North Kitsap United Development

FEASIBILITY REPORT

KITSAP COUNTY, WASHINGTON

Prepared For:
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DEA Job No. RAYORYPP0001

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1 INTRODUCTION

This engineering feasibility provides preliminary analysis for the future potential development at the North Kitsap United project site. The properties that make up North Kitsap United have historically been land owned and operated as a commercial tree farm; first by Pope and Talbot, then Pope Resources, and beginning in 2020 by Rayonier/Raydient Places + Properties. Today, the property is also used as a connection to the Heritage Park trails by the public. The North Kitsap United site consists of 417.98 acres made up of 31 parcels in unincorporated Kitsap County.

This report summarizes the findings and research from publicly available information, technical reports provided by separate consultants and provides commentary based on David Evans and Associates (DEA) experience in land development in the Puget Sound Region. Sources for this data are cited throughout this report with verbatim quotes provided in narrow formatted italics texts. The attached appendix contains a mix of publicly available figures and summary exhibits produced by DEA and other consultants.

This report was written in the context of one potential development scenario provided by the Owner including:

- One large community sports and recreation facility (including a YMCA and approximately 40 acres of sports and recreation.
- Five acres of commercial use.
- Eighty residential lots. To be conservative, each lot was assumed to include one primary and one accessory dwelling unit (ADU) as permitted in the Rural Residential zone.

2 SITE CONDITIONS

The site contains moderate to sleep slopes that are generally tributary to Gamble Creek, which runs south to north directly east of the site. Per the AESI Geotechnical Report, the site is generally underlain by Ragnar sandy loam soils. These soils are outwash type soils (type A/B soils) which are known to have high infiltration characteristics when dry. The geotechnical report is included as an attachment to this report.

2.1 Critical Areas

Kitsap County Code governs the development within Critical Areas. The code chapter is complex and involves several exceptions based on site specific conditions and, in general, the specific delineations and impacts of critical areas on development must be studied on a case by case basis by licensed professionals. Kitsap County Code (KCC) regulates the following Critical Areas:

KCC 19.150.215

"Critical areas" means those areas and ecosystems identified as:

A. wetlands;
B. critical recharging effect on aquifers;
C. fish and wildlife habitat conservation areas;
D. geologically hazardous areas;
E. frequently flooded areas.

Kitsap County maintains a catalog of known Critical Areas in their Critcal Area Ordinance Overlay (CAO). This database (updated in 2022 and in review for an update in 2024) was researched along with detailed site investigations. See Appendix B and Appendix C for the reports provided by AESI (Geotechnical Report) and by Ecological Land Services (Sensitive Areas Report).

Further information on critical areas within the project site is explored in the studies prepared. Please see these reports for background information regarding anticipated critical areas.

2.1.1 Streams and Wetlands

There are no agency mapped wetlands on the project site, and only one was found during a several-day field inspection of the property. This unusual condition is consistent with soils that are highly permeable and freely infiltrate surface water. See the Sensitive Areas Report prepared by Ecological Land Services in Appendix C for further information.

2.1.2 Critical Aquifer Recharge Areas

A category 2 Critical Aquifer Recharge Area (CARA) is mapped by Kitsap County. This condition was affirmed during he investigation by Associated Earth Sciences (See Appendix B). This condition with its highly permeable soils creates a uniue condition on the NKU site. There is an extreme lack of streams, ponds, wetlands or surface water of any sort.

2.1.3 Wildlife Habitat Conservation Area and Wildlife Habitat Network

There are no Wildlife Habitat Conservation Areas on the Project Site. See the Sensitive Areas report prepared by Ecological Land Services for further information.

2.1.4 Erosion Hazard

There are moderate Erosion Hazards mapped on the site per the Kitsap County Sensitive Area Ordinance. See the AESI geotechnical report for further information.

2.1.5 Landslide Hazards

There are moderate Deep Landslide Hazards mapped on the site per the Kitsap County Sensitive Area Ordinance. See the AESI geotechnical report for further information.

2.1.6 Seismic Hazard Areas

The Puget Sound region in general is susceptible to earthquakes due to the presence of a tectonic subduction zone near the coast. The region has experienced several earthquakes in the recent history including a magnitude 6.8 earthquake in 2001. See Appendix B for the AESI geotechnical report for further information.

2.1.7 Flood Hazard Areas

Kitsap County maps no Flood Hazard Areas at North Kitsap United and there are no marked FEMA flood zones on the project's FIRM panel.

2.2 Cultural Areas

A cultural resources desktop review has been completed for the site by Westland Resources dated 10/26/23, see Appendix D. Westland Resources found the following:

- There are no recorded archaeological sites or listed historic properties within or adjacent to the project area
- The project area has been logged and cleared historically, more than once
- The risk of intact archaeological sites is considered low (for precontact sites) and moderate (for historic period sites, possibly related to historic logging)
- A field survey and subsurface testing was recommended to identify any unknown resources
- The Port Gamble S'Klallam and Suquamish Tribes have been provided with a copy of the desktop study and both were asked for their input
- No feedback from either tribe has been received to date, though this may happen later during a formal review period

3 PLANNING AND ENTITLEMENTS

3.1 Key Development Components

The following five key aspects to the NKU Development trigger different planning and entitlement processes which are highlighted in this section.

- Comprehensive Plan Amendment with Concurrent Rezone
- Indoor Recreation; YMCA
- Outdoor recreation; Regional Ball Fields
- Rural Commercial
- Residential Development

3.2 Zoning Considerations Summary

The current zoning of the property is Rural Wooded with a minimum lot area of 20 acres. Two parcels in the southwest portion of the site are Zone Rural Residential which allows for one dwelling unit per 5 acres. See NKU Kitsap County Land Use Regulation and Washington State Growth Management Act Compliance white paper report in Exhibit A. A Comprehensive Plan Docketing Request to change the Comprehensive Plan and Zoning to Rural Residential for the majority of the property, and to Rural Commercial for a portion of the property between Stottelmeyer Road and Bond Road. The County estimates that the Comprehensive Plan and Zoning Map amendment process will follow the following schedule: Draft EIS done by December 2023, Preferred alternatives selected April 2024, Final EIS completed by August 2024, and final approval by the Board of Commissioners by December 2024.

Once the Comprehensive Plan amendments are completed there are several ways to achieve these developments.

The proposed YMCA facility fits into the definition of “Recreational Facility, Indoor”. “Recreational Facility, Indoor” is allowed with a Conditional Use Permit within the Rural Residential and within the Rural Wooded zones.

The proposed ball fields fit into the definitions of “Recreational Facility, Outdoor” and can be approved through an administrative conditional use permit in the Rural Residential zone, and can be approved through a Hearing Examiner approved Conditional Use permit in the Rural Wooded Zone.

3.3 Performance Based Development

The residential and commercial components of NKU can be achieved using Performance Based Development (PBD).

Residential Performance Based Development
Residential clustering can be achieved using the Performance Based Development Code (PBD) (KCC 17.450. 040). The open space requirements appear to allow regional recreational uses with ownership vested not only in an HOA, but also vested with a Nonprofit corporation or a public agency.

Commercial Performance Based Development
Commercial PBD is also outlined in the code (KCC17.450.045). The code does not marry the commercial element of the PBD to the residential element. However, there is no prohibition against a PBD that contains both commercial and residential elements. Further, the PBD code was used to gain approval for the Port Gamble Master Plan. Therefore, we can assume that one PBD could be used to include the residential and the commercial area.

With these definitions and requirements, it appears that a YMCA and regional playfields could be allowed as elements of the open space in a PBD. In addition any commercial development proposed in the new Rural Commercial zone could be included in the PBD. Because f of this the development could be approved under one combined permit Performance Based Development with concurrent subdivision for the entire site and concurrent conditional use permits for the playfields and the YMCA. See code analysis and alternative recommendations below.

3.4 Comprehensive Plan Process

The County has provided their three preliminary alternatives for comprehensive plan and zoning map changes. One of the three alternatives includes changing the plan and zoning of the site from Rural Wooded to Rural Residential, and changing a portion of the property between Bond Road and Stottelmeyer Road to Rural Commercial. The County's proposed comprehensive plan amendment schedule is below.

April 2023	December 2023	April 2024	August 2024	December 2024
Preliminary Alternatives Selected	Draft EIS, Comp Plan, CFP and Regulations Released	Preferred Alternative Selected	Final EIS, Comp Plan, Capital Facilities Plan and Regulations Released	Board Approval of Final Documents

3.5 Entitlement Alternatives (Permitting Paths)

Because of the code allowances, there are three possible permitting paths to achieve the desired development plan:

- Apply for a <u>combined permit master plan for all</u> elements of the project:
    - PBD for the entire site
    - Conditional use permits for the YMCA and for the playfields.
    - Subdivision to create the lots and tracts for the residential, commercial and recreational sites.
- Apply for the <u>PBD and Recreational Activities as one</u> application, apply for <u>commercial activities separately</u>.
    - PBD includes all of residentially zoned property.

  - Subdivision application includes all residentially zoned property.
  - Commercial property applied for and developed separately.
- Apply for the PBD for the residential clustering only.
  - Use the BLA process to create the boundary for the YMCA, for the Playfields and for the residential cluster development.
  - Apply for a PBD and subdivision for the residential cluster, providing open space with trails and critical area protection areas.
  - Apply separately for Conditional Use permits for the YMCA and for the playfields.
  - Apply separately for commercial uses in the new Rural Commercial zone.

The first alternative above contains the fewest steps. The first and second alternatives would allow the development application to utilize all of the residential density would be calculated upon all of the residentially zoned area within the PBD to calculate the allowed residential density. The third alternative exposes the development application to the most appeal opportunities while reducing the total number of residential units allowed. There appears to be very little advantage to including the commercial development in the PRD. Therefore, we recommend the second option above as the best choice, with the first option as a very close second. The third alternative above is a distant third choice.

3.6 Code Analysis

Because of the code allowances, there are three possible permitting paths to achieve the desired development plan:

Performance Based Development (PBD) KCC 17.450

The Performance Based Development code is a multipurpose code section that allows alterations in the underlaying bulk standards. The code allows for both residential and commercial developments. The code does not allow an increase in residential density and the code does not allow uses that are not otherwise allowed in the underlying zoning. The code explicitly states that it can be used for residential clustering. The code is also the best tool within the County for master planning across different zones and different uses.

17.450.040 Performance based Development Standards and Requirements – **Residential** :

B. Common Open Space:
The PBD code requires a minimum of 15% open space in 17.450.040.B.1 and 50% open space in 17.450.040.C.3. A summary of the open space requirements are as follows:

- Open space must be “suitable” for the PBD.
- Open space must be suitable for use as an amenity or recreational purpose.
- Open space must be held either by:
  - An HOA
  - A Public Agency
  - “A private nonprofit conservation trust or similar entity with the demonstrated capability to carry out the necessary duties.”

17.450.040.C.2* Contains the requirements for **Recreational Facilities** within a PBD.

This section requires the development to include recreation facilities. Ballfields are included as a recreational activity. Thus, the proposed ballfields and the proposed YMCA could help the development comply with the requirements of a PBD. However, there are several sections of this code that contain contradictions. Section h. notes that the recreation facility must be owned by an HOA, while section j. allows the recreational facility to be owned by a public agency and section 17.450.040.B.4.c allows for ownership by a private nonprofit conservation trust or similar.

Another degree of uncertainty is added with section 17.450.040.C 4. Which states:
"In order to promote creativity and innovation, these standards and criteria may be modified or substituted with other design concepts if so approved by the board of county commissioners."

Our interpretation is that the code will allow the open space to be owned by any of the different types of ownership outlined in the various sections of code.

The following list are the criteria for recreational facilities.

a. Developments of zero to nineteen lots/units are not required to have such an amenity;
b. For developments with greater than nineteen lots or units, one amenity shall be provided for every twenty lots/units within the development. Required amenities shall be sized to accommodate three hundred ninety square feet per lot/unit;
c. Amenities shall be centrally located within the development in clearly visible areas on property suitable for such development. Amenities may be located in other areas of the development if directly linked with a regional trail system or other public park facility;
d. Based upon topographical or site design characteristics of the subject property(s), amenities may be combined (while continuing to meet the overall square footage requirements established above) if the combination provides for increased benefit to all residents of the PBD;
e. Amenities may be located within, and be calculated towards, the recreational open space area if contiguous;
f. An athletic field with a minimum size of one hundred twenty yards long and sixty yards wide or swimming pool shall count as two amenities;
g. An equestrian development or similar theme community may be provided in lieu of other amenities;
h. Owned in common and available for use by all residents of the PBD;
i. The active recreational amenity(s) shall be located on five percent grade or less, except if a greater grade is necessary for the activities common to the amenity, e.g., skate park, trails; and
j. Written provisions or agreement for perpetual maintenance by the homeowners' association or a public agency willing to assume ownership and maintenance.

*****Note on KCC Section 17.450.040.C and subsections:
17.450.040.C topic heading is "Recreational Open Space. All residential PBDs within urban zones shall provide a developed recreational area that meets the following requirements". This heading clearly notes that the section applies only to urban areas. However, subsection 3 notes that Rural areas must provide 50% open space in contradiction with 17.450.040.B.1, and then directs the reader that rural developments must comply with 17.450.040.C.2. These contradictions make the requirements difficult

to read and understand, but our conclusion is that the rural cluster development will require 50% open space, and that the rural development must comply with the criteria found in 17.450.040.C.2. Because of this structure we must assume that 17.450.040.C.4 applies and this it is not intended only to apply to urban recreational facilities.

Allowance of the YMCA and the Rotary Ballfields in the Rural Residential and rural Wooded zones:

The Rural Residential Zone and the Rural Wooded zone allow "Recreational facility, indoor" with a Conditional use Permit with a public hearing before the Hearing Examiner (Type III Decision). Both zones disallow "Fitness Center". An interpretation could be made that the proposed YMCA is either "Recreational facility, indoor" or "Fitness Center". However, there is nothing in the "Recreational facility, indoor" that precludes the YMCA.

Comprehensive Plan Land Use Designation		Rural Residential	Rural Protection	Rural Wooded
Zoning Classification (1)(3)(4) ➡		RR (2)	RP	RW (2)
Categorical Use (1)(3)(4) ⬇		17.130	17.140	17.150
320	Recreational facilities, indoor	C	C	C
322	Recreational facilities, outdoor	ACUP	ACUP	C

(Portion of the table found in KCC 17.410.042 Rural, resource, and urban residential zones use table)

17.110.647 Recreational facility, indoor.

"Recreational facility, indoor" means a commercial recreational land use conducted entirely within a building. Examples include, but are not limited to, amusement centers, arcades, arenas, bowling alleys, gymnasiums, pool or billiard halls, skating rinks, and tennis courts.

17.110.278 Fitness center.

"Fitness center" means a place of business with equipment and facilities for exercising and improving physical fitness. Examples include health clubs, boxing gyms and micro-gyms.

The Rural Residential Zone allows Recreational Facilities – Outdoor with an administrative conditional use permit (Type II decision), while in the Rural Wooded zone Recreational Facilities – Outdoor with Conditional Use Permit approved by the Hearing Examiner (Type III decision).

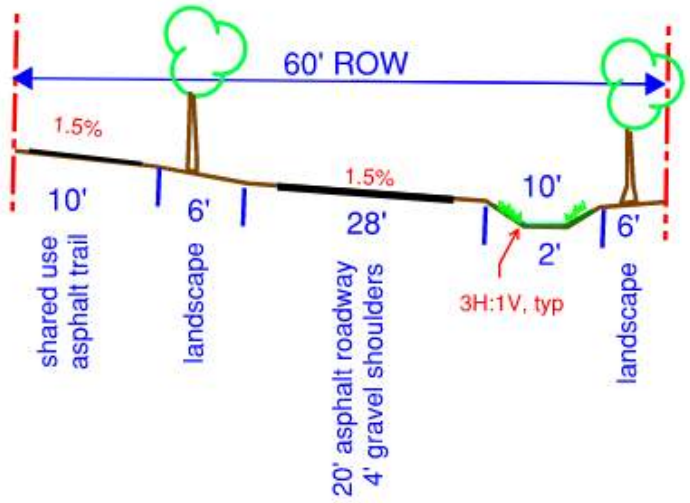
4 ACCESS

North Kitsap United is surrounded by a state highway and lower classification roads:

- SR 307 – a Washington State Highway running east/west south of North Kitsap United
- Stottlemeyer Road – a local Sub-Collector running east/west just south of North Kitsap United
- Port Gamble Road NE – a local Road running north/south just east of North Kitsap United

Primary access to North Kitsap United is currently available via Stottlemeyer Road and Port Gamble Road NE. Traffic count data, preliminary development trip generation, and traffic related recommendations were provided by Transpo Group. On November 15, 2023 the development and engineering team met with the Washington State Department of Transportation (WSDOT), Andy Larson and Justin Belk, regarding the development and access considerations. WSDOT concurred with the traffic investigation, primary access and intersection considerations presented by Transpo Group. WSDOT also noted with intersection upgrades it could be possible for the development to access SR 307 directly. See the traffic report prepared by Transpo Group in appendix 3 for further information.

Internal roadways to the proposed development can be either private or public depending on a number of factor such as access to County or State roadways, access to private residences, access to commercial facilities, and access to recreation facilities such as the YMCA, BallFields, and Trails. Internal roads are planned to maintin a rural character or the place complimenting the natural setting and significant open space preserved in the development. The road section identified below is envisioned and is intended to generally follow the 2020 Kitsap County Road Standards for local roads. The local roadways are intended for low volume slow traffic and not intended to ever become a bypass or a higher classification roadway. The largest vehicles are anticipated to be SU-30 (Single Unit Trucks), Garbage Collections, and Fire Apparatus Trucks capable of navigating the roadways without leaving the traveled way.



INTERNAL ROAD SECTION
NTS

Internal Local Roadway Considerations

Speed: Posted 25 mph or less

Surface: Curbless Asphalt Paved 20' wide. 3"HMA/2"CSTC/6"CSBC. 4' shoulders gravel or paved. Shoulder width allows bike route designation for biking withing traveled way.

Slope: 1.5% min cross slope towards roadside swale. 1% min and 12% Max Longitudinal

Peds/Bikes: Encouraged to use 10'min Shared Use Trail with shoulder riding possible.

Landsape: Formal or informal vegetated shoulders

Parking: Assumed to be in designated areas not roadside

5 STORMWATER

Developments at North Kitsap United will be required to follow the stormwater management guidelines set out in the 2021 Kitsap County Stormwater Design Manual (2021 SWDM). The 2021 SWDM has 9 minimum requirements that will apply to North Kitsap United. A brief description of each requirement is given below.

5.1 Minimum Requirements

5.1.1 Minimum Requirement #1: Preparation of Stormwater Site Plans

> *2021 SWDM: Stormwater Site Plans shall use site-appropriate development principles to retain native vegetation and minimize impervious surfaces to the extent feasible.*

Stormwater Site Plans for North Kitsap United will be prepared in accordance with the requirements of the 2021 SWDM. The residential areas are planned to utilize rooftop dispersion with new pollution generating hard surface roadways sheet flowing to open channel swales. The roadside swales are envisioned to utilize natural energy dissipation on steep slopes to control erosion and maintain a natural roadside character, see Exhibit below. Large wetponds are recommended for water quality treatment and flow control for the roadways, parking, commercial areas, and ball fields. While a preliminary site plan has yet to be developed initial feasibility has been performed and features noted in the following sections. The intent of the feasibility study was to determine the features necessary to keep 100% of the developed area drainage on-site, no on-site developed area stormwater discharges to the adjacent off-site areas. Large on-site wetponds can be sized to also accommodate the treatment of portions of the adjacent Stottlemeyer county roadway.

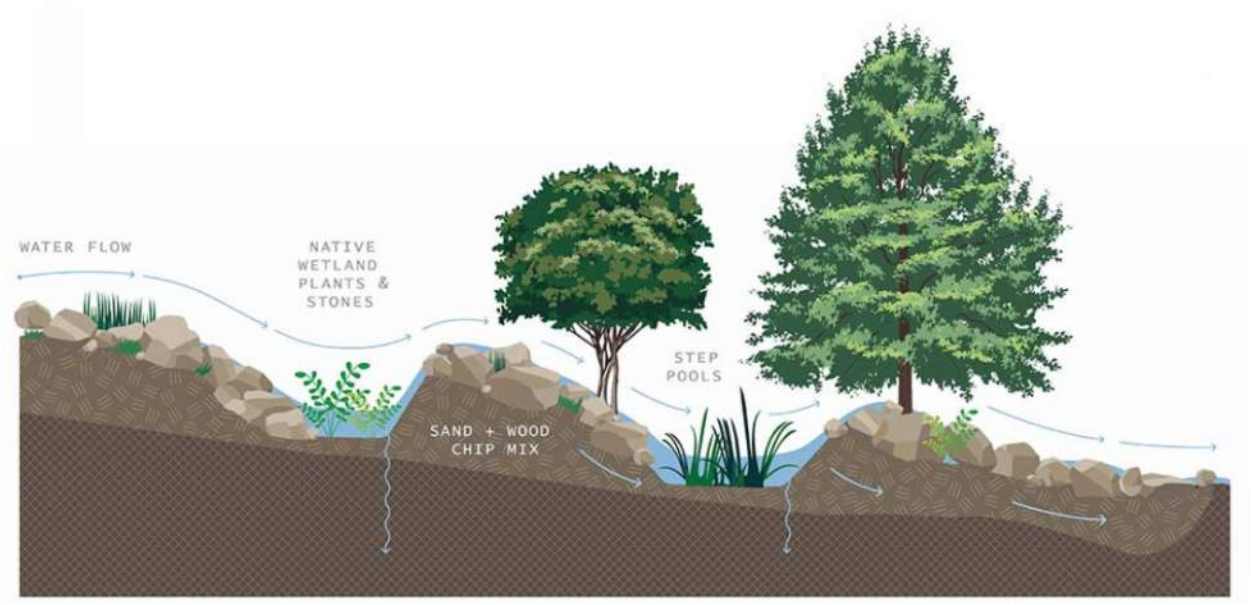


Exhibit: Swale Energy Dissipation Concept

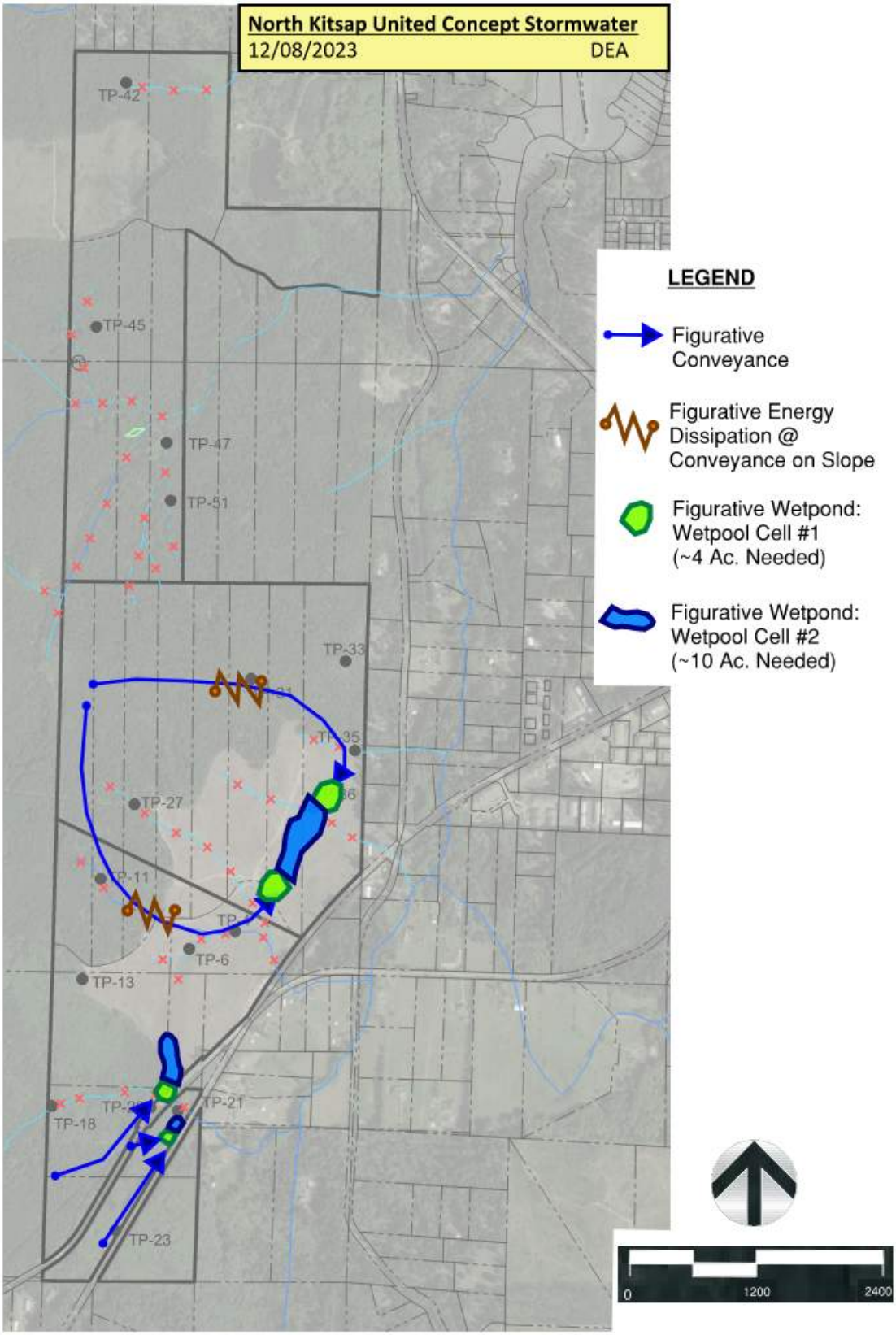


Exhibit: Figurative Stormwater Management Concept

5.1.2 Minimum Requirement #2: Construction Stormwater Pollution Prevention Plan

> *2021 SWDM: All new development and redevelopment projects are responsible for preventing erosion and discharge of sediment and other pollutants into receiving waters.*

This project will develop an erosion control plan to be used during construction as part of the Stormwater Site Plans. This plan is intended to prevent the release of sediment laden water and potential spills from the construction area. Typical measures and plans include the use of mulching, silt fences, swales and sediment treatment facilities such as ponds and filters. The plan will consider and include all 13 Construction SWPPP elements unless it is deemed unnecessary. Along with the plan, the project will develop a Construction SWPPP narrative that documents and explains the decisions for all BMPs considered and those to be implemented.

All projects that disturb more than one acre of ground are required to apply for and maintain a National Pollution Discharge Elimination System construction permit (NPDES permit). These permits are administered by the Washington Department of Ecology and require weekly monitoring and reporting of stormwater quality. These permits require approximately 2 months to obtain and involve a public notice period.

5.1.3 Minimum Requirement #3: Source Control of Pollution

> *2021 SWDM: All known, available and reasonable source control BMPs shall be applied to all projects.*

The project will implement all applicable source control Best Management Practices (BMPs) in accordance with the 2021 SWDM to help prevent stormwater runoff from contacting any pollutants on-site that may be conveyed to downstream receiving waters.

5.1.4 Minimum Requirement #4: Preservation of Natural Drainage Systems and Outfalls

> *2021 SWDM: Natural drainage patterns shall be maintained, and discharges from the project site shall occur at the natural location, to the maximum extent practicable. The manner by which runoff is discharged from the project site must not cause a significant adverse impact to downstream receiving waters and downgradient properties.*

Stormwater from North Kitsap United in the pre-developed condition discharges to Gamble Creek and an unnamed creek. In the developed condition the project will infiltrate all stormwater generated by the development. Any none developed areas will continue to discharge to Gamble Creek and the unnamed creek.

5.1.5 Minimum Requirement #5: On-Site Stormwater Management

> *2021 SWDM: Projects shall employ On-Site Stormwater Management BMPs in accordance with project thresholds, standards, and lists to infiltrate, disperse, and retain stormwater runoff on site to the extent feasible without causing flooding or erosion impacts.*

All projects are required to provide on-site flow control BMPs to mitigate the impacts of increased stormwater runoff generated by new development or redevelopment. The required on-site flow control measures vary widely depending on the classification of the development. The classifying a project is based on three main criteria. The first being, is the project a Large Project (triggering Minimum Requirements 1- 9) or a Small Project (triggering only Minimum Requirements 1-5). The second being, is the project urban, inside the Urban Growth Area (UGA) and/or the Census Urbanized Areas (UA), or rural. And lastly, is it on a small parcel (less than 5 acres) or large parcel (5 acres or larger).

The proposed development, location and size of the project would classify it as a new large project outside the UGA and UA on parcel larger than 5 acres. The requirements for this classification require the project to abide by the LID Performance Standard and utilize the Post-Construction Soil Quality and Depth BMP, or comply with the BMPS for individual surface types under List #2. The requirements for either of the paths would be met by the use of on-lot dispersion devices that would disperse roof and driveway runoff on an individual lot basis and infiltration facilities for roadways and commercial areas.

5.1.6 Minimum Requirement #6: Runoff Treatment

> *2021 SWDM: Projects shall provide runoff treatment to reduce pollutant loads and concentrations in stormwater runoff using physical, biological, and chemical removal mechanisms so that beneficial uses of receiving waters are maintained and, where applicable, restored.*

All projects triggering Minimum Requirements #6 must provide runoff treatment for stormwater from new and replaced pollution-generating hard surfaces (PGHS) and new pollution-generating pervious surfaces (PGPS). Areas requiring runoff treatment include all paved or hard surface areas subject to vehicular traffic and landscaped areas subject to fertilizers and pesticides. Runoff from rooftops are generally considered clean and residential backyards are usually considered non-pollution generating so individual lots are typically not required to provide water quality treatment. Residential projects are required to utilize “basic” treatment BMPs while commercial and multi-family developments must provide “enhanced” treatment BMPs. The selection of a basic or enhanced treatment for runoff treatment will depend on what portion of the project site the runoff was generated from. Oil control treatment is required for any site designated as high-use, or sites that generate a high concentration of oil due to high traffic turnover or frequent transfer of oil. Once basic or enhanced is determined runoff treatment BMP options are laid out in the *Department of Ecology Stormwater Management Manual for Western Washington* (Ecology Manual).

The Ecology Manual provides many options to achieve basic runoff treatment: bioretention, filter strips, wetpond/wetvault, stormwater treatment wetlands, combined detention and wetpool facilities, sand

filters and proprietary media and membrane filters. Bioretention, filter strips and media filters are typically used for smaller basin areas. For large scale developments wetponds, wetvaults and combined facilities are typically the most cost effective ways to accomplish basic water quality. Wet ponds are facilities that remove sediment from stormwater using settling. These facilities are usually permanently inundated with water and can be combined with detention facilities.

To achieve enhanced runoff treatment the Ecology Manual lists these options: large sand filter, stormwater treatment wetland, bioretention, proprietary media and membrane filters, or two-facility treatment trains consisting of combinations of basic treatment BMPs. To achieve the enhanced runoff treatment standard on a large scale the use of sand filters or proprietary filters are required. For Noth Kitsap United, the strategy to achieve enhanced runoff treatment will be to segregate the stormwater from the residential and commercial uses to limit the size and added cost of satisfying the enhanced runoff treatment requirements.

The required volume (and area) of a wetpond is dependent on the size of development it serves and the impervious coverage of that development. Low density residential development will require a smaller volume than a more dense residential or commercial development. A hydrologic modeling analysis was run for several hypothetical development scenarios at the North Kitsap United site. The table below gives the anticipated wetpond and infiltration pond volumes for a 5-acre area of low density and commercial development as well as 1,000 lineal feet of roadway. The volumes are presented in acre- feet (1 acre-foot = 43,560 cubic feet) and a corresponding land area required for that facility.

Table: Conceptual Water Quality Facility Sizes

Development Scenario	Impervious Coverage	Total Area	Impervious Area	Pervious Area	Standard Wetpond Volume	Top Area
	%	(ac)	(ac)	(ac)	(acre-feet)	(sf)
Low Density Residential	50%	5.0	2.50	2.50	0.30	5,456
Commercial	85%	5.0	4.25	0.75	0.51	8,816
1,000 LF of Roadway	63%	1.38	0.87	0.51	0.16	2,288

Wetponds storage volumes scale linearly so it is anticipated that for every five acres of residential area 0.30 acre-feet of storage would be required and 0.51 acre-feet of storage for commercial uses. The footprint of the final facility depends on the depth available to store stormwater. Wetponds are more space efficient the deeper they can be constructed but depth is limited by the location and depth of the outfall. These modeling results assume 6-feet of storage depth.

Roughly 4 Acres of wetpond footprint is needed for water quality treatment of a conservative assumption of up to 5 miles of internal roadways and 12 acres of parking for commercial, YMCA, and ballfields.

5.1.7 Minimum Requirement #7: Flow Control Facilities

2021 SWDM: Projects shall provide flow control to reduce the impacts of stormwater runoff from hard surfaces and land cover conversions.

All projects are required to provide flow control to mitigate the impacts of increased stormwater runoff flow rates generated by new development. Flow control is intended to slow down the rate at which runoff leaves new developments to reduce the possibility of erosion and flooding problems downstream. Flow control can be achieved through three main strategies: detention, infiltration or dispersion.

Infiltration is the practice of discharging stormwater to groundwater using either large regional facilities or at small, dispersed facilities. Infiltration at a large scale for rural and commercial development is likely feasible for North Kitsap United given that much of the site is underlain by outwash type soils that typically have a medium to high permeability/infiltration capacity.

Dispersion is the practice of discharging stormwater to sheet flow over a large undeveloped area on site. This is feasible for the residential portion of North Kitsap United but may have limited uses in the commercial areas as this practice requires that large amounts of land be permanently set aside in growth protection easements and tracts and therefore reduces the density that properties can be developed. Dispersion is a feasible strategy to meet individual lot flow control requirements for low-density residential development.

Detention is the practice of collecting and storing runoff from development in ponds or vaults and discharging the runoff at a lower rate. Detention is the most feasible form of flow control for high density developments where infiltration is impracticable as it is scales more efficiently than the other methods of flow control. For North Kitsap United detention ponds would collect and store stormwater from the proposed development before discharging towards the on-site creeks if infiltration is infeasible. Detention ponds are typically combined with water quality facilities to meet runoff treatment requirements. Stormwater ponds that detain over 10-acre feet of water must be registered as a Dam with the Washington State Department of Ecology Dam Safety office. These “Dam Safety” ponds must incorporate additional design features resulting in a significantly more expensive stormwater facility.

Depending on choices made by the developer, the project may need to provide a higher level of flow control than a similar project that lies inside of the Urban Growth Area. This additional level of flow control is known as the Low Impact Development (LID) performance standard and is known to require at least 1.5 times the detention volumes as compared to the standard flow control requirement.

The required volume (and area) of an infiltration pond is dependent on the infiltration rate of the soil, the size of development it serves and the impervious and pervious coverage of that development. A Low-density residential development will require a smaller volume than a denser residential or commercial development.

Associated Earth Sciences, Inc. (AESI) has performed a preliminary soil study and estimates the infiltration rate to range from 2-10 inches per hour in the lower elevations along the southern boundary of the site and from 0.25-2 inches per hour in the upper elevations.

A hydrologic modeling analysis was run for several hypothetical development scenarios at the North Kitsap United site. The table below gives the anticipated infiltration pond volume for 5-acre low density and commercial development as well as 1,000 lineal feet of roadway with a 1 inch-per-hour and 5 inch-per-hour infiltration rate. The volumes are presented in acre-feet (1 acre-foot = 43,560 cubic feet).

Table: Conceptual Flow Control Facility Sizes

Development Scenario	Impervious Coverage	Total Area	Impervious Area	Pervious Area	1 in/hr Infiltration Volume	5 in/hr Infiltration Volume
	%	(ac)	(ac)	(ac)	(acre-feet)	(acre-feet)
Low-Density Residential	50%	5.0	2.50	2.50	0.87	0.45
Commercial	85%	5.0	4.25	0.75	1.44	0.81
1,000 LF of Roadway	63%	1.38	0.87	0.51	0.29	0.14

Infiltration facility storage volumes don't scale linearly and are dependent on the calculated infiltration rate, tributary area to the facility and the depth available to store stormwater. Infiltration ponds are more space efficient the deeper they can be constructed but depth is limited by the location and depth of infiltrating soil layer. These modeling results assume 6-feet of storage depth.

Roughly 10 Acres of wetpond footprint is needed for flow control of up to 5 miles of internal roadways, and non-residential developed areas. This is anticipated to be broken up into multiple wetpond locations with the intent of balancing the minimization of maintenance locations and cost of conveyance. Residential lots are anticipated to have zero runoff utilizing dispersion and infiltration within each lot.

5.1.8 Minimum Requirement #8: Wetlands Protection

> *2021 SWDM: Projects whose stormwater discharges into a wetland, either directly or indirectly through a conveyance system shall comply with Volume II, Chapter 6 on page 271.*

Projects with on-site wetlands or those that discharge to them must provide protection to prevent the diminishment of the ecological functions that wetlands provide. Changes to the existing hydrologic conditions, structural appearance or water quality characteristics of these critical areas shall be limited to the extent feasible. Wetlands protection is divided into three categories that all wetlands must receive: general protection, protection from pollutants, and wetland hydroperiod protection. The level of protection provided under each category is dependent on the wetland category, habitat score and wetland characteristics. Any on-site wetlands or wetlands the North Kitsap United project discharges stormwater to shall be mapped and categorized to determine appropriate protection BMPs to be utilized in order to maintain wetland ecological functions and characteristics. The NKU downstream condition will need to be studied further to confirm if wetlands exist and receive existing site runoff and if so what if anything will need to be done to protect the existing wetlands by matching the hydroperiod.

5.1.9 Minimum Requirement #9: Operation and Maintenance

> *2021 SWDM: An operation and maintenance manual that is consistent with the provisions in Volume II, Chapter 7 on page 273 shall be provided for proposed stormwater facilities and BMPs, and the party (or parties) responsible for maintenance and operation shall be identified.*

The 2021 SWDM requires that a maintenance and operation manual be developed for the proposed stormwater facilities. Stormwater facilities for developments at North Kitsap United will be privately owned and maintained. Stormwater facilities that fall under the private maintenance responsibility and typical maintenance activities include:

Conveyance systems include curbs, gutters, catch basins, pipes, ditches, intakes, outfalls and dispersion devices. Maintenance responsibilities for these facilities include cleaning of sediment and trash, repair of incidental damage.

Flow control facilities: removal of trash and debris, landscaping including mowing of grass pond embankments and pond bottoms, sediment removal from pond bottoms, repair of intake structures and spillways.

Water quality facilities: cleaning/dredging of accumulated sediment and regular replacement of filter media for sand filters and filter vaults.

These maintenance activities are typically funded by a Home Owners Association but can be funded by the developer directly.

6 WATER

6.1 Water Availability

North Kitsap United is within the Kitsap Public Utility District Service Area and is currently served by a water main which crosses the southwest portion of the site. The existing watermain which traverses the southwest corner of the site is a 12” pipe with a Fire Flow capacity of 2,000 GPM. The entire project is within the 540-pressure zone which is served by the Ridge Tanks reservoir (275,000 gallons) directly west of the site. A future 8” watermain is proposed within the KPUD system that would extend off the existing 12” main north to the northeast corner of the site. A future reservoir has also been proposed in the northwest corner of the site.

6.2 Water System Design

Future water system improvements and expansions will fall under Kitsap Public Utility District’s jurisdiction and must be designed to the Kitsap Public Utility District Standards and Specifications, more recently updated in 2020.

6.3 Water Connection Application

Kitsap Public Utility district has a Water Availability Certificate online application that must be submitted with a fee, this can also be submitted to their office. The districts engineering team will then determine if there is water availability, there is an appeal process if no water availability is determined. Developer extension of watermains requires a utility permit submittal to Kitsap Public Utility District and KPUD Water approval of a Developer Extension agreement that reserves system capacity.

7 SEWER

The nearest municipal sewer treatment to the site is the Central Kitsap Treatment Plant. This plant is a conventional activated sludge treatment plant located in Brownsville and serving the cities of Silverdale, Keyport, Poulsbo, Central Kitsap, Bangor base, and the Naval Station at Keyport. This plant treats more than 3.5 million gallons of sewer each day. The plant discharges treated effluent approximately ½ mile offshore into Port Orchard Bay. The NKU project site is not located within the Central Kitsap Plant service area and will be required to treat and discharge and sewer entirely on-site. On-site treatment is common in Kitsap County. More than 58,000 residences in Kitsap County discharge to on-site septic systems.

The NKU project is anticipated to consist of 80 residential lots anticipated to be one-half acre or more in size. To be conservative, each lot was assumed to include one primary and one accessory dwelling unit (ADU) as permitted in the Rural Residential zone. Also proposed is a YMCA facility, and a sports complex (outdoor) with supporting restroom facilities. There may be minor food production facilities to serve the public attending events.

7.1 Jurisdiction

With design flows less than 3,500 gallons per day on any given day the Kitsap County Health Department has jurisdiction over the on-site sewage disposal systems.

- Systems can be designed with soil (original, undisturbed, permeable material) depths of eighteen inches. Between eighteen- and 30-inches pre-treatment of the effluent is required prior to the drain field.
- Between 30 and 48 inches the system does not need pre-treatment (unless nitrogen is an issue) but needs pressure distribution.
- With over 48 inches of soil a gravity system may be used.
- Nitrogen is anticipated to be an issue due to the Critical Aquifer Recharge Areas (CARA) being a sensitive area. Also with downgradient waterways, and/or possible prior high levels in the area of Nitrogen then an aerobic treatment unit may be required which will treat to 10 to 20 mg/l Nitrogen.
- Design applications are normally a one-step process with follow up as built activities.
- The systems must be monitored by a Kitsap County accredited operation and maintenance firm.

With design flows between 3,500 gallons per day and 14,499 gallons per day on any given day the Washington State Health Department (DOH) has jurisdiction and the system is considered a Large On-Site System (LOSS).

- A minimum of 48 inches of soil is required for a LOSS.
- Nitrogen levels are a higher priority and are investigated more thoroughly. Treatment may be required to achieve less than 10 mg/l which normally requires a relatively expensive primary treatment unit.
- The design application is a multi-step process which includes pre-engineering report, soils investigation, site risk survey (which may lead to a hydrogeologic report), final engineering report, final plans and as built documentation including operation and maintenance manuals.

- The LOSS must be maintained by an operation and maintenance firm that is acceptable to DOH and Kitsap Health and is qualified to maintain the type of LOSS installed.
- If there are multiple owners of facilities connected to the LOSS a public entity (licensed as a utility) must be engaged in addition to the operation and maintenance firm to oversee the overall monitoring of the system.
- A yearly operating permit must be obtained for a LOSS.

With design flows between 14,500 gpd and 99,999 gpd on any given day the DOH still has jurisdiction of the LOSS. In addition to the above LOSS requirements some other items are required.

- The review of the larger LOSS may be more thorough and more information requested due to the system size (normally with the site risk survey and a greater chance that the hydrogeologic study is needed).
- Public notice is required with a comment period.
- Treatment plant, collection lines, and pump stations shall be a minimum of 100 feet away from wells providing public drinking water supplies. Treatment plants and drainfield discharges must be outside of the 100-year floodplain.

This is a generalized summary of the jurisdictions and differences in processes and regulations. These vary based on the site conditions and amount and type of sewage being disposed of.

7.2 Flows Generated

Each of the development uses for NKU are summarized below. **73,000 gallons per day is estimated as the sewer demand design flow for the development uses. For the sake of this feasibility study a system capable of treating 99,999 gallons per day is anticipated.**

7.2.1 Residences

For single family residences Kitsap Health and DOH size systems at 120 gallons per bedroom per day. There is a restriction that limits size of the residence to a minimum of two bedrooms. For a LOSS once there are enough bedrooms to equal the 14,500 change of LOSS sizes (120 bedrooms) then each additional residence is sized at 270 gallons per day regardless of number of bedrooms. For the sake of this study a conservative estimate of 480 bedrooms is assumed. This represents a flow of 46,900 gallons. This checks out when comparing against the WA ST Dept. of Ecology Criteria for Sewage Works Design (Orange Book) which states 100gpd per person for residential uses. For 80 residential lots assumed to include ADUs we can guesstimate 480 people resulting in a flow of 48,000 gallons per day. **48,000 gallons per day will be assumed for residential demand.**

7.2.2 YMCA

The YMCA facility flows are modeled after the Haselwood YMCA in Silverdale which indicates the highest average water usage from years 2011 to 2023 to be 16,665 gallons per day. A conservative estimate for

wastewater generated at the YMCA is 90% of the water usage. **15,000 gallons per day will be assumed for the YMCA demand.**

7.2.3 Outdoor Sports Complex

For a restroom facility that serves an outdoor sports complex calculations are normally done to create a conservative estimate of how many people will be using the restrooms during a peak day. A flow of two gallons per use (1.6 gallons per flush and 0.4 hand washing) is normally used. For this type of facility, it is also recognized that the facility may not be used to peak capacity every day so larger pump tanks can be utilized to provide a surge capacity that meters out the sewage to the drain field over non-peak times. This increases the tank size but can reduce the drain field area required. For the outdoor complex the Orange Book estimate of 5 gallons per day per car was used. It is estimated by the Traffic Study that 836 cars a day will use the sports fields on the high end. **5,000 gallons per day will be assumed for the sports complex demand.**

7.2.4 Commercial Areas

For the Commercial areas it is estimated that up to 15,000 square feet of space will be developed. The Orange Book estimates 300 gallons per day per 1,000 square feet on the high end for shopping centers. **5,000 gallons per day will be assumed for the Commercial Area Demand.**

7.3 Waste Strength

This Feasibility Study does not size or select wastewater systems for the use components of the NKU project. On-site sewage disposal systems are however commonly sized and designed based on the effluent being residential in nature in waste strength. Discharge of effluent is commonly anticipated to be through a septic drainfield. The main factors in sizing the system are biochemical oxygen demand, total suspended solids, oil and grease, and nitrogen.

No commercial or industrial waste is allowed in an on-site sewage disposal system. This includes water from swimming pools which has high levels of chemicals or salt that can sterilize the biological colonies that treat the effluent. If the YMCA is to have a swimming pool it will need to be side streamed and pretreated separately before discharging to a drainfield.

Facilities such as restaurants can be connected to the on-site sewage disposal system. Pre-treatment of the sewage can take place using grease traps and/or treatment plants that will reduce the higher strength waste associated with this type of connection down to the residential strength levels and below.

In Kitsap County if there is less than 30 inches of soil the effluent going to the drain field requires additional treatment to substitute for the lesser treatment provided in the soils by the shallower soils. This can be achieved with many different types of systems or treatment units.

DOH does not allow for reduction in required soil depth (48 inches) for LOSS systems with advanced treatment.

7.4 Size of Wastewater System

This Feasibility Study does not size or select wastewater systems for the use components of the NKU project. Common components of On-site sewage disposal systems however are gravity piping, sewer ejector pumps where gravity may not be possible, septic tanks to collect the sewerage and handle fluctuations in flows, and a dosed drainfield. Additionally treatment systems can be added to reduce the risk of underperforming drainfields and to minimize the size required for the drainfield. Types of systems range from trench (gravity or pressure dosed distribution) to subsurface irrigation and top of surface systems. The trench systems take up more area but the reduction in size with the more advanced systems normally requires advanced treatment of the effluent.

The second factor is the type of soil. The finer the soil the more absorption area is required. Loading rates are established in the regulations for different soil types. One exception to the soil typing are extremely coarse soils which due to the lack of treatment provided by the soils require pretreatment of the effluent.

The third factor is the design flow to the system which was discussed in a previous section of this report and estimated as 73,000 gallons per day at full capacity. A system capable of 99,999 gallons is the basis for this feasibility study. For facilities that do not have established flows, design flows can be found by gathering data from like facilities or calculating use based on facility use patterns.

Design flows are the flows that are used for the design of the system and represent the peak daily flows going to the system. Operating flows are flows that are less than the design flow and represent the target average daily flow to the system. The operating flow is normally about 80% of the design flow. The reason for this second flow is that if you dose the drain field at the design peak flow on a continual basis you may stress the system to the point of failure.

7.4.1 Treatment Technologies

Sustainable water strategies also known as **integrated water resource management strategies** are very relevant in today's growing world. Lack of clean water and downstream effects from pour or failing stormwater and sewer treatments are polluting our fresh and salt waters. As an example of such strategies the nearby Port Gamble project took on integrated water resource management with an advanced wastewater treatment process setup for irrigation reuse and capable of tens of thousands of gallons of water reuse each day. This Feasibility Study does not size or select wastewater systems for the use components of the NKU project however it is worth noting that similar opportunities to develop a holistic look at integrated water resource management will be available to NKU. This section will identify possible septic treatment technologies that allow for the reduction of drain field sizes and some that provide re-use opportunities. The site soils are noted to be fine sands and silty sand soils which will likely have a ground loading rate of 0.6 gallons of treated sewer effluent per square foot per day. Treating to Secondary standards will likely result in twice this loading rate and a 50% drainfield reduction. The more advanced systems capable of treating to the Reuse Standard will likely result in 7 or 8 times the loading rate and an 88% drainfield reduction. These treatment systems range from Advanced Secondary treatments such as the AdvanTex Pod system for BOD and Nitrogen reductions to Biological Secondary treatments such as Sequence Batch Reactors (SBR), Moving Bed Biofilm Reactors (MBBR), and Membrane Bio Reactors (MBR) that can take the treated effluent well below the ground discharge standard of 10mg/L BOD/TSS to below the blackwater reuse standard of below 5mg/L BOD/TSS as described in WAC Chapter 246-274.

Advanced Secondary Treatment. **Orenco's AdvanTex AX-Max Attached Growth Multipass Packed Bed.**
AX-Max Treatment Systems are intended for large residential applications or for commercial and municipal applications that require advanced secondary treatment. They provide recirculation and a discharge tank in one module. AX-Max units are ideal for subdivisions, "fringe" development, hotels, resorts, schools, churches, businesses, manufactured home parks, RV parks, campgrounds, rest areas, and truck stops. They are approved for use by DOH and DOE as a LOSS. 95% BOD reductions and 65% Total Nitrogen reductions are possible. A single unit can treat up to 15,000 gpd and can be phased over time as development grows. A 7 unit system was currently built at the Yakima Buena ByPass SubDivision at a cost of $1.5M excluding the cost of the drainfield and supply piping. A drainfield reduction of up to 50% may be possible with this system.

Figure: AdvanTex AX-Max Module

Sequence Batch Reactors (SBR)
SBR's are an advanced treatment derived from the activated sludge treatment similar to that of the Central Kitsap Treatment plan except they have been simplified to take place in a single or dual reactor tank which can be a large buried vault or an in building application. SBR's include 4 main Processes.

1. Filling the tank
2. Reacting, which involves aerating the mixed liquor
3. Settling
4. Separating purified water from the biological sludge. (some sludge must be wasted during this stage to maintain consistent biomass concentrations)

This four-step process can be performed several times per day. Sometimes aeration is cycled on and off during the react stage to encourage nitrification and denitrification for nitrogen removal. While the process does not require costly membranes to operate it can have challenges with settling out the solids over time and must be closely monitored to ensure it is operating properly for BOD and TSS removal. Additional processes are often added for adequate solids handling and removal. Cold temperatures possible at the NKU site would likely mean placing the SBR within a building in a similar manner to the MBR used out at Port Gamble thus increasing it's cost to be closer to the cost of the MBR. A drainfield reduction of more than 50% may be possible with this system

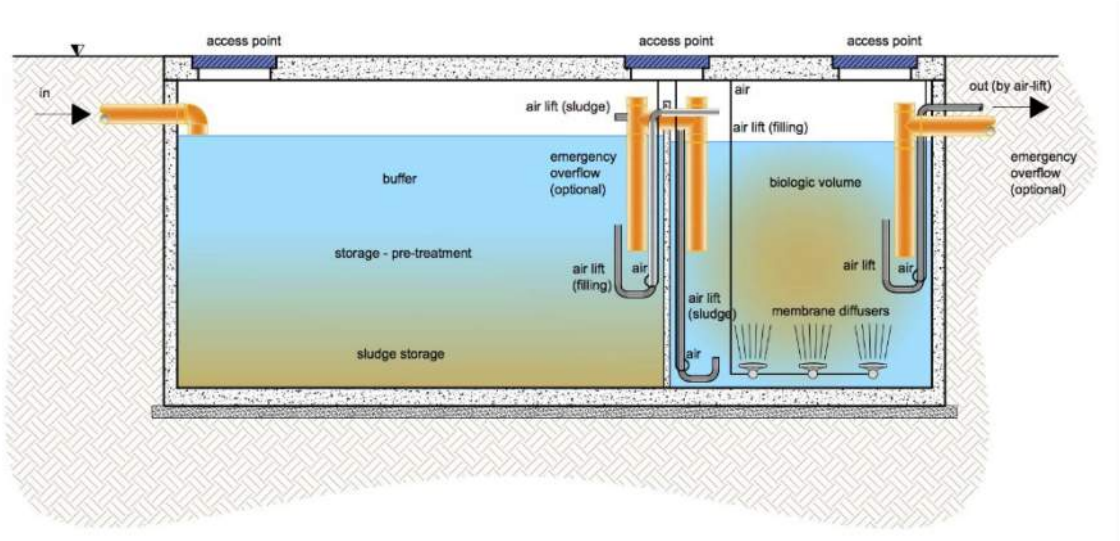


Figure: SBR Diagram

Moving Bed Biofilm Reactors (MBBR)

The MBBR process is an advanced biological treatment which utilizes floating plastic carriers (media) within an aeration tank to increase the amount of microorganisms available to treat the wastewater. The microorganisms consume organic material. A company called Sustainable Water created an MBBR process and coupled it with hydroponic plants to create what they called WaterHub for Emory University. In addition to the plastic media they also developed a textile root zone mesh that supports the plant roots while also breaking down the organic matter in 400,000 gallons of blackwater each day. The addition of the plants is very intriguing and makes this a focal point in the landscape.

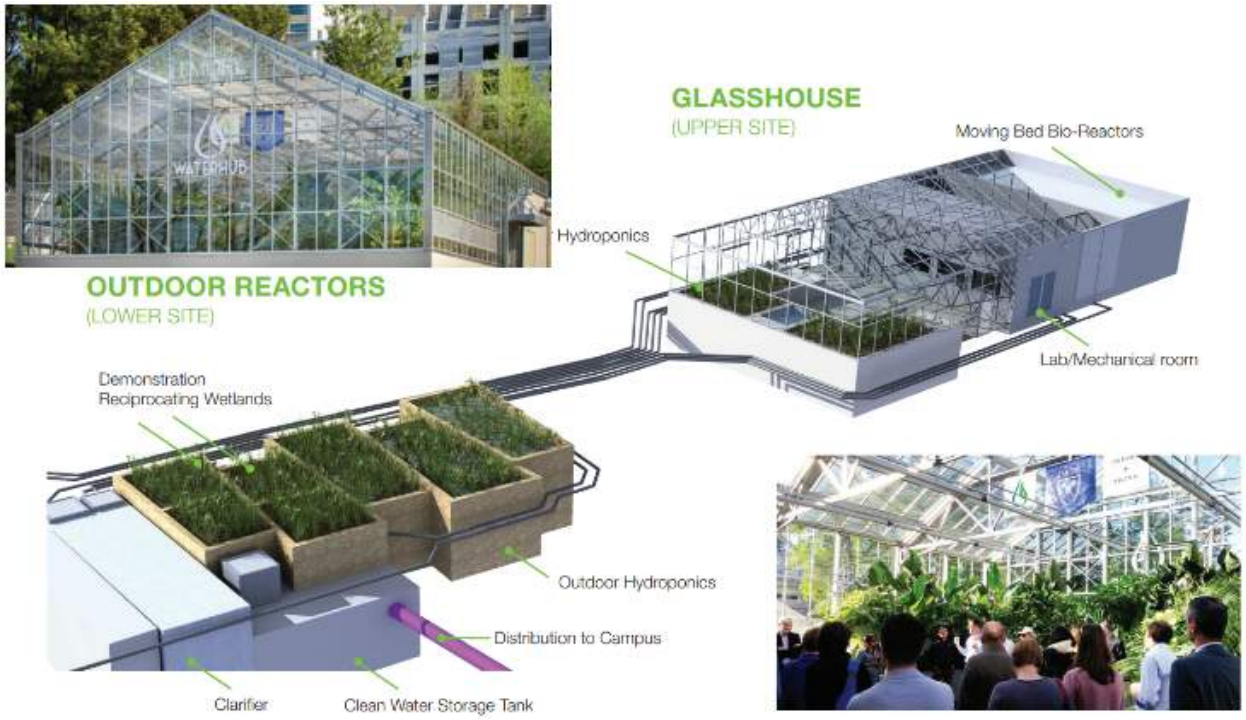


Figure: WaterHub at Emory University

Membrane Bio Reactors (MBR)

MBR's are an advanced treatment where sewerage is pre-screened and solids removed followed by forcing the blackwater through a series of membrane plates or hollow tubes which remove BOD, Nitrogen, Phosphorus, and TSS. This process can be repeated multiple times along with nitrifying and denitrifying the water for treatment down to less than 5mg/L of BOD and TSS. There are many different manufacturers of membranes. The Port Gamble project utilized the Ovivo membranes which have recently gone to making entirely ceramic membranes which are quite costly and come with long lead times. Another large scale manufacturer Kabota utilizes their Japanese factory to project a less costly flat plate membrane. GE Zennon membranes are also of the hollow tube or fiber variety. Kabota boasts a smaller footprint than all three of these large scape producers. All three can make reliable treatments and initial discussions with Wilson Engineering suggested that the Ovivo MBR and likely also the Kubota MBR have gone up significantly in the past 3 years and can expect their systems to be significantly more than what they cost at Port Gamble ($5M to 6M). Dale Richwine, the WWTP program manager out at Port Gamble discussed all three companies at length with DEA and suggested Kubota to likely be the front runner. Another very reliable and significantly less costly and more compact product is the MBR Package Plant by A3-USA. DEA spoke with the A3-USA owner and they just completed a 100,000 GPD system that came in under $3M.

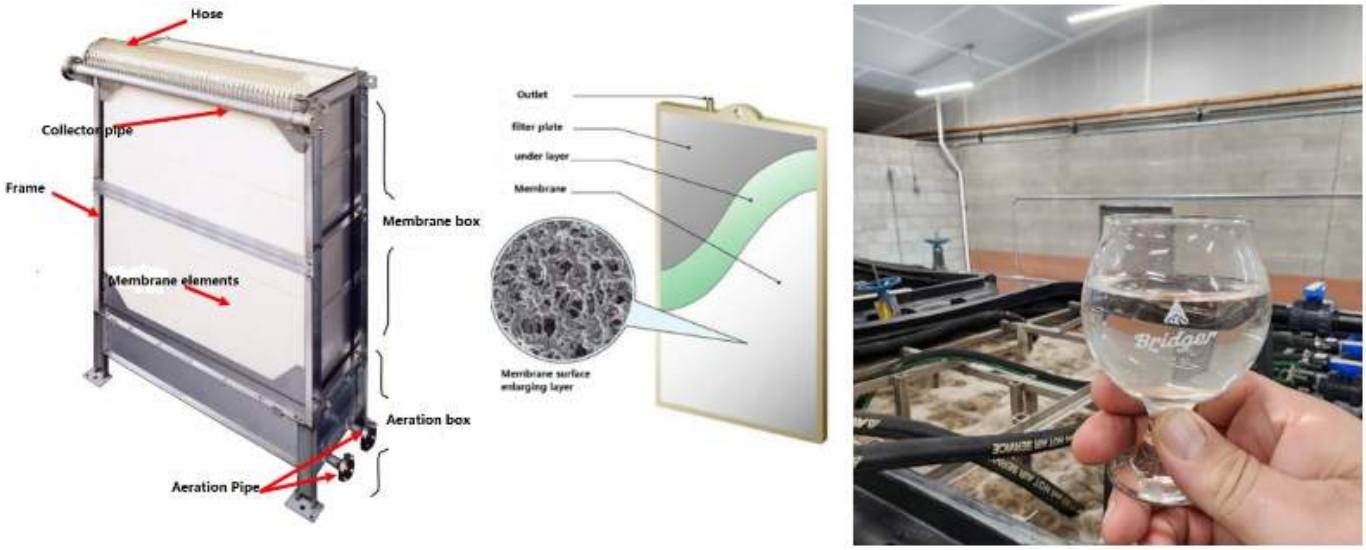


Figure: Kubota MBR Membrane & A3 USA Treated Effluent

The MBR used out at Port Gamble was able to achieve a drain field size ~7 times smaller than a conventional system due to the treatment to less than 5mg/l BOD & TSS and by going through a waiver process with the DOH. An MBR with a footprint used by A3-USA and a Drainfield size similar to that from Port Gamble was used for this feasibility study and shown in the Sewer concept that follows.

7.4.2 Example Drain Field Size without Secondary Treatment

A conservative set of factors are used to give a drain field size for a trench system and a subsurface irrigation system. The following factors were used:

- 500 gallons per day
- Type 4 soils
- Flat site with no trees or other site features impacting the installation of the system

For a trench system using three-foot-wide trenches, 50-foot-long trenches, and seven-foot spacing center to center on the trenches an area of 3,650 square feet is required for the combined active and reserve drain fields. A subsurface irrigation system with two foot lateral spacing and 50-foot drip line lengths an area of 2,500 square feet is required for the combined active and reserve drain fields. Based on this conventional loading approximately 11.5 acres of combined active and reserve drain field areas are needed if no additional treatment is provided.

Sewer Treatment	Resulting Drainfield & Replacement Drainfield Size (Ac)
Conventional	11.5 Acres
Secondary Treated (AdvanTex)	5.8 Acres
Advanced Secondary Biological Treatment	1.5 Acres

7.5 Summary

The feasibility of using a LOSS system for the uses at NKU is based on the presence of acceptable soils in a large enough area to support the number of houses proposed. While this Feasibility Study does not size or select wastewater systems for the use components of the NKU project it is recommended that at a minimum an AdvanTex system be considered if a combined residential and commercial LOSS is planned. And furthermore if such a combined system is planned a Biological system such as a Membrane Bio Reactor (MBR) is recommended to also be further studied as it provides the most reliable system possible and provides the ability to operate under cold weather conditions with varying flows, as well as the opportunity to generate greywater for reuse as irrigation, toilet flushing, dust control, etc.

Appendix A: Kitsap County Land Use Regulations and Growth Management Act Compliance

Land Use and GMA Compliance White Paper (Raydient)

North Kitsap United

Compliance with Kitsap County Land-Use Regulations

and

The Washington State Growth Management Act

October 20, 2023

Preamble

In 1990 the Washington State legislature passed the Growth Management Act ("GMA"). The Washington State legislature's purpose in passing the GMA was to plan for growth and to ensure it happens in a thoughtful, orderly manner.

The GMA requires that certain cities and counties in the State of Washington, including Kitsap County, develop comprehensive plans. Kitsap County's Comprehensive Plan is a policy document—a blueprint—that guides the County's development of regulations (such as zoning and critical area ordinances) that mandate that development of higher residential densities, and large-scale commercial be directed to urban areas while preferring that rural areas be utilized for rural residential densities, open space, recreational activities, and the conservation of natural resources.

The GMA does not prohibit all development in rural areas. To the contrary, the GMA encourages cities and counties to use rural areas to provide recreational facilities and encourage the development of small businesses that provide employment opportunities for those living in the state's rural areas. Per Futurewise (*A Beginner's Guide to Growth Management, 2-3*), counties and cities are required to identify lands useful for public purposes and open space corridors. Open space corridors link together fish and wildlife habitats, parks, and open spaces into connected local and regional networks of green spaces.

Kitsap County implements the plans and policies in its Comprehensive Plan through the Kitsap County Code ("Code"). The Code controls the use and development of land within the County. Unless Comprehensive Plan policies or Code regulations are timely challenged after adoption, the Comprehensive Plan and Code are binding law within the County and any uses permitted by Code either outright or conditionally may be developed subject to certain application/approval processes. If a particular proposed use is not permitted either outright or conditionally, a project proponent may request that the County amend its Comprehensive Plan or Code to allow for such use, and the Board of County Commissioners may accommodate such request so long as it accords with the GMA.

1. **Purpose** The purpose of this white paper is to demonstrate that the proposed North Kitsap United project concept ("NKU") is compliant and consistent with the Washington State GMA, the Kitsap County's Comprehensive Plan, and the County's regulations.

2. **Executive Summary** The Comprehensive Plan and its implementing land use regulations ("Zoning Code") have been brought before the Growth Management Hearings Board ("Board") several times since the state adopted the GMA to challenge their compliance with the GMA. The current Plan and Zoning Code are GMA compliant. Therefore, if a proposed land use is compliant with the Zoning Code, it is compliant under the GMA.

   There are 5 primary elements (land use types) within the proposed NKU Project concept as currently conceived. Three of the five are compliant with the current Comprehensive Plan and Zoning Code. Two elements, related to commercial services and residential uses, will require a Comprehensive Plan and a Zoning Code amendment.

3. **Proposed NKU Project Primary Elements**
   The proposed NKU Project concept includes 5 primary elements:
   1. A comprehensive sports and recreation complex

2. A YMCA to service North Kitsap County residents
3. Unimproved open space to serve as trail and wildlife corridors and areas of native vegetation
4. 3 to 5 acres of commercial services (primarily to develop a restaurant site to serve the YMCA, sports, and recreation activities)
5. Approximately 80 single family residential lots

This paper will demonstrate that:

- Elements 1, 2 and 3 are already either allowed outright or allowed with a conditional use permit under the current Zoning Code.
- Elements 4 and 5 require amendments to the Comprehensive Plan and the Zoning Code before development.

Elements 1, 2, and 3

Currently the NKU property is designated and zoned Rural Wooded ("RW"). Raydient has requested the designation to be changed to Rural Residential ("RR"). Elements 1, 2, and 3 are allowed either outright or through a conditional use under both designations. (See excerpts taken from the use tables in the Zoning Code). No change to the designation or zoning is required.

When the legislature adopted the GMA, it did not mandate that such uses are exclusive to urban areas.

An RW property owner can make an application for these uses today and, if properly mitigated, can expect County approval.

Element 4

Raydient has applied to redesignate and rezone 3 to 5 acres of its property from RW to Rural Commercial ("RC"). The goal is to establish a restaurant and uses that support the Heritage Park, and the proposed YMCA, recreation, and sports facilities.

This will create advantages commonly associated with "mixed use" projects. The inclusion of some commercial uses will help mitigate traffic impacts; visitors won't need to leave the area or make special trips before, between, or after their games and activities. Further, the services will provide a common meeting ground for citizens from all parts of North Kitsap County and enhance the overall user experience.

Element 5

Raydient has applied for a change from RW to RR to allow for an increase in residential lot density. This will allow a density of 1 residential lot per 5 acres. According to the County's Performance Based Development provisions, lots can be made smaller (or clustered) such that the residential footprint is reduced and open space can be created.

The goal of the proposed NKU Project is to find community uses for the property's open space.

This requested amendment reflects the reality of current conditions in North Kitsap County and is GMA compliant.

A. GMA Compliance

*"Kitsap County has approximately 256,661 upland acres. Approximately 34% of the County is zoned Rural Residential at **86,544** upland acres."* (See Kitsap County Zoning Code at https://storymaps.arcgis.com/stories/731881f1c32e4128b94704252dbb6077)

There is more Rural Residential land in Kitsap County than *all other rural designations combined* inclusive of Local Area of More Intense Rural Developments (LAMIRDS). (See Exhibit A). Redesignation and rezoning of Raydient's property will align with the County's common practice of designating its rural lands for residential uses.

B. Changed Conditions and the RW Designation

The RW zone was created early in the Comprehensive Plan after the county determined that there were virtually no areas in the county that were appropriate for long-term timberland management or designation as "resource" lands. (The resource designation is different than rural or urban). The purpose of the RW designation was to help preserve long-term timberland management for as long as possible in Kitsap County.

To quote The Plan:

"This zone is intended to encourage the preservation of forest uses and agricultural activities, retain an area's rural character and conserve the natural resources while providing for some rural residential use. ***This zone is further intended to discourage activities and facilities that can be considered detrimental to the maintenance of timber production.*** *Residents of rural wooded (RW) residential tracts shall recognize that they can be subject to normal and accepted farming and forestry practices on adjacent parcels."*

The vast majority of the RW lands lie in Southwest Kitsap County (see Exhibit C). If one drives that area it is easy to see how its character is dramatically different than North Kitsap County. There is very little population density and commercial forest management is commonplace. Large areas are devoid of any meaningful commercial services.

However, the conditions in North Kitsap have changed dramatically from the days when timberland management was commonplace. The viability of commercial timber production has been greatly reduced, to the point that it may not be profitable anymore. A large majority of its rural lands are zoned for RR (see Exhibit A). Currently, only a few large tracts remain zoned RW. These tracts are primarily owned by Rayonier's subsidiaries, the Port Gamble S'Klallam Tribe, and the Washington State Department of Natural Resources (DNR). DNR has applied to remove their property from timberland production as "economically under-performing state trust lands…" (See Exhibit B).

The proposed NKU Project property was once part of a 4,000-acre tree farm but is now a fraction of that. Also, the creation of the Port Gamble Forest Heritage Park adjacent to land currently zoned RW is not compatible with timber production over the long-term.

Looked at through a slightly different lens, it is easy to see that if the proposed NKU Project property was sold today, *it is highly unlikely that it would be purchased by an entity interested in commercial timberland management.*

4. <u>Conclusion</u>

The Washington State Legislature intended for Comprehensive Plans to be living, breathing planning documents that evolve to reflect the changing realities of conditions in the state and in cities and counties. That's why GMA mandates local governments to regularly review and revise them.

Conditions are changing rapidly in North Kitsap. The shortage of housing (of all types, affordability levels, and locations), and sports and recreation facilities is real. The supply of such facilities has not kept pace with past population growth, a situation that will get worse without proactive efforts.

Finally, all the elements of the proposed NKU Project concept comply with the Growth Management Act, the Kitsap County Comprehensive Plan, the Zoning Code, and the changing conditions in North Kitsap County.

Summary of Elements, Zones, and Allowed Uses			
Element	**Rural Wooded (current zoning)**	**Rural Residential**	**Rural Commercial**
1. Sports and Recreation	P if non-commercial C if commercial	P if non-commercial ACUP if commercial	
2. YMCA	P if non-commercial C if commercial	P if non-commercial C if commercial	
3. Open Space	P	P	
4. Commercial	X	X	P
5. Residential Density 1 residential lot per 5 acres	X	P PBD if clustered	

Key	
P	Permitted outright in the zone
C	Permitted with conditional use permit
ACUP	Permitted with administrative conditional use
X	Not permitted
PBD	Performance Based Design

Note: ALL uses must undergo review under the State Environmental Policy Act

Note

The requirement for ACUP and Conditional Use permits are very similar for low, medium, and high-density residential zones **inside** Urban Growth Areas.

See tables on following pages.

Helpful links from Chapter 17 of Kitsap County Land-use Regulations

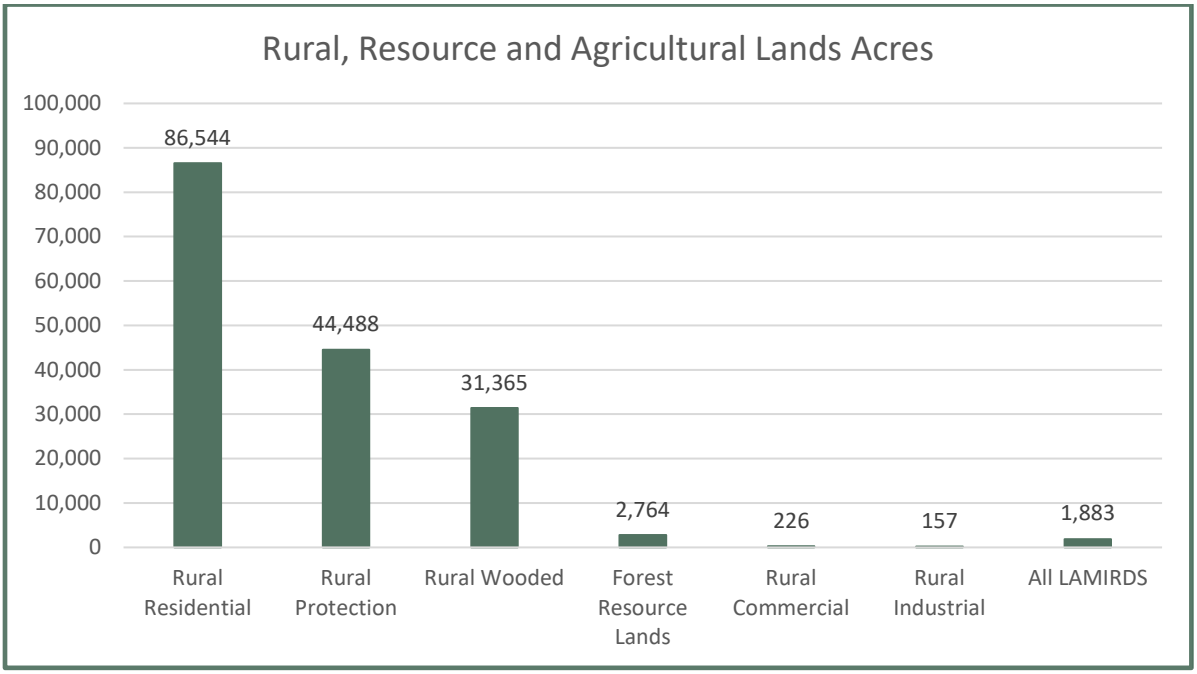
1. Chapter 17.150 Rural wooded zone
2. Chapter 17.130 Rural residential zone
3. Chapter 17.290 Rural commercial zone
4. Chapter 17.410 Allowed uses
5. Chapter 17.110 Definition open space
6. Chapter 17.110.647 Definition Recreational facility, indoor
7. Chapter 17.110.648 Definition Recreational facility, outdoor
8. Chapter 17.110.325 Hearing examiner use
9. Chapter 17.450 Performance Based Development

Exhibits

Exhibit A	Percentage of Rural Lands by Comprehensive Plan Designation
Exhibit B	Trust Land Transfer Revitalization Pilot Project
Exhibit C	Location of Rural Wooded Zoned Lands

Exhibit A

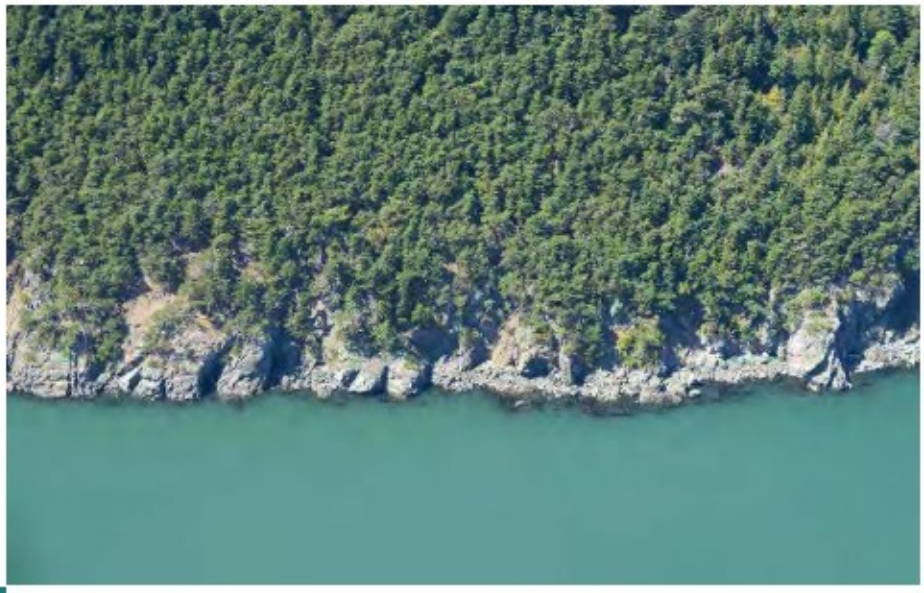
Percentage of Rural Lands by Comprehensive Plan Designation



	Percent*	Acres
Rural Residential	34%	86,544
Rural Protection	12%	44,488
Rural Wooded	17%	31,365
Forest Resource Lands	1%	2,764
Rural Commercial	≪ 1%	226
Rural Industrial	≪ 1%	157
All LAMIRDS**	< 1%	1,883
		167,427
* Kitsap County contains 256,660 acres of uplands		
** Local Areas of More Intense Rural Development		
Source: Kitsap County Zoning Code		

Exhibit B

Trust Land Transfer Revitalization Pilot Project



NATURAL RESOURCES

Trust Land Transfer Revitalization Pilot Project

Eglon Packet

July 2022

WASHINGTON STATE DEPT OF NATURAL RESOURCES

Exhibit B (cont.)

Trust Land Transfer Revitalization Pilot Project

TRUST LAND TRANSFER APPLICATION

(This application is available electronically.)
Submit by 4:00 PM on June 16, 2022 for consideration for the next funding cycle

Trust Land Transfer is an innovative tool for the Washington State Legislature, through the Department of Natural Resources, to address several land management needs. Specifically, this tool enables DNR to achieve the following:

- **Transfer out of economically under-performing state trust lands and acquire funds to purchase replacement lands with higher long-term income producing potential**
- **Conserve lands that have high ecological values or public benefits**

Applicant Information		DNR Staff contact (if different)	
Applicant's name:		Staff name:	Brandon Mohler
Address:		Address:	950 Farman Ave N
City, State, Zip:		City, State, Zip:	Enumclaw, WA 98022
Phone:		Phone:	360.918.1115
E-mail:		E-mail:	Brandon.mohler@dnr.wa.gov

Parcel name/moniker: **Eglon**

Property Information

For proposals with more than one trust ownership, or in more than one county, describe parcels separately:

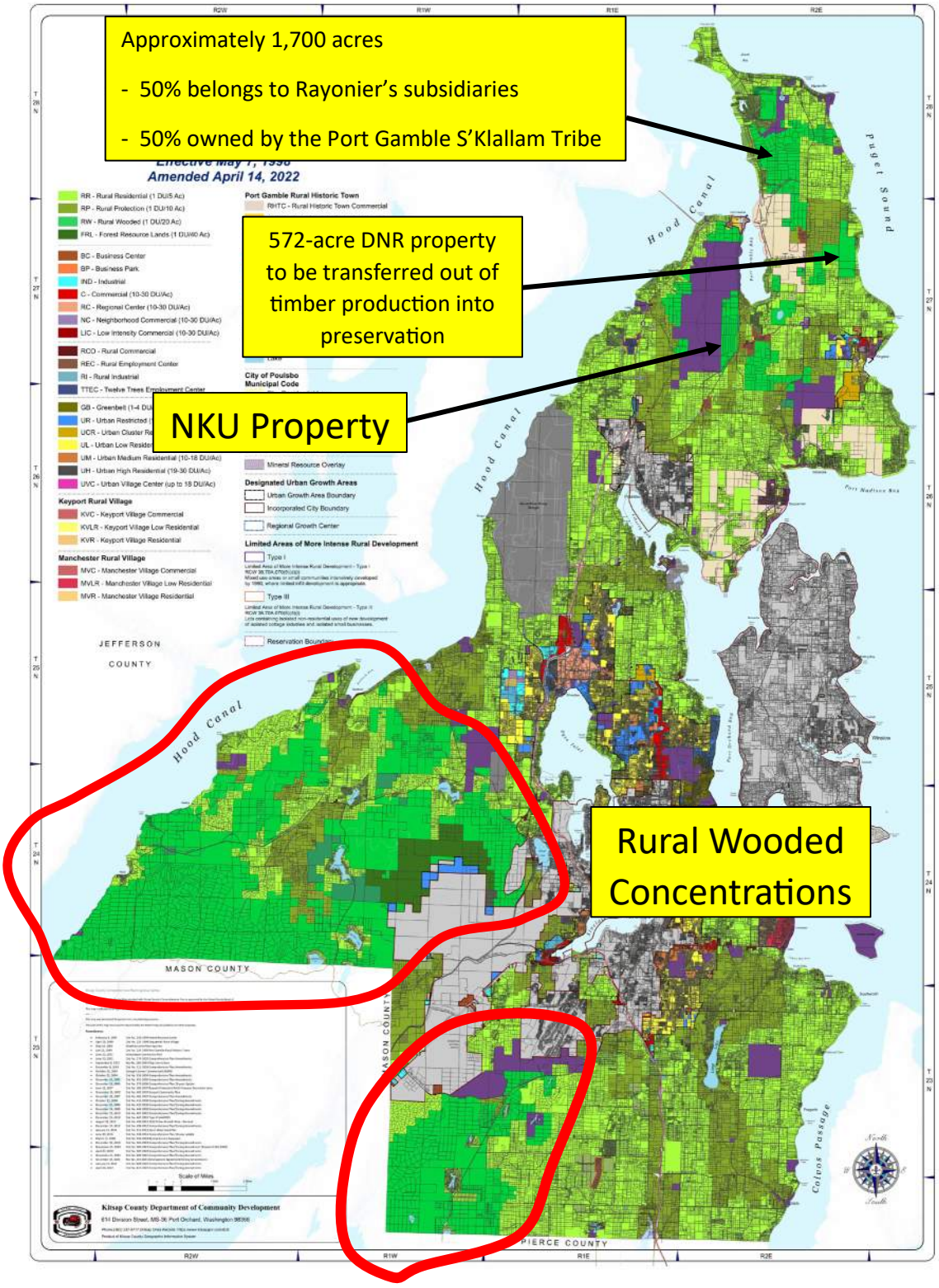
1.	County:	Kitsap	Section:	Portions of 2, 10,11, 14 & 22	Township:	27 N	Range:	2 E	B&M		Parcel#:	022702-3-035-2004, 112702-2-003-2003 & 142702-2-002-2001 102702-4-001-2002 & 222702-1-002-2003
	County:	Kitsap	Section:	Portions	Township:		Range:		B&M		Parcel#:	
	County:		Section:		Township:		Range:		B&M		Parcel#:	

2.	What is the land currently zoned as?	RW – Rural Wooded (main parcel) and Rural Residential (small parcel)			
3.	What is the current land type/land cover?	Wetlands and forest			
4.	What are the current uses of the property?	State trust land			
5.	Total project acres:	707	Total acres forest:	707	
6.	Proposed receiving agency. Kitsap County				
7.	What trust(s) does this property currently belong to? 03 & 11				
Trust #1	Common School (Trust 03)	Acres	226		
Trust #2	University Original (Trust 11)	Acres	481		
Trust #3		Acres			

1

Exhibit C

Location of Rural Wooded Zone Lands



Kitsap County Chapter 17.410
Rural Allowed Recreational/Cultural Uses

	Comprehensive Plan Land Use Designation	Rural Residential	Rural Protection	Rural Wooded	Forest Resource Lands	Mineral Resource Overlay	Urban Low Density Residential				Urban Medium Density Residential	Urban High Density Residential	Definition	Categorical Use Standards
	Zoning Classification (1)(3)(4) ➡	RR (2)	RP	RW (2)	FRL	MRO	UR (5)	GB (5)	UL (5)	UCR (5)	UM (5)	UH (5)		
	Categorical Use (1)(3)(4) ⬇	17.130	17.140	17.150	17.160	17.170	17.180	17.190	17.200	17.210	17.220	17.230		
300	Arboreta, botanical garden	--	--	--	--	--	C	C	--	--	--	--	17.110.086, Aquarium, arboretum, botanical garden, zoo.	17.415.050, Arboreta, botanical gardens
302	Campground	C	C	C	--	--	C	C	C	C	--	--	17.110.147, Campground.	17.415.090, Campground
304	Club	ACUP	C	--	--	--	C	C	C	C	ACUP	ACUP	17.110.165, Club.	17.415.115, Club.
306	Entertainment facility, indoor	--	--	--	--	--	--	--	--	--	ACUP	ACUP	17.110.261, Entertainment facility, indoor.	17.415.165, Entertainment facility, indoor.
308	Entertainment facility, outdoor	--	--	--	--	--	--	--	--	--	--	C	17.110.262, Entertainment facility, outdoor.	17.415.170, Entertainment facility, outdoor.
310	Golf courses	C	C	--	--	--	-- C	C	C	C	--	--	17.110.303, Golf course.	17.415.240, Golf courses.
312	Marinas	--	--	--	--	--	-- C	C	C	C	C	C	17.110.480, Marina.	17.415.350, Marinas.
314	Marina support services	--	--	--	--	--	--	--	--	--	--	--	17.110.482, Marina support services.	17.415.355, Marina support services.
316	Parks and open space	P	P	P	P	--	P	P	P	P	P	P	17.110.535, Open space.	
318	Racetrack	--	--	C	C	--	--	--	--	--	--	--	17.110.644, Racetrack.	17.415.405, Racetrack.
320	Recreational facilities, indoor	C	C	C	--	--	C	C	ACUP	ACUP	ACUP	ACUP	17.110.647, Recreational facility, indoor.	17.415.410, Recreational facilities, indoor.
322	Recreational facilities, outdoor	ACUP	ACUP	C	--	--	C	C	C	C	C	C	17.110.648, Recreational facility, outdoor.	17.415.415, Recreational facilities, outdoor.
324	Shooting/gun facility, indoor	C	C	C	--	--	--	--	--	--	--	--	17.110.678, Shooting/gun facility, indoor.	17.415.485, Shooting/gun facility, indoor.
326	Shooting/gun facility, outdoor	C	C	C	--	--	--	--	--	--	--	--	17.110.679, Shooting/gun facility, outdoor.	17.415.490, Shooting/gun facility, outdoor.
328	Zoo, aquarium	--	--	--	--	--	--	--	--	--	--	--	17.110.086, Aquarium, arboretum, botanical garden, zoo.	17.415.595, Zoo, aquarium.

Kitsap County Chapter 17.410
Rural Commercial Allowed Uses

Comprehensive Plan Land Use Designation →		Urban High Intensity Commercial			Urban Low Intensity Commercial		Rural Commercial	Urban Industrial			Rural Industrial	Public Facilities		
Zoning Classification (1)(3)(4) ➡		C	RC	LIC	UVC	NC	RCO	BC	BP	IND	RI	P		
Categorical Use (1)(3)(4)(5) ⬇		17.240	17.250	17.280	17.260	17.270	17.290	17.300	17.310	17.320	17.330	17.340	Definition ⬇	Categorical Use Standards ⬇
COMMERCIAL USES														
Hotels or Hospitality														
200	Adult entertainment	C	C	--	--	--	--	C	--	C	--	--	17.110.043, Adult entertainment.	17.415.025, Adult entertainment.
202	Conference center	P	P	P	P	--	--	--	--	--	--	ACUP	17.110.177, Conference center.	17.415.125, Conference center.
204	Drinking establishments	P	P	P	ACUP	P	ACUP	--	--	--	--	--	17.110.229, Drinking establishments.	17.415.155, Drinking establishments.
206	Espresso stands	P	P	P	P	P	ACUP	P	P	P	ACUP	--	17.110.267, Espresso stands.	17.415.190, Espresso stands.
208	Event facility	ACUP	ACUP	ACUP	ACUP	ACUP	--	--	--	--	--	ACUP	17.110.269, Event facility.	17.415.195, Event facility.
210	Hotel/motel	P	P	ACUP	ACUP	C	--	--	--	--	--	--	17.110.361, Hotel/motel.	17.415.285, Hotel/motel.
212	Resort	ACUP	ACUP	ACUP	ACUP	--	--	--	--	--	--	ACUP	17.110.661, Resort.	17.415.440, Resort.
214	Restaurants, with drive-through service	P	P	C	ACUP	C	--	P	P	P	--	--	17.110.662, Restaurant, with drive-through service.	17.415.445, Restaurant, with drive-through service.
216	Restaurants, without drive-through service	P	P	P	P	P	P	P	P	P	--	--	17.110.663, Restaurant, without drive-through service.	17.415.450, Restaurants, without drive-through service.

Definition: Open Space

17.110.535 Open space.

"Open space" shall mean land used for outdoor active or passive recreational purposes or for critical area or resource land protection, including structures incidental to these open space uses, including associated critical area buffers, but excluding land occupied by dwellings or hard surfaces not related to the open space uses and yards required by this title for such dwellings or hard surfaces. Open space may be used for native vegetation, drought-tolerant vegetation, and vegetated LID facilities. "Open space" is further divided into the following categories:

A. "Common open space" shall mean space that may be used by all occupants of a development complex or, if publicly dedicated, by the general public;

B. "Active recreational open space" shall mean space that is intended to create opportunities for recreational activity. Active recreational open space may be occupied by recreational facilities such as ball fields, playground equipment, trails (pedestrian, bicycle, equestrian or multi-modal), swimming pools, and game courts or sculptures, fountains, pools, benches or other outdoor furnishings;

C. "Passive open space" shall mean all common open space not meeting the definition of active recreational open space, including, but not limited to, critical areas and their associated buffers;

D. "Permanent open space" means an area that is permanently reserved as open space and remains in native vegetation unless approved for forestry, passive recreational or access uses; and

E. "Recreational open space" means an area that shall be improved and maintained for its intended use. Exterior as well as interior areas can constitute recreational open space. Examples of usable recreational space include swimming pools, community buildings, interior gyms, picnic areas, tennis courts, community gardens, improved playgrounds, paths and passive seating areas.

(Ord. 540 (2016) § 28, 2016; Ord. 534 (2016) § 7(5) (App. E) (part), 2016)

Definition: Recreation Facility

17.110.647 Recreational facility, indoor.

"Recreational facility, indoor" means a commercial recreational land use conducted entirely within a building. Examples include, but are not limited to, amusement centers, arcades, arenas, bowling alleys, gymnasiums, pool or billiard halls, skating rinks, and tennis courts.

(Ord. 611 (2022) § 106, 2022; Ord. 534 (2016) § 7(5) (App. E) (part), 2016)

17.110.648 Recreational facility, outdoor.

"Recreational facility, outdoor" means a commercial recreational land use conducted in open or partially enclosed facilities. Examples include, but are not limited to, amusement centers, miniature golf, swimming pools, tennis courts, basketball courts, outdoor racquetball courts, skateboard parks, and batting cages.

(Ord. 611 (2022) § 107, 2022)

Administrative Conditional Use Permit

Chapter 17.420
ADMINISTRATIVE CONDITIONAL USE PERMIT

Sections:

17.420.010 Purpose and applicability.
The purpose of this chapter is to set forth the procedure and decision criteria for administrative conditional use permits. An administrative conditional use permit is a mechanism by which the county may place special conditions on the use or development of property to ensure that new development is compatible with surrounding properties and achieves the intent of the Comprehensive Plan. This chapter applies to each application for an administrative conditional use and to uses formerly permitted after site plan review.

(Ord. 367 (2006) § 110 (part), 2006)

17.420.020 Administrative conditional use permit procedure.
A. The department may approve, approve with conditions, or deny an administrative conditional use permit through a Type II process as set forth in Title 21 of this code.

Administrative Conditional Use Permit (cont.)

B. Applications for an administrative conditional use permit shall contain the information required by the submittal requirements checklist established by the department as set forth in Section 21.04.045.

C. When an application is submitted together with another project permit application, the administrative conditional use permit shall be processed as set forth in Section 21.04.035.

D. Upon a determination of a complete application, the director shall have fourteen calendar days to notify the applicant whether the application shall be reviewed administratively or by the hearing examiner at a scheduled public hearing. A public hearing will be required when a component of development located within a commercial zone involves the conversion of previously undeveloped land which abuts a residential zone. Further, the director may refer any proposal under this section to the hearing examiner for review and decision.

(Ord. 367 (2006) § 110 (part), 2006)

17.420.030 Previous use approval.
Where, prior to December 11, 2006, approval was granted for establishing or conducting a particular use on a particular site through a site plan review process, such previous review and use approvals are by this section declared to be continued as an administrative conditional use permit.

(Ord. 367 (2006) § 110 (part), 2006)

17.420.035 Third party review.
The director may require a third-party review from a technical expert to provide information necessary to support an administrative decision. The expert will be chosen from a list of prequalified experts prepared and kept current by an annual solicitation by the department. The applicant shall select the expert from a list of three names selected by the director from the larger pre-qualified list. The expert will be contracted to the county and report their findings to the director and the applicant. The cost of such report will be the responsibility of the applicant.

(Ord. 415 (2008) § 186, 2008)

17.420.040 Decision criteria – Administrative conditional use permits.
A. The department may approve, approve with conditions, or deny an administrative conditional use permit. Approval or approval with conditions may be granted only when all the following criteria are met:

1. The proposal is consistent with the Comprehensive Plan;
2. The proposal complies with applicable requirements for the use set forth in this code;
3. The proposal is not materially detrimental to existing or future uses or property in the immediate vicinity; and

Administrative Conditional Use Permit (cont.)

4. The proposal is compatible with and incorporates specific features, conditions, or revisions that ensure it responds appropriately to the existing character, appearance, quality or development, and physical characteristics of the subject property and the immediate vicinity.

B. The department may impose conditions to ensure the approval criteria are met.

C. If the approval criteria are not met or conditions cannot be imposed to ensure compliance with the approval criteria, the administrative conditional use permit shall be denied.

(Ord. 415 (2008) § 187, 2008: Ord. 367 (2006) § 110 (part), 2006)

17.420.050 Revision of administrative conditional use permits.

A. Revision of an administrative conditional use permit or of conditions of permit approval is permitted as follows:

1. Minor revisions may be permitted by the department and shall be properly recorded in the official case file. No revision in points of vehicular access to the property shall be approved without prior written concurrence of the director of the department of public works. Minor revisions shall be processed as a Type I application; and
2. Major revisions, including any requested change in permit conditions, shall be processed as a Type II application;

B. Minor and major revisions are defined as follows:

1. A “minor” revision means any proposed change which does not involve substantial alteration of the character of the plan or previous approval, including increases in gross floor area of no more than ten percent; and
2. A “major” revision means any expansion of the lot area covered by the permit or approval, or any proposed change whereby the character of the approved development will be substantially altered. A major revision exists whenever intensity of use is substantially increased, performance standards are reduced below those set forth in the original permit, detrimental impacts on adjacent properties or public rights-of-way are created or increased, including increases in trip generation of more than ten percent, or the site plan design is substantially altered.
3. Any increase in vehicle trip generation shall be reviewed to determine whether the revision is major or minor. The traffic analysis shall be filed by the applicant at the same time as the request for revision. The traffic analysis will follow Traffic Impact Analysis guidelines as set forth in Chapter 20.04.

(Ord. 367 (2006) § 110 (part), 2006)

Hearing Examiner Conditional Use

17.110.325 Hearing examiner.

“Hearing examiner” means a person appointed to hear or review certain land use applications and appeals pursuant to Title 21, Land Use and Development Procedures.

(Ord. 534 (2016) § 7(5) (App. E) (part), 2016)

Performance Based Development

(Excerpt from Chapter 17.450)

Chapter 17.450
PERFORMANCE BASED DEVELOPMENT

Sections:

17.450.010 Purpose.
To allow flexibility in design and creative site planning, while providing for the orderly development of the county. A performance based development (PBD) is to allow for the use of lot clustering in order to preserve open space, encourage the creation of suitable buffers between differing types of development, facilitate the residential densities allowed by the zone, provide for increased efficiency in the layout of the streets, utilities and other public improvements and to encourage the use of low-impact development techniques and other creative designs for the development of land.

Standard regulations that may be modified through the use of a PBD include:
A. Lot size.

B. Lot width and depth.

C. Structure height (only within designated urban growth areas).

D. Setbacks (front, side and rear yards).

Minimum and maximum densities and allowed uses authorized by the zone shall not be subject to modification through the use of a PBD.

(Ord. 534 (2016) § 7(5) (App. E) (part), 2016)

END

Appendix B: Geotechnical Site Conditions

Geotechnical Report (AESI)

associated earth sciences incorporated

December 7, 2023
Project No. 20230264H001

David Evans and Associates, Inc.
1620 W. Marine View Drive, Suite 200
Everett, Washington 98201

Attention: Brook Jacksha

Subject: Preliminary Existing Conditions Characterization and Hydrogeologic/Geologic Hazard Analysis for Due Diligence
North Kitsap United Property
Portions of Sections 19, 30, and 31, T27N, R2E, W.M.
Kitsap County, Washington

Dear Mr. Jacksha:

Associated Earth Sciences, Inc. (AESI) is pleased to present this report providing the results of our geologic reconnaissance and feasibility-level hydrogeologic/geotechnical assessment for the above-referenced project.

Written authorization for this study was granted by Mr. Brook Jacksha with David Evans and Associates, Inc. Our study was accomplished in general accordance with our proposal dated September 15, 2023. This report has been prepared for the exclusive use of David Evans and Associates, Inc. and their agents, for specific application to this project. Within the limitations of scope, schedule, and budget, our services have been performed in accordance with generally accepted geotechnical engineering practices in effect in this area at the time our report was prepared. No other warranty, express or implied, is made. It must be understood that no recommendations or engineering design can yield a guarantee of stable slopes. Our observations, findings, and opinions are a means to identify and reduce the inherent risks of the owner. Our current scope includes visual reconnaissance and a limited subsurface exploration.

PROJECT UNDERSTANDING

The subject site consists of approximately 400+ acres located centrally between the communities of Poulsbo, Kingston, and Port Gamble in unincorporated Kitsap County (Figure 1). The site has a Rural Wooded Zoning overlay that allows for 1 residential unit per 20 acres. We understand that Raydient has applied for a Comprehensive Plan Amendment to allow for Rural Residential Zoning along with

5 acres of highway-type commercial and a community facility. The proposal would provide an enormous community benefit through partnership with the YMCA to build a community center and with the local Rotarians for an athletic field complex, along with open space and trails.

Specific project elements under consideration include:

- 80 residential lots
- 5 acres of highway commercial
- 1 large community facility
- Public water (existing onsite)
- Individual drainfields for residential and highway commercial
- Large on-site septic system (LOSS)for community facility
- 100 acres to 200 acres of permanent open space potentially contributed to the existing Port Gamble Heritage Forest
- Permanent trail corridors

The purpose of this study was to identify key geotechnical issues associated with site development for planning purposes. Our study included reviewing available geologic literature, site reconnaissance, excavating 14 exploration pits, and performing geologic studies to assess the type, thickness, distribution, and physical properties of the subsurface sediments and groundwater. This report summarizes our fieldwork and offers preliminary recommendations based on our present understanding of the plans for the property. We recommend that AESI review the recommendations presented in this report and revise them, if needed, when the project plans have been determined.

The site location is shown on the "Vicinity Map," Figure 1. A map of Light Detection and Ranging (LIDAR)-based topography is shown on Figure 2. A regional geomorphology map is shown on Figure 3. The approximate locations of the explorations completed for this study are shown on Figure 4. A schematic hydrogeologic cross-section is shown on Figure 5. Critical area maps are included as Figure 6, Figure 7, and Figure 8. Copies of the exploration logs are included in Appendix A.

KEY GEOTECHNICAL AND HYDROGEOLOGIC CONSIDERATIONS

AESI conducted an initial site visit on September 9, 2023. Using observations collected during this site visit and subsequent review of mapped geologic and groundwater conditions, we developed key geotechnical and hydrogeological project elements to address during this Due Diligence phase which were outlined in our proposal as follows:

- Presenting complex geologic and hydrogeologic conditions to the owner, the design team, and for presentation to the general public.

- Critical aquifer recharge areas and stormwater management opportunities: both are defined by depth to water table, soil characteristics, presence of flat terrain, and presence of permeable surficial geology. We understand that on-site stormwater infiltration and wastewater (individual and LOSS) systems will be a part of the proposal, so context for the mapped critical aquifer recharge areas (CARAs) onsite is important to document impacts and designing mitigation to protect groundwater quality.

- Streams and remnant drainages: AESI can relate current geomorphology to shallow and deep groundwater conditions and post-glacial processes, to document the subsurface "plumbing" that occurs onsite and the connection between groundwater and surface water. It may be that the hydrology that formed a portion of the ravines is likely a result of immediate post-glacial recession and does not exist currently.

- Geologic hazards: a landslide complex is mapped on the site as shown on Figure 3 "Geomorphology." Exploration pits were completed in the mapped landslide deposit to understand the presence and thickness of surficial sediments and implications for site development.

To assess these geotechnical and hydrogeological project elements we first conducted desktop review of available documents focusing on critical areas as defined by the Kitsap County Code, available geological maps, and LIDAR-based topographic maps. We then conducted a site reconnaissance followed by a limited subsurface exploration to evaluate our interpretations of the site conditions from the desktop review focusing on the site geology and groundwater. A summary of our conclusions are provided in a later section of this report.

CRITICAL AREAS REVIEW

Critical areas are described in Chapter 19 of the Kitsap County Code and geologically hazardous areas are noted in section 19.400. We have reviewed the code for geologic hazards on the site and have identified the site as having Erosion hazards, Landslide Hazards, Seismic Hazards, and within a Critical Aquifer Recharge Area.

Erosion Hazard Areas

According to the Kitsap County Code, Erosion hazard areas are described as the following:

19.400.420 Erosion hazard areas

A. General. Erosion hazard areas include areas likely to become unstable, such as bluffs, steep slopes, and areas with unconsolidated soils. These include coastal erosion-prone areas and channel migration zones, and may be inclusive of landslide areas.

B. Potential Erosion Hazard Areas. Potential erosion hazard areas are depicted on the Kitsap County erosion hazards map. These potential erosion hazard areas are identified using the following criteria:

1. *Areas of High Erosion Hazard.*
    a. *Channel migration zones, as mapped by the Washington Department of Ecology;*
    b. *Coastal erosion with a sediment source rating value of 0.6 to 1.0, per the Prioritization Analysis of Sediment Sources in Kitsap County;*
2. *Areas of Moderate Erosion Hazard.*
    a. *Slopes fifteen percent or greater, not classified as I, U, UOS, or URS, with soils classified by the U.S. Department of Agriculture NRCS as "highly erodible" or "potentially highly erodible";*
    b. *Coastal erosion with a sediment source rating value of 0.3 to 0.6 per the Prioritization Analysis of Sediment Sources in Kitsap County.*

C. Erosion Hazard Indicators. The project proponents are responsible for determining actual presence and location of an erosion hazard area. These areas may be indicated by, but not limited to, the following:

1. *Any of the above criteria currently identified in subsection (B) of this section or amended hereafter.*
2. *Coastal Erosion Hazards.*
    a. *Areas with active bluff retreat that exhibit continuing sloughing or calving of bluff sediments, resulting in a vertical or steep bluff face with little or no vegetation;*
    b. *Lands located directly adjacent to freshwater or marine waters that are identified as regressing, retreating, or potentially unstable as a result of undercutting by wave action or bluff erosion. The limits of the active shoreline erosion hazard area shall extend landward to include that land area that is calculated, based on the rate of regression, to be subject to erosion processes within the next ten-year time period.*
3. *Channel Migration Zones. The lateral extent that a river or stream is expected to migrate over time due to hydrologically and geomorphologically related processes, as indicated by historic record, geologic character, and evidence of past migration over the past one hundred years.*

Erosion Hazard Areas Review

We reviewed the following published critical areas map as part of our research:

- *Geologically Hazardous Map, Erosion Hazards, Kitsap County Washington* (Kitsap County Department of Community Development), Product of Kitsap County Geographic Information System, dated February 23, 2017.

According to the above-referenced critical areas map and as shown on Figure 6, "Critical Areas Erosion," the site exhibits moderate to high hazards areas with slope gradients of fifteen percent or greater with soils classified by the U.S. Department of Agricultural NRCS as "highly erodible" or "potentially highly erodible." The illustrated hazard areas represent approximate locations and should be considered guidelines that generally identify the potential for erosion hazard. The actual risk should be evaluated and the critical areas ordinance should be consulted and applied on a site-specific basis.

With proper implementation of a well thought out Temporary Erosion and Sedimentation Control plan and by field-adjusting appropriate erosion mitigation throughout development, the potential adverse impacts from erosion hazards on the project may be mitigated.

Landslide Hazard Area

According to the Kitsap County Code, landslide hazard areas are described as the following:

19.400.425 Landslide hazard areas.

A. General. Landslide hazard areas include those areas at risk of mass movement due to a combination of geologic, topographic, and hydrologic factors, such as bedrock, soil, slope (gradient), slope aspect, structure, hydrology, and other factors. Landslide hazards are further classified as either shallow or deep-seated.

B. Potential Landslide Hazard Areas. Potential landslide hazard areas are depicted on the Kitsap County landslide hazards map. These potential landslide hazard areas are identified using the following criteria:

1. *Areas of High Landslide Hazard.*
    a. *Shallow landslide areas with factor of safety (FS) of 0.5 to 1.5. FS is a method (Harp, 2006) for determining slope stability based on the angle of the slope from LiDAR elevation data and strength parameters.*
    b. *Areas with slopes greater to or equal to 30 percent in grade and deemed by a qualified geologist or geotechnical engineer to meet the criteria of U, UOS, or URS.*
    c. *All deep-seated landslide areas.*
2. *Areas of Moderate Landslide Hazard.*
    a. *Shallow landslide areas with FS of 1.5 to 2.5.*
    b. *Slopes of fifteen percent or greater and not classified as I, U, UOS, or URS, with soils classified by the U.S. Department of Agriculture NRCS as "highly erodible" or "potentially highly erodible"; or slopes of fifteen percent or greater with springs or groundwater seepage.*
    c. *Slopes in all areas equal to or greater than forty percent.*

C. Landslide Hazard Indicators. Project proponents are responsible for determining the actual presence and location of a landslide hazard area. These areas may be indicated by, but not limited to, the following:

1. *Any of the above criteria currently identified in subsection (B) of this section or amended hereafter;*
2. *Areas of historic failures, including areas of unstable, old and recent landslides or landslide debris within a head scarp;*
3. *Areas within active bluff retreat that exhibit continuing sloughing or calving of bluff sediments, resulting in a vertical or steep bluff face with little or no vegetation;*
4. *Hillsides that intersect geologic contacts with a relatively permeable sediment overlying a relatively impermeable sediment or bedrock;*
5. *Slopes that are parallel or sub-parallel to planes of weakness, such as bedding planes, joint systems, and fault planes in subsurface materials;*
6. *Areas exhibiting geomorphological features indicative of past slope failure, such as hummocky ground, back-rotated benches on slopes, etc.;*
7. *Areas with tension cracks or ground fractures along and/or near the edge of the top of a bluff or ravine;*
8. *Areas with structures that exhibit structural damage such as settling and cracking of building foundations or separation of steps or porch from a main structure that is located near the edge of a bluff or ravine;*
9. *The occurrence of toppling, leaning, bowed, or jackstrawed trees that are caused by disruptions of ground surface by active movement;*
10. *Areas with slopes containing soft or liquefiable soils;*

11. Areas where gullying and surface erosion have caused dissection of the bluff edge or slope face as a result of drainage or discharge from pipes, culverts, ditches, and natural drainage courses;
12. Areas where seeps, springs or vegetative indicators of a shallow groundwater table are observed on or adjacent to the face of the slope;
13. Areas that include alluvial or colluvial fans located at the base of steep slopes and drainages;
14. Areas within two hundred feet of areas classified as U, UOS, or URS.

Landslide Hazard Area Review

We reviewed the following published critical areas map as part of our research:

- *Geologically Hazardous Map, Landslide Hazards, Kitsap County Washington* (Kitsap County Department of Community Development), Product of Kitsap County Geographic Information System, dated February 23, 2017.

According to the above-referenced critical areas map and as shown on Figure 7, "Critical Areas Landslide," the site exhibits moderate hazard areas for the potential for both deep landslide hazards and shallow landslide hazards with slope gradients between 15 to 30 percent containing soils classified by the U.S. Department of Agricultural NRCS as "highly erodible" or "potentially highly erodible." The illustrated hazard areas represent approximate locations and should be considered guidelines that generally identify the potential for landslide hazards. The actual risk and the presence of other areas that meet the steepness requirements based upon actual survey should be evaluated and the critical areas ordinance should be consulted and applied on a site-specific basis.

A mapped landslide is present on the site as shown on the geomorphology map (Figure 3) and per 19.400.425C2 and C6 is considered a landslide hazard area. Our assessment of this mapped landslide is discussed later in this report.

Seismic Hazard Areas

According to the Kitsap County Code, seismic hazard areas are described as the following:

19.400.430 Seismic hazard areas.

A. General. Seismic hazard areas are areas subject to severe risk of damage as a result of earthquake-induced land sliding, seismic ground shaking, dynamic settlement, fault rupture, soil liquefaction, or flooding caused by tsunamis and seiches.
B. Potential Seismic Hazard Areas. Potential seismic hazard areas are depicted on the Kitsap County seismic hazards map. These potential seismic hazard areas are identified using the following criteria:
1. Areas of high seismic hazard are those areas with faults that have evidence of rupture at the ground surface.
2. Areas of moderate seismic hazard.
a. Areas susceptible to seismically induced soil liquefaction, such as hydric soils as identified by the NRCS, and areas that have been filled to make a site more suitable for development. This may include former wetlands that have been covered with fill.
b. Areas identified as Seismic Site Class D, E, and F.
c. Faults without recognized evidence of rupture at the ground surface.

C. Seismic Hazard Indicators. Project proponents are responsible for determining actual presence and location of a seismic hazard area. These areas may be indicated by, but not limited to, the following:

1. Any of the above criteria currently identified in subsection (B) of this section or amended hereafter;

2. Areas identified as potential landslide areas, including slopes that can become unstable as a result of strong ground shaking, even though these areas may be stable under non-seismic conditions;

3. Areas identified as high and moderate liquefaction and dynamic settlement hazard areas by the Washington Department of Natural Resources, including areas underlain by unconsolidated sandy or silt soils and a shallow groundwater table (static groundwater depth less than thirty feet) capable of liquefying in response to earthquake shaking. Dynamic settlement hazard areas are those underlain by more than ten feet of loose or soft soil not susceptible to liquefaction, but that could result in vertical settlement of the ground surface in response to earthquake shaking;

4. Tsunami and seiche hazard areas. Generally, these are areas that are adjacent to Puget Sound marine waters and lakes that are designated as "A" or "V" zones as identified by FEMA and depicted on the FEMA maps or other maps adopted by Kitsap County;

5. Fault rupture hazard areas, including areas where displacement (movement up, down, or laterally) of the ground surface has occurred during past earthquake(s) in the Holocene Epoch, and areas adjacent that may be potentially subject to ground surface displacement in a future earthquake.

Based upon the recent site work it is inconclusive as to whether seismic hazards exist in the site, and further must be performed to determine the depth to the water table and the potential for liquefaction.

Critical Aquifer Recharge Areas

According to the Kitsap County Code, critical aquifer recharge areas are described as the following:

19.600.610 Critical aquifer recharge area categories.

As defined at Section 19.150.210, "critical aquifer recharge areas" means those land areas that contain hydrogeologic conditions that facilitate aquifer recharge and/or transmit contaminants to an underlying aquifer. Critical aquifer recharge areas under this title may be established based on general criteria, specifically designated due to special circumstances, or based on scientific studies and mapping efforts. Factors considered in the identification of critical aquifer recharge areas include depth to water table, presence of highly permeable soils (specifically Group A hydrologic soils), presence of flat terrain, and the presence of more permeable surficial geology.

A. Category I Critical Aquifer Recharge Areas. Category I critical aquifer recharge areas are those areas where the potential for certain land use activities to adversely affect groundwater is high. Category I critical aquifer recharge areas include:

1. Areas inside the five-year time of travel zone for Group A water system wells, calculated in accordance with the Washington State Wellhead Protection Program.

2. Areas inside the ten-year time of travel zones in wellhead protection areas when the well draws its water from an aquifer that is at or above sea level and is overlain by permeable soils without any underlying protective impermeable layer.

3. Areas identified as significant recharge areas due to special circumstances or identified in accordance with WAC 365-190-100(4) as aquifer areas of significant potable water supply with susceptibility to groundwater contamination, including but not limited to the following:

a. Hansville Significant Recharge Area. The Hansville aquifer is a significant potable water supply that is highly susceptible to the introduction of pollutants. Additional information regarding this aquifer is available from the Kitsap public utility district.

b. Seabeck Significant Recharge Area. The Seabeck aquifer is a significant potable water supply that is being developed for use in central and north Kitsap County. Additional information regarding this aquifer is available from the Kitsap public utility district.

c. Island Lake Significant Recharge Area. The Island Lake aquifer is a significant potable water supply for the Silverdale area. Additional information regarding this aquifer is available from the Silverdale water district.

d. Gorst Significant Recharge Area. Aquifers in the Gorst basin are highly susceptible to the introduction of pollutants and provide significant potable water supplies for the city of Bremerton.

e. Poulsbo Significant Recharge Area. The Poulsbo aquifer is highly susceptible to the introduction of pollutants and provides a significant potable water supply for the Kitsap public utility district and city of Poulsbo.

4. The department may add, reclassify or remove Category I critical aquifer recharge areas based on additional information about areas of significant potable water supply with susceptibility to groundwater contamination or supply reduction, or based on changes to sole source aquifers or wellhead protection areas as identified in wellhead protection programs.

B. Category II Critical Aquifer Recharge Areas. Category II critical aquifer recharge areas are areas that provide recharge effects to aquifers that are current or potentially will become potable water supplies and are vulnerable to contamination based on the type of land use activity. The general location of these areas is available on the Kitsap County geographic information system. Category II critical aquifer recharge areas include:

1. Highly permeable soils (Group A hydrologic soils). The general location and characteristics of Group A hydrologic soils in Kitsap County are given in the Soil Survey of Kitsap County by the U.S. Department of Agriculture, Natural Resources Conservation Service (NRCS). The soil survey information is available on the Kitsap County geographic information system (GIS).

2. Areas above shallow aquifers or surface areas that are separated from the underlying aquifers by an impermeable layer that provides adequate protection from contamination to the aquifer(s) below. The general location of shallow aquifers in Kitsap County is based upon the professional judgment of licensed hydrogeologists with knowledge of the area. The location of shallow aquifers is available on the Kitsap County geographic information system (GIS).

3. Areas above the Vashon aquifer. Surface areas above the Vashon aquifer that are not separated from the underlying aquifers by a poorly permeable layer that provides adequate protection to preclude the proposed land use from contaminating the Vashon aquifer below. Vashon aquifers in Kitsap County are typically mapped as "Qva" (Vashon advance aquifer) or "Qvr" (Vashon recessional aquifer) on geologic maps. Best available information concerning the location of Vashon aquifers is available on the Kitsap County geographic information system (GIS).

4. Areas with high concentration of potable water supply wells.

5. The department may add, reclassify or remove Category II critical aquifer recharge areas based on additional information about areas of potential potable water supply with susceptibility to groundwater contamination or supply reduction, or based on changes to sole source aquifers or wellhead protection areas as identified in wellhead protection programs.

Critical Aquifer Recharge Areas Review

Kitsap County Code 19.610 classifies critical aquifer recharge areas into two categories, Category I and Category II, based on the potential of land use activities to adversely affect groundwater. Factors considered in the identification of critical aquifer recharge areas include the depth to water table, soil characteristics, presence of flat terrain, and the presence of permeable surficial geology. We reviewed the Kitsap County Best Available Science (BAS) Study for CARAs. This study mapped a

Class II CARA that encompasses the entire site (see Figure 8). A number of small water supply systems are present within a ¼ mile of the project to the southwest and east as shown on Figure 8.

Development in critical aquifer recharge areas requires stormwater best management practices (BMPs) in accordance with Kitsap County Code Title 12, Stormwater Drainage. Further exploration including the installation of groundwater monitoring wells and submittal of a hydrogeological report may be required for a large on-site septic system or for multiple small on-site septic systems. Project hydrogeology and local wells are discussed in more detail in the "Hydrogeology" section of this report.

PROJECT TOPOGRAPHY, GEOLOGY, AND GEOMORPHOLOGY

Our on-site review, reconnaissance, and explorations were focused on the southern half of the project area based upon our conversations with the design team, the locations of critical infrastructure, and the feasibility timeline. The southern half contains potential locations for a commercial area and stormwater management/infiltration facilities. We also focused further explorations in the vicinity of the landslide feature identified on Figure 3, "Geomorphology."

Topography

As shown on the attached LIDAR-based topographic map of the property (Figure 2) and observed during our site reconnaissance, the project site contains significant topographic relief formed by glaciation of the region. The topography consists of three general terrains: (1) higher elevation gentle to moderate sloping upland area that generally slopes down toward the east and southeast; (2) a band of moderate to steep slopes located in the central portion of the site that is dissected by several steep-sided ravines; and (3) the lower elevation eastern portion of the site below these steep slope areas and adjacent to SR307 (also called Bond Road). Gamble Creek is located 500 to 800 feet east of SR307. Several streams are shown onsite on the County GIS maps within the site ravine areas; however, no evidence of surface flow was identified.

The site is accessed via numerous logging roads and bike trails that can be driven or ridden.

Site Geology

We reviewed the following published geologic maps as part of our research:

- *Geologic Map Units, Kitsap County Washington* (Kitsap County Department of Community Development), Product of Kitsap County Geographic Information System, dated April 11, 2017.
- *Preliminary Geomorphic Map of the Kitsap Peninsula, Washington* (U.S. Geological Survey) by R.A. Haugerud, 2009, Open-Field Report OF-2009-1033, 1:36,000.

- *Geology and Ground-Water Resources of Kitsap County, Washington*: U.S. Geological Survey, Water-Supply Paper 1413 by J.E. Sceva, 1957.
- *Water Resources and Geology of the Kitsap Peninsula and Certain Adjacent Islands*: Washington Division of Water Resources, Water-Supply Bulletin 18 by M.E. Garling, and Dee Molenaar, 1965.

We also reviewed NRCS soils mapping. The geologic mapping is conducted at a more regional scale than the soils mapping, and indicates that most of the site above about elevation 200 feet is mapped as glacial till, while the remainder of the site is mapped as glacial outwash. Our limited subsurface exploration did not encounter glacial till at the site. Detailed descriptions of these units are described in the "Geologic Unit" section of this report.

Geomorphology and Landslide Mapping

A portion of the *Preliminary Geomorphic Map of the Kitsap Peninsula*, *Washington*: U.S. Geological Survey, Open-File Report OF-2009-1033, scale 1:36,000 is included as Figure 3, "Geomorphology," and provides an illustration of the generalized surface based upon LIDAR and topographic features. The map indicates terrain that is the result of the last glaciation in the Puget Sound. The geomorphic map shows the surficial morphology is dominated by pock-marked glaciated surfaces. The pock-marked glaciated surfaces are consistent with a kame-kettle topography. Hillslope morphology is generally dominated by colluvium (small incoherent deposits from upper slopes) and can include mass movement processes, such as debris flows or shallow landslides. Kame-kettle channel features were mapped on the northern portion of the project area. One large area of potentially deep-seated landslides was mapped in the southern portion of the site, indicated by "ls" on the map. Hillslope morphology is also present within incised ravines. It is important to note that the map is generated from review of LIDAR images and topographic mapping of the area. Features that may indicate landslides need to be studied further onsite to verify their existence. Explorations were conducted in the mapped landslide deposit. In our opinion, the mapped landslide complex area is shallow and inactive, as discussed later in this report.

Site Reconnaissance

AESI performed a limited geologic reconnaissance of the project area on October 10, 2023. The reconnaissance was limited by the presence of dense undergrowth, forest management disturbance, and areas of dense forest with various types of trees. Select site features observed and stations are identified on Figure 4, "Existing Site and Exploration Plan." The following was noted during our reconnaissance:

- We circumnavigated the central and southern regions of the project site using trails and existing access roads. Within this portion of the site, we observed the ground surface to be undulating with generally shallow sloping topography from west to east with some steep ravines in the western region of the drainages.

- We observed mapped ravines and associated culverts extending from the central region to the southern boundary of the site. During our reconnaissance, no groundwater or evidence to suggest the existence of recent surface flow were observed at the time of our reconnaissance (i.e., lack of depositional features, erosional features, and/or vegetation that favors wet soil conditions). The only mapped drainage that was observed to contain surface flow was Port Gamble Creek located east of the project site.

- Within the area of the mapped landslide complex shown on Figure 3, "Geomorphology," we observed hummocky terrain, trees with "pistol-butt" characteristics, and steep bowl-shaped terrain with a crest-like topography near the top of slope. We interpret the "pistol butt" to be consistent with shallow soil creep, common in sloping terrain. However, no leaning trees, open cracks or fissures, or emergent groundwater were observed. Therefore, based upon the surface features observed there were no conditions that would be associated with current large-scale movement of the slope.

Subsurface Exploration

Our field study included a reconnaissance of the site and excavation of 14 exploration pits to gain subsurface information about the site. The various types of sediments, as well as the depths where characteristics of the sediments changed, are indicated on the exploration logs presented in Appendix A. The depths indicated on the logs where conditions changed may represent gradational variations between sediment types in the field. The approximate locations and depths explored of the exploration pits are shown on Figure 4, "Existing Site and Exploration Plan."

Exploration Pits

The exploration pits (EP-1 through EP-14) were excavated in October 2023 using a John Deere 160G track-mounted excavator operated by Seton Construction contracted through Raydient. The pits permitted direct, visual observation of subsurface conditions. Materials encountered in the exploration pits were studied and classified in the field by an engineering geologist from our firm. The exploration pits were backfilled after examination and logging. Samples collected from the exploration pits were classified in the field and representative portions placed in watertight containers. The samples were then transported to our laboratory for further visual classification.

We were limited at this time to 2 days of exploration to expedite the work and meet the project schedule. We generally focused the exploration in potential infiltration areas and the mapped landslide area.

Subsurface Conditions

Our interpretation of surface and subsurface geologic/hydrogeologic conditions in the project area is based on a review of the available geologic and hydrogeologic information, a brief reconnaissance,

targeted exploration pits, and our experience on similar projects. We also reviewed a limited number of water well reports from the Washington State Department of Ecology (Ecology). Detailed review of water well logs outside the study area was beyond the current scope of this project. A schematic hydrogeologic cross-section illustrating conceptual geologic conditions for a portion of the site based upon our observations is presented on Figure 5. The location of Cross-Section A-A' is shown on Figure 4. The following section presents more detailed subsurface information organized from the shallowest (youngest) to the deepest (oldest) sediment types. Copies of the exploration logs are included in Appendix A.

Geologic Unit Summary

Colluvium (Qco): Near-surface sediments encountered within EP-5, EP-12, EP-13, and EP-14 consisted of loose to medium dense yellow to light brown to grayish brown with gray mottles fine- to coarse-grained sands to sandy silt with gravel and cobble. Moisture varies from slightly moist to moist and no groundwater was observed at the time of our exploration. Colluvial sediments included variable abundance of rootlets and roots up to 0.5-inch in diameter, fragments of buried organics, pockets of sandy silt with gravel, and a chaotic texture. Where observed these materials extended to depths of about 4.5 feet below ground surface and display moderate weathering and trace pinhole voids. The lower contact of this unit typically displays an undulating oxidized contact with the glacial outwash deposits below.

This unit is interpreted to be landslide runout deposits. Due to the thin nature of the unit and absence of evidence to suggest recent large-scale movement (i.e., leaning trees and cracks or fissures emergent groundwater), we believe the landslide is ancient, consistent with the period of glacial retreat, and is inactive. However, further study beyond feasibility level is recommended to confirm.

Vashon Recessional Outwash (Qvr) and Vashon Ice-Contact Deposits (Qvi): Geologic and geomorphic mapping includes both recessional outwash and coarse-grained kame ice-contact deposits in the site vicinity. For purposes of this report, we have grouped the loose sandy sediments within the Vashon recessional outwash. Recessional outwash sediments were encountered within EP-1, EP-4, EP-5, EP-6, EP-8, and EP-11. These sediments were observed to be loose to medium dense, light brown to gray fine- to medium-grained sand with silt and gravel with occasional boulders. A large truck-sized glacial erratic boulder was observed onsite. Moisture contents typically range from dry to slightly moist and no groundwater was observed at the time of our exploration. Where observed these recessional outwash materials displayed a massive structure with occasional faint laminations, thin oxidized lenses of sandy silt to very fine-grained sand, and thin beds of fine- to coarse-grained sand and gravel. The upper 4 feet is typically moderately weathered. During excavation, these materials displayed minor to heavy caving. We interpret these sediments to be representative of material deposited by meltwater streams flowing off of the retreating glacial ice during the latter portion of the Vashon Stade of the Fraser Glaciation, approximately 12,000 years ago. Recessional outwash if not saturated can be a suitable receptor horizon for infiltration. Recessional outwash on

upland surfaces can commonly be underlain by Vashon lodgement till, restricting infiltration capacity.

Vashon Lodgement Till (Qvt): Although not encountered during our site reconnaissance or exploration pits, Vashon lodgement till may be present, particularly in the higher elevation areas of the site. Vashon lodgement till is generally comprised of low-permeability silty fine sand with few gravel that has been consolidated by the weight of an ice sheet. Till is commonly referred to as "hardpan," and is typically 10 to 30 feet thick, and rarely more than 50 feet thick. The till generally acts as an aquitard or confining unit, and is not suitable for infiltration facilities unless a significant lateral dispersion area is present.

Vashon Advance Outwash (Qva): Advance outwash sediments were encountered within EP-2, EP-3, EP-7, EP-9, EP-10, EP-12, and EP-13. These sediments were observed to be medium dense to dense yellowish brown to dark brownish gray fine- to medium-grained sand with silt, gravel, and cobble. Moisture contents ranged from dry to moist with an increase with depth. No groundwater was observed during our exploration. Where observed advance outwash sediments were massive with occasional laminations to thin beds approximately 1-inch thick of varying sand grain size, laminated silt fragments up to 6 inches in diameter with oxidized rims, discontinuous oxidized lenses, and rare boulders up to approximately 24 inches in diameter. Vashon advance outwash was deposited by meltwater streams from an advancing ice sheet during the Vashon Stade of the Fraser Glaciation and was glacially overridden and compacted. Relatively thick advance outwash sand deposits are interpreted to be present beneath the upland and can be excellent receptor horizons for treated stormwater and treated wastewater. The advance outwash on the upland may also contain a thin aquifer as illustrated on the Schematic Hydrogeologic Cross-Section A-A', Figure 5.

Pre-Fraser Deposits (Qpf): Sediments encountered within EP-1, EP-2, EP-4, EP-7, EP-8, and EP-14 at depths ranging from 8 to 14 feet below existing grade consisted of medium dense to dense dark grayish brown fine- to coarse-grained sand to silty sand with gravels and cobbles. These sediments included occasional fine-grained sand laminations, thin oxidized beds, lenses of increased gravel and cobble abundance, and gray silt clasts with laminations. Pre-Fraser-age sediments can include a variety of depositional environments, including in a low-energy lacustrine and moderate- to higher-energy fluvial systems. The pre-Fraser-age sediments have been overridden by glacial ice during at least one subsequent glaciation. Where encountered, the pre-Fraser sediments extended to depths of approximately 15 to 18 feet and beyond the maximum depth explored.

Hydrogeology

Groundwater conditions and aquifer properties are an important consideration for siting of stormwater infiltration and wastewater treatment facilities. Stormwater infiltration and on-site wastewater disposal act to increase groundwater recharge. Increases in groundwater recharge are beneficial to stream baseflow and for maintaining groundwater levels, but the effects of increasing groundwater recharge can include groundwater mounding and potentially groundwater loading in

areas of geologic instability. This section contains an overview of hydrogeologic conditions and for purposes of due-diligence characterization, describes three principal groundwater "regimes" and two intervening aquitard units in the project area.

Regional Hydrogeologic Studies

Regional hydrogeology in the site vicinity is primarily described in the following reports:

- *Geology and Ground-water Resources of Kitsap County, Washington*, U.S. Geological Survey Water-Supply Paper 1413, 1957: Prepared by J.E. Sceva, Tacoma, Washington.
- *Water Resources and Geology of the Kitsap Peninsula and Certain Adjacent Islands*, Washington State Department of Conservation, Division of Water Resources, 1965, Water Supply Bulletin No. 18 (including Plates 1 to 5): Prepared by M.E. Garling and Dee Molenaar, Olympia, Washington.
- *Kitsap County Initial Basin Assessment*, Open File Report 97-04, October 1997: Prepared by Kitsap Public Utility District in association with Economic and Engineering Services, Inc., Pacific Groundwater Group, Robinson and Noble, Inc., and KCM, Inc.: Prepared in cooperation with Ecology, Northwest Regional office, Bellevue Washington.
- *Hydrogeologic Framework, Groundwater Movement, and Water Budget of the Kitsap Peninsula, West-Central Washington*, U.S. Geological Survey Scientific Investigations Report 2014-5106, 2014: Prepared by Wendy B. Welch, Lonna M. Frans, and Theresa D. Olsen, Tacoma, Washington, in cooperation with the Kitsap Public Utility District.
- *Numeric Simulation of the Groundwater Flow System of the Kitsap Peninsula, West-Central Washington*, U.S. Geological Survey Scientific Investigations Report 2016-5052, 2014: Prepared by Lonna M. Frans and Theresa D. Olsen, Tacoma, Washington, in cooperation with the Kitsap Public Utility District No. 1 of Kitsap County.

The *Kitsap County Initial Basin Assessment* (KPUD, 1997) builds on the fundamental hydrogeologic field data contained in Sceva (1957) and Garling and Molenaar (1965) and includes more local geologic and hydrogeologic information. The *Hydrogeologic Framework, Groundwater Movement, and Water Budget of the Kitsap Peninsula, West-Central Washington* (Welch et al., 2014) compiled significant hydrogeologic and water system data information into numerical databases and GIS software. However, the scale of the study necessitated generalizing some of the detail contained in the previous studies and is less specific.

Project Hydrogeology and Nearby Water Supply Wells

No groundwater was observed in our explorations and no evidence of groundwater springs was observed within the on-site ravines at the time of exploration and site reconnaissance. Higher moisture contents in the bottom of the exploration pits at the lower elevations were observed, possibly indicative that groundwater may be just out of reach of the excavator.

Although not encountered in our explorations and site reconnaissance, for purposes of due-diligence characterization, we describe the following principal groundwater "regimes" in the project area: (1) intermittent interflow, (2) perched upland aquifer (at base of Vashon advance outwash), (3) deeper aquifer systems (contained in the pre-Fraser sediments), and (4) valley aquifer (Recent alluvial and Vashon recessional outwash). Hydrogeologic conditions are illustrated on Cross-Section A-A' (Figure 5). It should be noted that the presence and depth of groundwater may vary in response to such factors as changes in season, precipitation, and land use. Our work was conducted in October when groundwater levels are near seasonal lows.

Interflow: In upland areas, perched groundwater occurs when surface water infiltrates down through relatively permeable soils, such as thin Vashon recessional outwash and the weathered portions of the glacial till, and becomes trapped or "perched" atop a comparatively impermeable barrier, such as unweathered till horizons or silty outwash horizons. This zone of shallow perched groundwater when formed in weathered till sediments is commonly referred to as the "interflow zone." The perched groundwater can only slowly penetrate the underlying low-permeability zones. Much of the ground observed during site reconnaissance and in our explorations was dry and sandy, and it appears that very little classic "interflow" is present onsite. Off-site areas west of the site may contribute interflow to the site, which then infiltrates into the sandy outwash sediments and recharges deeper groundwater.

Perched Upland Aquifer: A thin unconfined aquifer within the Vashon-age advance outwash is interpreted to be present beneath the upland, perched on either fine-grained basal bed of the Vashon advance outwash or on pre-Fraser-age sediments, as illustrated on Cross-Section A-A' (Figure 5). The Vashon advance aquifer corresponds with aquifer unit Qg1a in the Initial Basin Assessment (KUPD, 1997) and Qva in the Kitsap Peninsula Framework (Welch et al., 2014). The advance outwash aquifer typically has fine-grained sediments at the base which grade upward into coarser deposits. The advance outwash aquifer is typically an unconfined aquifer. Very little information was readily available on groundwater within the Vashon advance outwash in the project vicinity. A few domestic water wells south of the site are interpreted to be completed in Vashon advance outwash based on the driller's logs. Recharge to the upland aquifer is from downward migration of precipitation through the lodgement till, where present, or from direct precipitation or infiltration of surface water runoff where the till is absent. Discharge occurs in the form of downward seepage to underlying aquifers in the older undifferentiated pre-Fraser-age sediments, from withdrawal by domestic water supply wells, and as seeps and springs where the advance outwash aquifer has been exposed on slopes and bluffs. We note that no indications of groundwater springs or seeps were observed on the southern portion of the site during site reconnaissance. We have inferred a groundwater elevation on the geologic cross-section on Figure 5 based upon limited review of water well logs offsite to the south. To assist with site feasibility and design, groundwater level monitoring wells should be installed to better characterize the extent and seasonal variation.

Deeper Aquifers: Groundwater is present at depth beneath the upland in pre-Fraser-age sediments, as shown on the geologic cross-section on Figure 5, based upon limited review of water well logs

offsite to the south and information present in the regional documents. The upper portion of the pre-Fraser-age groundwater is hydraulically connected to the Valley aquifer in the site vicinity. At least two deeper aquifers in the pre-Fraser-age sediments are documented during review of area water wells, including two Kitsap PUD wells, which indicate significant groundwater is present between about elevation +100 and -220 feet. The data also indicate the presence of a much deeper aquifer that is separated from the near-surface regional water table that contributes to Gamble Creek.

Valley Aquifer: Groundwater is present within the Gamble Creek valley east of the site as shown on Figure 5 and is contained within the Recent alluvial and Vashon recessional outwash. The Valley aquifer is recharged by direct precipitation, seasonally by surface water infiltration in losing reaches of ditches and channels that cross the valley floor, and by lateral hydraulic connections with deeper aquifers.

Groundwater - Surface Water Interaction

Stream channels and wetlands are surface water features which interact directly with groundwater. Three general processes occur: (1) the surface water features gain water from inflowing groundwater, (2) the surface water features lose water to groundwater by outflow through the streambed or depression sidewalls or base, or (3) the systems vary between gaining water and losing water either seasonally or spatially, in particular for streams as the streambed intersects different geologic units or groundwater discharge zones.

Wetlands also receive water from groundwater, provide a source of recharge to groundwater, or both. Wetlands located on the upland surfaces generally result from interflow or direct runoff collecting in depressions between till ridges, and can be an expression of a very shallow perched water table in topographically low areas on shallow, low-permeability sediments.

No streams or large wetland features were observed onsite. It is our interpretation that the on-site ravines are the result of a paleo-drainage system formed during or immediately following deglaciation of the area approximately 10,000 to 11,000 years ago. This finding is consistent with (1) the lack of headwater wetland areas and supporting hydrology, (2) the presence of permeable sand deposits that allow for vertical infiltration of rainfall, (3) no evidence of naturally occurring stream channels, and (4) the ravines terminate well above modern base levels.

CONCLUSIONS

Mapped Landslide Review

U.S. Geological Survey (USGS) geomorphic map (Figure 3) depicts a large, deep-seated landslide in the center of the southern portion of the site. It should be noted that the USGS landslide mapping

is based on a desktop review of LIDAR and aerial imagery and the presence of the mapped landslides was not field-verified by USGS. The feature is located in the moderately to steeply sloping areas in the southeastern portion of the project site. The extent of the mapped landslide feature originates at mid-slope and has a runout area that extends to the eastern limits of the property.

During our site reconnaissance of the mapped landslide feature, surface observations indicated a hummocky-like topography, occasional trees displaying "pistol-butt" characteristics, and a steep bowl-shaped terrain with a crest-like topography near the top of slope. During our limited subsurface exploration in the area, we observed a thin deposit of fine- to coarse-grained sands and sandy silts that contained fragments of buried organics and pockets of gravels within a massive matrix with a chaotic texture. However, we did not observe cracks or fractures, emergent groundwater, or shear-like characteristics of the subsurface soils. Where observed, the colluvium that contained a chaotic structure was generally shallow within depths ranging from 1.4 to 4.5 feet below ground surface. Below this elevation undisturbed outwash with horizontal bedding was observed.

Our preliminary evaluation based upon limited exploration suggests that the features observed are remnants of an ancient landslide deposit. It is likely that the subject area was historically part of a glacial lake environment during the last glacial retreat. When the glacial lake was rapidly drained the shoreline failed due to saturation and the subsequent release to pore water pressure, along less impermeable lenses. The resultant "bluff" failure deposited a thin layer of potentially subaqueous landslide debris.

The lack of evidence of groundwater discharge near what would be the potential failure surface suggests that the mechanism for failure is no longer present. In our opinion, the mapped landslide complex area is inactive. We recommend additional study consisting of deep borings and monitoring wells to provide additional characterization of the mapped landslide and determine if mitigation measures are necessary.

Infiltration Potential

Infiltration feasibility is dependent on the permeability of the infiltration receptor horizon, the vertical and lateral extent of the unsaturated material, the depth to groundwater for perched water, the transmissivity of the underlying aquifer, proximity to geologic hazards, and considerations for other nearby water users such as wells, springs, and streams.

The County has adopted the *2021 Kitsap County Stormwater Design Manual* (2021 KCSWDM). The County encourages development proposals to incorporate low impact design (LID) planning and design approaches into project development. A geotechnical report must be completed to address the feasibility of infiltration LID measures such as pervious pavement, bioretention and other stormwater infiltration facilities. The County also requires establishment of seasonal high groundwater elevations at the site as part of stormwater infiltration feasibility assessment.

Based on our review of the regional geologic and soils mapping, shallow infiltration of stormwater into the recessional outwash in lower elevation areas west of Bond Road may be feasible. The recessional outwash is anticipated to contain a shallow groundwater table aquifer that corresponds generally to the elevation of Gamble Creek. Seasonal high groundwater will be a key datapoint to determine feasibility and sizing for infiltration facilities.

On the upland areas, shallow dispersed infiltration BMPs are feasible where the Vashon recessional or coarser-grained ice-contact sediments are present in sufficient lateral or vertical extent. However, for larger or more concentrated facilities, it is possible that deeper infiltration into sediments below the upland is feasible, and recommended, to avoid impacts to steeply sloping areas.

FUTURE STUDIES

Future phases of work should include exploration borings and monitoring wells to provide key information related to subsurface conditions critical for basic characterization of geologic units, documentation of groundwater resources, obtaining geotechnical parameters for slope stability analysis, and potentially liquefaction analysis. The groundwater monitoring data will provide documentation of seasonal high groundwater levels.

The following exploration and testing activities are recommended for potential development areas to provide additional data for feasibility and site design:

- Site reconnaissance of the northern portion of the site.
- Three shallow monitoring wells (25 to 30 feet) along the east side of the site adjacent to Bond Road to allow for seasonal high groundwater level monitoring.
- Groundwater level monitoring during the wet season.
- Two deep monitoring wells (80 to 120 feet) within the upland area near the top of the landslide feature.
- Exploration borings near the proposed tunnel location.
- Site-wide shallow exploration pits using an excavator.
- Grain-size testing and pilot infiltration testing in areas under consideration for infiltration facilities.
- Depending upon the results of the additional exploration and testing, it may be necessary for more testing to evaluate the seismic risks or other project design elements.

CLOSURE

Thank you for allowing us to conduct this feasibility-level geotechnical/hydrogeologic assessment of the property in support of planning on the proposed development. Based on the current preliminary findings during our research and reconnaissance of the site, the planned development described previously appears feasible with mitigations and the implementation of appropriate BMPs. However, it must be understood that further subsurface exploration of the site is recommended to complete the study for a design-level report. Our opinions have been based upon visual reconnaissance and readily available information. AESI is available to provide specific geotechnical engineering recommendations for the property once development plans become more final. Kitsap County may require such services as part of permitting for the planned development.

We appreciate the opportunity to submit this report and hope that it meets your needs. If you have any questions, please do not hesitate to call.

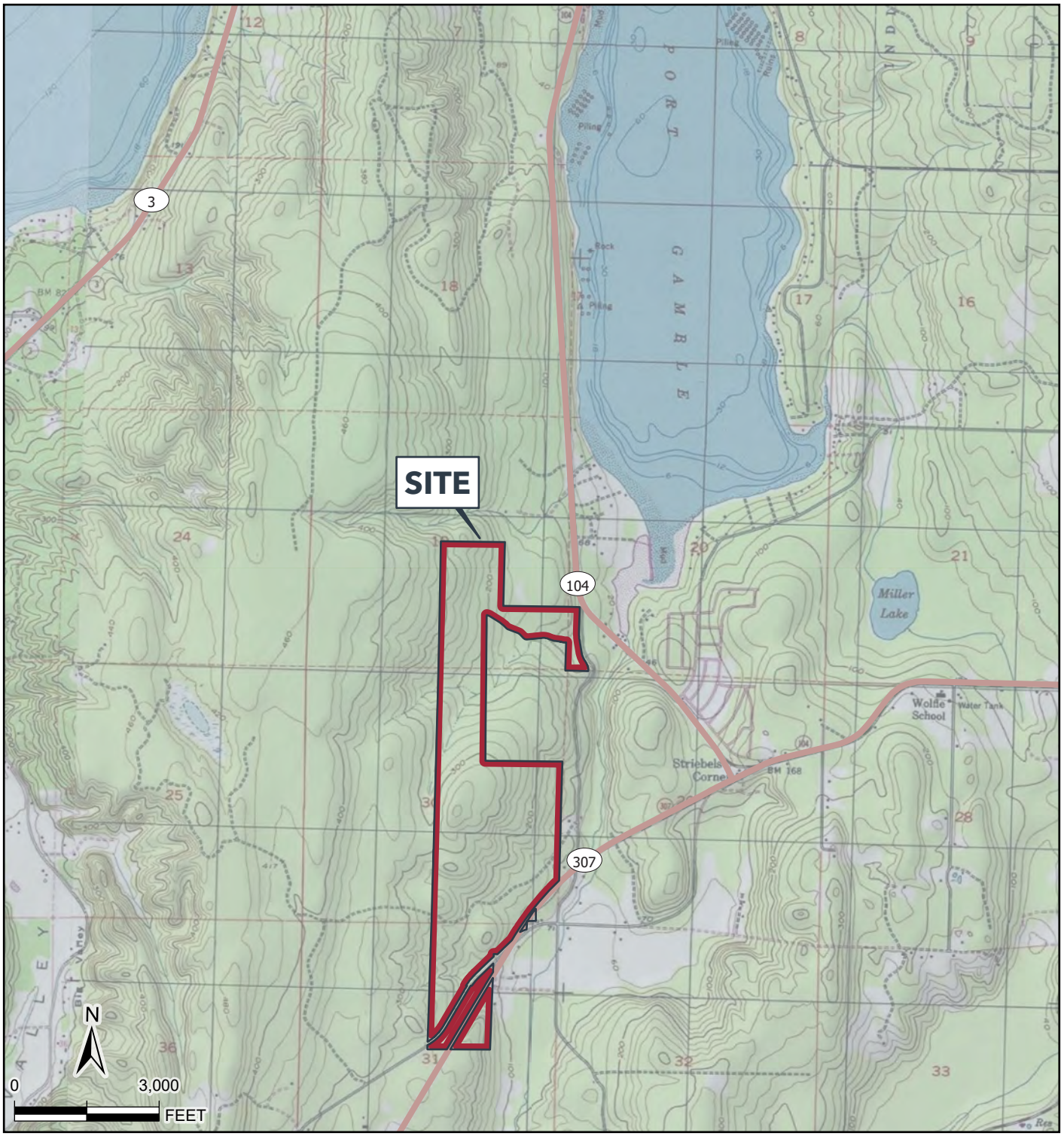
Sincerely,
ASSOCIATED EARTH SCIENCES, INC.
Kirkland, Washington

Dustin R. Williams, MSc, L.G., C.E.G., L.E.G.
Project Engineering Geologist

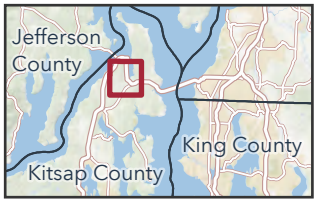
Jennifer H. Saltonstall, L.G., L.Hg.
Principal Geologist/Hydrogeologist

Matthew A. Miller, P.E.
Principal Geotechnical Engineer

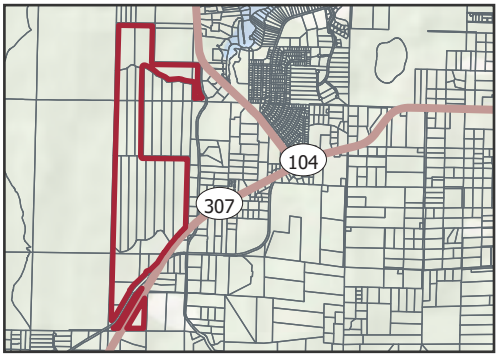
ATTACHMENTS



COUNTY LOCALE



LOCATION



ESRI, USGS, NATIONAL GEOGRAPHIC, DELORME, NATURALVUE, I-CUBED, GEBCO: ARCGIS ONLINE BASEMAP. WADOT STATE ROUTES 24K (12/20). KITSAP CO: PARCELS, ROADS (6/22). NOTE: LOCATION AND DISTANCES SHOWN ARE APPROXIMATE. BLACK AND WHITE REPRODUCTION OF THIS COLOR ORIGINAL MAY REDUCE ITS EFFECTIVENESS AND LEAD TO INCORRECT INTERPRETATION.

associated earth sciences incorporated

VICINITY MAP

NORTH KITSAP UNITED
KITSAP COUNTY, WASHINGTON

PROJECT NO.	DATE	FIGURE
20230264H001	11/23	1

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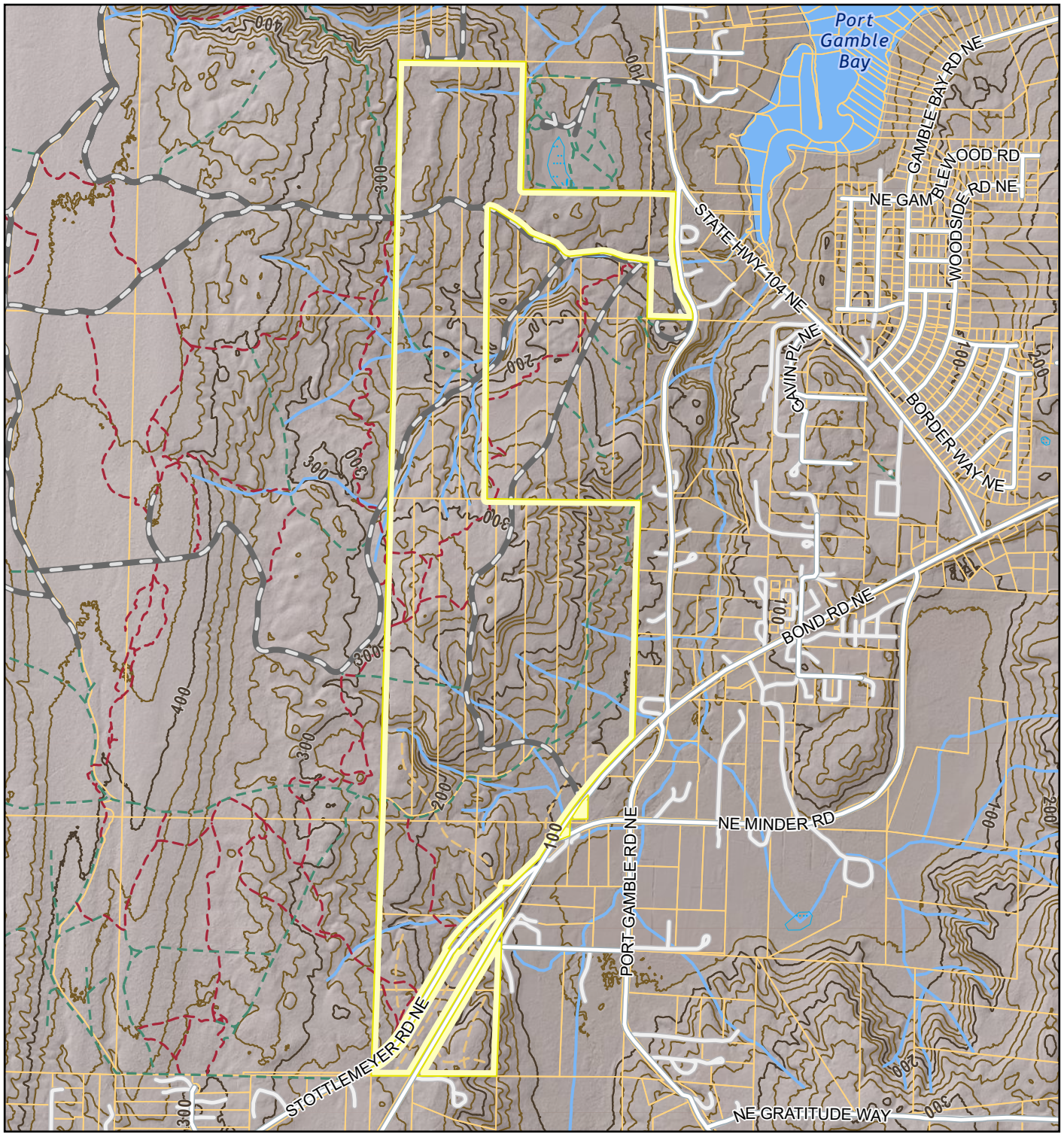

LEGEND

- SITE
- ROAD
- SERVICE ROAD
- FOOT PATH; TRAIL
- MOUNTAIN BIKE TRAIL
- TRAIL CLEARING 07/23
- PARCEL
- CONTOUR 100 FT
- CONTOUR 20 FT

DATA SOURCES/REFERENCES: KITSAP COUNTY: ROADS, PARCELS (6/22), OPENSTREETMAP: TRAILS (9/23) WA DOE: WATERBODIES (3/19), STREAMS (5/19). WA DNR LIDAR: KITSAP_COUNTY_OPSW_2018, ACQUIRED 12/17 & 2/18, 3' CELL SIZE. CONTOURS DERIVED FROM LIDAR.

N

0 1,500

FEET

LOCATION AND DISTANCES SHOWN ARE APPROXIMATE.

BLACK AND WHITE REPRODUCTION OF THIS COLOR ORIGINAL MAY REDUCE ITS EFFECTIVENESS AND LEAD TO INCORRECT INTERPRETATION.

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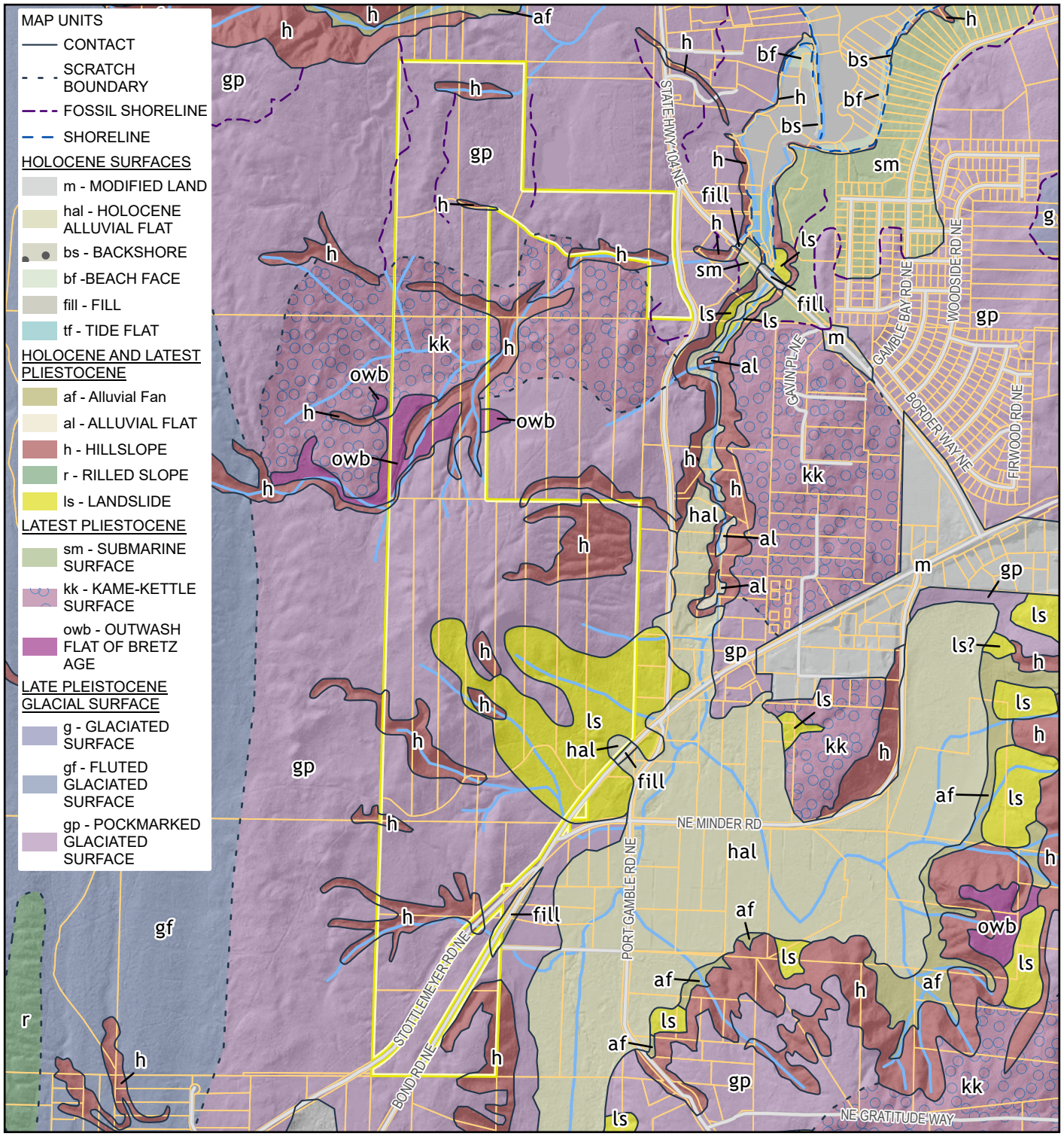
TOPOGRAPHY

NORTH KITSAP UNITED
KITSAP COUNTY, WASHINGTON

PROJECT NO.	DATE	FIGURE
20230264H001	11/23	2

G:\GIS_Projects\2023\230264 North Kitsap United_aprx\H001\20230264H001 F2 TOPO_NKU.aprx | 20230264H001 F2 TOPO_NKU | 2023-11-16 | nfink



LEGEND

SITE

PARCEL

N

0 1,500

FEET

LOCATION AND DISTANCES SHOWN ARE APPROXIMATE.

BLACK AND WHITE REPRODUCTION OF THIS COLOR ORIGINAL MAY REDUCE ITS EFFECTIVENESS AND LEAD TO INCORRECT INTERPRETATION.

DATA SOURCES/REFERENCES: USGS PRELIMINARY GEOMORPHIC MAP OF THE KITSAP PENINSULA, 2009. KITSAP COUNTY: ROADS, PARCELS (6/22), OPENSTREETMAP: TRAILS (9/23) WA DOE: WATERBODIES (3/19), STREAMS (5/19). WA DNR LIDAR: KITSAP_COUNTY_OPSW_2018, ACQUIRED 12/17 & 2/18, 3' CELL SIZE.

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GEOMORPHOLOGY

NORTH KITSAP UNITED
KITSAP COUNTY, WASHINGTON

PROJECT NO.	DATE	FIGURE
20230264H001	11/23	3

G:\GIS_Projects\20230230264 North Kitsap United_aprx\H001\20230264H001 F3 GeoMorph_NKU.aprx | 20230264H001 F3 Geomorph_NKU | 2023-11-16 | nflink

Obs. No.	Type	Description
1	Culvert	No Water
2	Stream	Stream To Port Gamble - Moderate Flow
3	Drainage	No Flow - Thick Vegetation
4	Culvert	No Flow
5	Drainage	No Flow
6	Culvert	No Flow
7	Culvert	No Flow
8	Drainage	No Flow
9	Culvert	No Flow
10	Drainage	No Flow - No Culvert Observed
11	Road Cut	Sand
12	Culvert	No Flow
13	Drainage	No Flow
14	Drainage	No Flow
15	Silty Sand	
16	Road Cut	Silty Sand (some Coarse Sand and Gravel)
17	Culvert	No Flow
18	Culvert	No Flow

LEGEND

- SITE
- EXPLORATION BORING MUD BAY GEOTECHNICAL 2020
- EXPLORATION PIT (TOTAL DEPTH)

FIELD OBSERVATION (10/23)

- CULVERT
- DRAINAGE
- ROAD CUT
- SILTY SAND
- STREAM
- ROAD
- SERVICE ROAD
- FOOT PATH; TRAIL
- MOUNTAIN BIKE TRAIL
- TRAIL CLEARING 07/23
- TRAILHEAD PARKING
- CROSS-SECTION

N

0 1,000

FEET

DATA SOURCES/REFERENCES:
KITSAP COUNTY: ROADS, PARCELS. WA DOE: WATERBODIES (3/19), STREAMS (5/19). WA DNR LIDAR: KITSAP_COUNTY_OPSW_2018, ACQUIRED 12/17 AND 2/18, 3' CELL SIZE. CONTOURS DERIVED FROM LIDAR. OPENSTREETMAP: SECONDARY ROADS AND TRAILS.

BLACK AND WHITE REPRODUCTION OF THIS COLOR ORIGINAL MAY REDUCE ITS EFFECTIVENESS AND LEAD TO INCORRECT INTERPRETATION. LOCATION AND DISTANCES SHOWN ARE APPROXIMATE.

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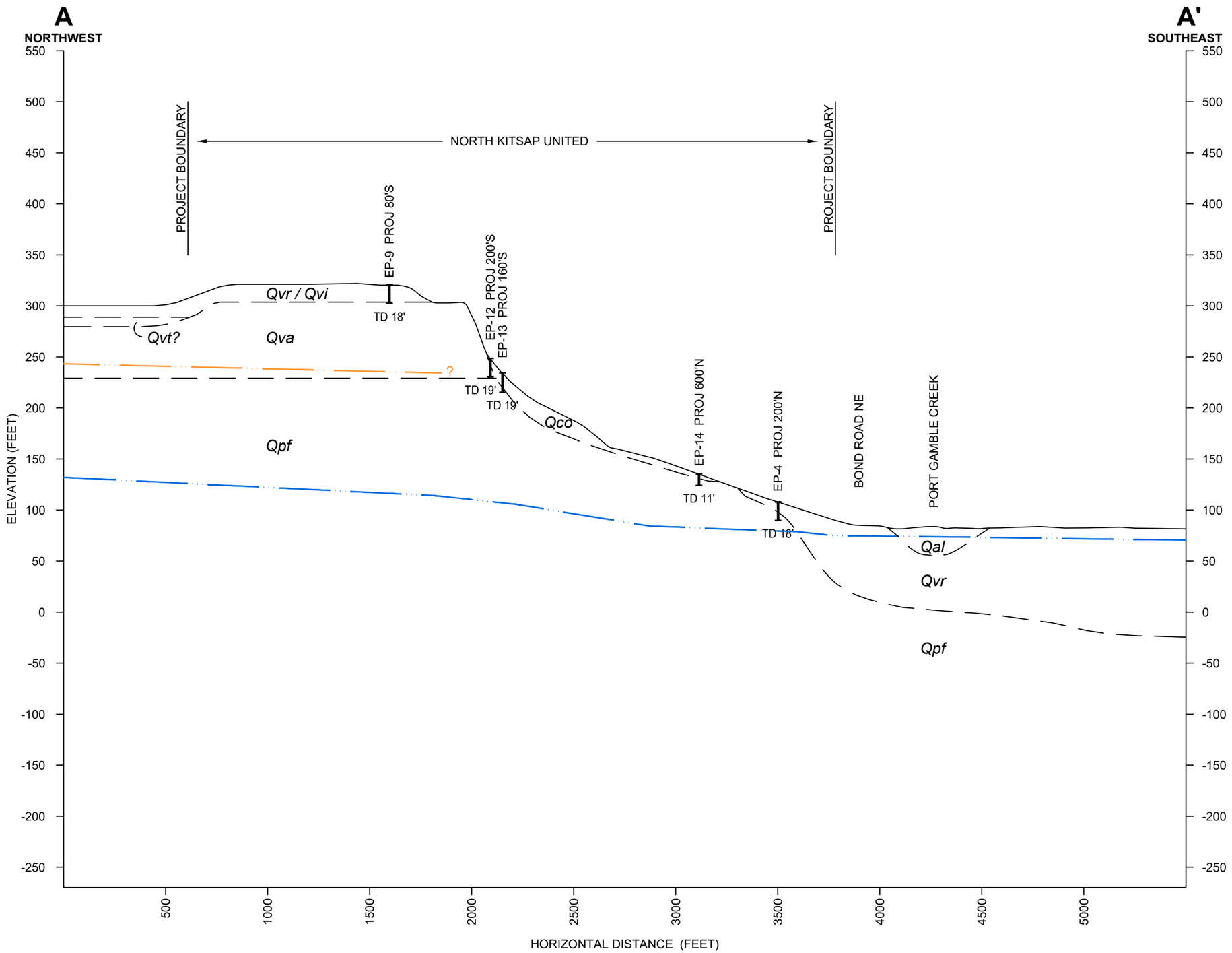
EXISTING SITE AND EXPLORATION PLAN

NORTH KITSAP UNITED
KITSAP COUNTY, WASHINGTON

PROJECT NO.	DATE	FIGURE
20230264H001	12/23	4

G:\GIS_Projects\20230264 North Kitsap United_aprx\H001\20230264H001 F4 ESsouth_NKU.aprx | 20230264H001 F4 ESsouth_NKU | 2023-12-06 | mtrop



LEGEND:

Qal	ALLUVIUM
Qco	COLLUVIUM
Qvr	VASHON RECESSIONAL OUTWASH
Qvi	VASHON ICE CONTACT
Qvt	VASHON LODGEMENT TILL
Qva	VASHON ADVANCE OUTWASH
Qpf	PRE-FRASER DEPOSITS

EXPLORATION

TD TOTAL DEPTH OF EXPLORATION

GEOLOGIC CONTACT

INFERRED GROUNDWATER ASSUMED FROM OFFSITE INFORMATION

POTENTIAL GROUNDWATER SURFACE BASED ON GEOLOGIC CONTACT AND OFFSITE INFORMATION

VERTICAL EXAGGERATION = 5X

NOTE: LOCATION AND DISTANCES SHOWN ARE APPROXIMATE

NOTES:

1. THE SUBSURFACE CONDITIONS PRESENTED IN THIS GEOLOGIC CROSS-SECTION ARE BASED ON AN INTERPRETATION OF CONDITIONS ENCOUNTERED IN WIDELY SPACED EXPLORATIONS COMPLETED AT THE SUBJECT SITE AND RELEVANT SITE INFORMATION DEVELOPED AND PROVIDED BY OTHERS. THE SUBSURFACE INTERPRETATIONS PRESENTED IN THIS GEOLOGIC CROSS-SECTION SHOULD NOT BE CONSTRUED AS A WARRANTY OF ACTUAL SUBSURFACE CONDITIONS AT THE SITE. OUR EXPERIENCE HAS SHOWN THAT SOIL AND GROUNDWATER CONDITIONS CAN VARY SIGNIFICANTLY OVER SMALL DISTANCES.

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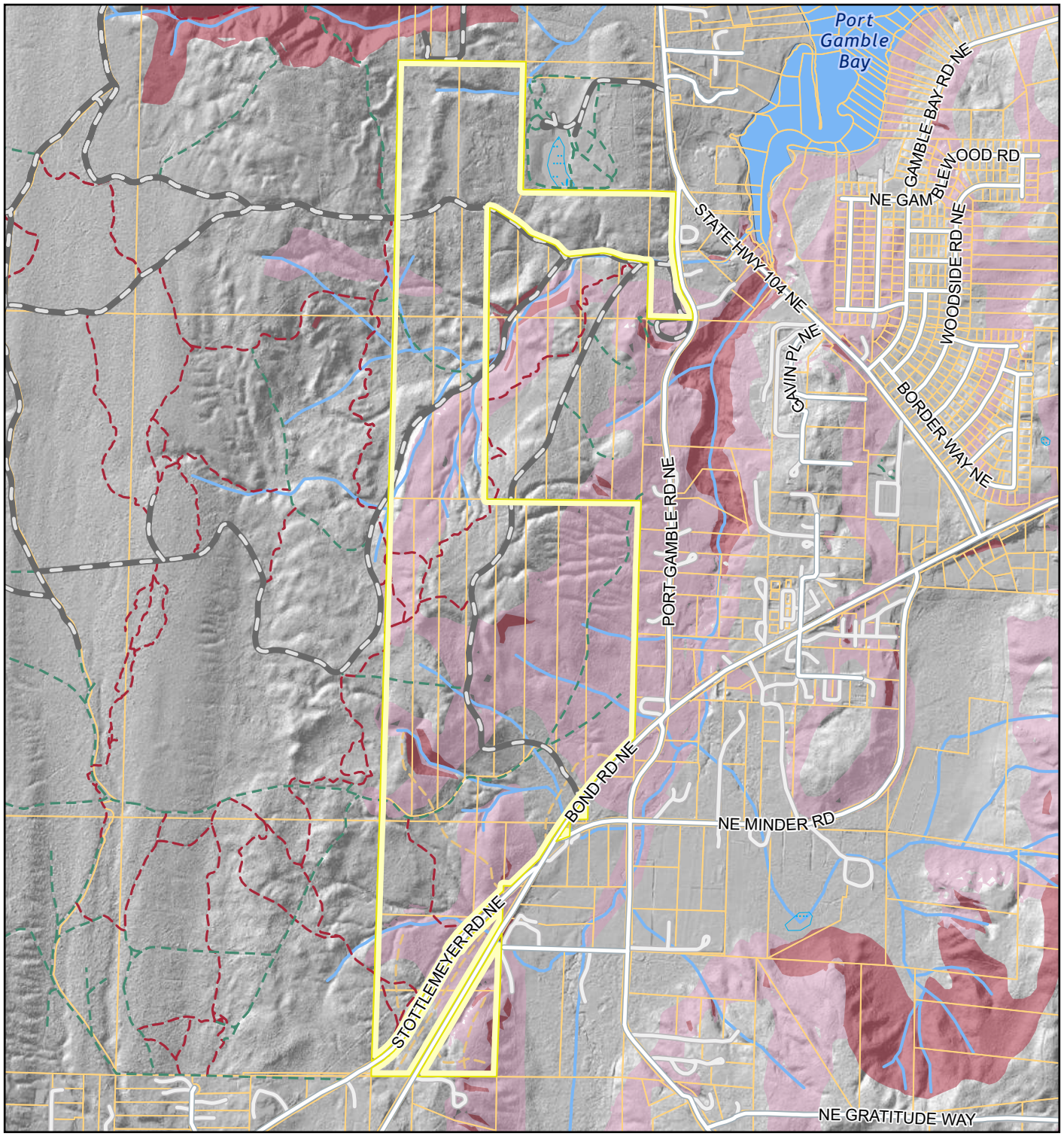
SCHEMATIC HYDROGEOLOGIC CROSS-SECTION A - A'

NORTH KITSAP UNITED
KITSAP COUNTY, WASHINGTON

PROJ NO.	DATE:	FIGURE:
20230264H001	12/23	5



LEGEND

- SITE
- ROAD
- SERVICE ROAD
- FOOT PATH; TRAIL
- MOUNTAIN BIKE TRAIL
- TRAIL CLEARING 07/23
- PARCEL

GEOLOGICALLY HAZARDOUS AREAS

- HIGH HAZARD AREA
- MODERATE HAZARD AREA

DATA SOURCES/REFERENCES: KITSAP COUNTY: GEOLOGICAL HAZARD AREAS 2ND EDITION (WEB), ROADS , PARCELS, PARKS (6/22), OPENSTREETMAP: TRAILS (9/23) WA DOE: WATERBODIES (3/19), STREAMS (5/19). WA DNR LIDAR: KITSAP_COUNTY_OPSW_2018, ACQUIRED 12/17 &

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FEET

LOCATION AND DISTANCES SHOWN ARE APPROXIMATE.

BLACK AND WHITE REPRODUCTION OF THIS COLOR ORIGINAL MAY REDUCE ITS EFFECTIVENESS AND LEAD TO INCORRECT INTERPRETATION.

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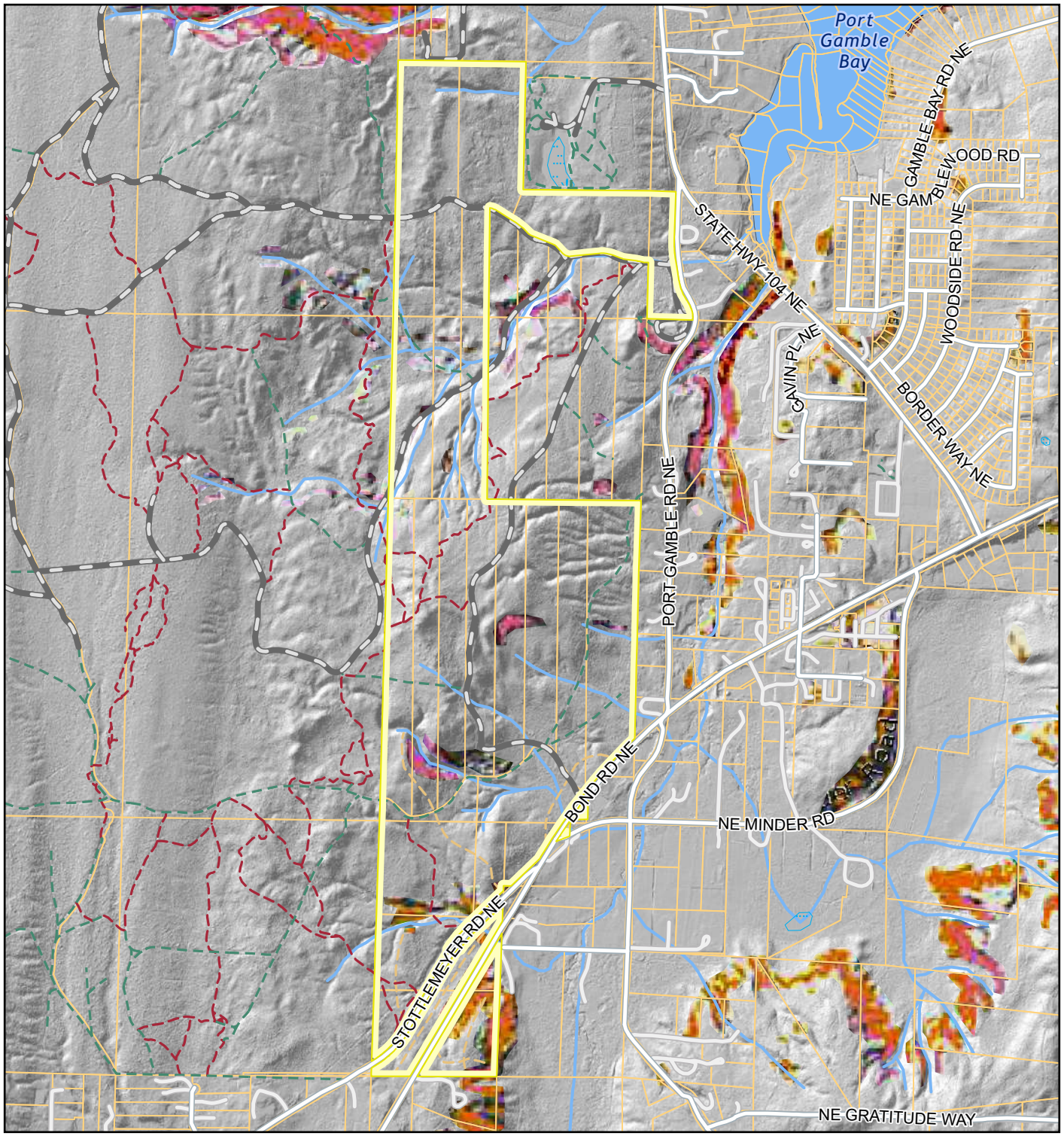
CRITICAL AREA EROSION

NORTH KITSAP UNITED
KITSAP COUNTY, WASHINGTON

PROJECT NO.	DATE	FIGURE
20230264H001	11/23	6

G:\GIS_Projects\20231230264 North Kitsap United_aprx\H001\20230264H001 F6 CAEro_NKU aprx | 20230264H001 F6 CAEro_NKU | 2023-11-16 | nflink



LEGEND

- SITE
- ROAD
- SERVICE ROAD
- FOOT PATH; TRAIL
- MOUNTAIN BIKE TRAIL
- TRAIL CLEARING 07/23
- PARCEL

DEEP LANDSLIDE HAZARD
- HIGH
- MODERATE

SHALLOW LANDSLIDE HAZARD
- HIGH
- MODERATE

DATA SOURCES/REFERENCES: KITSAP COUNTY: LANDSLIDE HAZARD PDF MAP (2/17), ROADS , PARCELS, PARKS (6/22), OPENSTREETMAP: TRAILS (9/23) WA DOE: WATERBODIES (3/19), STREAMS (5/19). WA DNR LIDAR: KITSAP_COUNTY_OPSW_2018, ACQUIRED 12/17&2/18, 3' CELL SIZE.

N

0 1,500

FEET

LOCATION AND DISTANCES SHOWN ARE APPROXIMATE.

BLACK AND WHITE REPRODUCTION OF THIS COLOR ORIGINAL MAY REDUCE ITS EFFECTIVENESS AND LEAD TO INCORRECT INTERPRETATION.

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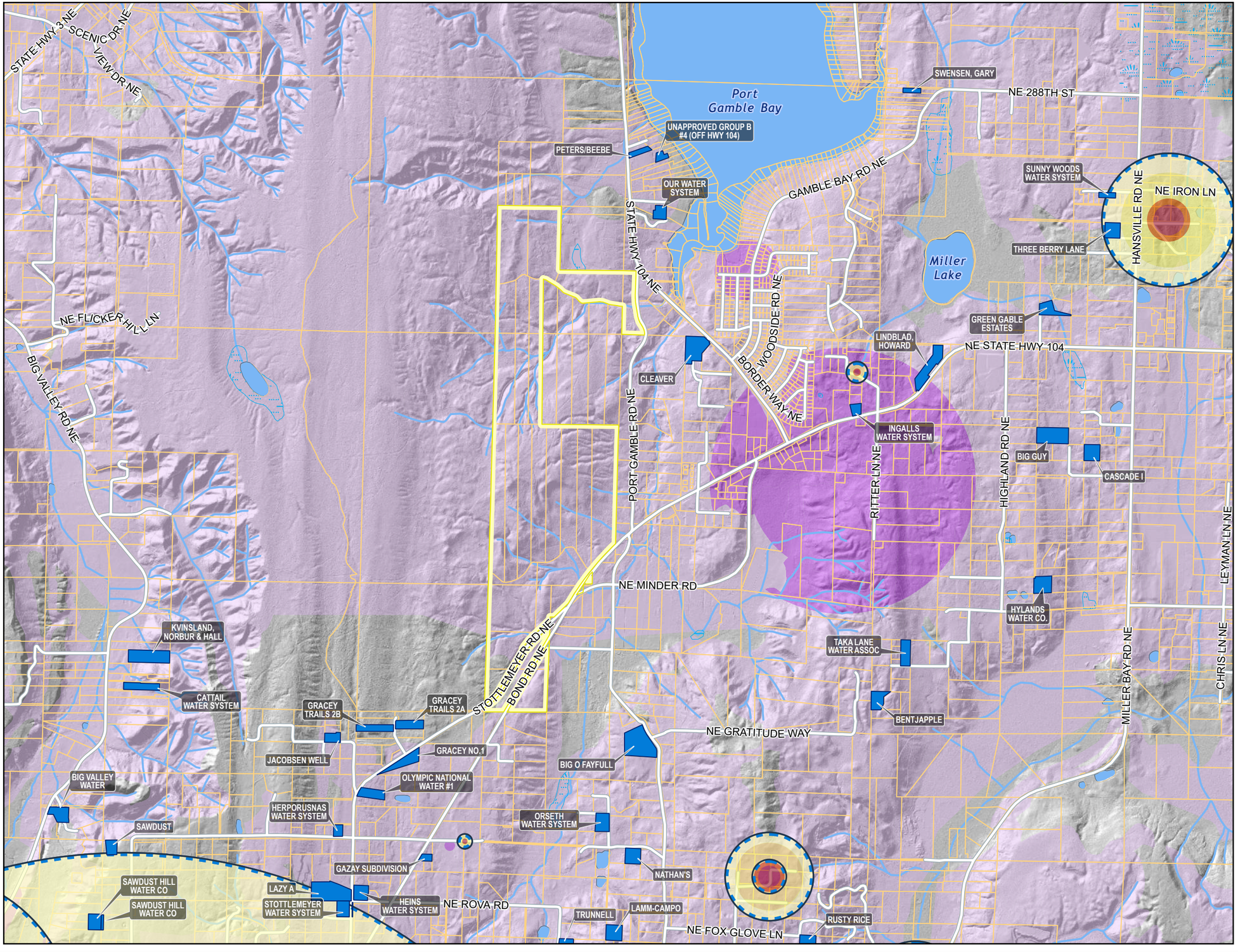
CRITICAL AREA LANDSLIDE

NORTH KITSAP UNITED
KITSAP COUNTY, WASHINGTON

PROJECT NO.	DATE	FIGURE
20230264H001	11/23	7

G:\GIS_Projects\2023\230264 North Kitsap United_aprx\H001\20230264H001 F7 CALs_NKU.aprx | 20230264H001 F7 CALs_NKU | 2023-11-16 | nflink



LEGEND

- SITE
- GROUP B WATER SYSTEMS

DOH WELLHEAD PROTECTION AREAS

- 10 YEAR TIME OF TRAVEL
- 5 YEAR TIME OF TRAVEL
- 1 YEAR TIME OF TRAVEL
- 6 MONTH TIMT OF TRAVEL

CRITICAL AQUIFER RECHARGE AREA

- CATEGORY I
- CATEGORY II
- PARCEL

N

0 2,000

FEET

DATA SOURCES/REFERENCES:
KITSAP COUNTY: CRITICAL AQUIFER RECHARGE AREAS (WEB), GROUP B WATER SYSTEMS (WEB) ROADS , PARCELS, PARKS (6/22), OPENSTREETMAP: TRAILS (9/23) WA DOE: WATERBODIES (3/19), STREAMS (5/19). WA DNR LIDAR: KITSAP_COUNTY_OPSW_2018, ACQUIRED 12/17 & 2/18, 3' CELL SIZE.

BLACK AND WHITE REPRODUCTION OF THIS COLOR ORIGINAL MAY REDUCE ITS EFFECTIVENESS AND LEAD TO INCORRECT INTERPRETATION. LOCATION AND DISTANCES SHOWN ARE APPROXIMATE.

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CRITICAL AQUIFER RECHARGE AREA

NORTH KITSAP UNITED
KITSAP COUNTY, WASHINGTON

PROJECT NO.	DATE	FIGURE
20230264H001	11/23	8

G:\GIS_Projects\2023\230264 North Kitsap United_aprx\H001\20230264H001 F8 CARA_NKU.aprx | 20230264H001 F8 CARA_NKU | 2023-11-16 | nfink

APPENDIX A

Exploration Logs

Coarse-Grained Soils - More than 50%[1] Retained on No. 200 Sieve	Gravels - More than 50%[1] of Coarse Fraction Retained on No. 4 Sieve	≤5% Fines[2]	GW	Well-graded gravel and gravel with sand, little to no fines
			GP	Poorly-graded gravel and gravel with sand, little to no fines
		≥12% Fines[2]	GM	Silty gravel and silty gravel with sand
			GC	Clayey gravel and clayey gravel with sand
	Sands - 50%[1] or More of Coarse Fraction Passes No. 4 Sieve	≤5% Fines[2]	SW	Well-graded sand and sand with gravel, little to no fines
			SP	Poorly-graded sand and sand with gravel, little to no fines
		≥12% Fines[2]	SM	Silty sand and silty sand with gravel
			SC	Clayey sand and clayey sand with gravel
Fine-Grained Soils - 50%[1] or More Passes No. 200 Sieve	Silts and Clays Liquid Limit Less than 50		ML	Silt, sandy silt, gravelly silt, silt with sand or gravel
			CL	Clay of low to medium plasticity; silty, sandy, or gravelly clay, lean clay
			OL	Organic clay or silt of low plasticity
	Silts and Clays Liquid Limit 50 or More		MH	Elastic silt, clayey silt, silt with micaceous or diatomaceous fine sand or silt
			CH	Clay of high plasticity, sandy or gravelly clay, fat clay with sand or gravel
			OH	Organic clay or silt of medium to high plasticity
Highly Organic Soils			PT	Peat, muck and other highly organic soils

Terms Describing Relative Density and Consistency

Coarse-Grained Soils	Density	SPT[3] blows/foot
	Very Loose	0 to 4
	Loose	4 to 10
	Medium Dense	10 to 30
	Dense	30 to 50
	Very Dense	>50

Fine-Grained Soils	Consistency	SPT[3] blows/foot
	Very Soft	0 to 2
	Soft	2 to 4
	Medium Stiff	4 to 8
	Stiff	8 to 15
	Very Stiff	15 to 30
	Hard	>30

Test Symbols

G = Grain Size
M = Moisture Content
A = Atterberg Limits
C = Chemical
DD = Dry Density
K = Permeability

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)

[4] Estimated Percentage

Component	Percentage by Weight
Trace	<5
Some	5 to <12
Modifier (silty, sandy, gravelly)	12 to <30
Very *modifier* (silty, sandy, gravelly)	30 to <50

Moisture Content

Dry - Absence of moisture, dusty, dry to the touch
Slightly Moist - Perceptible moisture
Moist - Damp but no visible water
Very Moist - Water visible but not free draining
Wet - Visible free water, usually from below water table

Symbols

Sampler Type and Description

- Blows/6" or portion of 6"
- Split-Spoon Sampler (SPT)
- California Sampler
- Ring Sampler
- Continuous Sampling
- Grab Sample
- Portion not recovered

Groundwater depth

- ATD At time of drilling
- Static water level (date)

- Cement grout surface seal
- Bentonite seal
- Filter pack with blank casing section
- Screened casing or Hydrotip with filter pack
- End cap

Classifications of soils in this report 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 D-2487 and D-2488 were used as an identification guide for the Unified Soil Classification System.

(1) Percentage by dry weight
(2) Combined USCS symbols used for fines between 5% and 12%
(3) (SPT) Standard Penetration Test (ASTM D-1586)
(4) In General Accordance with Standard Practice for Description and Identification of Soils (ASTM D-2488)

associated earth sciences incorporated

EXPLORATION LOG KEY

FIGURE: A1

associated earth sciences incorporated

Exploration Pit EP-1

North Kitsap United — Sheet: 1 of 1

Kitsap County, WA	Date: 10/26/2023	Logged By: DW
20230264E001	Total Depth (ft): 15	Approved By: JHS

Elev.: 145 ft NAVD88

Depth (ft)	Description	USCS
0	**Vashon Recessional Outwash** Loose, slightly moist, brown, silty, fine SAND, some medium sand, trace gravel; some rootlets (less than 1/2 inch in diameter) (SM).	
	Gradationally becomes gray and brown (weathered to 3.5 feet).	
2.5		
	Medium dense, slightly moist, gray with light brown mottling, silty, SAND, trace fine round gravel; massive (SM).	
5		
	Medium dense, slightly moist, light brownish gray, silty, SAND; thinly bedded with gradational contacts; few thin beds of fine to medium sand with gravel and sandy, silt (SM).	
7.5	Medium dense, slightly moist, brownish gray, fine SAND; mainly massive with faint laminations of mafic minerals (SP).	
	Heavy caving undermining materials above.	
10		
	Trace round gravel (less than 1 inch in diameter), rare granitic cobble, heavy caving.	
12.5		
	Pre-Fraser Fine Grained Sediments Dense, slightly moist, dark brownish gray, fine SAND, trace medium sand and round cobble; clasts of gray, silt with occasional laminations (SP/ML).	
15	No seepage. Heaving caving 9 to 12 feet.	
17.5		
20		

12/7/2023

20230264E001

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Exploration Pit EP-2

North Kitsap United — Sheet: 1 of 1

Kitsap County, WA	Date: 10/27/2023	Logged By: DW
20230264E001	Total Depth (ft): 16	Approved By: JHS

Elev.: 200 ft NAVD88

Depth (ft)	Description	USCS
0	**Vashon Advance Outwash**	
	Loose to medium dense, slightly moist, yellowish gray with brownish yellow mottling, silty, fine SAND, some round gravel (less than 1 inch in diameter); trace granitic cobble; abundant rootlets; some pinhole voids; moderately weathered (SM).	
2.5	Medium dense to dense, dry to slightly moist, grayish brown, silty, fine SAND; no rootlets or gravel observed; massive with zones of faint laminations (SM).	
5		
7.5	Dense, slightly moist, grayish brown, fine SAND, trace medium sand; discontinuous thin lenses (≈1 inch thick) of very fine sandy, silt; some oxidized beds (SP).	
	Rare boulder (≈24 inches).	
10		
	Dense, slightly moist, grayish brown, silty, fine SAND, trace medium sand, trace granitic gravel; pockets of oxidation; fragments of sandy, silt clasts (up to 6 inches in diameter) with oxidized rims; rare rootlets in clasts (SM).	
12.5		
	Pre-Fraser Fine Grained (?)	
15	Dense, moist, dark brownish gray, fine to medium SAND; massive with few lenses of oxidized fine sand (SP).	
	No seepage. No caving.	
17.5		
20		

12/7/2023

20230264E001

associated earth sciences incorporated

Exploration Pit EP-3

North Kitsap United — Sheet: 1 of 1

Kitsap County, WA	Date: 10/27/2023	Logged By: DW
20230264E001	Total Depth (ft): 10	Approved By: JHS

Depth (ft)	Description	USCS
	Elev.: 205 ft NAVD88	
0	Vashon Advance Outwash	
	Loose, slightly moist, light brown, silty, fine SAND, trace round gravel (less than 1/4 inch in diameter); some rootlets (SM).	
	Loose to medium dense, slightly moist, brownish gray, silty, fine SAND, some round gravel (SM).	
	Sand becomes fine to medium, no gravel.	
	Sand has gradationally become fine to medium, some gravel, decrease in fines.	
2.5	Medium dense to dense, slightly moist, gray, silty, fine SAND; wavy beds of fine sand dipping (5 to 10 deg) to the east; some beds of oxidized faint laminations (SM).	
5		
	Becomes dense; beds become thinner and less defined, zones (less than 3/4 inch thick) with some gravel.	
7.5		
	Dense, slightly moist, gray, silty, fine SAND; laminations of very fine sand and mafic minerals; rare pockets of fine gravel (SM).	
10	No seepage. No caving.	
12.5		
15		
17.5		
20		

12/7/2023

20230264E001

associated earth sciences incorporated

Exploration Pit EP-4

North Kitsap United — Sheet: 1 of 1

Kitsap County, WA	Date: 10/27/2023	Logged By: DW
20230264E001	Total Depth (ft): 18	Approved By: JHS

Elev.: 85 ft NAVD88

Depth (ft)	Description	USCS
0	**Vashon Recessional Outwash** Loose, slightly moist, light brown, silty, fine SAND, trace coarse sand; trace rootlets; thin lenses of soil; moderately weathered with pinhole voids (SM),	
	Gradational color change to gray with yellowish brown mottling.	
2.5	Medium dense, dry, light brownish gray, silty, fine SAND; trace rootlets; sequential beds (1 to 3 inches thick) of very fine to fine sand and fine to coarse sand with gravel (SM).	
	Dry dusty digging.	
5		
	Beds become thinner and less defined, zones (less than 3/4 inch thick) with some gravel.	
	Dense, dry, gray with light brownish gray mottling, silty, fine SAND; faint discontinuous oxidized lenses; trace rootlets (SM).	
7.5	**Pre-Fraser Fine Grained Sediments** Dense, slightly moist, dark brownish gray, fine SAND, trace subrounded to round gravel; rare mica; massive (SP).	
10		
12.5	Thin beds of fine sand with increased density.	
15	Lenses of gravel.	
	Slight increase in grain size.	
17.5	No seepage. No caving.	
20		

12/7/2023

20230264E001

associated earth sciences incorporated

Exploration Pit EP-5

North Kitsap United — Sheet: 1 of 1

Kitsap County, WA	Date: 10/27/2023	Logged By: DW
20230264E001	Total Depth (ft): 10	Approved By: JHS

Elev.: 115 ft NAVD88

Depth (ft)	Description	USCS
0	**Quaternary Colluvium** Loose to medium dense, slightly moist, light brown with orangish brown mottling, silty, fine SAND, trace rootlets; moderately weathered; trace pinhole voids; chaotic texture (SM).	
	Becomes slightly weathered, some gray coloring; decomposing organics.	
2.5	Medium dense, slightly moist, gray with brownish yellow mottling, silty, fine SAND; slight increase in pinhole void abundance; chaotic texture (SM).	
	Vashon Recessional Outwash Medium dense, slightly moist, gray, silty, very fine to fine SAND, some round gravel; increased rootlet abundance and pinhole voids (SM).	
5	Medium dense, dry, dark brownish gray, fine SAND; faint laminations within sand texture; thin oxidized beds of decreased grain size and increased density; rare boulder (16 inches) (SP).	
7.5	Medium dense, slightly moist, dark brownish gray, fine SAND; massive with few faint beds of fine to medium sand (SP).	
10	No seepage. No caving.	
12.5		
15		
17.5		
20		

12/7/2023

20230264E001

associated earth sciences incorporated

Exploration Pit EP-6

North Kitsap United — Sheet: 1 of 1

Kitsap County, WA	Date: 10/27/2023	Logged By: DW
20230264E001	Total Depth (ft): 11.5	Approved By: JHS

Depth (ft)	Description	USCS
	Elev.: 110 ft NAVD88	
0	**Vashon Recessional Outwash**	
	Loose, slightly moist, brown, silty, fine SAND, some round gravel (less than 1/4 inch diameter); some rootlets; moderately weathered (SM).	
	Medium dense, slightly moist, gray with yellowish brown mottling, silty, very fine to fine SAND; some roots (less than 1 inch in diameter); trace pinhole voids; massive (SM).	
2.5		
	Medium dense, dry, brownish gray, silty, fine SAND; few oxidized thin lenses; faint laminations in sand texture; minor caving (SM).	
5		
7.5	Medium dense, slightly moist, brownish gray, silty, fine SAND; few oxidized beds of finer sand (SM).	
10	Becomes gray, massive; minor caving.	
	No seepage. Minor caving 4 to 10 feet.	
12.5		
15		
17.5		
20		

12/7/2023

20230264E001

associated earth sciences incorporated

Exploration Pit EP-7

North Kitsap United — Sheet: 1 of 1

Kitsap County, WA	Date: 10/27/2023	Logged By: DW
20230264E001	Total Depth (ft): 17	Approved By: JHS

Elev.: 110 ft NAVD88

Depth (ft)	Description	USCS
0	**Vashon Advance Outwash** Medium dense to dense, slightly moist, gray with light gray and yellowish brown mottling, silty, fine SAND, trace gravel, some rootlets; trace pinhole voids (SM).	
2.5	Gradationally becomes gray, increased gravel abundance and size (less than 1 inch in diameter), pockets of very fine silty, sand with oxidized rims.	
	Pre-Fraser Fine and Coarse Grained Sediments Dense, slightly moist, dark brownish gray, fine to coarse SAND, some round gravel (less than 1 inch in diameter); faint laminations in sand texture (SM). Dense, slightly moist, gray, silty, very fine to fine SAND and stiff, slightly moist, gray, sandy, SILT (SM/ML).	
5	Stiff to very stiff, slightly moist, gray, silty, very fine SAND and sandy, SILT; faint wavy laminations (ML). Dense, slightly moist, dark brownish gray, silty, fine sand, trace gravel and cobble; massive (SM).	
7.5	Dense, slightly moist, dark brownish gray, fine SAND; massive with few thin oxidized beds (0.5 to 1 inch thick) of decreased grain size and silt (SP).	
10		
12.5	Dense, moist, dark brownish gray, gravelly, fine to coarse SAND, trace cobble; massive; some consolidated clasts; varying gravel abundance with depth (SW).	
15	Medium dense to dense, moist, dark grayish brown, silty, fine SAND, trace gravel; massive (SM).	
17.5	No seepage. No caving.	
20		

12/7/2023

20230264E001

associated earth sciences incorporated

Exploration Pit EP-8

North Kitsap United — Sheet: 1 of 1

Kitsap County, WA	Date: 10/27/2023	Logged By: DW
20230264E001	Total Depth (ft): 11.5	Approved By: JHS

Elev.: 97 ft NAVD88

Depth (ft)	Description	USCS
0	**Vashon Recessional Outwash** Loose to medium dense, slightly moist, grayish brown with orangish brown mottling, silty, fine SAND, trace medium sand and gravel; massive; slightly weathered; pockets of oxidation (SM).	
	Gradationally becomes gray, less weathered, slight increase in gravel abundance.	
2.5	Medium dense, slightly moist, brown, silty, very fine to fine SAND; massive; trace rootlets and pinhole voids (SM).	
	Gradational increase in sand grain size, becoming grayish brown, trace gravel.	
5	Medium dense, slightly moist, grayish brown, gravelly, fine to coarse SAND, some round gravel (less than 1/5 inches in diameter) (SM). Dense, dry, dark brownish gray, silty, fine to medium SAND, some coarse sand; massive with few lenses of varying gravel abundance (SM).	
7.5	Increased gravel abundance, fine to coarse sand, subround to round cobbles (up to 4 inches in diameter) and rare cobbles (up to 10 inches in diameter).	
	Varying coarse sand, gravel and cobble abundance to 10 feet.	
10		
	Pre-Fraser Fine Grained Dense, slightly moist, gray, fine SAND; massive with very faint laminations of mafic minerals (SP).	
	No seepage. No caving.	
12.5		
15		
17.5		
20		

12/7/2023

20230264E001

associated earth sciences incorporated

Exploration Pit EP-9

North Kitsap United — Sheet: 1 of 1

Kitsap County, WA	Date: 10/26/2023	Logged By: DW
20230264E001	Total Depth (ft): 18	Approved By: JHS

Elev.: ??? ft NAVD88

Depth (ft)	Description	USCS
0	**Fill, Undocumented** Loose, slightly moist, brown, silty, fine SAND, trace medium sand, some round gravel (up to 1 inch in diameter); some roots (up to 1 inch in diameter) (SM). Buried log.	
2.5	**Vashon Advance Outwash** Loose to medium dense, slightly moist, yellow and gray, silty, fine SAND, some rounded gravel (less than 1/2 inch in diameter); some rootlets and pinhole voids (SM). Becomes light gray with yellow mottles, massive with faint wavy texture.	
5	Becomes dense, fine sand with some rounded gravel (up to 1 inch in diameter), some rootlets, some faint oxidation around clasts, pockets of fine to medium sand.	
7.5	Sand becomes fine to medium grained.	
10	Dense, slightly moist, yellowish brown, silty, fine SAND; thin beds (≈1 inch thick) of dense oxidized fine sand; thin beds of fine to medium sand; minor caving (SM).	
12.5	Some round gravel and cobble. Dense, moist, light brown, fine to medium sand, trace gravel and cobbles; massive; till-like rip-up clasts (SP).	
15	Thin beds of fine sand with silt.	
17.5	Dense, moist, dark brownish gray, silty, fine SAND; stratified beds with faint cross bedding interbedded with fine-grained sand beds with no gravel (SM).	
20	No seepage. Minor caving 9 feet.	

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20230264E001

associated earth sciences incorporated

Exploration Pit EP-10

North Kitsap United — Sheet: 1 of 1

Kitsap County, WA	Date: 10/26/2023	Logged By: DW
20230264E001	Total Depth (ft): 18	Approved By: JHS

Depth (ft)	Description	USCS
	Elev.: 290 ft NAVD88	
0	Vashon Advance Outwash	
	Loose to medium dense, moist, reddish brown, silty, fine SAND, some roots and rootlets (up to 1/2 inch in diameter); massive (SM).	
2.5	Gradational color change to yellowish gray, trace subround to round gravel (≈1/4 inch in diameter); material faintly breaks along 45 deg structure, medium dense, trace subangular 3 inch granitic clasts.	
	Wavy thin beds of very fine to fine sand with silt.	
5		
	Dense, slightly moist, yellowish brown with yellowish gray mottling, silty, fine SAND, trace medium sand and fine round gravel; faint wavy laminations; few beds (1/2 to 1 inch thick) of dense oxidized silty, sand with downward coarsening sequence between beds (SM).	
7.5		
	Dense, slightly moist, yellowish brown, silty, fine SAND, trace gravel; faint laminations; slight downward coarsening sequences (SM).	
10		
	Operator calls out easy digging.	
	Massive, no gravel observed.	
12.5		
15		
	Slight decrease in sand grain size, slight increase in moisture, faint wavy laminations.	
17.5		
	No seepage. No caving.	
20		

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20230264E001

associated earth sciences incorporated

Exploration Pit EP-11

North Kitsap United — Sheet: 1 of 1

Kitsap County, WA	Date: 10/26/2023	Logged By: DW
20230264E001	Total Depth (ft): 18	Approved By: JHS

Elev.: 128 ft NAVD88

Depth (ft)	Description	USCS
0	Vashon Recessional (?) Outwash Loose, slightly moist, brown, silty, fine SAND, some round gravel (1/4 inch in diameter); abundant rootlets; trace roots (SM). Loose, slightly moist to moist, gray with brownish yellow mottling, silty, fine SAND, some fine round gravel; trace pinhole voids (SM).	
2.5	Gradationally becomes medium dense, slightly moist, less mottled, no gravel, no voids, trace rootlets, massive with few thin discontinuous oxidized lenses. Gradationally becomes gray.	
5	Medium dense, slightly moist, light brownish gray, fine SAND, some silt; massive with some faint laminations (SP-SM).	
7.5		
10	Medium dense, slightly moist, light brownish gray, silty, fine SAND; faint laminations; few thin beds of well graded sand; minor caving (SM).	
12.5	Medium dense, slightly moist, light brownish gray, silty, very fine to fine SAND; massive with rare sandy, silt bed (SM).	
15		
17.5	Trace fine gravel.	
	No seepage. Minor caving 10 feet.	
20		

12/7/2023

20230264E001

associated earth sciences incorporated

Exploration Pit EP-12

North Kitsap United — Sheet: 1 of 1

Kitsap County, WA	Date: 10/26/2023	Logged By: DW
20230264E001	Total Depth (ft): 19	Approved By: JHS

Elev.: 210 ft NAVD88

Depth (ft)	Description	USCS
0	**Quaternary Colluvium** Medium dense, slightly moist, light brown, silty, fine to medium SAND, some round gravel (less than 1/4 inch in diameter); some roots and rootlets (less than 1/2 inch in diameter); moderately weathered; coarsening downward (SM).	
2.5	**Vashon Advance Outwash** Medium dense, slightly moist, grayish brown, silty, fine to coarse SAND, some subround to round gravel (up to 3 inches in diameter); rootlets; continous bed around test pit (SM). No gravel, sand gradationally becomes very fine; increase in rootlet abundance to 3 feet.	
5	Medium dense to dense, slightly moist, gray with some yellowish gray, silty, fine SAND; massive (SM).	
7.5	Dense, slightly moist (increase from above), gray, fine SAND; laminated to thinly bedded and wavy beds (SM).	
10	Wavy beds, faint cross bedding, some cross cutting of cross bedding stratification, trace fine-grained mica.	
12.5	Dense, slightly moist, brownish gray, fine SAND; massive, decrease in silt abundance with depth (SP-SM).	
15		
17.5	Faint laminations.	
	No seepage. No caving.	
20		

12/7/2023

20230264E001

associated earth sciences incorporated

Exploration Pit EP-13

North Kitsap United — Sheet: 1 of 1

Kitsap County, WA	Date: 10/26/2023	Logged By: DW
20230264E001	Total Depth (ft): 19	Approved By: JHS

Elev.: 220 ft NAVD88

Depth (ft)	Description	USCS
0	**Quaternary Colluvium** Loose to medium dense, slightly moist, yellow, silty, fine SAND, trace round gravel (less than 1/4 inch in diameter); some roots and rootlets; buried organics; trace pinhole voids; pockets of stiff, gray, sandy, silt with gravel; faint chaotic texture (SM).	
2.5	Increased abundance of gray, sandy, silt with very fine sand, increased rootlet abundance.	
	Vashon Advance Outwash Dense, slightly moist, yellowish brown, silty, fine to coarse SAND, some fine gravel (SM).	
5	Becomes light gray, very fine sand; faint wavy laminations, trace thin oxidized beds.	
7.5	Dense, slightly moist, light gray, silty, very fine to fine SAND; faint wavy laminations; subvertical infilled fracture with oxidized planes; infilled with white very fine sand; healed fracture extends the length of the excavator bucket (SM).	
10	Dense, slightly moist, light gray, SILT and silty, very fine SAND; discontinuous thin oxidized lenses; increased material weight from above (ML-SM).	
12.5	Slight increase in sand grain size.	
15	Slight increase in moisture, trace thin dense beds (1.5 inches thick) with laminations.	
	Oxidized lenses.	
17.5	No seepage. No caving.	
20		

12/7/2023

20230264E001

associated earth sciences incorporated

Exploration Pit EP-14

North Kitsap United — Sheet: 1 of 1

Kitsap County, WA	Date: 10/27/2023	Logged By: DW
20230264E001	Total Depth (ft): 11	Approved By: JHS

Elev.: 118 ft NAVD88

Depth (ft)	Description	USCS
0	**Quaternary Colluvium** Medium dense, moist, grayish brown with gray mottling, silty, fine SAND, trace round gravel (less than 1 inch in diameter); pockets of organics; chaotic texture (SM).	
	Stiff, moist, gray with grayish brown mottling, sandy, SILT, some gravel (ML).	
	Pre-Fraser Fine Grained	
2.5	Medium dense, to dense, slightly moist, dark brownish gray, silty, fine SAND, trace round gravel (less than 1/2 inch thick in diameter); massive; few thin oxidized lenses of decreased sand grain size (SM).	
5		
7.5	Dense, slightly moist, dark brownish gray, fine to coarse SAND, some round gravel (less than 1 inch in diameter); moderate caving (SW).	
	Dense, slightly moist, dark brownish gray, gravelly, SAND, some subround to round gravel; trace cobble (SW).	
10	Dense, slightly moist, dark brownish gray, fine to medium SAND, trace coarse sand, trace subround to round gravel (less than 1.5 inches in diameter); massive; increased abundance of felsic minerals from above (SP).	
	No seepage. Moderate caving 7 feet.	
12.5		
15		
17.5		
20		

12/7/2023

20230264E001

Appendix C: Site Sensitive Areas Study

Sensitive Areas Study (Ecological Land Services)

CRITICAL AREAS RECONNAISSANCE

November 11, 2023

NK United
Kingston, Washington

Prepared for

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SIGNATURE PAGE

The information in this report was compiled and prepared under the supervision and direction of the undersigned.

Joanne Bartlett
Senior Biologist

TABLE OF CONTENTS

TABLES (IN TEXT)

FIGURES AND PHOTOPLATES

INTRODUCTION

Ecological Land Services, Inc. (ELS) completed this Critical Areas Reconnaissance Report for the NK United project proposed on 400 acres that borders the east side of the Port Gamble Heritage Park (PGHP). The 400 acres are comprised of 20 properties ranging in size from 19.77 acres to 33.18 acres (Kitsap County Tax Parcel Nos. **192702**-4-003-2001, -4-004-2000, -4-005-2009, -3-005-2008, **302702-1**-013-2000, -1-012-2002, -1-011-2006, **302702-4**-009-2000, -4-010-2007, -4-011-2006, -4-012-2005, 4-013-2004, -4-014-2003, -4-015-2002, -4-016-2001, -4-017-2000, and **312702-1**-022-2008, -1-004-2000, -1-023-2007, 1-024-2006). These properties are in Section 19, 30, and 31, Township 27 North, Range 2 East of the Willamette Meridian. ELS biologists conducted a series of site reconnaissance site visits on October 10, 12, 18, 19, and 24, 2023.

STUDY AREA DESCRIPTION

The roughly 400-acre study area is active forestland composed mostly of unharvested coniferous forest with large areas of harvested forested upland located west of Stottlemeyer Road on the south half and Port Gamble Road on the north half. The Port Gamble Heritage Park lies across the entire west edge of the study area (Figure 2). The topography is composed of a high ridge on the west side that slopes moderately down to the east (Figure 2). There are ravines and topographic troughs that have formed in the east slope that end at the east boundary of the study area (Figures 2, 2a, 2b, and 2c). The east end of the property is essentially the bottom of the bowl that forms the west side of the Gamble Creek Valley, which is primarily east of Bond Road (SR 307).

Logging and service roads provide access to most of the study area and are drivable to a certain degree. Many of these roads have become little more than hiking trails that cross these properties, and several are continuation of trails on the Port Gamble Heritage Park. The properties are oriented north to south beginning at residentially developed lots on the north adjacent properties and ending at the Stottlemeyer trailhead, which lies at the south end. The orientation lends the study area designation for discussion of onsite conditions (Figure 2). There are three smaller segments that include:

- North Segment is at the north end and is located on the west and north sides of the excluded parcels to be used as a sand mine (Figure 2a). This area is primarily composed of unharvested upland forest with harvested forest (harvested in 2018, 2022, and 2023) areas at the north end. This portion borders Port Gamble Road and there is a service road entering near the northeast corner. This road represents access to the harvested areas and will be used as access to the sand mine properties.
- Central Segment is as the name implies in the central portion of the study area (Figure 2b). It is located south of the excluded sand mine properties and is west of homes along Port Gamble Road. The southeastern portion borders Bond Road and is accessed via a service road that is gated to prevent unauthorized access. Most of this segment is also composed of unharvested forest with harvested forest (harvested in 2018) in the southeastern portion.
- South Segment is located at the south end and includes properties on both sides of Stottlemeyer Road and most of it is bordered by Bond Road on the east edge (Figure 2c). It includes an area east of Bond Road that is accessed from Stevens-Uhler Road. The trailhead to the Port Gamble Heritage Park is located on the east side of Stottlemeyer Road.

The trails in this segment cross mostly through unharvested forest with the area of harvested forest extending on the northeast corner where it is continuous with the harvested forest on the Central Segment.

METHODOLOGY

WETLAND IDENTIFICATION METHODOLOGY

The study area was evaluated for the presence of wetlands using the Routine Determination Method according to the U.S. Army Corps of Engineers' 1987 Wetland Delineation Manual and the Regional Supplement to the Corps of Engineers' Wetland Delineation Manual (Environmental Laboratory 1987); Western Mountains, Valleys, and Coast Region (Version 2.0) (Corps 2010). The Routine Determination Method and defining wetland criteria are discussed further in Appendix A. Wetlands are regulated as "Waters of the United States" by the U.S. Army Corps of Engineers (Corps) and as "Waters of the State" by the Washington Department of Ecology (Ecology), and locally by Kitsap County.

STREAM IDENTIFICATION METHODOLOGY

Streams are defined by the State of Washington as "…a) Any body of running water that moves under gravity to progressively lower levels, in a relatively narrow but clearly defined channel on the ground surface, in a subterranean cavern, or beneath or in a glacier and transports sediments and dissolved particles. b) A term used in quantitative geomorphology interchangeably with channel. c) A natural waterway that is defined as first to third order. d) (under the Shoreline Management Act) A naturally occurring body of periodic or continuous flowing water where: (1) The mean annual flow is greater than twenty cubic feet per second; and (2) The water is contained with a channel." (Anderson et. al. 2016).

The KCC title 19 defines a stream as an "…an area where surface water flow is sufficient to produce a defined channel or bed. Such areas demonstrate evidence of the passage of water and included but aren't limited to, bedrock channels, gravel beds, sand and silt beds, and defined-channel swales. The channel or bed need not contain water throughout the year to be considered a stream."

The stream identification methodology was conducted by examining conditions within the mapped streams to determine if there were characteristics bed and banks were present to indicate the action of waters are so common and usual, and so long continued in all ordinary years, as to mark upon the soil a character distinct from that of the abutting upland, in respect to vegetation. In essence, the presence of streams was determined by assessing three main criteria: 1) the presence or evidence of hydrology, 2) the soil, substrate, and/or geomorphological changes, and 3) changes in vegetation (Appendix B).

ELS conducted five site visits in October 2023 to ascertain whether streams were present within the areas mapped by various critical area mapping sources. Prior to conducting the site visit, ELS reviewed current and historic aerial photographs of the study area, and consulted online databases for soil, wetland, topography, priority habitat, and historic stream conditions. During the reconnaissance visits, ELS examined the mapped streams as well as the topographic indicators of potential streams across the study area. As part of the reconnaissance, data and photos were

collected in these locations to document conditions and confirm the absence of stream indicators including the lack of defined channels and banks, separated gravels indicating water flow, and dense upland plant species in each of the mapped streams. The data will be compiled onto data forms for the final report for the NK United project.

Reconnaissance Observations and Data Collection Overview

Vegetation

Unharvested Forest Areas

The forest that has not been harvested was dominated by Douglas fir (*Pseudotsuga menziesii*, FACU), western red cedar (*Thuja plicata*, FAC), western hemlock (*Tsuga heterophylla*, FACU), red alder (*Alnus rubra*, FAC), salmonberry (*Rubus spectabilis*, FAC), red elderberry (*Sambucus racemosa*, FACU), Oregon grape (*Mahonia nervosa*, FACU), salal (*Gaultheria shallon*, FAC), evergreen huckleberry (*Vaccinium ovatum*, FACU), holly (*Ilex aquifolium*, FACU), red huckleberry (*Vaccinium parvifolium*, FACU), sword fern (*Polystichum munitum*, FACU), stinging nettle (*Urtica dioica*, FAC), and trailing blackberry (*Rubus ursinus*, FACU). Most of the areas sampled within the unharvested forest were composed of bare ground beneath the dominant tree and/or shrub cover above. The vegetation dominance ranged from FAC to FACU with FACU species dominating throughout, including within the mapped stream areas. See Appendix A for plant indicator status definitions.

Harvested Forest Areas

The harvested areas were vegetated by a mixture of native and invasive plant species including Douglas fir saplings, salmonberry, scotch broom (*Cytisus scoparius*, FACU), red flowering currant (*Ribes sanguineum*, FACU), black cap (*Rubus leucodermis*, FACU), red huckleberry, bull thistle (*Cirsium vulgare*, FACU), hairy cat's ear (*Hypochaeris radicata*, FACU), common groundsel (*Senecio vulgaris*, FACU), sword fern, foxglove (*Digitalis purpurea*, FACU), fireweed (*Chamerion angustifolium*, FACU), trailing blackberry, Himalayan blackberry (*Rubus bifrons*, FAC), evergreen blackberry (*Rubus laciniatus*, FACU), velvet grass (*Holcus lanatus*, FAC), bedstraw (*Galium aparine*, FACU), pearly everlasting (*Anaphalis margaritacea*, FACU), wall lettuce (*Mycelis muralis*, NL), common nipplewort (*Lapsana communis*, FACU), bracken fern (*Pteridium aquilinum*, FACU), and lady fern (*Athyrium filix-femina*, FAC). These areas were dominated by similar species prior to the harvesting of the trees but had become dominated by a mixture of pioneer weed species along with native tree, shrub, and herbaceous species that were planted or recovering on their own. Most of the species in the harvested areas were species that grow predominantly within upland.

The vegetation data collected throughout the NK United study area revealed that there was no coverage by potential wetland plant species (OBL through FAC).

SOILS

The Natural Resources Conservation Service (NRCS) maps the soils within the study area as (NRCS 2023A; Figure 3). Table 1 provides an overview of the soil types mapped on the study area along with whether they are hydric and the segments in which they are present.

Table 1. Web Soil Survey Mapping

Soil Map Unit	Hydric?	North Segment	Central Segment	South Segment
28 Kitsap silt loam, 2 to 8 percent slopes	No	--	--	X
29 Kitsap silt loam, 8 to 15 percent slopes	No	--	X	--
40 Poulsbo gravelly sandy loam, 6 to 15 percent slopes	No	X	X	X
43 Poulsbo-Ragnar complex, 6 to 15 percent	No	X	--	--
44 Ragnar fine sandy loam, 0 to 6 percent slopes	No	X	X	--
45 Ragnar fine sandy loam, 6 to 15 percent slopes	No	X	--	X
46 Ragnar fine sandy loam, 15 to 30 percent slopes	No	X	X	X
47 Ragnar-Poulsbo complex, 15 to 30 percent slopes	No	X	--	X

- Kitsap formed on terraces from lacustrine depositions with volcanic ash in the upper part. Moderately well drained; depth to water table 18 to 30 inches.
- Poulsbo formed on terraces and moraines from basal till with volcanic ash in the upper part. They are moderately well drained with a water table between 12 and 30 inches below ground.
- Ragnar formed on terraces from glacial outwash with some volcanic ash in the upper part. Well drained; depth to water table more than 80 inches.
- Sinclair formed on till plains from basal till. Moderately well drained; depth to water table 18 to 29 inches.

These soil map units are not classified as hydric because they are moderately well to well drained and the depth to water table is below 18 inches. The soil data collected at the test plot locations within the ravines and mapped stream did not exhibit positive indicators for hydric soils.

HYDROLOGY

Streams are natural bodies of water that move under gravity to progressively lower layers and when periodic or continuous flowing water is present would exhibit a defined channel on the ground surface. A channel would also have sorted gravels and water flow would maintain openings in the culverts. Water was not present during the reconnaissance visits and there was no evidence of periodic flowing water based on the absence of defined channels, sorted gravels, and riparian plant communities.

CRITICAL AREA INVENTORIES[1]

NATIONAL WETLANDS INVENTORY

The U.S. Fish and Wildlife Services (USFWS) National Wetlands Inventory (NWI 2023) indicates a series of streams across the study area in the same locations and configuration as those indicated on Figure 2 (Figure 5). No wetlands were mapped along the streams or elsewhere on the properties, which was confirmed during the field reconnaissance field visits.

WASHINGTON STATE AND KITSAP COUNTY CRITICAL AREAS INVENTORIES

Table 2 lists the critical areas found in the three segments of NK United. The inventories were obtained from the websites of the Washington Department of Fish and Wildlife (2023), Washington State Department of Natural Resources (2023), Statewide Integrated Fish Distribution (2023), and the Kitsap County GIS Critical areas mapping (2023). The table lists streams and wetlands in each segment as mapped by the websites. As noted below, the Washington Department of Fish and Wildlife and Statewide Integrated Fish Distribution maps show the same streams, and the Washington Department of Natural Resources and Kitsap County maps show the same area of streams. None of the maps indicated wetlands. Maps obtained from each of these websites are provided in Appendix C.

Table 2. Critical Areas Mapping

	North Segment	Central Segment	South Segment
Washington Department of Fish and Wildlife Priority Habitats and Species			
Streams	Type N	Type F (mostly across the excluded properties)	None
Wetlands	None	None	None
Washington Department of Natural Resources, Forest Practices Mapping Application Tool			
Streams	None	Type F (2) Type N (2) Unknown* (3)	Type F (1) Type N (2) Unknown (1)
Wetlands	None	None	None
Statewide Integrated Fish Distribution			
Streams	None	Type F (same mapping as WDFW PHS map)	None
Wetlands	None	None	None

[1] The critical areas maps should be used with discretion because they are used to gather general wetland and stream information about a regional area and therefore are limited in accuracy for smaller areas because of their large scale.

	North Segment	Central Segment	South Segment
Kitsap County Critical Areas			
Streams	Type N	Type F (2) Type N (2) Unknown (3)	Type F (1) Type N (2) Unknown (1)
Wetlands	None	None	None

*Unknown streams are denoted on the maps as a dashed line or with a U.

CRITICAL AREAS RECONNAISSANCE SUMMARY

STREAMS

The critical areas maps obtained for this project including the Kitsap County GIS map indicate the presence of a number of streams within the study area. These streams have been mapped because the ravines that crosses eastern slopes of the study area. However, upon examination, none of these mapped streams met the definition of a stream in Kitsap County Code, Section 19.150.650[2]. During the reconnaissance, streams were not observed and are not present as mapped because:

- There were no defined-channel swales or defined banks in any of the ravines to indicate periodic water flow at any time of the year.
- There were no bedrock channels, gravel beds, or sand and silt beds observed within any of the mapped streams.
- The absence of water flow is further indicated by the culverts that are half filled with soil culverts under the onsite logging and service roads and Stottlemeyer Road.
- The mapped stream and topographic ravines contained dense groundcover vegetation that would not be present if there was water flow at any time of the year.
- The observation of no surface water channels or streams is consistent with the geologic investigation performed for the study area that have indicated the presence of highly permeable soils that quality the area as a critical aquifer recharge area.

A water type modification to remove the streams from the critical areas maps will be prepared as part of the next phase of the critical areas reconnaissance. The modification forms to be filled out will be reviewed by the Washington Department of Natural Resources, Washington Department of Fish and Wildlife, the Suquamish Indian Tribe, and Kitsap County Department of Community development. These agencies will conduct field visits to confirm the absence of the mapped streams.

WETLANDS

Wetlands were not observed on most of the study area because as revealed at the test plots, the vegetation was dominated by upland species (FACU to UPL), the soils did not exhibit hydric soil characteristics, and there was no hydrology or evidence of wetland hydrology. A single wetland was found in the north segment lying adjacent to a service road (Figure 2a). This wetland was not formally delineated but was determined to be a wetland because of the dominance by wetland plant

[2] KCC Section 19.150.600 stream definition "Streams mean those areas in Kitsap County where the surface water flows are sufficient to produce a defined channel or bed. A defined channel or bed is an area which demonstrates clear evidence of the passage of water and includes but is not limited to bedrock channels, gravel beds, sand and silt beds, and defined-channel swales. The channel or bed need not contain water year-round. This definition is not meant to include irrigation ditches, canals, storm or surface water runoff devices or other artificial watercourses unless they are used by fish or used to convey streams naturally occurring prior to construction.

species (OBL, FACW, and FAC) species. Hydrology was also observed within the wetland. The wetland will be delineated during the critical area delineation phase of the project. The absence of wetlands on the study area is also consistent with the geologic reconnaissance, which indicated the presence of highly permeable soils that facilitate percolation rather than detention/retention of water.

LIMITATIONS

ELS bases this report's determinations on standard scientific methodology and best professional judgment. In our opinion, local, state, and federal regulatory agencies should agree with our determinations. However, the information contained in this report should be considered preliminary and used at your own risk until it has been approved in writing by the appropriate regulatory agencies. ELS is not responsible for the impacts of any changes in environmental standards, practices, or regulations after the date of this report.

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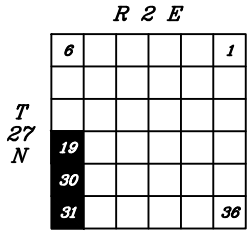
FIGURES AND PHOTOPLATES

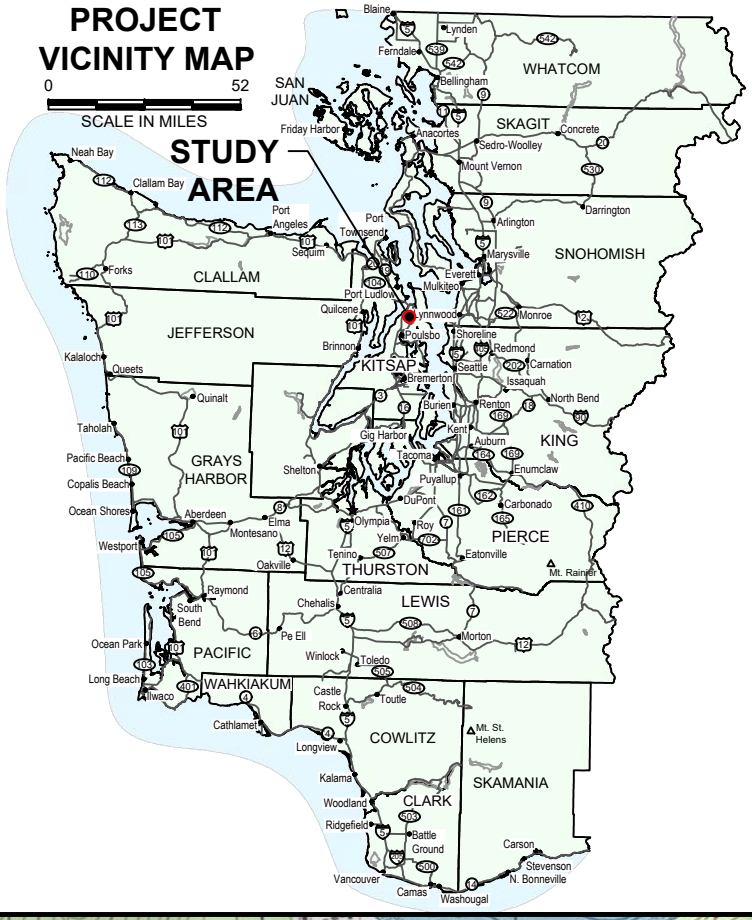
WASHINGTON

47.7999° Latitude
-122.5951° Longitude

LOCATION MAP



PROJECT VICINITY MAP



NOTE:
Quadrangle topographic map from USGS.

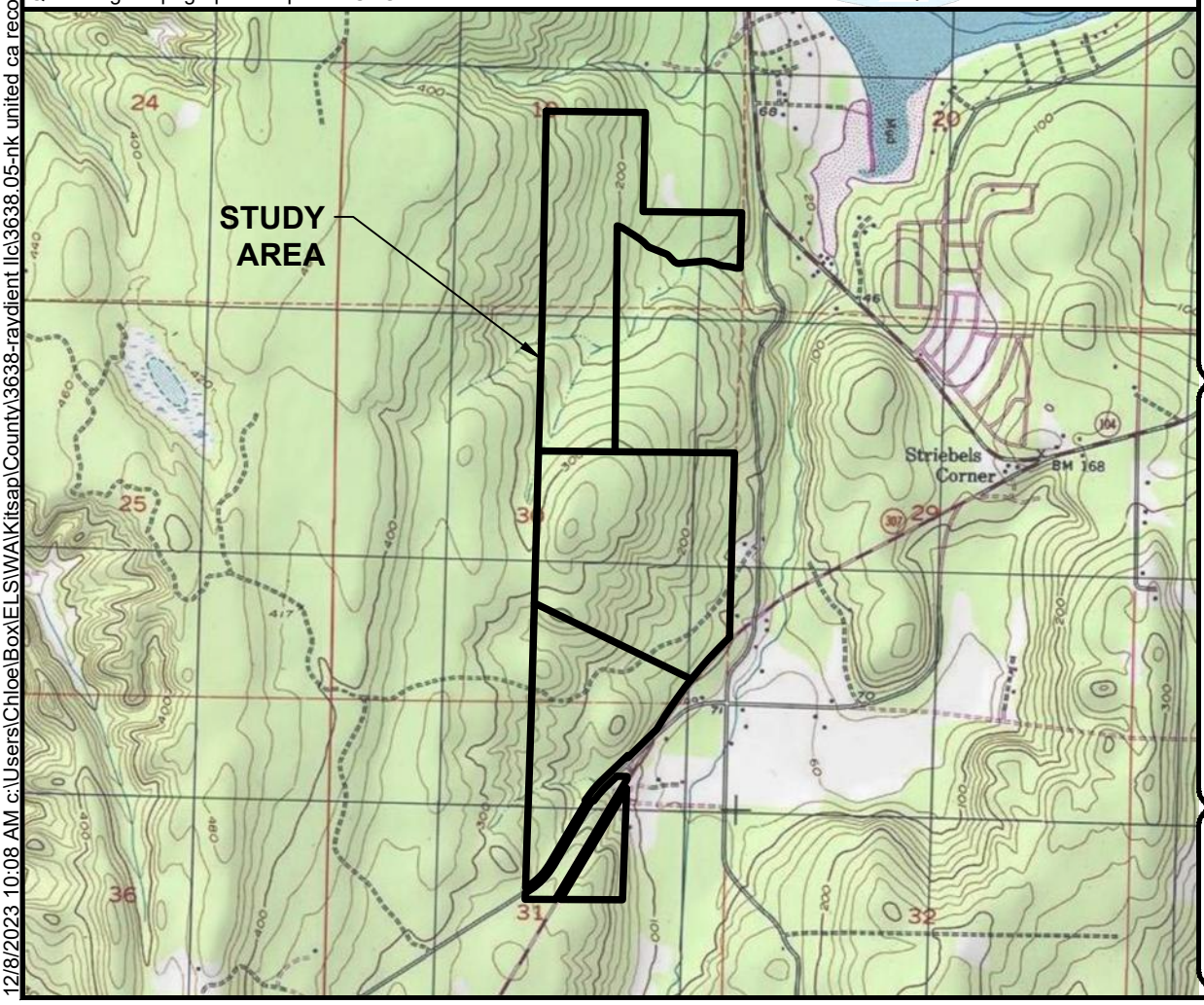


Figure 1
VICINITY MAP
Critical Areas Reconnaissance
Raydient/NK United
Kitsap County, Washington
Section 19, 30 & 31, Township 27N, Range 02E, W.M.

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REQ. BY: JB
PRJ. MGR: JB
CHK:
PROJECT NO: 3638.05

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North Segment
(Figure 2a)

Harvested:
10/24/23

Harvested:
2018

Harvested:
2022

Parcels
Not
Included

LEGEND:

- Study Area Boundary
- Parcel Boundary
- Mapped Type F Stream
- Mapped Type N Stream
- Mapped Unknown Feature
- Harvested Forest
- Tracked Path
- Parcels Not Included

Central
Segment
(Figure 2b)

South
Segment
(Figure 2c)

Harvested:
2018

NOTE(S):

1. Aerial from Google Earth™ (2021).
2. Parcel and Stream data from Kitsap County GIS.
3. Source documents depict streams but our field examination lead to the conclusion that there are no streams, as mapped, within the NK United Project area.

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Figure 2
EXISTING CONDITIONS - OVERALL
Critical Areas Reconnaissance
Raydient/NK United
Kitsap County, Washington
Section 19, 30 & 31, Township 27N, Range 02E, W.M.

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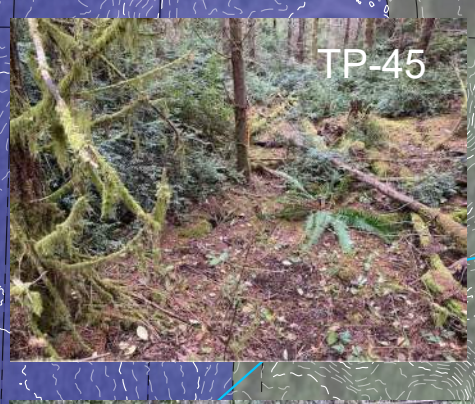
LEGEND:

- Study Area Boundary
- Parcel Boundary
- Mapped Type F Stream
- Mapped Type N Stream
- Mapped Unknown Feature
- Harvested Forest
- Tracked Path
- TP-1 Test Plot Location
- (1) Photopoint Location
- Collapsed Culvert
- Parcels Not Included

TP-43
TP-42
TP-41
PP
Harvested: 10/24/23
Harvested: 2018
Harvested: 2022
TP-44
TP-45
TP-46
TP-47
TP-51
TP-50
Forested Wetland
Trail, Typ
Parcels Not Included



NOTE(S):

1. Aerial from Google Earth™ (2021).
2. Wetland and test plots located using handheld GPS capable of submeter accuracy.
3. Parcel data from Kitsap County GIS.
4. Source documents depict streams but our field examination lead to the conclusion that there are no streams, as mapped, within the NK United Project area.

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Figure 2a
EXISTING CONDITIONS - NORTH SEGMENT
Critical Areas Reconnaissance
Raydient/NK United
Kitsap County, Washington
Section 19, 30 & 31, Township 27N, Range 02E, W.M.

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TP-50

TP-49
TP-48
TP-29
TP-30
TP-31
TP-32
TP-33
TP-34
TP-35
TP-36
TP-38
TP-28
TP-27
TP-26
TP-11
TP-10
TP-9
TP-8
TP-7
TP-6
TP-5
TP-4
TP-3
TP-2
TP-1
TP-39
TP-40

NOTE(S):
1. Aerial from Google Earth™ (2021).
2. Wetland and test plots located using handheld GPS capable of submeter accuracy.
3. Parcel data from Kitsap County GIS.
4. Source documents depict streams but our field examination lead to the conclusion that there are no streams, as mapped, within the NK United Project area.

LEGEND:
- Study Area Boundary
- Parcel Boundary
- Mapped Type F Stream
- Mapped Type N Stream
- Mapped Unknown Feature
- Harvested Forest
- Tracked Path
- TP-1 Test Plot Location
- (1) Photopoint Location
- Collapsed Culvert

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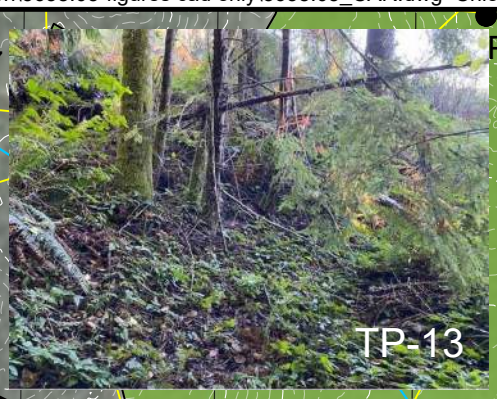
Figure 2b
EXISTING CONDITIONS - CENTRAL SEGMENT
Critical Areas Reconnaissance
Raydient/NK United
Kitsap County, Washington
Section 19, 30 & 31, Township 27N, Range 02E, W.M.



P-38

T

TP-11

TP-10

TP-9

TP-8

TP-4

TP-7

TP-5

TP-6

TP-3

TP-2

TP-1

TP-12

TP-13

LEGEND:

- Study Area Boundary
- Parcel Boundary
- Mapped Type F Stream
- Mapped Type N Stream
- Mapped Unknown Feature
- Harvested Forest
- Tracked Path
- TP-1 Test Plot Location
- 1 Photopoint Location
- Collapsed Culvert

TP-14

TP-15

TP-16

TP-16a

TP-18

TP-17

TP-20

TP-21

TP-22

TP-19

TP-23

TP-24

NOTE(S):

1. Aerial from Google Earth™ (2021).
2. Wetland and test plots located using handheld GPS capable of submeter accuracy.
3. Parcel data from Kitsap County GIS.
4. Source documents depict streams but our field examination lead to the conclusion that there are no streams, as mapped, within the NK United Project area.

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Figure 2c
EXISTING CONDITIONS - SOUTH SEGMENT
Critical Areas Reconnaissance
Raydient/NK United
Kitsap County, Washington
Section 19, 30 & 31, Township 27N, Range 02E, W.M.

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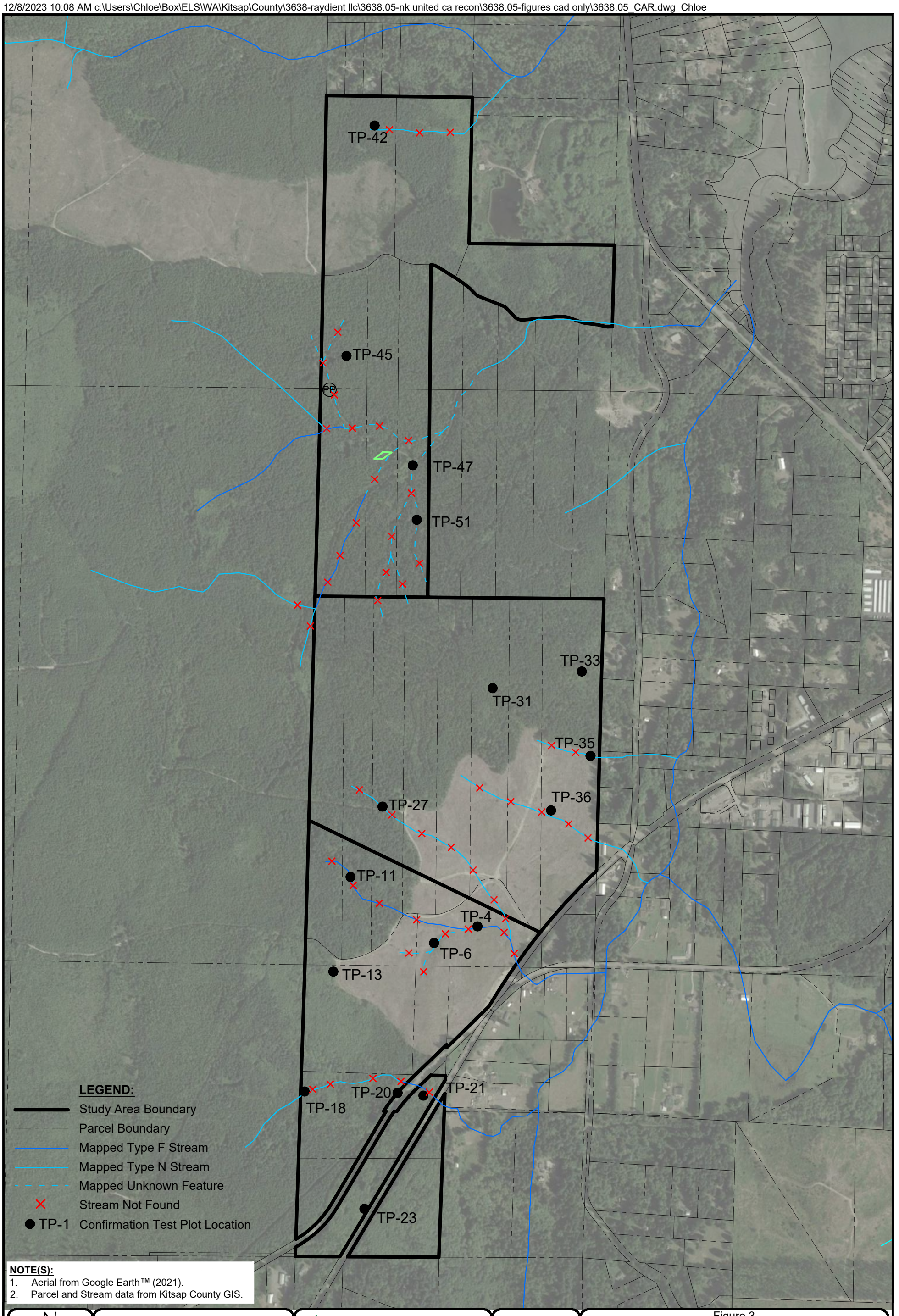

NOTE(S):
1. Aerial from Google Earth™ (2021).
2. Parcel and Stream data from Kitsap County GIS.

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Figure 3
CRITICAL AREAS RECONNAISSANCE RESULTS
Critical Areas Reconnaissance
Raydient/NK United
Kitsap County, Washington
Section 19, 30 & 31, Township 27N, Range 02E, W.M.

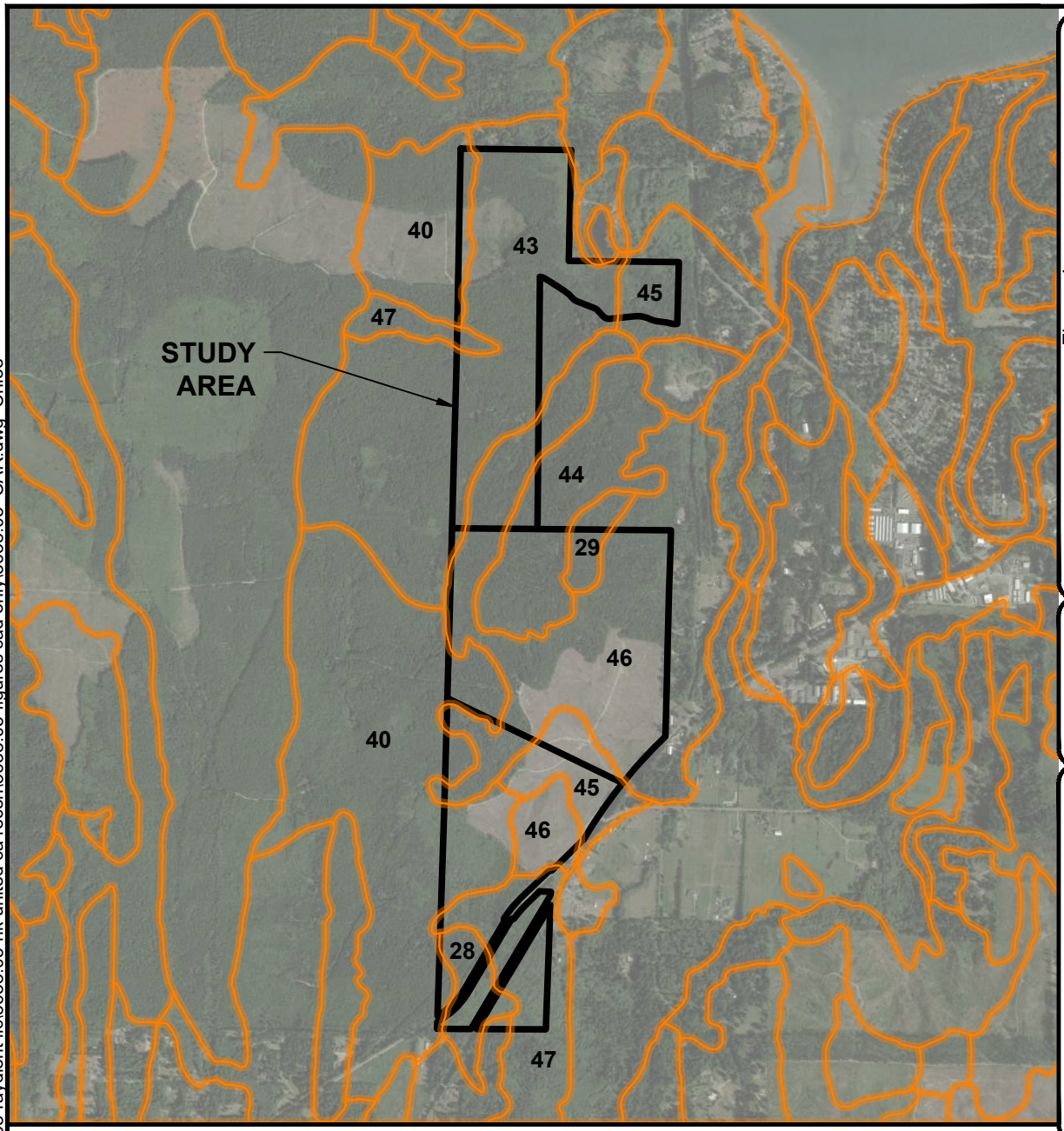

Figure 4
NRCS SOIL SURVEY
Critical Areas Reconnaissance
Raydient/NK United
Kitsap County, Washington
Section 19, 30 & 31, Township 27N, Range 02E, W.M.

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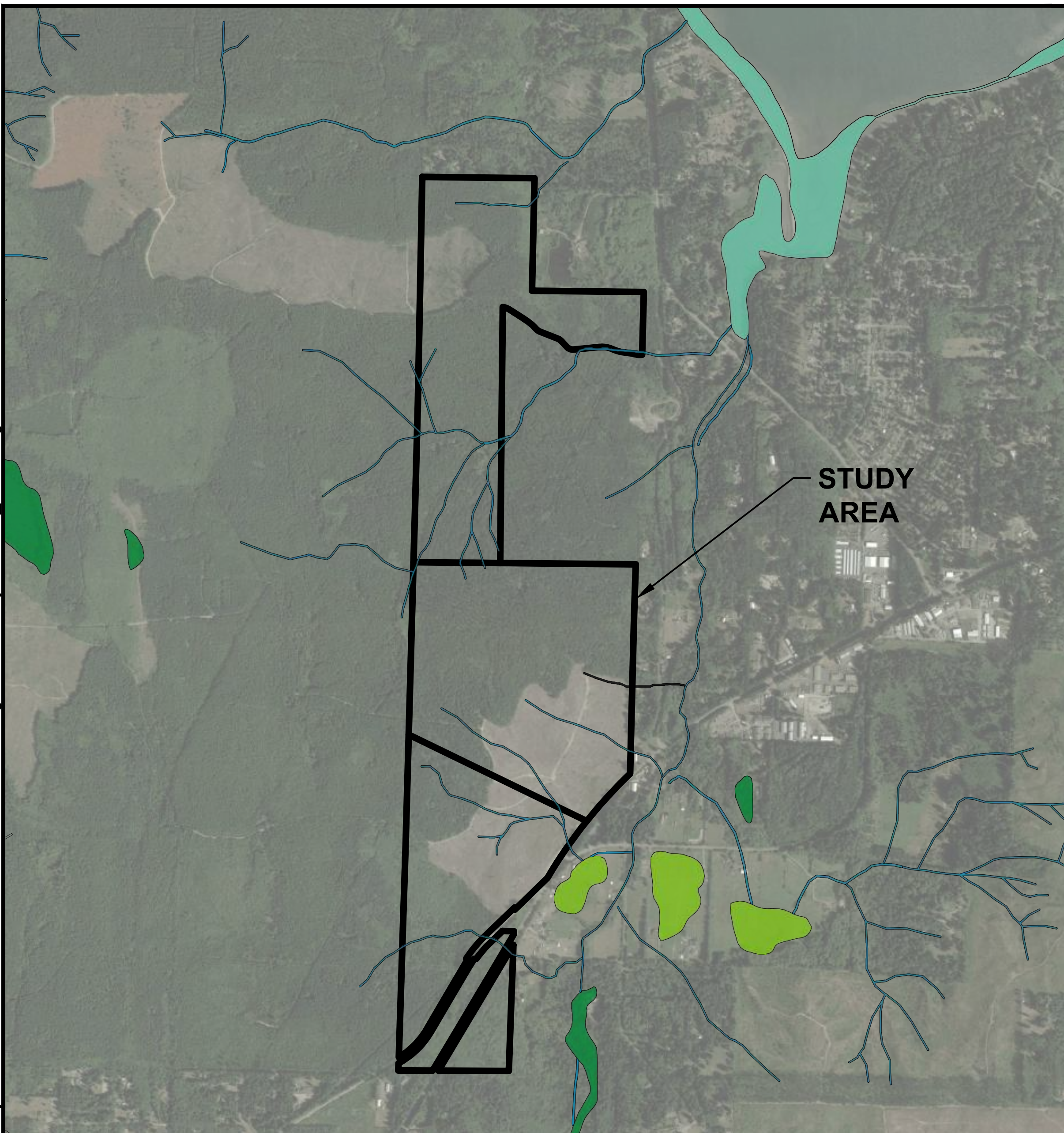
LEGEND:

- Study Area Boundary
- NRCS Soil Boundary

28	Kitsap silt loam, 2 to 8 percent slopes. Not hydric.
29	Kitsap silt loam, 8 to 15 percent slopes. Not hydric.
40	Poulsbo gravelly sandy loam, 6 to 15 percent slopes. Not hydric.
43	Poulsbo-Ragnar complex, 6 to 15 percent slopes. Not hydric.
44	Ragnar fine sandy loam, 0 to 6 percent slopes. Not hydric.
45	Ragnar fine sandy loam, 6 to 15 percent slopes. Not hydric.
46	Ragnar fine sandy loam, 15 to 30 percent slopes. Not hydric.
47	Ragnar-Poulsbo complex, 15 to 30 percent slopes. Not hydric.

NOTE(S):
1. Map provided on-line by NRCS at web address: *http://websoilsurvey.nrcs.usda.gov/app/*



LEGEND:

Study Area Boundary

Wetlands

- Estuarine and Marine Deepwater
- Estuarine and Marine Wetland
- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond
- Lake
- Other
- Riverine

NOTE(S):

1. Map provided on-line by US Fish & Wildlife Service at web address: *https://www.fws.gov/program/national-wetlands-inventory/wetlands-mapper*

Figure 5
USFWS NATIONAL WETLANDS INVENTORY
Critical Areas Reconnaissance
Raydient/NK United
Kitsap County, Washington
Section 19, 30 & 31, Township 27N, Range 02E, W.M.

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Photo 1-Test Plot 3 within the lower end of mapped stream in South Segment. No stream channel this location.

Photo 2-Test Plot 3 looking east toward Bond Road/SR 307 along the mapped stream.

Photo 3-Test Plot 8 in the middle segment of the mapped stream within the South Segment. Upland vegetation and no stream channel.

Photo 4-Test Plot 8 looking upslope and west along the mapped stream. No stream channel and presence of upland vegetation.

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Photoplate 1-Test Plots 3 and 8
Critical Areas Reconnaissance
NK United /Raydient
Poulsbo, Washington

Photo 5-Test Plot 11 conducted in southernmost mapped stream in South Segment. No stream observed**.**

Photo 6-Test Plot 11 looking east down the ravine in which the stream is mapped. Dense ferns throughout and no channel observed**.**

Photo 7-Test Plot 18 located at the western extent of the onsite stream in South Segment. Bare ground but no channel observed.

Photo 8-Test Plot 18 looking east down the sloping ravine. No stream channel or evidence of water flow.

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Photoplate 2-Test Plots 11 and 18
Critical Areas Reconnaissance
NK United /Raydient
Poulsbo, Washington

Photo 9-Test Plot 20 conducted at the east end of a ravine parallel to Stottlemeyer Road. Not mapped as a stream and none observed.

Photo 10-Test Plot 20 looking north toward culvert under Stottlemeyer Road. Bare ground with no evidence of water flow.

Photo 11-Test Plot 21 (east of Stottlemeyer Road) in the southernmost stream in South Segment. Along path cleared for easy access.

Photo 12-Test Plot 21 looking east toward Bond Road (SR 307). Dense vegetation with no channel observed within the mapped area.

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PROJ.#: 3638.05

Photoplate 3-Test Plots 20 and 21
Critical Areas Reconnaissance
NK United /Raydient
Poulsbo, Washington

Photo 13-Test Plot 35 in the mapped stream at northern edge of harvested forest within the Central Segment.

Photo 14-Test Plot 35 looking downslope and easterly along mapped stream.

Photo 15-Test Plot 38 in topographic trough where stream is mapped. No channel observed and no evidence of water flow.

Photo 16-Test Plot 38 looking southeasterly down the topographic trough. No stream channel or evidence of water flow.

Ecological Land Services

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PROJ.#: 3638.05

Photoplate 4-Test Plots 35 and 38
Critical Areas Reconnaissance
NK United /Raydient
Poulsbo, Washington

Photo 17-Test Plot 30 located within a ravine where a stream has not been mapped. No stream or evidence of water flow observed.

Photo 18-Test Plot 30 looking downslope and easterly within the topographic trough.

Photo 19-Test Plot 44 in topographic trough with no mapped stream. Downslope of a large slash pile within the trough.

Photo 20-Test Plot 44 looking downslope and north into trough. No stream or water flow indicators present.

Ecological Land Services

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DATE: 11/10/23
DWN: JB
PRJ. MGR: JB
PROJ.#: 3638.05

Photoplate 5-Test Plots 30 and 44
Critical Areas Reconnaissance
NK United /Raydient
Poulsbo, Washington

Photo 21-Photo Point 5 looking east to document site conditions. A stream was not observed within this area.

Photo 22 Photo Point 5 south looking downslope where there is dense vegetation cover not indicative of stream conditions.

Photo 23-Photo Point 10 is located along a topographic trough that lies west of Stottlemeyer Road. Non mapped stream/no stream.

Photo 24-Photo Point 10 west shows another area of the topographic trough where no stream was observed during the 10/23 site visits.

Ecological Land Services

1157 3rd Ave., Suite 220A
Longview, WA 98632
Phone: (360) 578-1371
Fax: (360) 414-9305

DATE: 11/10/23
DWN: JB
PRJ. MGR: JB
PROJ.#: 3638.05

Photoplate 6-Photo Points 5 and 10
Critical Areas Reconnaissance
NK United /Raydient
Poulsbo, Washington

Photo 25-Photo Point 13 looking north along a topographic trough at the northern tip of South Segment between Stottlemeyer and Bond Roads.

Photo 26 Photo Point 13 looking south along the low area along Bond Road.

Photo 27-Photo Point 18 looks easterly down a topographic trough where no stream was mapped in the Central Segment.

Photo 28-Photo Point 18 looks westerly up the topographic trough across the north end of the Central Segment. No stream observed.

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Photoplate 7-Photo Points 13 and 18
Critical Areas Reconnaissance
NK United /Raydient
Poulsbo, Washington

Photo 29-Photo Point 13 looking north along a topographic trough at the northern tip of South Segment between Stottlemeyer and Bond Roads.

Photo 30 Photo Point 13 looking south along the low area along Bond Road.

Photo 31-Photo Point 18 looks easterly down a topographic trough where no stream was mapped in the Central Segment.

Photo 32-Photo Point 18 looks westerly up the topographic trough across the north end of the Central Segment. No stream observed.

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PROJ.#: 3638.05

Photoplate 8-Photo Points 13 and 18
Critical Areas Reconnaissance
NK United /Raydient
Poulsbo, Washington

Photo 33-Shows the inlet of the culvert under Stottlemeyer Road, which is at the end of the non mapped stream just west of the road.

Photo 34 shows the culvert under Bond Road in the upland between Bond and Stottlemeyer Roads in the south segment.

Photo 35 shows the culvert under Bond Road at the north end of the South Segment.

Photo 36 shows a culvert under one of the service road. It appears that the culvert was installed during construction of logging roads.

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DWN: JB
PRJ. MGR: JB
PROJ.#: 3638.05

Photoplate 9-Culverts
Critical Areas Reconnaissance
NK United /Raydient
Poulsbo, Washington

APPENDIX A

ROUTINE DETERMINATION METHOD AND PLANT INDICATOR RATING DEFINITIONS

Routine Determination Method

The Routine Determination Method is defined according to the U.S. Army Corps of Engineers' 1987 *Wetland Delineation Manual* and the *Regional Supplement to the Corps of Engineers' Wetland Delineation Manual* (Environmental Laboratory 1987)*; Western Mountains, Valleys, and Coast Region (Version 2.0)* (Corps 2010). The Routine Determination Method examines three parameters – vegetation, soils, and hydrology – to determine if wetlands exist in a given area. Hydrology is critical in determining what is a wetland, but if often difficult to assess because hydrologic conditions can change periodically (hourly, daily, or seasonally). Consequently, it is necessary to determine if hydrophytic vegetation and hydric soils are present, which would indicate that water is present for a long enough duration to support a wetland plant community. By definition, wetlands are those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions.

Vegetation Indicator Status

The indicator status, following the scientific names of plant species, indicates the likelihood of the species to be found in wetlands according to the *National Wetland Plant List Indicator Rating Definitions* (Corps 2012). Listed from most likely to least likely to be found in wetlands, the indicator status categories are:

- **OBL** (obligate wetland) - occur almost always under natural conditions in wetlands.
- **FACW** (facultative wetland) - usually occur in wetlands, but occasionally found in non-wetlands.
- **FAC** (facultative) - equally likely to occur in wetlands or non-wetlands.
- **FACU** (facultative upland) - usually occur in non-wetlands, but occasionally found in wetlands.
- **UPL** (obligate upland) - occur almost always under natural conditions in non-wetlands.
- **NI** (no indicator) - insufficient data to assign to an indicator category.

APPENDIX B

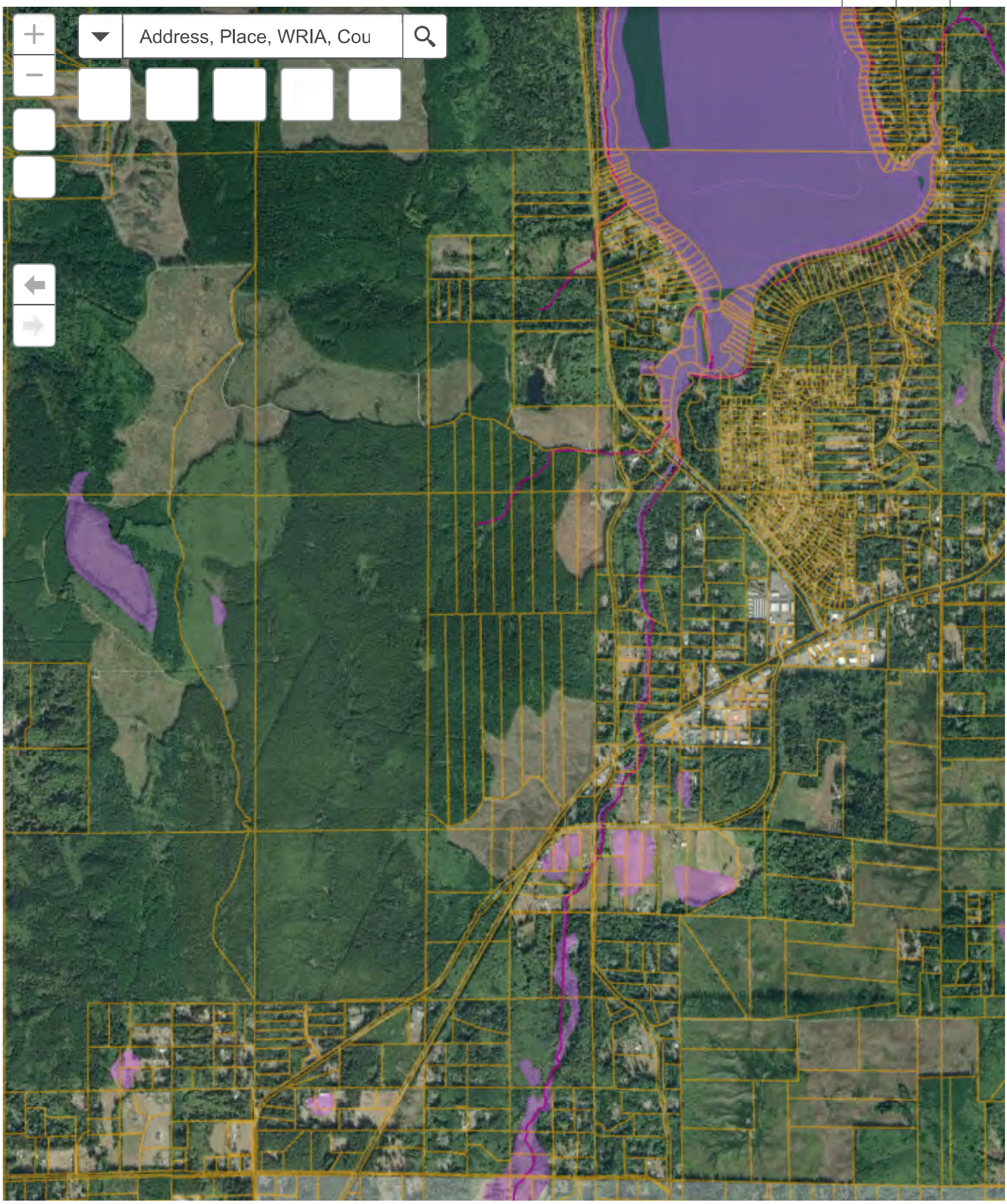
ORDINARY HIGH WATER MARK DELINEATION METHODOLOGY

OHWM Methodology

The ordinary high water mark (OHWM) of the one onsite streams were determined according to guidance from RCW 90.58.030 and Determining the Ordinary High Water Mark for Shoreline Management Act Compliance in Washington State (Ecology 2016). OHWM is defined as a mark "on all lakes, streams, and tidal waters . . . found by examining the bed and banks and ascertaining where the presence and action of waters are so common and usual, and so long continued in all ordinary years, as to mark upon the soil a character distinct from that of the abutting upland, in respect to vegetation" (Anderson et. al. 2016). In essence, the OHWM is determined by assessing three main criteria: 1) the presence or evidence of hydrology, 2) the soil, substrate, and/or geomorphological changes, and 3) changes in vegetation. Indicators for each criterion differ depending on the environment (lake, stream, tidal). The main indicators used to discern the OHWM onsite were change in vegetation, breaks in topography, and changes in soil and substrate.

APPENDIX C

WASHINGTON STATE AND KITSAP COUNTY CRITICAL AREAS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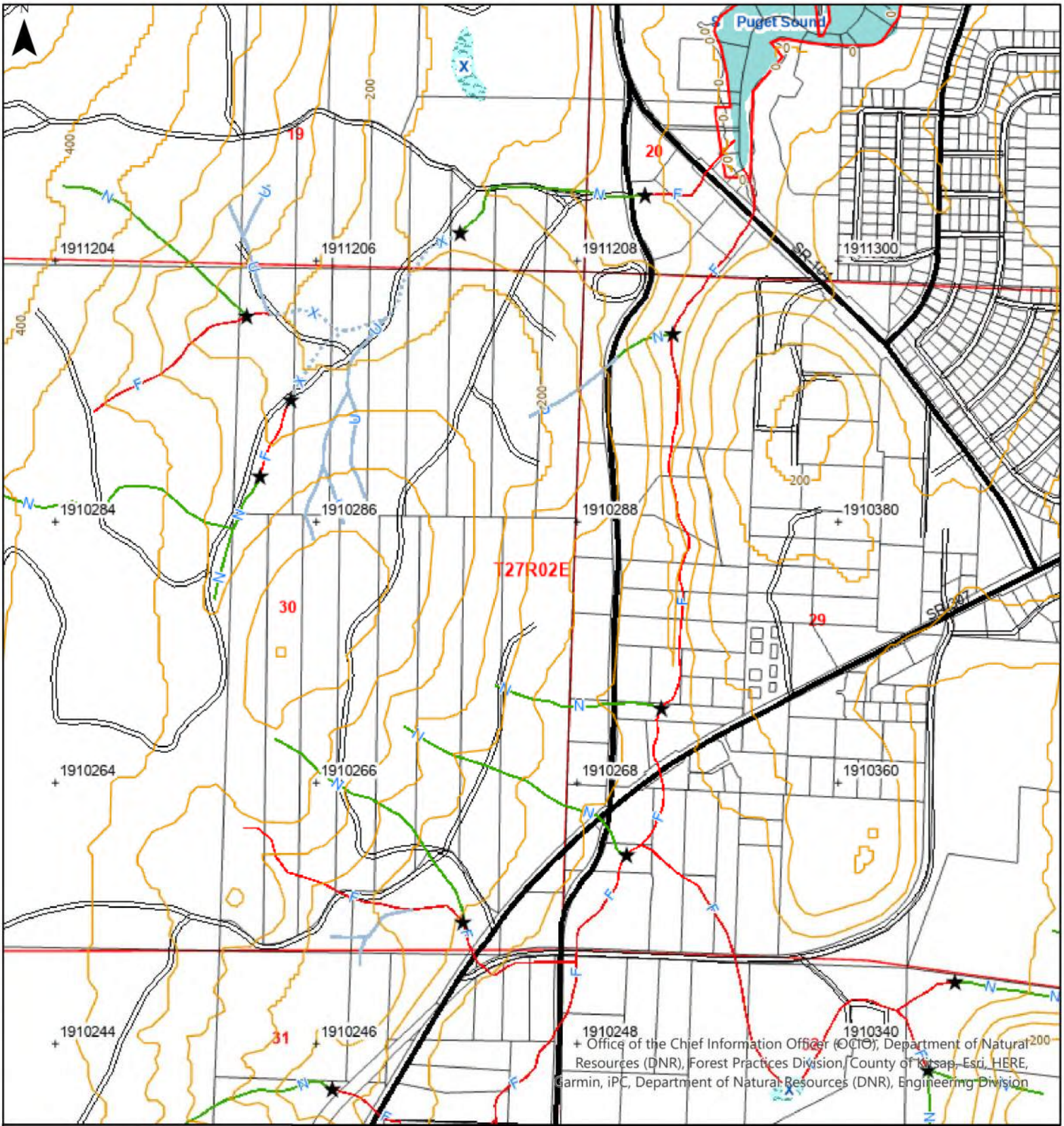
Forest Practices Activity Map - Application #_____



Map Symbols

- Harvest Boundary
- Road Construction
- Stream
- RMZ / WMZ Buffers
- Rock Pit
- Landing
- Waste Area
- Clumped WRTS/GRTS
- Existing Structure

Additional Information

Legal Description

S19 T27.0N R02.0E, S20 T27.0N R02.0E, S32 T27.0N R02.0E, S29 T27.0N R02.0E, S30 T27.0N R02.0E, S31 T27.0N R02.0E

WASHINGTON STATE DEPARTMENT OF NATURAL RESOURCES

Approximate Scale : 1:12,000

0 500 1,000 2,000 Feet

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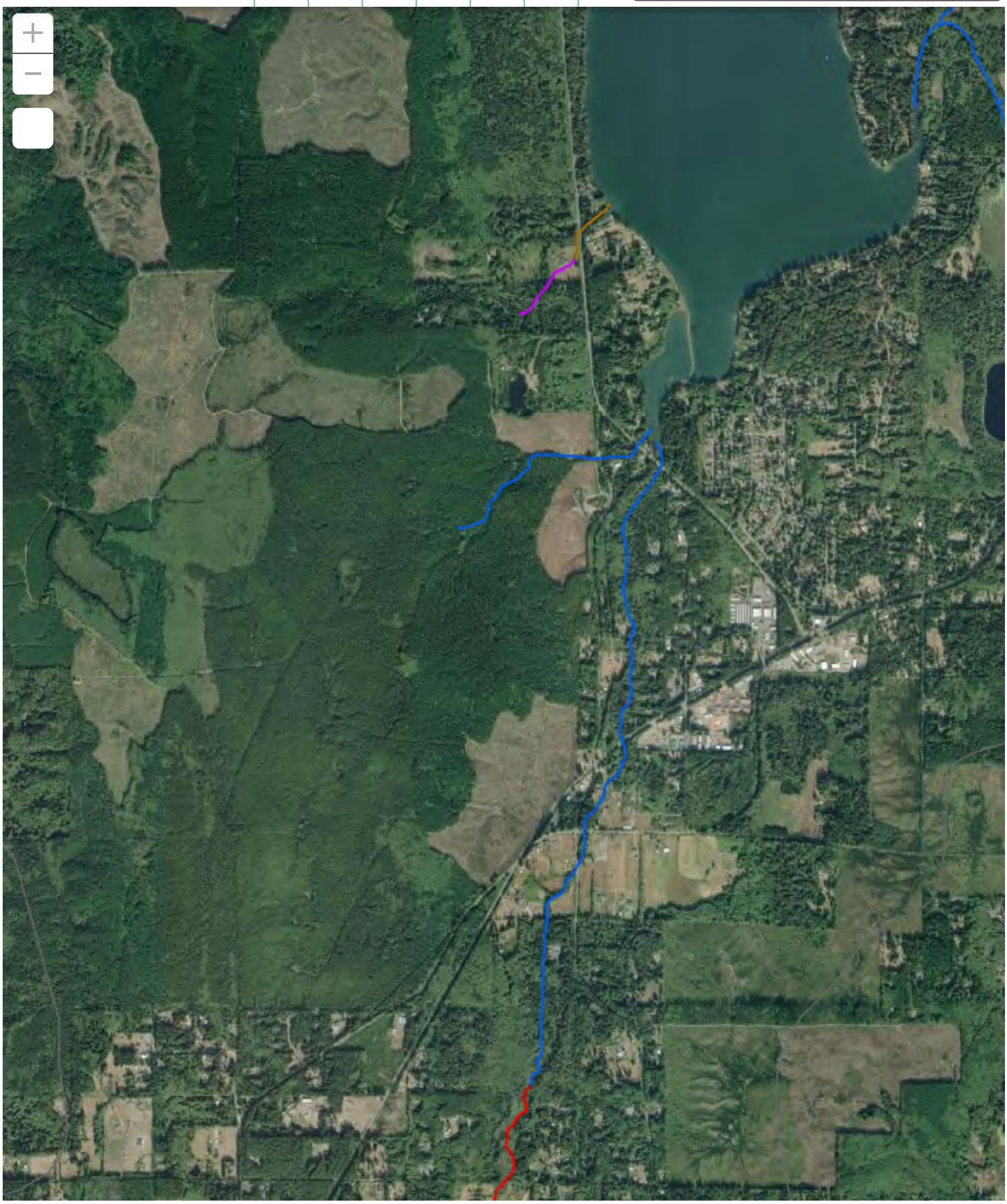
SWIFD

Search for a location



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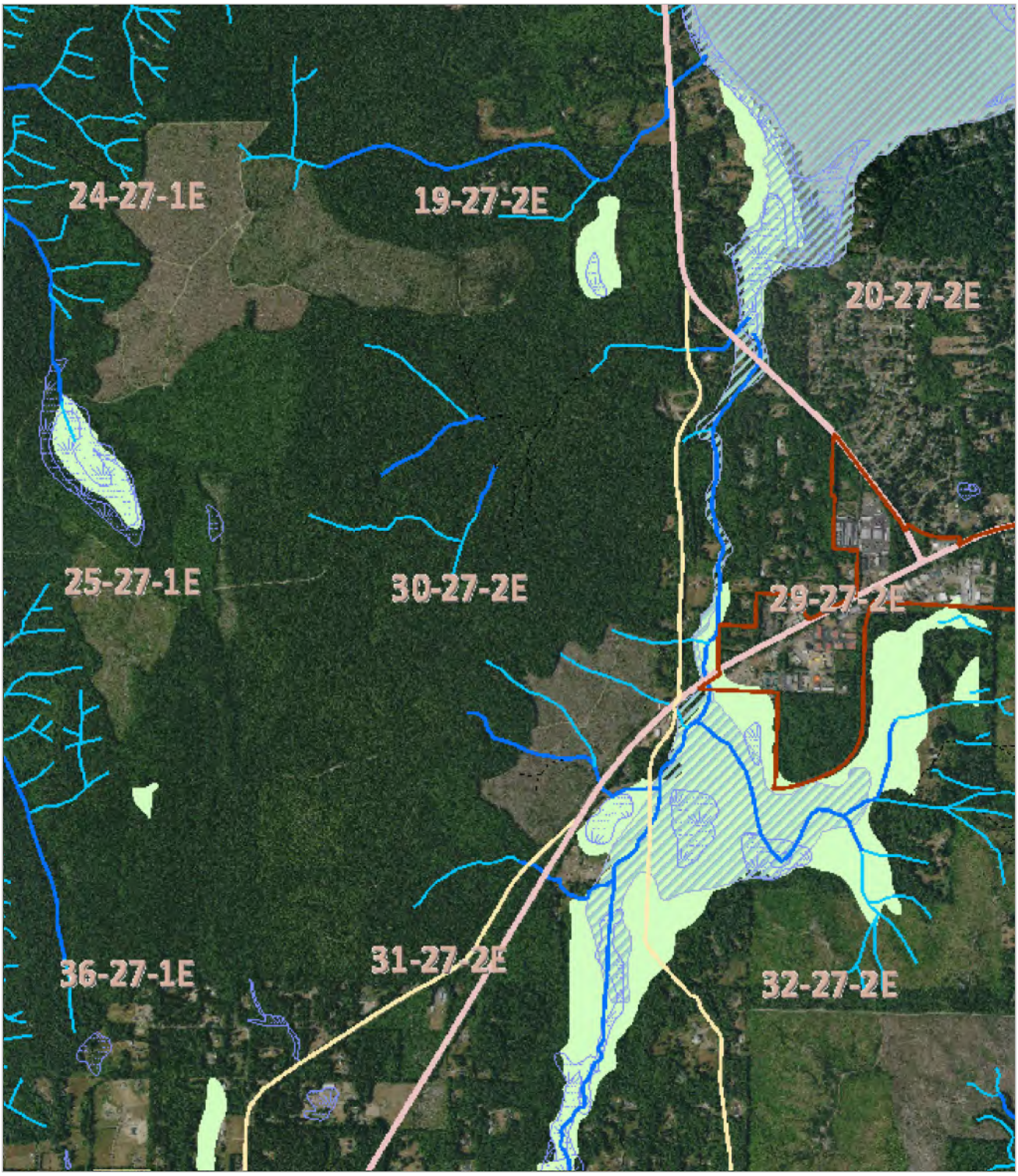
-122.591992 47.799443 Degrees

Map Scale: 1 : 24,000

Printed: Saturday. Nov 12, 2023



** This map is not a substitute for field survey **

0 0.2 0.4mi

Comments

N
W E
S

Appendix D: Site Cultural Resources Report

Cultural Resources (Westland Resources)

Cultural Resources Assessment for the North Kitsap United Project, Kitsap County, Washington

Raydient, LLC

Prepared by:
Dallin F. Webb, M.A., RPA

Reviewed and submitted by:
Jennifer Hushour, M.S., RPA

WestLand Engineering & Environmental Services, Inc.
17901 Bothell-Everett Hwy, #107 – Bothell, Washington 98012
+1 425-371-6650

Cultural Resources Report No. 2023-242
WestLand Project No. 11393

November 10, 2023

WestLand 100% EMPLOYEE OWNED | Engineering & Environmental Services, Inc.

STATEMENT OF CONFIDENTIALITY

Disclosure of the locations of historic properties to the public may be in violation of both federal and state laws. Applicable United States laws include, but may not be limited to, Section 304 (54 U.S.C. §307103) of the National Historic Preservation Act and the Archaeological Resources Protection Act (16 U.S.C. §470hh). Archaeological sites are protected under Washington State law (RCW 27.53) and their locations are exempt from public disclosure (RCW 42.56.300).

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Figures

Tables

ABSTRACT

Management Summary: WestLand Engineering & Environmental Services (WestLand) conducted a cultural resources assessment for the North Kitsap United Project. The cultural resources assessment included background and archival research of the Area of Potential Effects (API) and everything within 0.5 miles of the API. This assessment revealed that no cultural resources have been previously documented within 0.5 miles of the API. WestLand's background research indicates that there is a moderate potential for encountering historic period cultural resources and a low potential for encountering precontact cultural resources in the API. WestLand recommends that a cultural resources survey of the entire API should be conducted prior to initiation of the project.

Report Title: Cultural Resources Assessment for the North Kitsap United Project, Kitsap County, Washington

Report Date: October 26, 2023

Project Sponsor: Raydient, LLC

Description of Proposed Undertaking: Raydient, LLC (Raydient) proposes to construct a residential development on a 418.8-acre parcel of land (Project Area/API) south of the city of Port Gamble, in north Kitsap County, Washington. The proposed development will include 80 residential lots possibly with ADU's, park, trails, open spaces, and a gravel pit. Raydient is conducting due diligence to facilitate anticipated permitting, administrative, and legal requirements in the future. Raydient therefore contracted WestLand to conduct a cultural resources desktop assessment of the API and everything within a half-mile buffer to identify any existing or potential cultural (e.g., archaeological, tribal, historical, architectural) resources in the API and its immediate vicinity.

Project Location: Kitsap County, Washington parcels 192702-4-003-2001, 192702-4-004-2000, 192702-4-005-2009, 202702-3-005-2008, 302702-1-011-2002, 302702-1-012-2001, 302702-1-013-2000, 302702-4-009-2000, 302702-4-010-2007, 302702-4-011-2006, 302702-4-012-2005, 302702-4-013-2004, 302702-4-014-2003, 302702-4-015-2002, 302702-4-016-2001, 302702-4-017-2000, 312702-1-004-2000, 312702-1-022-2008, 312702-1-023-2007, and 312702-1-024-2006

Project Locator UTM: NAD83 UTM Zone 10 T: E 530660, N 5294210

Legal Description: Portions of Sections 19, 20, 30, and 31 of Township 27 North, Range 2 East

USGS 7.5′ Quadrangle(s): Port Gamble, Washington

Total Acres: 418.8 acres

Applicable Regulations: None; this is a preemptive due diligence exercise

Lead Agency: Not applicable

Other Involved Agencies: Not applicable

Funding Source: Private

Land Jurisdiction: Private

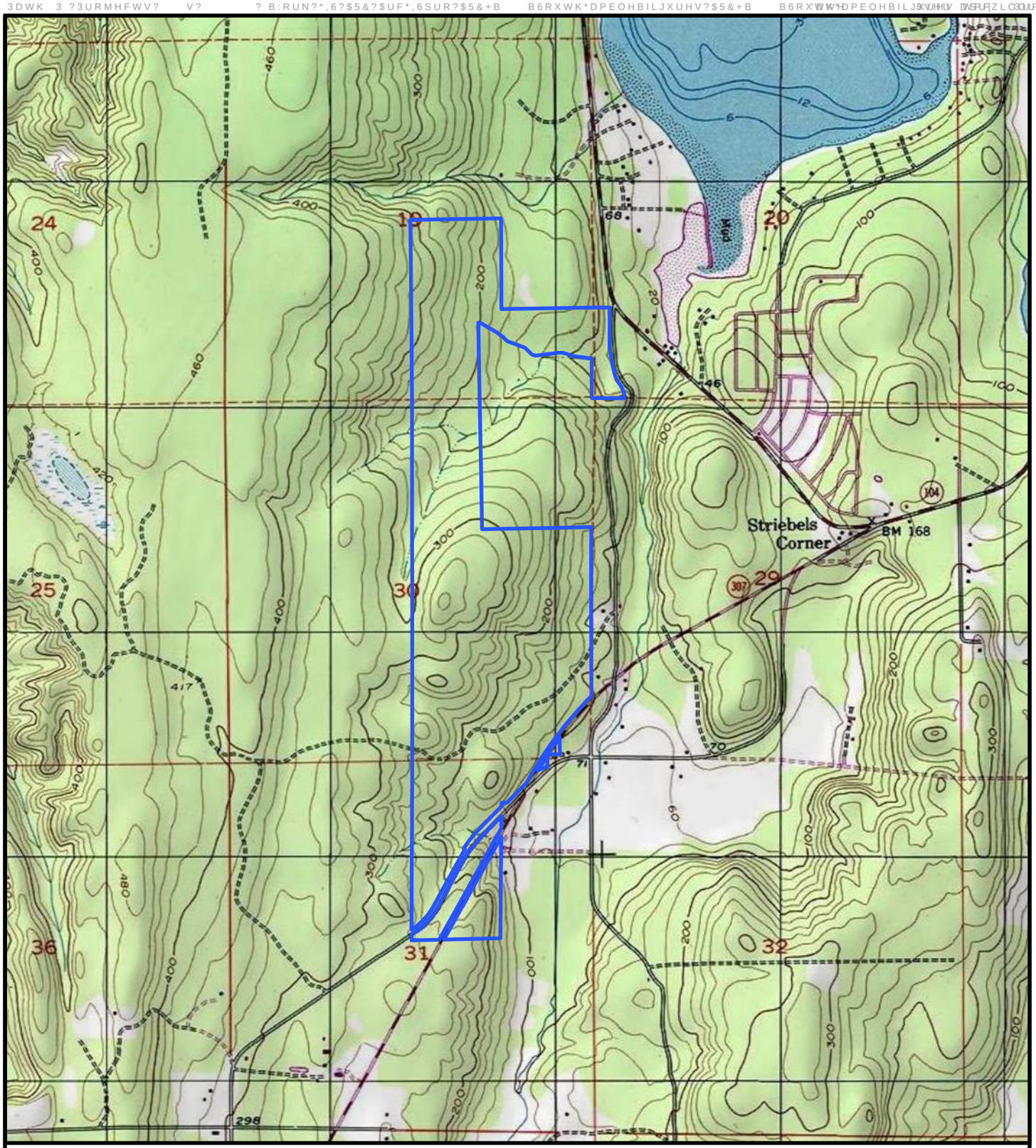
Project Area/Area of Potential Impacts: The Project Area/API consists of the entirety of the project parcels.

INTRODUCTION AND PROJECT BACKGROUND

Raydient, LLC (Raydient) proposes to construct a residential development on a 418.8-acre parcel of land (Project Area) in north Kitsap County, Washington (project). The project is located approximately 2.5 miles south of the city of Port Gamble in portions of Sections 19, 20, 30, and 31 in Township 27 North, Range 2 East, Willamette Meridian, as depicted on the United States Geological Survey (USGS) Port Gamble Dam 7.5-minute topographic quadrangle map **(Figure 1)**.

The proposed development will include between 80 and 100 homes, a park, trails, open spaces, and a gravel pit within a 418.8-acre area consisting of multiple parcels (see **Abstract** for parcel numbers) located mostly northwest of Bond Road. The Project Area is nearly contiguous; however, two major thoroughfares, Bond Road and Stottlemeyer Road, which are excluded from the Project Area, run through the southern portion of the Project Area, splitting it into multiple small, noncontiguous portions. This Project Area is the same as the Area of Potential Impacts (API) **(Figure 2)**.

Raydient is conducting due diligence to facilitate anticipated permitting, administrative, and legal requirements in the future. Raydient therefore contracted WestLand Engineering & Environmental Services (WestLand) to conduct a cultural resources desktop assessment of the API and everything within a half-mile buffer of the API to identify any existing or potential cultural (e.g., archaeological, tribal, historical, architectural) resources in the API and its immediate vicinity. The purpose of this review is to determine the presence or likelihood of cultural resources within or near the proposed project in order to develop future avoidance, assessment, or mitigation measures.



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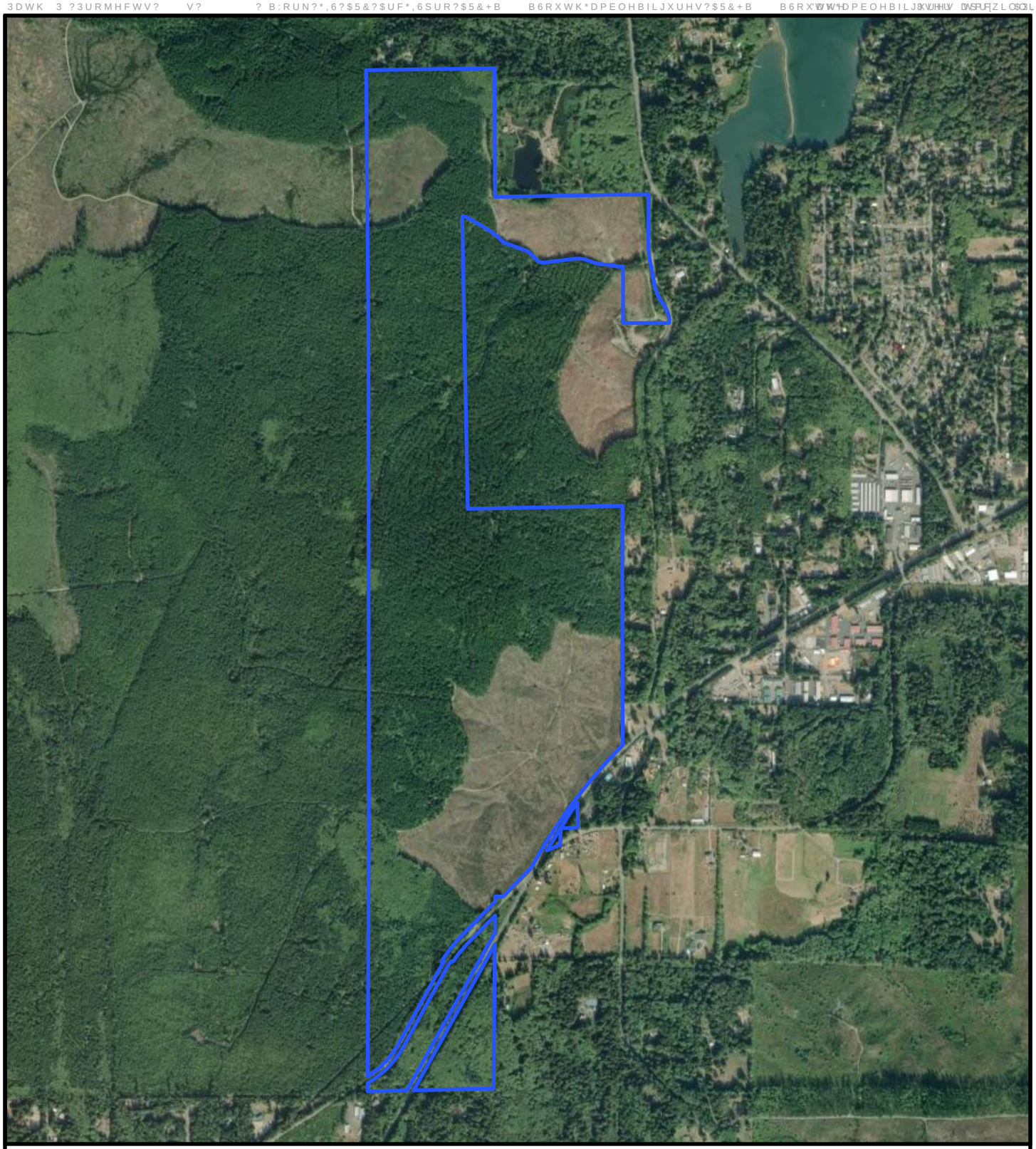

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BACKGROUND RESEARCH

Sources Consulted

For the following sections, WestLand archaeologists consulted the Department of Archaeology and Historic Preservation's (DAHP's) Washington Information System for Architectural & Archaeological Records Data (WISAARD) database, the Washington State Department of Natural Resources, the United States Department of Agriculture online soil survey, ethnographic and historical sources containing accounts of Native American occupation and land use before and after Euroamerican settlement, and documents, historic maps, and historic aerial photographs available in the public record.

Archival Research Results

Research revealed that one previous cultural resources survey has been conducted within the API, and three additional cultural resources surveys have been completed within 0.5 miles of the API **(Table 1)**. No previously recorded archaeological sites are present within the API, and no recorded precontact sites, historic period sites, Washington or National Register of Historic Places–listed properties, or cemeteries are present within 0.5 miles of the API.

Table 1. Previous cultural resources surveys within 0.5 miles of the API

NADB		Report Title	Reference	Distance and Direction from API
1350738	1	A Cultural Resources Survey for State Highways Safety Project, XL 2645, Clallam, Jefferson, and Kitsap Counties, Washington	Bundy 2007	Within API (survey consists of two discrete polygons)
1687270	2	Cultural Resources Survey, SR 307 Gamble Creek Fish Barrier Removal Project, Kitsap County, Washington	Kiers 2015	0.15 mi E
1351652	3	Cultural Resources Survey for SR 307/SR104 Safety Corridor Study, Kitsap County, Washington	Kiers 2008	0.1 mi E
1685402	4	Cultural Resource Report for the Port Gamble Bay Derelict Debris Removal, Kitsap County, Washington	Wisniewski 2014	0.15 mi NE

Other archival resources reveal potential historic period resources within 0.5 miles of the API. A General Land Office (GLO) plat from 1860 depicts the "Trail from Pt. Madison to Pt. Gamble" running south to north about 0.25 miles east of the API **(Table 2)**. USGS topographic quadrangles from 1937 and 1940 depict several historic period resources near the API, including Poulsbo Road (which appears to follow the same route as modern-day Stottlemeyer Road) and a transmission line substation **(see Table 2)**. A historic aerial

photograph from 1951 also depicts Poulsbo Road transecting, but not intersecting, the south end of the API (Historic Aerials 1951) **(see Table 2)**. In addition to Poulsbo Road, historic aerial photographs and USGS topographic quadrangles from this period (i.e., the 1950s) onward depict numerous other historic period resources within 0.5 miles of the API, including Port Gamble Road (just east of the API) and other unnamed roads and buildings. However, all the features that fall within the API on these maps and in the aerial photographs are unnamed and undeveloped trails.

Table 2. Historic resources identified in archival resources within 0.5 miles of the API

Resource Description	Reference	Distance and Direction from API
Historic trail: "Trail from Pt. Madison to Pt. Gamble"	GLO 1860	About 0.25 mi E
Paved thoroughfare: Poulsbo Road	USGS 1937, 1940; Historic Aerials 1951	Cuts through API but is not included
Unnamed/undeveloped trails	USGS 1937, 1940	Within API
"Transmission Line Sub Station"	USGS 1937, 1940	Adjacent to API near intersection of Bond Rd and NE Minder Rd

PROJECT AREA CONTEXT

Environmental Context

The API is located in a wooded area in the north-central portion of the Kitsap Peninsula that rises about 200–400 feet above Hood Canal to the east and Puget Sound to the west. The surrounding landscape was formed by multiple glacial advances during the Pleistocene before 17,000 years ago, which deposited huge quantities of glacial till and drift that now comprise the uplands in and around the Project Area (Washington Geologic Information Portal 2023). Soils within the API and the surrounding vicinity are mapped primarily as Poulsbo and Ragnar loams, ranging between fine sandy loam and gravelly sandy loam, on 0–15 percent slopes (Natural Resources Conservation Service 2023). These soils are derived primarily from glacial outwash but have some volcanic ash nearer the surface. The Puget Lowland is characterized by a maritime climate with frequent winter rain, arid summers, and mild temperatures year-round.

The API is within the western hemlock (*Tsuga heterophylla*) vegetation zone forest, which is characterized by western red cedar (*Thuja plicata*), western hemlock, and Douglas-fir (*Pseudotsuga menziesii*), with dense forest understories of shrubs and herbaceous species (Franklin and

Dyrness 1988). The precontact and historic period environment of the northern Kitsap Peninsula provided foraging and breeding habitats for a wide range of terrestrial and aquatic mammals such as sea lions (*Zalophus californianus*), orcas (*Ornicus orca*), sea otters (*Enhydra lutris*), marmots (*Marmota* spp.), black bears (*Ursus americanus*), Canadian timber wolves (*Canis lupus occidentalis*), elk (*Cervus canadensis*), and many others (Franklin and Dyrness 1988).

Cultural Context

Precontact Period

Archaeological evidence suggests that soon after the land emerged from the last glacial retreat, Native populations moved into the tundra-like environment in pursuit of now-extinct megafauna while also opportunistically hunting small game and gathering plant resources (Kopperl et al. 2016; Waters et al. 2011). It is largely accepted within the archaeological community that pre-Clovis populations were present in North America south of the glacial ice between 15,500 and 13,050 years ago (Potter et al. 2021).

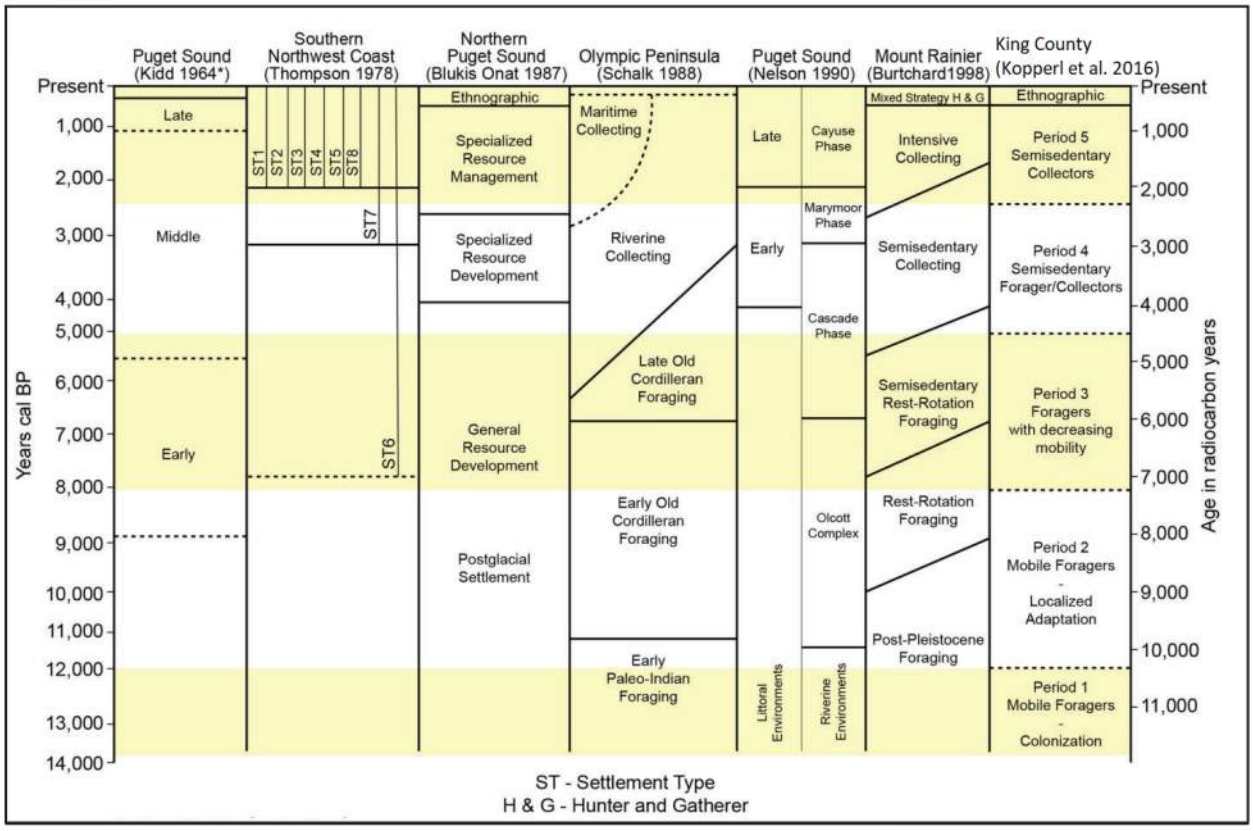
Early residential base camp sites dating to between 8000 and 5000 B.P. (or 6000 and 3000 BC, also referred to as the Middle Period) are commonly found on glacial outwash surfaces in the Puget Lowland, northwest Washington, and inland western Washington foothill valleys (Kidd 1964; Mattson 1985). The people occupying the sites formed highly mobile settlements, repeatedly occupying one locus and occupying others only briefly on one occasion (Chatters et al. 2011). This pattern may have persisted for more than 6,000 years, with the end of this time period marked by an increased reliance on marine and riverine resources.

As the climate and sea level stabilized after about 5000 B.P. (or 3000 BC), local populations increased and utilized a diverse array of landforms and resources. Native populations became more reliant on marine resources and anadromous fish, gradually shifting to semisedentary subsistence patterns marked by the seasonal round (Carlson and Dalla Bona 1996; Matson and Coupland 1995). Development of marine- oriented cultures is apparent around 2500 B.P (or 500 BC). Archaeological sites from this Late Period (post- 2500 B.P.) include village sites, residential base camps, field camps, and special-use sites. Residential village sites represent the winter village described by early ethnographers. These sites are often recognized by large shell middens near the modern shoreline or inland at river confluences. Port Gamble Bay, a resource-rich area and sheltered inland location, would have been a natural draw to local populations.

Table 3 presents a synthesis of archaeological chronologies commonly used in the API and western Washington. This synthesis and additional context applicable to Puget Sound archaeology can be found in *The Archaeology of King County, Washington: A Context Statement for Native American Archaeological Resources* (Kopperl et al. 2016).

Several precontact sites have been recorded in the project vicinity, though none within the API. These shell midden sites are important in understanding the extensive precontact use of the area. These sites include 45KP21 (the Little Boston site) across the water from Port Gamble to the east at Point Julia, which produced radiocarbon dates of circa 1310 AD, and 45JE364 and 45JE365, which are approximately 1.5 miles to the northwest of Port Gamble at Termination Point on the west side of Hood Canal. No carbon dates were derived from these latter two sites. All of these sites contained similar artifact types, including FMR, lithics, charcoal, shell, and other faunal remains. Taken together, these sites indicate ongoing utilization of the nearshore environment by indigenous populations for minimally 1,500 years.

Table 3. Comparative chronological sequences for western Washington (after Kopperl et al. 2016)



Indigenous Populations in the Contact Period

The API lies within the traditional territory of the S'Klallam (Clallam) people. The Port Gamble townsite location to the north of the API was a summer residence of the S'kllalam, who also resided in the Hood Canal region. Port Gamble bay was at the intersection of several tribal territories, and the area was within the interaction sphere of the S'Klallam with the nearby Chemakum, Skokomish (Twana), and Suquamish (Lushootseed) groups (Indian Claims Commission 1974:363, 380b; Riley 1974:63).

Surrounded by water, canoe transportation favored interaction and exploration along the many beautiful bays and inlets along the Kitsap and Hood Canal shorelines. Teekalet Bluff connects Port Gamble to Salsbury Point and the Hood Canal overland. Trails also connected traditional Suquamish territory to Hood Canal via Port Madison to the Port Gamble Bay (General Land Office 1860a, 1860b; Gunther 1927:212; Miller 1999:106; Riley 1974:63; Snyder 1968:134, map).

Ethnographers of the early twentieth century recorded multiple dialects of Indigenous place-names in the Port Gamble Bay vicinity, corroborating the idea that this was shared territory. Ethnographic sources approximate each group's core territories as follows.

Clallam-speaking S'Klallam territory follows the northern shores of the Kitsap and Olympic Peninsulas along the Strait of Juan de Fuca (Gunther 1927:177; Miller 1999:106; Spier 1936:32). The S'Klallam name for the settlements at Port Gamble and Little Boston was *Nukay'it* (Elmendorf 1992:55; Lambert 1992:23; Sharley 2010; Wray 2002:17).

"Chemakum"-speaking Chemakum territory is recorded as stretching along the northwestern shores of the Olympic Peninsula, from the modern location of Port Townsend to Port Ludlow and as far south as Port Gamble (Elmendorf 1990:439; Powell 1877:177; Spier 1936:32).

Twana-speaking Skokomish territory extended from Teekalet Bluff and Hood Canal south along the canal to Tahuya and Skokomish, Washington, near Shelton. Skokomish winter villages were reported at Dabob and Quilcene bays (Castile 1985:15; Elmendorf 1992:1, Map II; Powell 1877:178; Spier 1936:32; Swindell 1942:236). Skokomish villages are reported at Tahuya and Union City, Washington (Gunther 1927:195). Twana place-names include *Duxwk'élat* for the Port Gamble/Little Boston area and *Bcsc'ä5wał* ("black bear") and *Sivei-ei'he* for Salsbury Point, approximately one mile west of Port Gamble (Elmendorf 1992:55; Skokomish Culture and Art Committee 2002:67).

Lushootseed-speaking Suquamish territory included the northern and eastern shores of the Kitsap Peninsula extending northward toward the San Juan Islands. Teekalet is a transliteration of the

Lushootseed word *Texq3e'ultx* ("skunk cabbage") for Teekalet Bluff. The town of Port Gamble itself was called *Q3qla'xad* ("fence, stockade"); Port Gamble Bay was called *Stce'yûx* ("bay"); and the historic-period village Little Boston across Port Gamble bay was called *Sdeu'wap* ("noon, broad daylight") (Waterman et al. 2001:189, 190, 193).

As they had for millennia, Indigenous people made their homes along marine waterways or major rivers, which served as transportation corridors while also providing a diverse and resource-rich brackish near-shore environment. The Indigenous peoples of the region viewed the land communally, and resources were shared between and stewarded by allied tribes and extended families (Miller 1999:144, 150; Riley 1974:78).

Trade, marriage, and mutual ceremonies created bonds between neighboring groups that otherwise retained political autonomy (Castile 1985; Suttles and Lane 1990). Substantial split-plank buildings made up permanent village sites, while temporary camps are indicative of seasonal fishing, hunting, and gathering forays.

Port Gamble Bay was known as a summer fishery where the S'Klallam, Suquamish, and others camped for the season. The S'Klallam had permanent residences at Hood Canal, where they resided during the prime fishing season from August through early December or later. The S'Klallam, Suquamish, and Chemakum groups traveled regularly to Hood Canal for fishing, shrimp and shellfish harvest, berry picking, collecting basketry materials, visiting relatives, religious devotions, and trade (Gunther 1927:195, 212; Lane 1977:19; Miller 1999:106; See-Hem-Itza 1992:70; Swindell 1942:136, 237, 240).

Hood Canal vicinity campsites were sometimes occupied through the winter. The Hamma Hamma River and Brinnon areas were reported as favorite S'Klallam camping areas (Gunther 1927:195).

The first documented Indigenous and European contact occurred in May 1792, when British captain George Vancouver led a small exploratory party south through Hood Canal. They reported a peaceful encounter with Indigenous people near Port Ludlow. No further encounters between Europeans and Native peoples are recorded in the historical record in the subsequent 35 years. Europeans did not become a permanent presence in the region until the establishment of trading posts in Fort Langley in 1827, Fort Nisqually on southern Puget Sound in 1833, and Fort Victoria on Vancouver Island in 1843.

In 1853, William Talbot arrived at Port Gamble Bay to establish a sawmill for the Puget Mill Company, which led to the founding of a town called Teekalet (a name which was later changed to Port Gamble in 1868). The townsite of Teekalet/Port Gamble, lying just west of the mouth of Gamble Bay, was already inhabited by the S'Klallam as discussed above. The town of Port Gamble grew around the sawmill, drawing many

local S'Klallam and other Native Americans, as well as immigrants from all over the United States, Europe, Russia, and China.

Almost all of the API and adjacent land (including the mill at Port Gamble) was purchased in 1925 by Charles McCormick, owner of the Charles R. McCormick Lumber Company (Metsker 1926; Wilma 2003). He purchased the land and assets (i.e., the Puget Mill Company) from Pope and Talbot, Inc. Poor management and overspending led to foreclosure by Pope and Talbot, who retook control of the company in 1938. The API was logged at some point during this time span between 1925 and 1938.

Historical topographic quadrangles from 1937 onward depict limited development within the API (USGS 1937, 1940). Currently, several recreational trails are present, some of which could be remnants of logging roads. Photograph layers in Google Earth (2023) depict the project area as having been largely cleared in 1985 and 1990 **(Figures 3 and 4)**.

Figure 3. Google Earth 1985 aerial photo of the API

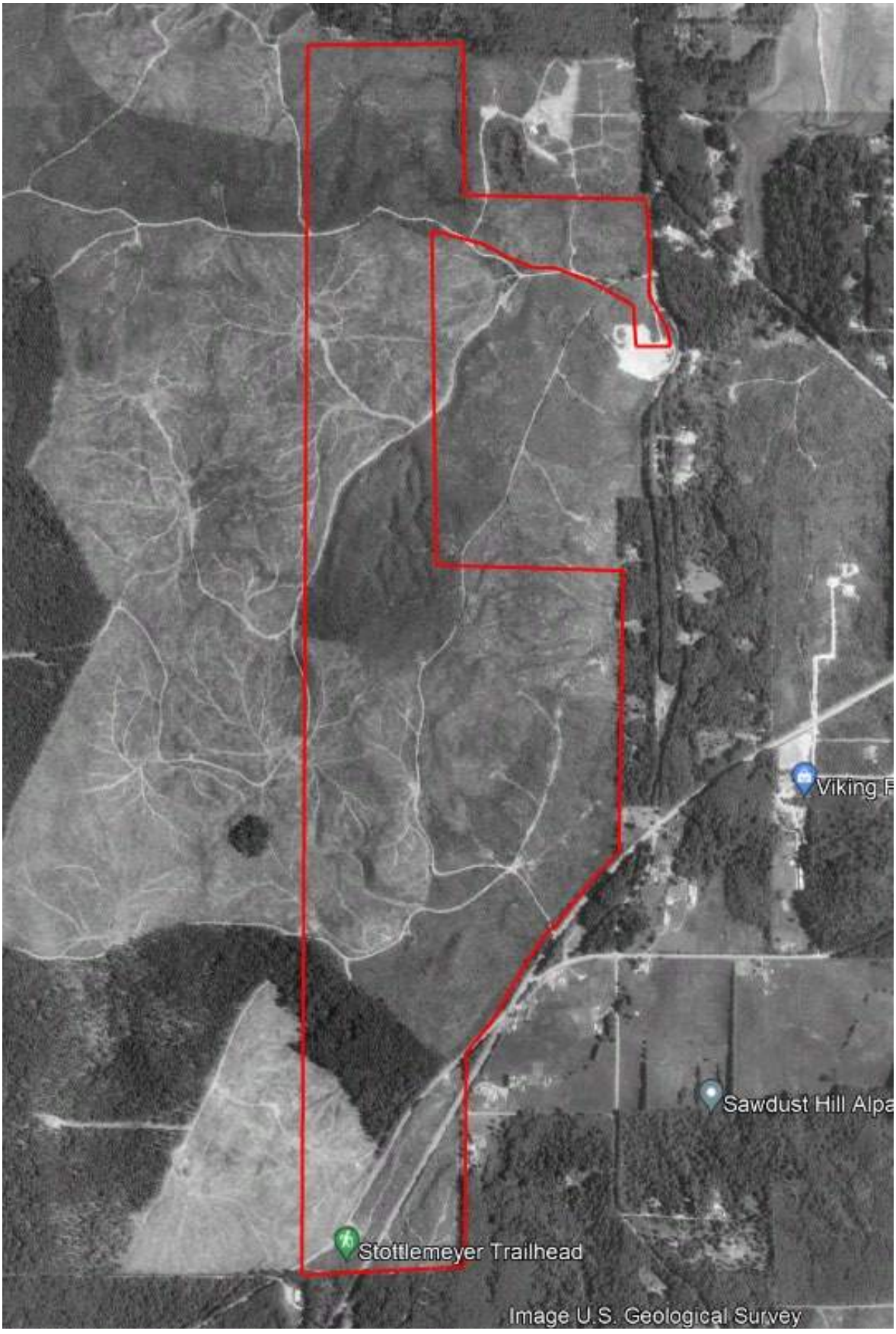


Figure 4. Google Earth 1990 aerial photo of the API

ANTICIPATED FINDS

DAHP's probability model predicts a low to high probability of precontact and historic cultural resources throughout the API; the likelihood increases in the north and east portions of the API, near drainages and Gamble Bay. Based on additional review, WestLand considers there to be a moderate probability for historic period resources to be found, as indicated by archival evidence for historic period structures near the API and some limited development within the API.

There are no known precontact resources within 0.5 miles of the API; however, relatively few cultural resources surveys have been conducted in or near the API, so the potential for identifying precontact resources here is not well understood, as precontact resources are unlikely to be identified in the absence of cultural resources surveys.

A growing body of evidence suggests that North America has been inhabited for upwards of 20,000 years (e.g., Bennett et al. 2021; Pigati et al. 2023; Smith and Barker 2017); nonetheless, there is no potential for finding cultural materials in the API from earlier than 17,000 years ago, prior to the last glacial advance that deposited the glacial tills and drifts that comprise the API and its surrounding landscape. The thickness of the glacial deposits in the API is not definitively documented but is likely in the order of tens of meters (or scores of feet) deep. The project impacts will not penetrate the mudflow deposit to reach soils older than 17,000 years.

Any precontact deposits would be present at or near the surface (due to the lack of soil development which would have buried cultural deposits), and most of the surface has been disturbed multiple times by logging and clearing. The probability of finding intact precontact resources is therefore considered low. However, it cannot be ruled out that archaeological materials may be present at or near the surface that were not disturbed by previous clearing efforts.

CONCLUSIONS AND RECOMMENDATIONS

WestLand's cultural resources assessment included background and archival research of the API and everything within 0.5 miles. This assessment revealed that no cultural resources have been previously documented within 0.5 miles of the API. As discussed in the **Anticipated Finds** section above, background research indicates that there is a moderate potential for encountering historic period cultural resources and a low potential for encountering precontact cultural resources in the API.

This cultural resources assessment revealed that very little of the API has been surveyed previously; based on the results of the assessment, there is a potential for extant cultural resources in the API. Therefore, WestLand recommends that a cultural resources survey of the entire API should be conducted. This should include 100 percent pedestrian survey of the API and shovel testing in areas and on landforms with a higher likelihood of encountering cultural resources, to be determined based on field observations. If project plans change in ways that would require ground disturbance in areas not reviewed in this document, additional cultural resources desktop review would be recommended.

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Appendix E: Access

Transportation Report (Transpo Group)

Preliminary Transportation Assessment

NORTH KITSAP UNITED (SOUTH GAMBLE)

Prepared for:
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December 2023

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Executive Summary

The North Kitsap United development proposal could include a variety of land uses from residential, retail, and recreational that would attract local and regional visitors to the area. This analysis provides a preliminary assessment of the primary transportation issues to consider when redeveloping the site. The analysis in this report includes an evaluation of existing conditions as well as future forecasted conditions without and with development of the site.

A specific site plan has not been developed; however, a preliminary development plan was assumed to include the following uses:

- Residential – 80 residential lots with and without a detached accessory dwelling unit (ADU) as permitted in the Rural Residential Zone.
- YMCA regional facility - 80,000 square-feet (sf)
- 6-12 fields as well as supportive uses such as baseball, tennis, pickleball, etc.
- Restaurant - 2,000-4,000 sf anticipated to be high turnover sit down
- Retail – 2,000-4,000 of small-scale retail

The south end of the site abuts Stottlemeyer Road NE as well as Bond Road (SR 307), which was assumed to provide all of the access to the site. Stottlemeyer Road NE is a local County road whereas Bond Road (SR 307) is classified as a Highway of Statewide Significance and is a Managed Class 2 Highway by Washington State Department of Transportation (WSDOT). The vast majority of traffic would be traveling to and from Bond Road. Access to any private development is typically preferred to occur with lower classified County roads such as Stottlemeyer Road rather than direct driveway access to a State Route facility.

Through evaluation of existing conditions, the volumes of traffic along Bond Road (SR 307) were high enough that stop controlled side streets with full access could only accommodate nominal levels of traffic before degrading below operational standards. Most of the stop controlled side streets in the area are at or near capacity. This includes the stop controlled intersections of Stottlemeyer and Minder along Bond Road that are immediately adjacent to the site. The level of development being contemplated for this site would require more than stop controlled traffic control at locations where the majority of traffic would access Bond Road (SR 307).

Through the operations analysis and preliminary coordination with WSDOT, the most ideal locations for access to Bond Road (SR 307) would be to realign Stottlemeyer Road NE with NE Minder Road and/or consider an access location toward the southern end of the site. Access locations at either one of these locations would require a higher level of traffic control such as a traffic signal or roundabout in order to provide safe and efficient operations. This would require further coordination with WSDOT and the County and require an Intersection Control Evaluation (ICE) and other WSDOT permitting.

The evaluation of off-site signalized intersections at SR 104 and NE Gunderson Road showed that although there is capacity to accommodate additional growth and development in the area, they are near level of service thresholds.

Further analysis and coordination would be necessary with the County and WSDOT in order to fully evaluate access alternatives and the potential for off-site mitigation

Introduction

This report provides a preliminary evaluation of potential transportation-related impacts associated with the development of the proposed North Kitsap United (NKU) South Gamble project located in Kitsap County. This included preliminary coordination with WSDOT regarding access to Bond Road (SR 307).

Project Description

The proposed NKU South Gamble development site is located west of the State Route (SR) 104/ Bond Road (SR 307) intersection in Kitsap County and generally bounded by Port Gamble Road NE and north of and Stottlemeyer Road NE (see Figure 1). The specific land use sizes and quantities have not been determined at this point nor has a specific site plan been developed. In general, the development team is interested in exploring the development of some single-family residential homes, a YMCA, a sports field recreation complex and potentially supportive commercial spaces that could include restaurants and/or retail space. To gauge levels of impact, the follow range of land use assumptions were used.

- Residential – 80 residential lots with and without a detached accessory dwelling unit (ADU) as permitted in the Rural Residential Zone.
- YMCA regional facility - 80,000 square-feet (sf)
- 6-12 fields as well as supportive uses such as baseball, tennis, pickleball, etc.
- Restaurant – 2,000-4,000 sf anticipated to be high turnover sit down
- Retail – 2,000-4,000 sf of small-scale retail

The residential is anticipated to be located centrally within the site with the remaining uses located more proximate to Bond Road (SR 307). Access is reviewed in greater detail below but is anticipated to be via Stottlemeyer Road NE to the south. The site extends to the north with frontage along a portion of Port Gamble Road. However, access was not assumed to occur to the north or via Port Gamble Road in this analysis to provide for a more conservative analysis of impacts. A specific site plan has not been developed at this point; however, the site area is outlined in Figure 1.

Study Scope

The following study intersections were reviewed during the weekday PM peak hour to access the traffic impacts associated with the proposed development.

1. SR 104/Bond Road (SR 307)
2. NE Minder Road (East)/Bond Road (SR 307)
3. Port Gamble Rd NE/Bond Road (SR 307)
4. Bond Road (SR 307)/NE Minder Road (West)
5. Bond Road (SR 307)/Stottlemeyer Road NE (North)
6. Bond Road (SR 307)/NE Gunderson Road/Stottlemeyer Road (South)

This report includes a review of the surrounding street system, existing and future (2028)[1] without-project weekday peak hour traffic volumes, traffic operations, and traffic safety. Future (2028) with-project conditions were estimated by adding site-generated traffic to future without-project volumes. The project's impacts on the surrounding transportation system were identified by comparing the future with-project conditions to the future without-project conditions.

[1] Note that the development timing is not determined at this time and for purposes of the initial traffic impact assessment, a 5-year horizon year was evaluated.

Site Vicinity and Study Intersections

FIGURE 1

NKU South Gamble

transpogroup

Existing and Future Without-Project Conditions

This section describes both existing and future (2028) without-project conditions within the identified study area. Characteristics are provided for the roadway network, traffic volumes, traffic operations, and traffic safety.

Roadway Network

The following section describes the existing street network within the vicinity of the proposed project and anticipated changes resulting from planned improvements.

Existing

The primary roadways within the study area and their characteristics near study intersections are illustrated in Figure 2. As shown in the figure, Bond Road (SR 307) is classified as a Highway of Statewide Significance and is also a Managed Class 2 Highway by WSDOT with a posted speed limit of 50 miles per hour (mph) and an average daily traffic (ADT) of 14,500 vehicles. A Managed Class 2 Highway favors mobility over access and has additional access and operational restrictions.

The other adjacent roadways are classified as major or local sub collectors or local roadways.

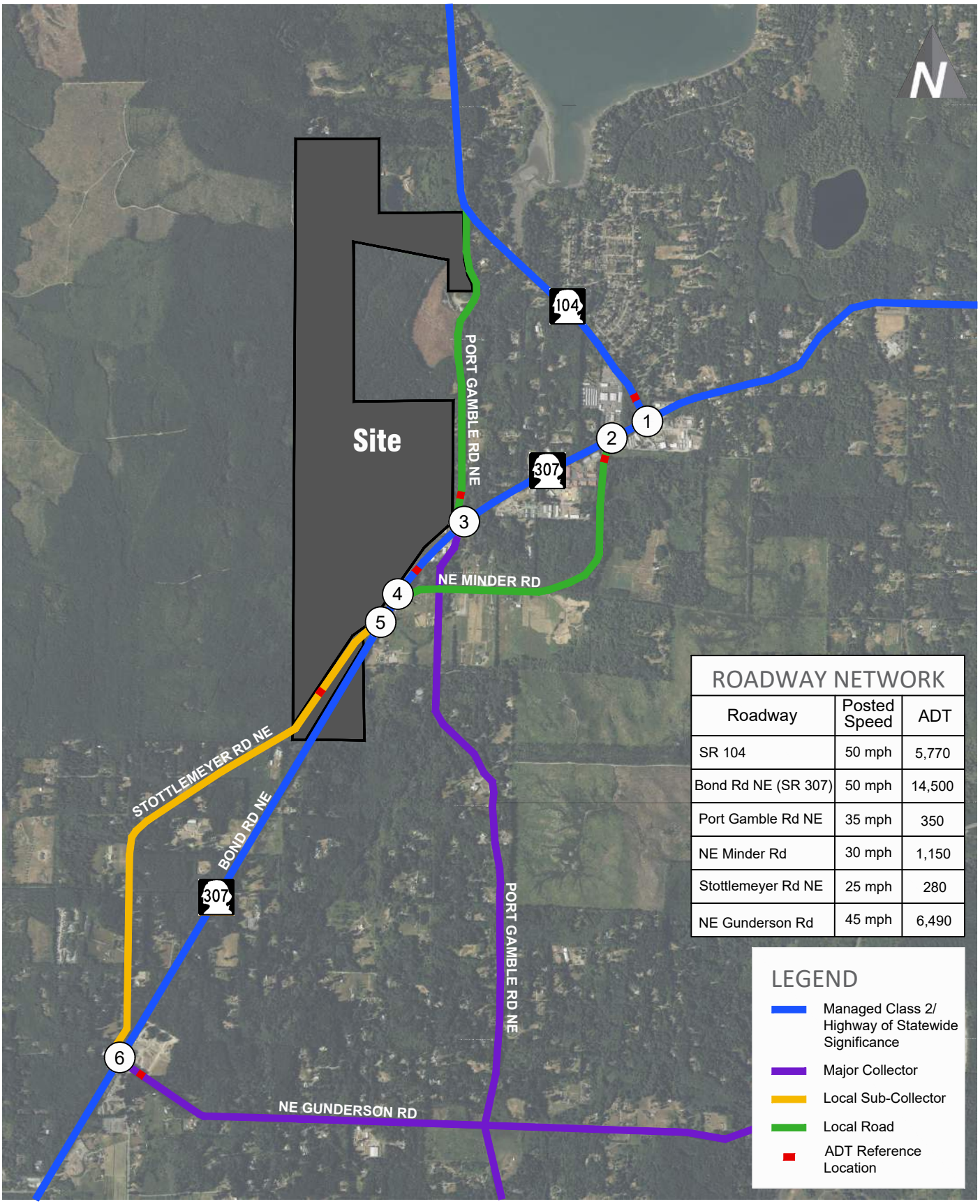
The majority of the roadways are side street stop controlled with the exception of the 2 existing traffic signals within the study area along Bond Road (SR 307) at SR 104 east of the site and at Gunderson Road/Stottlemeyer Road NE (south) southwest of the site.

The spacing of the roadways in the vicinity of the site along SR 307 are illustrated on Figure 3.

Planned Improvements

No specific planned improvements were identified based on a review of WSDOT's Statewide Transportation Improvement Program (STIP).

The installation of a westbound right turn lane at the SR 104/Bond Rd NE (SR 307) intersection is anticipated to mitigate impacts from the future development anticipated at Port Gamble. This is assumed to be completed prior to the 2028 horizon year and assumed in the future conditions analysis.



ROADWAY NETWORK

Roadway	Posted Speed	ADT
SR 104	50 mph	5,770
Bond Rd NE (SR 307)	50 mph	14,500
Port Gamble Rd NE	35 mph	350
NE Minder Rd	30 mph	1,150
Stottlemeyer Rd NE	25 mph	280
NE Gunderson Rd	45 mph	6,490

LEGEND

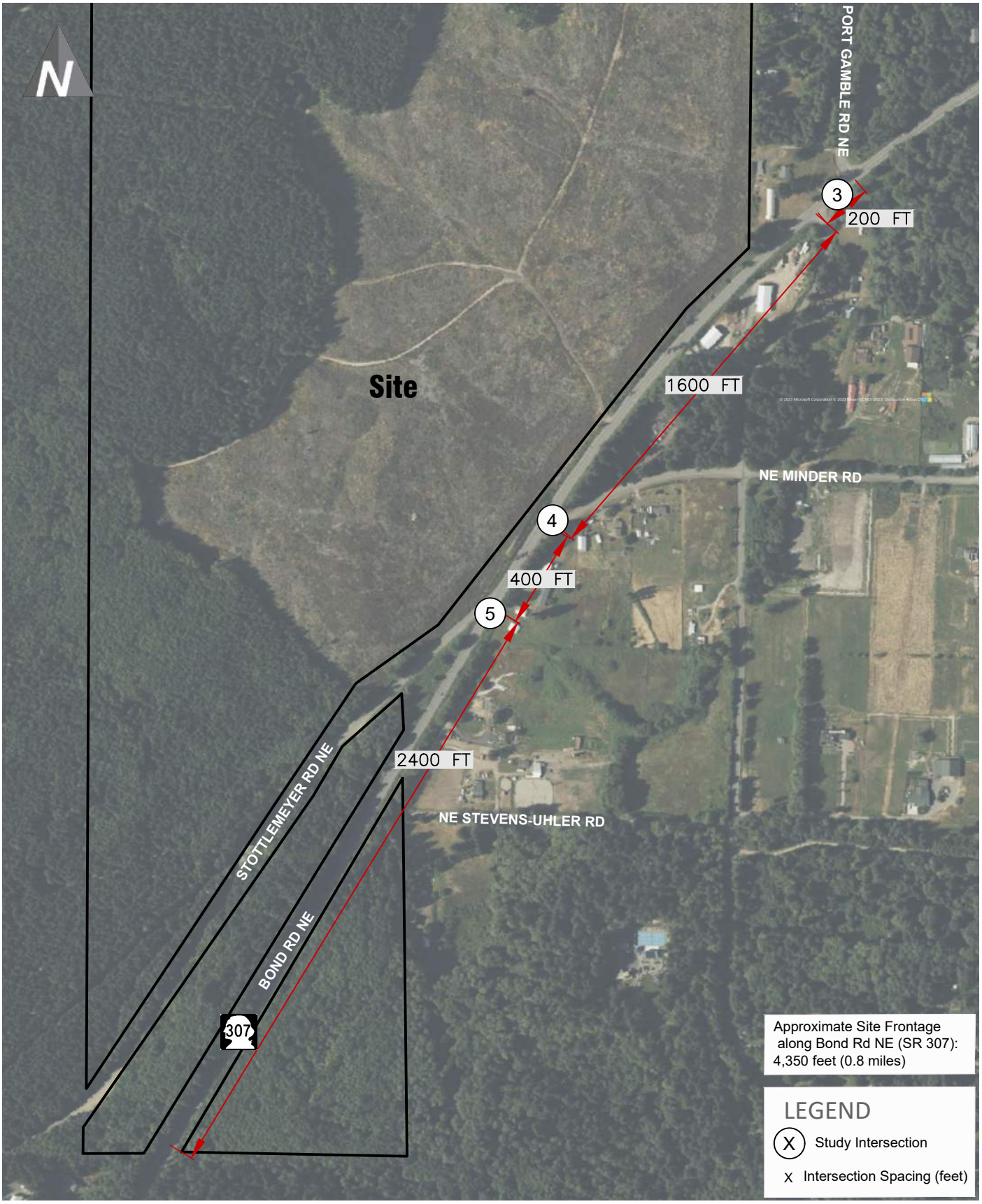
- Managed Class 2/ Highway of Statewide Significance
- Major Collector
- Local Sub-Collector
- Local Road
- ADT Reference Location

Roadway Classification and Characteristics

NKU South Gamble

FIGURE 2

transpogroup



Existing Intersection Spacing

NKU South Gamble

FIGURE
3

transpogroup

Traffic Volumes

The following sections summarize existing and future (2028) without-project traffic volumes within the study area.

Existing

Existing weekday PM peak period (4-6 p.m.) traffic volumes were collected in October 2023. The estimated existing weekday PM peak hour traffic volumes are shown on Figure 5. Note that due to the low volumes of the side streets, the traffic volumes were not rounded. Additionally, there were a limited number of illegal movements seen in the observations which were not included in the analysis (e.g. northbound and southbound through movements at the Port Gamble Road/SR 307 intersection which is restricted to RIRO).

In addition to the intersection turning movement counts, 7-day 24-hour traffic counts were conducted along Stottlemeyer Road, west of SR 307 and SR 307 east of Minder Road. The counts showed ADT of 280 vehicles and 14,500 vehicles along Stottlemeyer Road and SR 307, respectively. Detailed traffic counts are provided in Appendix A. The hourly weekday volume trends throughout the week are illustrated in Figure 4 below for SR 307.

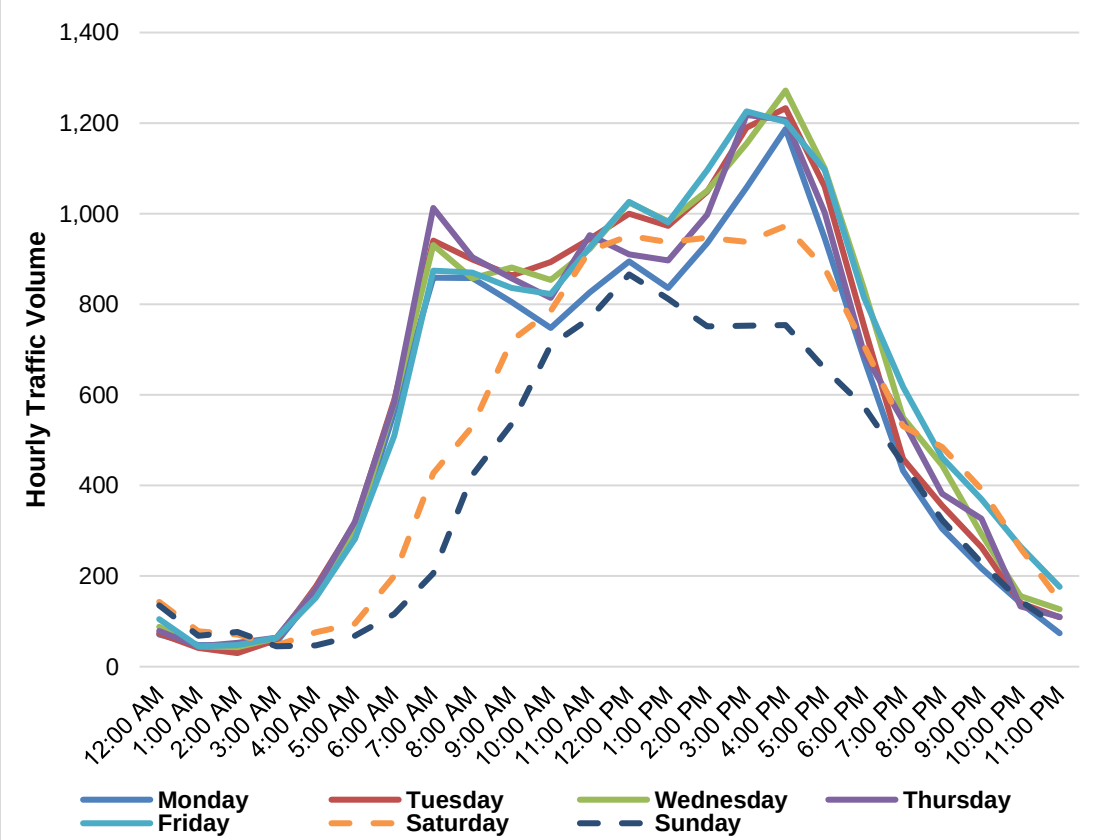
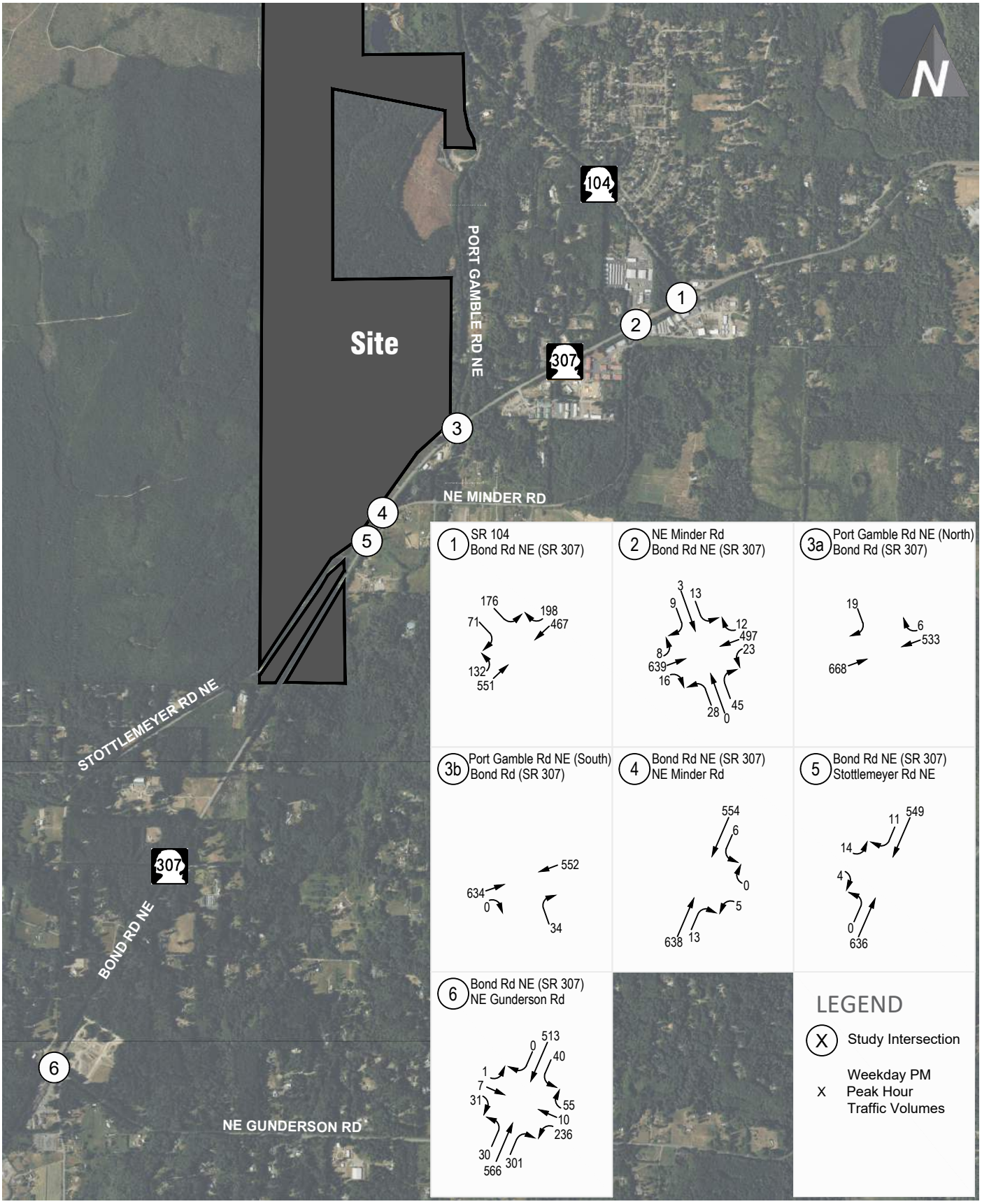


Figure 4. Bond Road (SR 307) 7-Day Hourly Volumes (based on October 2023 Traffic Counts)

As shown in Figure 4, the weekday PM peak hour volumes represent the highest peak hour volumes throughout the week, with the highest occurring midweek on a Wednesday which is consistent with the focus of the operational analysis (weekday PM peak hour).



Existing Weekday Peak Hour Traffic Volumes

FIGURE 5

NKU South Gamble

transpogroup

The seasonal variation in the vicinity was reviewed also reviewed based on WSDOT's Permanent traffic recorder located along SR 307 west of Gunderson. The monthly ADT for 2022 is illustrated in Figure 6. The counts conducted in October 2023 are shown to reflect average (typical) conditions and no seasonal adjustment was applied.

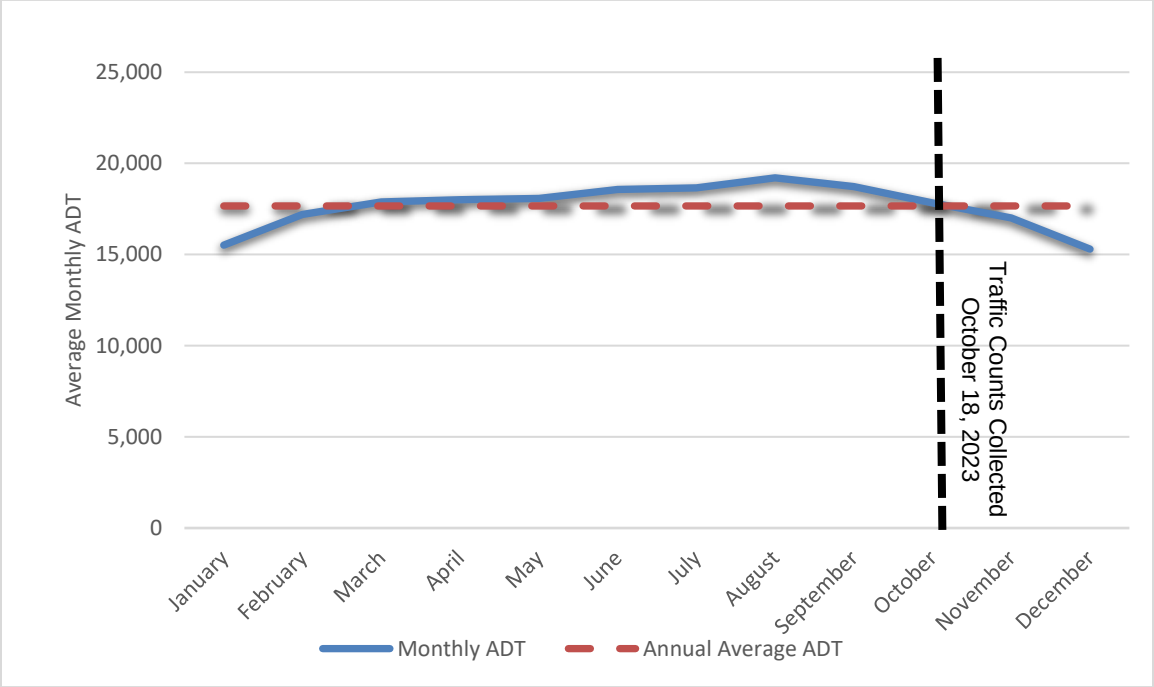
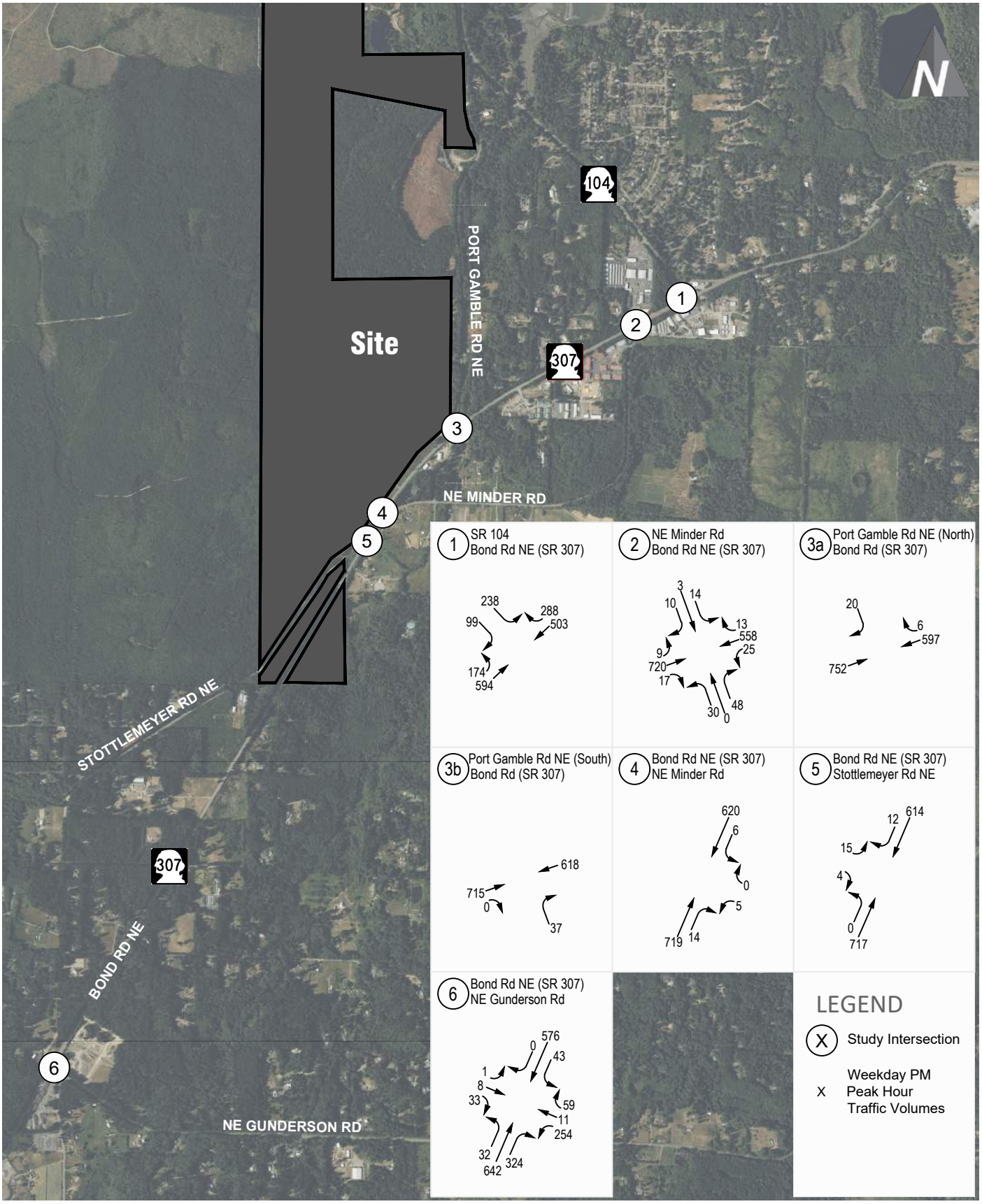


Figure 6. SR 307 Seasonal Variation (based on WSDOT Traffic Count Database, 2022)

Future Without-Project Traffic Volumes

Future (2028) without-project traffic volumes are developed based on applying an annual background traffic growth rate of 1.5 percent consistent with other projects in the vicinity and confirmed based on historical growth in the vicinity. Additionally, the Port Gamble residential development pipeline development traffic was included in the analysis. The forecast future (2028) without-project weekday peak hour traffic volumes are shown in Figure 7.



Future (2028) Without-Project Weekday Peak Hour Traffic Volumes

FIGURE 7

NKU South Gamble

transpogroup

Traffic Operations

The operational characteristics of an intersection are determined by calculating the intersection level of service (LOS). At signalized intersections, LOS is measured in average control delay per vehicle and is reported using the intersection delay. At two-way stop controlled (TWSC) intersections, delay is reported for the worst movement. Traffic operations and average vehicle delay can be described qualitatively with a range of levels of service (LOS A through LOS F), with LOS A indicating free-flowing traffic and LOS F indicating extreme congestion and long vehicle delays. Appendix B contains a detailed explanation of LOS criteria and definitions. WSDOT defines an LOS C intersection standard at the study intersections.

Existing signal timing was provided by WSDOT and assumed for the analysis of existing conditions. Analysis parameters such as lane channelization and signal timing were maintained for future (2028) without-project conditions from existing conditions with the exception of the planned improvement at the SR 307/SR 104 intersection as described above. Weekday PM peak hour traffic operations for existing and future (2028) without-project conditions were evaluated based on the procedures identified in the *Highway Capacity Manual* (HCM 7th Edition) using *Synchro 12*. *Synchro 12* is a software program that uses *HCM* methodology to evaluate intersection LOS and average vehicle delay. Results for the existing and future without-project operations analyses are summarized in Table 1. Detailed LOS worksheets for each intersection analysis are included in Appendix C.

Table 1. Existing and Future (2028) Without-Project Weekday PM Peak Hour LOS Summary

Intersection	Traffic Control	Existing			2028 Without-Project		
		LOS[1]	Delay[2]	WM[3]	LOS	Delay	WM
1. SR 104/Bond Rd NE (SR 307)	Signal	B	14	-	B	19	-
2. NE Minder Rd/Bond Rd NE (SR 307)[4]	TWSC	**D**	**28**	**SB**	**E**	**36**	**SB**
		D	**26**	**NB**	**E**	**36**	**NB**
3A. Port Gamble Rd NE (N of SR 307)/SR 307	TWSC	B	12	SB	B	13	SB
3B. Port Gamble Rd NE (S of SR 307)/SR 307	TWSC	B	14	NB	B	15	NB
4. Bond Rd NE (SR 307)/NE Minder Rd	TWSC	**D**	**25**	**WB**	**D**	**30**	**WB**
5. Bond Rd NE (SR 307)/Stottlemeyer Rd NE (North)	TWSC	C	23	EB	**D**	**28**	**EB**
6. Bond Rd NE (SR 307)/Stottlemeyer Rd NE (South)/NE Gunderson Rd	Signal	C	22	-	C	24	-

Note: TWSC = two-way stop controlled. Bold text indicates not meeting the LOS standard.
1. Level of Service (A – F) as defined by the *Highway Capacity Manual* (TRB, 7th Edition)
2. Average delay per vehicle in seconds
3. Worst Movement shown for stop controlled intersections. EB = eastbound approach, WB = westbound, NB = northbound, SB = southbound.
4. Note that both the north and south stop controlled approaches of this intersection are operating below standard so both are included in the table.

As shown in Table 1, the study intersection generally meeting the operational LOS C standard under existing conditions during the PM peak hour with the exception of the NE Minder Road (eastern and western intersections) along Bond Road (SR 307) are operating below standard at LOS D. These are generally low volume side street stop-controlled approaches with limited gaps for left-turning movements onto the major road (Bond Rd NE (SR 307)). Under future (2028) conditions, the Stottlemeyer Road NE (north) intersection also degrades to operating below standard at LOS D due to the increase in forecast traffic along Bond Road NE (SR 307).

Traffic Safety

The five most recent years of collision records (January 1, 2018 to December 31, 2022) provided by the Washington State Department of Transportation (WSDOT) were reviewed within the study area to identify any existing traffic safety issues in the study area. Figure 7 illustrates the collisions and their severity that have been reported during the study period. As illustrated in the figure, approximately 70 percent of the collisions occurred at the intersections with the remaining collisions occurring along the roadway segments in the study area. Additionally, the figure illustrates that the majority of the reported collisions were property damage only.

Additionally, a summary of the total and average annual number of reported collisions at the study intersections are provided in Table 2.

Table 2. Five-Year Collision Summary (2018-2022)

Location	Number of Collisions					Total	Annual Average
	2018	2019	2020	2021	2022		
1. SR 104/Bond Rd NE (SR 307)	10	7	2	5	6	30	6.0
2. NE Minder Rd/Bond Rd NE (SR 307)	1	2	0	4	3	10	2.0
3A. Port Gamble Rd NE (N of SR 307)/SR 307	1	1	1	0	0	3	0.6
3B. Port Gamble Rd NE (S of SR 307)/SR 307	0	0	0	2	0	2	0.4
4. Bond Rd NE (SR 307)/NE Minder Rd	0	0	1	0	4	5	1.0
5. Bond Rd NE (SR 307)/Stottlemeyer Rd NE (North)	0	0	0	0	0	0	0.0
6. Bond Rd NE (SR 307)/Stottlemeyer Rd NE (South) /NE Gunderson Rd	5	2	2	3	8	20	4.0

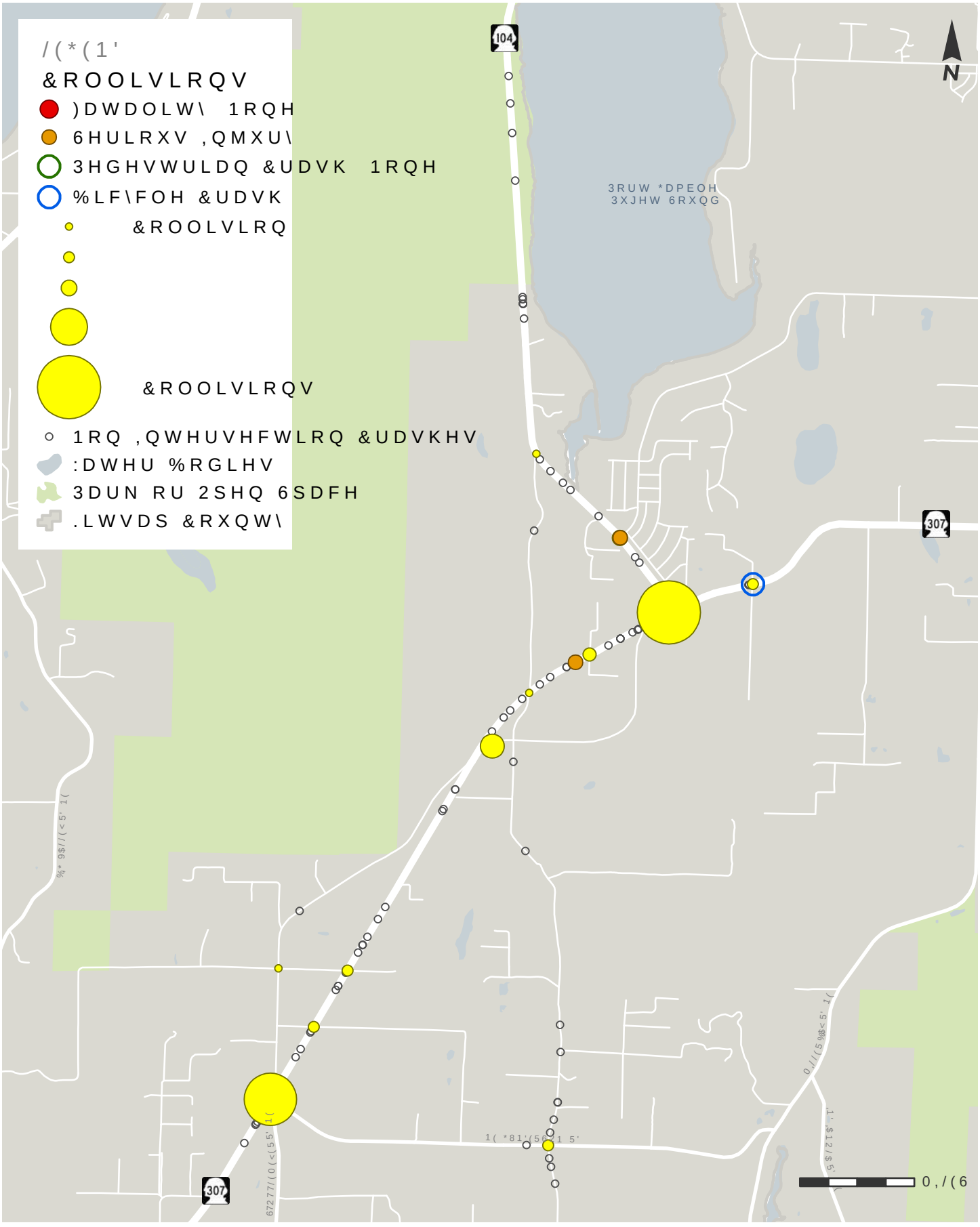
Source: WSDOT September 2023

As shown in Table 2, most of the collisions at the study intersections over the five-year review period occurred at the signalized intersections of SR 104 and Stottlemeyer Rd NE/NE Gunderson Rd along Bond Rd NE (SR 307) with an annual average of approximately 6 collisions and 4 collisions, respectively. The most common collision type experienced at both of these intersections were rear end collisions, which primarily resulted in property damage only. Rear-end collisions are typical at signalized locations along State Routes.

Along the project site's frontage on Bond Rd NE (SR 307), 4 collisions were reported over the last five-year period, unrelated to any intersections. The project frontage along Port Gamble Road NE had no reported collisions over the last five-year period.

There were no reported fatalities nor collisions involving either a pedestrian or bicyclist at or between the study intersections during the review period.

Overall, there were no patterns of collisions that would indicate significant safety issues.



Five-Year Collision Summary (2018-2022)

FIGURE
8

NKU South Gamble

transpogroup

Project Impacts

The following sections summarize the proposed project's impacts on the surrounding street system. First, traffic volumes generated by the proposed project are estimated and then distributed and assigned to adjacent roadways within the study area. Next, project trips are added to future without-project traffic volumes and the potential impact to traffic operations are identified. Site-specific items are also discussed.

Trip Generation

The trip generation for the project was estimated based on data provided in Institute of Transportation Engineers (ITE) *Trip Generation Manual* (11th Edition, 2021). As identified above, the trip generation was estimated assuming a range of development options. The high-end and low-end development options are summarized below along with the assumed ITE land uses.

Low Estimate Land Use Assumptions:

- 80 Residential Lots (LU 210)
- High Turnover Sit Down Restaurant (LU 932) – 2,000 sf
- Strip Retail Plaza (<40k) (LU 822) – 2,000 sf
- Soccer Complex (LU 488) – 6 fields
- YMCA - Recreational Community Center (LU 495) – 80,000 sf

High Estimate Land Use Assumptions:

- 80 Residential Lots (LU 210)
- 80 Accessory Dwelling Units (LU 210)[2]
- High Turnover Sit Down Restaurant (LU 932) – 4,000 sf
- Strip Retail Plaza (<40k) (LU 822) – 4,000 sf
- Soccer Complex (LU 488) – 12 fields as well as 60,000 sf Recreational Community Center (LU 495)
- YMCA - Recreational Community Center (LU 495) – 80,000 sf

Adjustments for both pass-by and internal capture were included in the analysis based on the methodology as outlined in ITE's *Trip Generation Handbook* (3rd Edition). Land uses with pass-by rates in ITE's *Trip Generation Manual* (11th Edition) included High Turnover Sit Down Restaurant (LU 932) and Strip Retail Plaza (<40k) (LU 822). Note that it is anticipated that the soccer complex and YMCA land uses would also have pass-by related trips; however, specific data was not identified at this time and therefore no pass-by reductions were assumed for these uses in the analysis providing a conservative analysis at the off-site intersections. The weekday daily and peak hour trip generation is summarized in Table 3 for both options. Appendix D includes the detailed trip generation.

As shown in the table, the primary weekday daily trips are estimated to range from approximately 3,546 trips to 6,472 trips with between 225 and 407 trips occurring during the weekday AM peak hour and 371 to 690 trips occurring during the weekday PM peak hour. For purposes of the traffic analysis below and for estimating impacts, the high trip generation estimate was assumed.

[2] The 80 ADU's were conservatively assumed to accompany the 80 residential lots as permitted in rural residential zone.

Table 3. Estimated Weekday Vehicle Trip Generation

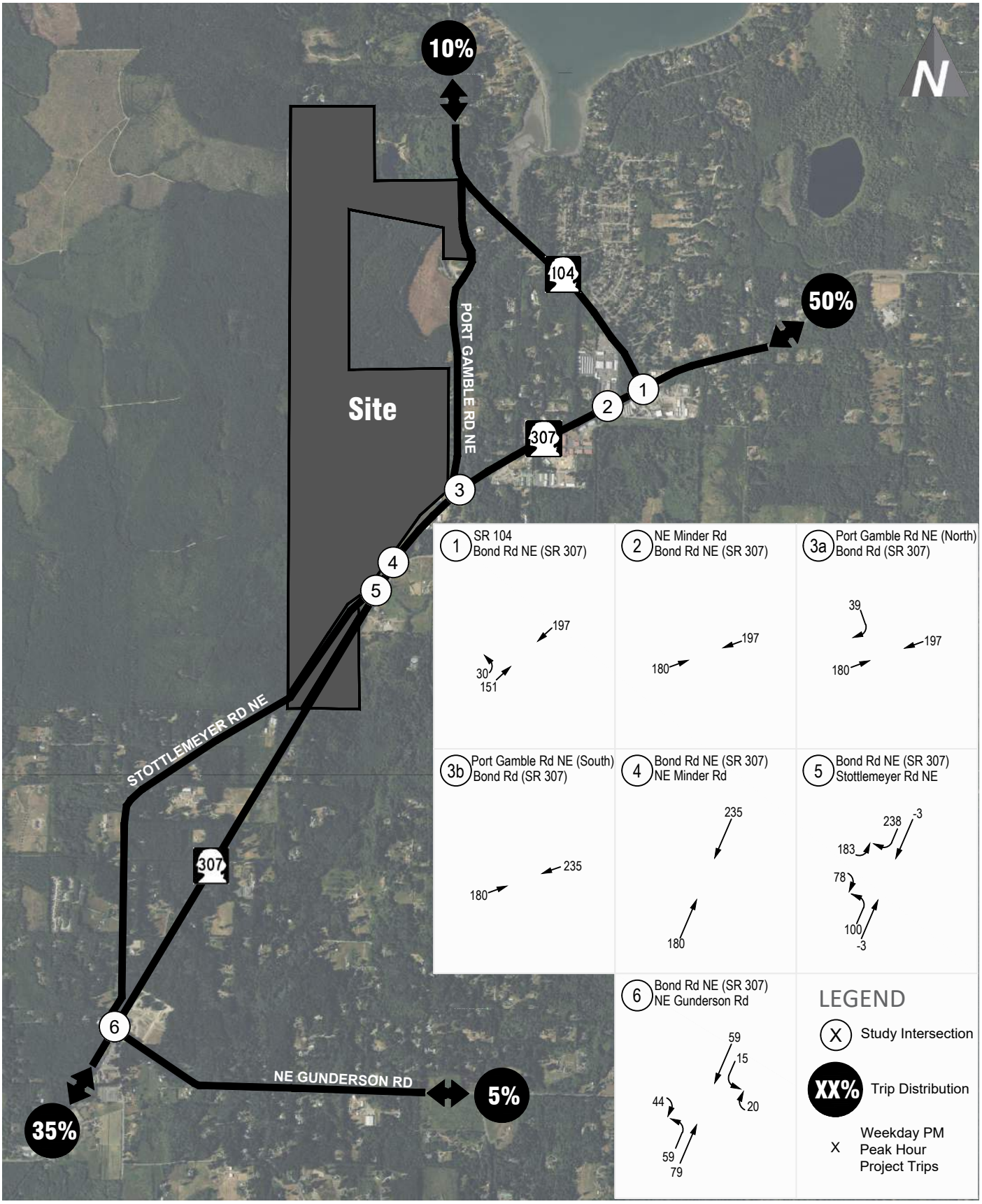
Trip Generation Scenario	Land Use	Daily Trips[1]	AM Peak Hour Trips			PM Peak Hour Trips		
			In	Out	Total	In	Out	Total
High End Estimate	Residential	1,390	26	79	105	85	51	136
	YMCA	2,282	101	52	153	93	103	196
	Sports Complex	2,568	83	44	127	200	142	342
	Commercial	402	20	18	38	19	9	28
	Passby	*-170*	*-8*	*-8*	*-16*	*-6*	*-6*	*-12*
	Total New Trips	**6,472**	**222**	**185**	**407**	**391**	**299**	**690**
Low End Estimate	Residential	700	14	40	54	42	25	67
	YMCA	2,288	101	52	153	93	104	197
	Sports Complex	428	4	2	6	65	34	99
	Commercial	224	11	11	22	10	4	14
	Passby	*-94*	*-5*	*-5*	*-10*	*-3*	*-3*	*-6*
	Total New Trips	**3,546**	**125**	**100**	**225**	**207**	**164**	**371**

1. The trip generation for the project was estimated based on data provided in Institute of Transportation Engineers (ITE) Trip Generation Manual (11th Edition, 2021).

Trip Distribution and Assignment

Trip distribution patterns for the proposed uses to and from the site were based on existing travel patterns in the vicinity and proposed location of site functions. The trip distribution for the proposed project is shown in Figure 9.

The net new peak hour project trips were assigned to the study intersections based on the anticipated distribution for the proposed project and the assumed site access point in the area of Stottlemeyer Road NE and Bond Road NE (SR 307). The resulting trip assignment is shown in Figure 9.The future (2028) with-project traffic volumes were forecast by adding the weekday PM peak hour project trips to the future (2028) without-project traffic volumes. The resulting future (2028) with-project weekday PM peak hour traffic volumes are shown in Figure 10.

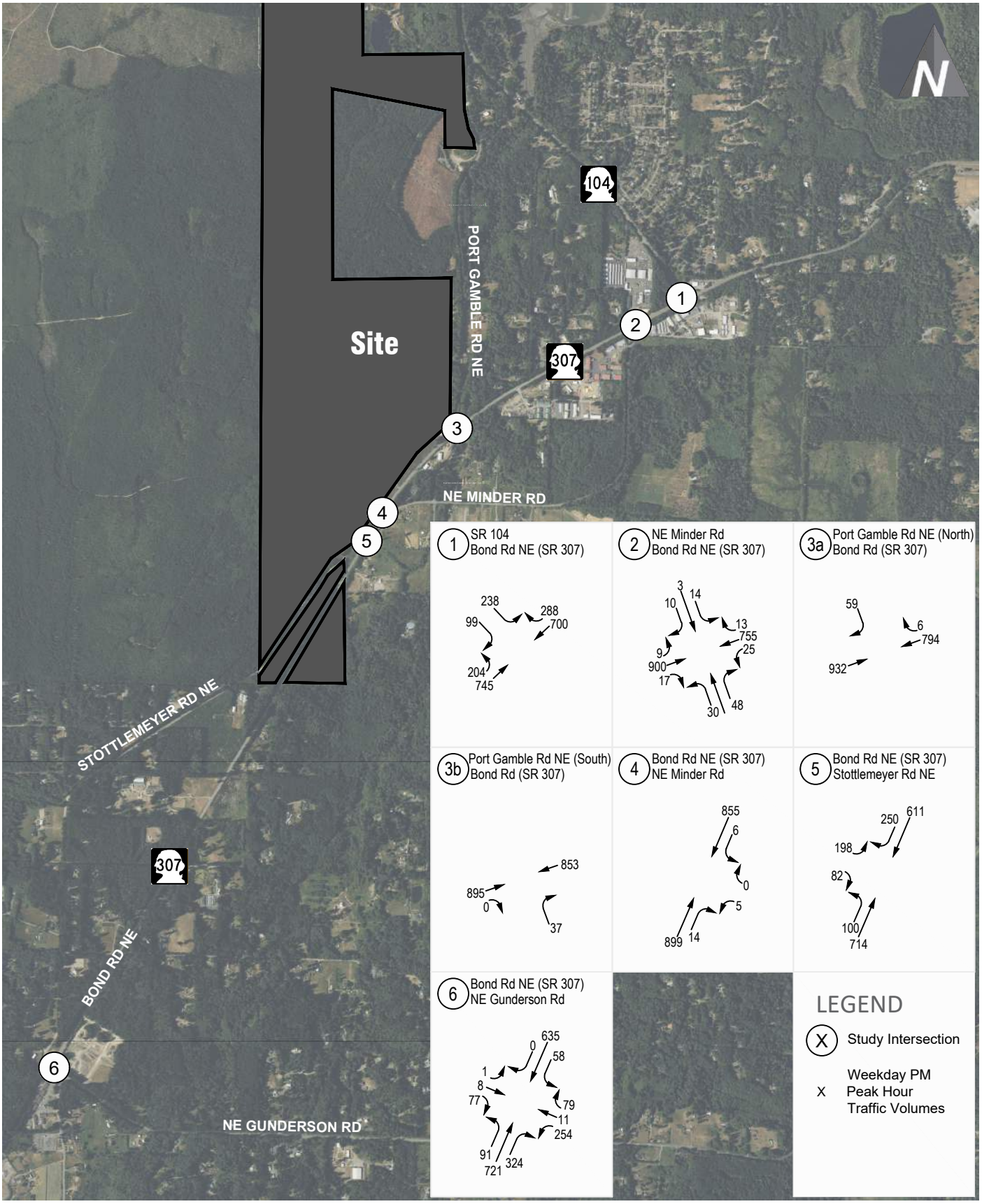


Project Trip Distribution and Assignment

NKU South Gamble

FIGURE
9

transpogroup



Future (2028) With-Project Weekday Peak Hour Traffic Volumes

FIGURE **10**

NKU South Gamble

transpogroup

With-Project Traffic Operations

A future (2028) with-project level of service analysis was conducted for the weekday peak hour to analyze traffic impacts of the proposed project. The same methodologies were applied as described for existing and future without-project conditions. All intersection parameters such as channelization, intersection control, and signal timing were consistent with those used in the evaluation of future without-project conditions. A comparison of future (2028) without-project and with-project weekday peak hour traffic operations is summarized in Table 4. Detailed LOS worksheets are provided in Appendix C.

Table 4. Future (2028) Without and With-Project Weekday PM Peak Hour LOS Summary

Intersection	Traffic Control	2028 Without-Project			2028 With-Project		
		LOS[1]	Delay[2]	WM[3]	LOS	Delay	WM
1. SR 104/Bond Rd NE (SR 307)	Signal	B	19	-	C	24	-
2. NE Minder Rd/Bond Rd NE (SR 307)[4]	TWSC	**E**	**36**	**SB**	**F**	**78**	**SB**
		E	**36**	**NB**	**F**	**95**	**NB**
3A. Port Gamble Rd NE (N of SR 307)/SR 307	TWSC	B	13	SB	C	17	SB
3B. Port Gamble Rd NE (S of SR 307)/SR 307	TWSC	B	15	NB	C	18	NB
4. Bond Rd NE (SR 307)/NE Minder Rd	TWSC	**D**	**30**	**WB**	**F**	**54**	**WB**
5. Bond Rd NE (SR 307)/Stottlemeyer Rd NE (North)	TWSC	**D**	**28**	**EB**	**F**	**1,003**	**EB**
6. Bond Rd NE (SR 307)/Stottlemeyer Rd NE (South)/NE Gunderson Rd	Signal	C	24	-	C	33	-

Note: TWSC = two-way stop controlled. Bold text indicates not meeting the LOS standard.
1. Level of Service (A – F) as defined by the *Highway Capacity Manual* (TRB, 7th Edition)
2. Average delay per vehicle in seconds
3. Worst Movement shown for stop controlled intersections. EB = eastbound approach, WB = westbound, NB = northbound, SB = southbound.
4. Note that both the north and south stop controlled approaches of this intersection are operating below standard so both are included in the table.

As shown in Table 4, with the addition of project generated traffic, the NE Minder Road (eastern and western intersections) along Bond Road (SR 307) degrade to operate at a LOS F, under PM peak hour conditions with no improvements. These are generally low volume side street stop-controlled approaches with limited gaps for left-turning movements onto the major road (Bond Road). The Stottlemeyer Road NE (north) intersection also degrades compared to future 2028 without-project conditions to operating at LOS F, failing to meet standard.

Site Access Assessment

The site has frontage along Stottlemeyer Road NE, Port Gamble Road NE and Bond Road NE (SR 307). The majority of the development is anticipated to be developed along the southern portion of the site along Bond Road (SR 307) as well as Stottlemeyer Road NE with most traffic anticipated to travel to and from Bond Road (SR 307).

Typically access to a development of this size would occur through a County roadway that would then have access to Bond Road (SR 307). Stottlemeyer Road NE is currently the only option for this type of access; however, it connects to Bond Road (SR 307) at an obtuse angle that makes left turning maneuvers and sight lines more challenging than a typical right-angle intersection. In addition, the travel volumes on Bond Road (SR 307) are high enough that any moderate level of traffic on the side street would have enough delay to exceed the LOS C operational standards WSDOT has for Bond Road (SR 307).

As described above, SR 307 is a Managed Class 2 roadway. The WSDOT design manual section 540.03(2) defines key characteristics of this road type including:

- Mobility favored over access
- Intersection spacing of a 1/2 mile is desired. Less spacing may be allowed when no reasonable alternative access exists
- Only 1 access connection is allowed for an individual parcel unless the highway frontage exceeds 1,320 feet and it can be shown the additional access will not adversely affect the desired function of the state highway. The site has approximately 4,350 feet of frontage along Bond Road (SR 307).

Access in the preliminary traffic analysis was assumed via Stottlemeyer (north) connecting to Bond Road (SR 307). It is possible that the project may include a northern road connection directly onto Port Gamble Road, but this access was not assumed as the single access provides a more conservative impact at the Bond/Stottlemeyer/Minder Road intersections.

As shown in the operational summary above, assuming the existing traffic control and channelization, the Bond Rd NE (SR 307)/Stottlemeyer Rd NE (North) intersection degrades to operating below standard under future conditions both without and with the project. Additionally, the NE Minder Road (eastern and western) intersections along Bond Road (SR 307) degrade to operate at a LOS F, under PM peak hour conditions.

Improvement options were reviewed at the 3 intersections identified to operate below standard. This initially considered adding turn lanes or refuge lanes to the existing configurations; however, this only resulted in operational improvement to LOS standards at the Bond Rd NE (SR 307)/NE Minder Rd (western) intersection. The level of traffic generated by the development that would need to access Bond (SR 307) would require a traffic signal or roundabout for traffic control.

A number of conditions were considered based on safety, traffic operations, intersection spacing, and other WSDOT requirements. Through these considerations, relocating Stottlemeyer Road NE through the site to align with NE Minder Road was identified as an option to explore further. Aligning these two intersections and providing traffic control such as a traffic signal or roundabout would provide acceptable operations and improve accessibility to Bond Road (SR 307) for areas both north and south of Bond Road (SR 307).

The resulting forecast future (2028) with-project weekday PM peak hour traffic volumes are shown in Figure 11.

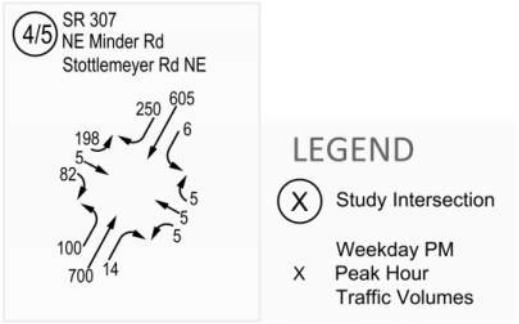


Figure 11. Future (2028) With-Project Traffic Volumes Aligning Bond Rd NE (SR 307)/Stottlemeyer Rd NE/Minder Rd

The resulting traffic operations are summarized in Table 6. Only a traffic signal or roundabout under the aligned configuration resulted in the intersection operations meeting the LOS standards.[4] **Note that further review of design feasibility of the traffic signal and roundabout options needs to be completed. This would also include working with WSDOT to complete an Intersection Control Evaluation and obtain approval permits for this to occur.**

Table 5. Future (2028) With-Project Weekday PM Peak Hour LOS Summary – Improvement Options

Intersection	Traffic Control	2028 With-Project			2028 With-Project (Improvement Option)		
		LOS[1]	Delay[2]	WM[3]	LOS	Delay	WM or v/c ratio[4]
Maintain existing configuration (3-leg) with added TWLTL							
2. NE Minder Rd/Bond Rd NE (SR 307)	TWSC	**F**	**78**	**SB**	**F**	**74**	**SB**
		F	**95**	**NB**	**F**	**89**	**NB**
4. Bond Rd NE (SR 307)/NE Minder Rd	TWSC	**F**	**54**	**WB**	C	22	WB
5. Bond Rd NE (SR 307)/Stottlemeyer Rd NE (North)	TWSC	**F**	**1003**	**EB**	**F**	**163**	**EB**
Align Minder and Stottlemeyer (4-leg):							
4/5. Bond Rd NE (SR 307)/Stottlemeyer Rd NE/Minder Rd	TWSC	-	-	-	**F**	**1,530**	**EB**
	TWSC (with added TWLTL)	-	-	-	**F**	**1,307**	**EB**
	Signal[6]	-	-	-	C	30	-
	RAB	-	-	-	A	8.2	0.81

Note: TWSC = two-way stop controlled. RAB = Roundabout, TWLTL = two-way left-turn lane. Bold text indicates not meeting the LOS standard.
1. Level of Service (A – F) as defined by the *Highway Capacity Manual* (TRB, 7th Edition)
2. Average delay per vehicle in seconds
3. Worst Movement shown for stop controlled intersections. EB = eastbound approach, WB = westbound, NB = northbound, SB = southbound.
4. Volume to capacity (v/c) ratio reported for roundabouts.
5. Roundabout analysis assumes an environmental factor (i.e. driver confusion factor) of 1.1, typical of opening year.
6. Signal warrants were met. See Appendix E.

[4] A signal warrant analysis was performed per Manual on Uniform Traffic Control Devices (MUTCD, 2009 Edition) four-hour and eight-hour signal warrants (Warrants 1-2, respectively per Chapter 4C). Hourly traffic volumes were developed using the future (2028) weekday PM peak hour with-project aligned traffic volumes at the Stottlemeyer/Minder/SR 307 intersection and applying the hourly distribution from the National Cooperative Highway Research Program (NCHRP) Report 365 Travel Estimation Techniques for Urban Planning to evaluate Warrants 1 and 2 using the HCS2023 Software. The signal warrants are included in Appendix E. A traffic signal should not be installed unless one or more of the signal warrants are met, though the satisfaction of a traffic signal warrant or warrants does not itself require the installation of traffic control signal. Both the four-hour nor eight-hour signal warrants were met.

Summary of Findings

General findings of the preliminary transportation assessment for the NKU South Gamble development include:

Land Use Assumptions – For purposes of the transportation assessment the following range of development was reviewed:

- Residential – 80 residential lots with and without a detached accessory dwelling unit (ADU) as permitted in the Rural Residential Zone.
- YMCA regional facility - 80,000 square-feet (sf)
- 6-12 fields as well as supportive uses such as baseball, tennis, pickleball, etc.
- Restaurant - 2,000-4,000 sf anticipated to be high turnover sit down
- Retail – 2,000-4,000 sf strip mall

Trip Generation – The primary weekday daily trips are estimated to range from approximately 3,546 trips to 6,472 trips with between 225 and 407 trips occurring during the weekday AM peak hour and 371 to 690 trips occurring during the weekday PM peak hour.

Traffic Operations – The existing full access side street stop-controlled intersections along Bond Road (SR 307) are shown to operate below the LOS C standard by future (2028) conditions without the project during the weekday PM peak hour due to the high volumes along Bond Road (SR 307). The traffic signals are shown to operate acceptably with additional project traffic, although they are near level of service thresholds.

Access – Access in the preliminary traffic analysis was assumed via Stottlemeyer (north) connecting to Bond Road (SR 307), consistent with where the majority of the traffic generated by the project will desire to travel. Stottlemeyer Road NE currently travels through the site and accesses Bond Road (SR 307); however, occurs at an obtuse angle and operations would fail with just a two way stop controlled intersection. Advanced traffic control such as a traffic signal or roundabout would be necessary. Locating a traffic signal or roundabout along Bond Road (SR 307) needs to be evaluated further in coordination with WSDOT. Initial thoughts would be to further explore aligning Stottlemeyer Road NE with NE Minder Road into one intersection or consider shifting Stottlemeyer Road further south or west of its current location. Note that it is possible that the project may include a northern road connection directly onto Port Gamble Road, but this access was not assumed as the single access provides a more conservative impact at the Bond/Stottlemeyer/Minder Road intersections.

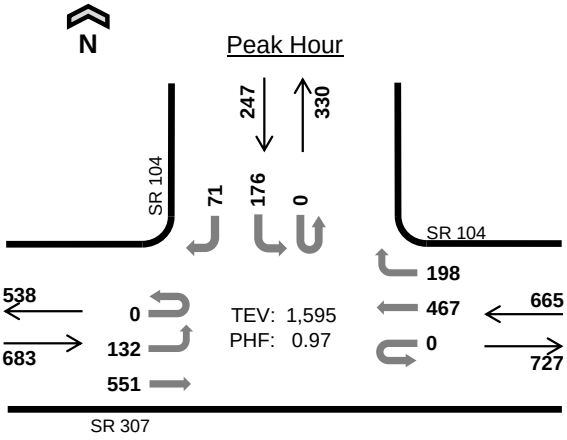
Next Steps/Additional Considerations –

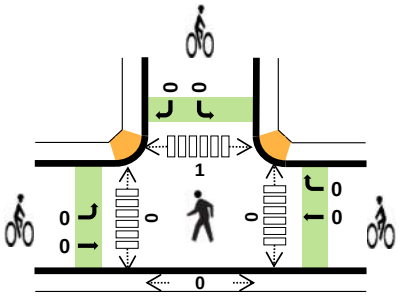
- Explore access alternatives through on-going coordination with WSDOT and design review. This would likely include evaluating options for realigning NE Stottlemeyer Road to either align with NE Minder Road or shifting the Stottlemeyer Road intersection further south.
- Seasonal impacts – the current analysis reflects average (typical) conditions. Higher seasonal impacts during summer months could result in increased delay and additional impacts.
- The above analysis focuses on the weekday PM peak hour condition. Given the proposed recreational field uses which may have peaking conditions outside of the typical weekday PM peak hour condition (e.g. Fridays and/or weekends), additional review of these non-typical periods may be necessary. This could identify the need for event management strategies to address traffic and/or parking concerns.

Appendix A: Traffic Counts

SR 104
SR 307

Date: 10/18/2023
Count Period: 4:00 PM to 6:00 PM
Peak Hour: 4:45 PM to 5:45 PM





	HV %:	PHF
EB	2.2%	0.88
WB	2.4%	0.89
NB	-	-
SB	1.6%	0.95
TOTAL	2.2%	0.97

Two-Hour Count Summaries

Interval Start		SR 307 Eastbound				SR 104 Westbound				0 Northbound				SR 104 Southbound				15-min Total	Rolling One Hour
		UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
4:00 PM		0	22	148	0	0	0	129	56	0	0	0	0	0	15	0	18	388	0
4:15 PM		0	35	133	0	0	0	109	31	0	0	0	0	0	43	0	12	363	0
4:30 PM		0	28	147	0	0	0	121	36	0	0	0	0	0	52	0	10	394	0
4:45 PM		**0**	**36**	**141**	**0**	**0**	**0**	**123**	**48**	**0**	**0**	**0**	**0**	**0**	**47**	**0**	**16**	**411**	1,556
5:00 PM		**0**	**29**	**164**	**0**	**0**	**0**	**107**	**35**	**0**	**0**	**0**	**0**	**0**	**50**	**0**	**10**	**395**	1,563
5:15 PM		**0**	**39**	**109**	**0**	**0**	**0**	**100**	**66**	**0**	**0**	**0**	**0**	**0**	**43**	**0**	**22**	**379**	1,579
5:30 PM		**0**	**28**	**137**	**0**	**0**	**0**	**137**	**49**	**0**	**0**	**0**	**0**	**0**	**36**	**0**	**23**	**410**	**1,595**
5:45 PM		0	12	110	0	0	0	88	33	0	0	0	0	0	41	0	8	292	1,476
Count Total		0	229	1,089	0	0	0	914	354	0	0	0	0	0	327	0	119	3,032	0
Peak Hour	**All**	**0**	**132**	**551**	**0**	**0**	**0**	**467**	**198**	**0**	**0**	**0**	**0**	**0**	**176**	**0**	**71**	**1,595**	**0**
	HV	**0**	**2**	**13**	**0**	**0**	**0**	**13**	**3**	**0**	**0**	**0**	**0**	**0**	**4**	**0**	**0**	**35**	**0**
	HV%	**-**	**2%**	**2%**	**-**	**-**	**-**	**3%**	**2%**	**-**	**-**	**-**	**-**	**-**	**2%**	**-**	**0%**	**2%**	**0**

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

Interval Start	Heavy Vehicle Totals EB	WB	NB	SB	Total	Bicycles EB	WB	NB	SB	Total	Pedestrians (Crossing Leg) East	West	North	South	Total
4:00 PM	0	11	0	1	*12*	0	1	0	0	*1*	0	0	0	0	*0*
4:15 PM	3	6	0	4	*13*	0	0	0	0	*0*	0	0	0	0	*0*
4:30 PM	4	7	0	2	*13*	0	0	0	0	*0*	0	0	0	0	*0*
4:45 PM	**5**	**4**	**0**	**1**	***10***	**0**	**0**	**0**	**0**	***0***	**0**	**0**	**0**	**0**	*0*
5:00 PM	**5**	**3**	**0**	**1**	***9***	**0**	**0**	**0**	**0**	***0***	**0**	**0**	**0**	**0**	*0*
5:15 PM	**4**	**3**	**0**	**1**	***8***	**0**	**0**	**0**	**0**	***0***	**0**	**0**	**0**	**0**	*0*
5:30 PM	**1**	**6**	**0**	**1**	***8***	**0**	**0**	**0**	**0**	***0***	**0**	**0**	**1**	**0**	***1***
5:45 PM	2	6	0	1	*9*	0	0	0	0	*0*	0	0	0	0	*0*
Count Total	24	46	0	12	*82*	0	1	0	0	*1*	0	0	1	0	*1*
Peak Hr	**15**	**16**	**0**	**4**	***35***	**0**	**0**	**0**	**0**	***0***	**0**	**0**	**1**	**0**	***1***

Two-Hour Count Summaries - Heavy Vehicles

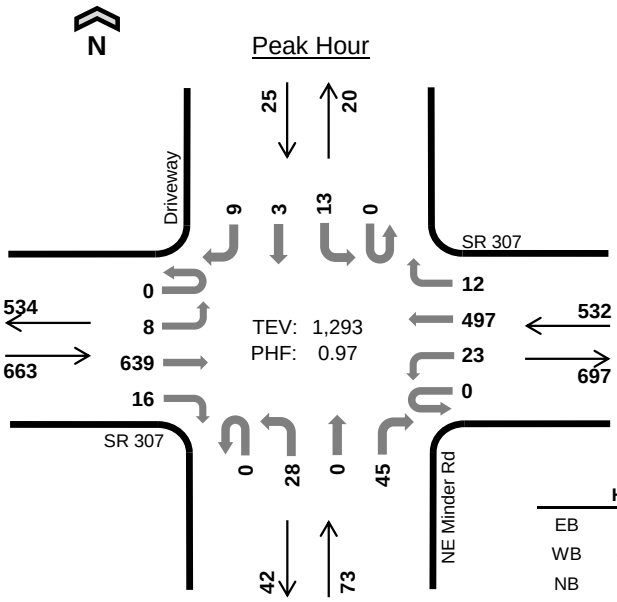
Interval Start	SR 307 Eastbound				SR 104 Westbound				0 Northbound				SR 104 Southbound				15-min Total	Rolling One Hour
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
4:00 PM	0	0	0	0	0	0	5	6	0	0	0	0	0	0	0	1	12	0
4:15 PM	0	0	3	0	0	0	4	2	0	0	0	0	0	3	0	1	13	0
4:30 PM	0	1	3	0	0	0	7	0	0	0	0	0	0	2	0	0	13	0
4:45 PM	**0**	**2**	**3**	**0**	**0**	**0**	**4**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**10**	48
5:00 PM	**0**	**0**	**5**	**0**	**0**	**0**	**3**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**9**	45
5:15 PM	**0**	**0**	**4**	**0**	**0**	**0**	**2**	**1**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**8**	40
5:30 PM	**0**	**0**	**1**	**0**	**0**	**0**	**4**	**2**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**8**	**35**
5:45 PM	0	0	2	0	0	0	5	1	0	0	0	0	0	1	0	0	9	34
Count Total	0	3	21	0	0	0	34	12	0	0	0	0	0	10	0	2	82	0
Peak Hour	**0**	**2**	**13**	**0**	**0**	**0**	**13**	**3**	**0**	**0**	**0**	**0**	**0**	**4**	**0**	**0**	**35**	**0**

Two-Hour Count Summaries - Bikes

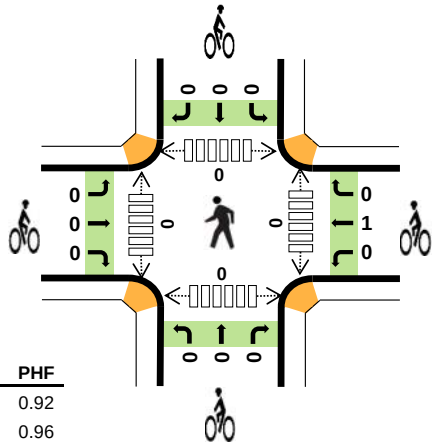
Interval Start	SR 307 Eastbound			SR 104 Westbound			0 Northbound			SR 104 Southbound			15-min Total	Rolling One Hour
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT		
4:00 PM	0	0	0	0	1	0	0	0	0	0	0	0	1	0
4:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:45 PM	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	1
5:00 PM	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	0
5:15 PM	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	0
5:30 PM	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
5:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Count Total	0	0	0	0	1	0	0	0	0	0	0	0	1	0
Peak Hour	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

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

NE Minder Rd
SR 307



Date: 10/18/2023
Count Period: 4:00 PM to 6:00 PM
Peak Hour: 4:00 PM to 5:00 PM



	HV %:	PHF
EB	1.8%	0.92
WB	4.1%	0.96
NB	1.4%	0.76
SB	4.0%	0.63
TOTAL	2.8%	0.97

Two-Hour Count Summaries

Interval Start		SR 307 Eastbound				SR 307 Westbound				NE Minder Rd Northbound				Driveway Southbound				15-min Total	Rolling One Hour
		UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
4:00 PM		**0**	**2**	**175**	**3**	**0**	**9**	**126**	**2**	**0**	**5**	**0**	**6**	**0**	**3**	**0**	**3**	**334**	0
4:15 PM		**0**	**3**	**151**	**2**	**0**	**5**	**113**	**4**	**0**	**12**	**0**	**11**	**0**	**5**	**3**	**2**	**311**	0
4:30 PM		**0**	**1**	**144**	**3**	**0**	**4**	**131**	**4**	**0**	**9**	**0**	**15**	**0**	**4**	**0**	**1**	**316**	0
4:45 PM		**0**	**2**	**169**	**8**	**0**	**5**	**127**	**2**	**0**	**2**	**0**	**13**	**0**	**1**	**0**	**3**	**332**	**1,293**
5:00 PM		0	1	176	1	0	4	110	2	0	10	0	10	0	4	1	4	323	1,282
5:15 PM		0	3	135	1	0	8	116	1	0	1	1	3	0	2	1	2	274	1,245
5:30 PM		0	2	151	1	0	9	147	4	0	1	0	7	0	3	2	5	332	1,261
5:45 PM		0	7	125	0	0	3	93	3	0	0	0	7	0	1	1	1	241	1,170
Count Total		0	21	1,226	19	0	47	963	22	0	40	1	72	0	23	8	21	2,463	0
Peak Hour	**All**	**0**	**8**	**639**	**16**	**0**	**23**	**497**	**12**	**0**	**28**	**0**	**45**	**0**	**13**	**3**	**9**	**1,293**	**0**
	HV	**0**	**0**	**9**	**3**	**0**	**1**	**21**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**1**	**36**	**0**
	HV%	**-**	**0%**	**1%**	**19%**	**-**	**4%**	**4%**	**0%**	**-**	**0%**	**-**	**2%**	**-**	**0%**	**0%**	**11%**	**3%**	**0**

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

Interval Start	Heavy Vehicle Totals					Bicycles					Pedestrians (Crossing Leg)				
	EB	WB	NB	SB	Total	EB	WB	NB	SB	Total	East	West	North	South	Total
4:00 PM	**0**	**6**	**1**	**0**	***7***	**0**	**0**	**0**	**0**	***0***	**0**	**0**	**0**	**0**	*0*
4:15 PM	**1**	**5**	**0**	**1**	***7***	**0**	**1**	**0**	**0**	***1***	**0**	**0**	**0**	**0**	*0*
4:30 PM	**6**	**8**	**0**	**0**	***14***	**0**	**0**	**0**	**0**	***0***	**0**	**0**	**0**	**0**	*0*
4:45 PM	**5**	**3**	**0**	**0**	***8***	**0**	**0**	**0**	**0**	***0***	**0**	**0**	**0**	**0**	***0***
5:00 PM	4	4	1	0	*9*	0	0	0	0	*0*	0	0	0	0	*0*
5:15 PM	1	2	0	0	*3*	0	0	0	0	*0*	0	0	0	0	*0*
5:30 PM	1	4	0	0	*5*	0	0	0	0	*0*	0	0	0	0	*0*
5:45 PM	1	4	0	0	*5*	0	0	0	0	*0*	0	0	0	0	*0*
Count Total	19	36	2	1	*58*	0	1	0	0	*1*	0	0	0	0	*0*
Peak Hour	**12**	**22**	**1**	**1**	***36***	**0**	**1**	**0**	**0**	***1***	**0**	**0**	**0**	**0**	***0***

Two-Hour Count Summaries - Heavy Vehicles

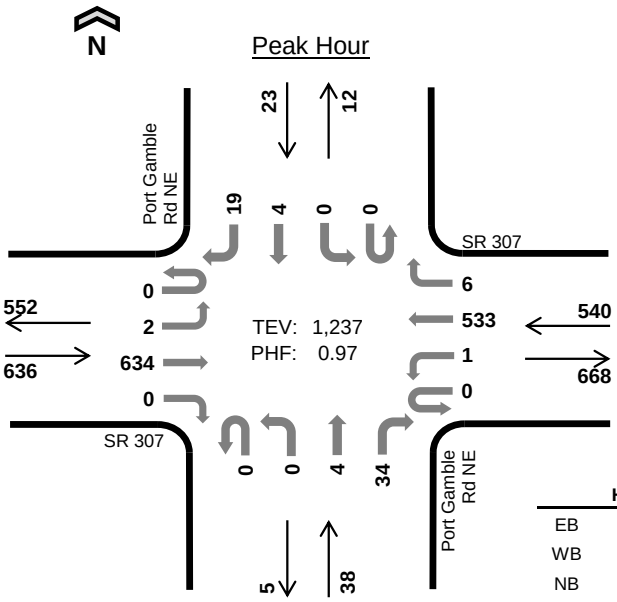
Interval Start	SR 307 Eastbound				SR 307 Westbound				NE Minder Rd Northbound				Driveway Southbound				15-min Total	Rolling One Hour
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
4:00 PM	**0**	**0**	**0**	**0**	**0**	**0**	**6**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**7**	0
4:15 PM	**0**	**0**	**1**	**0**	**0**	**0**	**5**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**7**	0
4:30 PM	**0**	**0**	**4**	**2**	**0**	**1**	**7**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**14**	0
4:45 PM	**0**	**0**	**4**	**1**	**0**	**0**	**3**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**8**	**36**
5:00 PM	0	0	4	0	0	0	4	0	0	0	0	1	0	0	0	0	9	38
5:15 PM	0	0	1	0	0	0	2	0	0	0	0	0	0	0	0	0	3	34
5:30 PM	0	0	1	0	0	0	4	0	0	0	0	0	0	0	0	0	5	25
5:45 PM	0	0	1	0	0	0	4	0	0	0	0	0	0	0	0	0	5	22
Count Total	0	0	16	3	0	1	35	0	0	0	0	2	0	0	0	1	58	0
Peak Hour	**0**	**0**	**9**	**3**	**0**	**1**	**21**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**1**	**36**	**0**

Two-Hour Count Summaries - Bikes

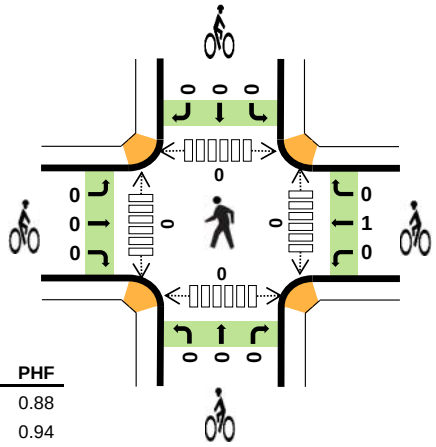
Interval Start	SR 307 Eastbound			SR 307 Westbound			NE Minder Rd Northbound			Driveway Southbound			15-min Total	Rolling One Hour
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT		
4:00 PM	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	0
4:15 PM	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	0
4:30 PM	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	0
4:45 PM	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**
5:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	1
5:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Count Total	0	0	0	0	1	0	0	0	0	0	0	0	1	0
Peak Hour	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0**

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

Port Gamble Rd NE
SR 307



Date: 10/18/2023
Count Period: 4:00 PM to 6:00 PM
Peak Hour: 4:15 PM to 5:15 PM



	HV %:	PHF
EB	2.8%	0.88
WB	3.9%	0.94
NB	7.9%	0.68
SB	8.7%	0.82
TOTAL	3.6%	0.97

Two-Hour Count Summaries

Interval Start		SR 307 Eastbound				SR 307 Westbound				Port Gamble Rd NE Northbound				Port Gamble Rd NE Southbound				15-min Total	Rolling One Hour
		UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
4:00 PM		0	0	158	0	0	0	141	3	0	0	1	4	0	0	1	4	312	0
4:15 PM		**0**	**0**	**143**	**0**	**0**	**0**	**129**	**2**	**0**	**0**	**1**	**11**	**0**	**0**	**2**	**3**	**291**	0
4:30 PM		**0**	**0**	**157**	**0**	**0**	**0**	**144**	**0**	**0**	**0**	**0**	**5**	**0**	**0**	**0**	**7**	**313**	0
4:45 PM		**0**	**1**	**154**	**0**	**0**	**0**	**137**	**2**	**0**	**0**	**1**	**13**	**0**	**0**	**1**	**4**	**313**	1,229
5:00 PM		**0**	**1**	**180**	**0**	**0**	**1**	**123**	**2**	**0**	**0**	**2**	**5**	**0**	**0**	**1**	**5**	**320**	**1,237**
5:15 PM		0	0	136	0	0	0	129	2	0	0	1	6	0	0	0	4	278	1,224
5:30 PM		0	1	142	0	0	0	151	0	0	0	0	17	0	0	1	6	318	1,229
5:45 PM		0	0	121	0	0	0	93	0	0	0	1	4	0	0	0	5	224	1,140
Count Total		0	3	1,191	0	0	1	1,047	11	0	0	7	65	0	0	6	38	2,369	0
Peak Hour	**All**	**0**	**2**	**634**	**0**	**0**	**1**	**533**	**6**	**0**	**0**	**4**	**34**	**0**	**0**	**4**	**19**	**1,237**	**0**
	HV	**0**	**0**	**18**	**0**	**0**	**0**	**20**	**1**	**0**	**0**	**0**	**3**	**0**	**0**	**0**	**2**	**44**	**0**
	HV%	**-**	**0%**	**3%**	**-**	**-**	**0%**	**4%**	**17%**	**-**	**-**	**0%**	**9%**	**-**	**-**	**0%**	**11%**	**4%**	**0**

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

Interval Start	Heavy Vehicle Totals					Bicycles					Pedestrians (Crossing Leg)				
	EB	WB	NB	SB	Total	EB	WB	NB	SB	Total	East	West	North	South	Total
4:00 PM	0	6	0	1	*7*	0	0	1	0	*1*	0	0	0	0	*0*
4:15 PM	**2**	**6**	**1**	**0**	***9***	**0**	**1**	**0**	**0**	***1***	**0**	**0**	**0**	**0**	*0*
4:30 PM	**6**	**7**	**1**	**2**	***16***	**0**	**0**	**0**	**0**	***0***	**0**	**0**	**0**	**0**	*0*
4:45 PM	**5**	**5**	**0**	**0**	***10***	**0**	**0**	**0**	**0**	***0***	**0**	**0**	**0**	**0**	*0*
5:00 PM	**5**	**3**	**1**	**0**	***9***	**0**	**0**	**0**	**0**	***0***	**0**	**0**	**0**	**0**	***0***
5:15 PM	2	2	0	0	*4*	0	0	0	0	*0*	0	0	0	0	*0*
5:30 PM	1	3	1	0	*5*	0	1	0	0	*1*	0	0	0	0	*0*
5:45 PM	2	4	0	0	*6*	0	0	0	0	*0*	0	0	0	0	*0*
Count Total	23	36	4	3	*66*	0	2	1	0	*3*	0	0	0	0	*0*
Peak Hour	**18**	**21**	**3**	**2**	***44***	**0**	**1**	**0**	**0**	***1***	**0**	**0**	**0**	**0**	***0***

Two-Hour Count Summaries - Heavy Vehicles

Interval Start	SR 307 Eastbound				SR 307 Westbound				Port Gamble Rd NE Northbound				Port Gamble Rd NE Southbound				15-min Total	Rolling One Hour
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
4:00 PM	0	0	0	0	0	0	6	0	0	0	0	0	0	0	1	0	7	0
4:15 PM	**0**	**0**	**2**	**0**	**0**	**0**	**5**	**1**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**9**	0
4:30 PM	**0**	**0**	**6**	**0**	**0**	**0**	**7**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**2**	**16**	0
4:45 PM	**0**	**0**	**5**	**0**	**0**	**0**	**5**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**10**	42
5:00 PM	**0**	**0**	**5**	**0**	**0**	**0**	**3**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**9**	**44**
5:15 PM	0	0	2	0	0	0	2	0	0	0	0	0	0	0	0	0	4	39
5:30 PM	0	0	1	0	0	0	3	0	0	0	0	1	0	0	0	0	5	28
5:45 PM	0	0	2	0	0	0	4	0	0	0	0	0	0	0	0	0	6	24
Count Total	0	0	23	0	0	0	35	1	0	0	0	4	0	0	1	2	66	0
Peak Hour	**0**	**0**	**18**	**0**	**0**	**0**	**20**	**1**	**0**	**0**	**0**	**3**	**0**	**0**	**0**	**2**	**44**	**0**

Two-Hour Count Summaries - Bikes

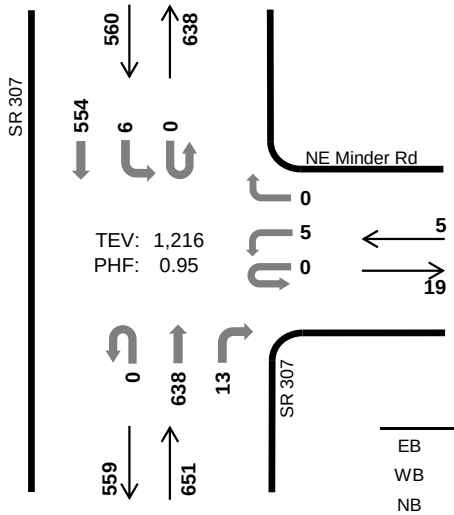
Interval Start	SR 307 Eastbound			SR 307 Westbound			Port Gamble Rd NE Northbound			Port Gamble Rd NE Southbound			15-min Total	Rolling One Hour
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT		
4:00 PM	0	0	0	0	0	0	0	1	0	0	0	0	1	0
4:15 PM	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	0
4:30 PM	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	0
4:45 PM	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	2
5:00 PM	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**
5:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:30 PM	0	0	0	0	1	0	0	0	0	0	0	0	1	1
5:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Count Total	0	0	0	0	2	0	0	1	0	0	0	0	3	0
Peak Hour	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0**

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

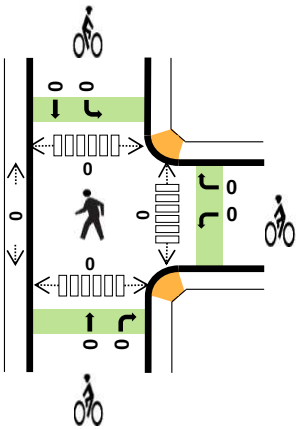
SR 307
NE Minder Rd

Date: 10/18/2023
Count Period: 4:00 PM to 6:00 PM
Peak Hour: 4:15 PM to 5:15 PM

Peak Hour



	HV %:	PHF
EB	-	-
WB	0.0%	0.42
NB	2.5%	0.86
SB	3.4%	0.91
TOTAL	2.9%	0.95



Two-Hour Count Summaries

Interval Start		0 Eastbound				NE Minder Rd Westbound				SR 307 Northbound				SR 307 Southbound				15-min Total	Rolling One Hour
		UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
4:00 PM		0	0	0	0	0	2	0	0	0	0	161	4	0	4	142	0	313	0
4:15 PM		**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**143**	**4**	**0**	**1**	**130**	**0**	**278**	0
4:30 PM		**0**	**0**	**0**	**0**	**0**	**3**	**0**	**0**	**0**	**0**	**154**	**1**	**0**	**4**	**150**	**0**	**312**	0
4:45 PM		**0**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**158**	**2**	**0**	**1**	**145**	**0**	**307**	1,210
5:00 PM		**0**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**183**	**6**	**0**	**0**	**129**	**0**	**319**	**1,216**
5:15 PM		0	0	0	0	0	2	0	0	0	0	133	2	0	1	128	0	266	1,204
5:30 PM		0	0	0	0	0	1	0	0	0	0	145	3	0	2	154	0	305	1,197
5:45 PM		0	0	0	0	0	1	0	0	0	0	124	0	0	0	102	0	227	1,117
Count Total		0	0	0	0	0	11	0	0	0	0	1,201	22	0	13	1,080	0	2,327	0
Peak Hour	**All**	**0**	**0**	**0**	**0**	**0**	**5**	**0**	**0**	**0**	**0**	**638**	**13**	**0**	**6**	**554**	**0**	**1,216**	**0**
	HV	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**15**	**1**	**0**	**0**	**19**	**0**	**35**	**0**
	HV%	**-**	**-**	**-**	**-**	**-**	**0%**	**-**	**-**	**-**	**-**	**2%**	**8%**	**-**	**0%**	**3%**	**-**	**3%**	**0**

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

Interval Start	Heavy Vehicle Totals					Bicycles					Pedestrians (Crossing Leg)				
	EB	WB	NB	SB	Total	EB	WB	NB	SB	Total	East	West	North	South	Total
4:00 PM	0	0	0	6	*6*	0	0	0	1	*1*	0	0	0	0	*0*
4:15 PM	**0**	**0**	**3**	**4**	***7***	**0**	**0**	**0**	**0**	***0***	**0**	**0**	**0**	**0**	*0*
4:30 PM	**0**	**0**	**5**	**8**	***13***	**0**	**0**	**0**	**0**	***0***	**0**	**0**	**0**	**0**	*0*
4:45 PM	**0**	**0**	**4**	**5**	***9***	**0**	**0**	**0**	**0**	***0***	**0**	**0**	**0**	**0**	*0*
5:00 PM	**0**	**0**	**4**	**2**	***6***	**0**	**0**	**0**	**0**	***0***	**0**	**0**	**0**	**0**	***0***
5:15 PM	0	0	2	2	*4*	0	0	0	0	*0*	0	0	0	0	*0*
5:30 PM	0	0	1	3	*4*	0	0	0	0	*0*	0	0	0	0	*0*
5:45 PM	0	0	2	3	*5*	0	0	0	0	*0*	0	0	0	0	*0*
Count Total	0	0	21	33	*54*	0	0	0	1	*1*	0	0	0	0	*0*
Peak Hr	**0**	**0**	**16**	**19**	***35***	**0**	**0**	**0**	**0**	***0***	**0**	**0**	**0**	**0**	***0***

Two-Hour Count Summaries - Heavy Vehicles

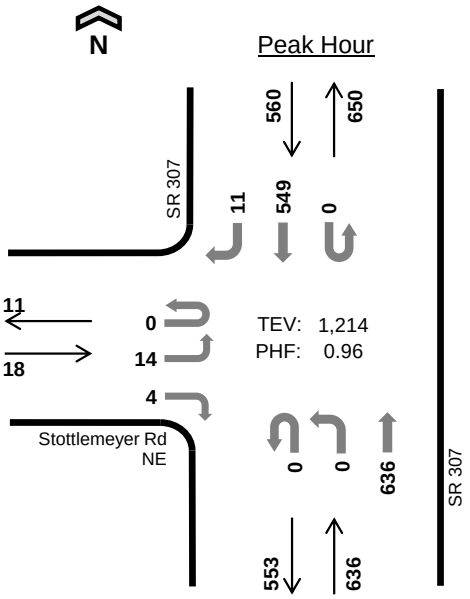
Interval Start	0				NE Minder Rd				SR 307				SR 307				15-min Total	Rolling One Hour
	Eastbound				Westbound				Northbound				Southbound					
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
4:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	0	6	0
4:15 PM	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**2**	**1**	**0**	**0**	**4**	**0**	**7**	0
4:30 PM	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**5**	**0**	**0**	**0**	**8**	**0**	**13**	0
4:45 PM	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**4**	**0**	**0**	**0**	**5**	**0**	**9**	35
5:00 PM	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**4**	**0**	**0**	**0**	**2**	**0**	**6**	**35**
5:15 PM	0	0	0	0	0	0	0	0	0	0	2	0	0	0	2	0	4	32
5:30 PM	0	0	0	0	0	0	0	0	0	0	1	0	0	0	3	0	4	23
5:45 PM	0	0	0	0	0	0	0	0	0	0	2	0	0	0	3	0	5	19
Count Total	0	0	0	0	0	0	0	0	0	0	20	1	0	0	33	0	54	0
Peak Hour	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**15**	**1**	**0**	**0**	**19**	**0**	**35**	**0**

Two-Hour Count Summaries - Bikes

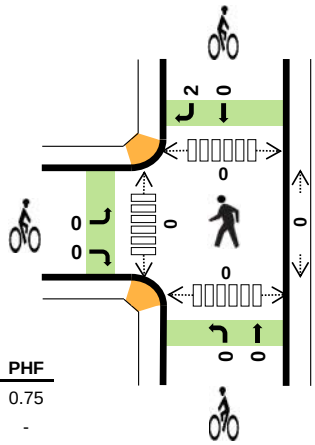
Interval Start	0			NE Minder Rd			SR 307			SR 307			15-min Total	Rolling One Hour
	Eastbound			Westbound			Northbound			Southbound				
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT		
4:00 PM	0	0	0	0	0	0	0	0	0	1	0	0	1	0
4:15 PM	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	0
4:30 PM	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	0
4:45 PM	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	1
5:00 PM	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
5:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Count Total	0	0	0	0	0	0	0	0	0	1	0	0	1	0
Peak Hour	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

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

SR 307
Stottlemeyer Rd NE



Date: 10/18/2023
Count Period: 4:00 PM to 6:00 PM
Peak Hour: 4:15 PM to 5:15 PM



	HV %:	PHF
EB	5.6%	0.75
WB	-	-
NB	3.0%	0.85
SB	3.2%	0.92
TOTAL	3.1%	0.96

Two-Hour Count Summaries

Interval Start		Stottlemeyer Rd NE Eastbound				0 Westbound				SR 307 Northbound				SR 307 Southbound				15-min Total	Rolling One Hour
		UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
4:00 PM		0	4	0	0	0	0	0	0	0	1	161	0	0	0	136	5	307	0
4:15 PM		**0**	**5**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**145**	**0**	**0**	**0**	**125**	**5**	**280**	0
4:30 PM		**0**	**2**	**0**	**2**	**0**	**0**	**0**	**0**	**0**	**0**	**153**	**0**	**0**	**0**	**150**	**3**	**310**	0
4:45 PM		**0**	**5**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**152**	**0**	**0**	**0**	**147**	**3**	**308**	1,205
5:00 PM		**0**	**2**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**186**	**0**	**0**	**0**	**127**	**0**	**316**	**1,214**
5:15 PM		0	2	0	0	0	0	0	0	0	0	137	0	0	0	120	6	265	1,199
5:30 PM		0	1	0	0	0	0	0	0	0	0	143	0	0	0	151	6	301	1,190
5:45 PM		0	0	0	1	0	0	0	0	0	0	123	0	0	0	101	5	230	1,112
Count Total		0	21	0	5	0	0	0	0	0	1	1,200	0	0	0	1,057	33	2,317	0
Peak Hour	**All**	**0**	**14**	**0**	**4**	**0**	**0**	**0**	**0**	**0**	**0**	**636**	**0**	**0**	**0**	**549**	**11**	**1,214**	**0**
	HV	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**19**	**0**	**0**	**0**	**17**	**1**	**38**	**0**
	HV%	**-**	**7%**	**-**	**0%**	**-**	**-**	**-**	**-**	**-**	**-**	**3%**	**-**	**-**	**-**	**3%**	**9%**	**3%**	**0**

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

Interval Start	Heavy Vehicle Totals					Bicycles					Pedestrians (Crossing Leg)				
	EB	WB	NB	SB	Total	EB	WB	NB	SB	Total	East	West	North	South	Total
4:00 PM	0	0	1	8	*9*	0	0	0	0	*0*	0	0	0	0	*0*
4:15 PM	**1**	**0**	**4**	**4**	***9***	**0**	**0**	**0**	**1**	***1***	**0**	**0**	**0**	**0**	*0*
4:30 PM	**0**	**0**	**3**	**9**	***12***	**0**	**0**	**0**	**0**	***0***	**0**	**0**	**0**	**0**	*0*
4:45 PM	**0**	**0**	**6**	**5**	***11***	**0**	**0**	**0**	**0**	***0***	**0**	**0**	**0**	**0**	*0*
5:00 PM	**0**	**0**	**6**	**0**	***6***	**0**	**0**	**0**	**1**	***1***	**0**	**0**	**0**	**0**	***0***
5:15 PM	0	0	4	2	*6*	0	0	0	0	*0*	0	0	0	0	*0*
5:30 PM	0	0	2	3	*5*	0	0	0	1	*1*	0	0	0	0	*0*
5:45 PM	0	0	1	3	*4*	0	0	0	0	*0*	0	0	0	0	*0*
Count Total	1	0	27	34	*62*	0	0	0	3	*3*	0	0	0	0	*0*
Peak Hr	**1**	**0**	**19**	**18**	***38***	**0**	**0**	**0**	**2**	***2***	**0**	**0**	**0**	**0**	***0***

Two-Hour Count Summaries - Heavy Vehicles

Interval Start	Stottlemeyer Rd NE				0				SR 307				SR 307				15-min Total	Rolling One Hour
	Eastbound				Westbound				Northbound				Southbound					
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
4:00 PM	0	0	0	0	0	0	0	0	0	0	1	0	0	0	8	0	9	0
4:15 PM	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**4**	**0**	**0**	**0**	**4**	**0**	**9**	0
4:30 PM	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**3**	**0**	**0**	**0**	**9**	**0**	**12**	0
4:45 PM	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**6**	**0**	**0**	**0**	**4**	**1**	**11**	41
5:00 PM	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**6**	**0**	**0**	**0**	**0**	**0**	**6**	**38**
5:15 PM	0	0	0	0	0	0	0	0	0	0	4	0	0	0	2	0	6	35
5:30 PM	0	0	0	0	0	0	0	0	0	0	2	0	0	0	3	0	5	28
5:45 PM	0	0	0	0	0	0	0	0	0	0	1	0	0	0	3	0	4	21
Count Total	0	1	0	0	0	0	0	0	0	0	27	0	0	0	33	1	62	0
Peak Hour	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**19**	**0**	**0**	**0**	**17**	**1**	**38**	**0**

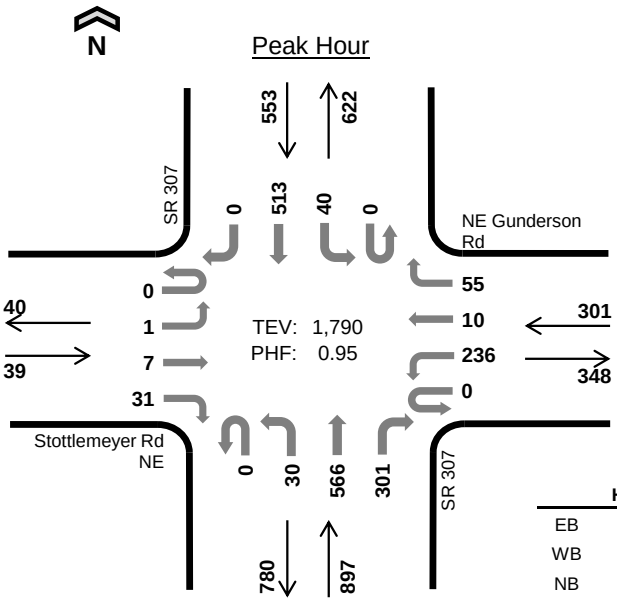
Two-Hour Count Summaries - Bikes

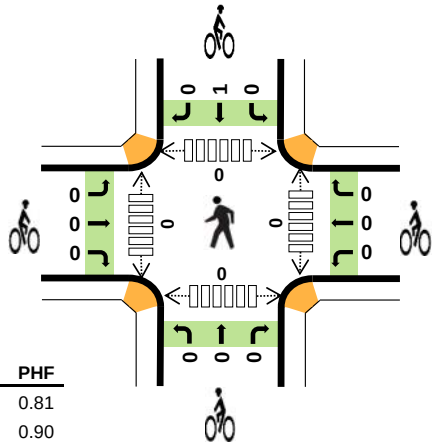
Interval Start	Stottlemeyer Rd NE			0			SR 307			SR 307			15-min Total	Rolling One Hour
	Eastbound			Westbound			Northbound			Southbound				
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT		
4:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:15 PM	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**1**	0
4:30 PM	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	0
4:45 PM	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	1
5:00 PM	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**1**	**2**
5:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	1
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	1	1	2
5:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Count Total	0	0	0	0	0	0	0	0	0	0	0	3	3	0
Peak Hour	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**2**	**2**	**0**

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

SR 307
NE Gunderson Rd

Date: 10/18/2023
Count Period: 4:00 PM to 6:00 PM
Peak Hour: 4:00 PM to 5:00 PM





	HV %:	PHF
EB	5.1%	0.81
WB	3.0%	0.90
NB	2.1%	0.88
SB	4.2%	0.90
TOTAL	3.0%	0.95

Two-Hour Count Summaries

Interval Start		Stottlemeyer Rd NE				NE Gunderson Rd				SR 307				SR 307				15-min Total	Rolling One Hour
		Eastbound				Westbound				Northbound				Southbound					
		UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
4:00 PM		**0**	**0**	**3**	**6**	**0**	**57**	**2**	**15**	**0**	**10**	**150**	**96**	**0**	**9**	**119**	**0**	**467**	0
4:15 PM		**0**	**0**	**0**	**7**	**0**	**62**	**4**	**7**	**0**	**8**	**125**	**60**	**0**	**7**	**134**	**0**	**414**	0
4:30 PM		**0**	**1**	**2**	**9**	**0**	**69**	**1**	**14**	**0**	**7**	**133**	**71**	**0**	**12**	**119**	**0**	**438**	0
4:45 PM		**0**	**0**	**2**	**9**	**0**	**48**	**3**	**19**	**0**	**5**	**158**	**74**	**0**	**12**	**141**	**0**	**471**	**1,790**
5:00 PM		0	1	1	2	0	58	3	13	0	2	160	66	0	9	117	0	432	1,755
5:15 PM		0	0	4	6	0	77	1	12	0	1	129	77	0	18	102	1	428	1,769
5:30 PM		0	0	2	4	0	50	1	8	0	7	121	66	0	15	136	0	410	1,741
5:45 PM		0	0	3	4	0	36	2	13	0	11	113	66	0	8	97	2	355	1,625
Count Total		0	2	17	47	0	457	17	101	0	51	1,089	576	0	90	965	3	3,415	0
Peak Hour	**All**	**0**	**1**	**7**	**31**	**0**	**236**	**10**	**55**	**0**	**30**	**566**	**301**	**0**	**40**	**513**	**0**	**1,790**	**0**
	HV	**0**	**0**	**0**	**2**	**0**	**1**	**2**	**6**	**0**	**2**	**10**	**7**	**0**	**6**	**17**	**0**	**53**	**0**
	HV%	**-**	**0%**	**0%**	**6%**	**-**	**0%**	**20%**	**11%**	**-**	**7%**	**2%**	**2%**	**-**	**15%**	**3%**	**-**	**3%**	**0**

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

Interval Start	Heavy Vehicle Totals					Bicycles					Pedestrians (Crossing Leg)				
	EB	WB	NB	SB	Total	EB	WB	NB	SB	Total	East	West	North	South	Total
4:00 PM	**1**	**4**	**5**	**6**	***16***	**0**	**0**	**0**	**0**	***0***	**0**	**0**	**0**	**0**	*0*
4:15 PM	**1**	**2**	**4**	**5**	***12***	**0**	**0**	**0**	**1**	***1***	**0**	**0**	**0**	**0**	*0*
4:30 PM	**0**	**0**	**6**	**7**	***13***	**0**	**0**	**0**	**0**	***0***	**0**	**0**	**0**	**0**	*0*
4:45 PM	**0**	**3**	**4**	**5**	***12***	**0**	**0**	**0**	**0**	***0***	**0**	**0**	**0**	**0**	***0***
5:00 PM	1	3	4	3	*11*	1	1	0	0	*2*	0	0	0	0	*0*
5:15 PM	0	1	4	2	*7*	0	0	0	0	*0*	0	0	0	0	*0*
5:30 PM	0	2	1	4	*7*	1	0	0	0	*1*	0	0	0	0	*0*
5:45 PM	0	2	4	3	*9*	0	0	0	0	*0*	0	0	0	0	*0*
Count Total	3	17	32	35	*87*	2	1	0	1	*4*	0	0	0	0	*0*
Peak Hour	**2**	**9**	**19**	**23**	***53***	**0**	**0**	**0**	**1**	***1***	**0**	**0**	**0**	**0**	***0***

Two-Hour Count Summaries - Heavy Vehicles

Interval Start	Stottlemeyer Rd NE				NE Gunderson Rd				SR 307				SR 307				15-min Total	Rolling One Hour
	Eastbound				Westbound				Northbound				Southbound					
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
4:00 PM	**0**	**0**	**0**	**1**	**0**	**1**	**0**	**3**	**0**	**0**	**1**	**4**	**0**	**2**	**4**	**0**	**16**	0
4:15 PM	**0**	**0**	**0**	**1**	**0**	**0**	**2**	**0**	**0**	**1**	**3**	**0**	**0**	**2**	**3**	**0**	**12**	0
4:30 PM	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**5**	**0**	**0**	**1**	**6**	**0**	**13**	0
4:45 PM	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**3**	**0**	**0**	**1**	**3**	**0**	**1**	**4**	**0**	**12**	**53**
5:00 PM	0	0	1	0	0	3	0	0	0	0	4	0	0	0	3	0	11	48
5:15 PM	0	0	0	0	0	1	0	0	0	0	2	2	0	0	2	0	7	43
5:30 PM	0	0	0	0	0	2	0	0	0	0	1	0	0	0	4	0	7	37
5:45 PM	0	0	0	0	0	1	0	1	0	0	2	2	0	0	3	0	9	34
Count Total	0	0	1	2	0	8	2	7	0	2	19	11	0	6	29	0	87	0
Peak Hour	**0**	**0**	**0**	**2**	**0**	**1**	**2**	**6**	**0**	**2**	**10**	**7**	**0**	**6**	**17**	**0**	**53**	**0**

Two-Hour Count Summaries - Bikes

Interval Start	Stottlemeyer Rd NE			NE Gunderson Rd			SR 307			SR 307			15-min Total	Rolling One Hour
	Eastbound			Westbound			Northbound			Southbound				
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT		
4:00 PM	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	0
4:15 PM	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**1**	0
4:30 PM	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	0
4:45 PM	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**
5:00 PM	0	1	0	0	1	0	0	0	0	0	0	0	2	3
5:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	2
5:30 PM	0	0	1	0	0	0	0	0	0	0	0	0	1	3
5:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	3
Count Total	0	1	1	0	1	0	0	0	0	0	1	0	4	0
Peak Hour	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**1**	**0**

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

Appendix B: LOS Definitions

Highway Capacity Manual 7th Edition

Signalized intersection level of service (LOS) is defined in terms of a weighted average control delay for the entire intersection. Control delay quantifies the increase in travel time that a vehicle experiences due to the traffic signal control as well as provides a surrogate measure for driver discomfort and fuel consumption. Signalized intersection LOS is stated in terms of average control delay per vehicle (in seconds) during a specified time period (e.g., weekday PM peak hour). Control delay is a complex measure based on many variables, including signal phasing and coordination (i.e., progression of movements through the intersection and along the corridor), signal cycle length, and traffic volumes with respect to intersection capacity and resulting queues. Table 1 summarizes the LOS criteria for signalized intersections, as described in the *Highway Capacity Manual* 7th Edition (Transportation Research Board, 2023).

Table 1. Level of Service Criteria for Signalized Intersections

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

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

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

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

Table 2. Level of Service Criteria for Unsignalized Intersections

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

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

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

Appendix C: LOS Worksheets

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	132	551	467	198	176	71
Future Volume (veh/h)	132	551	467	198	176	71
Initial Q (Qb), veh	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00
Ped-Bike Adj(A_pbT)	1.00			1.00	1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No	No		No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	136	568	481	204	181	73
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	180	1111	764	647	235	95
Arrive On Green	0.10	0.59	0.41	0.41	0.19	0.19
Sat Flow, veh/h	1781	1870	1870	1583	1221	493
Grp Volume(v), veh/h	136	568	481	204	255	0
Grp Sat Flow(s),veh/h/ln	1781	1870	1870	1583	1721	0
Q Serve(g_s), s	4.0	9.4	10.9	4.7	7.5	0.0
Cycle Q Clear(g_c), s	4.0	9.4	10.9	4.7	7.5	0.0
Prop In Lane	1.00			1.00	0.71	0.29
Lane Grp Cap(c), veh/h	180	1111	764	647	331	0
V/C Ratio(X)	0.75	0.51	0.63	0.32	0.77	0.00
Avail Cap(c_a), veh/h	852	1906	1906	1613	1430	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	23.3	6.3	12.6	10.7	20.4	0.0
Incr Delay (d2), s/veh	5.7	0.9	2.0	0.7	4.6	0.0
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.7	2.1	3.7	1.3	2.9	0.0
Unsig. Movement Delay, s/veh						
LnGrp Delay(d), s/veh	29.0	7.2	14.6	11.4	25.0	0.0
LnGrp LOS	C	A	B	B	C	
Approach Vol, veh/h		704	685		255	
Approach Delay, s/veh		11.4	13.6		25.0	
Approach LOS		B	B		C	

Timer - Assigned Phs	1	2			6	8
Phs Duration (G+Y+Rc), s	9.9	27.5			37.4	15.9
Change Period (Y+Rc), s	4.5	5.7			5.7	5.7
Max Green Setting (Gmax), s	25.5	54.3			54.3	44.3
Max Q Clear Time (g_c+I1), s	6.0	12.9			11.4	9.5
Green Ext Time (p_c), s	0.3	8.8			8.4	1.0

Intersection Summary	
HCM 7th Control Delay, s/veh	14.4
HCM 7th LOS	B

Notes

User approved volume balancing among the lanes for turning movement.

Intersection	
Int Delay, s/veh	2.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	8	639	16	23	497	12	28	0	45	13	3	9
Future Vol, veh/h	8	639	16	23	497	12	28	0	45	13	3	9
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	97	97	97	97	97	97	97	97	97	97	97	97
Heavy Vehicles, %	2	2	2	4	4	4	1	1	1	4	4	4
Mvmt Flow	8	659	16	24	512	12	29	0	46	13	3	9

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	525	0	0	675	0	0	1245	1256	667	1241	1258	519
Stage 1	-	-	-	-	-	-	684	684	-	566	566	-
Stage 2	-	-	-	-	-	-	561	572	-	675	692	-
Critical Hdwy	4.12	-	-	4.14	-	-	7.11	6.51	6.21	7.14	6.54	6.24
Critical Hdwy Stg 1	-	-	-	-	-	-	6.11	5.51	-	6.14	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.11	5.51	-	6.14	5.54	-
Follow-up Hdwy	2.218	-	-	2.236	-	-	3.509	4.009	3.309	3.536	4.036	3.336
Pot Cap-1 Maneuver	1042	-	-	907	-	-	152	172	461	150	169	553
Stage 1	-	-	-	-	-	-	441	451	-	505	504	-
Stage 2	-	-	-	-	-	-	514	506	-	440	442	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1042	-	-	907	-	-	139	164	461	128	161	553
Mov Cap-2 Maneuver	-	-	-	-	-	-	139	164	-	128	161	-
Stage 1	-	-	-	-	-	-	435	445	-	487	486	-
Stage 2	-	-	-	-	-	-	483	487	-	391	437	-

Approach	EB	WB	NB	SB
HCM Control Delay, s/v	0.1	0.39	26.19	27.77
HCM LOS			D	D

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	244	22	-	-	77	-	-	184
HCM Lane V/C Ratio	0.308	0.008	-	-	0.026	-	-	0.14
HCM Control Delay (s/veh)	26.2	8.5	0	-	9.1	0	-	27.8
HCM Lane LOS	D	A	A	-	A	A	-	D
HCM 95th %tile Q(veh)	1.3	0	-	-	0.1	-	-	0.5

Intersection	
Int Delay, s/veh	0.2

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	0	668	533	6	0	19
Future Vol, veh/h	0	668	533	6	0	19
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	97	97	97	97	97	97
Heavy Vehicles, %	3	3	4	4	9	9
Mvmt Flow	0	689	549	6	0	20

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	-	0	-	0	-	553
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	6.29
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	3.381
Pot Cap-1 Maneuver	0	-	-	-	0	520
Stage 1	0	-	-	-	0	-
Stage 2	0	-	-	-	0	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	-	-	-	-	-	520
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	SB
HCM Control Delay, s/v	0	0	12.2
HCM LOS			B

Minor Lane/Major Mvmt	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	-	-	-	520
HCM Lane V/C Ratio	-	-	-	0.038
HCM Control Delay (s/veh)	-	-	-	12.2
HCM Lane LOS	-	-	-	B
HCM 95th %tile Q(veh)	-	-	-	0.1

Intersection	
Int Delay, s/veh	0.4

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	634	0	0	552	0	34
Future Vol, veh/h	634	0	0	552	0	34
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	97	97	97	97	97	97
Heavy Vehicles, %	3	3	4	4	8	8
Mvmt Flow	654	0	0	569	0	35

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	-	-	-	654
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	6.28
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	3.372
Pot Cap-1 Maneuver	-	-	0	-	0	456
Stage 1	-	-	0	-	0	-
Stage 2	-	-	0	-	0	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	-	-	-	456
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s/v	0	0	13.54
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT
Capacity (veh/h)	456	-	-	-
HCM Lane V/C Ratio	0.077	-	-	-
HCM Control Delay (s/veh)	13.5	-	-	-
HCM Lane LOS	B	-	-	-
HCM 95th %tile Q(veh)	0.2	-	-	-

Intersection	
Int Delay, s/veh	0.1

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	5	0	638	13	6	554
Future Vol, veh/h	5	0	638	13	6	554
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	0	0	3	3	3	3
Mvmt Flow	5	0	672	14	6	583

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1274	678	0	0	685	0
Stage 1	678	-	-	-	-	-
Stage 2	596	-	-	-	-	-
Critical Hdwy	6.4	6.2	-	-	4.13	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.227	-
Pot Cap-1 Maneuver	186	455	-	-	904	-
Stage 1	508	-	-	-	-	-
Stage 2	554	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	184	455	-	-	904	-
Mov Cap-2 Maneuver	184	-	-	-	-	-
Stage 1	508	-	-	-	-	-
Stage 2	549	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s/v	25.11	0	0.1
HCM LOS	D		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	184	19	-
HCM Lane V/C Ratio	-	-	0.029	0.007	-
HCM Control Delay (s/veh)	-	-	25.1	9	0
HCM Lane LOS	-	-	D	A	A
HCM 95th %tile Q(veh)	-	-	0.1	0	-

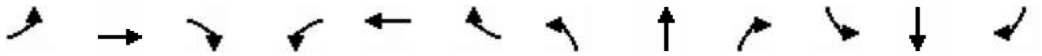
Intersection	
Int Delay, s/veh	0.3

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	14	4	0	636	549	11
Future Vol, veh/h	14	4	0	636	549	11
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	6	6	3	3	3	3
Mvmt Flow	15	4	0	663	572	11

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1240	578	583	0	-	0
Stage 1	578	-	-	-	-	-
Stage 2	663	-	-	-	-	-
Critical Hdwy	6.46	6.26	4.13	-	-	-
Critical Hdwy Stg 1	5.46	-	-	-	-	-
Critical Hdwy Stg 2	5.46	-	-	-	-	-
Follow-up Hdwy	3.554	3.354	2.227	-	-	-
Pot Cap-1 Maneuver	190	508	986	-	-	-
Stage 1	553	-	-	-	-	-
Stage 2	505	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	190	508	986	-	-	-
Mov Cap-2 Maneuver	190	-	-	-	-	-
Stage 1	553	-	-	-	-	-
Stage 2	505	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s/v	22.84	0	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	986	-	220	-	-
HCM Lane V/C Ratio	-	-	0.085	-	-
HCM Control Delay (s/veh)	0	-	22.8	-	-
HCM Lane LOS	A	-	C	-	-
HCM 95th %tile Q(veh)	0	-	0.3	-	-



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	1	7	31	236	10	55	30	566	301	40	513	0
Future Volume (veh/h)	1	7	31	236	10	55	30	566	301	40	513	0
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width 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
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
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	1826	1826	1826	1856	1856	1856	1870	1870	1870	1841	1841	1841
Adj Flow Rate, veh/h	1	7	33	248	11	58	32	596	317	42	540	0
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	5	5	5	3	3	3	2	2	2	4	4	4
Cap, veh/h	2	13	60	308	45	236	71	747	633	84	750	0
Arrive On Green	0.05	0.05	0.05	0.17	0.17	0.17	0.04	0.40	0.40	0.05	0.41	0.00
Sat Flow, veh/h	39	272	1282	1767	257	1355	1781	1870	1585	1753	1841	0
Grp Volume(v), veh/h	41	0	0	248	0	69	32	596	317	42	540	0
Grp Sat Flow(s),veh/h/ln	1593	0	0	1767	0	1612	1781	1870	1585	1753	1841	0
Q Serve(g_s), s	1.8	0.0	0.0	9.4	0.0	2.6	1.2	19.7	10.5	1.6	17.2	0.0
Cycle Q Clear(g_c), s	1.8	0.0	0.0	9.4	0.0	2.6	1.2	19.7	10.5	1.6	17.2	0.0
Prop In Lane	0.02		0.80	1.00		0.84	1.00		1.00	1.00		0.00
Lane Grp Cap(c), veh/h	75	0	0	308	0	281	71	747	633	84	750	0
V/C Ratio(X)	0.55	0.00	0.00	0.81	0.00	0.25	0.45	0.80	0.50	0.50	0.72	0.00
Avail Cap(c_a), veh/h	330	0	0	619	0	564	369	1425	1208	363	1402	0
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	0.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	32.6	0.0	0.0	27.8	0.0	24.9	32.8	18.5	15.8	32.5	17.4	0.0
Incr Delay (d2), s/veh	5.5	0.0	0.0	4.5	0.0	0.4	4.0	2.4	0.7	4.1	1.6	0.0
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	0.8	0.0	0.0	4.0	0.0	0.9	0.6	7.4	3.3	0.7	6.2	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	38.1	0.0	0.0	32.3	0.0	25.3	36.9	20.9	16.5	36.6	19.0	0.0
LnGrp LOS	D			C		C	D	C	B	D	B	
Approach Vol, veh/h		41			317			945			582	
Approach Delay, s/veh		38.1			30.8			20.0			20.2	
Approach LOS		D			C			B			C	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	8.8	34.6		8.8	8.3	35.2		17.7				
Change Period (Y+Rc), s	5.5	6.7		5.5	5.5	6.7		5.5				
Max Green Setting (Gmax), s	14.5	53.3		14.5	14.5	53.3		24.5				
Max Q Clear Time (g_c+I1), s	3.6	21.7		3.8	3.2	19.2		11.4				
Green Ext Time (p_c), s	0.0	6.3		0.1	0.0	4.1		0.8				

Intersection Summary												
HCM 7th Control Delay, s/veh			22.3									
HCM 7th LOS			C									

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	174	594	503	288	238	99
Future Volume (veh/h)	174	594	503	288	238	99
Initial Q (Qb), veh	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00
Ped-Bike Adj(A_pbT)	1.00			1.00	1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No	No		No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	179	612	519	297	245	102
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	226	1116	758	642	291	121
Arrive On Green	0.13	0.60	0.41	0.41	0.24	0.24
Sat Flow, veh/h	1781	1870	1870	1583	1210	504
Grp Volume(v), veh/h	179	612	519	297	348	0
Grp Sat Flow(s),veh/h/ln	1781	1870	1870	1583	1719	0
Q Serve(g_s), s	6.8	13.8	16.0	9.6	13.5	0.0
Cycle Q Clear(g_c), s	6.8	13.8	16.0	9.6	13.5	0.0
Prop In Lane	1.00			1.00	0.70	0.29
Lane Grp Cap(c), veh/h	226	1116	758	642	414	0
V/C Ratio(X)	0.79	0.55	0.68	0.46	0.84	0.00
Avail Cap(c_a), veh/h	648	1449	1449	1226	1086	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	29.7	8.5	17.1	15.3	25.3	0.0
Incr Delay (d2), s/veh	5.6	1.0	2.6	1.2	5.6	0.0
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.0	4.0	6.1	3.1	5.4	0.0
Unsig. Movement Delay, s/veh						
LnGrp Delay(d), s/veh	35.3	9.5	19.7	16.5	30.9	0.0
LnGrp LOS	D	A	B	B	C	
Approach Vol, veh/h		791	816		348	
Approach Delay, s/veh		15.3	18.5		30.9	
Approach LOS		B	B		C	

Timer - Assigned Phs	1	2			6	8
Phs Duration (G+Y+Rc), s	13.4	34.1			47.5	22.6
Change Period (Y+Rc), s	4.5	5.7			5.7	5.7
Max Green Setting (Gmax), s	25.5	54.3			54.3	44.3
Max Q Clear Time (g_c+I1), s	8.8	18.0			15.8	15.5
Green Ext Time (p_c), s	0.3	10.4			9.1	1.4

Intersection Summary	
HCM 7th Control Delay, s/veh	19.4
HCM 7th LOS	B

Notes

User approved volume balancing among the lanes for turning movement.

Intersection	
Int Delay, s/veh	2.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	9	720	17	25	558	13	30	0	48	14	3	10
Future Vol, veh/h	9	720	17	25	558	13	30	0	48	14	3	10
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	97	97	97	97	97	97	97	97	97	97	97	97
Heavy Vehicles, %	2	2	2	4	4	4	1	1	1	4	4	4
Mvmt Flow	9	742	18	26	575	13	31	0	49	14	3	10

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	589	0	0	760	0	0	1398	1410	751	1394	1412	582
Stage 1	-	-	-	-	-	-	770	770	-	634	634	-
Stage 2	-	-	-	-	-	-	628	640	-	761	778	-
Critical Hdwy	4.12	-	-	4.14	-	-	7.11	6.51	6.21	7.14	6.54	6.24
Critical Hdwy Stg 1	-	-	-	-	-	-	6.11	5.51	-	6.14	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.11	5.51	-	6.14	5.54	-
Follow-up Hdwy	2.218	-	-	2.236	-	-	3.509	4.009	3.309	3.536	4.036	3.336
Pot Cap-1 Maneuver	987	-	-	843	-	-	119	139	412	118	137	509
Stage 1	-	-	-	-	-	-	395	412	-	464	470	-
Stage 2	-	-	-	-	-	-	472	471	-	395	404	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	987	-	-	843	-	-	107	131	412	97	128	509
Mov Cap-2 Maneuver	-	-	-	-	-	-	107	131	-	97	128	-
Stage 1	-	-	-	-	-	-	389	405	-	443	449	-
Stage 2	-	-	-	-	-	-	439	450	-	342	397	-

Approach	EB	WB	NB	SB
HCM Control Delay, s/v	0.1	0.39	35.5	35.79
HCM LOS			E	E

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	196	22	-	-	75	-	-	144
HCM Lane V/C Ratio	0.41	0.009	-	-	0.031	-	-	0.193
HCM Control Delay (s/veh)	35.5	8.7	0	-	9.4	0	-	35.8
HCM Lane LOS	E	A	A	-	A	A	-	E
HCM 95th %tile Q(veh)	1.8	0	-	-	0.1	-	-	0.7

Intersection	
Int Delay, s/veh	0.2

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	0	752	597	6	0	20
Future Vol, veh/h	0	752	597	6	0	20
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	97	97	97	97	97	97
Heavy Vehicles, %	3	3	4	4	9	9
Mvmt Flow	0	775	615	6	0	21

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	-	0	-	0	-	619
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	6.29
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	3.381
Pot Cap-1 Maneuver	0	-	-	-	0	476
Stage 1	0	-	-	-	0	-
Stage 2	0	-	-	-	0	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	-	-	-	-	-	476
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	SB
HCM Control Delay, s/v	0	0	12.9
HCM LOS			B

Minor Lane/Major Mvmt	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	-	-	-	476
HCM Lane V/C Ratio	-	-	-	0.043
HCM Control Delay (s/veh)	-	-	-	12.9
HCM Lane LOS	-	-	-	B
HCM 95th %tile Q(veh)	-	-	-	0.1

Intersection	
Int Delay, s/veh	0.4

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	715	0	0	618	0	37
Future Vol, veh/h	715	0	0	618	0	37
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	97	97	97	97	97	97
Heavy Vehicles, %	3	3	4	4	8	8
Mvmt Flow	737	0	0	637	0	38

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	-	-	-	737
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	6.28
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	3.372
Pot Cap-1 Maneuver	-	-	0	-	0	409
Stage 1	-	-	0	-	0	-
Stage 2	-	-	0	-	0	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	-	-	-	409
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s/v	0	0	14.72
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT
Capacity (veh/h)	409	-	-	-
HCM Lane V/C Ratio	0.093	-	-	-
HCM Control Delay (s/veh)	14.7	-	-	-
HCM Lane LOS	B	-	-	-
HCM 95th %tile Q(veh)	0.3	-	-	-

Intersection	
Int Delay, s/veh	0.2

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	5	0	719	14	6	620
Future Vol, veh/h	5	0	719	14	6	620
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	0	0	3	3	3	3
Mvmt Flow	5	0	757	15	6	653

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1429	764	0	0	772	0
Stage 1	764	-	-	-	-	-
Stage 2	665	-	-	-	-	-
Critical Hdwy	6.4	6.2	-	-	4.13	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.227	-
Pot Cap-1 Maneuver	150	407	-	-	839	-
Stage 1	463	-	-	-	-	-
Stage 2	515	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	148	407	-	-	839	-
Mov Cap-2 Maneuver	148	-	-	-	-	-
Stage 1	463	-	-	-	-	-
Stage 2	509	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s/v	30.19	0	0.09
HCM LOS	D		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	148	17	-
HCM Lane V/C Ratio	-	-	0.036	0.008	-
HCM Control Delay (s/veh)	-	-	30.2	9.3	0
HCM Lane LOS	-	-	D	A	A
HCM 95th %tile Q(veh)	-	-	0.1	0	-

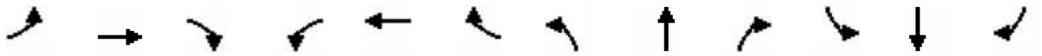
Intersection	
Int Delay, s/veh	0.4

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	15	4	0	717	614	12
Future Vol, veh/h	15	4	0	717	614	12
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	6	6	3	3	3	3
Mvmt Flow	16	4	0	747	640	13

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1393	646	652	0	-	0
Stage 1	646	-	-	-	-	-
Stage 2	747	-	-	-	-	-
Critical Hdwy	6.46	6.26	4.13	-	-	-
Critical Hdwy Stg 1	5.46	-	-	-	-	-
Critical Hdwy Stg 2	5.46	-	-	-	-	-
Follow-up Hdwy	3.554	3.354	2.227	-	-	-
Pot Cap-1 Maneuver	153	465	930	-	-	-
Stage 1	514	-	-	-	-	-
Stage 2	461	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	153	465	930	-	-	-
Mov Cap-2 Maneuver	153	-	-	-	-	-
Stage 1	514	-	-	-	-	-
Stage 2	461	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s/v	27.69	0	0
HCM LOS	D		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	930	-	178	-	-
HCM Lane V/C Ratio	-	-	0.111	-	-
HCM Control Delay (s/veh)	0	-	27.7	-	-
HCM Lane LOS	A	-	D	-	-
HCM 95th %tile Q(veh)	0	-	0.4	-	-



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	1	8	33	254	11	59	32	642	324	43	576	0
Future Volume (veh/h)	1	8	33	254	11	59	32	642	324	43	576	0
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width 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
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
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	1826	1826	1826	1856	1856	1856	1870	1870	1870	1841	1841	1841
Adj Flow Rate, veh/h	1	8	35	267	12	62	34	676	341	45	606	0
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	5	5	5	3	3	3	2	2	2	4	4	4
Cap, veh/h	2	14	59	319	47	244	71	811	688	83	813	0
Arrive On Green	0.05	0.05	0.05	0.18	0.18	0.18	0.04	0.43	0.43	0.05	0.44	0.00
Sat Flow, veh/h	36	290	1269	1767	261	1351	1781	1870	1585	1753	1841	0
Grp Volume(v), veh/h	44	0	0	267	0	74	34	676	341	45	606	0
Grp Sat Flow(s),veh/h/ln	1596	0	0	1767	0	1612	1781	1870	1585	1753	1841	0
Q Serve(g_s), s	2.2	0.0	0.0	11.6	0.0	3.1	1.5	25.5	12.4	2.0	21.8	0.0
Cycle Q Clear(g_c), s	2.2	0.0	0.0	11.6	0.0	3.1	1.5	25.5	12.4	2.0	21.8	0.0
Prop In Lane	0.02		0.80	1.00		0.84	1.00		1.00	1.00		0.00
Lane Grp Cap(c), veh/h	75	0	0	319	0	291	71	811	688	83	813	0
V/C Ratio(X)	0.59	0.00	0.00	0.84	0.00	0.25	0.48	0.83	0.50	0.54	0.75	0.00
Avail Cap(c_a), veh/h	290	0	0	543	0	496	324	1251	1060	319	1231	0
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	0.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	37.2	0.0	0.0	31.5	0.0	28.0	37.4	20.0	16.3	37.1	18.5	0.0
Incr Delay (d2), s/veh	6.5	0.0	0.0	5.3	0.0	0.4	4.5	3.4	0.7	4.9	1.7	0.0
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	1.0	0.0	0.0	5.0	0.0	1.2	0.7	10.0	3.9	0.9	8.1	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	43.7	0.0	0.0	36.8	0.0	28.4	41.9	23.4	16.9	42.0	20.2	0.0
LnGrp LOS	D			D		C	D	C	B	D	C	
Approach Vol, veh/h		44			341			1051			651	
Approach Delay, s/veh		43.7			35.0			21.9			21.7	
Approach LOS		D			C			C			C	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	9.3	41.3		9.2	8.7	41.9		19.9				
Change Period (Y+Rc), s	5.5	6.7		5.5	5.5	6.7		5.5				
Max Green Setting (Gmax), s	14.5	53.3		14.5	14.5	53.3		24.5				
Max Q Clear Time (g_c+I1), s	4.0	27.5		4.2	3.5	23.8		13.6				
Green Ext Time (p_c), s	0.0	7.0		0.1	0.0	4.7		0.8				

Intersection Summary												
HCM 7th Control Delay, s/veh			24.4									
HCM 7th LOS			C									

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	204	745	700	288	238	99
Future Volume (veh/h)	204	745	700	288	238	99
Initial Q (Qb), veh	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00
Ped-Bike Adj(A_pbT)	1.00			1.00	1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No	No		No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	210	768	722	297	245	102
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	252	1197	837	708	279	116
Arrive On Green	0.14	0.64	0.45	0.45	0.23	0.23
Sat Flow, veh/h	1781	1870	1870	1583	1210	504
Grp Volume(v), veh/h	210	768	722	297	348	0
Grp Sat Flow(s),veh/h/ln	1781	1870	1870	1583	1719	0
Q Serve(g_s), s	10.1	22.1	30.6	11.2	17.2	0.0
Cycle Q Clear(g_c), s	10.1	22.1	30.6	11.2	17.2	0.0
Prop In Lane	1.00			1.00	0.70	0.29
Lane Grp Cap(c), veh/h	252	1197	837	708	397	0
V/C Ratio(X)	0.83	0.64	0.86	0.42	0.88	0.00
Avail Cap(c_a), veh/h	395	1728	1218	1031	924	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	36.8	9.7	21.9	16.5	32.6	0.0
Incr Delay (d2), s/veh	8.6	0.6	4.6	0.4	6.3	0.0
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.9	7.9	13.6	4.0	7.6	0.0
Unsig. Movement Delay, s/veh						
LnGrp Delay(d), s/veh	45.4	10.3	26.5	16.9	38.9	0.0
LnGrp LOS	D	B	C	B	D	
Approach Vol, veh/h		978	1019		348	
Approach Delay, s/veh		17.8	23.7		38.9	
Approach LOS		B	C		D	

Timer - Assigned Phs	1	2			6	8
Phs Duration (G+Y+Rc), s	16.9	45.1			62.0	26.0
Change Period (Y+Rc), s	4.5	5.7			5.7	5.7
Max Green Setting (Gmax), s	19.5	57.3			81.3	47.3
Max Q Clear Time (g_c+I1), s	12.1	32.6			24.1	19.2
Green Ext Time (p_c), s	0.3	6.8			7.0	1.1

Intersection Summary	
HCM 7th Control Delay, s/veh	23.5
HCM 7th LOS	C

Notes

User approved volume balancing among the lanes for turning movement.

Intersection	
Int Delay, s/veh	5.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	9	900	17	25	755	13	30	0	48	14	3	10
Future Vol, veh/h	9	900	17	25	755	13	30	0	48	14	3	10
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	97	97	97	97	97	97	97	97	97	97	97	97
Heavy Vehicles, %	2	2	2	4	4	4	1	1	1	4	4	4
Mvmt Flow	9	928	18	26	778	13	31	0	49	14	3	10

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	792	0	0	945	0	0	1787	1798	937	1783	1801	785
Stage 1	-	-	-	-	-	-	955	955	-	837	837	-
Stage 2	-	-	-	-	-	-	831	843	-	946	964	-
Critical Hdwy	4.12	-	-	4.14	-	-	7.11	6.51	6.21	7.14	6.54	6.24
Critical Hdwy Stg 1	-	-	-	-	-	-	6.11	5.51	-	6.14	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.11	5.51	-	6.14	5.54	-
Follow-up Hdwy	2.218	-	-	2.236	-	-	3.509	4.009	3.309	3.536	4.036	3.336
Pot Cap-1 Maneuver	829	-	-	718	-	-	64	80	323	63	79	390
Stage 1	-	-	-	-	-	-	312	338	-	358	379	-
Stage 2	-	-	-	-	-	-	365	381	-	311	331	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	829	-	-	718	-	-	54	73	323	49	72	390
Mov Cap-2 Maneuver	-	-	-	-	-	-	54	73	-	49	72	-
Stage 1	-	-	-	-	-	-	304	330	-	335	355	-
Stage 2	-	-	-	-	-	-	330	356	-	257	323	-

Approach	EB	WB	NB	SB
HCM Control Delay, s/v	0.09	0.32	95.06	77.58
HCM LOS			F	F

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	111	17	-	-	57	-	-	76
HCM Lane V/C Ratio	0.723	0.011	-	-	0.036	-	-	0.366
HCM Control Delay (s/veh)	95.1	9.4	0	-	10.2	0	-	77.6
HCM Lane LOS	F	A	A	-	B	A	-	F
HCM 95th %tile Q(veh)	3.9	0	-	-	0.1	-	-	1.4

Intersection	
Int Delay, s/veh	0.6

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	0	932	794	6	0	59
Future Vol, veh/h	0	932	794	6	0	59
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	97	97	97	97	97	97
Heavy Vehicles, %	3	3	4	4	9	9
Mvmt Flow	0	961	819	6	0	61

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	-	0	-	0	-	822
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	6.29
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	3.381
Pot Cap-1 Maneuver	0	-	-	-	0	364
Stage 1	0	-	-	-	0	-
Stage 2	0	-	-	-	0	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	-	-	-	-	-	364
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	SB
HCM Control Delay, s/v	0	0	16.88
HCM LOS			C

Minor Lane/Major Mvmt	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	-	-	-	364
HCM Lane V/C Ratio	-	-	-	0.167
HCM Control Delay (s/veh)	-	-	-	16.9
HCM Lane LOS	-	-	-	C
HCM 95th %tile Q(veh)	-	-	-	0.6

Intersection	
Int Delay, s/veh	0.4

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	895	0	0	853	0	37
Future Vol, veh/h	895	0	0	853	0	37
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	97	97	97	97	97	97
Heavy Vehicles, %	3	3	4	4	8	8
Mvmt Flow	923	0	0	879	0	38

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	-	-	-	923
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	6.28
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	3.372
Pot Cap-1 Maneuver	-	-	0	-	0	319
Stage 1	-	-	0	-	0	-
Stage 2	-	-	0	-	0	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	-	-	-	319
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s/v	0	0	17.82
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT
Capacity (veh/h)	319	-	-	-
HCM Lane V/C Ratio	0.12	-	-	-
HCM Control Delay (s/veh)	17.8	-	-	-
HCM Lane LOS	C	-	-	-
HCM 95th %tile Q(veh)	0.4	-	-	-

Intersection	
Int Delay, s/veh	0.2

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	5	0	899	14	6	855
Future Vol, veh/h	5	0	899	14	6	855
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	0	0	3	3	3	3
Mvmt Flow	5	0	946	15	6	900

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1866	954	0	0	961	0
Stage 1	954	-	-	-	-	-
Stage 2	913	-	-	-	-	-
Critical Hdwy	6.4	6.2	-	-	4.13	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.227	-
Pot Cap-1 Maneuver	81	317	-	-	712	-
Stage 1	377	-	-	-	-	-
Stage 2	395	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	79	317	-	-	712	-
Mov Cap-2 Maneuver	79	-	-	-	-	-
Stage 1	377	-	-	-	-	-
Stage 2	388	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s/v	53.57	0	0.07
HCM LOS	F		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	79	13	-
HCM Lane V/C Ratio	-	-	0.066	0.009	-
HCM Control Delay (s/veh)	-	-	53.6	10.1	0
HCM Lane LOS	-	-	F	B	A
HCM 95th %tile Q(veh)	-	-	0.2	0	-

Intersection	
Int Delay, s/veh	144.2

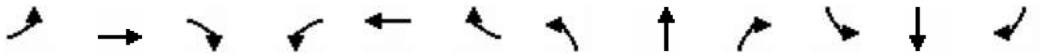
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	198	82	100	714	611	250
Future Vol, veh/h	198	82	100	714	611	250
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	6	6	3	3	3	3
Mvmt Flow	206	85	104	744	636	260

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1719	767	897	0	-	0
Stage 1	767	-	-	-	-	-
Stage 2	952	-	-	-	-	-
Critical Hdwy	6.46	6.26	4.13	-	-	-
Critical Hdwy Stg 1	5.46	-	-	-	-	-
Critical Hdwy Stg 2	5.46	-	-	-	-	-
Follow-up Hdwy	3.554	3.354	2.227	-	-	-
Pot Cap-1 Maneuver	~ 96	396	753	-	-	-
Stage 1	451	-	-	-	-	-
Stage 2	369	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	~ 74	396	753	-	-	-
Mov Cap-2 Maneuver	~ 74	-	-	-	-	-
Stage 1	345	-	-	-	-	-
Stage 2	369	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s/v	$ 1003.02	1.3	0
HCM LOS	F		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	221	-	97	-	-
HCM Lane V/C Ratio	0.138	-	3.018	-	-
HCM Control Delay (s/veh)	10.5	0	$ 1003	-	-
HCM Lane LOS	B	A	F	-	-
HCM 95th %tile Q(veh)	0.5	-	28.2	-	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	1	8	77	254	11	79	91	721	324	58	635	0
Future Volume (veh/h)	1	8	77	254	11	79	91	721	324	58	635	0
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width 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
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
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	1826	1826	1826	1856	1856	1856	1870	1870	1870	1841	1841	1841
Adj Flow Rate, veh/h	1	8	81	267	12	83	96	759	341	61	668	0
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	5	5	5	3	3	3	2	2	2	4	4	4
Cap, veh/h	1	10	102	310	36	246	123	858	728	88	810	0
Arrive On Green	0.07	0.07	0.07	0.18	0.18	0.18	0.07	0.46	0.46	0.05	0.44	0.00
Sat Flow, veh/h	17	140	1414	1767	203	1401	1781	1870	1585	1753	1841	0
Grp Volume(v), veh/h	90	0	0	267	0	95	96	759	341	61	668	0
Grp Sat Flow(s),veh/h/ln	1571	0	0	1767	0	1603	1781	1870	1585	1753	1841	0
Q Serve(g_s), s	5.4	0.0	0.0	14.0	0.0	5.0	5.1	35.3	14.2	3.3	30.4	0.0
Cycle Q Clear(g_c), s	5.4	0.0	0.0	14.0	0.0	5.0	5.1	35.3	14.2	3.3	30.4	0.0
Prop In Lane	0.01		0.90	1.00		0.87	1.00		1.00	1.00		0.00
Lane Grp Cap(c), veh/h	113	0	0	310	0	282	123	858	728	88	810	0
V/C Ratio(X)	0.79	0.00	0.00	0.86	0.00	0.34	0.78	0.88	0.47	0.69	0.82	0.00
Avail Cap(c_a), veh/h	238	0	0	453	0	411	270	1044	885	266	1027	0
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	0.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	43.6	0.0	0.0	38.2	0.0	34.5	43.7	23.5	17.8	44.6	23.5	0.0
Incr Delay (d2), s/veh	10.8	0.0	0.0	10.4	0.0	0.6	9.3	8.2	0.6	8.4	4.7	0.0
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	2.4	0.0	0.0	6.7	0.0	1.9	2.4	15.5	4.7	1.6	12.7	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	54.4	0.0	0.0	48.6	0.0	35.1	53.1	31.8	18.4	53.0	28.2	0.0
LnGrp LOS	D			D		D	D	C	B	D	C	
Approach Vol, veh/h		90			362			1196			729	
Approach Delay, s/veh		54.4			45.1			29.7			30.3	
Approach LOS		D			D			C			C	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	10.3	50.5		12.4	12.1	48.8		22.3				
Change Period (Y+Rc), s	5.5	6.7		5.5	5.5	6.7		5.5				
Max Green Setting (Gmax), s	14.5	53.3		14.5	14.5	53.3		24.5				
Max Q Clear Time (g_c+I1), s	5.3	37.3		7.4	7.1	32.4		16.0				
Green Ext Time (p_c), s	0.1	6.5		0.2	0.1	4.8		0.8				

Intersection Summary												
HCM 7th Control Delay, s/veh			33.1									
HCM 7th LOS			C									

Intersection	
Int Delay, s/veh	5.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	9	900	17	25	755	13	30	0	48	14	3	10
Future Vol, veh/h	9	900	17	25	755	13	30	0	48	14	3	10
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	100	-	-	100	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	97	97	97	97	97	97	97	97	97	97	97	97
Heavy Vehicles, %	2	2	2	4	4	4	1	1	1	4	4	4
Mvmt Flow	9	928	18	26	778	13	31	0	49	14	3	10

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	792	0	0	945	0	0	1787	1798	937	1783	1801	785
Stage 1	-	-	-	-	-	-	955	955	-	837	837	-
Stage 2	-	-	-	-	-	-	831	843	-	946	964	-
Critical Hdwy	4.12	-	-	4.14	-	-	7.11	6.51	6.21	7.14	6.54	6.24
Critical Hdwy Stg 1	-	-	-	-	-	-	6.11	5.51	-	6.14	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.11	5.51	-	6.14	5.54	-
Follow-up Hdwy	2.218	-	-	2.236	-	-	3.509	4.009	3.309	3.536	4.036	3.336
Pot Cap-1 Maneuver	829	-	-	718	-	-	64	80	323	63	79	390
Stage 1	-	-	-	-	-	-	312	338	-	358	379	-
Stage 2	-	-	-	-	-	-	365	381	-	311	331	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	829	-	-	718	-	-	57	77	323	51	75	390
Mov Cap-2 Maneuver	-	-	-	-	-	-	57	77	-	51	75	-
Stage 1	-	-	-	-	-	-	308	334	-	346	366	-
Stage 2	-	-	-	-	-	-	340	367	-	261	327	-

Approach	EB	WB	NB	SB
HCM Control Delay, s/v	0.09	0.32	88.71	73.53
HCM LOS			F	F

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	115	829	-	-	718	-	-	79
HCM Lane V/C Ratio	0.699	0.011	-	-	0.036	-	-	0.352
HCM Control Delay (s/veh)	88.7	9.4	-	-	10.2	-	-	73.5
HCM Lane LOS	F	A	-	-	B	-	-	F
HCM 95th %tile Q(veh)	3.7	0	-	-	0.1	-	-	1.3

Intersection	
Int Delay, s/veh	0.1

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	5	0	899	14	6	855
Future Vol, veh/h	5	0	899	14	6	855
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	0	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	0	0	3	3	3	3
Mvmt Flow	5	0	946	15	6	900

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1866	954	0	0	961	0
Stage 1	954	-	-	-	-	-
Stage 2	913	-	-	-	-	-
Critical Hdwy	6.4	6.2	-	-	4.13	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.227	-
Pot Cap-1 Maneuver	81	317	-	-	712	-
Stage 1	377	-	-	-	-	-
Stage 2	395	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	80	317	-	-	712	-
Mov Cap-2 Maneuver	212	-	-	-	-	-
Stage 1	377	-	-	-	-	-
Stage 2	391	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s/v	22.42	0	0.07
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	212	712	-
HCM Lane V/C Ratio	-	-	0.025	0.009	-
HCM Control Delay (s/veh)	-	-	22.4	10.1	-
HCM Lane LOS	-	-	C	B	-
HCM 95th %tile Q(veh)	-	-	0.1	0	-

Intersection	
Int Delay, s/veh	23.9

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	198	82	100	714	611	250
Future Vol, veh/h	198	82	100	714	611	250
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	150	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	6	6	3	3	3	3
Mvmt Flow	206	85	104	744	636	260

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1719	767	897	0	-	0
Stage 1	767	-	-	-	-	-
Stage 2	952	-	-	-	-	-
Critical Hdwy	6.46	6.26	4.13	-	-	-
Critical Hdwy Stg 1	5.46	-	-	-	-	-
Critical Hdwy Stg 2	5.46	-	-	-	-	-
Follow-up Hdwy	3.554	3.354	2.227	-	-	-
Pot Cap-1 Maneuver	~ 96	396	753	-	-	-
Stage 1	451	-	-	-	-	-
Stage 2	369	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	~ 83	396	753	-	-	-
Mov Cap-2 Maneuver	211	-	-	-	-	-
Stage 1	389	-	-	-	-	-
Stage 2	369	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s/veh	62.88	1.3	0
HCM LOS	F		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	753	-	244	-	-
HCM Lane V/C Ratio	0.138	-	1.195	-	-
HCM Control Delay (s/veh)	10.5	-	162.9	-	-
HCM Lane LOS	B	-	F	-	-
HCM 95th %tile Q(veh)	0.5	-	13.8	-	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection	
Int Delay, s/veh	219.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	198	0	82	5	0	0	100	700	14	6	605	250
Future Vol, veh/h	198	0	82	5	0	0	100	700	14	6	605	250
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	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	96	96	96	96	96	96	96	96	96	96	96	96
Heavy Vehicles, %	6	6	6	0	0	0	3	3	3	3	3	3
Mvmt Flow	206	0	85	5	0	0	104	729	15	6	630	260

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1710	1725	760	1588	1848	736	891	0	0	744	0	0
Stage 1	773	773	-	945	945	-	-	-	-	-	-	-
Stage 2	938	952	-	643	903	-	-	-	-	-	-	-
Critical Hdwy	7.16	6.56	6.26	7.1	6.5	6.2	4.13	-	-	4.13	-	-
Critical Hdwy Stg 1	6.16	5.56	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.16	5.56	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.554	4.054	3.354	3.5	4	3.3	2.227	-	-	2.227	-	-
Pot Cap-1 Maneuver	~ 70	87	399	88	75	422	757	-	-	859	-	-
Stage 1	386	403	-	317	343	-	-	-	-	-	-	-
Stage 2	312	333	-	465	359	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	~ 53	65	399	52	57	422	757	-	-	859	-	-
Mov Cap-2 Maneuver	~ 53	65	-	52	57	-	-	-	-	-	-	-
Stage 1	380	397	-	243	262	-	-	-	-	-	-	-
Stage 2	239	254	-	360	353	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s/v	$ 1529.84	81.47	1.29	0.06
HCM LOS	F	F		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	220	-	-	71	52	12	-	-
HCM Lane V/C Ratio	0.138	-	-	4.132	0.1	0.007	-	-
HCM Control Delay (s/veh)	10.5	0	-	$ 1529.8	81.5	9.2	0	-
HCM Lane LOS	B	A	-	F	F	A	A	-
HCM 95th %tile Q(veh)	0.5	-	-	31.1	0.3	0	-	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection	
Int Delay, s/veh	187.4

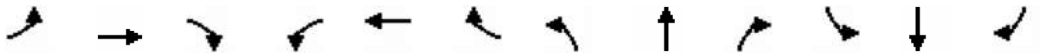
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	198	0	82	5	0	0	100	700	14	6	605	250
Future Vol, veh/h	198	0	82	5	0	0	100	700	14	6	605	250
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	150	-	-	150	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	96	96	96	96	96	96	96	96	96	96	96	96
Heavy Vehicles, %	6	6	6	0	0	0	3	3	3	3	3	3
Mvmt Flow	206	0	85	5	0	0	104	729	15	6	630	260

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1710	1725	760	1588	1848	736	891	0	0	744	0	0
Stage 1	773	773	-	945	945	-	-	-	-	-	-	-
Stage 2	938	952	-	643	903	-	-	-	-	-	-	-
Critical Hdwy	7.16	6.56	6.26	7.1	6.5	6.2	4.13	-	-	4.13	-	-
Critical Hdwy Stg 1	6.16	5.56	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.16	5.56	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.554	4.054	3.354	3.5	4	3.3	2.227	-	-	2.227	-	-
Pot Cap-1 Maneuver	~ 70	87	399	88	75	422	757	-	-	859	-	-
Stage 1	386	403	-	317	343	-	-	-	-	-	-	-
Stage 2	312	333	-	465	359	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	~ 60	74	399	59	65	422	757	-	-	859	-	-
Mov Cap-2 Maneuver	~ 60	74	-	59	65	-	-	-	-	-	-	-
Stage 1	383	400	-	274	296	-	-	-	-	-	-	-
Stage 2	269	287	-	363	356	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s/v	$ 1306.83	71.42	1.29	0.06
HCM LOS	F	F		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	757	-	-	80	59	859	-	-
HCM Lane V/C Ratio	0.138	-	-	3.661	0.088	0.007	-	-
HCM Control Delay (s/veh)	10.5	-	-	$ 1306.8	71.4	9.2	-	-
HCM Lane LOS	B	-	-	F	F	A	-	-
HCM 95th %tile Q(veh)	0.5	-	-	30.1	0.3	0	-	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	198	0	82	5	0	0	100	700	14	6	605	250
Future Volume (veh/h)	198	0	82	5	0	0	100	700	14	6	605	250
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width 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
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	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	1811	1811	1900	1900	1900	1856	1856	1856	1856	1856	1856
Adj Flow Rate, veh/h	206	0	85	5	0	0	104	729	15	6	630	260
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	6	6	0	0	0	3	3	3	3	3	3
Cap, veh/h	234	0	97	12	0	0	128	1190	24	39	665	273
Arrive On Green	0.20	0.00	0.20	0.01	0.00	0.00	0.07	0.66	0.66	0.54	0.54	0.54
Sat Flow, veh/h	1178	0	486	1809	0	0	1767	1812	37	3	1236	507
Grp Volume(v), veh/h	291	0	0	5	0	0	104	0	744	896	0	0
Grp Sat Flow(s),veh/h/ln	1665	0	0	1810	0	0	1767	0	1849	1746	0	0
Q Serve(g_s), s	16.6	0.0	0.0	0.3	0.0	0.0	5.7	0.0	22.6	9.5	0.0	0.0
Cycle Q Clear(g_c), s	16.6	0.0	0.0	0.3	0.0	0.0	5.7	0.0	22.6	47.5	0.0	0.0
Prop In Lane	0.71		0.29	1.00		0.00	1.00		0.02	0.01		0.29
Lane Grp Cap(c), veh/h	331	0	0	12	0	0	128	0	1215	977	0	0
V/C Ratio(X)	0.88	0.00	0.00	0.43	0.00	0.00	0.81	0.00	0.61	0.92	0.00	0.00
Avail Cap(c_a), veh/h	408	0	0	92	0	0	128	0	1276	1034	0	0
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	0.00	1.00	0.00	0.00	1.00	0.00	1.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	38.1	0.0	0.0	48.4	0.0	0.0	44.7	0.0	9.6	21.4	0.0	0.0
Incr Delay (d2), s/veh	16.8	0.0	0.0	22.6	0.0	0.0	31.0	0.0	0.8	12.1	0.0	0.0
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	8.3	0.0	0.0	0.2	0.0	0.0	3.5	0.0	7.2	19.4	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	54.8	0.0	0.0	71.0	0.0	0.0	75.7	0.0	10.4	33.5	0.0	0.0
LnGrp LOS	D			E			E		B	C		
Approach Vol, veh/h		291			5			848			896	
Approach Delay, s/veh		54.8			71.0			18.4			33.5	
Approach LOS		D			E			B			C	

Timer - Assigned Phs		2		4	5	6		8				
Phs Duration (G+Y+Rc), s		68.8		23.9	11.6	57.2		5.1				
Change Period (Y+Rc), s		4.5		4.5	4.5	4.5		4.5				
Max Green Setting (Gmax), s		67.5		24.0	7.1	55.9		5.0				
Max Q Clear Time (g_c+I1), s		24.6		18.6	7.7	49.5		2.3				
Green Ext Time (p_c), s		5.3		0.8	0.0	3.1		0.0				

Intersection Summary												
HCM 7th Control Delay, s/veh			30.4									
HCM 7th LOS			C									

MOVEMENT SUMMARY

Site: 4/5 [Int 4_5 Aligned Access (Site Folder: General)]

Aligned Access Future (2028) With-Project PM Peak Hour
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] ft	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed mph
South: SR 307														
3	L2	89	3.0	93	3.0	0.786	13.9	LOS B	11.0	282.5	0.85	0.74	0.95	34.9
8	T1	700	3.0	729	3.0	0.786	7.9	LOS A	11.0	282.5	0.85	0.74	0.95	34.8
18	R2	14	3.0	15	3.0	0.786	8.0	LOS A	11.0	282.5	0.85	0.74	0.95	33.8
Approach		803	3.0	836	3.0	0.786	8.6	LOS A	11.0	282.5	0.85	0.74	0.95	34.8
East: NE Minder Rd														
1	L2	5	0.0	5	0.0	0.016	17.0	LOS B	0.1	2.7	0.87	0.72	0.87	32.3
6	T1	1	0.0	1	0.0	0.016	11.0	LOS B	0.1	2.7	0.87	0.72	0.87	32.2
16	R2	1	0.0	1	0.0	0.016	11.1	LOS B	0.1	2.7	0.87	0.72	0.87	31.3
Approach		7	0.0	7	0.0	0.016	15.3	LOS B	0.1	2.7	0.87	0.72	0.87	32.1
North: SR 307														
7	L2	6	3.0	6	3.0	0.741	11.0	LOS B	9.3	237.9	0.64	0.51	0.64	36.0
4	T1	605	3.0	630	3.0	0.741	5.0	LOS A	9.3	237.9	0.64	0.51	0.64	35.9
14	R2	222	3.0	231	3.0	0.741	5.1	LOS A	9.3	237.9	0.64	0.51	0.64	34.8
Approach		833	3.0	868	3.0	0.741	5.1	LOS A	9.3	237.9	0.64	0.51	0.64	35.6
West: Stottlemeyer Rd NE														
5	L2	183	6.0	191	6.0	0.393	14.3	LOS B	2.6	67.4	0.79	0.88	0.80	33.3
2	T1	1	6.0	1	6.0	0.393	8.3	LOS A	2.6	67.4	0.79	0.88	0.80	33.3
12	R2	76	6.0	79	6.0	0.393	8.4	LOS A	2.6	67.4	0.79	0.88	0.80	32.4
Approach		260	6.0	271	6.0	0.393	12.6	LOS B	2.6	67.4	0.79	0.88	0.80	33.1
All Vehicles		1903	3.4	1982	3.4	0.786	7.6	LOS A	11.0	282.5	0.75	0.66	0.79	34.9

Site Level of Service (LOS) Method: Delay & Degree of Saturation (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Signalised Intersections.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
Intersection and Approach LOS values are based on average delay for all movements (v/c not used).
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: HCM Queue Formula.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Appendix D: Trip Generation Calculations

NKU South Gamble (Low)

Proposed Use

Land Use	Setting	Size	Units	Model	Rate	Inbound %	Gross Trips Inbound	Gross Trips Outbound	Gross Trips Subtotal	Land Use Type	Internal Trips In	Internal Trips Out	Internal Trips Total	Internal Trips %	External Trips In	External Trips Out	External Trips Total	Pass-By Trips %	Pass-By Trips In	Pass-By Trips Out	Pass-By Trips Total	Primary Trips Inbound	Primary Trips Outbound	Primary Trips Total
Residential Lots (LU 210)		**80**	du							Residential														
Daily	General Urban/Suburban			Rate	9.43	50%	377	377	754		27	27	54	7%	350	350	700		-	-	-	350	350	700
AM Peak Hour	General Urban/Suburban			Rate	0.70	25%	14	42	56		0	2	2	4%	14	40	54		-	-	-	14	40	54
PM Peak Hour	General Urban/Suburban			Rate	0.94	63%	47	28	75		5	3	8	11%	42	25	67		-	-	-	42	25	67
High Turnover (Sit Down) Restaurant (LU 932)		**2,000**	sf							Restaurant														
Daily	General Urban/Suburban			Rate	107.20	50%	107	107	214		32	32	64	30%	75	75	150	43%	32	32	64	43	43	86
AM Peak Hour	General Urban/Suburban			Rate	9.57	55%	10	9	19		2	0	2	11%	8	9	17	43%	4	4	8	4	5	9
PM Peak Hour	General Urban/Suburban			Rate	9.05	61%	11	7	18		4	5	9	50%	7	2	9	43%	2	2	4	5	0	5
Strip Retail Plaza (<40k) (822)		**2,000**	sf							Retail														
Daily	General Urban/Suburban			Rate	54.45	50%	54	54	108		17	17	34	31%	37	37	74	40%	15	15	30	22	22	44
AM Peak Hour	General Urban/Suburban			Rate	2.36	60%	3	2	5		0	0	0	0%	3	2	5	40%	1	1	2	2	1	3
PM Peak Hour	General Urban/Suburban			Rate	6.59	50%	7	6	13		4	4	8	62%	3	2	5	40%	1	1	2	2	1	3
Soccer Complex (LU 488)		**6**	fields							Cinema/Entertainment														
Daily	General Urban/Suburban			Rate	71.33	50%	214	214	428		0	0	0	0%	214	214	428		-	-	-	214	214	428
AM Peak Hour	General Urban/Suburban			Rate	0.99	61%	4	2	6		0	0	0	0%	4	2	6		-	-	-	4	2	6
PM Peak Hour	General Urban/Suburban			Rate	16.43	66%	65	34	99		0	0	0	0%	65	34	99		-	-	-	65	34	99
Recreational Commuity Center (LU 495)		**80,000**	sf							Cinema/Entertainment														
Daily	General Urban/Suburban			Rate	28.82	50%	1,153	1,153	2,306		9	9	18	1%	1144	1144	2288		-	-	-	1,144	1,144	2,288
AM Peak Hour	General Urban/Suburban			Rate	1.91	66%	101	52	153		0	0	0	0%	101	52	153		-	-	-	101	52	153
PM Peak Hour	General Urban/Suburban			Rate	2.50	47%	94	106	200		1	2	3	2%	93	104	197		-	-	-	93	104	197
Subtotal																								
Daily							1,905	1,905	3,810	Check	85	85	170	4%	1,820	1,820	3,640		47	47	94	1,773	1,773	3,546
AM Peak Hour							132	107	239	Check	2	2	4	2%	130	105	235		5	5	10	125	100	225
PM Peak Hour							224	181	405	Check	14	14	28	7%	210	167	377		3	3	6	207	164	371

Notes:

1. Trip rates based on Institute of Transportation Engineers' (ITE) *Trip Generation* 11th Edition equation and average trip rates as shown above.

			additional trips without internal		
42	25	67	14	40	54
93	104	197	101	52	153
#REF!	#REF!	#REF!	#REF!	#REF!	#REF!
#REF!	#REF!	#REF!	#REF!	#REF!	#REF!
3	3	6	5	5	10
207	164	371	125	100	225

NCHRP 8-51 Internal Trip Capture Estimation Tool			
Project Name:	NKU South Gamble	**Organization:**	
Project Location:	Kitsap County	**Performed By:**	
Scenario Description:	Low Generating LU	**Date:**	
Analysis Year:		**Checked By:**	
Analysis Period:	**AM Street Peak Hour**	**Date:**	

Table 1-A: Base Vehicle-Trip Generation Estimates (Single-Use Site Estimate)

Land Use	Development Data (*For Information Only*)			Estimated Vehicle-Trips		
	ITE LUCs[1]	Quantity	Units	Total	Entering	Exiting
Office				0	0	0
Retail				5	3	2
Restaurant				19	10	9
Cinema/Entertainment				159	105	54
Residential				56	14	42
Hotel				0	0	0
All Other Land Uses[2]				0	0	0
Total				239	132	107

Table 2-A: Mode Split and Vehicle Occupancy Estimates

Land Use	Entering Trips			Exiting Trips		
	Veh. Occ.	% Transit	% Non-Motorized	Veh. Occ.	% Transit	% Non-Motorized
Office						
Retail						
Restaurant						
Cinema/Entertainment						
Residential						
Hotel						
All Other Land Uses[2]						

Table 3-A: Average Land Use Interchange Distances (Feet Walking Distance)

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office						
Retail						
Restaurant						
Cinema/Entertainment						
Residential						
Hotel						

Table 4-A: Internal Person-Trip Origin-Destination Matrix*

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		0	0	0	0	0
Retail	0		0	0	0	0
Restaurant	0	0		0	0	0
Cinema/Entertainment	0	0	0		0	0
Residential	0	0	2	0		0
Hotel	0	0	0	0	0	

Table 5-A: Computations Summary

	Total	Entering	Exiting
All Person-Trips	239	132	107
Internal Capture Percentage	2%	2%	2%
External Vehicle-Trips[3]	235	130	105
External Transit-Trips[4]	0	0	0
External Non-Motorized Trips[4]	0	0	0

Table 6-A: Internal Trip Capture Percentages by Land Use

Land Use	Entering Trips	Exiting Trips
Office	N/A	N/A
Retail	0%	0%
Restaurant	20%	0%
Cinema/Entertainment	0%	0%
Residential	0%	5%
Hotel	N/A	N/A

[1]Land Use Codes (LUCs) from *Trip Generation Informational Report*, published by the Institute of Transportation Engineers.

[2]Total estimate for all other land uses at mixed-use development site-not subject to internal trip capture computations in this estimator

[3]Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-A

[4]Person-Trips

*Indicates computation that has been rounded to the nearest whole number.

Estimation Tool Developed by the Texas Transportation Institute

Project Name:	NKU South Gamble
Analysis Period:	**AM Street Peak Hour**

Table 7-A: Conversion of Vehicle-Trip Ends to Person-Trip Ends

Land Use	Table 7-A (D): Entering Trips			Table 7-A (O): Exiting Trips		
	Veh. Occ.	Vehicle-Trips	Person-Trips*	Veh. Occ.	Vehicle-Trips	Person-Trips*
Office	1.00	0	0	1.00	0	0
Retail	1.00	3	3	1.00	2	2
Restaurant	1.00	10	10	1.00	9	9
Cinema/Entertainment	1.00	105	105	1.00	54	54
Residential	1.00	14	14	1.00	42	42
Hotel	1.00	0	0	1.00	0	0

Table 8-A (O): Internal Person-Trip Origin-Destination Matrix (Computed at Origin)

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		0	0	0	0	0
Retail	1		0	0	0	0
Restaurant	3	1		0	0	0
Cinema/Entertainment	0	0	0		0	0
Residential	1	0	8	0		0
Hotel	0	0	0	0	0	

Table 8-A (D): Internal Person-Trip Origin-Destination Matrix (Computed at Destination)

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		1	2	0	0	0
Retail	0		5	0	0	0
Restaurant	0	0		0	1	0
Cinema/Entertainment	0	0	0		0	0
Residential	0	1	2	0		0
Hotel	0	0	1	0	0	

Table 9-A (D): Internal and External Trips Summary (Entering Trips)

Destination Land Use	Person-Trip Estimates			External Trips by Mode*		
	Internal	External	Total	Vehicles[1]	Transit[2]	Non-Motorized[2]
Office	0	0	0	0	0	0
Retail	0	3	3	3	0	0
Restaurant	2	8	10	8	0	0
Cinema/Entertainment	0	105	105	105	0	0
Residential	0	14	14	14	0	0
Hotel	0	0	0	0	0	0
All Other Land Uses[3]	0	0	0	0	0	0

Table 9-A (O): Internal and External Trips Summary (Exiting Trips)

Origin Land Use	Person-Trip Estimates			External Trips by Mode*		
	Internal	External	Total	Vehicles[1]	Transit[2]	Non-Motorized[2]
Office	0	0	0	0	0	0
Retail	0	2	2	2	0	0
Restaurant	0	9	9	9	0	0
Cinema/Entertainment	0	54	54	54	0	0
Residential	2	40	42	40	0	0
Hotel	0	0	0	0	0	0
All Other Land Uses[3]	0	0	0	0	0	0

[1]Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-A

[2]Person-Trips

[3]Total estimate for all other land uses at mixed-use development site-not subject to internal trip capture computations in this estimator

*Indicates computation that has been rounded to the nearest whole number.

NCHRP 8-51 Internal Trip Capture Estimation Tool			
Project Name:	NKU South Gamble	**Organization:**	
Project Location:	Kitsap County	**Performed By:**	
Scenario Description:	Low Generating LU	**Date:**	
Analysis Year:		**Checked By:**	
Analysis Period:	**PM Street Peak Hour**	**Date:**	

Table 1-P: Base Vehicle-Trip Generation Estimates (Single-Use Site Estimate)

Land Use	Development Data (*For Information Only*)			Estimated Vehicle-Trips		
	ITE LUCs[1]	Quantity	Units	Total	Entering	Exiting
Office				0	0	0
Retail				13	7	6
Restaurant				18	11	7
Cinema/Entertainment				299	159	140
Residential				75	47	28
Hotel				0	0	0
All Other Land Uses[2]				0	0	0
Total				405	224	181

Table 2-P: Mode Split and Vehicle Occupancy Estimates

Land Use	Entering Trips			Exiting Trips		
	Veh. Occ.	% Transit	% Non-Motorized	Veh. Occ.	% Transit	% Non-Motorized
Office						
Retail						
Restaurant						
Cinema/Entertainment						
Residential						
Hotel						
All Other Land Uses[2]						

Table 3-P: Average Land Use Interchange Distances (Feet Walking Distance)

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office						
Retail						
Restaurant						
Cinema/Entertainment						
Residential						
Hotel						

Table 4-P: Internal Person-Trip Origin-Destination Matrix*

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		0	0	0	0	0
Retail	0		2	0	2	0
Restaurant	0	3		1	1	0
Cinema/Entertainment	0	0	0		2	0
Residential	0	1	2	0		0
Hotel	0	0	0	0	0	

Table 5-P: Computations Summary

	Total	Entering	Exiting
All Person-Trips	405	224	181
Internal Capture Percentage	7%	6%	8%
External Vehicle-Trips[3]	377	210	167
External Transit-Trips[4]	0	0	0
External Non-Motorized Trips[4]	0	0	0

Table 6-P: Internal Trip Capture Percentages by Land Use

Land Use	Entering Trips	Exiting Trips
Office	N/A	N/A
Retail	57%	67%
Restaurant	36%	71%
Cinema/Entertainment	1%	1%
Residential	11%	11%
Hotel	N/A	N/A

[1]Land Use Codes (LUCs) from *Trip Generation Informational Report*, published by the Institute of Transportation Engineers.

[2]Total estimate for all other land uses at mixed-use development site-not subject to internal trip capture computations in this estimator

[3]Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-P

[4]Person-Trips

*Indicates computation that has been rounded to the nearest whole number.

Estimation Tool Developed by the Texas Transportation Institute

Project Name:	NKU South Gamble
Analysis Period:	**PM Street Peak Hour**

Table 7-P: Conversion of Vehicle-Trip Ends to Person-Trip Ends

Land Use	Table 7-P (D): Entering Trips			Table 7-P (O): Exiting Trips		
	Veh. Occ.	Vehicle-Trips	Person-Trips*	Veh. Occ.	Vehicle-Trips	Person-Trips*
Office	1.00	0	0	1.00	0	0
Retail	1.00	7	7	1.00	6	6
Restaurant	1.00	11	11	1.00	7	7
Cinema/Entertainment	1.00	159	159	1.00	140	140
Residential	1.00	47	47	1.00	28	28
Hotel	1.00	0	0	1.00	0	0

Table 8-P (O): Internal Person-Trip Origin-Destination Matrix (Computed at Origin)

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		0	0	0	0	0
Retail	0		2	0	2	0
Restaurant	0	3		1	1	0
Cinema/Entertainment	3	29	43		11	3
Residential	1	12	6	0		1
Hotel	0	0	0	0	0	

Table 8-P (D): Internal Person-Trip Origin-Destination Matrix (Computed at Destination)

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		1	0	2	2	0
Retail	0		3	41	22	0
Restaurant	0	4		51	8	0
Cinema/Entertainment	0	0	0		2	0
Residential	0	1	2	0		0
Hotel	0	0	1	0	0	

Table 9-P (D): Internal and External Trips Summary (Entering Trips)

Destination Land Use	Person-Trip Estimates			External Trips by Mode*		
	Internal	External	Total	Vehicles[1]	Transit[2]	Non-Motorized[2]
Office	0	0	0	0	0	0
Retail	4	3	7	3	0	0
Restaurant	4	7	11	7	0	0
Cinema/Entertainment	1	158	159	158	0	0
Residential	5	42	47	42	0	0
Hotel	0	0	0	0	0	0
All Other Land Uses[3]	0	0	0	0	0	0

Table 9-P (O): Internal and External Trips Summary (Exiting Trips)

Origin Land Use	Person-Trip Estimates			External Trips by Mode*		
	Internal	External	Total	Vehicles[1]	Transit[2]	Non-Motorized[2]
Office	0	0	0	0	0	0
Retail	4	2	6	2	0	0
Restaurant	5	2	7	2	0	0
Cinema/Entertainment	2	138	140	138	0	0
Residential	3	25	28	25	0	0
Hotel	0	0	0	0	0	0
All Other Land Uses[3]	0	0	0	0	0	0

[1]Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-P

[2]Person-Trips

[3]Total estimate for all other land uses at mixed-use development site-not subject to internal trip capture computations in this estimator

*Indicates computation that has been rounded to the nearest whole number.

NKU South Gamble (High)

Proposed Use

Land Use	Setting	Size	Units	Model	Rate	Inbound %	Gross Trips Inbound	Gross Trips Outbound	Gross Trips Subtotal	Land Use Type	Internal Trips In	Internal Trips Out	Internal Trips Total	Internal Trips %	External Trips In	External Trips Out	External Trips Total	Pass-By Trips %	Pass-By Trips In	Pass-By Trips Out	Pass-By Trips Total	Primary Trips Inbound	Primary Trips Outbound	Primary Trips Total
Residential Lots + ADUs (LU 210)		**160**	du							Residential														
Daily	General Urban/Suburban			Rate	9.43	50%	754	754	1,508		59	59	118	8%	695	695	1390		-	-	-	695	695	1,390
AM Peak Hour	General Urban/Suburban			Rate	0.70	25%	28	84	112		2	5	7	6%	26	79	105		-	-	-	26	79	105
PM Peak Hour	General Urban/Suburban			Rate	0.94	63%	95	55	150		10	4	14	9%	85	51	136		-	-	-	85	51	136
High Turnover (Sit Down) Restaurant (LU 932)		**4,000**	sf							Restaurant														
Daily	General Urban/Suburban			Rate	107.20	50%	214	214	428		70	70	140	33%	144	144	288	43%	62	62	124	82	82	164
AM Peak Hour	General Urban/Suburban			Rate	9.57	55%	21	17	38		5	1	6	16%	16	16	32	43%	7	7	14	9	9	18
PM Peak Hour	General Urban/Suburban			Rate	9.05	61%	22	14	36		8	10	18	50%	14	4	18	43%	4	4	8	10	0	10
Strip Retail Plaza (<40k) (822)		**4,000**	sf							Retail														
Daily	General Urban/Suburban			Rate	54.45	50%	109	109	218		52	52	104	47%	57	57	114	40%	23	23	46	34	34	68
AM Peak Hour	General Urban/Suburban			Rate	2.36	60%	5	4	9		1	2	3	33%	4	2	6	40%	1	1	2	3	1	4
PM Peak Hour	General Urban/Suburban			Rate	6.59	50%	13	13	26		8	8	16	62%	5	5	10	40%	2	2	4	3	3	6
Soccer Complex (LU 488)		**12**	fields							Cinema/Entertainment														
Daily	General Urban/Suburban			Rate	71.33	50%	428	428	856		3	3	6	1%	425	425	850		-	-	-	425	425	850
AM Peak Hour	General Urban/Suburban			Rate	0.99	61%	7	5	12		0	0	0	0%	7	5	12		-	-	-	7	5	12
PM Peak Hour	General Urban/Suburban			Rate	16.43	66%	130	67	197		1	2	3	2%	129	65	194		-	-	-	129	65	194
Recreational Commuity Center (LU 495)		**60,000**	sf							Cinema/Entertainment														
Daily	General Urban/Suburban			Rate	28.82	50%	865	865	1,730		6	6	12	1%	859	859	1718		-	-	-	859	859	1,718
AM Peak Hour	General Urban/Suburban			Rate	1.91	66%	76	39	115		0	0	0	0%	76	39	115		-	-	-	76	39	115
PM Peak Hour	General Urban/Suburban			Rate	2.50	47%	71	79	150		0	2	2	1%	71	77	148		-	-	-	71	77	148
Recreational Commuity Center (LU 495)		**80,000**	sf							Cinema/Entertainment														
Daily	General Urban/Suburban			Rate	28.82	50%	1,153	1,153	2,306		12	12	24	1%	1141	1141	2282		-	-	-	1,141	1,141	2,282
AM Peak Hour	General Urban/Suburban			Rate	1.91	66%	101	52	153		0	0	0	0%	101	52	153		-	-	-	101	52	153
PM Peak Hour	General Urban/Suburban			Rate	2.50	47%	94	106	200		1	3	4	2%	93	103	196		-	-	-	93	103	196
Subtotal																								
Daily							3,523	3,523	7,046	Check	202	202	404	6%	3,321	3,321	6,642		85	85	170	3,236	3,236	6,472
AM Peak Hour							238	201	439	Check	8	8	16	4%	230	193	423		8	8	16	222	185	407
PM Peak Hour							425	334	759	Error	28	29	57	8%	397	305	702		6	6	12	391	299	690

Notes:

1. Trip rates based on Institute of Transportation Engineers' (ITE) *Trip Generation* 11th Edition equation and average trip rates as shown above.

NCHRP 8-51 Internal Trip Capture Estimation Tool			
Project Name:	NKU South Gamble	**Organization:**	
Project Location:	Kitsap County	**Performed By:**	
Scenario Description:	High Generating LU	**Date:**	
Analysis Year:		**Checked By:**	
Analysis Period:	**AM Street Peak Hour**	**Date:**	

Table 1-A: Base Vehicle-Trip Generation Estimates (Single-Use Site Estimate)

Land Use	Development Data (*For Information Only*)			Estimated Vehicle-Trips		
	ITE LUCs[1]	Quantity	Units	Total	Entering	Exiting
Office				0	0	0
Retail				9	5	4
Restaurant				38	21	17
Cinema/Entertainment				280	184	96
Residential				112	28	84
Hotel				0	0	0
All Other Land Uses[2]				0	0	0
Total				439	238	201

Table 2-A: Mode Split and Vehicle Occupancy Estimates

Land Use	Entering Trips			Exiting Trips		
	Veh. Occ.	% Transit	% Non-Motorized	Veh. Occ.	% Transit	% Non-Motorized
Office						
Retail						
Restaurant						
Cinema/Entertainment						
Residential						
Hotel						
All Other Land Uses[2]						

Table 3-A: Average Land Use Interchange Distances (Feet Walking Distance)

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office						
Retail						
Restaurant						
Cinema/Entertainment						
Residential						
Hotel						

Table 4-A: Internal Person-Trip Origin-Destination Matrix*

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		0	0	0	0	0
Retail	0		1	0	1	0
Restaurant	0	0		0	1	0
Cinema/Entertainment	0	0	0		0	0
Residential	0	1	4	0		0
Hotel	0	0	0	0	0	

Table 5-A: Computations Summary

	Total	Entering	Exiting
All Person-Trips	439	238	201
Internal Capture Percentage	4%	3%	4%
External Vehicle-Trips[3]	423	230	193
External Transit-Trips[4]	0	0	0
External Non-Motorized Trips[4]	0	0	0

Table 6-A: Internal Trip Capture Percentages by Land Use

Land Use	Entering Trips	Exiting Trips
Office	N/A	N/A
Retail	20%	50%
Restaurant	24%	6%
Cinema/Entertainment	0%	0%
Residential	7%	6%
Hotel	N/A	N/A

[1]Land Use Codes (LUCs) from *Trip Generation Informational Report*, published by the Institute of Transportation Engineers.

[2]Total estimate for all other land uses at mixed-use development site-not subject to internal trip capture computations in this estimator

[3]Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-A

[4]Person-Trips

*Indicates computation that has been rounded to the nearest whole number.

Estimation Tool Developed by the Texas Transportation Institute

Project Name:	NKU South Gamble
Analysis Period:	**AM Street Peak Hour**

Table 7-A: Conversion of Vehicle-Trip Ends to Person-Trip Ends

Land Use	Table 7-A (D): Entering Trips			Table 7-A (O): Exiting Trips		
	Veh. Occ.	Vehicle-Trips	Person-Trips*	Veh. Occ.	Vehicle-Trips	Person-Trips*
Office	1.00	0	0	1.00	0	0
Retail	1.00	5	5	1.00	4	4
Restaurant	1.00	21	21	1.00	17	17
Cinema/Entertainment	1.00	184	184	1.00	96	96
Residential	1.00	28	28	1.00	84	84
Hotel	1.00	0	0	1.00	0	0

Table 8-A (O): Internal Person-Trip Origin-Destination Matrix (Computed at Origin)

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		0	0	0	0	0
Retail	1		1	0	1	0
Restaurant	5	2		0	1	1
Cinema/Entertainment	0	0	0		0	0
Residential	2	1	17	0		0
Hotel	0	0	0	0	0	

Table 8-A (D): Internal Person-Trip Origin-Destination Matrix (Computed at Destination)

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		2	5	0	0	0
Retail	0		11	0	1	0
Restaurant	0	0		0	1	0
Cinema/Entertainment	0	0	0		0	0
Residential	0	1	4	0		0
Hotel	0	0	1	0	0	

Table 9-A (D): Internal and External Trips Summary (Entering Trips)

Destination Land Use	Person-Trip Estimates			External Trips by Mode*		
	Internal	External	Total	Vehicles[1]	Transit[2]	Non-Motorized[2]
Office	0	0	0	0	0	0
Retail	1	4	5	4	0	0
Restaurant	5	16	21	16	0	0
Cinema/Entertainment	0	184	184	184	0	0
Residential	2	26	28	26	0	0
Hotel	0	0	0	0	0	0
All Other Land Uses[3]	0	0	0	0	0	0

Table 9-A (O): Internal and External Trips Summary (Exiting Trips)

Origin Land Use	Person-Trip Estimates			External Trips by Mode*		
	Internal	External	Total	Vehicles[1]	Transit[2]	Non-Motorized[2]
Office	0	0	0	0	0	0
Retail	2	2	4	2	0	0
Restaurant	1	16	17	16	0	0
Cinema/Entertainment	0	96	96	96	0	0
Residential	5	79	84	79	0	0
Hotel	0	0	0	0	0	0
All Other Land Uses[3]	0	0	0	0	0	0

[1]Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-A

[2]Person-Trips

[3]Total estimate for all other land uses at mixed-use development site-not subject to internal trip capture computations in this estimator

*Indicates computation that has been rounded to the nearest whole number.

NCHRP 8-51 Internal Trip Capture Estimation Tool			
Project Name:	NKU South Gamble	**Organization:**	
Project Location:	Kitsap County	**Performed By:**	
Scenario Description:	High Generating LU	**Date:**	
Analysis Year:		**Checked By:**	
Analysis Period:	**PM Street Peak Hour**	**Date:**	

Table 1-P: Base Vehicle-Trip Generation Estimates (Single-Use Site Estimate)

Land Use	Development Data (*For Information Only*)			Estimated Vehicle-Trips		
	ITE LUCs[1]	Quantity	Units	Total	Entering	Exiting
Office				0	0	0
Retail				26	13	13
Restaurant				36	22	14
Cinema/Entertainment				547	295	252
Residential				150	95	55
Hotel				0	0	0
All Other Land Uses[2]				0	0	0
Total				759	425	334

Table 2-P: Mode Split and Vehicle Occupancy Estimates

Land Use	Entering Trips			Exiting Trips		
	Veh. Occ.	% Transit	% Non-Motorized	Veh. Occ.	% Transit	% Non-Motorized
Office						
Retail						
Restaurant						
Cinema/Entertainment						
Residential						
Hotel						
All Other Land Uses[2]						

Table 3-P: Average Land Use Interchange Distances (Feet Walking Distance)

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office						
Retail						
Restaurant						
Cinema/Entertainment						
Residential						
Hotel						

Table 4-P: Internal Person-Trip Origin-Destination Matrix*

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		0	0	0	0	0
Retail	0		4	1	3	0
Restaurant	0	6		1	3	0
Cinema/Entertainment	0	1	1		4	0
Residential	0	1	3	0		0
Hotel	0	0	0	0	0	

Table 5-P: Computations Summary

	Total	Entering	Exiting
All Person-Trips	759	425	334
Internal Capture Percentage	7%	7%	8%
External Vehicle-Trips[3]	703	397	306
External Transit-Trips[4]	0	0	0
External Non-Motorized Trips[4]	0	0	0

Table 6-P: Internal Trip Capture Percentages by Land Use

Land Use	Entering Trips	Exiting Trips
Office	N/A	N/A
Retail	62%	62%
Restaurant	36%	71%
Cinema/Entertainment	1%	2%
Residential	11%	7%
Hotel	N/A	N/A

[1]Land Use Codes (LUCs) from *Trip Generation Informational Report*, published by the Institute of Transportation Engineers.

[2]Total estimate for all other land uses at mixed-use development site-not subject to internal trip capture computations in this estimator

[3]Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-P

[4]Person-Trips

*Indicates computation that has been rounded to the nearest whole number.

Estimation Tool Developed by the Texas Transportation Institute

Project Name:	NKU South Gamble
Analysis Period:	**PM Street Peak Hour**

Table 7-P: Conversion of Vehicle-Trip Ends to Person-Trip Ends

Land Use	Table 7-P (D): Entering Trips			Table 7-P (O): Exiting Trips		
	Veh. Occ.	Vehicle-Trips	Person-Trips*	Veh. Occ.	Vehicle-Trips	Person-Trips*
Office	1.00	0	0	1.00	0	0
Retail	1.00	13	13	1.00	13	13
Restaurant	1.00	22	22	1.00	14	14
Cinema/Entertainment	1.00	295	295	1.00	252	252
Residential	1.00	95	95	1.00	55	55
Hotel	1.00	0	0	1.00	0	0

Table 8-P (O): Internal Person-Trip Origin-Destination Matrix (Computed at Origin)

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		0	0	0	0	0
Retail	0		4	1	3	1
Restaurant	0	6		1	3	1
Cinema/Entertainment	5	53	78		20	5
Residential	2	23	12	0		2
Hotel	0	0	0	0	0	

Table 8-P (D): Internal Person-Trip Origin-Destination Matrix (Computed at Destination)

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		1	0	3	4	0
Retail	0		6	77	44	0
Restaurant	0	7		94	15	0
Cinema/Entertainment	0	1	1		4	0
Residential	0	1	3	0		0
Hotel	0	0	1	0	0	

Table 9-P (D): Internal and External Trips Summary (Entering Trips)

Destination Land Use	Person-Trip Estimates			External Trips by Mode*		
	Internal	External	Total	Vehicles[1]	Transit[2]	Non-Motorized[2]
Office	0	0	0	0	0	0
Retail	8	5	13	5	0	0
Restaurant	8	14	22	14	0	0
Cinema/Entertainment	2	293	295	293	0	0
Residential	10	85	95	85	0	0
Hotel	0	0	0	0	0	0
All Other Land Uses[3]	0	0	0	0	0	0

Table 9-P (O): Internal and External Trips Summary (Exiting Trips)

Origin Land Use	Person-Trip Estimates			External Trips by Mode*		
	Internal	External	Total	Vehicles[1]	Transit[2]	Non-Motorized[2]
Office	0	0	0	0	0	0
Retail	8	5	13	5	0	0
Restaurant	10	4	14	4	0	0
Cinema/Entertainment	6	246	252	246	0	0
Residential	4	51	55	51	0	0
Hotel	0	0	0	0	0	0
All Other Land Uses[3]	0	0	0	0	0	0

[1]Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-P

[2]Person-Trips

[3]Total estimate for all other land uses at mixed-use development site-not subject to internal trip capture computations in this estimator

*Indicates computation that has been rounded to the nearest whole number.

Appendix E: Traffic Signal Warrant

HCS Warrants Report

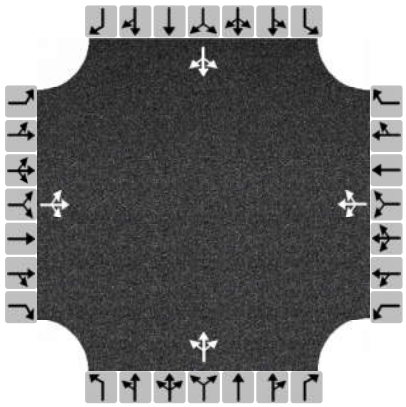
Project Information

Analyst	Transpo Group	Date	12/5/2023
Agency		Analysis Year	
Jurisdiction	Kitsap County	Time Period Analyzed	2028
Project Description			

General

Major Street Direction	North-South	Population < 10,000	Yes
Starting Time Interval	7	Coordinated Signal System	No
Median Type	Undivided	Crashes (crashes/year)	1
Major Street Speed (mi/h)	50	Adequate Trials of Crash Exp. Alt.	No
Nearest Signal (ft)	5490		

Geometry and Traffic



Approach	Eastbound			Westbound			Northbound			Southbound		
Movement	L	T	R	L	T	R	L	T	R	L	T	R
Number of Lanes, N	0	1	0	0	1	0	0	1	0	0	1	0
Lane Usage		LTR			LTR			LTR			LTR	
Vehicle Volumes Averages (veh/h)	135	0	56	3	0	0	65	516	10	4	446	163
Pedestrian Averages (peds/h)	0			0			0			0		
Gap Averages (gaps/h)	0			0			0			0		
Delay (s/veh)	0.0			0.0			0.0			0.0		
Delay (veh-hrs)	0.0			0.0			0.0			0.0		

School Crossing and Roadway Network

Number of Students in Highest Hour	0	Two or More Major Routes	No
Number of Adequate Gaps in Period	0	Weekend Counts	No
Number of Minutes in Period	0	5-year Growth Factor (%)	0

Railroad Crossing

Grade Crossing Approach	None	Rail Traffic (trains/day)	0
Highest Volume Hour with Trains	Unknown	High Occupancy Buses (%)	0
Distance to Stop Line (ft)	-	Tractor-Trailer Trucks (%)	10

Volume Summary

Hour	Major Volume	Minor Volume	Total Volume	Peds/h	Gaps/h	1A (70%)	1A (56%)	1B (70%)	1B (56%)	2 (70%)	3A (70%)	3B (56%)	4A (70%)	4B (56%)
07 - 08	1290	204	1498	0	0	Yes	Yes	Yes	Yes	Yes	No	Yes	No	No
08 - 09	960	152	1115	0	0	Yes	Yes	Yes	Yes	Yes	No	Yes	No	No
09 - 10	695	110	807	0	0	Yes	Yes	Yes	Yes	Yes	No	No	No	No
10 - 11	855	136	994	0	0	Yes	Yes	Yes	Yes	Yes	No	Yes	No	No
11 - 12	995	157	1155	0	0	Yes	Yes	Yes	Yes	Yes	No	Yes	No	No
12 - 13	1304	207	1515	0	0	Yes	Yes	Yes	Yes	Yes	No	Yes	No	No
13 - 14	1120	177	1300	0	0	Yes	Yes	Yes	Yes	Yes	No	Yes	No	No
14 - 15	1226	194	1424	0	0	Yes	Yes	Yes	Yes	Yes	No	Yes	No	No
15 - 16	1591	252	1848	0	0	Yes	Yes	Yes	Yes	Yes	No	Yes	No	No
16 - 17	1636	259	1900	0	0	Yes	Yes	Yes	Yes	Yes	No	Yes	No	No
17 - 18	1618	256	1879	0	0	Yes	Yes	Yes	Yes	Yes	No	Yes	No	No
18 - 19	1196	190	1390	0	0	Yes	Yes	Yes	Yes	Yes	No	Yes	No	No
Total	14486	2294	16825	0	0	12	12	12	12	12	0	11	0	0

Warrants

Warrant 1: Eight-Hour Vehicular Volume	✔
A. Minimum Vehicular Volumes (Both major approaches --and-- higher minor approach) --or--	✓
B. Interruption of Continuous Traffic (Both major approaches --and-- higher minor approach) --or--	✓
56% Vehicular --and-- Interruption Volumes (Both major approaches --and-- higher minor approach)	✓
Warrant 2: Four-Hour Vehicular Volume	✔
Four-Hour Vehicular Volume (Both major approaches --and-- higher minor approach)	✓
Warrant 3: Peak Hour	✔
A. Peak-Hour Conditions (Minor delay -- and-- minor volume --and-- total volume) --or--	
B. Peak-Hour Vehicular Volumes (Both major approaches --and-- higher minor approach)	✓
Warrant 4: Pedestrian Volume	
A. Four Hour Volumes --or--	
B. One-Hour Volumes	
Warrant 5: School Crossing	
Gaps Same Period --and--	
Student Volumes	
Nearest Traffic Control Signal (optional)	✓
Warrant 6: Coordinated Signal System	
Degree of Platooning (Predominant direction or both directions)	
Warrant 7: Crash Experience	
A. Adequate trials of alternatives, observance and enforcement failed --and--	
B. Reported crashes susceptible to correction by signal (12-month period) --and--	
C. 56% Volumes for Warrants 1A, 1B, --or-- 4 are satisfied	✓
Warrant 8: Roadway Network	
A. Weekday Volume (Peak hour total --and-- projected warrants 1, 2, or 3) --or--	
B. Weekend Volume (Five hours total)	
Warrant 9: Grade Crossing	
A. Grade Crossing within 140 ft --and--	
B. Peak-Hour Vehicular Volumes	

Appendix F: Stormwater

Flow Chart for Determining Minimum Requirements for New Development Projects, Kitsap County

Preliminary Infiltration Rates

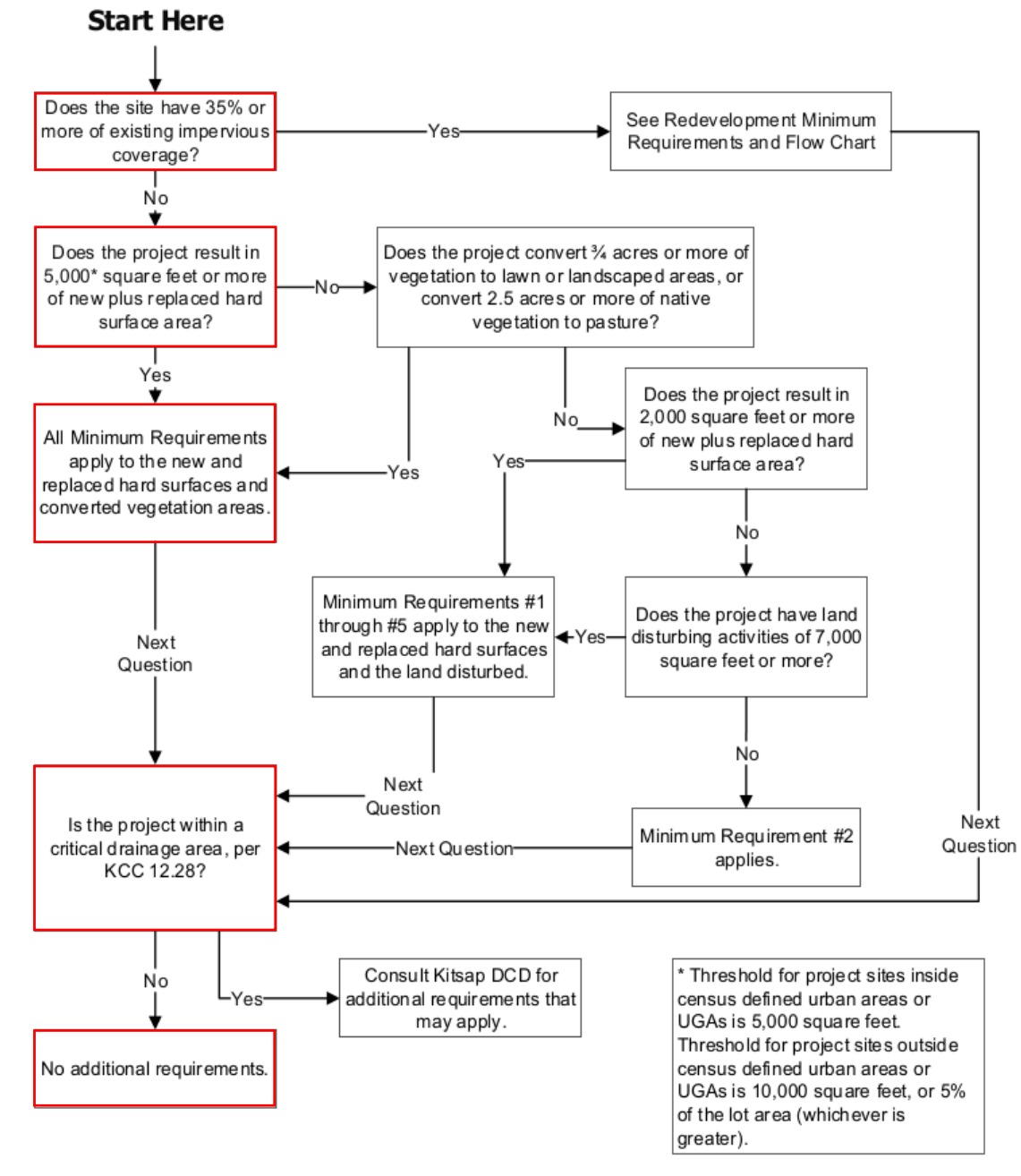
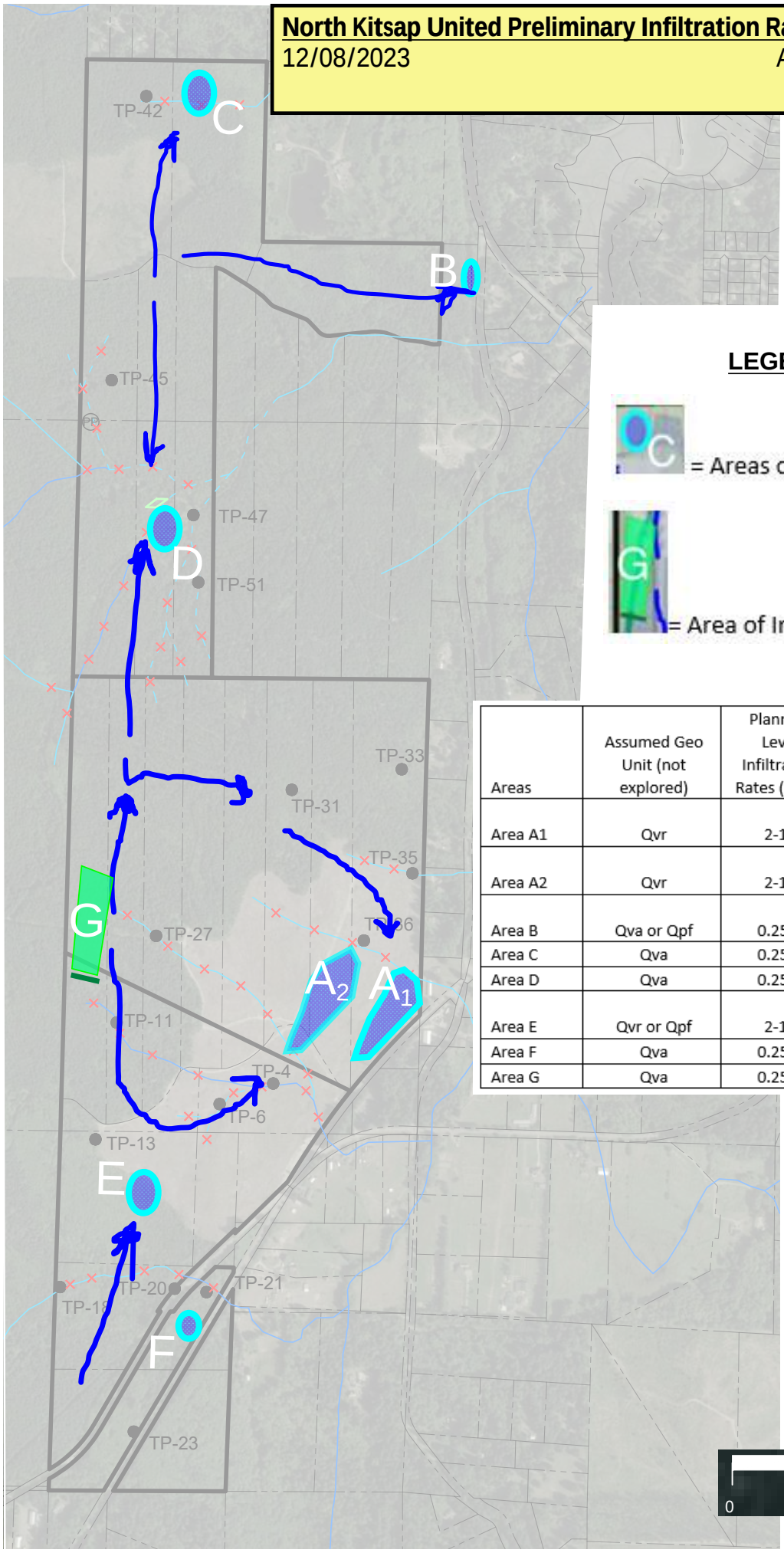


Figure I-4.1. Flow Chart for Determining Minimum Requirements for New Development Projects

July 2021

North Kitsap United Preliminary Infiltration Rates

12/08/2023 AESI



LEGEND

C = Areas of Interest for Infiltration

G = Area of Interest for SS Drainfield

Areas	Assumed Geo Unit (not explored)	Planning Level Infiltration Rates (in/hr)	Comments
Area A1	Qvr	2-10	Pond depth and infiltration rate may be constrained by groundwater
Area A2	Qvr	2-10	Pond depth and infiltration rate may be constrained by groundwater
Area B	Qva or Qpf	0.25-2	Speculative - basing feasibility on proximity to sand pit
Area C	Qva	0.25-2	
Area D	Qva	0.25-2	
Area E	Qvr or Qpf	2-10	Caution: may not be feasible if Qvr is thin and underlying geo is fine-grained.
Area F	Qva	0.25-2	
Area G	Qva	0.25-2	

Appendix G: Water

Kitsap County Water Purveyor Map
KPUD Water Service Exhibit

DAVID EVANS AND ASSOCIATES INC.

Water Purveyor Map

KITSAP COUNTY WASHINGTON

Coordinated Water System Plan
Water Service Areas

Legend

Coordinated Water System Plan Adopted May 9, 2005

Water Service Area Type

- City
- Community Water System
- Federal - Navy / Tribal
- Kitsap PUD
- Northwest Water Systems
- Other Private
- Uncontested Overlap
- Washington Water Service Company
- Water District
- Kitsap County Tax Parcel Layer - Satellite Management Area

C.W.S.P. Adopted May 9, 2005
Map Created October 12, 2020

Lambert Conformal Conic Projection
North American Datum 1983
Spheroid: GRS80
State Plane Coordinate System
FIPS Zone 4601
Washington North

Elevation data source:

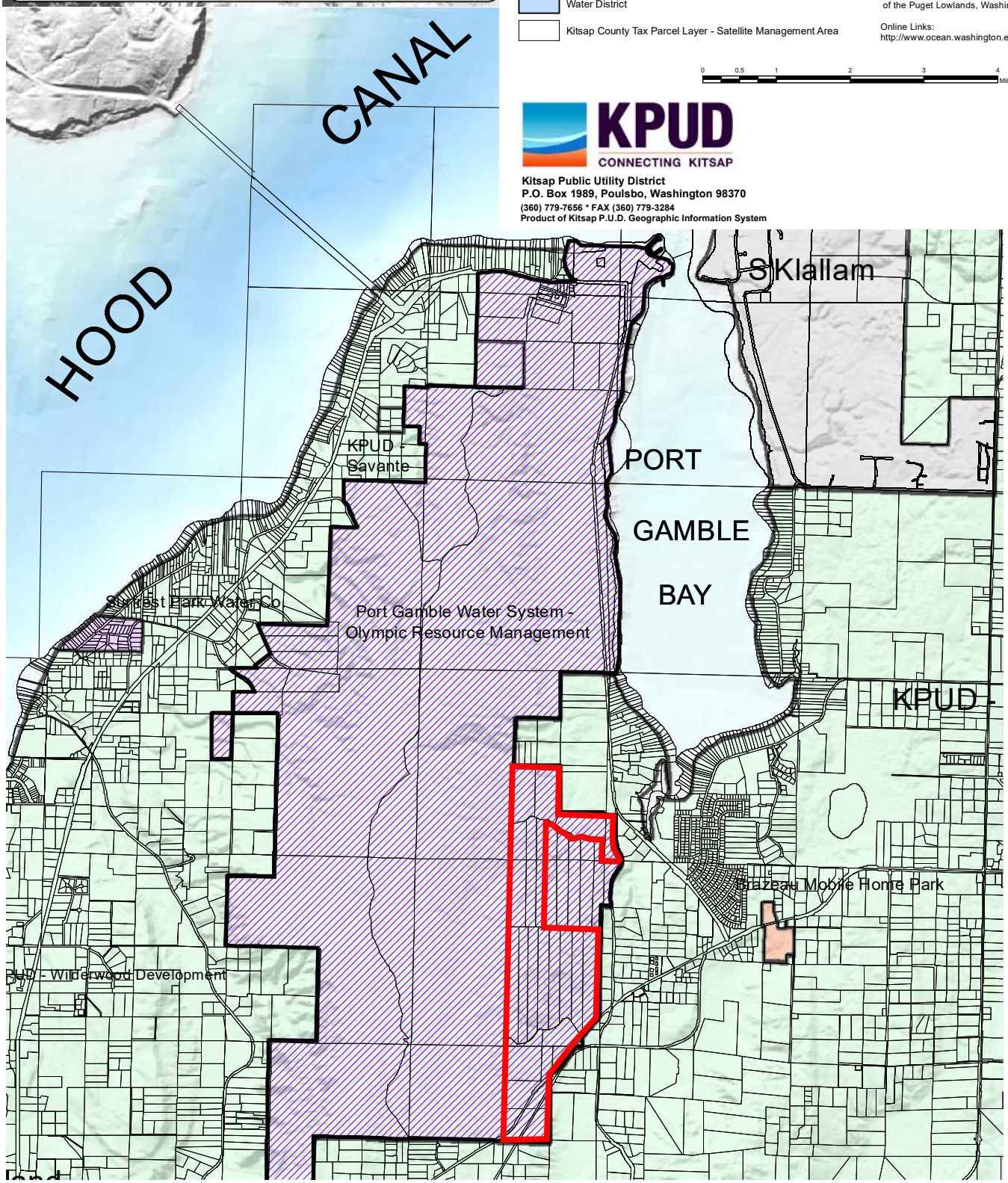
Finlayson, David, 20050124, Combined bathymetry and topography of the Puget Lowlands, Washington State (January 2005).

Online Links:
http://www.ocean.washington.edu/data/pugetsound/

0 0.5 1 2 3 4 Miles

KPUD CONNECTING KITSAP

Kitsap Public Utility District
P.O. Box 1989, Poulsbo, Washington 98370
(360) 779-7656 * FAX (360) 779-3284
Product of Kitsap P.U.D. Geographic Information System



KPUD Water Service Exhibit