			SM		Gray silty SAND, medium dense to dense, moist	103.0
7.0 – 8.0			ML		Gray SILT with sand, dense, moist	102.0
8.0 – 14.5			SP		Gray poorly graded SAND with gravel, dense, moist	95.5
10	GB	MC = 4.2 Fines = 2.9			[USDA Classification: very gravelly coarse SAND]	
	GB	MC = 18.1 OC = 0.7%			-grades fines	
14.5 – 17.9			SP-SM		Gray poorly graded SAND with silt, very dense, moist	92.1
15	GB	MC = 19.6 Fines = 9.9			[USDA Classification: slightly gravelly SAND]	
					-erratic silty sand lensing	
					-heavy perched groundwater seepage	
	GB	MC = 15.7				

Test pit terminated at 18.0 feet below existing grade. Groundwater seepage encountered at 17.0 feet during excavation. No caving observed. LIMITATIONS: Ground elevation (if listed) is approximate; the test location was not surveyed. Coordinates are approximate and based on the WGS84 datum. Do not rely on this test log as a standalone document. Refer to the text of the geotechnical report for a complete understanding of subsurface conditions.

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

TEST PIT NUMBER TP-18

PROJECT NUMBER ES-8578
PROJECT NAME The Plateau at Liberty Bay
DATE STARTED 7/21/22 **COMPLETED** 7/21/22
GROUND ELEVATION 110 ft
EXCAVATION CONTRACTOR NW Excavating
LATITUDE 47.73793 **LONGITUDE** -122.66385
LOGGED BY CGH **CHECKED BY** KDH
GROUND WATER LEVEL:
NOTES
∇ **AT TIME OF EXCAVATION**
SURFACE CONDITIONS Grass
AFTER EXCAVATION

DEPTH (ft)	SAMPLE TYPE NUMBER	TESTS	U.S.C.S.	Depth of change (ft)	MATERIAL DESCRIPTION	Elevation (ft)
0			TPSL	0.5	Dark brown TOPSOIL, roots to 3'	109.5
	GB	MC = 4.8	SP-SM	3.0	Brown poorly graded SAND with silt, medium dense, moist	107.0
5			ML	5.0	Gray sandy SILT, dense, moist	105.0
	GB	MC = 5.0	SP	9.5	Gray poorly graded SAND, dense to very dense, moist -erratic silty sand lensing to BOH	100.5
10	GB GB	MC = 6.5 Fines = 21.1 MC = 7.6 OC = 0.5%	SM	12.0	Gray silty SAND, very dense, moist [USDA Classification: slightly gravelly loamy SAND]	98.0

Test pit terminated at 12.0 feet below existing grade. No groundwater encountered during excavation. No caving observed.

LIMITATIONS: Ground elevation (if listed) is approximate; the test location was not surveyed. Coordinates are approximate and based on the WGS84 datum. Do not rely on this test log as a standalone document. Refer to the text of the geotechnical report for a complete understanding of subsurface conditions.

Appendix B

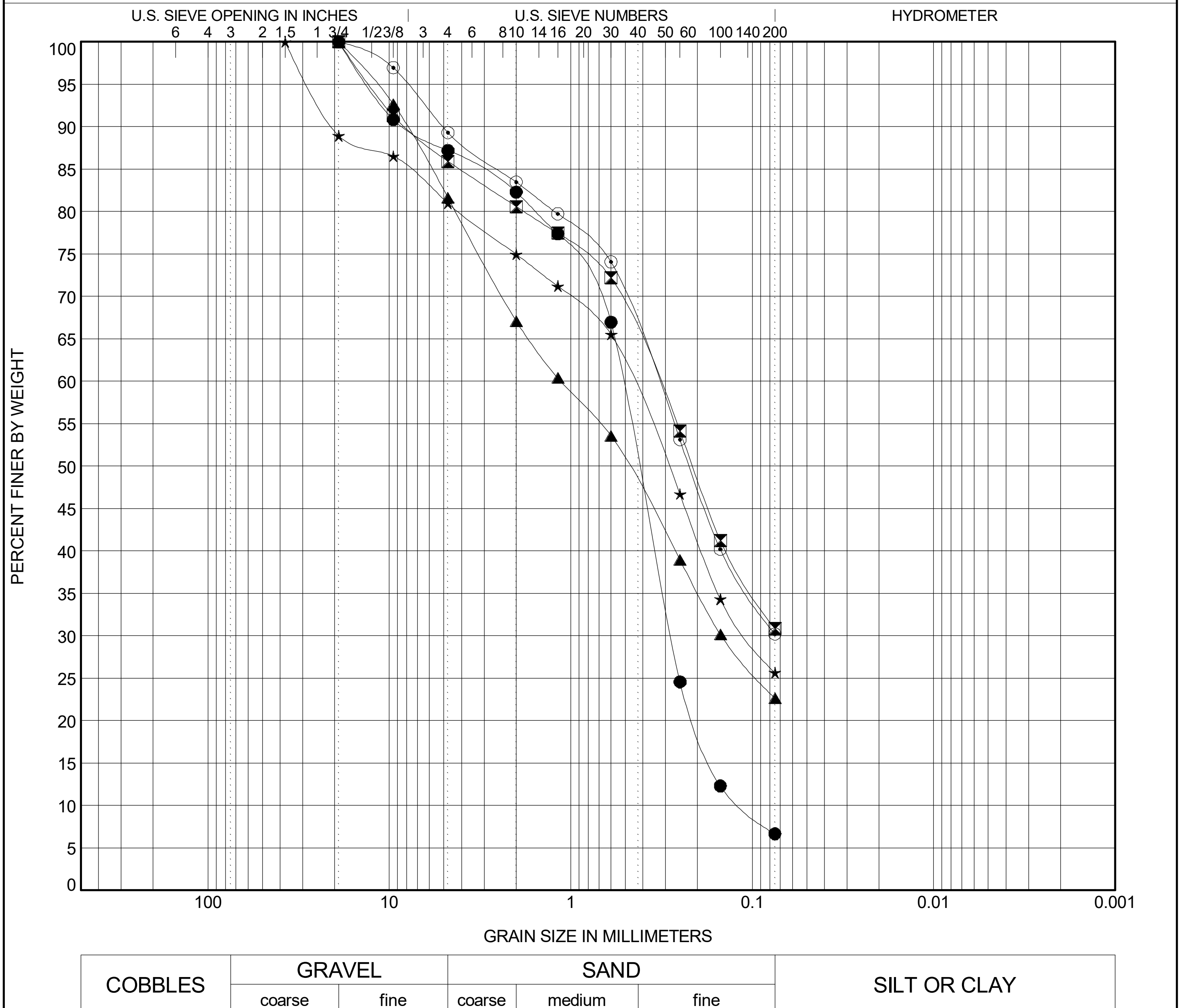
Laboratory Test Results

ES-8578

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

GRAIN SIZE DISTRIBUTION

PROJECT NUMBER ES-8578 **PROJECT NAME** The Plateau at Liberty Bay



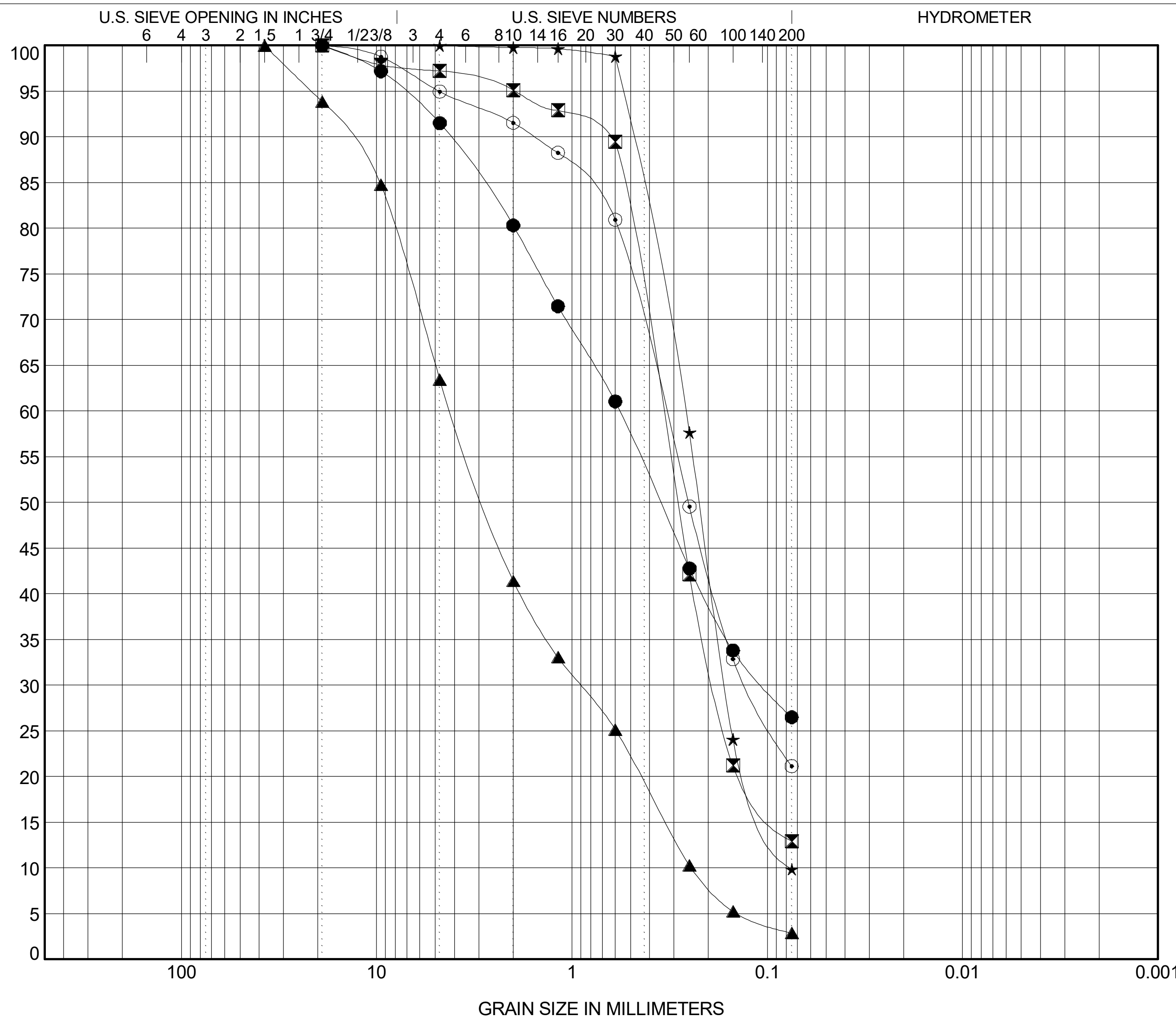
Specimen Identification		Classification	Cc	Cu
● B-01	15.00ft.	**USDA: Gray Gravelly Sand. USCS: SP-SM.**	1.33	4.60
⧗ TP-01	5.50ft.	**USDA: Gray Gravelly Sandy Loam. USCS: SM.**		
▲ TP-02	4.00ft.	**USDA: Gray Gravelly Sandy Loam. USCS: SM with Gravel.**		
★ TP-05	12.00ft.	**USDA: Gray Gravelly Sandy Loam. USCS: SM with Gravel.**		
⊙ TP-07	4.00ft.	**USDA: Gray Gravelly Sandy Loam. USCS: SM.**		

Specimen Identification		D100	D60	D30	D10	LL	PL	PI	%Silt	%Clay
● B-01	15.0ft.	19	0.52	0.28	0.113				6.7	
⧗ TP-01	5.5ft.	19	0.332						30.9	
▲ TP-02	4.0ft.	19	1.134	0.148					22.6	
★ TP-05	12.0ft.	37.5	0.464	0.106					25.7	
⊙ TP-07	4.0ft.	19	0.333						30.2	

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

GRAIN SIZE DISTRIBUTION

PROJECT NUMBER ES-8578 **PROJECT NAME** The Plateau at Liberty Bay



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification		Classification	Cc	Cu
● TP-11	3.50ft.	USDA: Gray Gravelly Sandy Loam. USCS: SM.		
⧗ TP-13	7.50ft.	USDA: Gray Slightly Gravelly Sand. USCS: SM.		
▲ TP-17	10.00ft.	USDA: Gray Very Gravelly Coarse Sand. USCS: SP with Gravel.	0.82	17.07
★ TP-17	14.50ft.	USDA: Gray Slightly Gravelly Sand. USCS: SP-SM.	1.36	3.48
⊙ TP-18	9.50ft.	USDA: Gray Slightly Gravelly Loamy Sand. USCS: SM.		

Specimen Identification		D100	D60	D30	D10	LL	PL	PI	%Silt	%Clay
● TP-11	3.5ft.	19	0.57	0.104					26.5	
⧗ TP-13	7.5ft.	19	0.348	0.186					13.0	
▲ TP-17	10.0ft.	37.5	4.147	0.907	0.243				2.9	
★ TP-17	14.5ft.	4.75	0.263	0.164	0.075				9.9	
⊙ TP-18	9.5ft.	19	0.335	0.127					21.1	

Report Distribution

ES-8578

EMAIL ONLY

Entitle Fund Two, LLC
P.O. Box 188
Puyallup, Washington 98371

Attention: Geoffrey Sherwin, P.E.

Exhibit E

ESNW2

Response to Comments

June 1, 2023

ESNW2
3 pages

Earth Solutions NW LLC

Geotechnical Engineering, Construction Observation/Testing and Environmental Services

June 1, 2023
ES-8578.02

Entitle Fund Two, LLC
P.O. Box 188
Puyallup, Washington 98371

Attention: Geoffrey Sherwin, P.E.

Subject: Response to Comments
The Plateau at Liberty Bay
19321 Viking Avenue Northwest
Poulsbo, Washington

Reference: Earth Solutions NW, LLC
Geotechnical Engineering Study, ES-8578, updated June 1, 2023

KPFF, Inc.
Civil Plan Set, Sheets 1.0 to 5.41, stamped January 6, 2023

City of Poulsbo Planning and Economic Development (PED)
Memo – Request for Revisions, P-12-06-22-02, dated March 15, 2023

City of Poulsbo Engineering Department (ED)
Development Engineering Review, P-12-06-22-02, dated March 16, 2023

Parametrix
Technical Memorandum, No. 553-2237-138, dated March 16, 2023

Greetings:

At your request, Earth Solutions NW, LLC (ESNW) has prepared this letter regarding the subject site and the referenced PED request for revisions. The geotechnically relevant comments are provided in this letter, followed by our responses.

PED Correction Item 3 – Please provide critical area documentation or drawing of the top of slope for "ravine" setback determination. Is the below Geotech reference (referring to an excerpt from the geotechnical engineering study) measuring to the top of the ravine or the edge of drainage basin on site?

ESNW Response – An approximate top-of-slope delineation has been prepared by ESNW and provided to the design team. From a geotechnical standpoint, any setback and buffer distances relating to areas of geologic concern should be measured from the top of the ravine slope. However, it appears that stream setbacks in the area are greater than any geotechnically related setback or buffer.

ED Correction Item 29 – Infiltration design rate is shown as both 1.4 in/hr and 1.3 in/hr in the design report. Please clarify.

ESNW Response – The design infiltration rate has been clarified as 1.4 in/hr. As noted below, the location where infiltration testing occurred (Tract H) is no longer proposed as an infiltration pond.

Parametrix Correction Item 1 – Per the City of Poulsbo Municipal Code Section 12.02.030, the stormwater design must follow the requirements of the 2019 SWMMWW published by the Department of Ecology. Please remove all references to the Kitsap County SDM and ensure the design is in conformance with the SWMMWW.

ESNW Response – References to the Kitsap County SDM have been removed from the referenced report.

Parametrix Correction Item 5 – Per the referenced Geotech report, a groundwater monitoring program is recommended since infiltration in the Tract H pond is being pursued due to groundwater being encountered during preliminary testing. When will the testing occur? A groundwater mounding analysis will be required if there is less than 15 feet to the seasonal high groundwater or other low permeability stratum per section V-5.2 of the SWMMWW.

ESNW Response – Groundwater monitoring was performed in the vicinity of Tract H from October 5, 2022 through April 30, 2023. Based on the results of the groundwater monitoring program, the seasonal high groundwater table elevates to depths between about 7 to 13 feet below the existing ground surface elevation. Due to relatively shallow groundwater conditions in the area, large-scale infiltration (as previously proposed) is no longer considered feasible, as the required vertical separation between the facility bottom and the seasonal high groundwater table elevation cannot be achieved. To our understanding, the project will no longer pursue infiltration within Tract H. Stormwater runoff originally intended to be directed to the pond will instead be directed to a vault. Dispersion will be utilized along the western lots.

We trust this letter meets your current needs. If you have any questions, or if additional information is required, please call.

Sincerely,

EARTH SOLUTIONS NW, LLC

06/01/2023

Chase G. Halsen

06/01/2023

Chase G. Halsen, L.G., L.E.G.
Senior Project Geologist

Keven D. Hoffmann, P.E.
Associate Principal Engineer

Exhibit E

H&A1

Traffic Impact Analysis

June 12, 2023

H&A1
112 pages

PLATEAU AT LIBERTY BAY

Poulsbo, WA

TRAFFIC IMPACT ANALYSIS (TIA)
REVISED:
June 12, 2023

HEATH & ASSOCIATES
Transportation Planning & Engineering

June 12, 2023

Anthony Burgess, PE
Development Review Engineer
City of Poulsbo

Subject: Revisions to Plateau at Liberty Bay Traffic Impact Analysis P-12-06-22-02.

This letter is in response to the City of Poulsbo's review memo dated March 16, 2023 regarding the TIA for the Plateau at Liberty Bay project.

1. Comment 18: The TIA is required to include all road links and intersections out to 10 peak trips. Please confirm that nearby intersections are outside of this scope.

   The TIA has been updated to include an additional four off-site intersections along Viking Avenue NW. Peak hour volume counts (AM and PM) and LOS analysis for existing and forecast conditions with and without the development are included.

2. Comment 19: TIA is required to discuss existing access roadway characteristics. This project proposes a singular access point to Viking Way, the entrance is within close proximity to a merge taper in the southbound direction. This will need to specifically discussed and a narrative provided to determine that the existing taper is acceptable or requires modification.

   Additional narrative on the driveway is included starting on page 28 for the Viking Avenue access. A right turn drop lane is proposed to replace the current merge lane with a conceptual drawing on page 29.

3. Comment 20: This project will be providing pedestrian connection to Viking Way via the new roadway connection and via the emergency access connection to Liberty Rd. Additional analysis is needed to determine that the preferred crossing location and should discuss the following at a minimum:

   a) *Description of current crossing facilities and conditions of those facilities within proximity of the project from the southern project limits and Liberty Rd.*
   b) *Impacts of development on new intersection from a pedestrian LOS perspective.*

c) *Analysis should indicate if existing crossing facilities are in preferred location and what improvements need to be made, if a new crossing is needed and what enhancements are required, and if pre-existing crossings should be abandoned in leu of new crossing.*
d) *The City welcomes additional discussion on this topic prior to resubmittal.*

Field counts were administered along Viking Avenue, including the midblock crossing. See page 11 for pedestrian crossing movement summaries. Moreover, collisions were identified at/near the midblock crossing as discussed in Section 3.7 (page 15). Potential improvements and mitigation for the crossing with explanations are provided in Section 4.8 (starting on page 30).

4. Comment 21: Horizon year should be adjusted 5 years from buildout, which is considered as the expected Final Plat date.

   A horizon year of 2030 was selected as plat approval is anticipated in 2025, this reflects a 5-year horizon. All volumes and analysis have been revised accordingly.

5. Comment 22: Add narrative to assess pedestrian concerns including pedestrian access within the proposed development, and from the proposed development to parks, commercial districts within 1 mile.

   The TIA has been updated to include a figure which highlights both commercial districts and parks in the vicinity of the subject site (Figure A in appendix on page 56). Additional pedestrian narrative described in Response #3.

6. Comment 23: Assessment of queuing for left turning movements onto Road D needs to be included. Is there sufficient distance provided within the existing street scape or is alteration for the landscaped median needed.

   The TIA has been updated to include queuing analysis (page 28) which projects a northbound left-turn queue of up to two vehicles. No modification with the existing street scape is identified based on the queuing demands.

7. Comment 24: Discussions of project generated construction traffic and proposed routes is missing from the TIA.

   The TIA has been updated to include a construction traffic section in Section 4.7 (page 27).

8. Comment 25: Pipeline project list should be revised to include Oslo Bay Apartments, 465 multifamily units. Please advise if this project is already considered. Northway Estates is no longer an active project.

   The TIA has been updated to reflect the correct pipeline projects with summarization in Section 4.3 (page 18) and peak hour exhibits figures in appendix (Figure B, page 66 and Figure C, page 67).

9. Comment 26: Accident analysis was not included in the TIA. Include a listing of the location's 3-year accident history. (for direct access points &/or intersections, list must cover area 0.1 mile to either side). Discuss the accident history, including the predominate accident types and their locations, any accident patterns, an assessment of the development's traffic safety impact, and mitigation for its safety impact.

   The TIA has been updated to include an accident history. See Section 3.7 (page 15).

Please call if you require anything further.

Sincerely,

Aaron Van Aken, P.E., PTOE

PLATEAU AT LIBERTY BAY
TRAFFIC IMPACT ANALYSIS

Prepared for:

Entitle Fund Two, LLC
Geoff Sherwin
PO Box 1887
Puyallup, WA 98371

Prepared by:

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PO Box 397
Puyallup, WA 98371
(253) 770 1401
Heathtraffic.com

License:

PLATEAU AT LIBERTY BAY
TRAFFIC IMPACT ANALYSIS

CONTENTS

TABLES

FIGURES

PLATEAU AT LIBERTY BAY
TRAFFIC IMPACT ANALYSIS

1. INTRODUCTION

The main goals of this study focus on the analysis of existing roadway conditions and forecasts of newly generated project traffic. The first task includes the review of general roadway information on the adjacent street system, baseline vehicular volumes, and any planned improvements in the area. Forecasts of future traffic and dispersion patterns on the street system are then determined using established trip generation and distribution techniques. As a final step, appropriate conclusions and mitigation measures are defined.

2. PROJECT DESCRIPTION

The Plateau at Liberty Bay is a proposed residential development comprising 63 single-family homes. The subject site, within the city of Poulsbo, is located west of Viking Avenue NW and is situated on 26.10-acres within tax parcel #'s: 152601-3; -025-2003; -023-2005; -033-2003; -040-2004; -090-2102. Existing on-site are four single-family homes which are to be demolished prior to new construction. Access to and from the development is proposed via one new roadway via an easement and extending west from Viking Avenue NW, aligned roughly with the Liberty Shores/Harbor House driveway (Senior Living). Currently opposite the Liberty Shores/Harbor House driveway, is a minor residential driveway which is to be relocated and shared with the project access. An emergency access only is proposed to extend south from NW Liberty Road. Figure 1 on the following page highlights the general location of the site and the surrounding roadway system. The proposed site plan showing the overall project configuration is given in Figure 2 on the following page.

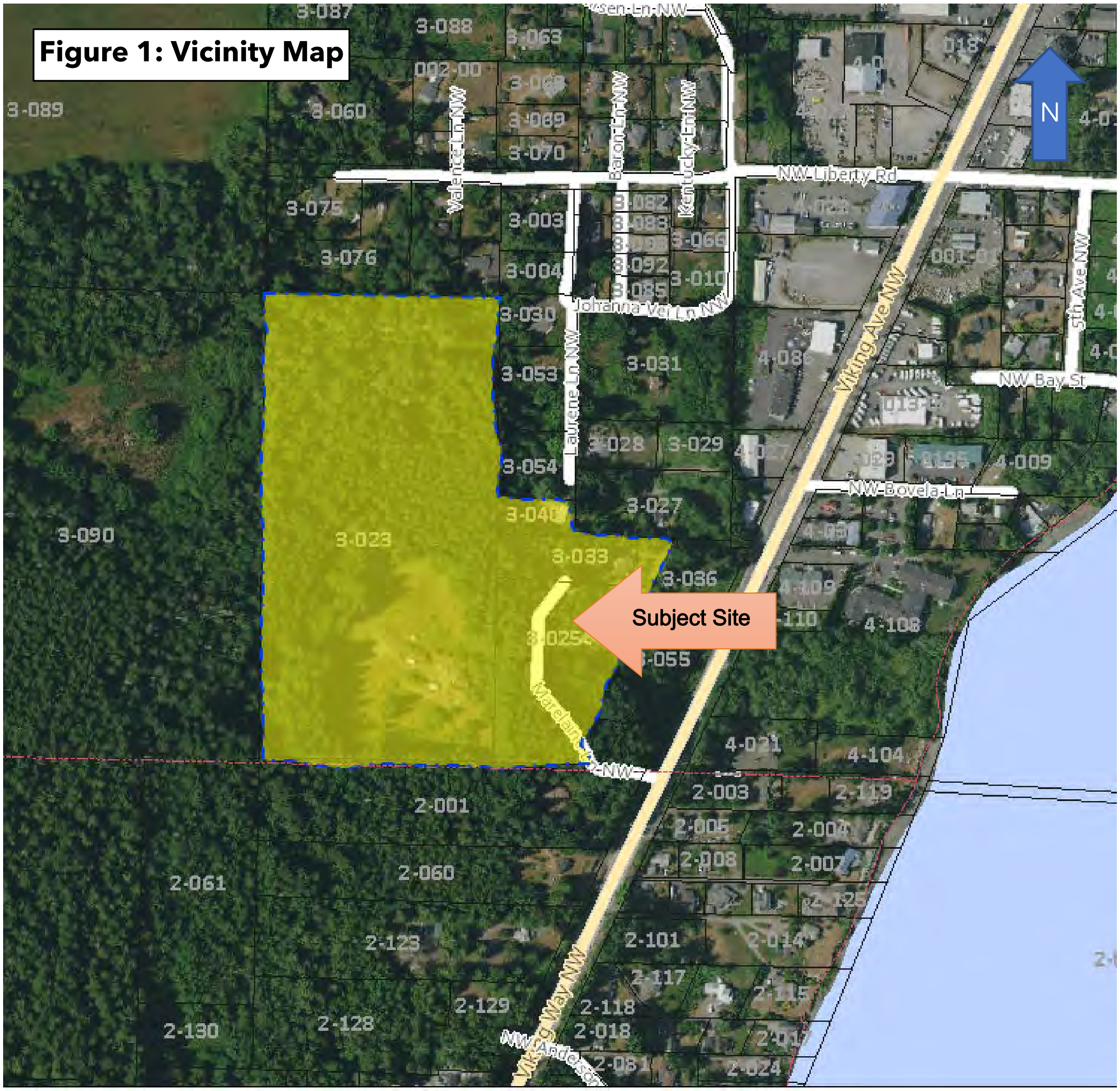
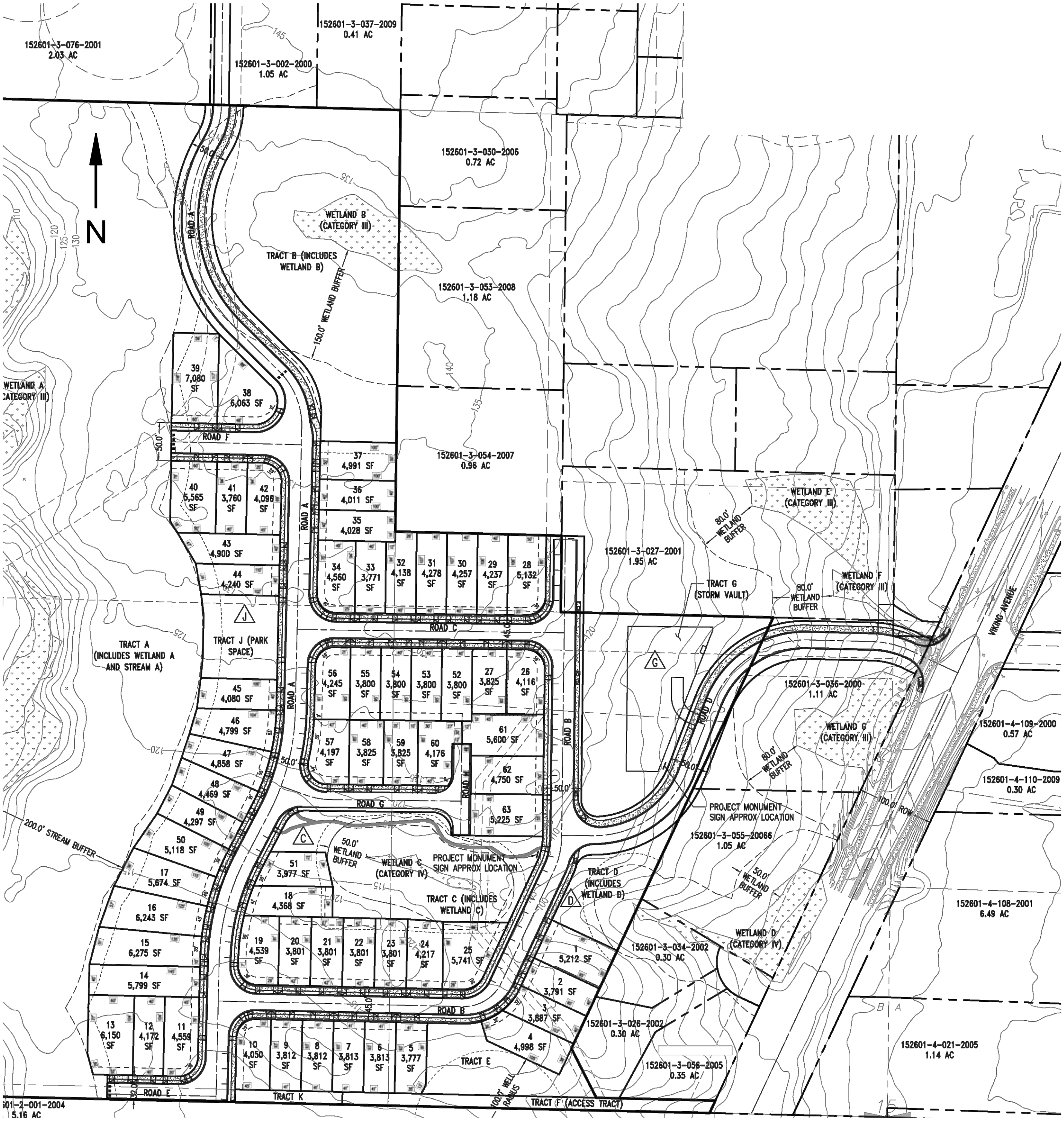


Figure 1: Vicinity Map
N
Subject Site
NW Liberty Rd
Viking Ave NW
Viking Way NW
Laurene Ln NW
Johanna Vei Ln NW
NW Bay St
NW Bovela Ln
Valence Ln NW
Baron Ln NW
Kentucky Ln NW
5th Ave NW
3-023
3-090
2-001
2-061
2-060



PLATEAU AT LIBERTY BAY

SITE PLAN
FIGURE 2

3. EXISTING CONDITIONS

3.1 Existing Street System

The street network serving the proposed project consists of a variety of roadways. The major roadways and arterials defined in the study area are listed and described below.

Table 1: Roadway Network

Functional Classification	Roadway	Speed Limit	Lanes	Street Parking	Sidewalk	Bike Lane
Minor Arterial	Viking Ave NW	35 mph	2-5	No	Yes	Yes
	NW Finn Hill Rd	25-35 mph	2-3	No	Yes	No
	NW Lindvig Way	25 mph	4-5	No	Yes	No
Local	NW Edvard St	20-25 mph	2	Some	Yes	No
	NW Liberty Rd	25 mph	2	Some	Some	No
	NW Bovela Ln	25 mph	2	Some	Some	No

3.2 Public Transit

A review of the Kitsap Transit regional bus schedule indicates that transit is provided in the vicinity of the subject site. The nearest stops in relation to the proposed development are located approximately ~350-feet north of the proposed access via Viking Avenue NW. Routes serviced at these stops include Route 332 and Route 333. Route 333 – Silverdale/ Bainbridge, provides service from the Silverdale Transit Center to the Bainbridge Ferry Terminal. Weekday service is provided from 4:15 AM – 9:05 PM. Route 332 – Poulsbo/Silverdale, provides service from the North Viking Transit Center to Silverdale Transit Center. Weekday service is provided from 7:30 AM – 7:25 PM with service provided approximately every 60-minutes. Saturday service is provided from 9:00 AM – 6:25 PM with service provided approximately every 60-minutes. Route 344 is available just under one mile walking distance to the north at the intersection of Viking Avenue NW & NW Lindvig Way. Route 344 – Poulsbo Central, provides service from North Viking Transit Center to 8th & Hostmark Transit Center. Weekday service is provided from 8:30 AM – 5:55 PM with service provided every 60-minutes. Refer to the Kitsap Transit website for more detailed information.

3.3 Roadway Improvements

A review of the City of Poulsbo Six-Year Transportation Improvement Program (2023-2028) indicates that the following projects are planned in the vicinity of the proposed Plateau at Liberty Bay project.

Finn Hill Road Overlay: This project entails an overlay from Viking Avenue NW to the intersection of NW Finn Hill Road & Rhododendron Lane NW. ADA improvements as required. This project has a total cost of $1,070,000 and a start date of 2025. (Priority #: 5).

Viking Avenue Complete Street Improvements: This project entails intersection and safety improvements and the construction of roundabouts. The project is to span from NW Liberty Road to NW Stendahl Court. The project has a total estimated cost of $6,150,000 and is scheduled to start in 2026 (Priority # 16).

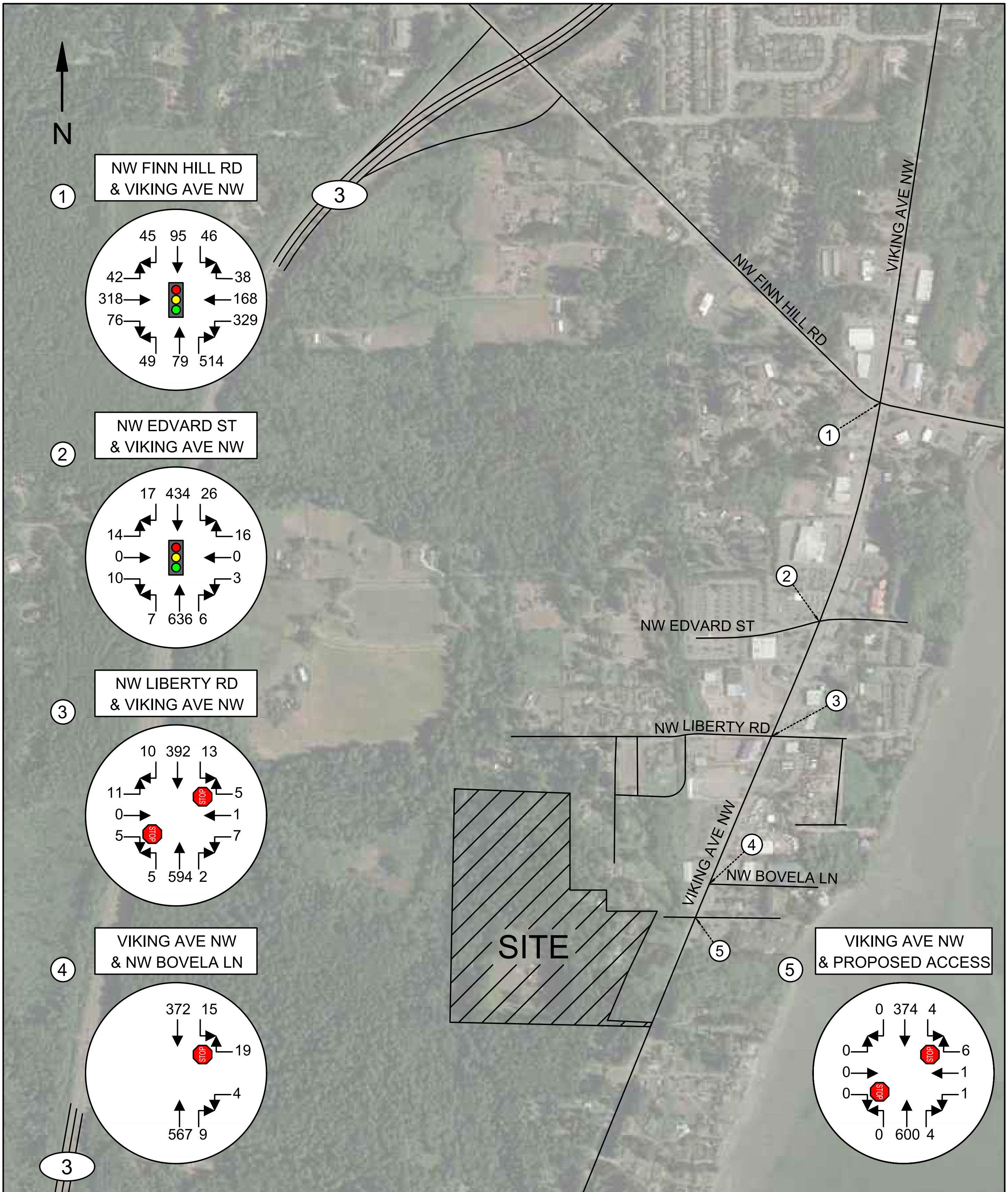
Bond Road Sidewalk Gap Closing: This project entails the construction of new sidewalk on the west side of Bond Road including curb, gutter, sidewalk, restoration, fencing and signage. The project is to span from 1st Avenue NE to SR-305. The project has an estimated cost of $550,000. The project is scheduled to begin in 2027 (Priority #: 17).

3.4 Existing Peak Hour Volumes

Field data for this study was administered at four outlying study intersections. Each intersection is listed below with the associated count date. Data were obtained during the peak periods between the hours of 7:00-9:00 AM and 4:00-6:00 PM, which generally translates to highest overall roadway volumes in a given 24-hour period. The one hour reflecting highest overall roadway volumes (peak hour) was then derived from these counts and used in operational analysis.

1. Viking Avenue NW & NW Finn Hill Road / NW Lindvig Way (AM: 4/18/2023; PM: 10/5/2022)
2. Viking Avenue NW & NW Edvard Street (AM: 3/28/2023; PM: 3/28/2023)
3. Viking Avenue NW & NW Liberty Road (AM: 3/28/2023; PM: 3/28/2023)
4. Viking Avenue NW & Access (AM: 9/13/2022; PM: 9/13/2022)

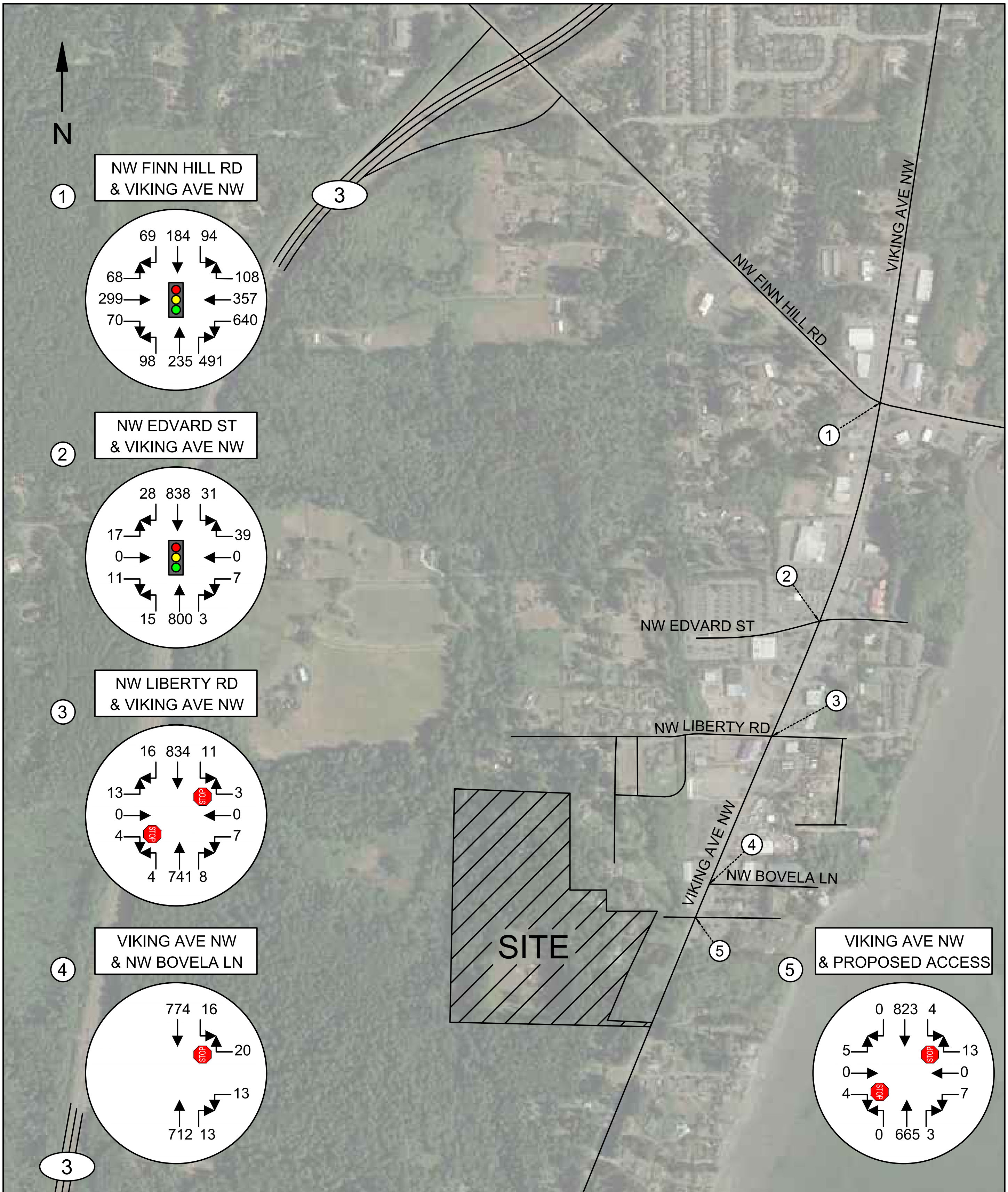
At the point of access, a minor residential driveway is aligned opposite the Liberty Shores/Harbor House driveway which is to be relocated and shared with the proposed development. Trips to and from the minor residential driveway have been captured in the peak hour turning movement counts and are included in the analysis. Figures 3 and 4 illustrate existing AM and PM peak hour volumes. Full count sheets have been attached in the appendix. As all existing intersection counts are less than one year old, no adjustments have been made and all volumes are considered baseline volumes.



HEATH&ASSOCIATES
Transportation Planning & Engineering

PLATEAU AT LIBERTY BAY

EXISTING AM PEAK HOUR VOLUMES
FIGURE 3



Heath & Associates Transportation Planning & Engineering

PLATEAU AT LIBERTY BAY

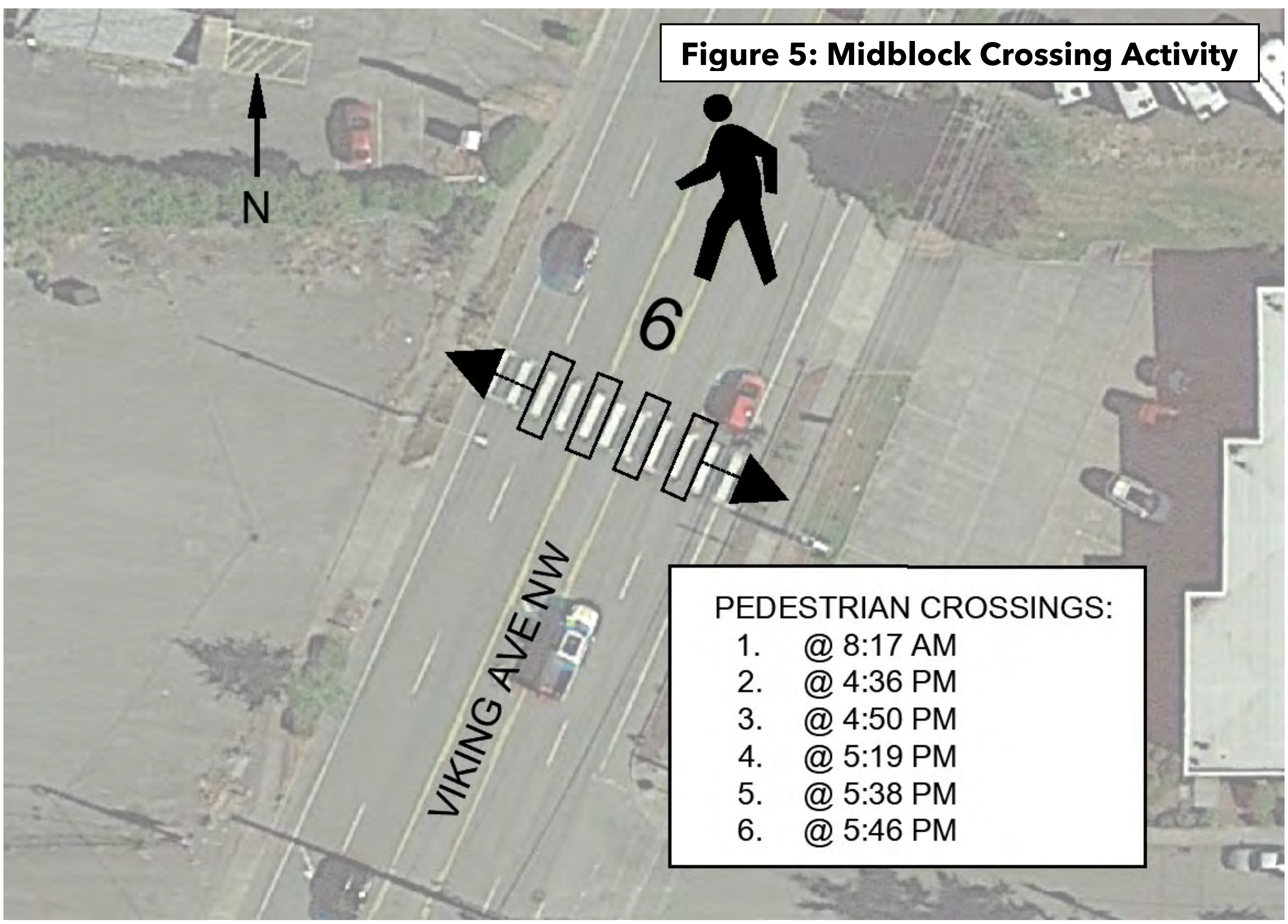
EXISTING PM PEAK HOUR VOLUMES
FIGURE 4

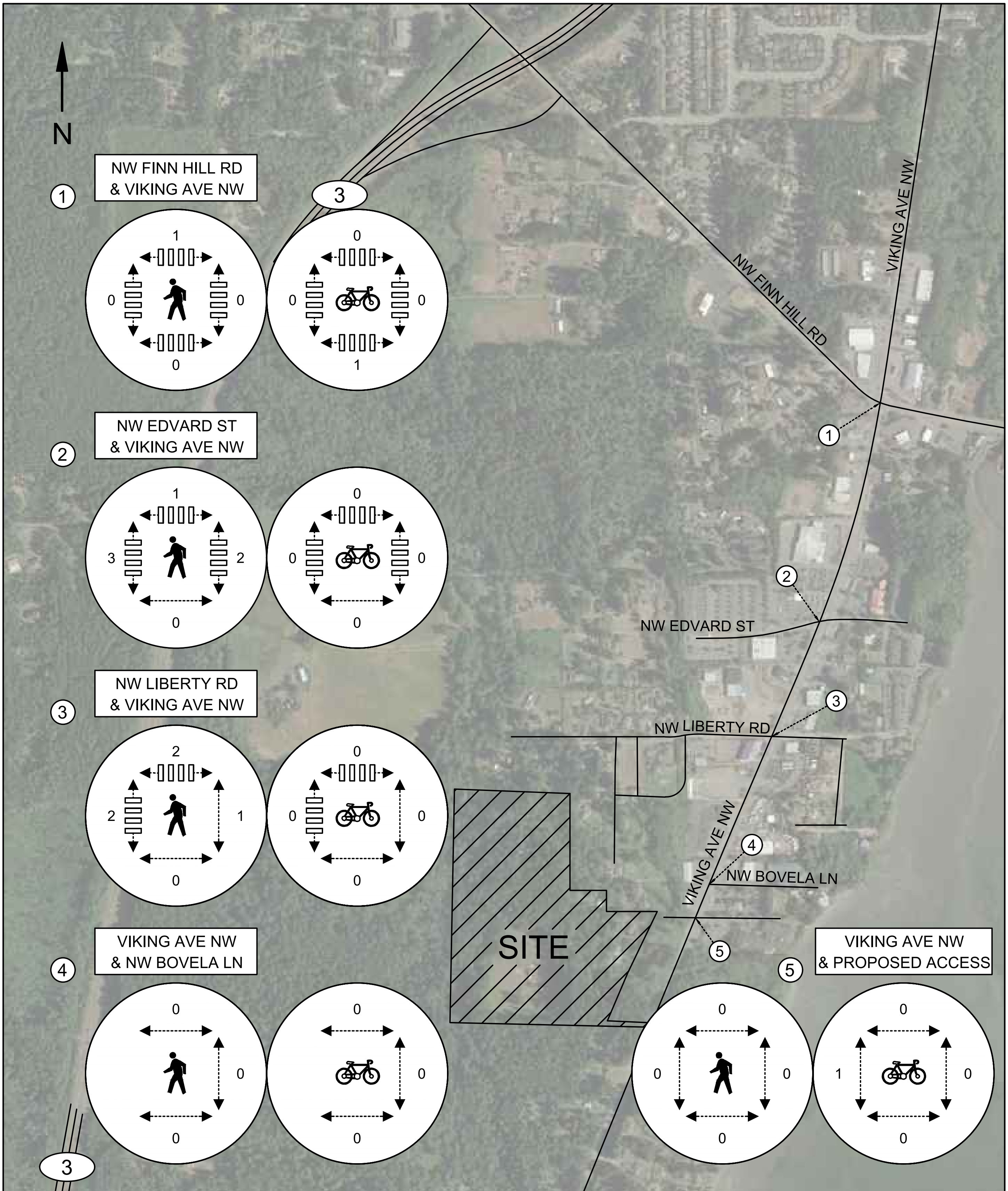
3.5 Non-Motorist Activity & Infrastructure

During routine field counts, non-motorist transport was observed during both the AM and PM peak hour periods. Complete sidewalks are generally available within the study area/intersections. Refer to Figures 6 and 7 for AM and PM peak hour non-motorist volumes at each intersection.

Additional evaluation was requested by the City with respect to the mid-block crossing located approximately 350-feet north of the proposed Viking Avenue NW access. During the span of four hours (7:00-9:00 AM and 4:00-6:00 PM), a total of six pedestrian crossings were recorded.

Given the available amenities and bus stops along Viking Avenue NW, non-motorist activity from the proposed development could be expected. Additional narrative is provided in Section 4. Figure A in the appendix highlights all nearby parks and commercial districts within 1.0-mile of the subject site that could generate pedestrian activity.

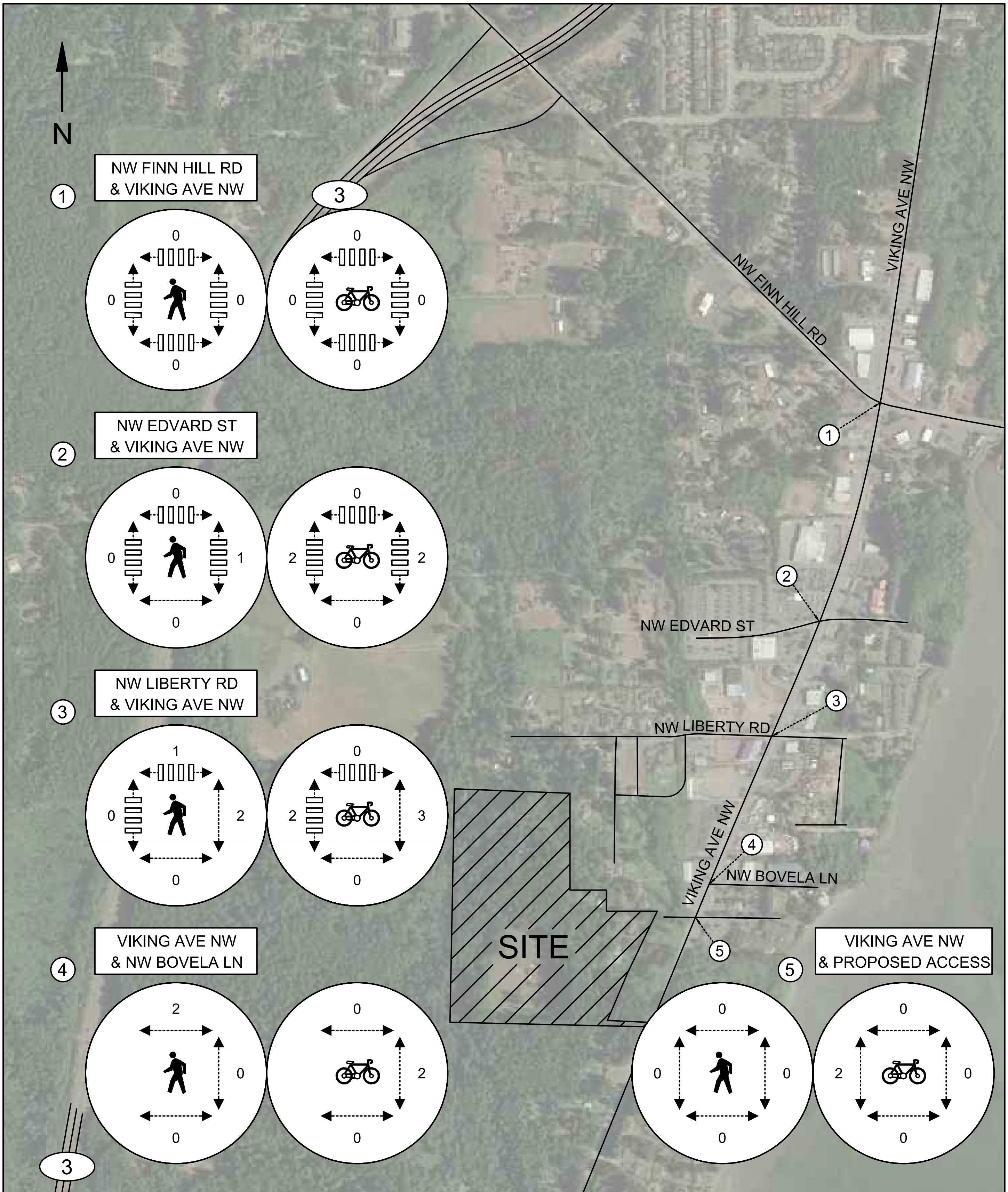




PLATEAU AT LIBERTY BAY

AM PEAK HOUR NON-MOTORIST VOLUMES

FIGURE 6



HEATH&ASSOCIATES
Transportation Planning & Engineering

PLATEAU AT LIBERTY BAY

PM PEAK HOUR NON-MOTORIST VOLUMES
FIGURE 7

3.6 Existing Level of Service

Existing intersection delays were determined through the use of the *Highway Capacity Manual* 6th Edition. Capacity analysis is used to determine level of service (LOS) which is an established measure of congestion for transportation facilities. The range[1] for intersection level of service is LOS A to LOS F with the former indicating the best operating conditions with low control delays and the latter indicating the worst conditions with heavy control delays. Detailed descriptions of intersection LOS are given in the 2016 Highway Capacity Manual. Level of service calculations were made through the use of the *Synchro 11* analysis program. For stop-controlled intersections, delays are reported for the highest delayed approach. For signalized intersections, LOS is determined by overall average delay for all approaches. Table 2 below presents existing AM and PM peak hour LOS delays for the study/access intersections.

Table 2: Existing AM & PM Peak Hour Level of Service
Delays given in seconds per vehicle

Intersection	Control	Peak Hour	Movement	LOS	Delay
Viking Ave NW & NW Finn Hill Rd	Signal	AM PM	Overall	C E	21.6 61.2
Viking Ave NW & NW Edvard St	Signal	AM PM	Overall	A A	6.5 7.0
Viking Ave NW & NW Liberty Rd	Stop	AM PM	WB EB	B C	14.4 20.4
Viking Ave NW & NW Bovela Ln	Stop	AM PM	WB	B B	11.2 14.0
Viking Ave NW & Access	Stop	AM PM	WB EB	B C	14.0 20.0

City of Poulsbo Level of Service Standard: LOS E standard for all city intersection unless otherwise designated such as LOS F standard for the intersection of Viking Avenue NW & NW Finn Hill Road/NW Lindvig Way.

Existing AM and PM peak hour delays are shown to operate with LOS C or better conditions with the exception of Viking Avenue NE & NW Finn Hill Road/NW Lindvig Way which is shown to operate with LOS E or better conditions. All intersections are shown meet City LOS standards.

---

[1] *Signalized Intersections - Level of Service*

Level of Service	Control Delay per Vehicle (sec)
A	≤10
B	>10 and ≤20
C	>20 and ≤35
D	>35 and ≤55
E	>55 and ≤80
F	>80

Stop Controlled Intersections – Level of Service

Level of Service	Control Delay per Vehicle (sec)
A	≤10
B	>10 and ≤15
C	>15 and ≤25
D	>25 and ≤35
E	>35 and ≤50
F	>50

Highway Capacity Manual, 6th Edition

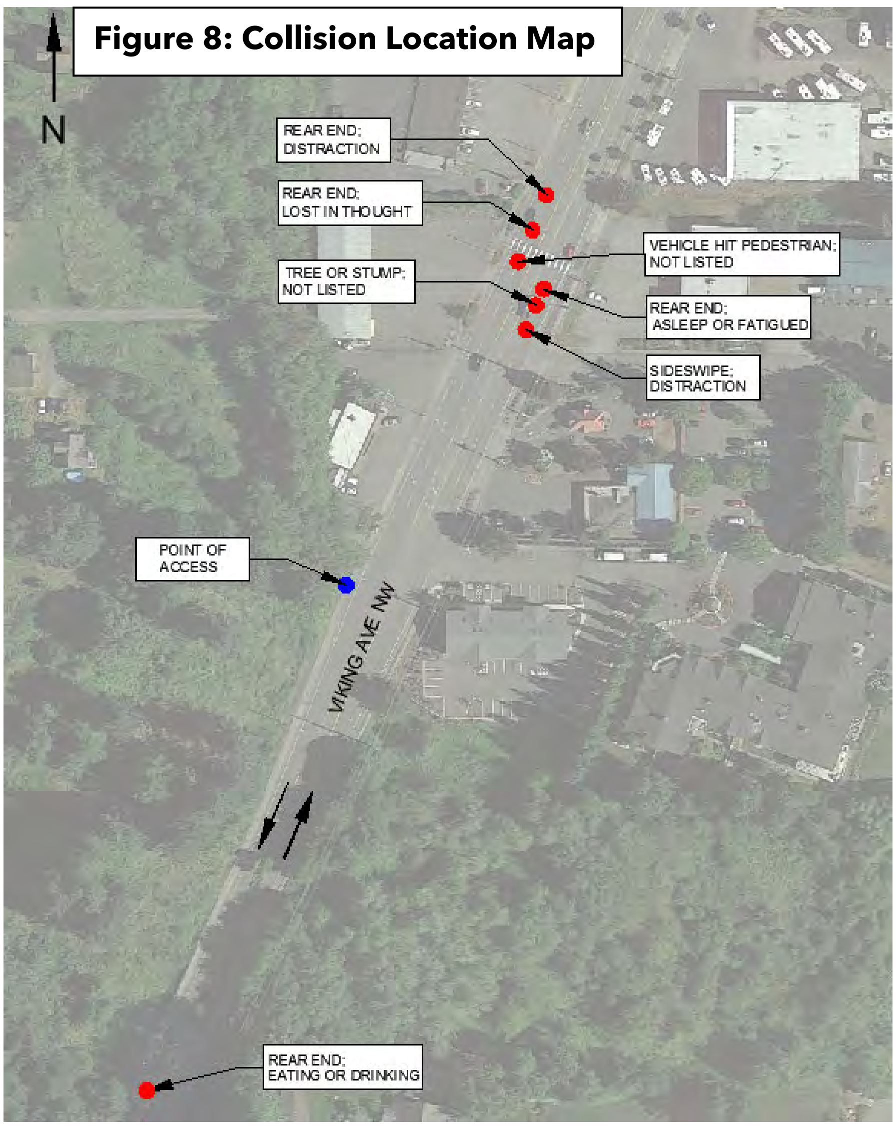
3.7 Safety Analysis

A list of the recorded collision history from the last 5-years at the access intersection (and 0.1-miles north and south) was requested from WSDOT. A summary of the collisions per year at the access intersection is listed below in Table 3.

Table 3: Collision History

Intersection/Corridor	2018	2019	2020	2021	2022	Avg/Yr
Viking Avenue NW (North of Proposed Access)	1	0	0	3	2	1.2
Viking Avenue NW (South of Proposed Access)	1	0	0	0	0	0.2

Figure 8: Collision Location Map

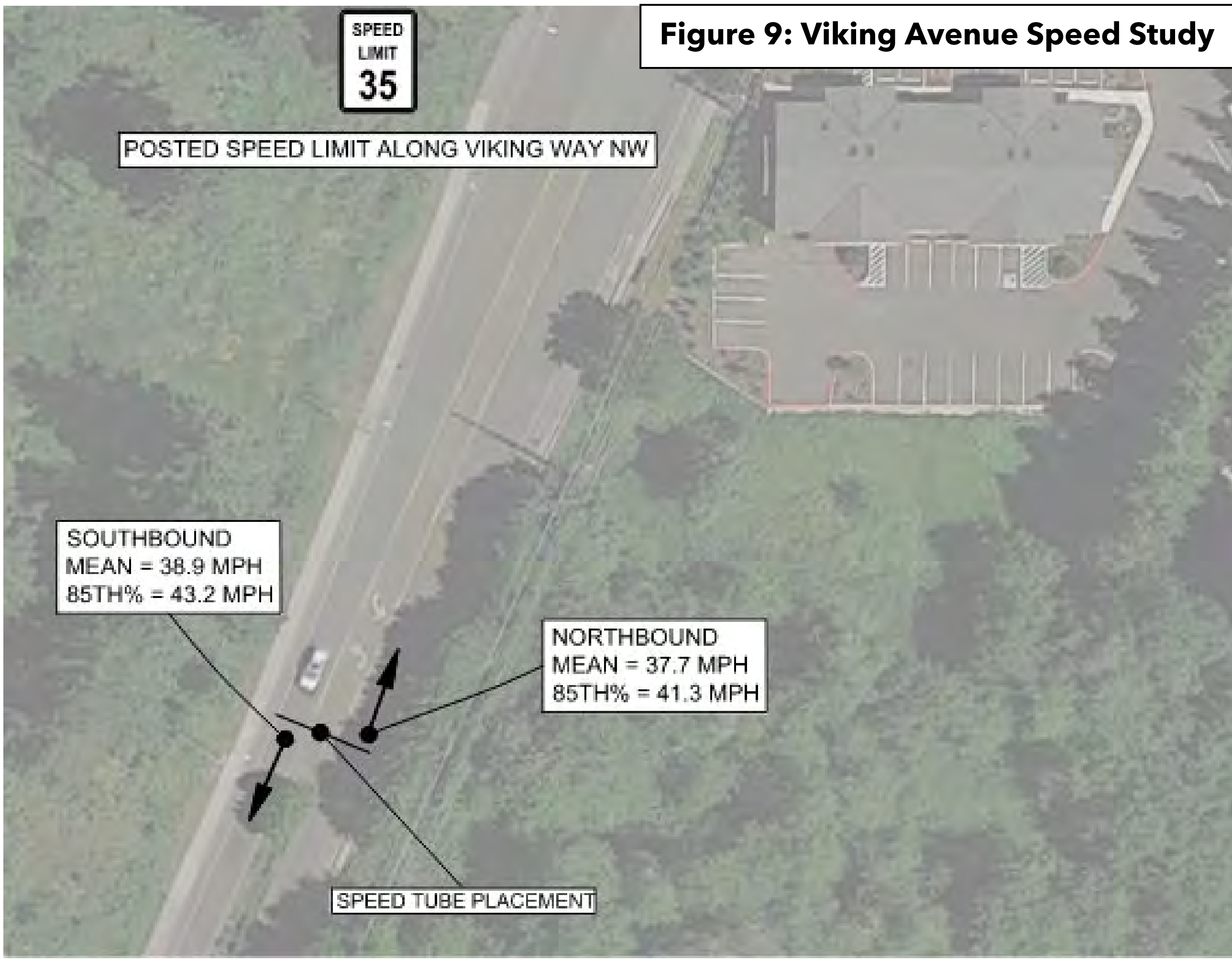


Out of the 7 reported collisions at or near the access intersection, the most common occurrences were listed as "Rear-End" (4) followed by "Sideswipe" (1), "Tree or Stump" (1), "Vehicle Going Straight Hits Pedestrian" (1). The leading driver circumstance was listed as "Distractions" (2), "Day Dreaming" (1), "Asleep or Fatigued" (1), "Eating or Drinking" (1), "Not Listed" (2). Refer to the figure to the left which provides a location map of each reported collision in the study area. Given the cluster of incidents near the crosswalk, additional evaluation is recommended to determine whether safety improvements should be considered. Additional narrative is provided in Section 4.

3.8 Speed Study

A speed study was conducted along Viking Avenue NW to determine both average and 85th percentile speeds. Viking Avenue NW, a classified minor arterial, has a posted speed limit of 35-mph. Speed tubes were placed transversely across Viking Avenue NW south of the merging area (to avoid potential skewed data by merging vehicles) over the span of 72-hours (March 28-30, 2023).

Figure 9: Viking Avenue Speed Study



As shown above, both the average speed and 85th percentile speeds are greater than the 35-mph posted speed limit.

4. FORECAST TRAFFIC DEMAND & ANALYSIS

4.1 Project Trip Generation

Trip generation is used to determine the magnitude of project impacts on the surrounding street system. This is usually denoted by the quantity or specific number of new trips that enter and exit a project during a designated time period, such as a specific peak hour (AM or PM) or an entire day. Data presented in this report was taken from the Institute of Transportation Engineer's publication *Trip Generation,* 11th Edition. The designated land use for this project is defined as Single-Family Detached Housing (LUC 210). Table 4 below summarizes the estimated project trip generation using ITE average rates to determine trips ends with dwelling units as the input variable. Included are the average weekday daily traffic (AWDT) and the AM and PM peak hours. Refer to the appendix for trip generation output.

Table 4: Project Trip Generation

Land Use	Units	AWDT	AM Peak-Hour Trips			PM Peak-Hour Trips		
			In	Out	Total	In	Out	Total
Single-Family (LUC 210)	63	**594**	11	33	**44**	37	22	**59**

Based on ITE data, the project is anticipated to generate 594 average weekday daily trips with 44 trips (11 inbound / 33 outbound) occurring in the AM peak hour and 59 trips (37 inbound/ 22 outbound) in the PM peak hour.

4.2 Distribution & Assignment

Trip distribution describes the anticipated travel routes for inbound and outbound project traffic during the peak hour study periods. AM and PM peak hour trips generated by the project are expected to follow the general patterns as shown in Figures 10 and 11, respectively. The prepared trip distribution to and from the site is primarily based on observations from existing travel patterns and consistent with past projects in the area.

4.3 Future Peak Hour Volumes

A 5-year horizon of 2030 was used for future analysis (plat approval projected in 2025, 7-year horizon from count date). Forecast 2030 traffic volumes with and without the project were derived by applying a 2.0%[2] growth rate per year to the existing traffic volumes shown in Figures 3 and 4. Pipeline volumes from the nearby Viking Avenue Gas, Viking Avenue Residential, Spencer Plat, Winslow Ridge, and Oslo Bay Apartments projects have been included in analysis. Pipeline volumes from the nearby projects are illustrated in Figures B and C in the appendix. Future 2030 AM and PM peak hour volumes without project traffic are shown in Figure 12 and 13. Forecast 2030 AM and PM peak hour volumes with the proposed Plateau at Liberty Bay project are illustrated in Figures 14 and 15.

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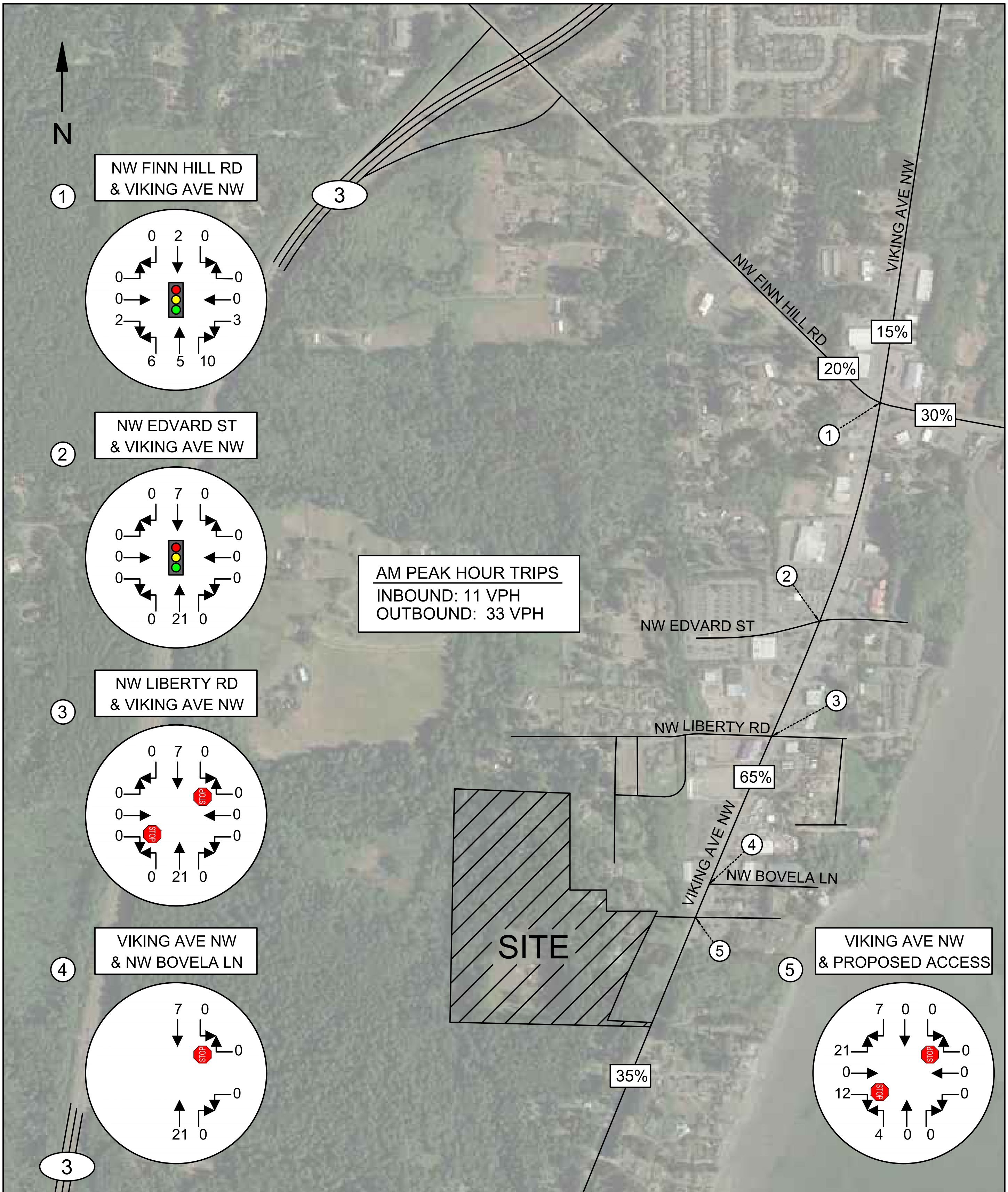
2 City of Poulsbo Transportation Comprehensive Plan



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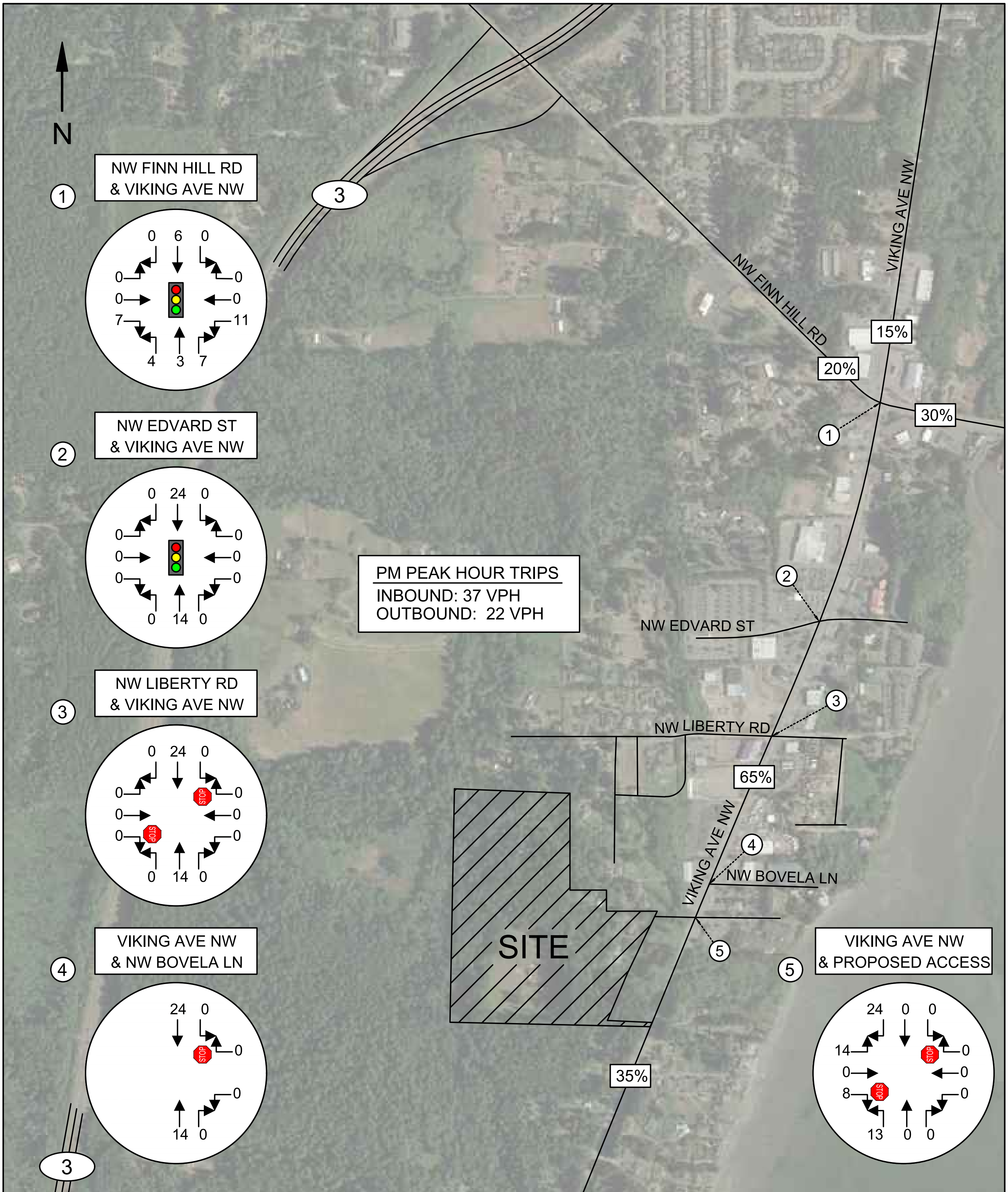
PLATEAU AT LIBERTY BAY

AM PEAK HOUR TRIP DISTRIBUTION & ASSIGNMENT
FIGURE 10



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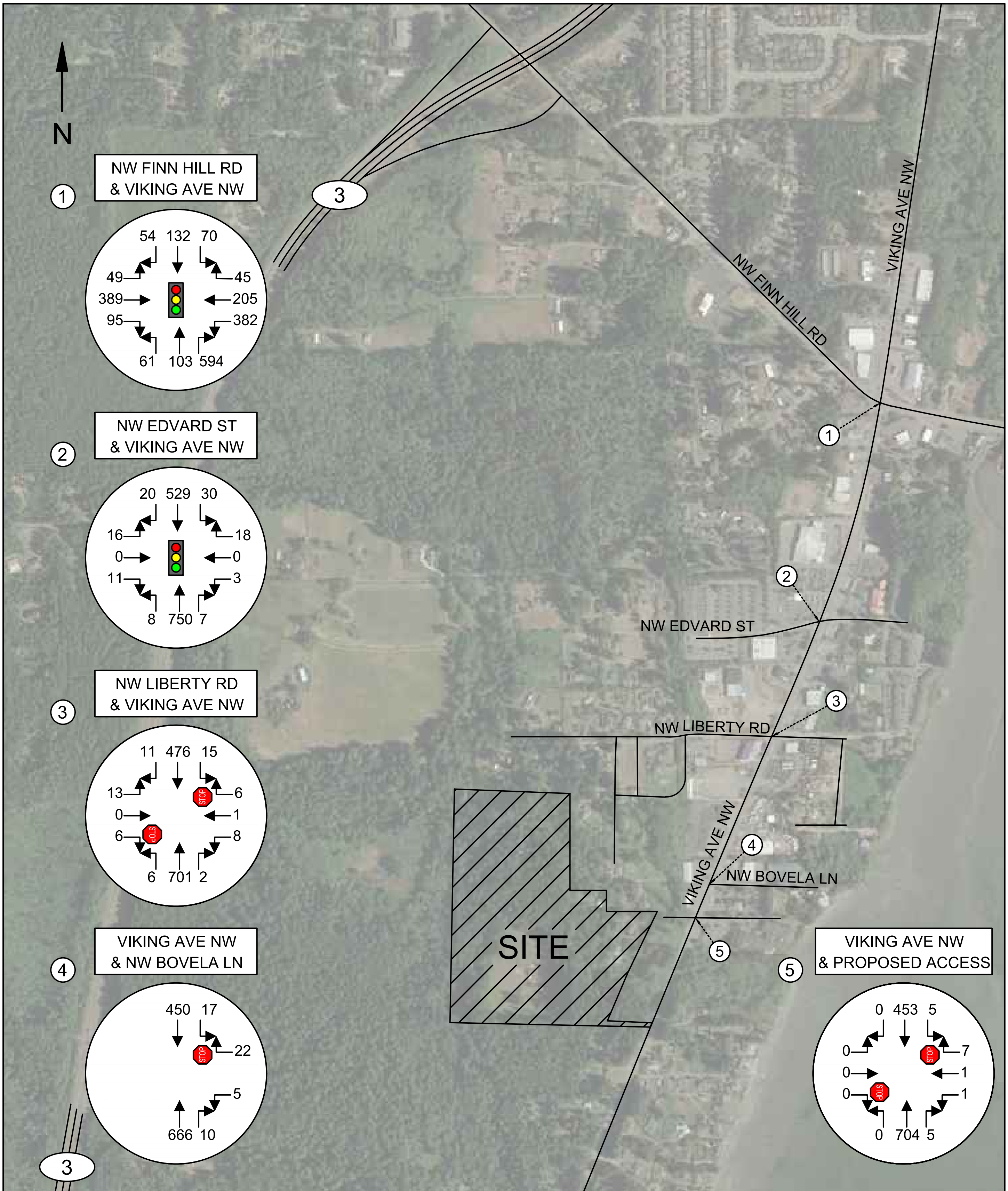
PLATEAU AT LIBERTY BAY
PM PEAK HOUR TRIP DISTRIBUTION & ASSIGNMENT
FIGURE 11



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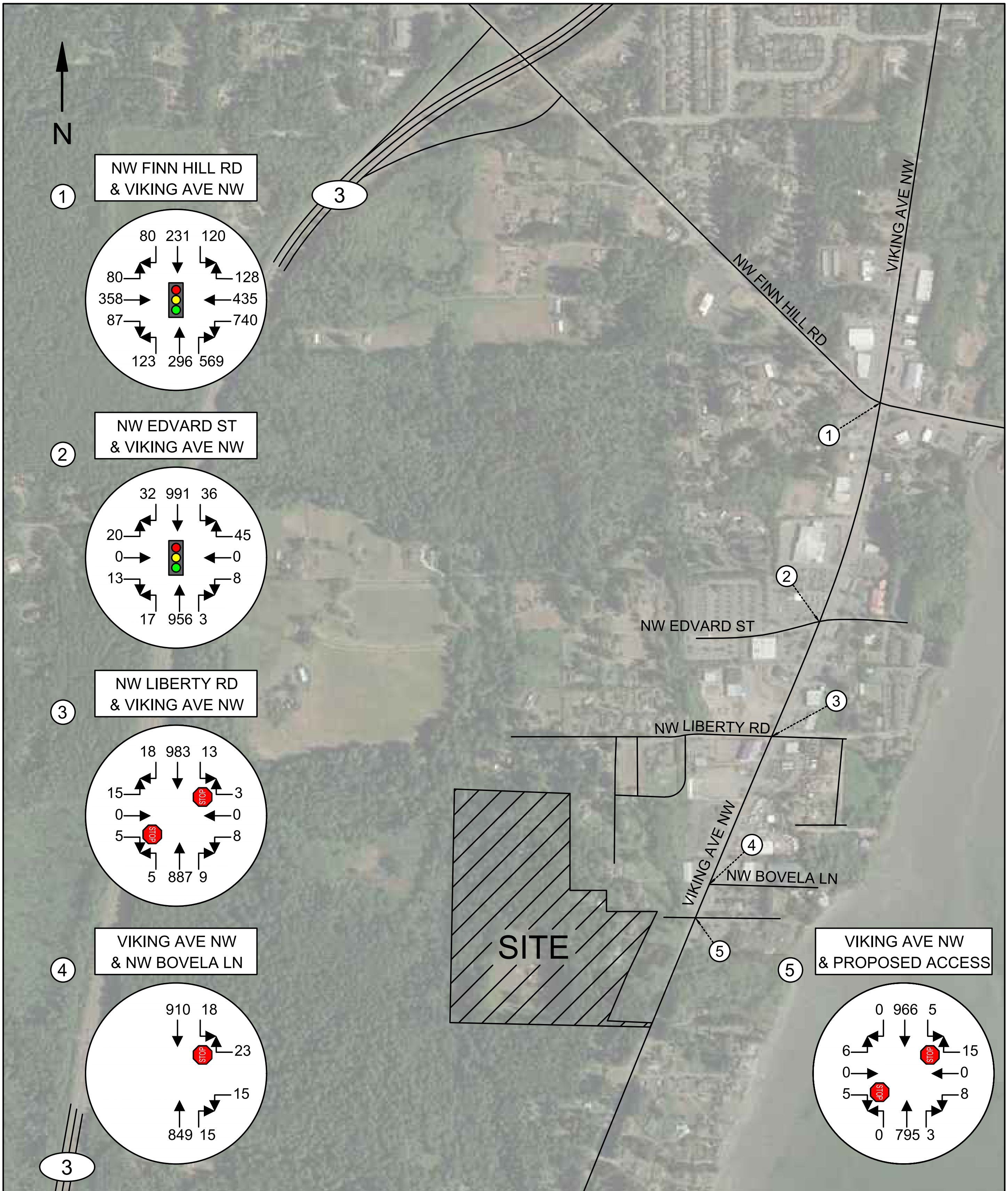
PLATEAU AT LIBERTY BAY

FORECAST 2030 AM PEAK HOUR VOLUMES WITHOUT PROJECT

FIGURE 12



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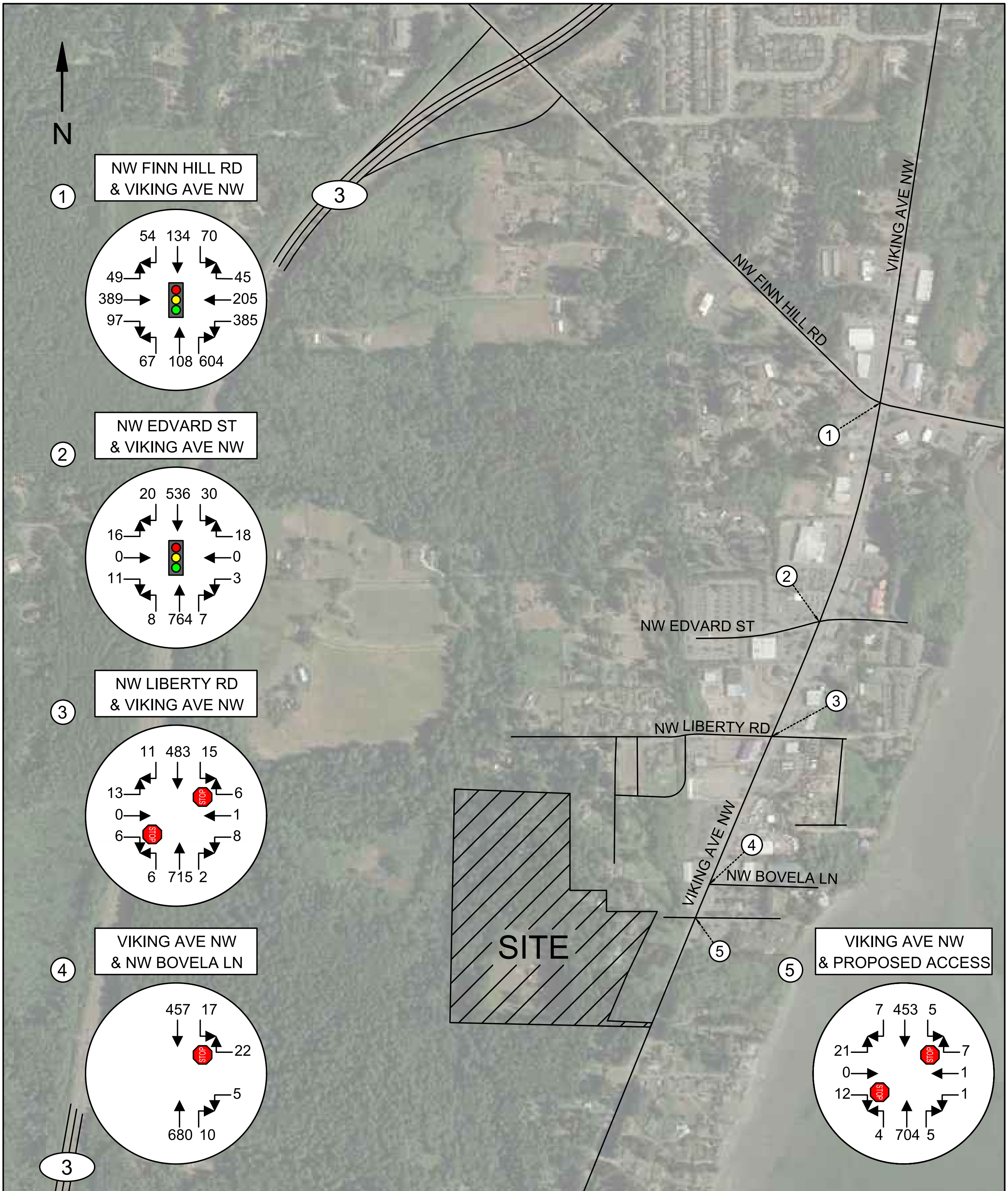
PLATEAU AT LIBERTY BAY

FORECAST 2030 PM PEAK HOUR VOLUMES WITHOUT PROJECT
FIGURE 13



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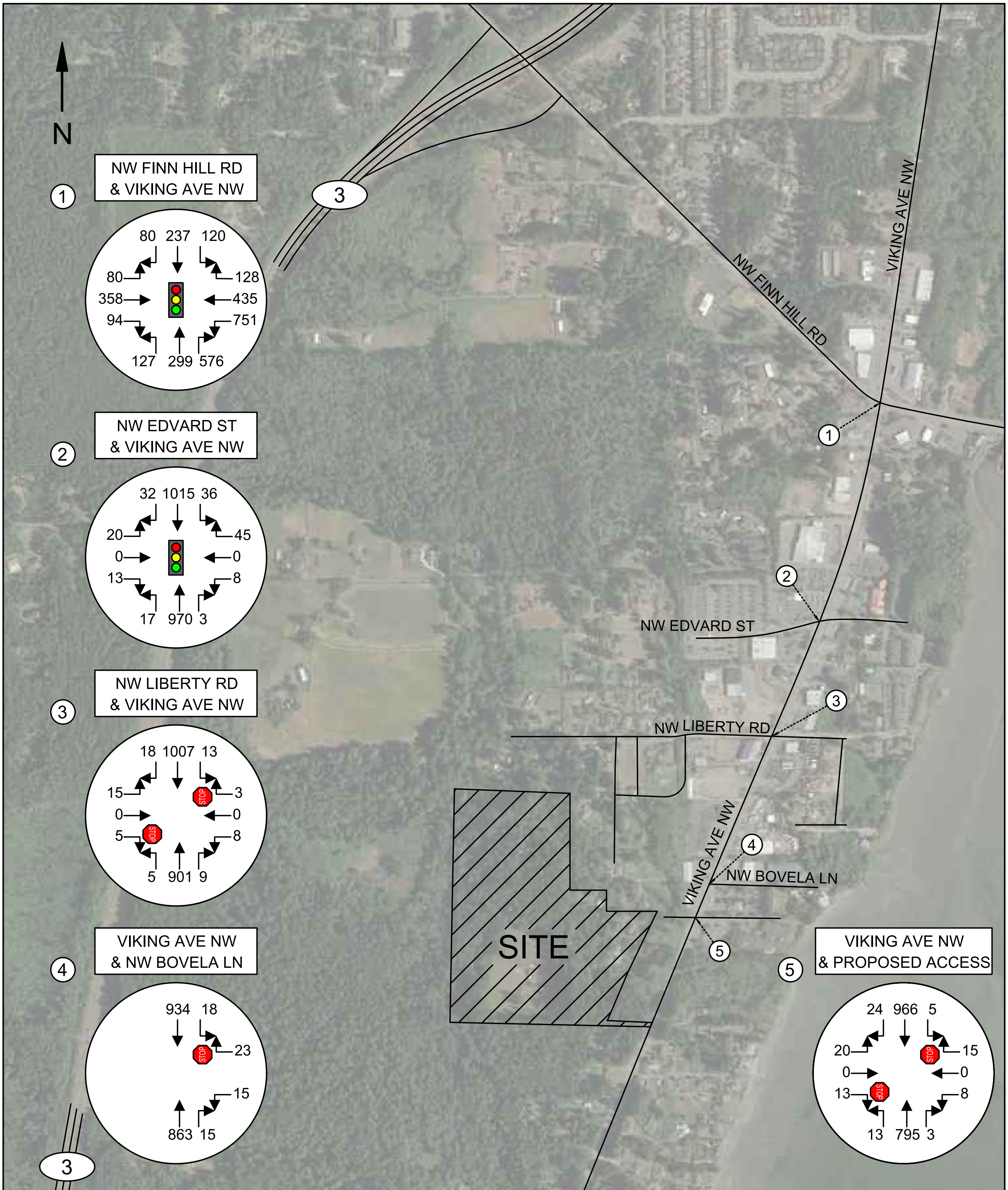
PLATEAU AT LIBERTY BAY

FORECAST 2030 AM PEAK HOUR VOLUMES WITH PROJECT
FIGURE 14



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PLATEAU AT LIBERTY BAY

FORECAST 2030 PM PEAK HOUR VOLUMES WITH PROJECT
FIGURE 15

4.4 Sight Distance at Access Driveway

Access to the subject site is proposed via one new driveway extending west from Viking Avenue NW aligned with the adjacent Liberty Shores/Harbor House driveway. A secondary, emergency access only is proposed to extend south from NW Liberty Road. Removeable bollards will be placed along the roadway to deter vehicular access to and from the site. Along the project Viking Avenue frontage exists a center raised bioswale. However, due to grading constraints, the proposed driveway has been located off-site to the north via an easement and now spaced approximately 270-feet from the edge of the bioswale thereby allowing full use of the center two-way left-turn lane.

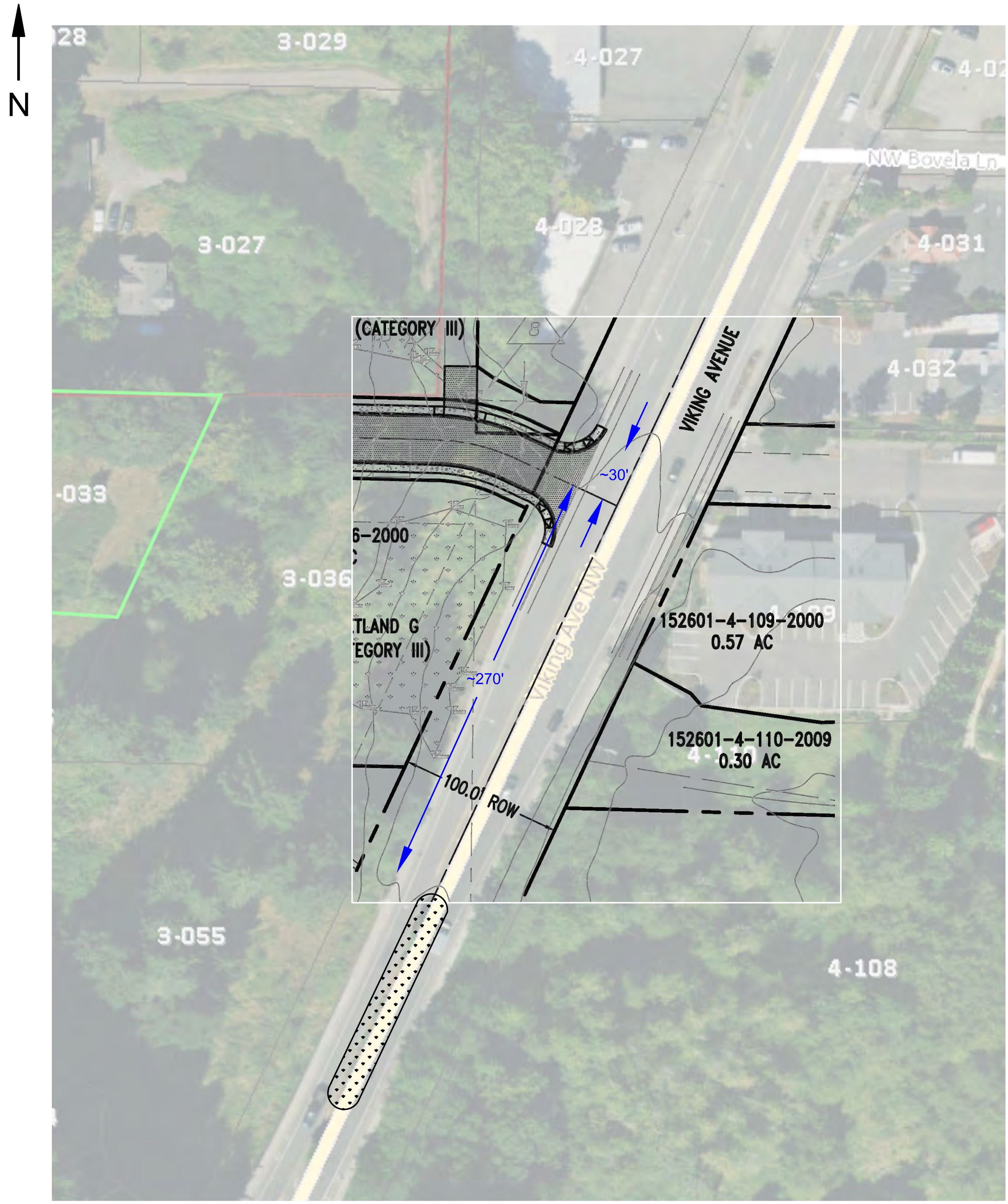
While the posted speed limit along Viking Avenue NW is 35-mph, the speed study identified higher operating speeds. The southbound 85th percentile speed was 43.2 mph and the northbound 85th percentile speed was 41.3 mph. Therefore, 45-mph was used for sight distance analysis as opposed to the posted speed limit.

In accordance with AASHTO standards and taking into consideration of the Viking Avenue width and cross-section, approximately 565-feet of entering sight distance would be needed for motorists entering the roadway. Based on preliminary field measurements of the approximate access location, sight lines looking both north and south are shown to be visible up to 600 feet. It is recommended that vegetation within the center lane median south of the site be maintained as overgrowth could interfere with sight lines.

4.5 Driveway Spacing

The proposed driveway on Viking Avenue NW is located approximately ~30-feet south of the Liberty Shores/Harbor House private drive access (center to center measurement). The access has been placed as far north as possible to align with the opposite approach. A minor residential driveway currently exists opposite the Liberty Shores/Harbor House access. As part of site development, the access would be relocated and shared with the newly constructed project access.

While the proposed approach is slightly offset from the opposite driveway, the positive offset would still allow unconflicted northbound and southbound left-turns from Viking Avenue NW. See Figure 16 for driveway spacing diagram with reference to both the bioswale and adjacent driveway. Given the proximity, the operational analysis accounted the proposed driveway as a four-way intersection with the Liberty Shores/Harbor House.



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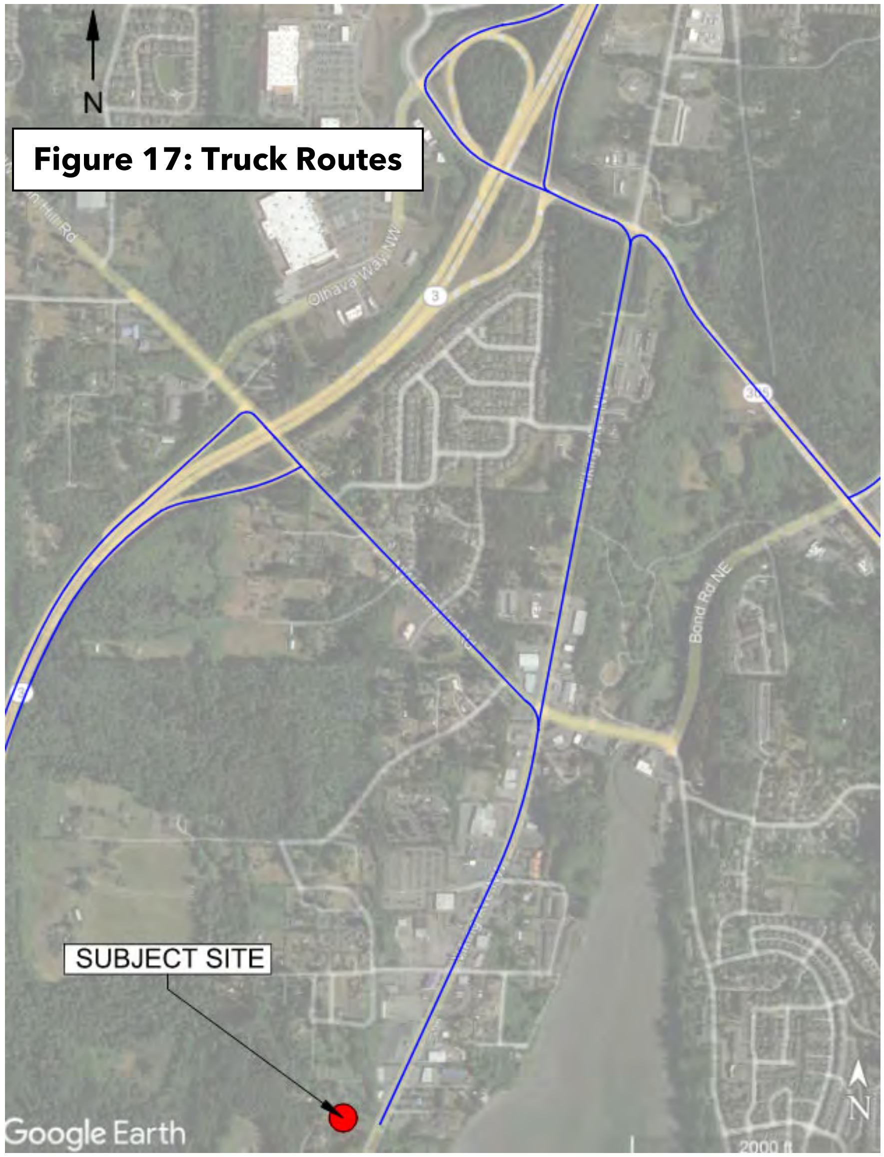
PLATEAU AT LIBERTY BAY

DRIVEWAY SPACING
FIGURE 16

4.6 Construction Traffic

Construction traffic is anticipated to primarily utilize major arterial/state routes to and from the subject property. Potential construction routes are illustrated in the figure below. Any route restrictions or preferences can be coordinated with the City. According to the project manager, the development is anticipated to remove approximately 10,000 cubic yards of soil (subject to change through the final design process). All the "cut" section of material is planned to stay on-site for "fill" material which may reduce the number of external construction trucks.

Figure 17: Truck Routes



4.7 Future Level of Service & Queuing

A level of service (LOS) analysis was made of the forecast AM and PM peak hour volumes with and without project generated trips added to the key intersections of study. Results for intersection delay conditions were again determined using the *Synchro 11* program. A summary of the analysis results is shown in Table 5.

Table 5: Forecast 2030 AM & PM Peak Hour Level of Service

Delays Given in Seconds per Vehicle

				2030 Without		*2030 With*	
Intersection	**Control**	**LOS Standard**	**Peak Hour**	**LOS**	**Delay**	**LOS**	**Delay**
Viking Ave NW & Finn Hill Rd	Signal	F	AM	C	26.9	C	27.5
			PM	F	113.0	F	116.2
Viking Ave NW & NW Edvard St	Signal	E	AM	A	6.6	A	6.6
			PM	A	7.3	A	7.3
Viking Ave NW & NW Liberty Rd	Stop	E	AM	C	16.0	C	16.2
			PM	C	24.9	C	25.7
Viking Ave NW & NW Bovela Ln	Stop	E	AM	B	11.9	B	12.0
			PM	C	16.0	C	16.2
Viking Ave NW & Access	Stop	E	AM	C	15.6	C	18.2
			PM	C	24.3	D	29.2

Forecast 2030 peak hour LOS is shown to continue meeting city standards with and without the project. Viking Avenue NW & Finn Hill Road is projected to operate with LOS F conditions; however, this intersection is established within the City's Comprehensive Plan to allow LOS F conditions per Policy TR-2.2. Plateau at Liberty Bay adds less than four seconds of overall average delay.

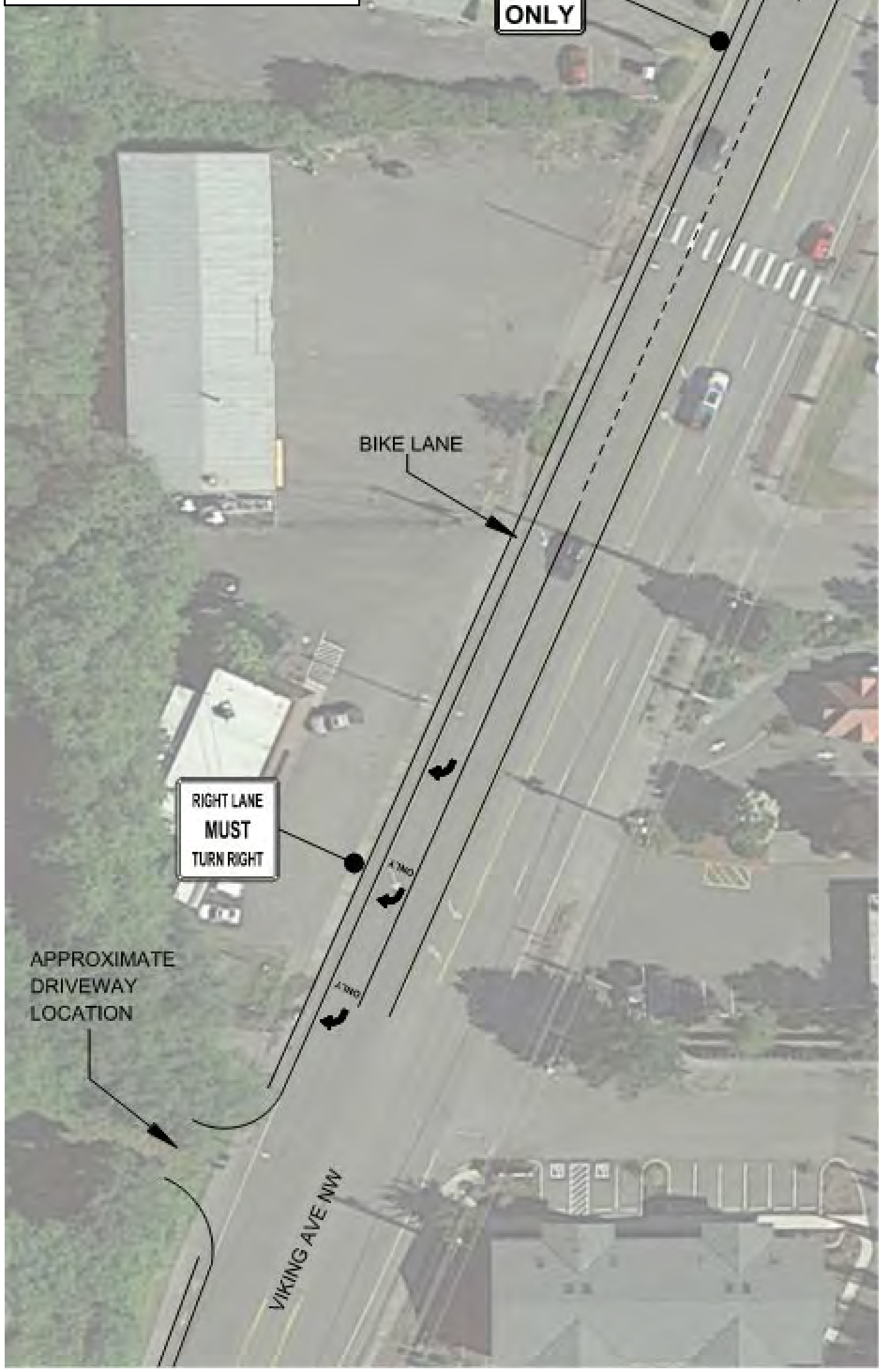
Viking Avenue Access:

Forecast service levels are anticipated to operate with LOS C and LOS D conditions in the respective AM and PM peak hours. Queuing was analyzed at the access intersection's east leg (project approach) and at the northbound left turn lane. The east leg had a 95th percentile of three vehicles waiting for entry to Viking Avenue NW. The northbound left turn lane had a maximum of a two-vehicle queue. The left turn lane spacing from the point of access to the center raised median is approximately 270 feet. The left turn lane has sufficient storage and deceleration to accommodate the project's access.

Merging Lane

The proposed driveway is located within a southbound merging taper whereupon Viking Avenue NW transitions from a five-lane cross-section down to a three-lane section. The project proposes to convert the existing southbound merge lane to a right-turn drop lane to function as a right-turn lane for the subject site. A conceptual sketch is displayed to the right. Proper advanced warning signs would be needed to alert drivers of the lane restriction and could result in merging occurring more upstream. Given the existing roadway configuration and pavement width, this could be implemented with restriping and signs and would benefit the project's driveway.

Figure 18: Right-Turn Drop Lane



4.8 Pedestrian Crossing

The Viking Avenue midblock crossing located ~350-feet north of the subject site was further examined at the request of the City. Section 3 summarized collision history which reported six collisions in the past five years (five of which occurred in the past two years) near the crosswalk. One incident resulted in a vehicle striking a pedestrian causing suspected serious injury. The collision history alone indicates the need for further investigation.

The crosswalk is an at grade, marked crossing. Pedestrian crossing signs are located at either end of the crossing, though no advanced warning signs were observed. Bus stops are located just north of the crosswalk; however, no buses were observed pick-up or dropping-off passengers during the four-hour observations.

While the posted speed limit is 35-mph, the speed study indicated 85th percentile travel speeds of up to 44-mph. The average daily traffic volumes during the March observations were 15,200 vehicles. Per the U.S. Department of Transportation Federal Highway Administration's *Guide for Improving Pedestrian Safety at Uncontrolled Crossing Locations,* this location could require enhanced treatment such as a pedestrian refuge island, Rectangular Rapid-Flashing Beacon (RRFB), and advance signs/striping (see right).

Table 1. Application of pedestrian crash countermeasures by roadway feature.

Roadway Configuration	Posted Speed Limit and AADT								
	Vehicle AADT <9,000			Vehicle AADT 9,000–15,000			Vehicle AADT >15,000		
	≤30 mph	35 mph	≥40 mph	≤30 mph	35 mph	≥40 mph	≤30 mph	35 mph	≥40 mph
2 lanes (1 lane in each direction)	❶ 2 4 5 6	❶ 5 6 7 9	① 5 6 ❼ ❾	❶ 4 5 6	❶ 5 6 7 9	① 5 6 ❼ ❾	❶ 4 5 6 7 9	① 5 6 7 9	① 5 6 ❾
3 lanes with raised median (1 lane in each direction)	❶ 2 3 4 5	❶ ❸ 5 7 9	① ❸ 5 ❼ ❾	① 3 4 5 7 9	① ❸ 5 ❼ ❾	① ❸ 5 ❼ ❾	① ❸ 4 5 7 9	① ❸ 5 ❼ ❾	① ❸ 5 ❾
3 lanes w/o raised median (1 lane in each direction with a two-way left-turn lane)	❶ 2 3 4 5 6 7 9	❶ ❸ 5 6 7 9	① ❸ 5 6 ❾	① 3 4 5 6 7 9	① ❸ 5 6 ❼ ❾	① ❸ 5 6 ❾	① ❸ 4 5 6 7 9	① ❸ 5 6 ❾	① ❸ 5 6 ❾
4+ lanes with raised median (2 or more lanes in each direction)	❶ ❸ 5 7 8 9	❶ ❸ 5 7 8 9	① ❸ 5 8 ❾	① ❸ 5 7 8 9	① ❸ 5 ❼ 8 ❾	① ❸ 5 8 ❾	① ❸ 5 ❼ 8 ❾	① ❸ 5 8 ❾	① ❸ 5 8 ❾
4+ lanes w/o raised median (2 or more lanes in each direction)	❶ ❸ 5 6 7 8 9	① ❸ 5 ❻ 7 8 9	① ❸ 5 ❻ 8 ❾	① ❸ 5 ❻ 7 8 9	① ❸ 5 ❻ ❼ 8 ❾	① ❸ 5 ❻ 8 ❾	① ❸ 5 ❻ ❼ 8 ❾	① ❸ 5 ❻ 8 ❾	① ❸ 5 ❻ 8 ❾

Given the set of conditions in a cell,

- \# Signifies that the countermeasure is a candidate treatment at a marked uncontrolled crossing location.
- ● Signifies that the countermeasure should always be considered, but not mandated or required, based upon engineering judgment at a marked uncontrolled crossing location.
- ○ Signifies that crosswalk visibility enhancements should always occur in conjunction with other identified countermeasures.*

The absence of a number signifies that the countermeasure is generally not an appropriate treatment, but exceptions may be considered following engineering judgment.

1 High-visibility crosswalk markings, parking restrictions on crosswalk approach, adequate nighttime lighting levels, and crossing warning signs
2 Raised crosswalk
3 Advance Yield Here To (Stop Here For) Pedestrians sign and yield (stop) line
4 In-Street Pedestrian Crossing sign
5 Curb extension
6 Pedestrian refuge island
7 Rectangular Rapid-Flashing Beacon (RRFB)**
8 Road Diet
9 Pedestrian Hybrid Beacon (PHB)**

*Refer to Chapter 4, 'Using Table 1 and Table 2 to Select Countermeasures,' for more information about using multiple countermeasures.

A conceptual design is provided below. A pedestrian refuge island allows a two-stage crossing and additional protection via vertical curbing. An RRFB and advanced warning signs provide additional awareness for passing motorists of the presence of pedestrians.

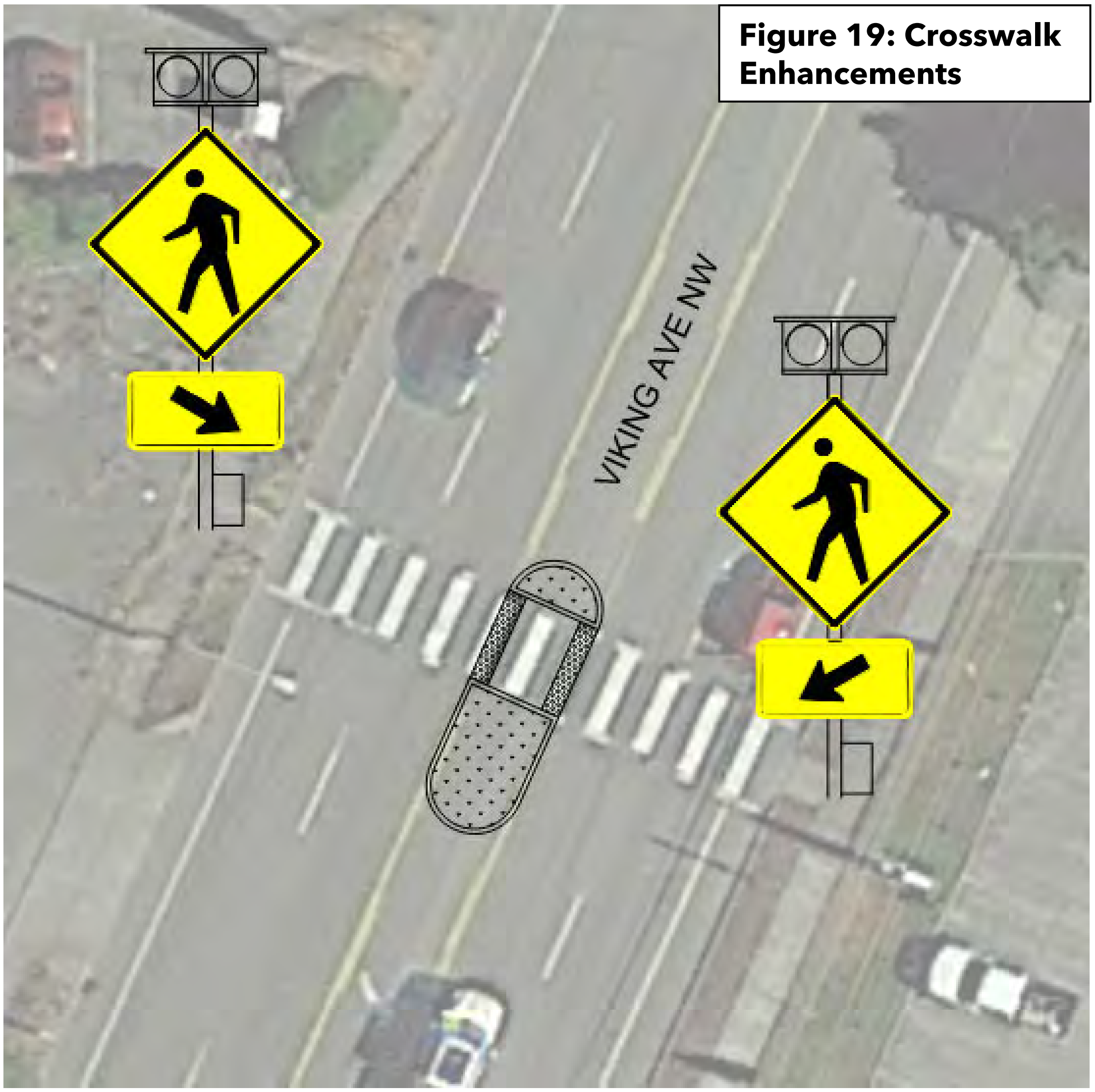


Figure 19: Crosswalk Enhancements

The proposed development would add 63 single-family homes to the area. Based on the existing pedestrian volumes (refer to Figures 6 and 7) and no transit observations at the nearest stops suggests that there may not be a significant amount on non-motorist transport in this area. However, some pedestrian trips from the development site would be expected. South of the crosswalk, the only amenity that may attract pedestrians is a brewery off NW Bovela Lane. All other attractions are located to the north. Relocating the crosswalk could be further explored in collaboration with the city. Moving further south where the Viking Avenue cross-section reduces to three lanes provides benefit with a shorter crossing distance. However, this would increase distance from the amenities and transit stops.

Recommendation:
Based on the findings of the crash history, travel speeds, and traffic volumes, enhanced crossing treatment is recommended to improve safety. As the safety concern is an existing issue, any mitigation on behalf of the development would improve existing conditions. Therefore, it is recommended that traffic impact fees (TIF) either be allocated toward improvements or a credit to offset improvement costs. The design and crossing location, whether it remains in its present location or is relocated, should be further coordinated with the City, but is anticipated to comprise the features in Figure 19.

5. CONCLUSIONS & MITIGATION

The Plateau at Liberty Bay proposes for the construction of 63 single-family homes located within the city of Poulsbo. The subject site is situated on 26.10-acres along the westside of Viking Avenue NW and south of NW Liberty Road. Access to the site is proposed via one new roadway extending west from Viking Avenue NW with a secondary, emergency access only out to NW Liberty Road. Existing on-site are four single-family homes which are to be removed prior to new construction. Level of service (LOS) within the study area operates with up to LOS E conditions—meeting City of Poulsbo standards.

According to ITE data, the proposed Plateau at Liberty Bay is anticipated to generate 594 average weekday daily trips with 44 trips (11 inbound / 33 outbound) occurring in the AM peak hour and 59 trips (37 inbound / 22 outbound) occurring in the PM peak hour. A five-year horizon from the expected plat approval date 92025) was utilized to forecast traffic volumes. Along with a 2.0 percent annual growth rate, pipeline volumes from several nearby projects have been included in the five-year forecast analysis. All study intersections are shown to continue meeting the City of Poulsbo LOS standards under forecast 2030 AM and PM peak hour periods.

Based on the above analysis, mitigation is as follows:

1. The proposed development would be subject to Traffic Impact Fees (TIF) as imposed by the City of Poulsbo (PMC 3.86). Fees are based on new daily project trips. An estimated fee calculation is as follows:

(594 new daily trips - 38 daily trips for 4 existing dwelling units = 556 new trips) x $564.00 per daily trip = $313,584.00

2. Lane modification to restripe the southbound merging lane along Viking Avenue NW at the proposed access to comprise a southbound right-turn drop lane is recommended. A conceptual design is illustrated on Figure 20. Should this mitigation be accepted, proposed signage through the MUTCD manual and storage lengths would be included.

3. The existing midblock crossing along Viking Avenue NW is recommended for enhanced treatment consisting of a pedestrian refuge island, Rectangular Rapid-Flashing Beacons (RRFB), and advanced warning signs. The design and determining whether the existing location is suitable should be further discussed with the City.
    a. TIF credit or improvement cost offset should be discussed with the City as any enhancements would improve safety to an existing condition.

Actual TIF will be calculated and determined by the City at the time of building permit issuance. Fees are subject to current fee schedules in effect at such time.

No other mitigation is identified.

PLATEAU AT LIBERTY BAY
TRAFFIC IMPACT ANALYSIS

APPENDIX

Heath & Associates

File Name : 4987c
Site Code : 00004987
Start Date : 4/18/2023
Page No : 1

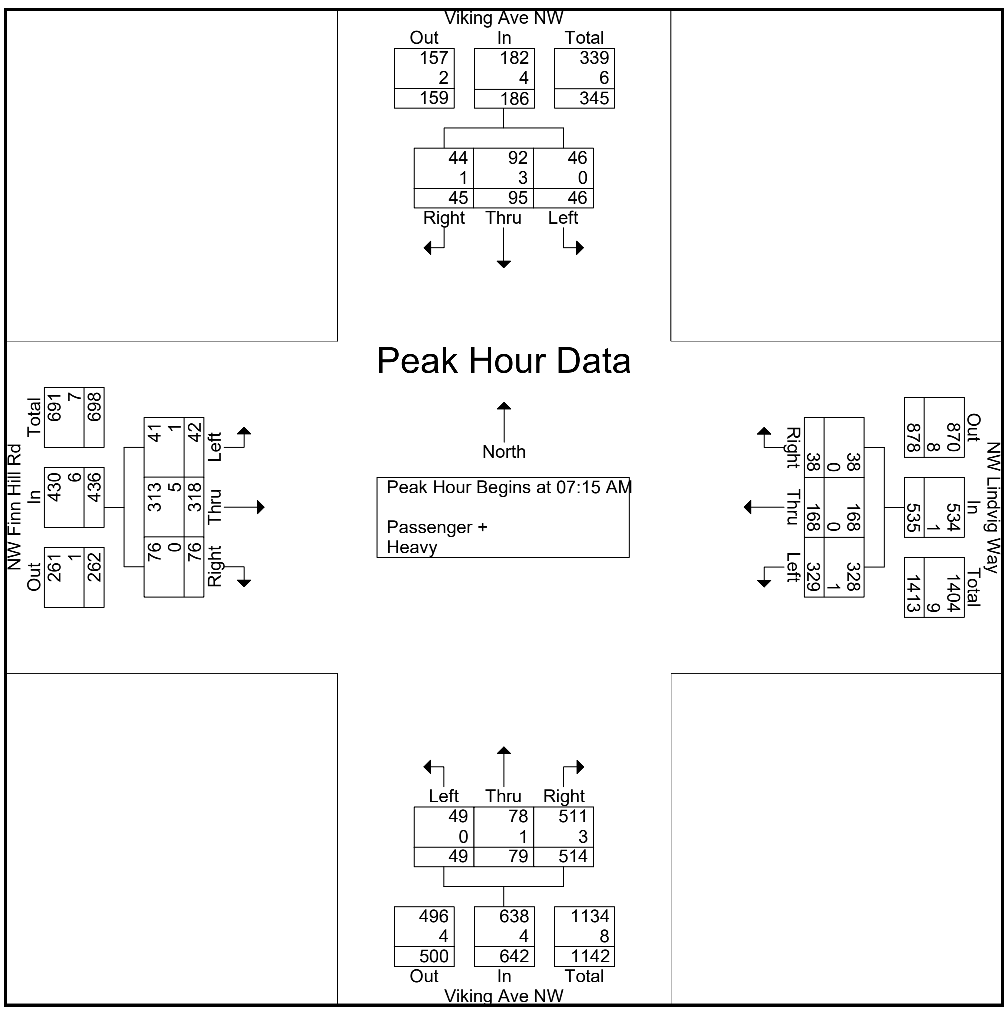
Groups Printed- Passenger + - Heavy

	Viking Ave NW Southbound				NW Lindvig Way Westbound				Viking Ave NW Northbound				NW Finn Hill Rd Eastbound				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
07:00 AM	14	17	6	37	6	38	51	95	92	14	11	117	22	52	3	77	326
07:15 AM	10	16	10	36	6	35	68	109	140	27	9	176	11	80	13	104	425
07:30 AM	10	24	16	50	8	42	80	130	143	23	8	174	20	93	3	116	470
07:45 AM	12	25	10	47	14	39	75	128	128	18	15	161	26	82	12	120	456
Total	46	82	42	170	34	154	274	462	503	82	43	628	79	307	31	417	1677
08:00 AM	13	30	10	53	10	52	106	168	103	11	17	131	19	63	14	96	448
08:15 AM	7	30	10	47	7	36	78	121	101	17	10	128	22	62	6	90	386
08:30 AM	6	32	11	49	8	35	69	112	114	28	16	158	17	66	9	92	411
08:45 AM	7	36	18	61	11	38	77	126	101	20	29	150	25	70	6	101	438
Total	33	128	49	210	36	161	330	527	419	76	72	567	83	261	35	379	1683
Grand Total	79	210	91	380	70	315	604	989	922	158	115	1195	162	568	66	796	3360
Apprch %	20.8	55.3	23.9		7.1	31.9	61.1		77.2	13.2	9.6		20.4	71.4	8.3		
Total %	2.4	6.2	2.7	11.3	2.1	9.4	18	29.4	27.4	4.7	3.4	35.6	4.8	16.9	2	23.7	
Passenger +	78	204	91	373	70	315	599	984	914	157	115	1186	160	559	64	783	3326
% Passenger +	98.7	97.1	100	98.2	100	100	99.2	99.5	99.1	99.4	100	99.2	98.8	98.4	97	98.4	99
Heavy	1	6	0	7	0	0	5	5	8	1	0	9	2	9	2	13	34
% Heavy	1.3	2.9	0	1.8	0	0	0.8	0.5	0.9	0.6	0	0.8	1.2	1.6	3	1.6	1

Heath & Associates

File Name : 4987c
Site Code : 00004987
Start Date : 4/18/2023
Page No : 2

	Viking Ave NW Southbound				NW Lindvig Way Westbound				Viking Ave NW Northbound				NW Finn Hill Rd Eastbound				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:15 AM																	
07:15 AM	10	16	10	36	6	35	68	109	140	27	9	176	11	80	13	104	425
07:30 AM	10	24	16	50	8	42	80	130	143	23	8	174	20	93	3	116	470
07:45 AM	12	25	10	47	14	39	75	128	128	18	15	161	26	82	12	120	456
08:00 AM	13	30	10	53	10	52	106	168	103	11	17	131	19	63	14	96	448
Total Volume	45	95	46	186	38	168	329	535	514	79	49	642	76	318	42	436	1799
% App. Total	24.2	51.1	24.7		7.1	31.4	61.5		80.1	12.3	7.6		17.4	72.9	9.6		
PHF	.865	.792	.719	.877	.679	.808	.776	.796	.899	.731	.721	.912	.731	.855	.750	.908	.957
Passenger +	44	92	46	182	38	168	328	534	511	78	49	638	76	313	41	430	1784
% Passenger +	97.8	96.8	100	97.8	100	100	99.7	99.8	99.4	98.7	100	99.4	100	98.4	97.6	98.6	99.2
Heavy	1	3	0	4	0	0	1	1	3	1	0	4	0	5	1	6	15
% Heavy	2.2	3.2	0	2.2	0	0	0.3	0.2	0.6	1.3	0	0.6	0	1.6	2.4	1.4	0.8



Heath & Associates

PO Box 397 Puyallup, WA 98371

File Name : 4841b
Site Code : 00004841
Start Date : 10/5/2022
Page No : 1

Groups Printed- Passenger + - Heavy

	Viking Ave NW Southbound				NW Lindvig Wy Westbound				Viking Ave NW Northbound				NW Finn Hill Rd Eastbound				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
04:00 PM	10	48	18	76	22	73	178	273	104	46	22	172	28	70	19	117	638
04:15 PM	17	42	19	78	25	67	174	266	110	53	20	183	20	63	20	103	630
04:30 PM	14	46	20	80	24	108	165	297	121	63	25	209	14	82	17	113	699
04:45 PM	20	62	30	112	31	92	156	279	129	58	25	212	23	83	17	123	726
Total	61	198	87	346	102	340	673	1115	464	220	92	776	85	298	73	456	2693
05:00 PM	18	34	25	77	28	90	145	263	131	61	28	220	13	71	14	98	658
05:15 PM	23	35	20	78	27	86	125	238	119	56	23	198	14	67	20	101	615
05:30 PM	15	39	15	69	29	80	117	226	122	55	24	201	47	52	5	104	600
05:45 PM	16	34	16	66	27	80	109	216	106	49	20	175	22	56	16	94	551
Total	72	142	76	290	111	336	496	943	478	221	95	794	96	246	55	397	2424
Grand Total	133	340	163	636	213	676	1169	2058	942	441	187	1570	181	544	128	853	5117
Apprch %	20.9	53.5	25.6		10.3	32.8	56.8		60	28.1	11.9		21.2	63.8	15		
Total %	2.6	6.6	3.2	12.4	4.2	13.2	22.8	40.2	18.4	8.6	3.7	30.7	3.5	10.6	2.5	16.7	
Passenger +	130	334	162	626	211	669	1151	2031	933	425	185	1543	179	533	128	840	5040
% Passenger +	97.7	98.2	99.4	98.4	99.1	99	98.5	98.7	99	96.4	98.9	98.3	98.9	98	100	98.5	98.5
Heavy	3	6	1	10	2	7	18	27	9	16	2	27	2	11	0	13	77
% Heavy	2.3	1.8	0.6	1.6	0.9	1	1.5	1.3	1	3.6	1.1	1.7	1.1	2	0	1.5	1.5

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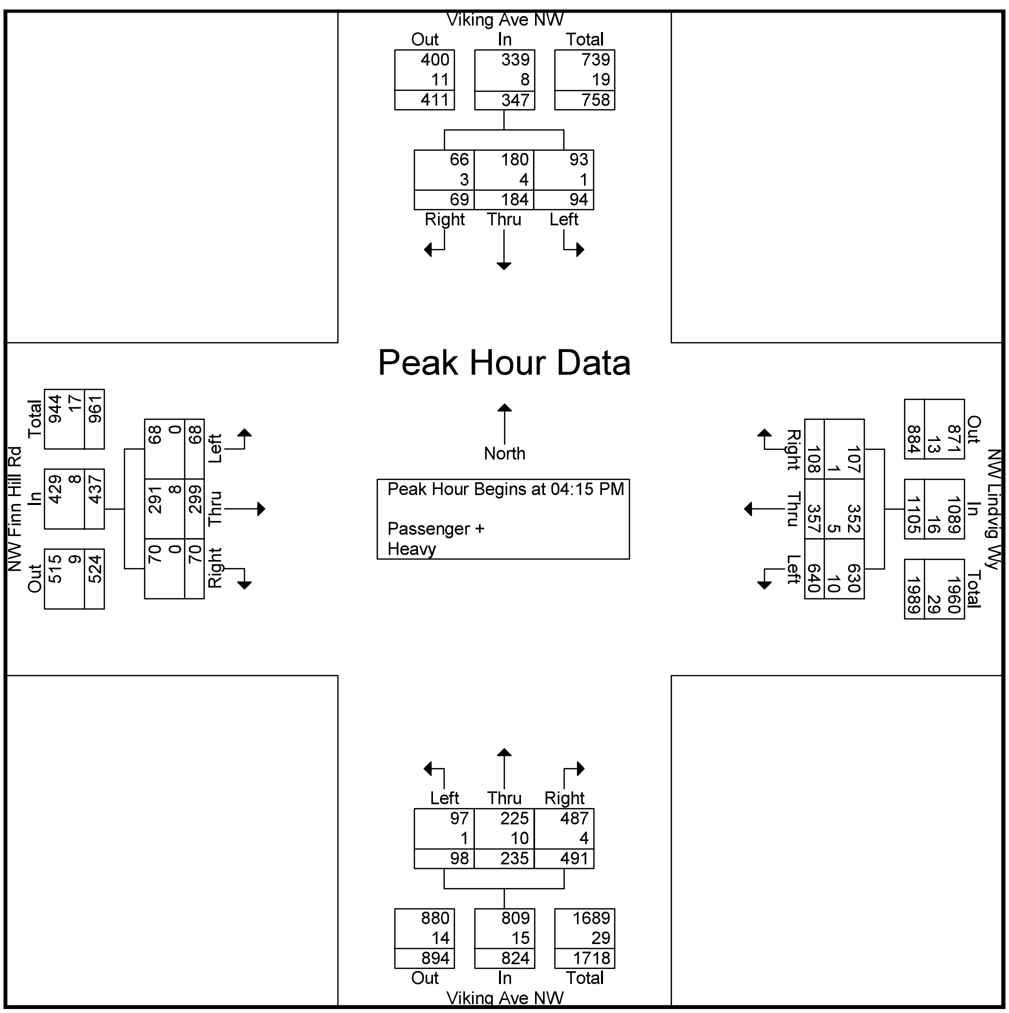
File Name : 4841b
Site Code : 00004841
Start Date : 10/5/2022
Page No : 2

	Viking Ave NW Southbound				NW Lindvig Wy Westbound				Viking Ave NW Northbound				NW Finn Hill Rd Eastbound				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:15 PM																	
04:15 PM	17	42	19	78	25	67	174	266	110	53	20	183	20	63	20	103	630
04:30 PM	14	46	20	80	24	108	165	297	121	63	25	209	14	82	17	113	699
04:45 PM	20	62	30	112	31	92	156	279	129	58	25	212	23	83	17	123	726
05:00 PM	18	34	25	77	28	90	145	263	131	61	28	220	13	71	14	98	658
Total Volume	69	184	94	347	108	357	640	1105	491	235	98	824	70	299	68	437	2713
% App. Total	19.9	53	27.1		9.8	32.3	57.9		59.6	28.5	11.9		16	68.4	15.6		
PHF	.863	.742	.783	.775	.871	.826	.920	.930	.937	.933	.875	.936	.761	.901	.850	.888	.934
Passenger +	66	180	93	339	107	352	630	1089	487	225	97	809	70	291	68	429	2666
% Passenger +	95.7	97.8	98.9	97.7	99.1	98.6	98.4	98.6	99.2	95.7	99.0	98.2	100	97.3	100	98.2	98.3
Heavy	3	4	1	8	1	5	10	16	4	10	1	15	0	8	0	8	47
% Heavy	4.3	2.2	1.1	2.3	0.9	1.4	1.6	1.4	0.8	4.3	1.0	1.8	0	2.7	0	1.8	1.7



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PO Box 397 Puyallup, WA 98371

File Name : 4987c
Site Code : 00004987
Start Date : 3/28/2023
Page No : 1

Groups Printed- Passenger + - Heavy

	Viking Ave NW Southbound				NW Edvard St Westbound				Viking Ave NW Northbound				NW Edvard St Eastbound				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
07:00 AM	1	88	3	92	1	0	0	1	0	104	2	106	2	0	3	5	204
07:15 AM	1	89	1	91	5	0	1	6	1	163	2	166	4	0	5	9	272
07:30 AM	5	123	6	134	4	0	0	4	2	170	0	172	2	0	4	6	316
07:45 AM	6	100	10	116	2	0	0	2	3	179	3	185	3	0	3	6	309
Total	13	400	20	433	12	0	1	13	6	616	7	629	11	0	15	26	1101
08:00 AM	5	122	9	136	5	0	2	7	0	124	2	126	1	0	2	3	272
08:15 AM	1	88	9	98	4	0	0	4	5	121	2	128	2	1	3	6	236
08:30 AM	1	106	14	121	6	0	3	9	0	114	3	117	1	0	7	8	255
08:45 AM	7	113	11	131	5	0	3	8	0	132	1	133	0	0	7	7	279
Total	14	429	43	486	20	0	8	28	5	491	8	504	4	1	19	24	1042
Grand Total	27	829	63	919	32	0	9	41	11	1107	15	1133	15	1	34	50	2143
Apprch %	2.9	90.2	6.9		78	0	22		1	97.7	1.3		30	2	68		
Total %	1.3	38.7	2.9	42.9	1.5	0	0.4	1.9	0.5	51.7	0.7	52.9	0.7	0	1.6	2.3	
Passenger +	25	797	62	884	28	0	9	37	10	1066	14	1090	14	1	33	48	2059
% Passenger +	92.6	96.1	98.4	96.2	87.5	0	100	90.2	90.9	96.3	93.3	96.2	93.3	100	97.1	96	96.1
Heavy	2	32	1	35	4	0	0	4	1	41	1	43	1	0	1	2	84
% Heavy	7.4	3.9	1.6	3.8	12.5	0	0	9.8	9.1	3.7	6.7	3.8	6.7	0	2.9	4	3.9

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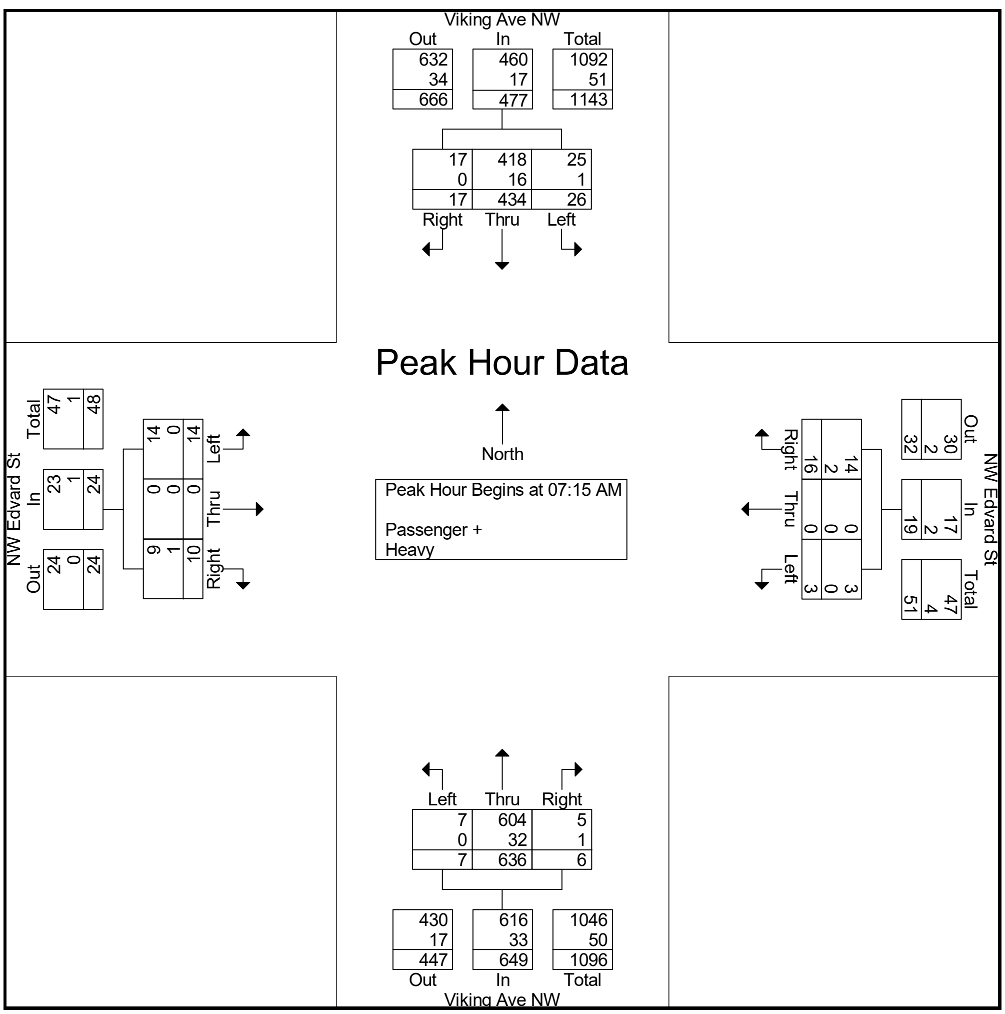
File Name : 4987c
Site Code : 00004987
Start Date : 3/28/2023
Page No : 2

	Viking Ave NW Southbound				NW Edvard St Westbound				Viking Ave NW Northbound				NW Edvard St Eastbound				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:15 AM																	
07:15 AM	1	89	1	91	**5**	0	1	6	1	163	2	166	**4**	0	**5**	**9**	272
07:30 AM	5	**123**	6	134	4	0	0	4	2	170	0	172	2	0	4	6	**316**
07:45 AM	**6**	100	**10**	116	2	0	0	2	**3**	**179**	**3**	**185**	3	0	3	6	309
08:00 AM	5	122	9	**136**	5	0	**2**	**7**	0	124	2	126	1	0	2	3	272
Total Volume	17	434	26	477	16	0	3	19	6	636	7	649	10	0	14	24	1169
% App. Total	3.6	91	5.5		84.2	0	15.8		0.9	98	1.1		41.7	0	58.3		
PHF	.708	.882	.650	.877	.800	.000	.375	.679	.500	.888	.583	.877	.625	.000	.700	.667	.925
Passenger +	17	418	25	460	14	0	3	17	5	604	7	616	9	0	14	23	1116
% Passenger +	100	96.3	96.2	96.4	87.5	0	100	89.5	83.3	95.0	100	94.9	90.0	0	100	95.8	95.5
Heavy	0	16	1	17	2	0	0	2	1	32	0	33	1	0	0	1	53
% Heavy	0	3.7	3.8	3.6	12.5	0	0	10.5	16.7	5.0	0	5.1	10.0	0	0	4.2	4.5



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PO Box 397 Puyallup, WA 98371

File Name : 4987d
Site Code : 00004987
Start Date : 3/28/2023
Page No : 1

Groups Printed- Passenger + - Heavy

	Viking Ave NW Southbound				NW Edvard St Westbound				Viking Ave NW Northbound				NW Edvard St Eastbound				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
04:00 PM	8	215	10	233	11	0	0	11	1	195	8	204	3	0	4	7	455
04:15 PM	7	197	9	213	10	0	1	11	0	206	3	209	2	0	5	7	440
04:30 PM	10	204	8	222	11	0	3	14	2	185	1	188	1	0	2	3	427
04:45 PM	3	222	4	229	7	0	3	10	0	214	3	217	5	0	6	11	467
Total	28	838	31	897	39	0	7	46	3	800	15	818	11	0	17	28	1789
05:00 PM	13	197	12	222	8	0	1	9	1	178	3	182	7	0	13	20	433
05:15 PM	3	185	4	192	4	0	1	5	1	188	0	189	2	0	6	8	394
05:30 PM	6	192	8	206	3	0	1	4	2	171	0	173	4	0	6	10	393
05:45 PM	9	135	8	152	6	0	2	8	2	114	1	117	0	0	6	6	283
Total	31	709	32	772	21	0	5	26	6	651	4	661	13	0	31	44	1503
Grand Total	59	1547	63	1669	60	0	12	72	9	1451	19	1479	24	0	48	72	3292
Apprch %	3.5	92.7	3.8		83.3	0	16.7		0.6	98.1	1.3		33.3	0	66.7		
Total %	1.8	47	1.9	50.7	1.8	0	0.4	2.2	0.3	44.1	0.6	44.9	0.7	0	1.5	2.2	
Passenger +	57	1525	63	1645	59	0	11	70	8	1432	19	1459	24	0	46	70	3244
% Passenger +	96.6	98.6	100	98.6	98.3	0	91.7	97.2	88.9	98.7	100	98.6	100	0	95.8	97.2	98.5
Heavy	2	22	0	24	1	0	1	2	1	19	0	20	0	0	2	2	48
% Heavy	3.4	1.4	0	1.4	1.7	0	8.3	2.8	11.1	1.3	0	1.4	0	0	4.2	2.8	1.5

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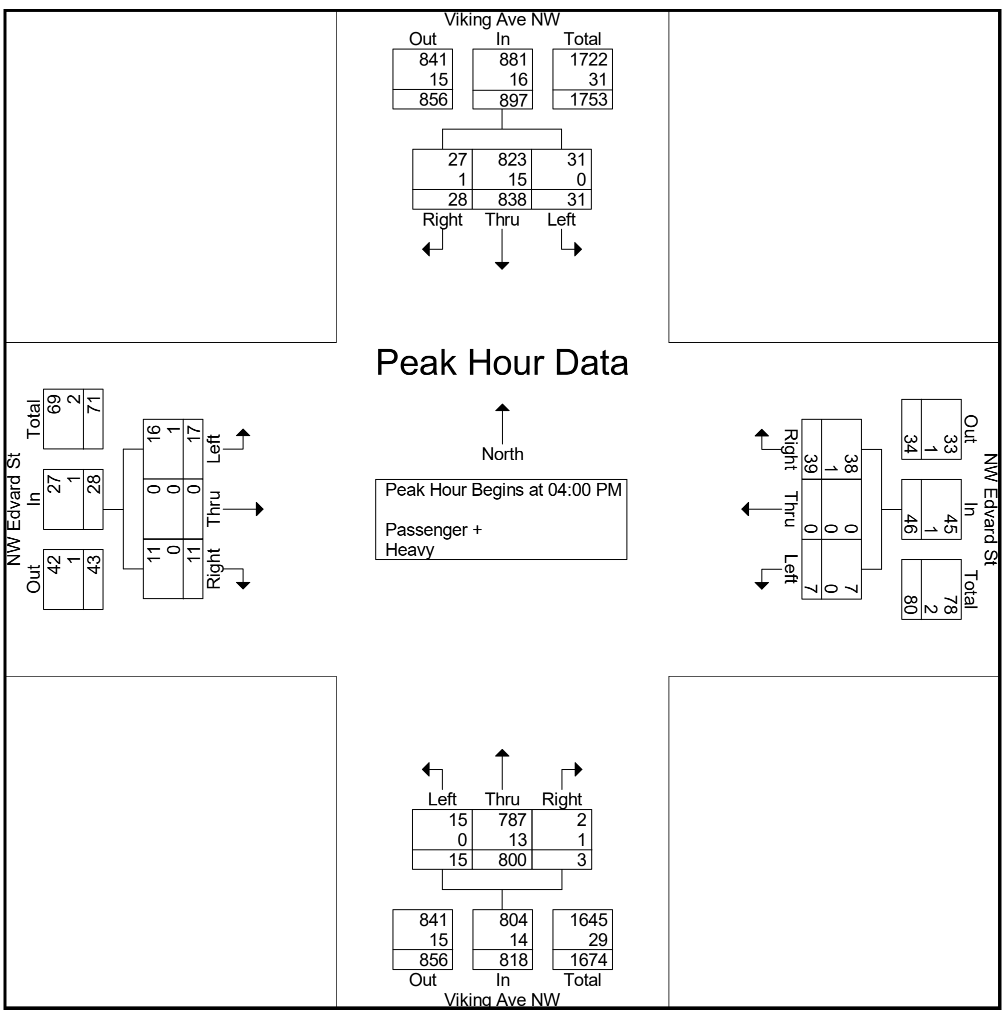
File Name : 4987d
Site Code : 00004987
Start Date : 3/28/2023
Page No : 2

	Viking Ave NW Southbound				NW Edvard St Westbound				Viking Ave NW Northbound				NW Edvard St Eastbound				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:00 PM																	
04:00 PM	8	215	**10**	**233**	**11**	0	0	11	1	195	**8**	204	3	0	4	7	455
04:15 PM	7	197	9	213	10	0	1	11	0	206	3	209	2	0	5	7	440
04:30 PM	**10**	204	8	222	11	0	**3**	**14**	**2**	185	1	188	1	0	2	3	427
04:45 PM	3	**222**	4	229	7	0	3	10	0	**214**	3	**217**	**5**	0	**6**	**11**	**467**
Total Volume	28	838	31	897	39	0	7	46	3	800	15	818	11	0	17	28	1789
% App. Total	3.1	93.4	3.5		84.8	0	15.2		0.4	97.8	1.8		39.3	0	60.7		
PHF	.700	.944	.775	.962	.886	.000	.583	.821	.375	.935	.469	.942	.550	.000	.708	.636	.958
Passenger +	27	823	31	881	38	0	7	45	2	787	15	804	11	0	16	27	1757
% Passenger +	96.4	98.2	100	98.2	97.4	0	100	97.8	66.7	98.4	100	98.3	100	0	94.1	96.4	98.2
Heavy	1	15	0	16	1	0	0	1	1	13	0	14	0	0	1	1	32
% Heavy	3.6	1.8	0	1.8	2.6	0	0	2.2	33.3	1.6	0	1.7	0	0	5.9	3.6	1.8



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PO Box 397 Puyallup, WA 98371

File Name : 4987e
Site Code : 00004987
Start Date : 3/28/2023
Page No : 1

Groups Printed- Passenger + - Heavy

	Viking Ave NW Southbound				NW Liberty Rd Westbound				Viking Ave NW Northbound				NW Liberty Rd Eastbound				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
07:00 AM	1	70	4	75	1	0	2	3	0	103	1	104	1	0	1	2	184
07:15 AM	3	78	4	85	3	1	4	8	1	157	1	159	2	0	2	4	256
07:30 AM	0	113	2	115	1	0	1	2	0	159	1	160	2	0	0	2	279
07:45 AM	5	88	5	98	0	0	1	1	0	167	1	168	0	0	5	5	272
Total	9	349	15	373	5	1	8	14	1	586	4	591	5	0	8	13	991
08:00 AM	2	113	2	117	1	0	1	2	1	111	2	114	1	0	4	5	238
08:15 AM	8	70	0	78	0	0	0	0	0	119	1	120	0	0	3	3	201
08:30 AM	4	99	2	105	1	0	0	1	3	114	0	117	1	0	1	2	225
08:45 AM	2	100	1	103	0	0	0	0	0	125	3	128	0	0	1	1	232
Total	16	382	5	403	2	0	1	3	4	469	6	479	2	0	9	11	896
Grand Total	25	731	20	776	7	1	9	17	5	1055	10	1070	7	0	17	24	1887
Apprch %	3.2	94.2	2.6		41.2	5.9	52.9		0.5	98.6	0.9		29.2	0	70.8		
Total %	1.3	38.7	1.1	41.1	0.4	0.1	0.5	0.9	0.3	55.9	0.5	56.7	0.4	0	0.9	1.3	
Passenger +	23	704	14	741	5	1	9	15	4	1024	10	1038	6	0	16	22	1816
% Passenger +	92	96.3	70	95.5	71.4	100	100	88.2	80	97.1	100	97	85.7	0	94.1	91.7	96.2
Heavy	2	27	6	35	2	0	0	2	1	31	0	32	1	0	1	2	71
% Heavy	8	3.7	30	4.5	28.6	0	0	11.8	20	2.9	0	3	14.3	0	5.9	8.3	3.8

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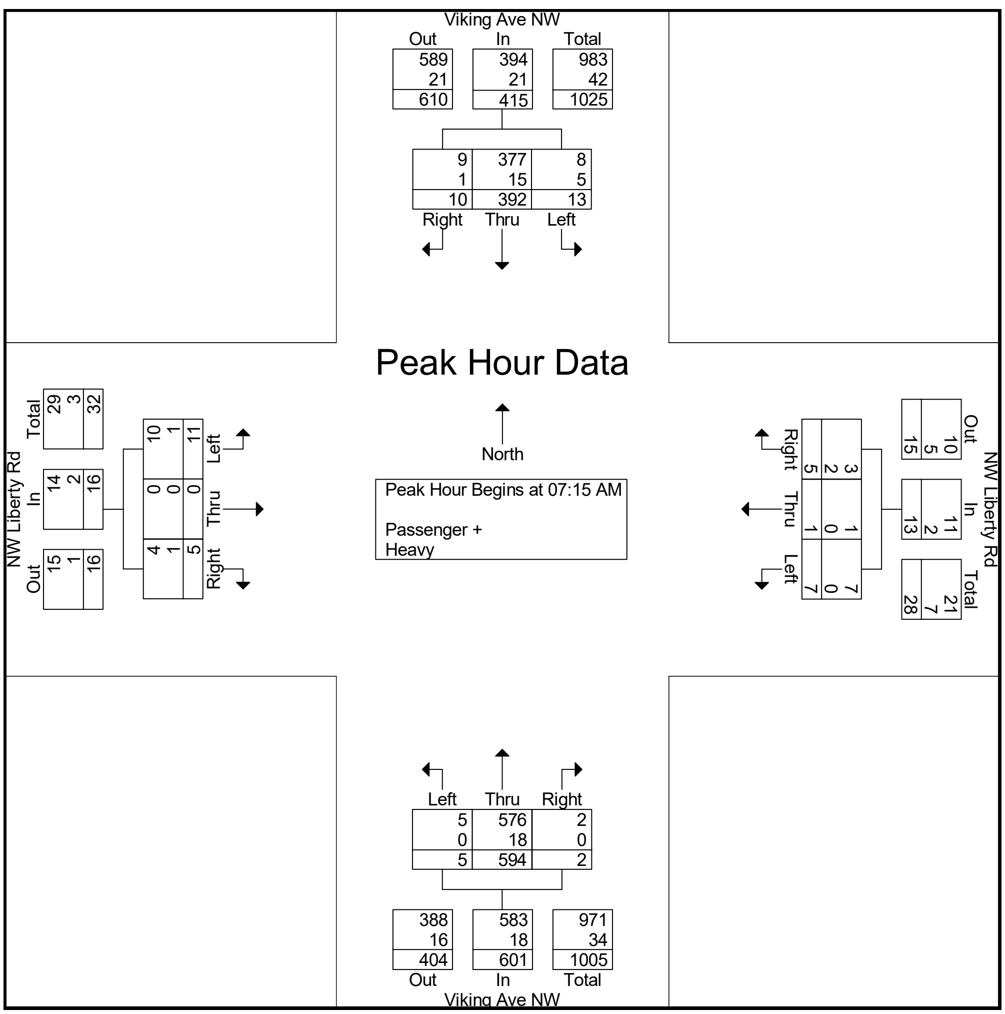
File Name : 4987e
Site Code : 00004987
Start Date : 3/28/2023
Page No : 2

	Viking Ave NW Southbound				NW Liberty Rd Westbound				Viking Ave NW Northbound				NW Liberty Rd Eastbound				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:15 AM																	
07:15 AM	3	78	4	85	**3**	**1**	**4**	**8**	**1**	157	1	159	**2**	0	2	4	256
07:30 AM	0	**113**	2	115	1	0	1	2	0	159	1	160	2	0	0	2	**279**
07:45 AM	**5**	88	**5**	98	0	0	1	1	0	**167**	1	**168**	0	0	**5**	**5**	272
08:00 AM	2	113	2	**117**	1	0	1	2	1	111	**2**	114	1	0	4	5	238
Total Volume	10	392	13	415	5	1	7	13	2	594	5	601	5	0	11	16	1045
% App. Total	2.4	94.5	3.1		38.5	7.7	53.8		0.3	98.8	0.8		31.2	0	68.8		
PHF	.500	.867	.650	.887	.417	.250	.438	.406	.500	.889	.625	.894	.625	.000	.550	.800	.936
Passenger +	9	377	8	394	3	1	7	11	2	576	5	583	4	0	10	14	1002
% Passenger +	90.0	96.2	61.5	94.9	60.0	100	100	84.6	100	97.0	100	97.0	80.0	0	90.9	87.5	95.9
Heavy	1	15	5	21	2	0	0	2	0	18	0	18	1	0	1	2	43
% Heavy	10.0	3.8	38.5	5.1	40.0	0	0	15.4	0	3.0	0	3.0	20.0	0	9.1	12.5	4.1



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PO Box 397 Puyallup, WA 98371

File Name : 4987f
Site Code : 00004987
Start Date : 3/28/2023
Page No : 1

Groups Printed- Passenger + - Heavy

	Viking Ave NW Southbound				NW Liberty Rd Westbound				Viking Ave NW Northbound				NW Liberty Rd Eastbound				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
04:00 PM	4	208	3	215	0	0	2	2	3	196	2	201	1	0	3	4	422
04:15 PM	4	204	4	212	2	0	2	4	2	182	0	184	2	0	2	4	404
04:30 PM	6	204	2	212	1	0	1	2	3	166	1	170	0	0	5	5	389
04:45 PM	2	218	2	222	0	0	2	2	0	197	1	198	1	0	3	4	426
Total	16	834	11	861	3	0	7	10	8	741	4	753	4	0	13	17	1641
05:00 PM	0	212	2	214	0	0	1	1	0	161	1	162	2	0	4	6	383
05:15 PM	2	194	2	198	3	0	1	4	1	168	2	171	1	0	2	3	376
05:30 PM	1	193	2	196	0	0	0	0	1	166	0	167	1	0	0	1	364
05:45 PM	0	127	6	133	2	0	2	4	1	109	0	110	0	0	1	1	248
Total	3	726	12	741	5	0	4	9	3	604	3	610	4	0	7	11	1371
Grand Total	19	1560	23	1602	8	0	11	19	11	1345	7	1363	8	0	20	28	3012
Apprch %	1.2	97.4	1.4		42.1	0	57.9		0.8	98.7	0.5		28.6	0	71.4		
Total %	0.6	51.8	0.8	53.2	0.3	0	0.4	0.6	0.4	44.7	0.2	45.3	0.3	0	0.7	0.9	
Passenger +	17	1537	22	1576	8	0	11	19	11	1323	7	1341	8	0	19	27	2963
% Passenger +	89.5	98.5	95.7	98.4	100	0	100	100	100	98.4	100	98.4	100	0	95	96.4	98.4
Heavy	2	23	1	26	0	0	0	0	0	22	0	22	0	0	1	1	49
% Heavy	10.5	1.5	4.3	1.6	0	0	0	0	0	1.6	0	1.6	0	0	5	3.6	1.6

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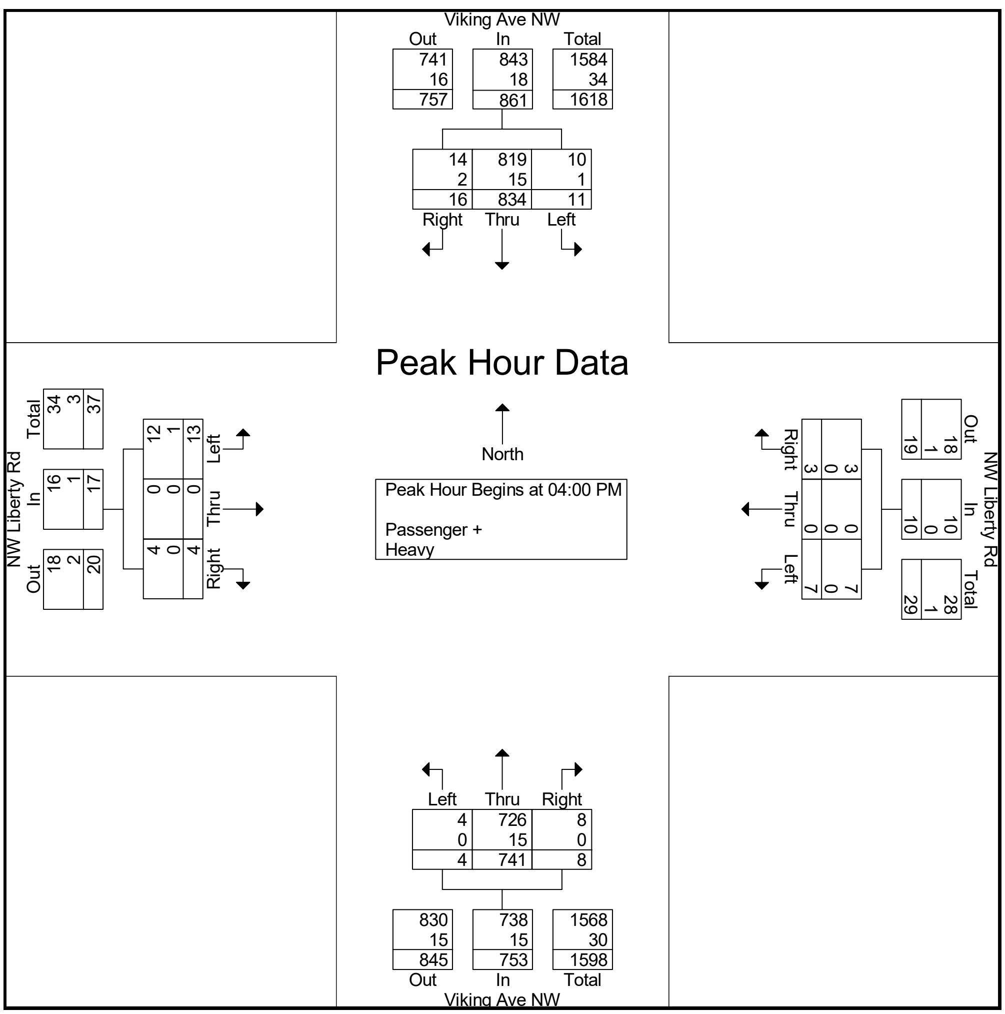
File Name : 4987f
Site Code : 00004987
Start Date : 3/28/2023
Page No : 2

	Viking Ave NW Southbound				NW Liberty Rd Westbound				Viking Ave NW Northbound				NW Liberty Rd Eastbound				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:00 PM																	
04:00 PM	4	208	3	215	0	0	**2**	2	**3**	196	**2**	**201**	1	0	3	4	422
04:15 PM	4	204	**4**	212	**2**	0	2	**4**	2	182	0	184	**2**	0	2	4	404
04:30 PM	**6**	204	2	212	1	0	1	2	3	166	1	170	0	0	**5**	**5**	389
04:45 PM	2	**218**	2	**222**	0	0	2	2	0	**197**	1	198	1	0	3	4	**426**
Total Volume	16	834	11	861	3	0	7	10	8	741	4	753	4	0	13	17	1641
% App. Total	1.9	96.9	1.3		30	0	70		1.1	98.4	0.5		23.5	0	76.5		
PHF	.667	.956	.688	.970	.375	.000	.875	.625	.667	.940	.500	.937	.500	.000	.650	.850	.963
Passenger +	14	819	10	843	3	0	7	10	8	726	4	738	4	0	12	16	1607
% Passenger +	87.5	98.2	90.9	97.9	100	0	100	100	100	98.0	100	98.0	100	0	92.3	94.1	97.9
Heavy	2	15	1	18	0	0	0	0	0	15	0	15	0	0	1	1	34
% Heavy	12.5	1.8	9.1	2.1	0	0	0	0	0	2.0	0	2.0	0	0	7.7	5.9	2.1



Heath & Associates

PO Box 397 Puyallup, WA 98371

File Name : 4987g
Site Code : 00004987
Start Date : 3/28/2023
Page No : 1

Groups Printed- Passenger + - Heavy

	Viking Ave NW Southbound			NW Bovela Ln Westbound			Viking Ave NW Northbound			
Start Time	Thru	Left	App. Total	Right	Left	App. Total	Right	Thru	App. Total	Int. Total
07:00 AM	66	1	67	1	2	3	3	105	108	178
07:15 AM	82	3	85	4	1	5	1	162	163	253
07:30 AM	103	1	104	4	2	6	2	139	141	251
07:45 AM	80	4	84	6	0	6	2	158	160	250
Total	331	9	340	15	5	20	8	564	572	932
08:00 AM	107	7	114	5	1	6	4	108	112	232
08:15 AM	68	3	71	2	1	3	2	120	122	196
08:30 AM	98	6	104	4	2	6	2	98	100	210
08:45 AM	103	2	105	6	3	9	1	122	123	237
Total	376	18	394	17	7	24	9	448	457	875
Grand Total	707	27	734	32	12	44	17	1012	1029	1807
Apprch %	96.3	3.7		72.7	27.3		1.7	98.3		
Total %	39.1	1.5	40.6	1.8	0.7	2.4	0.9	56	56.9	
Passenger +	680	26	706	29	12	41	17	984	1001	1748
% Passenger +	96.2	96.3	96.2	90.6	100	93.2	100	97.2	97.3	96.7
Heavy	27	1	28	3	0	3	0	28	28	59
% Heavy	3.8	3.7	3.8	9.4	0	6.8	0	2.8	2.7	3.3

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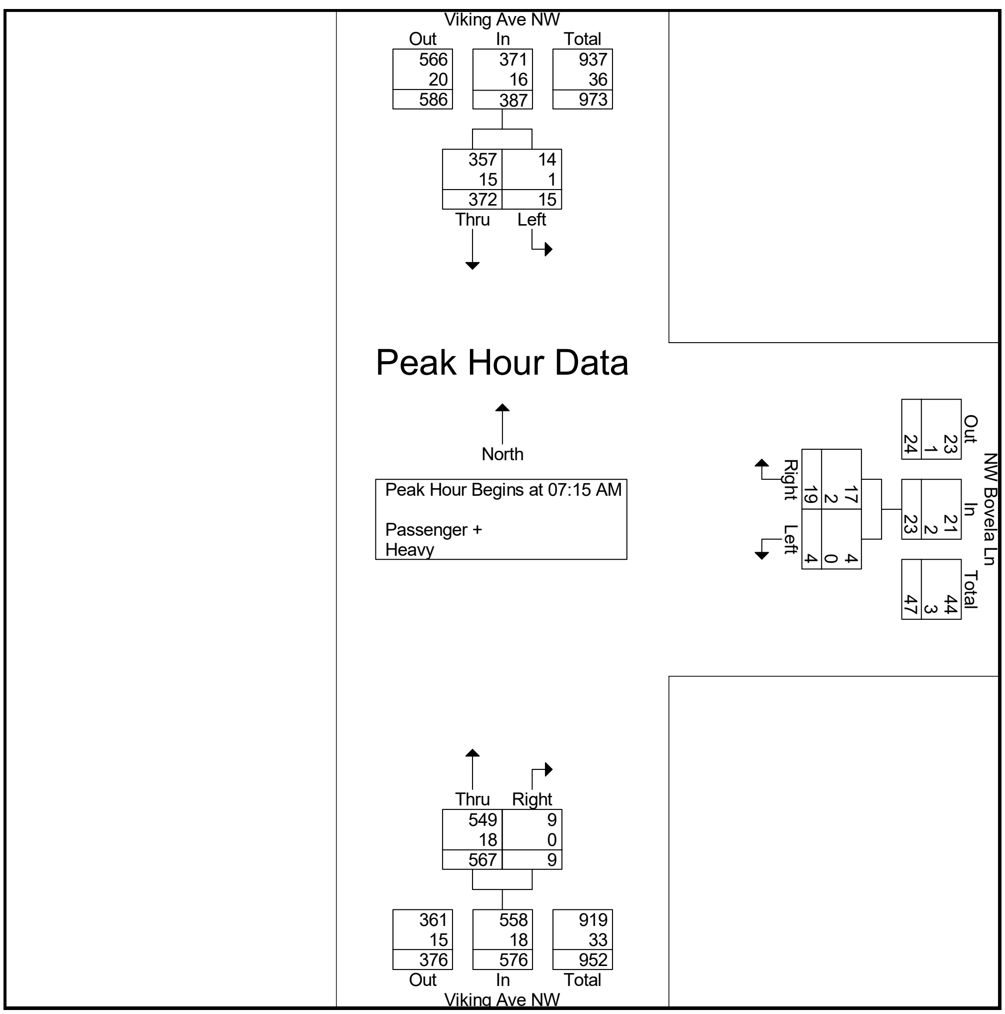
PO Box 397 Puyallup, WA 98371

File Name : 4987g
Site Code : 00004987
Start Date : 3/28/2023
Page No : 2

	Viking Ave NW Southbound			NW Bovela Ln Westbound			Viking Ave NW Northbound			
Start Time	Thru	Left	App. Total	Right	Left	App. Total	Right	Thru	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 07:15 AM										
07:15 AM	82	3	85	4	1	5	1	**162**	**163**	**253**
07:30 AM	103	1	104	4	**2**	**6**	2	139	141	251
07:45 AM	80	4	84	**6**	0	6	2	158	160	250
08:00 AM	**107**	**7**	**114**	5	1	6	**4**	108	112	232
Total Volume	372	15	387	19	4	23	9	567	576	986
% App. Total	96.1	3.9		82.6	17.4		1.6	98.4		
PHF	.869	.536	.849	.792	.500	.958	.563	.875	.883	.974
Passenger +	357	14	371	17	4	21	9	549	558	950
% Passenger +	96.0	93.3	95.9	89.5	100	91.3	100	96.8	96.9	96.3
Heavy	15	1	16	2	0	2	0	18	18	36
% Heavy	4.0	6.7	4.1	10.5	0	8.7	0	3.2	3.1	3.7



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PO Box 397 Puyallup, WA 98371

File Name : 4987h
Site Code : 00004987
Start Date : 3/28/2023
Page No : 1

Groups Printed- Passenger + - Heavy

	Viking Ave NW Southbound			NW Bovela Ln Westbound			Viking Ave NW Northbound			
Start Time	Thru	Left	App. Total	Right	Left	App. Total	Right	Thru	App. Total	Int. Total
04:00 PM	196	5	201	7	2	9	4	183	187	397
04:15 PM	192	7	199	2	2	4	5	185	190	393
04:30 PM	175	2	177	5	5	10	1	159	160	347
04:45 PM	211	2	213	6	4	10	3	185	188	411
Total	774	16	790	20	13	33	13	712	725	1548
05:00 PM	213	0	213	3	4	7	3	144	147	367
05:15 PM	193	4	197	12	3	15	1	158	159	371
05:30 PM	182	2	184	6	5	11	1	152	153	348
05:45 PM	124	3	127	0	2	2	1	96	97	226
Total	712	9	721	21	14	35	6	550	556	1312
Grand Total	1486	25	1511	41	27	68	19	1262	1281	2860
Apprch %	98.3	1.7		60.3	39.7		1.5	98.5		
Total %	52	0.9	52.8	1.4	0.9	2.4	0.7	44.1	44.8	
Passenger +	1462	25	1487	41	27	68	19	1242	1261	2816
% Passenger +	98.4	100	98.4	100	100	100	100	98.4	98.4	98.5
Heavy	24	0	24	0	0	0	0	20	20	44
% Heavy	1.6	0	1.6	0	0	0	0	1.6	1.6	1.5

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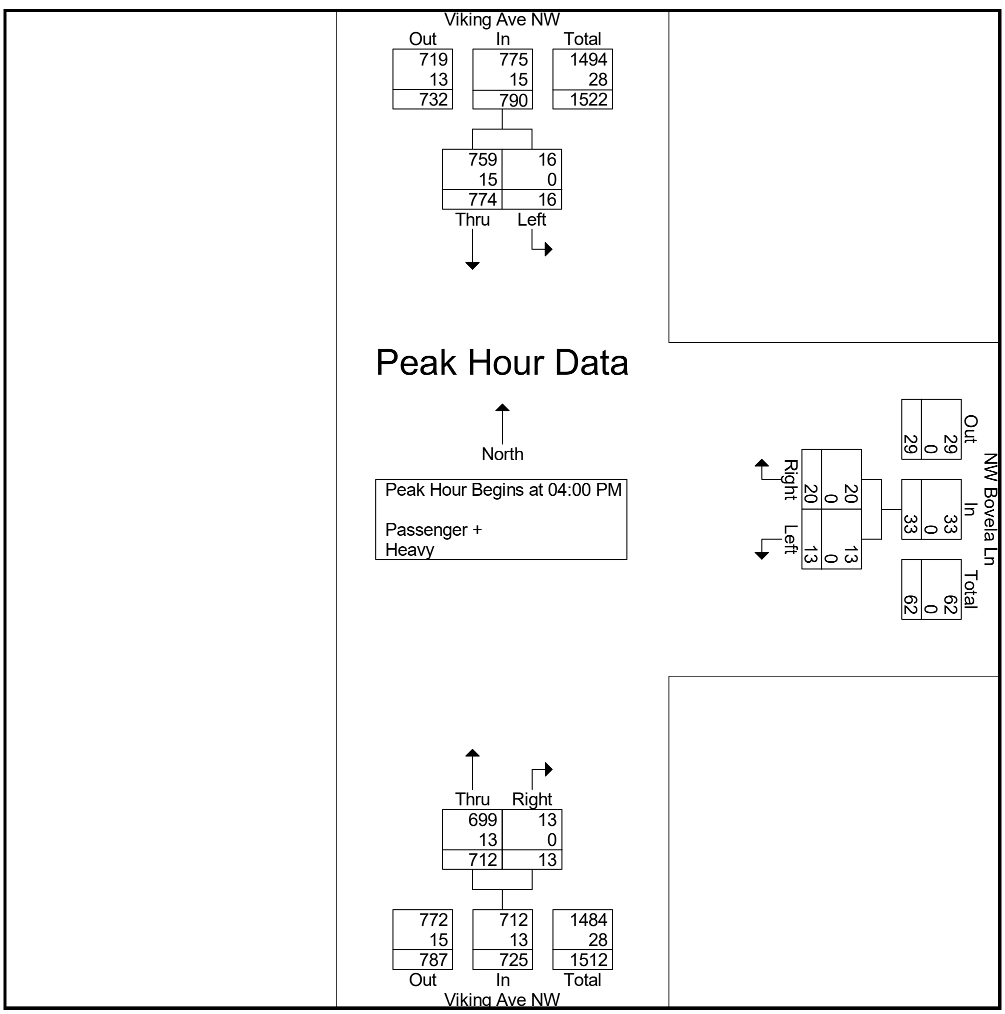
PO Box 397 Puyallup, WA 98371

File Name : 4987h
Site Code : 00004987
Start Date : 3/28/2023
Page No : 2

	Viking Ave NW Southbound			NW Bovela Ln Westbound			Viking Ave NW Northbound			
Start Time	Thru	Left	App. Total	Right	Left	App. Total	Right	Thru	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 04:00 PM										
04:00 PM	196	5	201	**7**	2	9	4	183	187	397
04:15 PM	192	**7**	199	2	2	4	**5**	**185**	**190**	393
04:30 PM	175	2	177	5	**5**	**10**	1	159	160	347
04:45 PM	**211**	2	**213**	6	4	10	3	185	188	**411**
Total Volume	774	16	790	20	13	33	13	712	725	1548
% App. Total	98	2		60.6	39.4		1.8	98.2		
PHF	.917	.571	.927	.714	.650	.825	.650	.962	.954	.942
Passenger +	759	16	775	20	13	33	13	699	712	1520
% Passenger +	98.1	100	98.1	100	100	100	100	98.2	98.2	98.2
Heavy	15	0	15	0	0	0	0	13	13	28
% Heavy	1.9	0	1.9	0	0	0	0	1.8	1.8	1.8



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PO Box 397 Puyallup, WA 98371

File Name : 4987a
Site Code : 00004987
Start Date : 9/13/2022
Page No : 1

Groups Printed- Passenger + - Heavy

	Viking Ave NW Southbound				Retirement Home Driveway Westbound				Viking Ave NW Northbound				Minor Residential Driveway Eastbound						
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	Peds	Peds	App. Total	Int. Total
07:00 AM	0	52	4	56	2	0	3	5	6	107	0	113	0	0	0	0	0	0	174
07:15 AM	0	67	0	67	1	0	0	1	1	169	0	170	0	0	0	0	0	0	238
07:30 AM	0	90	2	92	3	0	1	4	1	185	0	186	0	0	0	0	0	0	282
07:45 AM	0	118	0	118	1	0	0	1	2	131	0	133	0	0	0	0	0	0	252
Total	0	327	6	333	7	0	4	11	10	592	0	602	0	0	0	0	0	0	946
08:00 AM	0	99	2	101	1	1	0	2	0	115	0	115	0	0	0	0	0	0	218
08:15 AM	0	91	0	91	0	0	1	1	0	109	0	109	0	0	0	0	0	0	201
08:30 AM	0	93	2	95	1	0	0	1	0	128	0	128	0	0	0	0	0	0	224
08:45 AM	0	97	2	99	0	0	0	0	0	130	1	131	0	0	0	0	0	0	230
Total	0	380	6	386	2	1	1	4	0	482	1	483	0	0	0	0	0	0	873
Grand Total	0	707	12	719	9	1	5	15	10	1074	1	1085	0	0	0	0	0	0	1819
Apprch %	0	98.3	1.7		60	6.7	33.3		0.9	99	0.1		0	0	0	0	0		
Total %	0	38.9	0.7	39.5	0.5	0.1	0.3	0.8	0.5	59	0.1	59.6	0	0	0	0	0	0	
Passenger +	0	694	12	706	9	1	5	15	10	1052	1	1063	0	0	0	0	0	0	1784
% Passenger +	0	98.2	100	98.2	100	100	100	100	100	98	100	98	0	0	0	0	0	0	98.1
Heavy	0	13	0	13	0	0	0	0	0	22	0	22	0	0	0	0	0	0	35
% Heavy	0	1.8	0	1.8	0	0	0	0	0	2	0	2	0	0	0	0	0	0	1.9

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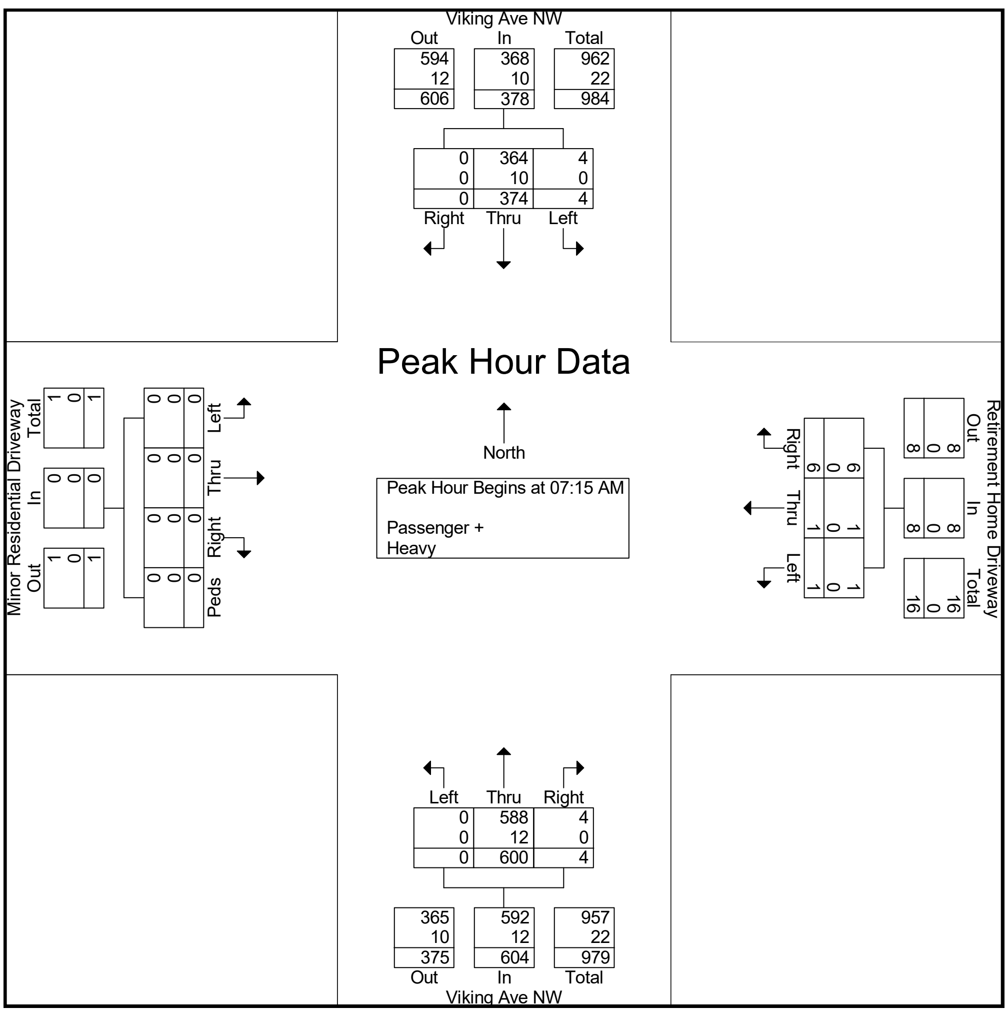
PO Box 397 Puyallup, WA 98371

File Name : 4987a
Site Code : 00004987
Start Date : 9/13/2022
Page No : 2

	Viking Ave NW Southbound				Retirement Home Driveway Westbound				Viking Ave NW Northbound				Minor Residential Driveway Eastbound						
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	Peds	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																			
Peak Hour for Entire Intersection Begins at 07:15 AM																			
07:15 AM	0	67	0	67	1	0	0	1	1	169	0	170	0	0	0	0	0	0	238
07:30 AM	0	90	2	92	3	0	1	4	1	185	0	186	0	0	0	0	0	0	282
07:45 AM	0	118	0	118	1	0	0	1	2	131	0	133	0	0	0	0	0	0	252
08:00 AM	0	99	2	101	1	1	0	2	0	115	0	115	0	0	0	0	0	0	218
Total Volume	0	374	4	378	6	1	1	8	4	600	0	604	0	0	0	0	0	0	990
% App. Total	0	98.9	1.1		75	12.5	12.5		0.7	99.3	0		0	0	0	0	0		
PHF	.000	.792	.500	.801	.500	.250	.250	.500	.500	.811	.000	.812	.000	.000	.000	.000	.000	.000	.878
Passenger +	0	364	4	368	6	1	1	8	4	588	0	592	0	0	0	0	0	0	968
% Passenger +	0	97.3	100	97.4	100	100	100	100	100	98.0	0	98.0	0	0	0	0	0	0	97.8
Heavy	0	10	0	10	0	0	0	0	0	12	0	12	0	0	0	0	0	0	22
% Heavy	0	2.7	0	2.6	0	0	0	0	0	2.0	0	2.0	0	0	0	0	0	0	2.2



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PO Box 397 Puyallup, WA 98371

File Name : 4987b
Site Code : 00004987
Start Date : 9/13/2022
Page No : 1

Groups Printed- Passenger + - Heavy

	Viking Ave NW Southbound				Retirement Home Driveway Westbound				Viking Ave NW Northbound				Minor Residential Driveway Eastbound						
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	Peds	Peds	App. Total	Int. Total
04:00 PM	0	166	0	166	0	0	1	1	0	176	0	176	0	0	1	0	0	1	344
04:15 PM	0	204	1	205	2	0	3	5	0	198	0	198	1	0	3	0	0	4	412
04:30 PM	0	189	0	189	4	0	1	5	0	171	0	171	1	0	1	0	0	2	367
04:45 PM	0	205	2	207	4	0	2	6	1	163	0	164	1	0	0	0	0	1	378
Total	0	764	3	767	10	0	7	17	1	708	0	709	3	0	5	0	0	8	1501
05:00 PM	0	225	1	226	3	0	1	4	2	133	0	135	1	0	1	0	0	2	367
05:15 PM	0	197	0	197	3	0	0	3	0	151	0	151	0	0	1	0	0	1	352
05:30 PM	0	157	0	157	1	0	1	2	0	150	0	150	0	0	1	0	0	1	310
05:45 PM	0	146	1	147	2	0	0	2	0	120	0	120	0	0	1	0	0	1	270
Total	0	725	2	727	9	0	2	11	2	554	0	556	1	0	4	0	0	5	1299
Grand Total	0	1489	5	1494	19	0	9	28	3	1262	0	1265	4	0	9	0	0	13	2800
Apprch %	0	99.7	0.3		67.9	0	32.1		0.2	99.8	0		30.8	0	69.2	0	0		
Total %	0	53.2	0.2	53.4	0.7	0	0.3	1	0.1	45.1	0	45.2	0.1	0	0.3	0	0	0.5	
Passenger +	0	1470	5	1475	19	0	9	28	3	1247	0	1250	4	0	9	0	0	13	2766
% Passenger +	0	98.7	100	98.7	100	0	100	100	100	98.8	0	98.8	100	0	100	0	0	100	98.8
Heavy	0	19	0	19	0	0	0	0	0	15	0	15	0	0	0	0	0	0	34
% Heavy	0	1.3	0	1.3	0	0	0	0	0	1.2	0	1.2	0	0	0	0	0	0	1.2

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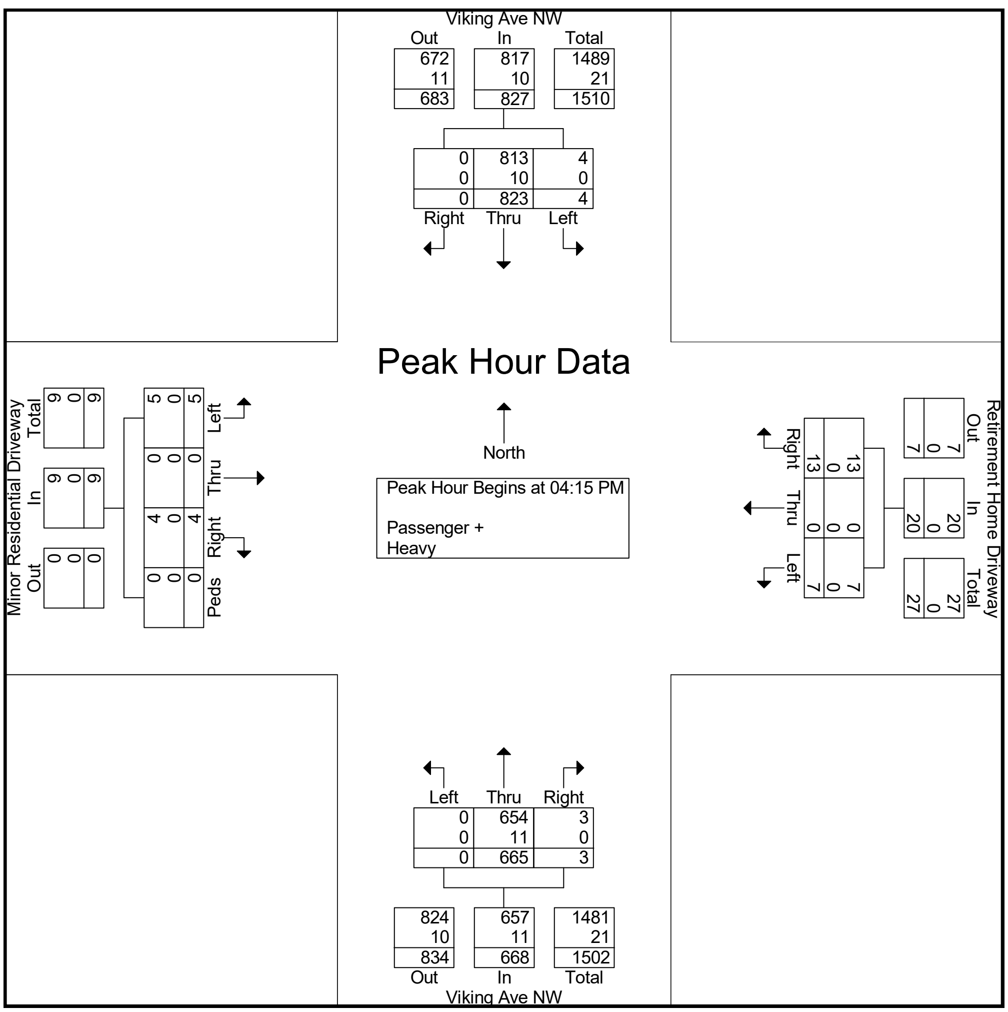
File Name : 4987b
Site Code : 00004987
Start Date : 9/13/2022
Page No : 2

	Viking Ave NW Southbound				Retirement Home Driveway Westbound				Viking Ave NW Northbound				Minor Residential Driveway Eastbound						
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	Peds	Peds	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																			
Peak Hour for Entire Intersection Begins at 04:15 PM																			
04:15 PM	0	204	1	205	2	0	3	5	0	198	0	198	1	0	3	0	0	4	412
04:30 PM	0	189	0	189	4	0	1	5	0	171	0	171	1	0	1	0	0	2	367
04:45 PM	0	205	2	207	4	0	2	6	1	163	0	164	1	0	0	0	0	1	378
05:00 PM	0	225	1	226	3	0	1	4	2	133	0	135	1	0	1	0	0	2	367
Total Volume	0	823	4	827	13	0	7	20	3	665	0	668	4	0	5	0	0	9	1524
% App. Total	0	99.5	0.5		65	0	35		0.4	99.6	0		44.4	0	55.6	0	0		
PHF	.000	.914	.500	.915	.813	.000	.583	.833	.375	.840	.000	.843	1.00	.000	.417	.000	.000	.563	.925
Passenger +	0	813	4	817	13	0	7	20	3	654	0	657	4	0	5	0	0	9	1503
% Passenger +	0	98.8	100	98.8	100	0	100	100	100	98.3	0	98.4	100	0	100	0	0	100	98.6
Heavy	0	10	0	10	0	0	0	0	0	11	0	11	0	0	0	0	0	0	21
% Heavy	0	1.2	0	1.2	0	0	0	0	0	1.7	0	1.6	0	0	0	0	0	0	1.4



PLATEAU AT LIBERTY BAY
TRAFFIC IMPACT ANALYSIS

APPENDIX

FIGURE A - NEARBY PARKS &
COMMERCIAL DISTRICTS

N

Map 2-1 2021 City Park Map

Other Properties

In addition to city-owned parks, recreation facilities and open space listed in Tables 2-1 and 2-2, the city has shared use agreements with the North Kitsap School District (NKSD) on fields at four schools. These fields are available for city-sponsored recreation programs and general public use. **NKSD shared-use fields total 43.22 acres.**

Table 2-3: Shared Fields with NKSD

School	Field Size
Vinland Elementary	3.4 acres
Strawberry Fields (Poulsbo Elementary)	8.34 acres
Poulsbo Middle School	20.4 acres
NK High School	11.08 acres
Total Shared Fields with NKSD	**43.22 acres**

Source: Poulsbo Planning and Economic Development Department GIS

Final Transportation Plan Update - 2016
City of Poulsbo, Washington

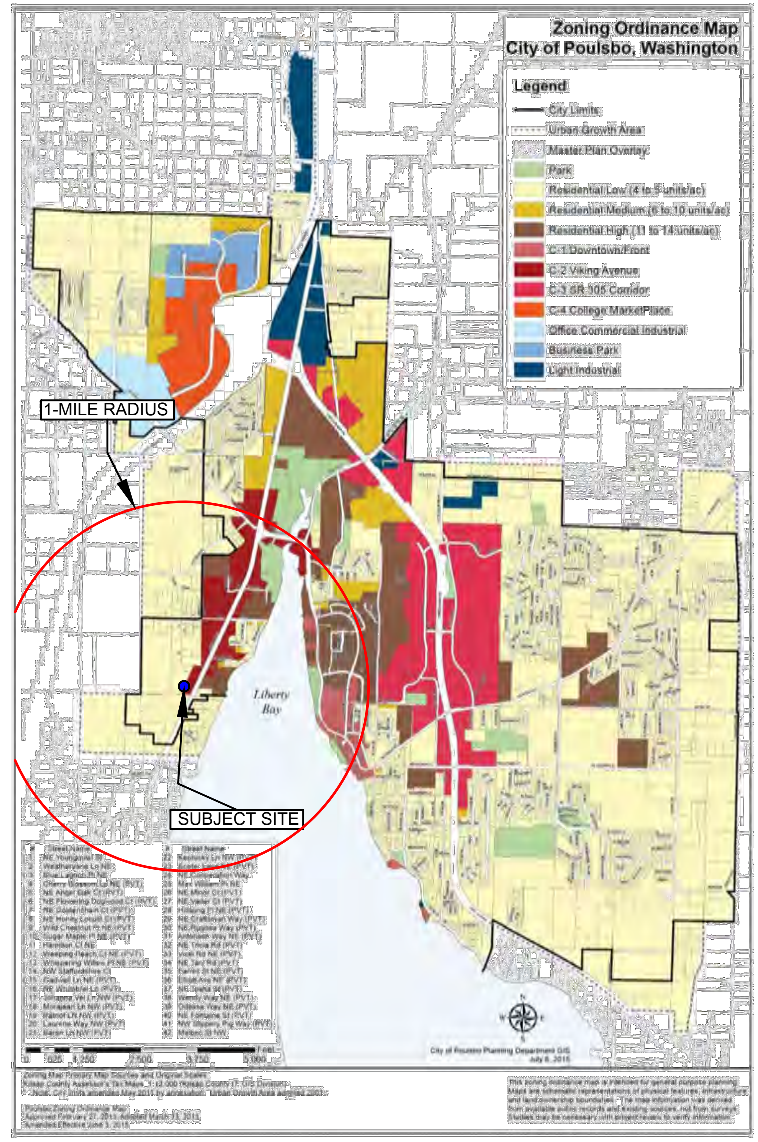


Figure 7. Zoning Map

HEATH & ASSOCIATES
Transportation Planning & Engineering

PLATEAU AT LIBERTY BAY

NEARBY PARKS AND COMMERCIAL DISTRICTS
FIGURE A

PLATEAU AT LIBERTY BAY
TRAFFIC IMPACT ANALYSIS

APPENDIX

SPEED STUDY

Vehicle Speed Report Summary

Location: Viking Ave NW S/O 19352 Viking Way NW

Count Direction: Northbound / Southbound

Date Range: 3/28/2023 to 3/30/2023

Site Code: 01

	Speed Range (mph)																	Total
	0 - 10	10 - 15	15 - 20	20 - 25	25 - 30	30 - 35	35 - 40	40 - 45	45 - 50	50 - 55	55 - 60	60 - 65	65 - 70	70 - 75	75 - 80	80 - 85	85 +	Volume
Study Total																		
Northbound	39	110	60	52	247	3,762	13,130	5,403	533	40	11	3	0	0	0	0	0	23,390
Percent	0.2%	0.5%	0.3%	0.2%	1.1%	16.1%	56.1%	23.1%	2.3%	0.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100%
Southbound	21	25	47	132	388	3,039	9,991	6,793	1,465	257	45	13	8	4	4	1	0	22,233
Percent	0.1%	0.1%	0.2%	0.6%	1.7%	13.7%	44.9%	30.6%	6.6%	1.2%	0.2%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	100%
Total	60	135	107	184	635	6,801	23,121	12,196	1,998	297	56	16	8	4	4	1	0	45,623
Percent	0.1%	0.3%	0.2%	0.4%	1.4%	14.9%	50.7%	26.7%	4.4%	0.7%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100%

Total Study Percentile Speed Summary			Total Study Speed Statistics		
Northbound			**Northbound**		
50th Percentile (Median)	37.8	mph	Mean (Average) Speed	37.7	mph
85th Percentile	41.3	mph	10 mph Pace	33.1 - 43.1	mph
95th Percentile	43.6	mph	Percent in Pace	86.2	%
Southbound			**Southbound**		
50th Percentile (Median)	38.8	mph	Mean (Average) Speed	38.9	mph
85th Percentile	43.2	mph	10 mph Pace	33.9 - 43.9	mph
95th Percentile	46.4	mph	Percent in Pace	77.4	%

Kyle Campbell: 425-213-7345
kyle.campbell@idaxdata.com

Location: Viking Ave NW S/O 19352 Viking Way NW
Date Range: 3/28/2023 - 4/3/2023
Site Code: 01

Time	Tuesday 3/28/2023			Wednesday 3/29/2023			Thursday 3/30/2023			Friday 3/31/2023			Saturday 4/1/2023			Sunday 4/2/2023			Monday 4/3/2023			Mid-Week Average		
	NB	SB	Total	NB	SB	Total	NB	SB	Total	NB	SB	Total	NB	SB	Total	NB	SB	Total	NB	SB	Total	NB	SB	Total
12:00 AM	25	29	54	14	32	46	21	32	53	-	-	-	-	-	-	-	-	-	-	-	-	20	31	51
1:00 AM	19	18	37	11	21	32	22	19	41	-	-	-	-	-	-	-	-	-	-	-	-	17	19	37
2:00 AM	6	11	17	11	20	31	11	20	31	-	-	-	-	-	-	-	-	-	-	-	-	9	17	26
3:00 AM	25	19	44	27	14	41	24	22	46	-	-	-	-	-	-	-	-	-	-	-	-	25	18	44
4:00 AM	44	31	75	58	34	92	50	26	76	-	-	-	-	-	-	-	-	-	-	-	-	51	30	81
5:00 AM	113	101	214	104	101	205	114	96	210	-	-	-	-	-	-	-	-	-	-	-	-	110	99	210
6:00 AM	277	175	452	268	185	453	247	197	444	-	-	-	-	-	-	-	-	-	-	-	-	264	186	450
7:00 AM	**580**	331	911	**582**	353	935	**582**	350	932	-	-	-	-	-	-	-	-	-	-	-	-	**581**	345	926
8:00 AM	471	352	823	480	370	850	473	384	857	-	-	-	-	-	-	-	-	-	-	-	-	475	369	843
9:00 AM	500	424	924	465	431	896	460	362	822	-	-	-	-	-	-	-	-	-	-	-	-	475	406	881
10:00 AM	463	428	891	421	404	825	436	392	828	-	-	-	-	-	-	-	-	-	-	-	-	440	408	848
11:00 AM	506	**446**	**952**	532	**481**	**1,013**	504	**486**	**990**	-	-	-	-	-	-	-	-	-	-	-	-	514	**471**	**985**
12:00 PM	531	520	1,051	585	533	1,118	515	498	1,013	-	-	-	-	-	-	-	-	-	-	-	-	544	517	1,061
1:00 PM	518	473	991	629	537	1,166	600	467	1,067	-	-	-	-	-	-	-	-	-	-	-	-	582	492	1,075
2:00 PM	641	527	1,168	603	581	1,184	624	524	1,148	-	-	-	-	-	-	-	-	-	-	-	-	623	544	1,167
3:00 PM	**728**	651	1,379	**696**	653	1,349	715	630	1,345	-	-	-	-	-	-	-	-	-	-	-	-	713	645	1,358
4:00 PM	**728**	**778**	**1,506**	692	744	**1,436**	**746**	**716**	**1,462**	-	-	-	-	-	-	-	-	-	-	-	-	**722**	**746**	**1,468**
5:00 PM	555	720	1,275	590	**755**	1,345	510	665	1,175	-	-	-	-	-	-	-	-	-	-	-	-	552	713	1,265
6:00 PM	381	476	857	406	489	895	378	496	874	-	-	-	-	-	-	-	-	-	-	-	-	388	487	875
7:00 PM	253	308	561	295	365	660	279	328	607	-	-	-	-	-	-	-	-	-	-	-	-	276	334	609
8:00 PM	181	232	413	194	230	424	186	248	434	-	-	-	-	-	-	-	-	-	-	-	-	187	237	424
9:00 PM	121	105	226	129	152	281	124	155	279	-	-	-	-	-	-	-	-	-	-	-	-	125	137	262
10:00 PM	69	88	157	52	92	144	64	100	164	-	-	-	-	-	-	-	-	-	-	-	-	62	93	155
11:00 PM	31	61	92	50	64	114	45	75	120	-	-	-	-	-	-	-	-	-	-	-	-	42	67	109
Total	7,766	7,304	15,070	7,894	7,641	15,535	7,730	7,288	15,018	-	-	-	-	-	-	-	-	-	-	-	-	7,797	7,411	15,208
Percent	52%	48%	-	51%	49%	-	51%	49%	-	-	-	-	-	-	-	-	-	-	-	-	-	51%	49%	-
AM Peak	07:00	11:00	11:00	07:00	11:00	11:00	07:00	11:00	11:00	-	-	-	-	-	-	-	-	-	-	-	-	07:00	11:00	11:00
Vol.	580	446	952	582	481	1,013	582	486	990	-	-	-	-	-	-	-	-	-	-	-	-	581	471	985
PM Peak	15:00	16:00	16:00	15:00	17:00	16:00	16:00	16:00	16:00	-	-	-	-	-	-	-	-	-	-	-	-	16:00	16:00	16:00
Vol.	728	778	1,506	696	755	1,436	746	716	1,462	-	-	-	-	-	-	-	-	-	-	-	-	722	746	1,468

1. Mid-week average includes data between Tuesday and Thursday.

Kyle Campbell: 425-213-7345
kyle.campbell@idaxdata.com

PLATEAU AT LIBERTY BAY
TRAFFIC IMPACT ANALYSIS

APPENDIX

ITE SHEETS

Single-Family Detached Housing
(210)

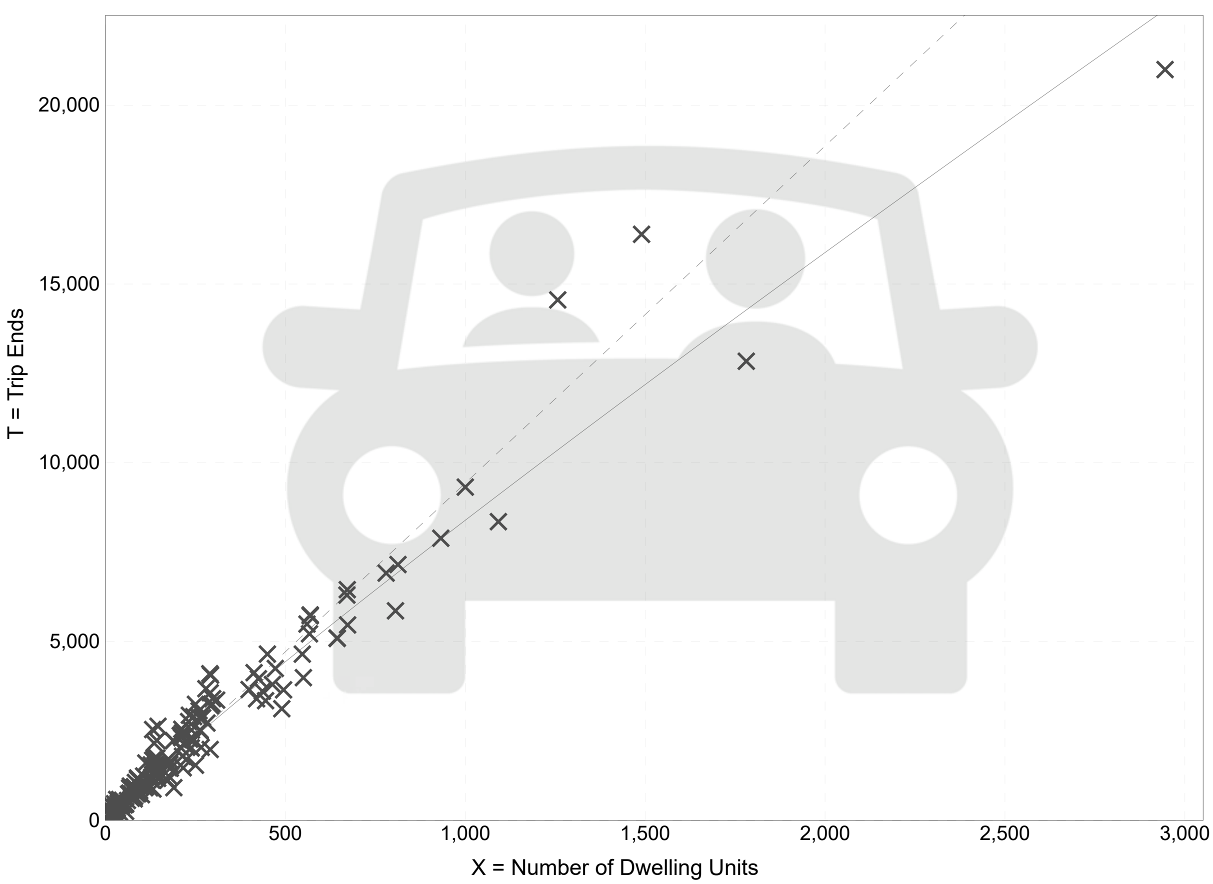
Vehicle Trip Ends vs: **Dwelling Units**
On a: **Weekday**

Setting/Location: **General Urban/Suburban**
Number of Studies: 174
Avg. Num. of Dwelling Units: 246
Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
9.43	4.45 - 22.61	2.13

Data Plot and Equation



× **Study Site** **Fitted Curve** **Average Rate**

Fitted Curve Equation: Ln(T) = 0.92 Ln(X) + 2.68 **R^2= 0.95**

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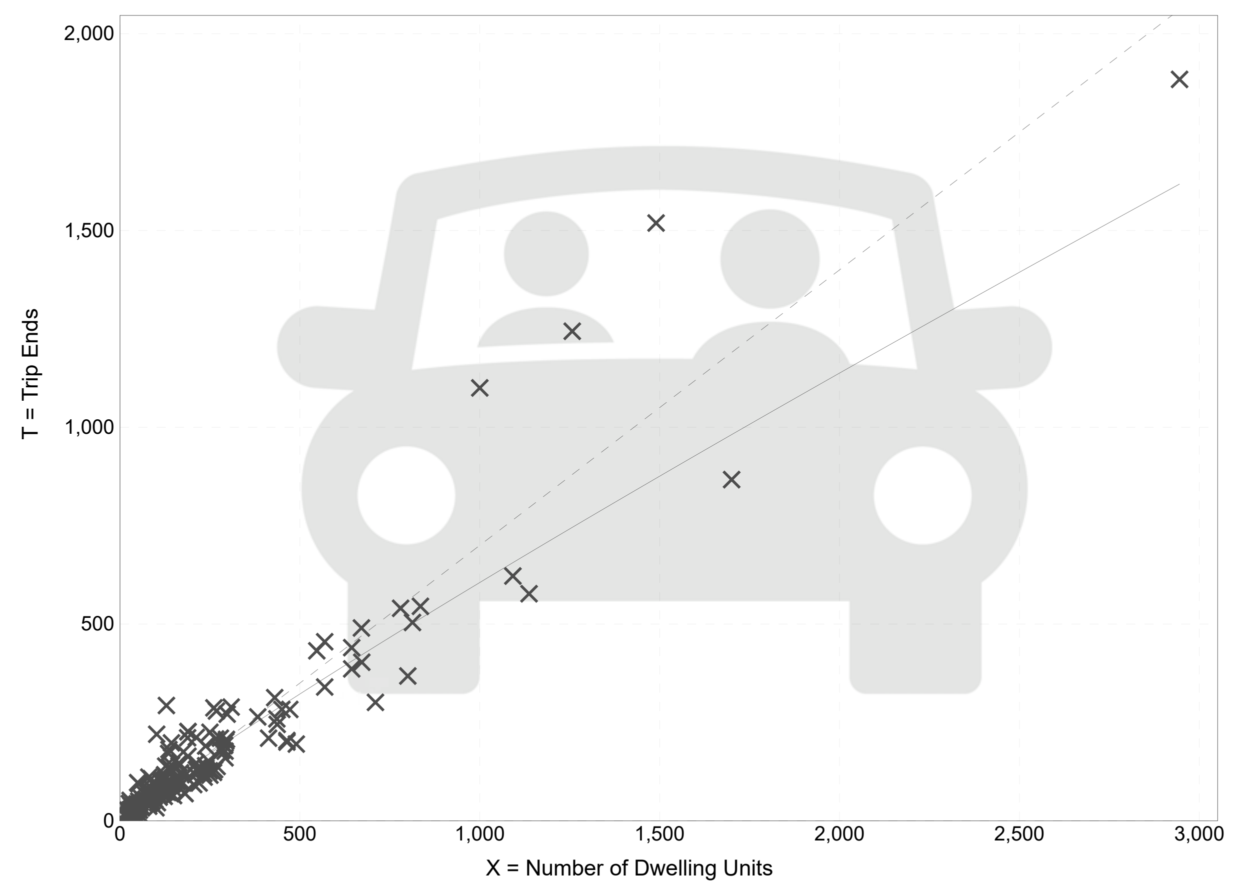
Single-Family Detached Housing
(210)

Vehicle Trip Ends vs: **Dwelling Units**
On a: **Weekday,**
Peak Hour of Adjacent Street Traffic,
One Hour Between 7 and 9 a.m.
Setting/Location: **General Urban/Suburban**
Number of Studies: 192
Avg. Num. of Dwelling Units: 226
Directional Distribution: 26% entering, 74% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.70	0.27 - 2.27	0.24

Data Plot and Equation



Fitted Curve Equation: Ln(T) = 0.91 Ln(X) + 0.12 **R^2= 0.90**

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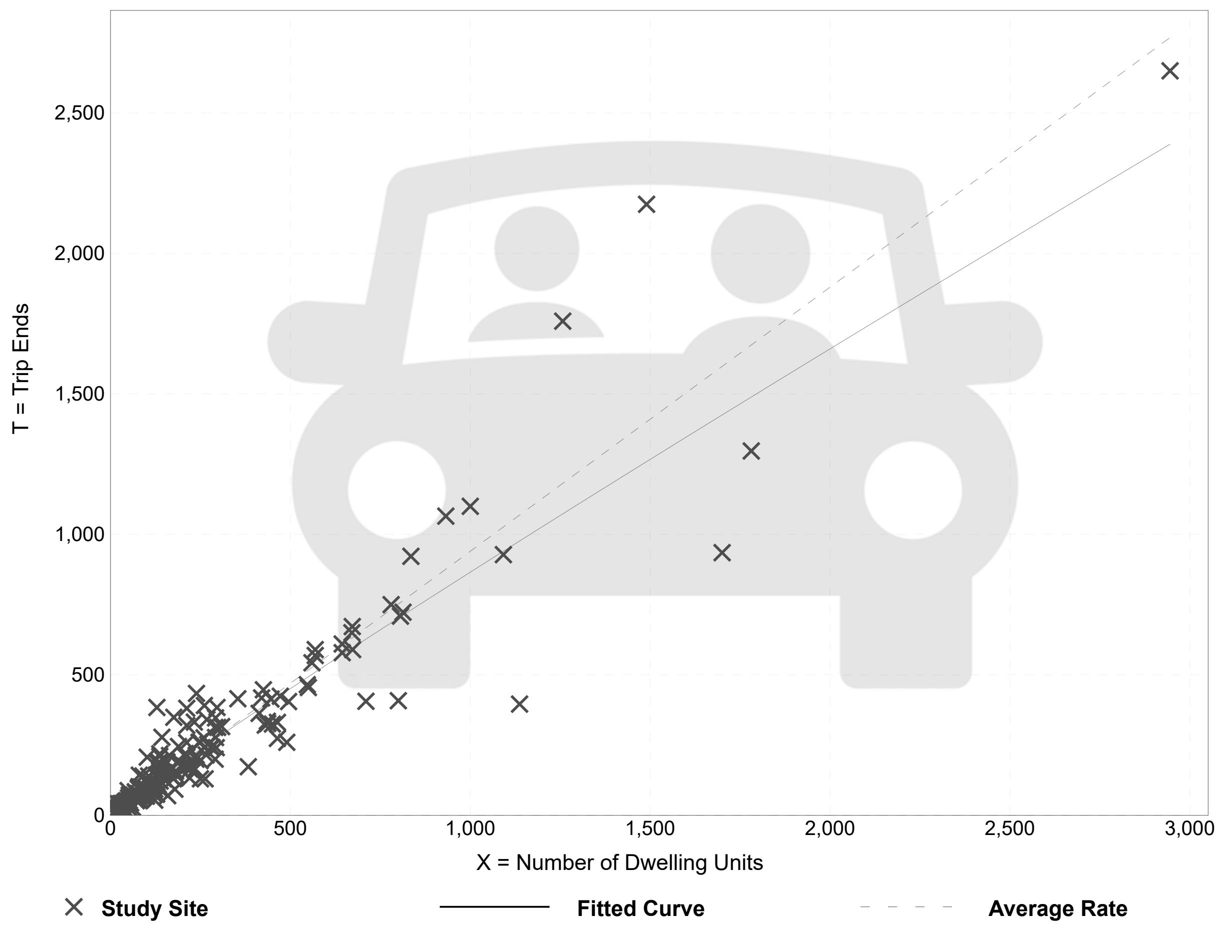
Single-Family Detached Housing
(210)

Vehicle Trip Ends vs:	**Dwelling Units**
On a:	**Weekday,**
	Peak Hour of Adjacent Street Traffic,
	One Hour Between 4 and 6 p.m.
Setting/Location:	**General Urban/Suburban**
Number of Studies:	208
Avg. Num. of Dwelling Units:	248
Directional Distribution:	63% entering, 37% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.94	0.35 - 2.98	0.31

Data Plot and Equation



Fitted Curve Equation: $Ln(T) = 0.94\ Ln(X) + 0.27$ **R^2= 0.92**

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PLATEAU AT LIBERTY BAY
TRAFFIC IMPACT ANALYSIS

APPENDIX

PIPELINE & FORECAST 2030 EXCEL

Heath & Associates, Inc.
Pipeline Volumes - Plateau At Liberty Bay TIA 4-18-2023

Pipeline Projects
1. Viking Ave Gas
2. Viking Ave Residential
3. Spencer Plat
4. Winslow Ridge
5. Oslo Bay Apartments

* No AM pipeline data was available for the Winslow Ridge project
PM peak hour volumes have been applied and flipped directionality.

1. Viking Ave NW & NW Finn Hill Rd/NW Lindvig

AM Peak Hour
Pipeline Volume Summations

1. Viking Ave Gas	0	2	0	0	0	4	4	3	3	3	0	0
2. Viking Ave Residential	2	1	3	1	0	0	0	0	0	0	0	1
3. Spencer Plat	0	0	0	0	4	0	0	0	1	2	11	0
4. Winslow Ridge*	0	0	0	0	8	0	0	0	1	3	13	0
5. Oslo Bay Apartments	0	20	14	0	0	0	0	9	0	0	0	0
Totals	2	23	17	1	12	4	4	12	5	8	24	1

1. Viking Ave NW & NW Finn Hill Rd/NW Lindvig Way

PM Peak Hour
Pipeline Volume Summations

1. Viking Ave Gas	0	4	0	0	0	5	5	4	4	4	0	0
2. Viking Ave Residential	1	1	2	3	0	0	0	1	0	0	0	2
3. Spencer Plat	0	0	0	0	12	0	0	0	3	2	7	0
4. Winslow Ridge	0	0	0	0	13	0	0	0	3	1	8	0
5. Oslo Bay Apartments	0	15	10	1	0	0	0	21	0	0	0	0
Totals	1	20	12	4	25	5	5	26	10	7	15	2

2. Viking Ave NW & NW Edvard St

AM Peak Hour
Pipeline Volume Summations

1. Viking Ave Gas	0	9	0	0	0	0	0	10	0	0	0	0
2. Viking Ave Residential	0	1	0	0	0	0	0	0	0	0	0	0
3. Spencer Plat	0	2	0	0	0	0	0	1	0	0	0	0
4. Winslow Ridge*	0	3	0	0	0	0	0	1	0	0	0	0
5. Oslo Bay Apartments	0	15	0	0	0	0	0	7	0	0	0	0
Totals	0	30	0	0	0	0	0	19	0	0	0	0

2. Viking Ave NW & NW Edvard St

PM Peak Hour
Pipeline Volume Summations

1. Viking Ave Gas	0	13	0	0	0	0	0	13	0	0	0	0
2. Viking Ave Residential	0	1	0	0	0	0	0	1	0	0	0	0
3. Spencer Plat	0	2	0	0	0	0	0	3	0	0	0	0
4. Winslow Ridge	0	1	0	0	0	0	0	3	0	0	0	0
5. Oslo Bay Apartments	0	11	0	0	0	0	0	17	0	0	0	0
Totals	0	28	0	0	0	0	0	37	0	0	0	0

3. Viking Ave NW & NW Liberty Rd

AM Peak Hour
Pipeline Volume Summations

1. Viking Ave Gas	0	9	0	0	0	0	0	10	0	0	0	0
2. Viking Ave Residential	0	1	0	0	0	0	0	0	0	0	0	0
3. Spencer Plat	0	2	0	0	0	0	0	1	0	0	0	0
4. Winslow Ridge*	0	3	0	0	0	0	0	1	0	0	0	0
5. Oslo Bay Apartments	0	11	0	0	0	0	0	7	0	0	0	0
Totals	0	26	0	0	0	0	0	19	0	0	0	0

3. Viking Ave NW & NW Liberty Rd

PM Peak Hour
Pipeline Volume Summations

1. Viking Ave Gas	0	13	0	0	0	0	0	13	0	0	0	0
2. Viking Ave Residential	0	1	0	0	0	0	0	1	0	0	0	0
3. Spencer Plat	0	2	0	0	0	0	0	3	0	0	0	0
4. Winslow Ridge	0	1	0	0	0	0	0	3	0	0	0	0
5. Oslo Bay Apartments	0	8	0	0	0	0	0	16	0	0	0	0
Totals	0	25	0	0	0	0	0	36	0	0	0	0

4. Viking Ave NW & NW Bovela Lane

AM Peak Hour
Pipeline Volume Summations

1. Viking Ave Gas	0	6	0	0	0	0	0	6	0	0	0	0
2. Viking Ave Residential	0	1	0	0	0	0	0	0	0	0	0	0
3. Spencer Plat	0	2	0	0	0	0	0	1	0	0	0	0
4. Winslow Ridge*	0	3	0	0	0	0	0	1	0	0	0	0
5. Oslo Bay Apartments	0	11	0	0	0	0	0	7	0	0	0	0
Totals	0	23	0	0	0	0	0	15	0	0	0	0

4. Viking Ave NW & NW Bovela Lane

PM Peak Hour
Pipeline Volume Summations

1. Viking Ave Gas	0	9	0	0	0	0	0	8	0	0	0	0
2. Viking Ave Residential	0	1	0	0	0	0	0	1	0	0	0	0
3. Spencer Plat	0	2	0	0	0	0	0	3	0	0	0	0
4. Winslow Ridge	0	1	0	0	0	0	0	3	0	0	0	0
5. Oslo Bay Apartments	0	8	0	0	0	0	0	16	0	0	0	0
Totals	0	21	0	0	0	0	0	31	0	0	0	0

5. Viking Ave NW & Project Access

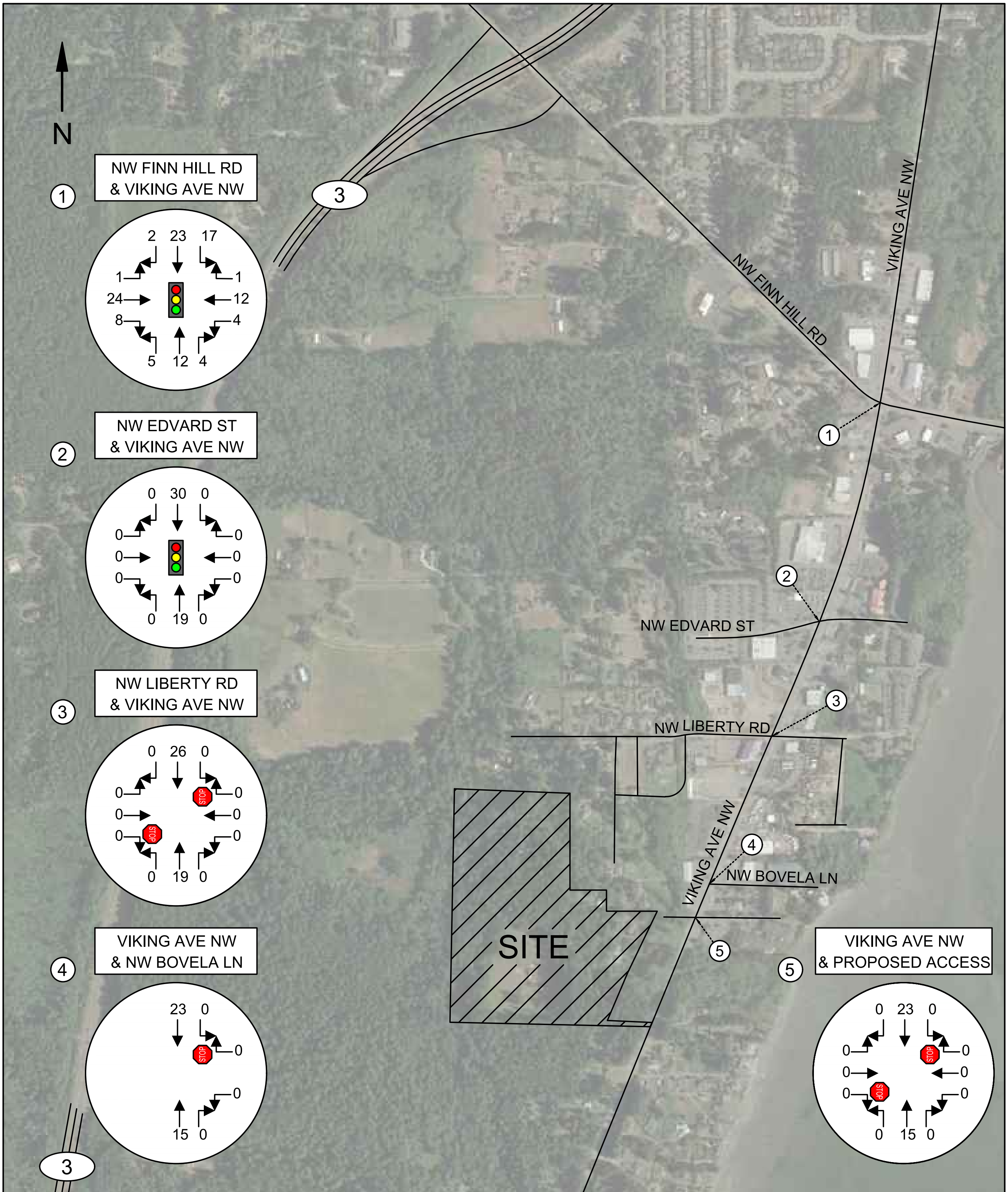
AM Peak Hour
Pipeline Volume Summations

1. Viking Ave Gas	0	6	0	0	0	0	0	6	0	0	0	0
2. Viking Ave Residential	0	1	0	0	0	0	0	0	0	0	0	0
3. Spencer Plat	0	2	0	0	0	0	0	1	0	0	0	0
4. Winslow Ridge*	0	3	0	0	0	0	0	1	0	0	0	0
5. Oslo Bay Apartments	0	11	0	0	0	0	0	7	0	0	0	0
Totals	0	23	0	0	0	0	0	15	0	0	0	0

5. Viking Ave NW & Project Access

PM Peak Hour
Pipeline Volume Summations

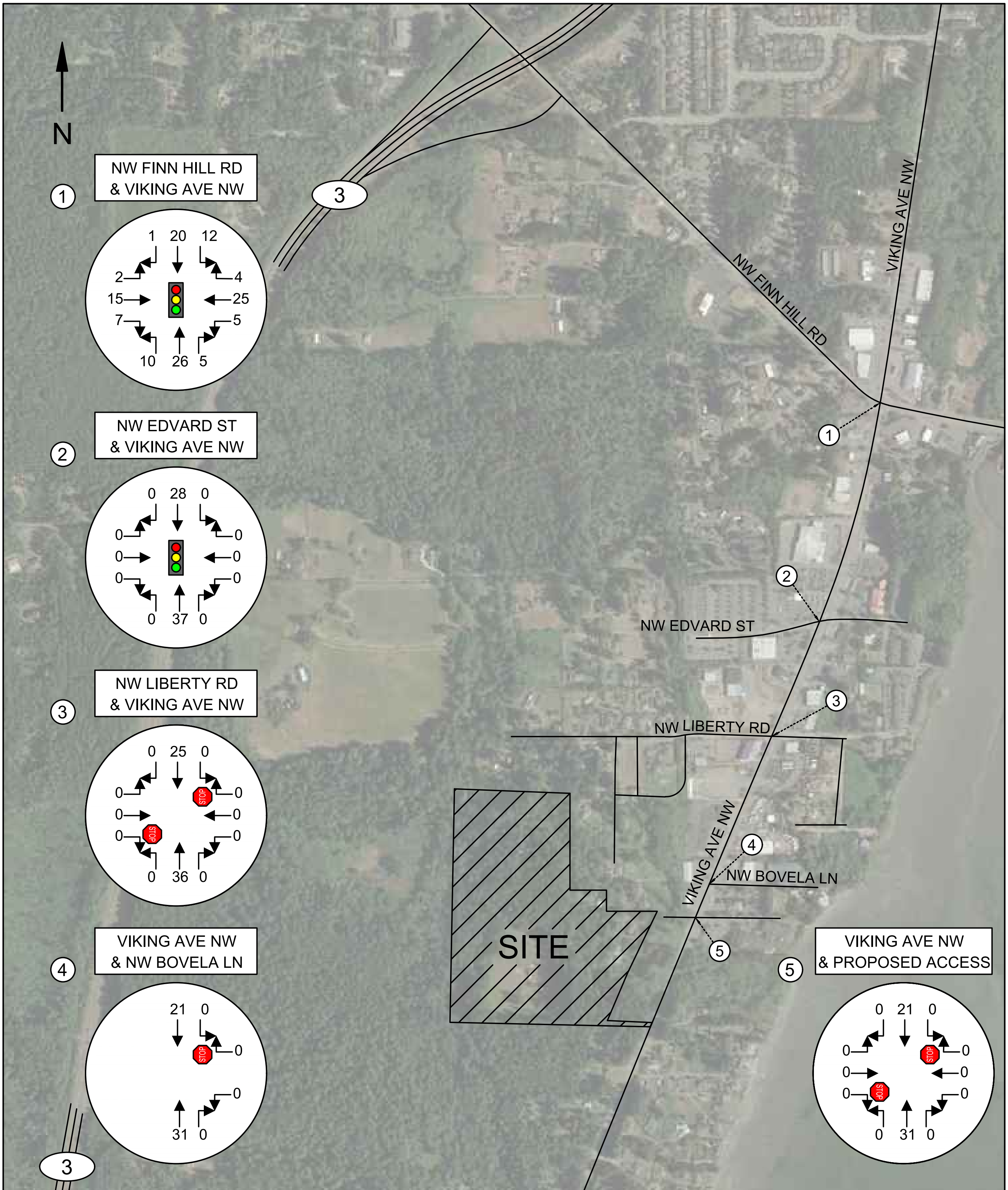
1. Viking Ave Gas	0	9	0	0	0	0	0	8	0	0	0	0
2. Viking Ave Residential	0	1	0	0	0	0	0	1	0	0	0	0
3. Spencer Plat	0	2	0	0	0	0	0	3	0	0	0	0
4. Winslow Ridge	0	1	0	0	0	0	0	3	0	0	0	0
5. Oslo Bay Apartments	0	8	0	0	0	0	0	16	0	0	0	0
Totals	0	21	0	0	0	0	0	31	0	0	0	0



HEATH & ASSOCIATES
Transportation Planning & Engineering

PLATEAU AT LIBERTY BAY

AM PEAK HOUR PIPELINE VOLUMES
FIGURE B



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PLATEAU AT LIBERTY BAY

PM PEAK HOUR PIPELINE VOLUMES
FIGURE C

Peak Hour Forecast Intersection Volumes

Annual Growth Rate: 2 %
2030
# of Years to Horizon: 7

AM PEAK HOUR

1. Viking Ave NW & NW Finn Hill Rd/NW Lindvig Wy

	SBR	SBT	SBL	WBR	WBT	WBL	NBR	NBT	NBL	EBR	EBT	EBL
Existing	45	95	46	38	168	329	514	79	49	76	318	42
Project Trips	0	2	0	0	0	3	10	5	6	2	0	0
Pipeline	2	23	17	1	12	4	4	12	5	8	24	1
Without	54	132	70	45	205	382	594	103	61	95	389	49
With	54	134	70	45	205	385	604	108	67	97	389	49

2. Viking Ave NW & NW Edvard St

	SBR	SBT	SBL	WBR	WBT	WBL	NBR	NBT	NBL	EBR	EBT	EBL
Existing	17	434	26	16	0	3	6	636	7	10	0	14
Project Trips	0	7	0	0	0	0	0	14	0	0	0	0
Pipeline	0	30	0	0	0	0	0	19	0	0	0	0
Without	20	529	30	18	0	3	7	750	8	11	0	16
With	20	536	30	18	0	3	7	764	8	11	0	16

3. Viking Ave NW & NW Liberty Rd

	SBR	SBT	SBL	WBR	WBT	WBL	NBR	NBT	NBL	EBR	EBT	EBL
Existing	10	392	13	5	1	7	2	594	5	5	0	11
Project Trips	0	7	0	0	0	0	0	14	0	0	0	0
Pipeline	0	26	0	0	0	0	0	19	0	0	0	0
Without	11	476	15	6	1	8	2	701	6	6	0	13
With	11	483	15	6	1	8	2	715	6	6	0	13

4. Viking Ave NW & NE Bovela Ln

	SBR	SBT	SBL	WBR	WBT	WBL	NBR	NBT	NBL	EBR	EBT	EBL
Existing	0	372	15	19	0	4	9	567	0	0	0	0
Project Trips	0	7	0	0	0	0	0	14	0	0	0	0
Pipeline	0	23	0	0	0	0	0	15	0	0	0	0
Without	0	450	17	22	0	5	10	666	0	0	0	0
With	0	457	17	22	0	5	10	680	0	0	0	0

5. Viking Ave NW & Access

	SBR	SBT	SBL	WBR	WBT	WBL	NBR	NBT	NBL	EBR	EBT	EBL
Existing	0	374	4	6	1	1	4	600	0	0	0	0
Project Trips	7	0	0	0	0	0	0	0	4	12	0	21
Pipeline	0	23	0	0	0	0	0	15	0	0	0	0
Without	0	453	5	7	1	1	5	704	0	0	0	0
With	7	453	5	7	1	1	5	704	4	12	0	21

PM PEAK HOUR

1. Viking Ave NW & NW Finn Hill Rd/NW Lindvig Wy

	SBR	SBT	SBL	WBR	WBT	WBL	NBR	NBT	NBL	EBR	EBT	EBL
Existing	69	184	94	108	357	640	491	235	98	70	299	68
Project Trips	0	6	0	0	0	11	7	3	4	7	0	0
Pipeline	1	20	12	4	25	5	5	26	10	7	15	2
Without	80	231	120	128	435	740	569	296	123	87	358	80
With	80	237	120	128	435	751	576	299	127	94	358	80

2. Viking Ave NW & NW Edvard St

	SBR	SBT	SBL	WBR	WBT	WBL	NBR	NBT	NBL	EBR	EBT	EBL
Existing	28	838	31	39	0	7	3	800	15	11	0	17
Project Trips	0	24	0	0	0	0	0	14	0	0	0	0
Pipeline	0	28	0	0	0	0	0	37	0	0	0	0
Without	32	991	36	45	0	8	3	956	17	13	0	20
With	32	1,015	36	45	0	8	3	970	17	13	0	20

3. Viking Ave NW & NW Liberty Rd

	SBR	SBT	SBL	WBR	WBT	WBL	NBR	NBT	NBL	EBR	EBT	EBL
Existing	16	834	11	3	0	7	8	741	4	4	0	13
Project Trips	0	24	0	0	0	0	0	14	0	0	0	0
Pipeline	0	25	0	0	0	0	0	36	0	0	0	0
Without	18	983	13	3	0	8	9	887	5	5	0	15
With	18	1,007	13	3	0	8	9	901	5	5	0	15

4. Viking Ave NW & NE Bovela Ln

	SBR	SBT	SBL	WBR	WBT	WBL	NBR	NBT	NBL	EBR	EBT	EBL
Existing	0	774	16	20	0	13	13	712	0	0	0	0
Project Trips	0	24	0	0	0	0	0	14	0	0	0	0
Pipeline	0	21	0	0	0	0	0	31	0	0	0	0
Without	0	910	18	23	0	15	15	849	0	0	0	0
With	0	934	18	23	0	15	15	863	0	0	0	0

5. Viking Ave NW & Access

	SBR	SBT	SBL	WBR	WBT	WBL	NBR	NBT	NBL	EBR	EBT	EBL
Existing	0	823	4	13	0	7	3	665	0	4	0	5
Project Trips	24	0	0	0	0	0	0	0	13	8	0	14
Pipeline	0	21	0	0	0	0	0	31	0	0	0	0
Without	0	966	5	15	0	8	3	795	0	5	0	6
With	24	966	5	15	0	8	3	795	13	13	0	20

PLATEAU AT LIBERTY BAY
TRAFFIC IMPACT ANALYSIS

APPENDIX

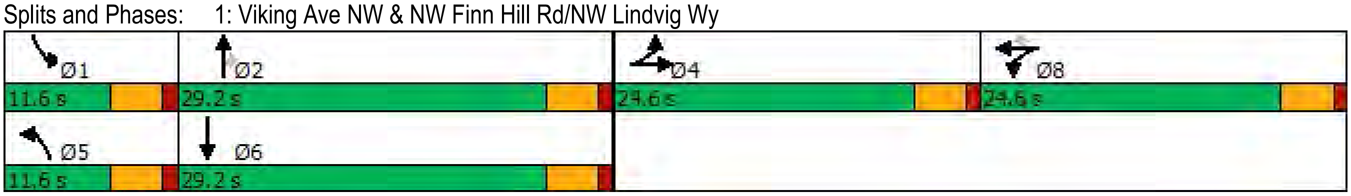
LEVEL OF SERVICE & QUEUING REPORTS

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	42	318	76	329	168	38	49	79	514	46	95	45
Future Volume (vph)	42	318	76	329	168	38	49	79	514	46	95	45
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	125		0	225		135	110		230	95		0
Storage Lanes	1		0	1		1	1		1	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	0.95	0.95	0.95	0.95	1.00	1.00	1.00	1.00	1.00	0.95	0.95
Ped Bike Factor	1.00	1.00		1.00	1.00	0.98	1.00		0.99	1.00	0.99	
Frt		0.971				0.850			0.850		0.952	
Flt Protected	0.950			0.950	0.983		0.950			0.950		
Satd. Flow (prot)	1770	3433	0	1698	1757	1599	1787	1881	1599	1787	3321	0
Flt Permitted	0.950			0.950	0.983		0.950			0.950		
Satd. Flow (perm)	1767	3433	0	1696	1756	1560	1783	1881	1576	1785	3321	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		30				127			535		47	
Link Speed (mph)		35			25			35			35	
Link Distance (ft)		560			696			779			583	
Travel Time (s)		10.9			19.0			15.2			11.4	
Confl. Peds. (#/hr)	1		1	1		1	1		1	1		1
Confl. Bikes (#/hr)			1			1			1			1
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	2%	2%	1%	1%	1%	1%	1%	1%	1%	1%	3%	2%
Adj. Flow (vph)	44	331	79	343	175	40	51	82	535	48	99	47
Shared Lane Traffic (%)				26%								
Lane Group Flow (vph)	44	410	0	254	264	40	51	82	535	48	146	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2	1	1	2	1	1	2	
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru	Right	Left	Thru	
Leading Detector (ft)	20	100		20	100	20	20	100	20	20	100	
Trailing Detector (ft)	0	0		0	0	0	0	0	0	0	0	
Detector 1 Position(ft)	0	0		0	0	0	0	0	0	0	0	
Detector 1 Size(ft)	20	6		20	6	20	20	6	20	20	6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Split	NA		Split	NA	Perm	Prot	NA	Perm	Prot	NA	
Protected Phases	4	4		8	8		5	2		1	6	
Permitted Phases						8			2			
Detector Phase	4	4		8	8	8	5	2	2	1	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	
Minimum Split (s)	22.5	22.5		22.5	22.5	22.5	9.5	22.5	22.5	9.5	22.5	
Total Split (s)	24.6	24.6		24.6	24.6	24.6	11.6	29.2	29.2	11.6	29.2	
Total Split (%)	27.3%	27.3%		27.3%	27.3%	27.3%	12.9%	32.4%	32.4%	12.9%	32.4%	
Maximum Green (s)	20.1	20.1		20.1	20.1	20.1	7.1	24.7	24.7	7.1	24.7	
Yellow Time (s)	3.5	3.5		3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	
All-Red Time (s)	1.0	1.0		1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	4.5	4.5		4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	
Lead/Lag							Lead	Lag	Lag	Lead	Lag	
Lead-Lag Optimize?							Yes	Yes	Yes	Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	None		None	None	None	None	Min	Min	None	Min	
Walk Time (s)	7.0	7.0		7.0	7.0	7.0		7.0	7.0		7.0	
Flash Dont Walk (s)	11.0	11.0		11.0	11.0	11.0		11.0	11.0		11.0	
Pedestrian Calls (#/hr)	1	1		1	1	1		1	1		1	
Act Effct Green (s)	13.1	13.1		14.9	14.9	14.9	7.2	11.2	11.2	7.2	11.2	
Actuated g/C Ratio	0.22	0.22		0.25	0.25	0.25	0.12	0.19	0.19	0.12	0.19	
v/c Ratio	0.11	0.53		0.60	0.61	0.08	0.24	0.23	0.73	0.23	0.22	
Control Delay	25.0	24.7		30.5	30.2	0.3	35.4	26.2	9.6	35.3	18.3	
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	25.0	24.7		30.5	30.2	0.3	35.4	26.2	9.6	35.3	18.3	
LOS	C	C		C	C	A	D	C	A	D	B	
Approach Delay		24.7			28.2			13.6			22.5	
Approach LOS		C			C			B			C	

Intersection Summary	
Area Type:	Other
Cycle Length: 90	
Actuated Cycle Length: 60.2	
Natural Cycle: 80	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.73	
Intersection Signal Delay: 21.6	Intersection LOS: C
Intersection Capacity Utilization 58.7%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 1: Viking Ave NW & NW Finn Hill Rd/NW Lindvig Wy



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	14	0	10	3	0	16	7	636	6	26	434	17
Future Volume (veh/h)	14	0	10	3	0	16	7	636	6	26	434	17
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.98		0.99	0.98		0.99	1.00		0.99	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1885	1885	1752	1885	1885	1707	1885	1826	1648	1841	1841	1885
Adj Flow Rate, veh/h	15	0	11	3	0	17	8	684	6	28	467	18
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	1	1	10	1	1	13	1	5	17	4	4	1
Cap, veh/h	378	0	113	168	0	91	581	1386	12	508	1433	55
Arrive On Green	0.08	0.00	0.08	0.08	0.00	0.08	0.01	0.39	0.39	0.04	0.42	0.42
Sat Flow, veh/h	1483	0	1472	209	0	1183	1795	3524	31	1753	3433	132
Grp Volume(v), veh/h	15	0	11	20	0	0	8	337	353	28	238	247
Grp Sat Flow(s),veh/h/ln	1483	0	1472	1392	0	0	1795	1735	1820	1753	1749	1816
Q Serve(g_s), s	0.0	0.0	0.2	0.3	0.0	0.0	0.1	4.0	4.0	0.3	2.5	2.5
Cycle Q Clear(g_c), s	0.2	0.0	0.2	0.5	0.0	0.0	0.1	4.0	4.0	0.3	2.5	2.5
Prop In Lane	1.00		1.00	0.15		0.85	1.00		0.02	1.00		0.07
Lane Grp Cap(c), veh/h	378	0	113	259	0	0	581	682	716	508	730	758
V/C Ratio(X)	0.04	0.00	0.10	0.08	0.00	0.00	0.01	0.49	0.49	0.06	0.33	0.33
Avail Cap(c_a), veh/h	1793	0	1619	1845	0	0	1680	1875	1968	1539	1890	1963
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	11.7	0.0	11.7	12.0	0.0	0.0	4.9	6.2	6.2	4.8	5.4	5.4
Incr Delay (d2), s/veh	0.0	0.0	0.4	0.1	0.0	0.0	0.0	0.6	0.5	0.0	0.3	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.1	0.0	0.1	0.1	0.0	0.0	0.0	0.8	0.9	0.0	0.5	0.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	11.8	0.0	12.1	12.1	0.0	0.0	4.9	6.8	6.8	4.9	5.6	5.6
LnGrp LOS	B	A	B	B	A	A	A	A	A	A	A	A
Approach Vol, veh/h		26			20			698			513	
Approach Delay, s/veh		11.9			12.1			6.8			5.6	
Approach LOS		B			B			A			A	
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	5.5	15.2		6.6	4.8	15.9		6.6				
Change Period (Y+Rc), s	4.5	4.5		4.5	4.5	4.5		4.5				
Max Green Setting (Gmax), s	17.0	29.5		30.0	17.0	29.5		30.0				
Max Q Clear Time (g_c+I1), s	2.3	6.0		2.2	2.1	4.5		2.5				
Green Ext Time (p_c), s	0.0	4.5		0.1	0.0	3.0		0.1				

Intersection Summary		
HCM 6th Ctrl Delay		6.5
HCM 6th LOS		A

Intersection	
Int Delay, s/veh	0.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	11	0	5	7	1	5	5	594	2	13	392	10
Future Vol, veh/h	11	0	5	7	1	5	5	594	2	13	392	10
Conflicting Peds, #/hr	4	0	4	4	0	4	4	0	4	4	0	4
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	50	-	-	100	-	-
Veh in Median Storage, #	-	1	-	-	1	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	94	94	94	94	94	94	94	94	94	94	94	94
Heavy Vehicles, %	9	1	20	1	1	40	1	3	1	39	4	10
Mvmt Flow	12	0	5	7	1	5	5	632	2	14	417	11

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	786	1103	222	888	1107	325	432	0	0	638	0	0
Stage 1	455	455	-	647	647	-	-	-	-	-	-	-
Stage 2	331	648	-	241	460	-	-	-	-	-	-	-
Critical Hdwy	7.68	6.52	7.3	7.52	6.52	7.7	4.12	-	-	4.88	-	-
Critical Hdwy Stg 1	6.68	5.52	-	6.52	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.68	5.52	-	6.52	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.59	4.01	3.5	3.51	4.01	3.7	2.21	-	-	2.59	-	-
Pot Cap-1 Maneuver	270	212	729	240	210	571	1131	-	-	730	-	-
Stage 1	536	570	-	428	467	-	-	-	-	-	-	-
Stage 2	637	467	-	744	567	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	260	205	723	232	203	567	1127	-	-	727	-	-
Mov Cap-2 Maneuver	377	319	-	338	321	-	-	-	-	-	-	-
Stage 1	532	557	-	425	463	-	-	-	-	-	-	-
Stage 2	624	463	-	722	554	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	13.5	14.4	0.1	0.3
HCM LOS	B	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1127	-	-	443	398	727	-	-
HCM Lane V/C Ratio	0.005	-	-	0.038	0.035	0.019	-	-
HCM Control Delay (s)	8.2	-	-	13.5	14.4	10	-	-
HCM Lane LOS	A	-	-	B	B	B	-	-
HCM 95th %tile Q(veh)	0	-	-	0.1	0.1	0.1	-	-

Intersection						
Int Delay, s/veh	0.4					

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	4	19	567	9	15	372
Future Vol, veh/h	4	19	567	9	15	372
Conflicting Peds, #/hr	1	1	0	1	1	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	65	-
Veh in Median Storage, #	1	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	97	97	97	97	97	97
Heavy Vehicles, %	1	11	3	1	7	4
Mvmt Flow	4	20	585	9	15	384

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	814	299	0	0	595	0
Stage 1	591	-	-	-	-	-
Stage 2	223	-	-	-	-	-
Critical Hdwy	6.82	7.12	-	-	4.24	-
Critical Hdwy Stg 1	5.82	-	-	-	-	-
Critical Hdwy Stg 2	5.82	-	-	-	-	-
Follow-up Hdwy	3.51	3.41	-	-	2.27	-
Pot Cap-1 Maneuver	318	671	-	-	944	-
Stage 1	519	-	-	-	-	-
Stage 2	796	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	312	670	-	-	943	-
Mov Cap-2 Maneuver	416	-	-	-	-	-
Stage 1	518	-	-	-	-	-
Stage 2	782	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	11.2	0	0.3
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	606	943	-
HCM Lane V/C Ratio	-	-	0.039	0.016	-
HCM Control Delay (s)	-	-	11.2	8.9	-
HCM Lane LOS	-	-	B	A	-
HCM 95th %tile Q(veh)	-	-	0.1	0.1	-

Intersection	
Int Delay, s/veh	0.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	0	0	1	1	6	0	600	4	4	374	0
Future Vol, veh/h	0	0	0	1	1	6	0	600	4	4	374	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	270	-	-	270	-	-
Veh in Median Storage, #	-	1	-	-	1	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	88	88	88	88	88	88	88	88	88	88	88	92
Heavy Vehicles, %	1	1	1	1	1	1	1	2	1	1	3	1
Mvmt Flow	0	0	0	1	1	7	0	682	5	5	425	0

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1124	1122	425	1120	1120	685	425	0	0	687	0	0
Stage 1	435	435	-	685	685	-	-	-	-	-	-	-
Stage 2	689	687	-	435	435	-	-	-	-	-	-	-
Critical Hdwy	7.11	6.51	6.21	7.11	6.51	6.21	4.11	-	-	4.11	-	-
Critical Hdwy Stg 1	6.11	5.51	-	6.11	5.51	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.11	5.51	-	6.11	5.51	-	-	-	-	-	-	-
Follow-up Hdwy	3.509	4.009	3.309	3.509	4.009	3.309	2.209	-	-	2.209	-	-
Pot Cap-1 Maneuver	183	207	631	185	207	450	1140	-	-	912	-	-
Stage 1	602	582	-	440	450	-	-	-	-	-	-	-
Stage 2	437	449	-	602	582	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	179	206	631	184	206	450	1140	-	-	912	-	-
Mov Cap-2 Maneuver	305	321	-	312	323	-	-	-	-	-	-	-
Stage 1	602	579	-	440	450	-	-	-	-	-	-	-
Stage 2	429	449	-	599	579	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	14	0	0.1
HCM LOS	A	B		

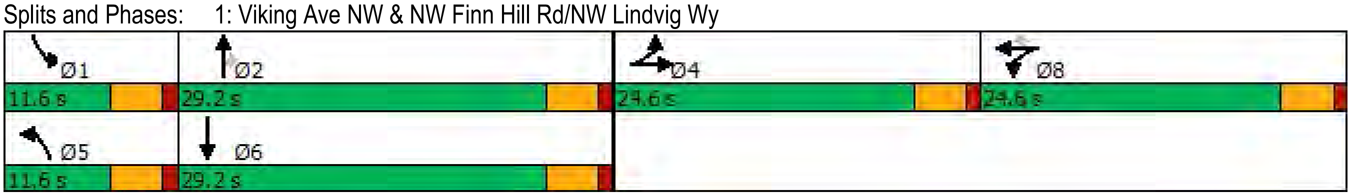
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1140	-	-	-	407	912	-	-
HCM Lane V/C Ratio	-	-	-	-	0.022	0.005	-	-
HCM Control Delay (s)	0	-	-	0	14	9	-	-
HCM Lane LOS	A	-	-	A	B	A	-	-
HCM 95th %tile Q(veh)	0	-	-	-	0.1	0	-	-

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	68	299	70	640	357	108	98	235	491	94	184	69
Future Volume (vph)	68	299	70	640	357	108	98	235	491	94	184	69
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	125		0	225		135	110		230	95		0
Storage Lanes	1		0	1		1	1		1	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	0.95	0.95	0.95	0.95	1.00	1.00	1.00	1.00	1.00	0.95	0.95
Ped Bike Factor	0.99	1.00		1.00	1.00	0.97	0.99		0.98	0.99	0.99	
Frt		0.972				0.850			0.850		0.959	
Flt Protected	0.950			0.950	0.986		0.950			0.950		
Satd. Flow (prot)	1787	3406	0	1681	1757	1599	1787	1827	1599	1787	3345	0
Flt Permitted	0.950			0.950	0.986		0.950			0.950		
Satd. Flow (perm)	1777	3406	0	1674	1755	1545	1772	1827	1567	1778	3345	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		29				127			528		59	
Link Speed (mph)		35			25			35			35	
Link Distance (ft)		560			696			779			583	
Travel Time (s)		10.9			19.0			15.2			11.4	
Confl. Peds. (#/hr)	5		5	5		5	5		5	5		5
Confl. Bikes (#/hr)			1			1			1			1
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Heavy Vehicles (%)	1%	3%	1%	2%	1%	1%	1%	4%	1%	1%	2%	4%
Adj. Flow (vph)	73	322	75	688	384	116	105	253	528	101	198	74
Shared Lane Traffic (%)				23%								
Lane Group Flow (vph)	73	397	0	530	542	116	105	253	528	101	272	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2	1	1	2	1	1	2	
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru	Right	Left	Thru	
Leading Detector (ft)	20	100		20	100	20	20	100	20	20	100	
Trailing Detector (ft)	0	0		0	0	0	0	0	0	0	0	
Detector 1 Position(ft)	0	0		0	0	0	0	0	0	0	0	
Detector 1 Size(ft)	20	6		20	6	20	20	6	20	20	6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Split	NA		Split	NA	Perm	Prot	NA	Perm	Prot	NA	
Protected Phases	4	4		8	8		5	2		1	6	
Permitted Phases						8			2			
Detector Phase	4	4		8	8	8	5	2	2	1	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	
Minimum Split (s)	22.5	22.5		22.5	22.5	22.5	9.5	22.5	22.5	9.5	22.5	
Total Split (s)	24.6	24.6		24.6	24.6	24.6	11.6	29.2	29.2	11.6	29.2	
Total Split (%)	27.3%	27.3%		27.3%	27.3%	27.3%	12.9%	32.4%	32.4%	12.9%	32.4%	
Maximum Green (s)	20.1	20.1		20.1	20.1	20.1	7.1	24.7	24.7	7.1	24.7	
Yellow Time (s)	3.5	3.5		3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	
All-Red Time (s)	1.0	1.0		1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	4.5	4.5		4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	
Lead/Lag							Lead	Lag	Lag	Lead	Lag	
Lead-Lag Optimize?							Yes	Yes	Yes	Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	None		None	None	None	None	Min	Min	None	Min	
Walk Time (s)	7.0	7.0		7.0	7.0	7.0		7.0	7.0		7.0	
Flash Dont Walk (s)	11.0	11.0		11.0	11.0	11.0		11.0	11.0		11.0	
Pedestrian Calls (#/hr)	5	5		5	5	5		5	5		5	
Act Effct Green (s)	14.0	14.0		20.5	20.5	20.5	7.2	19.2	19.2	7.2	16.3	
Actuated g/C Ratio	0.18	0.18		0.27	0.27	0.27	0.09	0.25	0.25	0.09	0.21	
v/c Ratio	0.22	0.61		1.18	1.15	0.23	0.62	0.55	0.67	0.60	0.36	
Control Delay	29.7	31.6		130.7	120.3	6.1	55.0	31.5	7.3	53.9	20.9	
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	29.7	31.6		130.7	120.3	6.1	55.0	31.5	7.3	53.9	20.9	
LOS	C	C		F	F	A	E	C	A	D	C	
Approach Delay		31.3			113.8			19.9			29.8	
Approach LOS		C			F			B			C	

Intersection Summary	
Area Type: Other	
Cycle Length: 90	
Actuated Cycle Length: 76.3	
Natural Cycle: 90	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 1.18	
Intersection Signal Delay: 61.2	Intersection LOS: E
Intersection Capacity Utilization 71.4%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 1: Viking Ave NW & NW Finn Hill Rd/NW Lindvig Wy



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	17	0	11	7	0	39	15	800	3	31	838	28
Future Volume (veh/h)	17	0	11	7	0	39	15	800	3	31	838	28
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		0.98	1.00		0.98	1.00		0.98
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1811	1885	1885	1885	1885	1856	1885	1870	1411	1885	1870	1841
Adj Flow Rate, veh/h	18	0	11	7	0	41	16	833	3	32	873	29
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	6	1	1	1	1	3	1	2	33	1	2	4
Cap, veh/h	366	0	130	153	1	105	442	1569	6	482	1578	52
Arrive On Green	0.08	0.00	0.08	0.08	0.00	0.08	0.02	0.43	0.43	0.04	0.45	0.45
Sat Flow, veh/h	1538	0	1567	200	17	1266	1795	3631	13	1795	3506	116
Grp Volume(v), veh/h	18	0	11	48	0	0	16	408	428	32	442	460
Grp Sat Flow(s),veh/h/ln	1538	0	1567	1483	0	0	1795	1777	1868	1795	1777	1846
Q Serve(g_s), s	0.0	0.0	0.2	0.7	0.0	0.0	0.1	5.1	5.1	0.3	5.5	5.5
Cycle Q Clear(g_c), s	0.3	0.0	0.2	1.0	0.0	0.0	0.1	5.1	5.1	0.3	5.5	5.5
Prop In Lane	1.00		1.00	0.15		0.85	1.00		0.01	1.00		0.06
Lane Grp Cap(c), veh/h	366	0	130	260	0	0	442	768	807	482	800	831
V/C Ratio(X)	0.05	0.00	0.08	0.18	0.00	0.00	0.04	0.53	0.53	0.07	0.55	0.55
Avail Cap(c_a), veh/h	1612	0	1553	1659	0	0	1413	1731	1820	1420	1731	1799
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	12.9	0.0	12.8	13.2	0.0	0.0	5.0	6.3	6.3	4.8	6.1	6.1
Incr Delay (d2), s/veh	0.1	0.0	0.3	0.3	0.0	0.0	0.0	0.6	0.5	0.1	0.6	0.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.1	0.0	0.1	0.3	0.0	0.0	0.0	1.1	1.2	0.1	1.2	1.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	12.9	0.0	13.1	13.5	0.0	0.0	5.0	6.9	6.9	4.8	6.7	6.7
LnGrp LOS	B	A	B	B	A	A	A	A	A	A	A	A
Approach Vol, veh/h		29			48			852			934	
Approach Delay, s/veh		13.0			13.5			6.9			6.6	
Approach LOS		B			B			A			A	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	5.7	17.6		7.0	5.1	18.1		7.0				
Change Period (Y+Rc), s	4.5	4.5		4.5	4.5	4.5		4.5				
Max Green Setting (Gmax), s	17.0	29.5		30.0	17.0	29.5		30.0				
Max Q Clear Time (g_c+I1), s	2.3	7.1		2.3	2.1	7.5		3.0				
Green Ext Time (p_c), s	0.0	5.5		0.1	0.0	6.1		0.2				

Intersection Summary		
HCM 6th Ctrl Delay		7.0
HCM 6th LOS		A

Intersection	
Int Delay, s/veh	0.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	13	0	4	7	0	3	4	741	8	11	834	16
Future Vol, veh/h	13	0	4	7	0	3	4	741	8	11	834	16
Conflicting Peds, #/hr	3	0	3	3	0	3	3	0	3	3	0	3
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	50	-	-	100	-	-
Veh in Median Storage, #	-	1	-	-	1	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	96	96	96	96	96	96	96	96	96	96	96	96
Heavy Vehicles, %	8	1	1	1	1	1	1	2	1	9	2	13
Mvmt Flow	14	0	4	7	0	3	4	772	8	11	869	17

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1300	1694	449	1247	1698	396	889	0	0	783	0	0
Stage 1	903	903	-	787	787	-	-	-	-	-	-	-
Stage 2	397	791	-	460	911	-	-	-	-	-	-	-
Critical Hdwy	7.66	6.52	6.92	7.52	6.52	6.92	4.12	-	-	4.28	-	-
Critical Hdwy Stg 1	6.66	5.52	-	6.52	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.66	5.52	-	6.52	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.58	4.01	3.31	3.51	4.01	3.31	2.21	-	-	2.29	-	-
Pot Cap-1 Maneuver	113	93	560	131	92	606	764	-	-	787	-	-
Stage 1	287	357	-	353	403	-	-	-	-	-	-	-
Stage 2	584	402	-	553	353	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	110	91	557	127	90	603	762	-	-	785	-	-
Mov Cap-2 Maneuver	216	210	-	248	209	-	-	-	-	-	-	-
Stage 1	285	351	-	350	400	-	-	-	-	-	-	-
Stage 2	576	399	-	540	347	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	20.4	17.4	0.1	0.1
HCM LOS	C	C		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	762	-	-	252	301	785	-	-
HCM Lane V/C Ratio	0.005	-	-	0.07	0.035	0.015	-	-
HCM Control Delay (s)	9.8	-	-	20.4	17.4	9.7	-	-
HCM Lane LOS	A	-	-	C	C	A	-	-
HCM 95th %tile Q(veh)	0	-	-	0.2	0.1	0	-	-

Intersection	
Int Delay, s/veh	0.4

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	13	20	712	13	16	774
Future Vol, veh/h	13	20	712	13	16	774
Conflicting Peds, #/hr	2	2	0	2	2	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	65	-
Veh in Median Storage, #	1	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	94	94	94	94	94	94
Heavy Vehicles, %	1	1	2	1	1	2
Mvmt Flow	14	21	757	14	17	823

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1214	390	0	0	773	0
Stage 1	766	-	-	-	-	-
Stage 2	448	-	-	-	-	-
Critical Hdwy	6.82	6.92	-	-	4.12	-
Critical Hdwy Stg 1	5.82	-	-	-	-	-
Critical Hdwy Stg 2	5.82	-	-	-	-	-
Follow-up Hdwy	3.51	3.31	-	-	2.21	-
Pot Cap-1 Maneuver	175	612	-	-	845	-
Stage 1	422	-	-	-	-	-
Stage 2	614	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	171	610	-	-	843	-
Mov Cap-2 Maneuver	300	-	-	-	-	-
Stage 1	421	-	-	-	-	-
Stage 2	600	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	14	0	0.2
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	434	843	-
HCM Lane V/C Ratio	-	-	0.081	0.02	-
HCM Control Delay (s)	-	-	14	9.4	-
HCM Lane LOS	-	-	B	A	-
HCM 95th %tile Q(veh)	-	-	0.3	0.1	-

Intersection												
Int Delay, s/veh	0.3											
Movement	**EBL**	**EBT**	**EBR**	**WBL**	**WBT**	**WBR**	**NBL**	**NBT**	**NBR**	**SBL**	**SBT**	**SBR**
Lane Configurations												
Traffic Vol, veh/h	5	0	4	7	0	13	0	665	3	4	823	0
Future Vol, veh/h	5	0	4	7	0	13	0	665	3	4	823	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	270	-	-	270	-	-
Veh in Median Storage, #	-	1	-	-	1	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	93	93	93	93	93	93	93	93	93	93	93	93
Heavy Vehicles, %	1	1	1	1	1	1	1	2	1	1	2	1
Mvmt Flow	5	0	4	8	0	14	0	715	3	4	885	0

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1617	1611	885	1612	1610	717	885	0	0	718	0	0
Stage 1	893	893	-	717	717	-	-	-	-	-	-	-
Stage 2	724	718	-	895	893	-	-	-	-	-	-	-
Critical Hdwy	7.11	6.51	6.21	7.11	6.51	6.21	4.11	-	-	4.11	-	-
Critical Hdwy Stg 1	6.11	5.51	-	6.11	5.51	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.11	5.51	-	6.11	5.51	-	-	-	-	-	-	-
Follow-up Hdwy	3.509	4.009	3.309	3.509	4.009	3.309	2.209	-	-	2.209	-	-
Pot Cap-1 Maneuver	84	105	345	84	105	431	769	-	-	888	-	-
Stage 1	338	361	-	422	435	-	-	-	-	-	-	-
Stage 2	419	435	-	337	361	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	81	104	345	83	104	431	769	-	-	888	-	-
Mov Cap-2 Maneuver	204	226	-	206	226	-	-	-	-	-	-	-
Stage 1	338	359	-	422	435	-	-	-	-	-	-	-
Stage 2	405	435	-	331	359	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	20	17.4	0	0
HCM LOS	C	C		

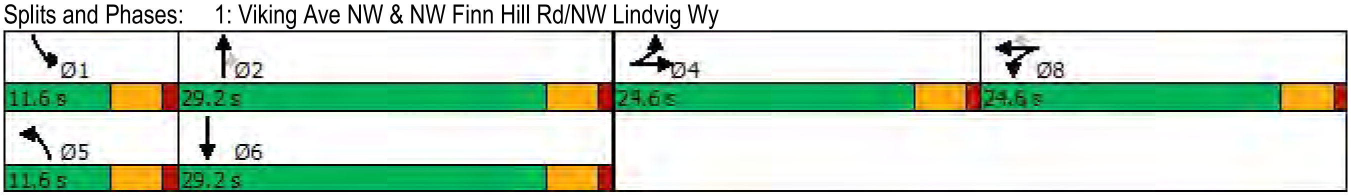
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	769	-	-	249	312	888	-	-
HCM Lane V/C Ratio	-	-	-	0.039	0.069	0.005	-	-
HCM Control Delay (s)	0	-	-	20	17.4	9.1	-	-
HCM Lane LOS	A	-	-	C	C	A	-	-
HCM 95th %tile Q(veh)	0	-	-	0.1	0.2	0	-	-

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	49	389	95	382	205	45	61	103	594	70	132	54
Future Volume (vph)	49	389	95	382	205	45	61	103	594	70	132	54
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	125		0	225		135	110		230	95		0
Storage Lanes	1		0	1		1	1		1	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	0.95	0.95	0.95	0.95	1.00	1.00	1.00	1.00	1.00	0.95	0.95
Ped Bike Factor	1.00	1.00		1.00	1.00	0.98	1.00		0.99	1.00	0.99	
Frt		0.971				0.850			0.850		0.957	
Flt Protected	0.950			0.950	0.985		0.950			0.950		
Satd. Flow (prot)	1770	3433	0	1698	1760	1599	1787	1881	1599	1787	3340	0
Flt Permitted	0.950			0.950	0.985		0.950			0.950		
Satd. Flow (perm)	1767	3433	0	1697	1760	1560	1784	1881	1576	1785	3340	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		31				127			554		56	
Link Speed (mph)		35			25			35			35	
Link Distance (ft)		560			696			779			583	
Travel Time (s)		10.9			19.0			15.2			11.4	
Confl. Peds. (#/hr)	1		1	1		1	1		1	1		1
Confl. Bikes (#/hr)			1			1			1			1
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	2%	2%	1%	1%	1%	1%	1%	1%	1%	1%	3%	2%
Adj. Flow (vph)	51	405	99	398	214	47	64	107	619	73	138	56
Shared Lane Traffic (%)				24%								
Lane Group Flow (vph)	51	504	0	302	310	47	64	107	619	73	194	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2	1	1	2	1	1	2	
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru	Right	Left	Thru	
Leading Detector (ft)	20	100		20	100	20	20	100	20	20	100	
Trailing Detector (ft)	0	0		0	0	0	0	0	0	0	0	
Detector 1 Position(ft)	0	0		0	0	0	0	0	0	0	0	
Detector 1 Size(ft)	20	6		20	6	20	20	6	20	20	6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Split	NA		Split	NA	Perm	Prot	NA	Perm	Prot	NA	
Protected Phases	4	4		8	8		5	2		1	6	
Permitted Phases						8			2			
Detector Phase	4	4		8	8	8	5	2	2	1	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	
Minimum Split (s)	22.5	22.5		22.5	22.5	22.5	9.5	22.5	22.5	9.5	22.5	
Total Split (s)	24.6	24.6		24.6	24.6	24.6	11.6	29.2	29.2	11.6	29.2	
Total Split (%)	27.3%	27.3%		27.3%	27.3%	27.3%	12.9%	32.4%	32.4%	12.9%	32.4%	
Maximum Green (s)	20.1	20.1		20.1	20.1	20.1	7.1	24.7	24.7	7.1	24.7	
Yellow Time (s)	3.5	3.5		3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	
All-Red Time (s)	1.0	1.0		1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	4.5	4.5		4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	
Lead/Lag							Lead	Lag	Lag	Lead	Lag	
Lead-Lag Optimize?							Yes	Yes	Yes	Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	None		None	None	None	None	Min	Min	None	Min	
Walk Time (s)	7.0	7.0		7.0	7.0	7.0		7.0	7.0		7.0	
Flash Dont Walk (s)	11.0	11.0		11.0	11.0	11.0		11.0	11.0		11.0	
Pedestrian Calls (#/hr)	1	1		1	1	1		1	1		1	
Act Effct Green (s)	15.5	15.5		17.5	17.5	17.5	7.1	13.6	13.6	7.2	16.1	
Actuated g/C Ratio	0.22	0.22		0.25	0.25	0.25	0.10	0.19	0.19	0.10	0.23	
v/c Ratio	0.13	0.64		0.71	0.70	0.10	0.35	0.29	0.82	0.39	0.24	
Control Delay	26.8	29.6		38.5	37.7	0.4	41.6	28.3	14.8	42.7	18.6	
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	26.8	29.6		38.5	37.7	0.4	41.6	28.3	14.8	42.7	18.6	
LOS	C	C		D	D	A	D	C	B	D	B	
Approach Delay		29.3			35.4			18.8			25.2	
Approach LOS		C			D			B			C	

Intersection Summary	
Area Type: Other	
Cycle Length: 90	
Actuated Cycle Length: 69.8	
Natural Cycle: 80	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.82	
Intersection Signal Delay: 26.9	Intersection LOS: C
Intersection Capacity Utilization 66.2%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 1: Viking Ave NW & NW Finn Hill Rd/NW Lindvig Wy



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	16	0	11	3	0	18	8	750	7	30	529	20
Future Volume (veh/h)	16	0	11	3	0	18	8	750	7	30	529	20
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.98		0.99	0.98		0.99	1.00		0.99	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1885	1885	1752	1885	1885	1707	1885	1826	1648	1841	1841	1885
Adj Flow Rate, veh/h	17	0	12	3	0	19	9	806	8	32	569	22
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	1	1	10	1	1	13	1	5	17	4	4	1
Cap, veh/h	359	0	118	153	1	105	550	1501	15	479	1556	60
Arrive On Green	0.08	0.00	0.08	0.08	0.00	0.08	0.01	0.43	0.43	0.04	0.45	0.45
Sat Flow, veh/h	1454	0	1471	188	18	1308	1795	3519	35	1753	3432	133
Grp Volume(v), veh/h	17	0	12	22	0	0	9	397	417	32	290	301
Grp Sat Flow(s),veh/h/ln	1454	0	1471	1515	0	0	1795	1735	1819	1753	1749	1816
Q Serve(g_s), s	0.0	0.0	0.2	0.2	0.0	0.0	0.1	5.1	5.1	0.3	3.2	3.2
Cycle Q Clear(g_c), s	0.3	0.0	0.2	0.5	0.0	0.0	0.1	5.1	5.1	0.3	3.2	3.2
Prop In Lane	1.00		1.00	0.14		0.86	1.00		0.02	1.00		0.07
Lane Grp Cap(c), veh/h	359	0	118	259	0	0	550	740	776	479	793	823
V/C Ratio(X)	0.05	0.00	0.10	0.08	0.00	0.00	0.02	0.54	0.54	0.07	0.37	0.37
Avail Cap(c_a), veh/h	1642	0	1485	1702	0	0	1555	1721	1805	1413	1735	1802
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	12.7	0.0	12.7	12.8	0.0	0.0	4.8	6.3	6.3	4.8	5.3	5.3
Incr Delay (d2), s/veh	0.1	0.0	0.4	0.1	0.0	0.0	0.0	0.6	0.6	0.1	0.3	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.1	0.0	0.1	0.1	0.0	0.0	0.0	1.1	1.1	0.1	0.6	0.6
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	12.7	0.0	13.0	12.9	0.0	0.0	4.8	7.0	6.9	4.8	5.6	5.6
LnGrp LOS	B	A	B	B	A	A	A	A	A	A	A	A
Approach Vol, veh/h		29			22			823			623	
Approach Delay, s/veh		12.9			12.9			6.9			5.6	
Approach LOS		B			B			A			A	
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	5.7	17.2		6.9	4.9	18.0		6.9				
Change Period (Y+Rc), s	4.5	4.5		4.5	4.5	4.5		4.5				
Max Green Setting (Gmax), s	17.0	29.5		30.0	17.0	29.5		30.0				
Max Q Clear Time (g_c+I1), s	2.3	7.1		2.3	2.1	5.2		2.5				
Green Ext Time (p_c), s	0.0	5.4		0.1	0.0	3.7		0.1				

Intersection Summary		
HCM 6th Ctrl Delay		6.6
HCM 6th LOS		A

Intersection	
Int Delay, s/veh	0.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	13	0	6	8	1	6	6	701	2	15	476	11
Future Vol, veh/h	13	0	6	8	1	6	6	701	2	15	476	11
Conflicting Peds, #/hr	4	0	4	4	0	4	4	0	4	4	0	4
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	50	-	-	100	-	-
Veh in Median Storage, #	-	1	-	-	1	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	94	94	94	94	94	94	94	94	94	94	94	94
Heavy Vehicles, %	9	1	20	1	1	40	1	3	1	39	4	10
Mvmt Flow	14	0	6	9	1	6	6	746	2	16	506	12

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	938	1312	267	1052	1317	382	522	0	0	752	0	0
Stage 1	548	548	-	763	763	-	-	-	-	-	-	-
Stage 2	390	764	-	289	554	-	-	-	-	-	-	-
Critical Hdwy	7.68	6.52	7.3	7.52	6.52	7.7	4.12	-	-	4.88	-	-
Critical Hdwy Stg 1	6.68	5.52	-	6.52	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.68	5.52	-	6.52	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.59	4.01	3.5	3.51	4.01	3.7	2.21	-	-	2.59	-	-
Pot Cap-1 Maneuver	209	159	680	182	158	520	1048	-	-	649	-	-
Stage 1	471	518	-	365	414	-	-	-	-	-	-	-
Stage 2	587	413	-	697	514	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	200	153	675	175	152	516	1044	-	-	647	-	-
Mov Cap-2 Maneuver	322	270	-	283	273	-	-	-	-	-	-	-
Stage 1	466	503	-	361	410	-	-	-	-	-	-	-
Stage 2	573	409	-	671	499	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	14.8	16	0.1	0.3
HCM LOS	B	C		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1044	-	-	386	344	647	-	-
HCM Lane V/C Ratio	0.006	-	-	0.052	0.046	0.025	-	-
HCM Control Delay (s)	8.5	-	-	14.8	16	10.7	-	-
HCM Lane LOS	A	-	-	B	C	B	-	-
HCM 95th %tile Q(veh)	0	-	-	0.2	0.1	0.1	-	-

Intersection	
Int Delay, s/veh	0.4

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	5	22	666	10	17	450
Future Vol, veh/h	5	22	666	10	17	450
Conflicting Peds, #/hr	1	1	0	1	1	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	65	-
Veh in Median Storage, #	1	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	97	97	97	97	97	97
Heavy Vehicles, %	1	11	3	1	7	4
Mvmt Flow	5	23	687	10	18	464

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	962	351	0	0	698	0
Stage 1	693	-	-	-	-	-
Stage 2	269	-	-	-	-	-
Critical Hdwy	6.82	7.12	-	-	4.24	-
Critical Hdwy Stg 1	5.82	-	-	-	-	-
Critical Hdwy Stg 2	5.82	-	-	-	-	-
Follow-up Hdwy	3.51	3.41	-	-	2.27	-
Pot Cap-1 Maneuver	255	620	-	-	862	-
Stage 1	460	-	-	-	-	-
Stage 2	755	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	249	619	-	-	861	-
Mov Cap-2 Maneuver	362	-	-	-	-	-
Stage 1	460	-	-	-	-	-
Stage 2	738	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	11.9	0	0.3
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	547	861	-
HCM Lane V/C Ratio	-	-	0.051	0.02	-
HCM Control Delay (s)	-	-	11.9	9.3	-
HCM Lane LOS	-	-	B	A	-
HCM 95th %tile Q(veh)	-	-	0.2	0.1	-

Intersection	
Int Delay, s/veh	0.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	0	0	1	1	7	0	704	5	5	453	0
Future Vol, veh/h	0	0	0	1	1	7	0	704	5	5	453	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	270	-	-	270	-	-
Veh in Median Storage, #	-	1	-	-	1	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	88	88	88	88	88	88	88	88	88	88	88	92
Heavy Vehicles, %	1	1	1	1	1	1	1	2	1	1	3	1
Mvmt Flow	0	0	0	1	1	8	0	800	6	6	515	0

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1335	1333	515	1330	1330	803	515	0	0	806	0	0
Stage 1	527	527	-	803	803	-	-	-	-	-	-	-
Stage 2	808	806	-	527	527	-	-	-	-	-	-	-
Critical Hdwy	7.11	6.51	6.21	7.11	6.51	6.21	4.11	-	-	4.11	-	-
Critical Hdwy Stg 1	6.11	5.51	-	6.11	5.51	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.11	5.51	-	6.11	5.51	-	-	-	-	-	-	-
Follow-up Hdwy	3.509	4.009	3.309	3.509	4.009	3.309	2.209	-	-	2.209	-	-
Pot Cap-1 Maneuver	131	155	562	132	155	385	1056	-	-	823	-	-
Stage 1	536	530	-	379	397	-	-	-	-	-	-	-
Stage 2	376	396	-	536	530	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	127	154	562	131	154	385	1056	-	-	823	-	-
Mov Cap-2 Maneuver	252	272	-	259	275	-	-	-	-	-	-	-
Stage 1	536	526	-	379	397	-	-	-	-	-	-	-
Stage 2	367	396	-	532	526	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	15.6	0	0.1
HCM LOS	A	C		

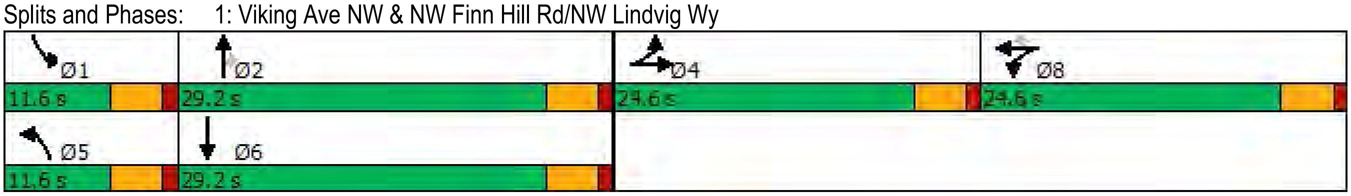
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1056	-	-	-	350	823	-	-
HCM Lane V/C Ratio	-	-	-	-	0.029	0.007	-	-
HCM Control Delay (s)	0	-	-	0	15.6	9.4	-	-
HCM Lane LOS	A	-	-	A	C	A	-	-
HCM 95th %tile Q(veh)	0	-	-	-	0.1	0	-	-

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	80	358	87	740	435	128	123	296	569	120	231	80
Future Volume (vph)	80	358	87	740	435	128	123	296	569	120	231	80
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	125		0	225		135	110		230	95		0
Storage Lanes	1		0	1		1	1		1	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	0.95	0.95	0.95	0.95	1.00	1.00	1.00	1.00	1.00	0.95	0.95
Ped Bike Factor	0.99	1.00		1.00	1.00	0.97	0.99		0.98	1.00	0.99	
Frt		0.971				0.850			0.850		0.961	
Flt Protected	0.950			0.950	0.987		0.950			0.950		
Satd. Flow (prot)	1787	3403	0	1681	1759	1599	1787	1827	1599	1787	3355	0
Flt Permitted	0.950			0.950	0.987		0.950			0.950		
Satd. Flow (perm)	1778	3403	0	1675	1757	1545	1773	1827	1567	1779	3355	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		31				127			527		53	
Link Speed (mph)		35			25			35			35	
Link Distance (ft)		560			696			779			583	
Travel Time (s)		10.9			19.0			15.2			11.4	
Confl. Peds. (#/hr)	5		5	5		5	5		5	5		5
Confl. Bikes (#/hr)			1			1			1			1
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Heavy Vehicles (%)	1%	3%	1%	2%	1%	1%	1%	4%	1%	1%	2%	4%
Adj. Flow (vph)	86	385	94	796	468	138	132	318	612	129	248	86
Shared Lane Traffic (%)				22%								
Lane Group Flow (vph)	86	479	0	621	643	138	132	318	612	129	334	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2	1	1	2	1	1	2	
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru	Right	Left	Thru	
Leading Detector (ft)	20	100		20	100	20	20	100	20	20	100	
Trailing Detector (ft)	0	0		0	0	0	0	0	0	0	0	
Detector 1 Position(ft)	0	0		0	0	0	0	0	0	0	0	
Detector 1 Size(ft)	20	6		20	6	20	20	6	20	20	6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Split	NA		Split	NA	Perm	Prot	NA	Perm	Prot	NA	
Protected Phases	4	4		8	8		5	2		1	6	
Permitted Phases						8			2			
Detector Phase	4	4		8	8	8	5	2	2	1	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	
Minimum Split (s)	22.5	22.5		22.5	22.5	22.5	9.5	22.5	22.5	9.5	22.5	
Total Split (s)	24.6	24.6		24.6	24.6	24.6	11.6	29.2	29.2	11.6	29.2	
Total Split (%)	27.3%	27.3%		27.3%	27.3%	27.3%	12.9%	32.4%	32.4%	12.9%	32.4%	
Maximum Green (s)	20.1	20.1		20.1	20.1	20.1	7.1	24.7	24.7	7.1	24.7	
Yellow Time (s)	3.5	3.5		3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	
All-Red Time (s)	1.0	1.0		1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	4.5	4.5		4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	
Lead/Lag							Lead	Lag	Lag	Lead	Lag	
Lead-Lag Optimize?							Yes	Yes	Yes	Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	None		None	None	None	None	Min	Min	None	Min	
Walk Time (s)	7.0	7.0		7.0	7.0	7.0		7.0	7.0		7.0	
Flash Dont Walk (s)	11.0	11.0		11.0	11.0	11.0		11.0	11.0		11.0	
Pedestrian Calls (#/hr)	5	5		5	5	5		5	5		5	
Act Effct Green (s)	16.1	16.1		20.3	20.3	20.3	7.2	20.1	20.1	7.2	20.1	
Actuated g/C Ratio	0.20	0.20		0.25	0.25	0.25	0.09	0.25	0.25	0.09	0.25	
v/c Ratio	0.25	0.69		1.49	1.47	0.29	0.85	0.71	0.78	0.83	0.39	
Control Delay	30.6	34.6		260.6	253.9	8.6	82.7	38.0	13.0	79.7	22.9	
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	30.6	34.6		260.6	253.9	8.6	82.7	38.0	13.0	79.7	22.9	
LOS	C	C		F	F	A	F	D	B	E	C	
Approach Delay		34.0			232.8			29.2			38.7	
Approach LOS		C			F			C			D	

Intersection Summary	
Area Type: Other	
Cycle Length: 90	
Actuated Cycle Length: 81.9	
Natural Cycle: 100	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 1.49	
Intersection Signal Delay: 113.0	Intersection LOS: F
Intersection Capacity Utilization 82.3%	ICU Level of Service E
Analysis Period (min) 15	

Splits and Phases: 1: Viking Ave NW & NW Finn Hill Rd/NW Lindvig Wy



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	20	0	13	8	0	45	17	956	3	36	991	32
Future Volume (veh/h)	20	0	13	8	0	45	17	956	3	36	991	32
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		0.98	1.00		0.98	1.00		0.98
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1811	1885	1885	1885	1885	1856	1885	1870	1411	1885	1870	1841
Adj Flow Rate, veh/h	21	0	14	8	0	47	18	996	3	38	1032	33
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	6	1	1	1	1	3	1	2	33	1	2	4
Cap, veh/h	349	0	139	139	4	118	402	1696	5	444	1714	55
Arrive On Green	0.09	0.00	0.09	0.09	0.00	0.09	0.02	0.47	0.47	0.04	0.49	0.49
Sat Flow, veh/h	1524	0	1566	184	41	1326	1795	3634	11	1795	3511	112
Grp Volume(v), veh/h	21	0	14	55	0	0	18	487	512	38	522	543
Grp Sat Flow(s),veh/h/ln	1524	0	1566	1552	0	0	1795	1777	1868	1795	1777	1847
Q Serve(g_s), s	0.0	0.0	0.3	0.6	0.0	0.0	0.2	6.8	6.8	0.4	7.2	7.2
Cycle Q Clear(g_c), s	0.4	0.0	0.3	1.1	0.0	0.0	0.2	6.8	6.8	0.4	7.2	7.2
Prop In Lane	1.00		1.00	0.15		0.85	1.00		0.01	1.00		0.06
Lane Grp Cap(c), veh/h	349	0	139	260	0	0	402	829	872	444	867	901
V/C Ratio(X)	0.06	0.00	0.10	0.21	0.00	0.00	0.04	0.59	0.59	0.09	0.60	0.60
Avail Cap(c_a), veh/h	1442	0	1393	1493	0	0	1265	1554	1634	1269	1554	1615
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	14.2	0.0	14.1	14.5	0.0	0.0	5.1	6.6	6.6	4.9	6.3	6.3
Incr Delay (d2), s/veh	0.1	0.0	0.3	0.4	0.0	0.0	0.0	0.7	0.6	0.1	0.7	0.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.1	0.0	0.1	0.4	0.0	0.0	0.0	1.6	1.6	0.1	1.6	1.6
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	14.2	0.0	14.4	14.9	0.0	0.0	5.1	7.3	7.2	4.9	6.9	6.9
LnGrp LOS	B	A	B	B	A	A	A	A	A	A	A	A
Approach Vol, veh/h		35			55			1017			1103	
Approach Delay, s/veh		14.3			14.9			7.2			6.9	
Approach LOS		B			B			A			A	
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	6.0	20.2		7.5	5.3	21.0		7.5				
Change Period (Y+Rc), s	4.5	4.5		4.5	4.5	4.5		4.5				
Max Green Setting (Gmax), s	17.0	29.5		30.0	17.0	29.5		30.0				
Max Q Clear Time (g_c+I1), s	2.4	8.8		2.4	2.2	9.2		3.1				
Green Ext Time (p_c), s	0.0	6.7		0.1	0.0	7.3		0.3				
Intersection Summary												
HCM 6th Ctrl Delay			7.3									
HCM 6th LOS			A									

Intersection	
Int Delay, s/veh	0.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	15	0	5	8	0	3	5	887	9	13	983	18
Future Vol, veh/h	15	0	5	8	0	3	5	887	9	13	983	18
Conflicting Peds, #/hr	3	0	3	3	0	3	3	0	3	3	0	3
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	50	-	-	100	-	-
Veh in Median Storage, #	-	1	-	-	1	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	96	96	96	96	96	96	96	96	96	96	96	96
Heavy Vehicles, %	8	1	1	1	1	1	1	2	1	9	2	13
Mvmt Flow	16	0	5	8	0	3	5	924	9	14	1024	19

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1540	2011	528	1485	2016	473	1046	0	0	936	0	0
Stage 1	1065	1065	-	942	942	-	-	-	-	-	-	-
Stage 2	475	946	-	543	1074	-	-	-	-	-	-	-
Critical Hdwy	7.66	6.52	6.92	7.52	6.52	6.92	4.12	-	-	4.28	-	-
Critical Hdwy Stg 1	6.66	5.52	-	6.52	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.66	5.52	-	6.52	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.58	4.01	3.31	3.51	4.01	3.31	2.21	-	-	2.29	-	-
Pot Cap-1 Maneuver	74	59	498	87	59	540	667	-	-	686	-	-
Stage 1	227	299	-	285	342	-	-	-	-	-	-	-
Stage 2	524	340	-	494	297	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	72	57	495	84	57	537	665	-	-	684	-	-
Mov Cap-2 Maneuver	169	166	-	196	167	-	-	-	-	-	-	-
Stage 1	225	292	-	282	338	-	-	-	-	-	-	-
Stage 2	516	336	-	477	290	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	24.9	21	0.1	0.1
HCM LOS	C	C		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	665	-	-	202	237	684	-	-
HCM Lane V/C Ratio	0.008	-	-	0.103	0.048	0.02	-	-
HCM Control Delay (s)	10.5	-	-	24.9	21	10.4	-	-
HCM Lane LOS	B	-	-	C	C	B	-	-
HCM 95th %tile Q(veh)	0	-	-	0.3	0.2	0.1	-	-

Intersection	
Int Delay, s/veh	0.4

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	15	23	849	15	18	910
Future Vol, veh/h	15	23	849	15	18	910
Conflicting Peds, #/hr	2	2	0	2	2	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	65	-
Veh in Median Storage, #	1	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	94	94	94	94	94	94
Heavy Vehicles, %	1	1	2	1	1	2
Mvmt Flow	16	24	903	16	19	968

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1437	464	0	0	921	0
Stage 1	913	-	-	-	-	-
Stage 2	524	-	-	-	-	-
Critical Hdwy	6.82	6.92	-	-	4.12	-
Critical Hdwy Stg 1	5.82	-	-	-	-	-
Critical Hdwy Stg 2	5.82	-	-	-	-	-
Follow-up Hdwy	3.51	3.31	-	-	2.21	-
Pot Cap-1 Maneuver	125	548	-	-	743	-
Stage 1	354	-	-	-	-	-
Stage 2	561	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	121	546	-	-	742	-
Mov Cap-2 Maneuver	247	-	-	-	-	-
Stage 1	353	-	-	-	-	-
Stage 2	545	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	16	0	0.2
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	369	742	-
HCM Lane V/C Ratio	-	-	0.11	0.026	-
HCM Control Delay (s)	-	-	16	10	-
HCM Lane LOS	-	-	C	A	-
HCM 95th %tile Q(veh)	-	-	0.4	0.1	-

Intersection	
Int Delay, s/veh	0.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	6	0	5	8	0	15	0	795	3	5	966	0
Future Vol, veh/h	6	0	5	8	0	15	0	795	3	5	966	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	270	-	-	270	-	-
Veh in Median Storage, #	-	1	-	-	1	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	93	93	93	93	93	93	93	93	93	93	93	93
Heavy Vehicles, %	1	1	1	1	1	1	1	2	1	1	2	1
Mvmt Flow	6	0	5	9	0	16	0	855	3	5	1039	0

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1914	1907	1039	1909	1906	857	1039	0	0	858	0	0
Stage 1	1049	1049	-	857	857	-	-	-	-	-	-	-
Stage 2	865	858	-	1052	1049	-	-	-	-	-	-	-
Critical Hdwy	7.11	6.51	6.21	7.11	6.51	6.21	4.11	-	-	4.11	-	-
Critical Hdwy Stg 1	6.11	5.51	-	6.11	5.51	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.11	5.51	-	6.11	5.51	-	-	-	-	-	-	-
Follow-up Hdwy	3.509	4.009	3.309	3.509	4.009	3.309	2.209	-	-	2.209	-	-
Pot Cap-1 Maneuver	52	69	281	52	69	358	673	-	-	787	-	-
Stage 1	276	306	-	353	375	-	-	-	-	-	-	-
Stage 2	350	375	-	275	306	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	49	69	281	51	69	358	673	-	-	787	-	-
Mov Cap-2 Maneuver	159	183	-	162	184	-	-	-	-	-	-	-
Stage 1	276	304	-	353	375	-	-	-	-	-	-	-
Stage 2	334	375	-	268	304	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	24.3	20.8	0	0
HCM LOS	C	C		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	673	-	-	198	252	787	-	-
HCM Lane V/C Ratio	-	-	-	0.06	0.098	0.007	-	-
HCM Control Delay (s)	0	-	-	24.3	20.8	9.6	-	-
HCM Lane LOS	A	-	-	C	C	A	-	-
HCM 95th %tile Q(veh)	0	-	-	0.2	0.3	0	-	-

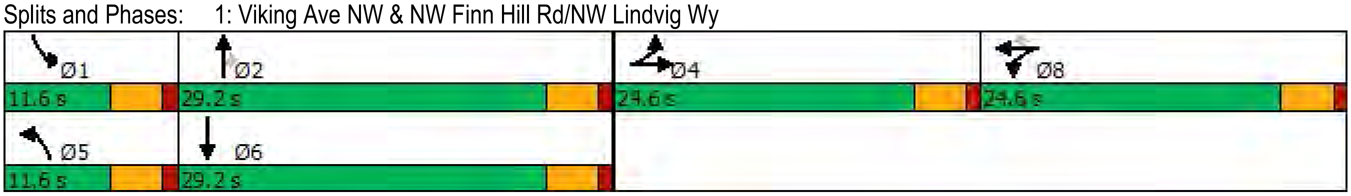
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	49	389	97	385	205	45	67	108	604	70	134	54
Future Volume (vph)	49	389	97	385	205	45	67	108	604	70	134	54
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	125		0	225		135	110		230	95		0
Storage Lanes	1		0	1		1	1		1	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	0.95	0.95	0.95	0.95	1.00	1.00	1.00	1.00	1.00	0.95	0.95
Ped Bike Factor	1.00	1.00		1.00	1.00	0.98	1.00		0.99	1.00	0.99	
Frt		0.970				0.850			0.850		0.957	
Flt Protected	0.950			0.950	0.984		0.950			0.950		
Satd. Flow (prot)	1770	3430	0	1698	1759	1599	1787	1881	1599	1787	3341	0
Flt Permitted	0.950			0.950	0.984		0.950			0.950		
Satd. Flow (perm)	1767	3430	0	1697	1758	1560	1784	1881	1576	1785	3341	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		32				127			554		56	
Link Speed (mph)		35			25			35			35	
Link Distance (ft)		560			696			779			583	
Travel Time (s)		10.9			19.0			15.2			11.4	
Confl. Peds. (#/hr)	1		1	1		1	1		1	1		1
Confl. Bikes (#/hr)			1			1			1			1
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	2%	2%	1%	1%	1%	1%	1%	1%	1%	1%	3%	2%
Adj. Flow (vph)	51	405	101	401	214	47	70	113	629	73	140	56
Shared Lane Traffic (%)				25%								
Lane Group Flow (vph)	51	506	0	301	314	47	70	113	629	73	196	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2	1	1	2	1	1	2	
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru	Right	Left	Thru	
Leading Detector (ft)	20	100		20	100	20	20	100	20	20	100	
Trailing Detector (ft)	0	0		0	0	0	0	0	0	0	0	
Detector 1 Position(ft)	0	0		0	0	0	0	0	0	0	0	
Detector 1 Size(ft)	20	6		20	6	20	20	6	20	20	6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Split	NA		Split	NA	Perm	Prot	NA	Perm	Prot	NA	
Protected Phases	4	4		8	8		5	2		1	6	
Permitted Phases						8			2			
Detector Phase	4	4		8	8	8	5	2	2	1	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	
Minimum Split (s)	22.5	22.5		22.5	22.5	22.5	9.5	22.5	22.5	9.5	22.5	
Total Split (s)	24.6	24.6		24.6	24.6	24.6	11.6	29.2	29.2	11.6	29.2	
Total Split (%)	27.3%	27.3%		27.3%	27.3%	27.3%	12.9%	32.4%	32.4%	12.9%	32.4%	
Maximum Green (s)	20.1	20.1		20.1	20.1	20.1	7.1	24.7	24.7	7.1	24.7	
Yellow Time (s)	3.5	3.5		3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	
All-Red Time (s)	1.0	1.0		1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	4.5	4.5		4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	
Lead/Lag							Lead	Lag	Lag	Lead	Lag	
Lead-Lag Optimize?							Yes	Yes	Yes	Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	None		None	None	None	None	Min	Min	None	Min	
Walk Time (s)	7.0	7.0		7.0	7.0	7.0		7.0	7.0		7.0	
Flash Dont Walk (s)	11.0	11.0		11.0	11.0	11.0		11.0	11.0		11.0	
Pedestrian Calls (#/hr)	1	1		1	1	1		1	1		1	
Act Effct Green (s)	15.6	15.6		17.6	17.6	17.6	7.2	13.9	13.9	7.2	14.0	
Actuated g/C Ratio	0.22	0.22		0.25	0.25	0.25	0.10	0.20	0.20	0.10	0.20	
v/c Ratio	0.13	0.65		0.71	0.72	0.10	0.38	0.30	0.83	0.40	0.28	
Control Delay	27.0	29.8		38.8	38.6	0.4	42.8	28.4	15.6	43.2	19.7	
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	27.0	29.8		38.8	38.6	0.4	42.8	28.4	15.6	43.2	19.7	
LOS	C	C		D	D	A	D	C	B	D	B	
Approach Delay		29.5			36.0			19.7			26.1	
Approach LOS		C			D			B			C	

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 70.4
Natural Cycle: 80
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.83
Intersection Signal Delay: 27.5 Intersection LOS: C
Intersection Capacity Utilization 66.8% ICU Level of Service C
Analysis Period (min) 15

Splits and Phases: 1: Viking Ave NW & NW Finn Hill Rd/NW Lindvig Wy



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	16	0	11	3	0	18	8	764	7	30	536	20
Future Volume (veh/h)	16	0	11	3	0	18	8	764	7	30	536	20
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.98		0.99	0.98		0.99	1.00		0.99	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1885	1885	1752	1885	1885	1707	1885	1826	1648	1841	1841	1885
Adj Flow Rate, veh/h	17	0	12	3	0	19	9	822	8	32	576	22
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	1	1	10	1	1	13	1	5	17	4	4	1
Cap, veh/h	356	0	118	151	2	106	549	1516	15	475	1572	60
Arrive On Green	0.08	0.00	0.08	0.08	0.00	0.08	0.01	0.43	0.43	0.04	0.46	0.46
Sat Flow, veh/h	1452	0	1471	188	20	1316	1795	3520	34	1753	3434	131
Grp Volume(v), veh/h	17	0	12	22	0	0	9	405	425	32	293	305
Grp Sat Flow(s),veh/h/ln	1452	0	1471	1524	0	0	1795	1735	1819	1753	1749	1816
Q Serve(g_s), s	0.0	0.0	0.2	0.2	0.0	0.0	0.1	5.2	5.2	0.3	3.3	3.3
Cycle Q Clear(g_c), s	0.3	0.0	0.2	0.4	0.0	0.0	0.1	5.2	5.2	0.3	3.3	3.3
Prop In Lane	1.00		1.00	0.14		0.86	1.00		0.02	1.00		0.07
Lane Grp Cap(c), veh/h	356	0	118	259	0	0	549	747	784	475	801	831
V/C Ratio(X)	0.05	0.00	0.10	0.09	0.00	0.00	0.02	0.54	0.54	0.07	0.37	0.37
Avail Cap(c_a), veh/h	1627	0	1471	1687	0	0	1544	1705	1789	1400	1719	1786
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	12.8	0.0	12.8	12.9	0.0	0.0	4.8	6.3	6.3	4.8	5.3	5.3
Incr Delay (d2), s/veh	0.1	0.0	0.4	0.1	0.0	0.0	0.0	0.6	0.6	0.1	0.3	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.1	0.0	0.1	0.1	0.0	0.0	0.0	1.1	1.2	0.1	0.6	0.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	12.9	0.0	13.2	13.0	0.0	0.0	4.8	7.0	6.9	4.8	5.6	5.6
LnGrp LOS	B	A	B	B	A	A	A	A	A	A	A	A
Approach Vol, veh/h		29			22			839			630	
Approach Delay, s/veh		13.0			13.0			6.9			5.5	
Approach LOS		B			B			A			A	

Timer - Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	5.7	17.4		6.9	4.9	18.2		6.9
Change Period (Y+Rc), s	4.5	4.5		4.5	4.5	4.5		4.5
Max Green Setting (Gmax), s	17.0	29.5		30.0	17.0	29.5		30.0
Max Q Clear Time (g_c+I1), s	2.3	7.2		2.3	2.1	5.3		2.4
Green Ext Time (p_c), s	0.0	5.5		0.1	0.0	3.8		0.1

Intersection Summary	
HCM 6th Ctrl Delay	6.6
HCM 6th LOS	A

Intersection	
Int Delay, s/veh	0.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	13	0	6	8	1	6	6	715	2	15	483	11
Future Vol, veh/h	13	0	6	8	1	6	6	715	2	15	483	11
Conflicting Peds, #/hr	4	0	4	4	0	4	4	0	4	4	0	4
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	50	-	-	100	-	-
Veh in Median Storage, #	-	1	-	-	1	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	94	94	94	94	94	94	94	94	94	94	94	94
Heavy Vehicles, %	9	1	20	1	1	40	1	3	1	39	4	10
Mvmt Flow	14	0	6	9	1	6	6	761	2	16	514	12

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	953	1335	271	1071	1340	390	530	0	0	767	0	0
Stage 1	556	556	-	778	778	-	-	-	-	-	-	-
Stage 2	397	779	-	293	562	-	-	-	-	-	-	-
Critical Hdwy	7.68	6.52	7.3	7.52	6.52	7.7	4.12	-	-	4.88	-	-
Critical Hdwy Stg 1	6.68	5.52	-	6.52	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.68	5.52	-	6.52	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.59	4.01	3.5	3.51	4.01	3.7	2.21	-	-	2.59	-	-
Pot Cap-1 Maneuver	203	154	675	176	153	513	1040	-	-	639	-	-
Stage 1	466	513	-	358	407	-	-	-	-	-	-	-
Stage 2	581	407	-	694	510	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	194	148	670	169	147	509	1036	-	-	637	-	-
Mov Cap-2 Maneuver	317	265	-	277	268	-	-	-	-	-	-	-
Stage 1	461	498	-	354	403	-	-	-	-	-	-	-
Stage 2	567	403	-	668	495	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	15	16.2	0.1	0.3
HCM LOS	C	C		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1036	-	-	380	338	637	-	-
HCM Lane V/C Ratio	0.006	-	-	0.053	0.047	0.025	-	-
HCM Control Delay (s)	8.5	-	-	15	16.2	10.8	-	-
HCM Lane LOS	A	-	-	C	C	B	-	-
HCM 95th %tile Q(veh)	0	-	-	0.2	0.1	0.1	-	-

Intersection						
Int Delay, s/veh	0.4					

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	5	22	680	10	17	457
Future Vol, veh/h	5	22	680	10	17	457
Conflicting Peds, #/hr	1	1	0	1	1	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	65	-
Veh in Median Storage, #	1	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	97	97	97	97	97	97
Heavy Vehicles, %	1	11	3	1	7	4
Mvmt Flow	5	23	701	10	18	471

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	980	358	0	0	712	0
Stage 1	707	-	-	-	-	-
Stage 2	273	-	-	-	-	-
Critical Hdwy	6.82	7.12	-	-	4.24	-
Critical Hdwy Stg 1	5.82	-	-	-	-	-
Critical Hdwy Stg 2	5.82	-	-	-	-	-
Follow-up Hdwy	3.51	3.41	-	-	2.27	-
Pot Cap-1 Maneuver	249	613	-	-	851	-
Stage 1	453	-	-	-	-	-
Stage 2	751	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	243	612	-	-	850	-
Mov Cap-2 Maneuver	356	-	-	-	-	-
Stage 1	453	-	-	-	-	-
Stage 2	734	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	12	0	0.3
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	540	850	-
HCM Lane V/C Ratio	-	-	0.052	0.021	-
HCM Control Delay (s)	-	-	12	9.3	-
HCM Lane LOS	-	-	B	A	-
HCM 95th %tile Q(veh)	-	-	0.2	0.1	-

Intersection	
Int Delay, s/veh	0.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	21	0	12	1	1	7	4	704	5	5	453	7
Future Vol, veh/h	21	0	12	1	1	7	4	704	5	5	453	7
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	270	-	-	270	-	-
Veh in Median Storage, #	-	1	-	-	1	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	88	88	88	88	88	88	88	88	88	88	88	92
Heavy Vehicles, %	1	1	1	1	1	1	1	2	1	1	3	1
Mvmt Flow	24	0	14	1	1	8	5	800	6	6	515	8

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1349	1347	519	1351	1348	803	523	0	0	806	0	0
Stage 1	531	531	-	813	813	-	-	-	-	-	-	-
Stage 2	818	816	-	538	535	-	-	-	-	-	-	-
Critical Hdwy	7.11	6.51	6.21	7.11	6.51	6.21	4.11	-	-	4.11	-	-
Critical Hdwy Stg 1	6.11	5.51	-	6.11	5.51	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.11	5.51	-	6.11	5.51	-	-	-	-	-	-	-
Follow-up Hdwy	3.509	4.009	3.309	3.509	4.009	3.309	2.209	-	-	2.209	-	-
Pot Cap-1 Maneuver	128	152	559	128	152	385	1049	-	-	823	-	-
Stage 1	534	528	-	374	393	-	-	-	-	-	-	-
Stage 2	371	392	-	529	526	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	124	150	559	124	150	385	1049	-	-	823	-	-
Mov Cap-2 Maneuver	248	268	-	251	270	-	-	-	-	-	-	-
Stage 1	531	524	-	372	391	-	-	-	-	-	-	-
Stage 2	361	390	-	512	522	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	18.2	15.7	0	0.1
HCM LOS	C	C		

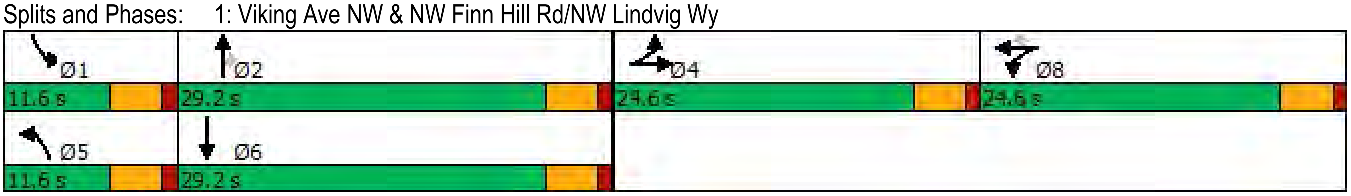
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1049	-	-	311	348	823	-	-
HCM Lane V/C Ratio	0.004	-	-	0.121	0.029	0.007	-	-
HCM Control Delay (s)	8.4	-	-	18.2	15.7	9.4	-	-
HCM Lane LOS	A	-	-	C	C	A	-	-
HCM 95th %tile Q(veh)	0	-	-	0.4	0.1	0	-	-

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	80	358	94	751	435	128	127	299	576	120	237	80
Future Volume (vph)	80	358	94	751	435	128	127	299	576	120	237	80
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	125		0	225		135	110		230	95		0
Storage Lanes	1		0	1		1	1		1	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	0.95	0.95	0.95	0.95	1.00	1.00	1.00	1.00	1.00	0.95	0.95
Ped Bike Factor	0.99	1.00		1.00	1.00	0.97	0.99		0.98	1.00	0.99	
Frt		0.969				0.850			0.850		0.962	
Flt Protected	0.950			0.950	0.986		0.950			0.950		
Satd. Flow (prot)	1787	3396	0	1681	1757	1599	1787	1827	1599	1787	3359	0
Flt Permitted	0.950			0.950	0.986		0.950			0.950		
Satd. Flow (perm)	1778	3396	0	1675	1755	1545	1773	1827	1567	1779	3359	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		34				127			527		51	
Link Speed (mph)		35			25			35			35	
Link Distance (ft)		560			696			779			583	
Travel Time (s)		10.9			19.0			15.2			11.4	
Confl. Peds. (#/hr)	5		5	5		5	5		5	5		5
Confl. Bikes (#/hr)			1			1			1			1
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Heavy Vehicles (%)	1%	3%	1%	2%	1%	1%	1%	4%	1%	1%	2%	4%
Adj. Flow (vph)	86	385	101	808	468	138	137	322	619	129	255	86
Shared Lane Traffic (%)				22%								
Lane Group Flow (vph)	86	486	0	630	646	138	137	322	619	129	341	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2	1	1	2	1	1	2	
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru	Right	Left	Thru	
Leading Detector (ft)	20	100		20	100	20	20	100	20	20	100	
Trailing Detector (ft)	0	0		0	0	0	0	0	0	0	0	
Detector 1 Position(ft)	0	0		0	0	0	0	0	0	0	0	
Detector 1 Size(ft)	20	6		20	6	20	20	6	20	20	6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Split	NA		Split	NA	Perm	Prot	NA	Perm	Prot	NA	
Protected Phases	4	4		8	8		5	2		1	6	
Permitted Phases						8			2			
Detector Phase	4	4		8	8	8	5	2	2	1	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	
Minimum Split (s)	22.5	22.5		22.5	22.5	22.5	9.5	22.5	22.5	9.5	22.5	
Total Split (s)	24.6	24.6		24.6	24.6	24.6	11.6	29.2	29.2	11.6	29.2	
Total Split (%)	27.3%	27.3%		27.3%	27.3%	27.3%	12.9%	32.4%	32.4%	12.9%	32.4%	
Maximum Green (s)	20.1	20.1		20.1	20.1	20.1	7.1	24.7	24.7	7.1	24.7	
Yellow Time (s)	3.5	3.5		3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	
All-Red Time (s)	1.0	1.0		1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	4.5	4.5		4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	
Lead/Lag							Lead	Lag	Lag	Lead	Lag	
Lead-Lag Optimize?							Yes	Yes	Yes	Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	None		None	None	None	None	Min	Min	None	Min	
Walk Time (s)	7.0	7.0		7.0	7.0	7.0		7.0	7.0		7.0	
Flash Dont Walk (s)	11.0	11.0		11.0	11.0	11.0		11.0	11.0		11.0	
Pedestrian Calls (#/hr)	5	5		5	5	5		5	5		5	
Act Effct Green (s)	16.2	16.2		20.3	20.3	20.3	7.2	20.2	20.2	7.2	20.2	
Actuated g/C Ratio	0.20	0.20		0.25	0.25	0.25	0.09	0.25	0.25	0.09	0.25	
v/c Ratio	0.24	0.70		1.52	1.49	0.29	0.88	0.72	0.79	0.83	0.39	
Control Delay	30.5	34.6		272.0	259.3	8.6	88.6	38.4	13.6	80.0	23.3	
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	30.5	34.6		272.0	259.3	8.6	88.6	38.4	13.6	80.0	23.3	
LOS	C	C		F	F	A	F	D	B	E	C	
Approach Delay		34.0			240.5			30.5			38.8	
Approach LOS		C			F			C			D	

Intersection Summary	
Area Type: Other	
Cycle Length: 90	
Actuated Cycle Length: 82.1	
Natural Cycle: 100	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 1.52	
Intersection Signal Delay: 116.2	Intersection LOS: F
Intersection Capacity Utilization 82.9%	ICU Level of Service E
Analysis Period (min) 15	

Splits and Phases: 1: Viking Ave NW & NW Finn Hill Rd/NW Lindvig Wy



Synchro 11 Light Report

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	20	0	13	8	0	45	17	970	3	36	1015	32
Future Volume (veh/h)	20	0	13	8	0	45	17	970	3	36	1015	32
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		0.98	1.00		0.98	1.00		0.98
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1811	1885	1885	1885	1885	1856	1885	1870	1411	1885	1870	1841
Adj Flow Rate, veh/h	21	0	14	8	0	47	18	1010	3	38	1057	33
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	6	1	1	1	1	3	1	2	33	1	2	4
Cap, veh/h	345	0	138	137	4	117	396	1717	5	441	1736	54
Arrive On Green	0.09	0.00	0.09	0.09	0.00	0.09	0.02	0.47	0.47	0.04	0.49	0.49
Sat Flow, veh/h	1525	0	1566	183	42	1326	1795	3634	11	1795	3515	110
Grp Volume(v), veh/h	21	0	14	55	0	0	18	494	519	38	534	556
Grp Sat Flow(s),veh/h/ln	1525	0	1566	1552	0	0	1795	1777	1868	1795	1777	1847
Q Serve(g_s), s	0.0	0.0	0.3	0.6	0.0	0.0	0.2	6.9	6.9	0.4	7.4	7.4
Cycle Q Clear(g_c), s	0.4	0.0	0.3	1.1	0.0	0.0	0.2	6.9	6.9	0.4	7.4	7.4
Prop In Lane	1.00		1.00	0.15		0.85	1.00		0.01	1.00		0.06
Lane Grp Cap(c), veh/h	345	0	138	258	0	0	396	840	883	441	877	912
V/C Ratio(X)	0.06	0.00	0.10	0.21	0.00	0.00	0.05	0.59	0.59	0.09	0.61	0.61
Avail Cap(c_a), veh/h	1423	0	1374	1473	0	0	1247	1533	1612	1255	1533	1594
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	14.4	0.0	14.3	14.7	0.0	0.0	5.1	6.6	6.6	4.8	6.3	6.3
Incr Delay (d2), s/veh	0.1	0.0	0.3	0.4	0.0	0.0	0.0	0.7	0.6	0.1	0.7	0.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.1	0.0	0.1	0.4	0.0	0.0	0.0	1.6	1.7	0.1	1.7	1.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	14.4	0.0	14.7	15.1	0.0	0.0	5.1	7.2	7.2	4.9	7.0	6.9
LnGrp LOS	B	A	B	B	A	A	A	A	A	A	A	A
Approach Vol, veh/h		35			55			1031			1128	
Approach Delay, s/veh		14.5			15.1			7.2			6.9	
Approach LOS		B			B			A			A	

Timer - Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	6.0	20.7		7.5	5.3	21.4		7.5
Change Period (Y+Rc), s	4.5	4.5		4.5	4.5	4.5		4.5
Max Green Setting (Gmax), s	17.0	29.5		30.0	17.0	29.5		30.0
Max Q Clear Time (g_c+I1), s	2.4	8.9		2.4	2.2	9.4		3.1
Green Ext Time (p_c), s	0.0	6.8		0.1	0.0	7.4		0.3

Intersection Summary			
HCM 6th Ctrl Delay			7.3
HCM 6th LOS			A

Intersection	
Int Delay, s/veh	0.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	15	0	5	8	0	3	5	901	9	13	1007	18
Future Vol, veh/h	15	0	5	8	0	3	5	901	9	13	1007	18
Conflicting Peds, #/hr	3	0	3	3	0	3	3	0	3	3	0	3
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	50	-	-	100	-	-
Veh in Median Storage, #	-	1	-	-	1	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	96	96	96	96	96	96	96	96	96	96	96	96
Heavy Vehicles, %	8	1	1	1	1	1	1	2	1	9	2	13
Mvmt Flow	16	0	5	8	0	3	5	939	9	14	1049	19

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1573	2051	540	1513	2056	480	1071	0	0	951	0	0
Stage 1	1090	1090	-	957	957	-	-	-	-	-	-	-
Stage 2	483	961	-	556	1099	-	-	-	-	-	-	-
Critical Hdwy	7.66	6.52	6.92	7.52	6.52	6.92	4.12	-	-	4.28	-	-
Critical Hdwy Stg 1	6.66	5.52	-	6.52	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.66	5.52	-	6.52	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.58	4.01	3.31	3.51	4.01	3.31	2.21	-	-	2.29	-	-
Pot Cap-1 Maneuver	70	56	489	83	55	535	652	-	-	676	-	-
Stage 1	219	291	-	279	336	-	-	-	-	-	-	-
Stage 2	518	335	-	485	289	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	68	54	486	80	53	532	650	-	-	674	-	-
Mov Cap-2 Maneuver	163	161	-	191	162	-	-	-	-	-	-	-
Stage 1	217	284	-	276	332	-	-	-	-	-	-	-
Stage 2	510	331	-	468	282	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	25.7	21.4	0.1	0.1
HCM LOS	D	C		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	650	-	-	195	231	674	-	-
HCM Lane V/C Ratio	0.008	-	-	0.107	0.05	0.02	-	-
HCM Control Delay (s)	10.6	-	-	25.7	21.4	10.5	-	-
HCM Lane LOS	B	-	-	D	C	B	-	-
HCM 95th %tile Q(veh)	0	-	-	0.4	0.2	0.1	-	-

Intersection	
Int Delay, s/veh	0.4

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	15	23	863	15	18	934
Future Vol, veh/h	15	23	863	15	18	934
Conflicting Peds, #/hr	2	2	0	2	2	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	65	-
Veh in Median Storage, #	1	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	94	94	94	94	94	94
Heavy Vehicles, %	1	1	2	1	1	2
Mvmt Flow	16	24	918	16	19	994

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1465	471	0	0	936	0
Stage 1	928	-	-	-	-	-
Stage 2	537	-	-	-	-	-
Critical Hdwy	6.82	6.92	-	-	4.12	-
Critical Hdwy Stg 1	5.82	-	-	-	-	-
Critical Hdwy Stg 2	5.82	-	-	-	-	-
Follow-up Hdwy	3.51	3.31	-	-	2.21	-
Pot Cap-1 Maneuver	120	542	-	-	734	-
Stage 1	348	-	-	-	-	-
Stage 2	553	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	116	540	-	-	733	-
Mov Cap-2 Maneuver	242	-	-	-	-	-
Stage 1	347	-	-	-	-	-
Stage 2	538	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	16.2	0	0.2
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	363	733	-
HCM Lane V/C Ratio	-	-	0.111	0.026	-
HCM Control Delay (s)	-	-	16.2	10	-
HCM Lane LOS	-	-	C	B	-
HCM 95th %tile Q(veh)	-	-	0.4	0.1	-

Intersection	
Int Delay, s/veh	0.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	20	0	13	8	0	15	13	795	3	5	966	24
Future Vol, veh/h	20	0	13	8	0	15	13	795	3	5	966	24
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	270	-	-	270	-	-
Veh in Median Storage, #	-	1	-	-	1	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	93	93	93	93	93	93	93	93	93	93	93	93
Heavy Vehicles, %	1	1	1	1	1	1	1	2	1	1	2	1
Mvmt Flow	22	0	14	9	0	16	14	855	3	5	1039	26

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1955	1948	1052	1954	1960	857	1065	0	0	858	0	0
Stage 1	1062	1062	-	885	885	-	-	-	-	-	-	-
Stage 2	893	886	-	1069	1075	-	-	-	-	-	-	-
Critical Hdwy	7.11	6.51	6.21	7.11	6.51	6.21	4.11	-	-	4.11	-	-
Critical Hdwy Stg 1	6.11	5.51	-	6.11	5.51	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.11	5.51	-	6.11	5.51	-	-	-	-	-	-	-
Follow-up Hdwy	3.509	4.009	3.309	3.509	4.009	3.309	2.209	-	-	2.209	-	-
Pot Cap-1 Maneuver	48	65	276	48	64	358	658	-	-	787	-	-
Stage 1	272	301	-	341	364	-	-	-	-	-	-	-
Stage 2	338	364	-	269	297	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	45	63	276	45	62	358	658	-	-	787	-	-
Mov Cap-2 Maneuver	151	176	-	147	171	-	-	-	-	-	-	-
Stage 1	266	299	-	334	356	-	-	-	-	-	-	-
Stage 2	316	356	-	254	295	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	29.2	21.8	0.2	0
HCM LOS	D	C		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	658	-	-	184	239	787	-	-
HCM Lane V/C Ratio	0.021	-	-	0.193	0.103	0.007	-	-
HCM Control Delay (s)	10.6	-	-	29.2	21.8	9.6	-	-
HCM Lane LOS	B	-	-	D	C	A	-	-
HCM 95th %tile Q(veh)	0.1	-	-	0.7	0.3	0	-	-

Intersection: 1: Viking Ave NW & Project Access/Liberty Shores/Harbor House Driveway

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	L	L
Maximum Queue (ft)	64	36	35	24
Average Queue (ft)	23	9	2	2
95th Queue (ft)	51	33	14	14
Link Distance (ft)	223	255		
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)			270	270
Storage Blk Time (%)				
Queuing Penalty (veh)				

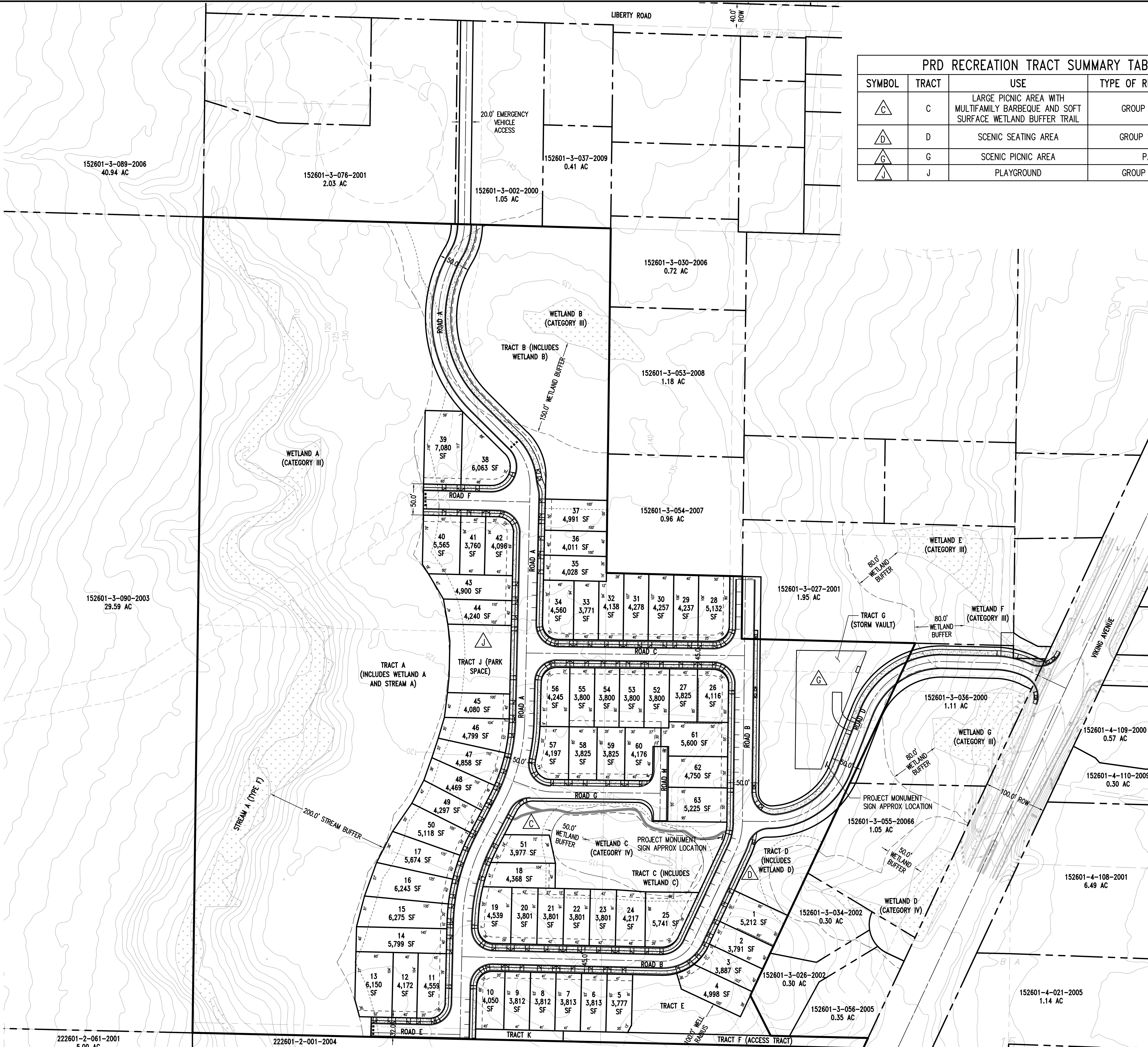
Intersection: 1: Viking Ave NW & Project Access/Liberty Shores/Harbor House Driveway

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	L	L
Maximum Queue (ft)	83	52	30	34
Average Queue (ft)	29	19	9	4
95th Queue (ft)	66	47	31	21
Link Distance (ft)	223	255		
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)			270	270
Storage Blk Time (%)				
Queuing Penalty (veh)				

PLATEAU AT LIBERTY BAY
TRAFFIC IMPACT ANALYSIS

APPENDIX

SITE PLAN



PRD RECREATION TRACT SUMMARY TABLE

SYMBOL	TRACT	USE	TYPE OF RECREATION USE
C	C	LARGE PICNIC AREA WITH MULTIFAMILY BARBEQUE AND SOFT SURFACE WETLAND BUFFER TRAIL	GROUP 2 – ACTIVE
D	D	SCENIC SEATING AREA	GROUP 1 – PASSIVE
G	G	SCENIC PICNIC AREA	PASSIVE
J	J	PLAYGROUND	GROUP 1 – ACTIVE

TRACT SUMMARY TABLE

TRACT	AREA (SF)	USE
A	457,688	WETLAND & STREAM A, CRITICAL AREA BUFFER, OPEN SPACE
B	82,609	WETLAND B, CRITICAL AREA BUFFER
C	37,029	WETLAND C, CRITICAL AREA BUFFER, OPEN SPACE, PASSIVE RECREATION
D	12,150	WETLAND D, CRITICAL AREA BUFFER, OPEN SPACE
E	14,489	WELL TRACT, OPEN SPACE
F	8,298	NEIGHBOR ACCESS TRACT
G	37,988	STORM VAULT, PASSIVE RECREATION
J	10,853	OPEN SPACE, ACTIVE RECREATION
K	2,527	OPEN SPACE

PRD LOT CALCULATIONS TABLE
PMC SECTION 18.260

CODE REFERENCE	ALLOWED	PROVIDED
MINIMUM LOT AREA	3,750 SF	3,777 SF
MINIMUM AVERAGE LOT AREA	4,500 SF	4,502 SF
MAX GROSS DENSITY (5 UNITS PER GROSS ACRE)	130 LOTS	63 LOTS
MINIMUM NET DENSITY (4 UNITS PER NET ACRE)	33 LOTS	63 LOTS

LEGEND

- PROPOSED PROPERTY LINE
- PROPERTY LINE
- CENTERLINE
- PROPOSED UTILITY EASEMENT (TYP) 6
- WETLAND BUFFER (EXISTING & PROPOSED BY AVERAGING)
- CRITICAL AREA BSBL 7

NOTES:

1. SEE SHEET C1.10 FOR PROPOSED PROJECT PHASING (2 PHASES).
2. GIS DATA IS USED FOR ALL GRADING INFORMATION AND CITY RECORDS ARE USED FOR ALL SHOWN EXISTING UTILITIES. THE PROJECT SURVEYOR SHALL PROVIDE A FULL SITE SURVEY DURING CONSTRUCTION DOCUMENT PREPARATION.
3. EXISTING LOT LINES AND EASEMENTS SHOWN ARE PROVIDED BY THE PROJECT SURVEYOR.
4. WETLAND AND STREAM LIMITS ARE FLAGGED IN THE FIELD BY THE WETLAND BIOLOGIST AND SURVEYED LOCATION IS SHOWN ON THESE PLANS.
5. SEE SHEET C1.20 FOR PRELIMINARY STRIPING, SIGNAGE, AND PROPOSED ON-STREET PARKING STALLS.
6. PROPOSED UTILITY EASEMENTS FOR WATER, SEWER, STORM WATER AND FRANCHISE UTILITIES SHALL BE 10' (TYP) UNLESS OTHERWISE NOTED.
7. 25 FOOT STREAM BUFFER BSBL IS SHOWN FROM THE STREAM A BUFFER. 15 FOOT WETLAND BUFFER BSBL IS SHOWN FROM WETLANDS B, C, AND D.

N

0 40 80 160
1 inch = 80 feet

Z:\2000001-2009999\2000505 Wotts\CADD\Design\PPLAT\C1.00 WA PPLAT PLN.dwg
Jun 05, 2023 – 12:04pm elisec

NO.	DATE	BY	CHD.	APPR.	REVISION
1	01/2023	EKC	EKC	JSF	INITIAL PRELIMINARY PLAT SUBMITTAL
2	02/2023	EKC	EKC	JSF	SECOND PRELIMINARY PLAT SUBMITTAL

DRAWN BY: RAG
DESIGNED BY: EKC
CHECKED BY: EKC
APPROVED BY: JSF
DATE: FEBRUARY 1, 2023
JOB No.: 2000505

CALL TWO BUSINESS DAYS BEFORE YOU DIG 1-800-424-5555

SCALE: AS NOTED

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JEREMY S. FEBUS — STATE OF WASHINGTON — 39847 — REGISTERED PROFESSIONAL ENGINEER

THE PLATEAU AT LIBERTY BAY PRD / ENTITLE FUND TWO, LLC
POULSBO, WASHINGTON

PRELIMINARY PLAT PLAN

SHEET
C1.00