



**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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DATE: 11/10/23  
DWN: JB  
PRJ. MGR: JB  
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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**Photoplate 9-Culverts**  
Critical Areas Reconnaissance  
NK United /Raydient  
Poulsbo, Washington

# APPENDIX A

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## 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 is 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**

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### **ORDINARY HIGH WATER MARK DELINEATION METHODOLOGY**

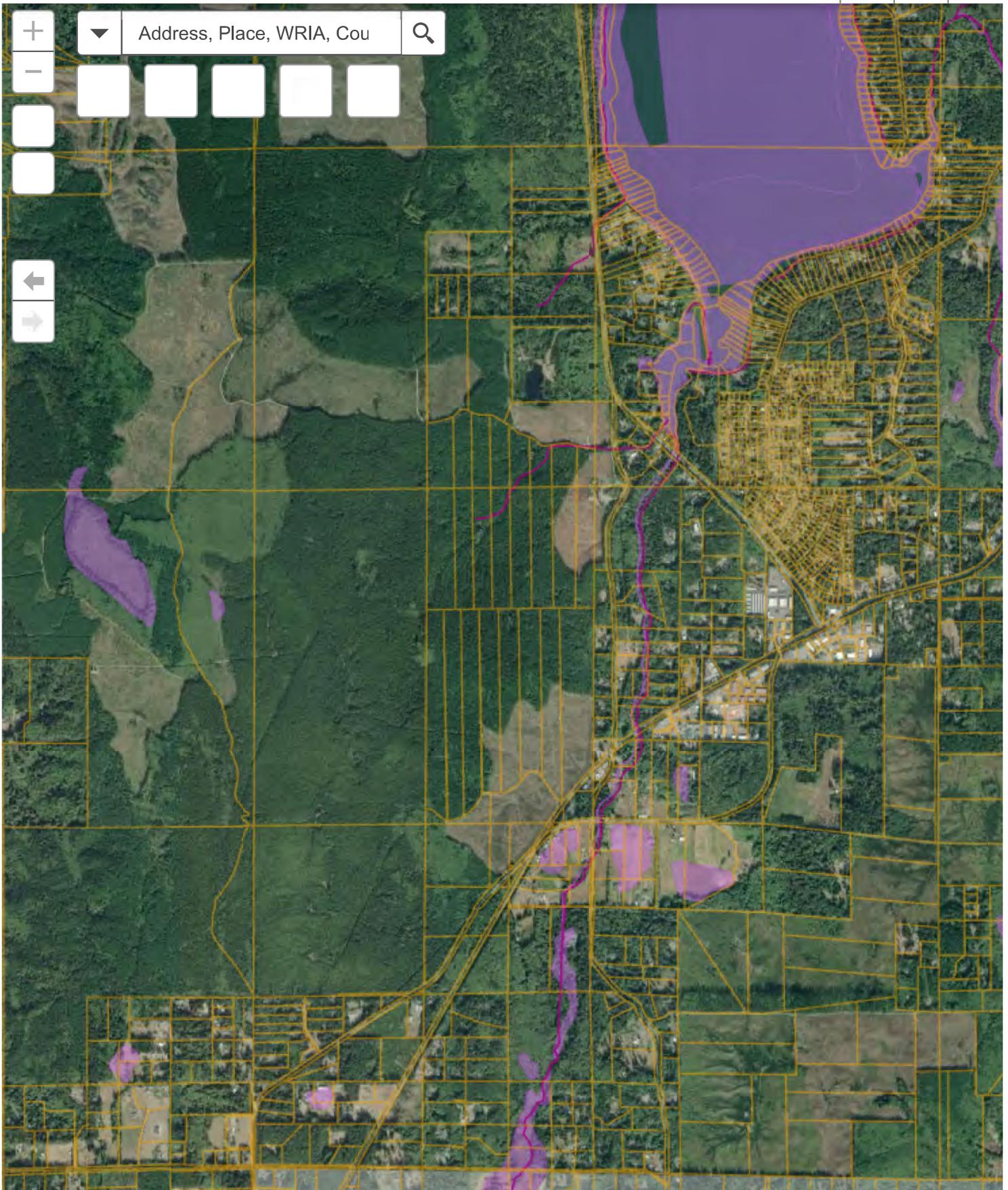
## OHWM METHODOLOGY

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

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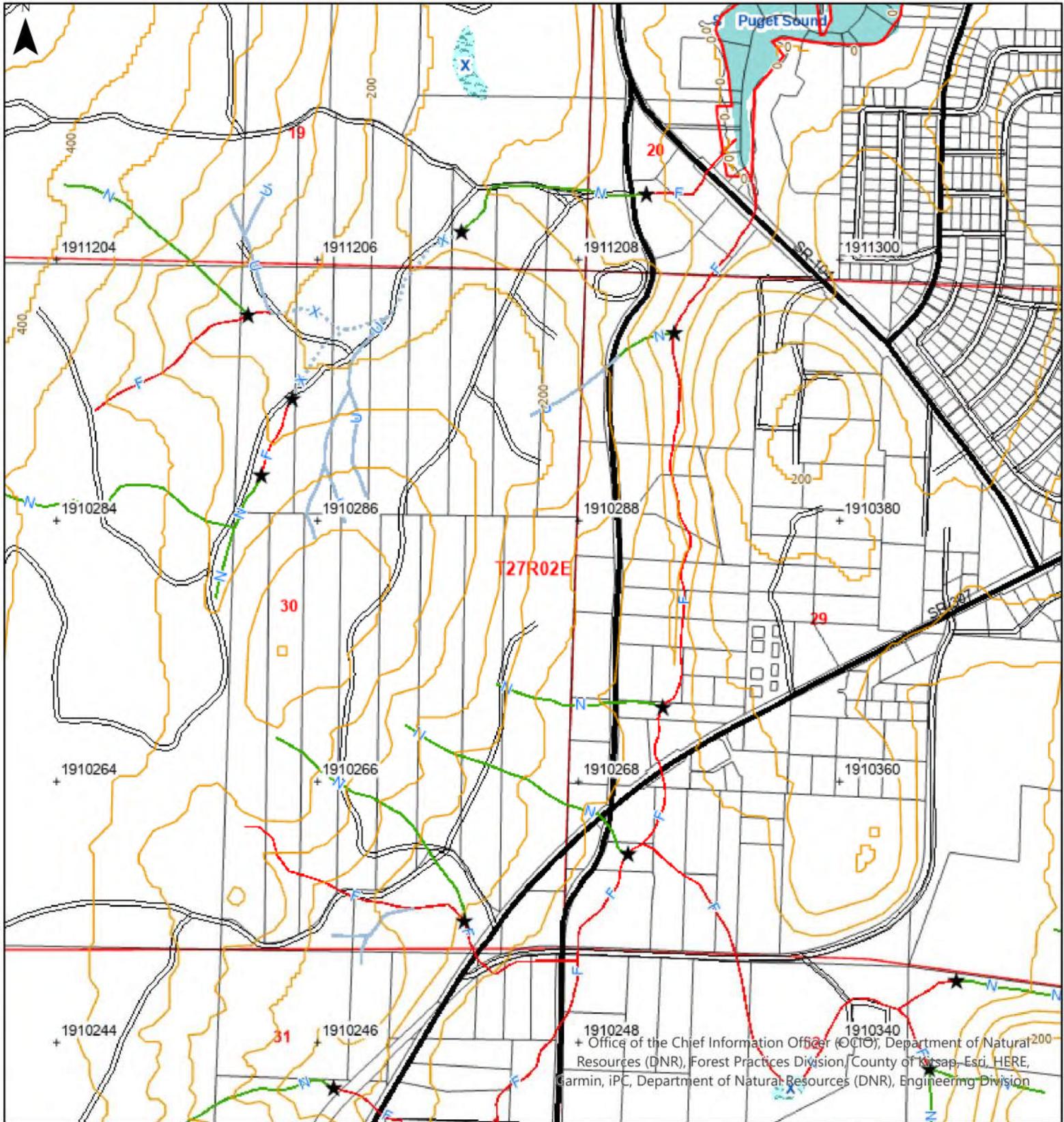
### WASHINGTON STATE AND KITSAP COUNTY CRITICAL AREAS



0.4mi

-122.59517 47.80708 Degrees

# Forest Practices Activity Map - Application # \_\_\_\_\_



1910248 + Office of the Chief Information Officer (OCIO), Department of Natural Resources (DNR), Forest Practices Division, County of Kitsap - Esri, HERE, Garmin, iPC, Department of Natural Resources (DNR), Engineering Division

### Map Symbols

- Harvest Boundary
- - - Road Construction
- ~ Stream
- RMZ / WMZ Buffers
- ⊗ Rock Pit
- ⊙ Landing
- ▽ Waste Area
- 🌲 Clumped WRTS/GRTS
- 🏠 Existing Structure

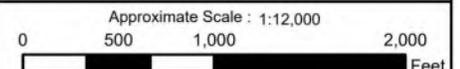
### Additional Information

### Legal Description

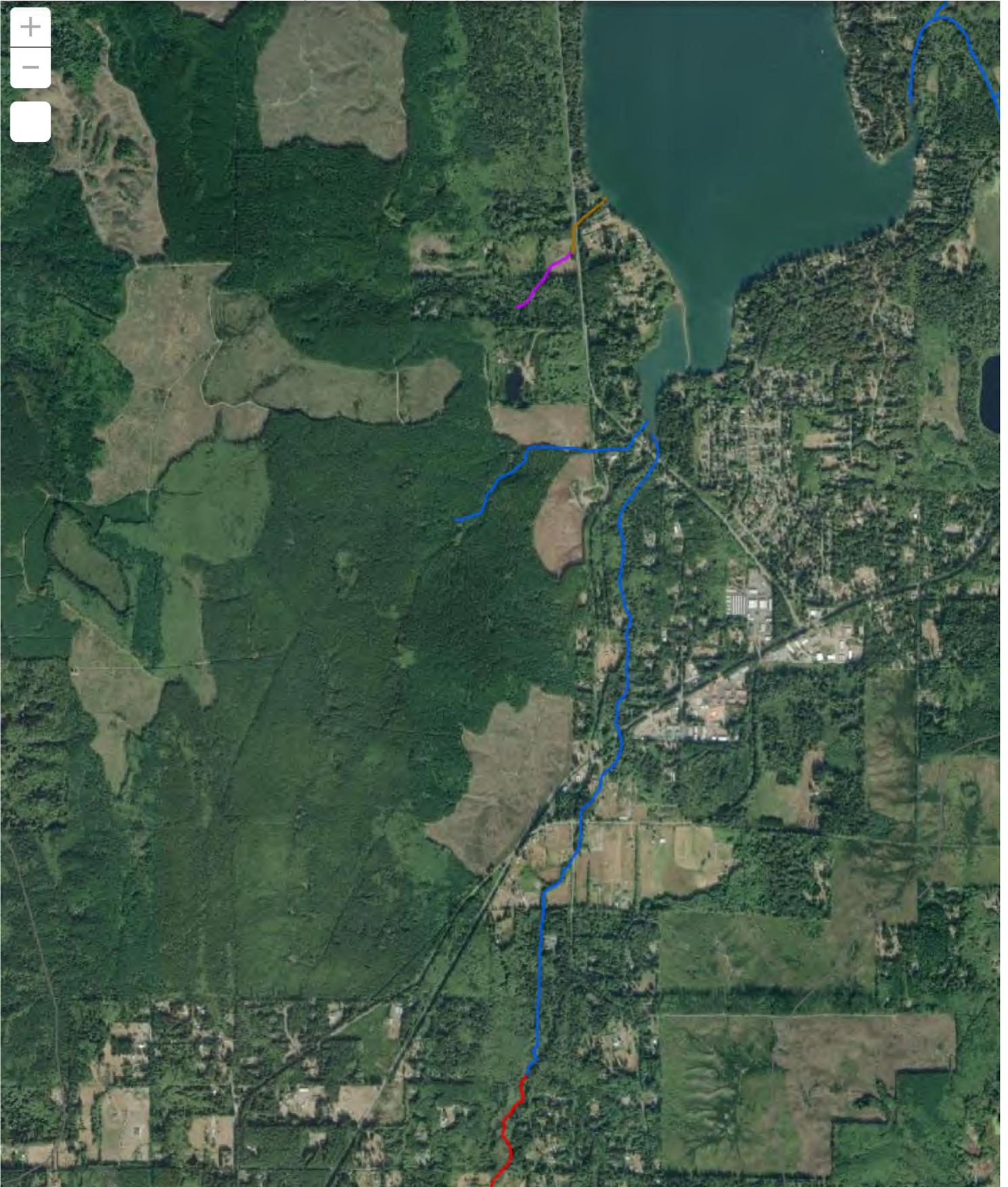
S19 T27.0N R02.0E, S20 T27.0N R02.0E, S32 T27.0N R02.0E, S29 T27.0N R02.0E, S30 T27.0N R02.0E, S31 T27.0N R02.0E



Extreme care was used during the compilation of this map to ensure its accuracy. However, due to changes in data and the need to rely on outside information, the Department of Natural Resources cannot accept responsibility for errors or omissions, and therefore, there are no warranties that accompany this material.

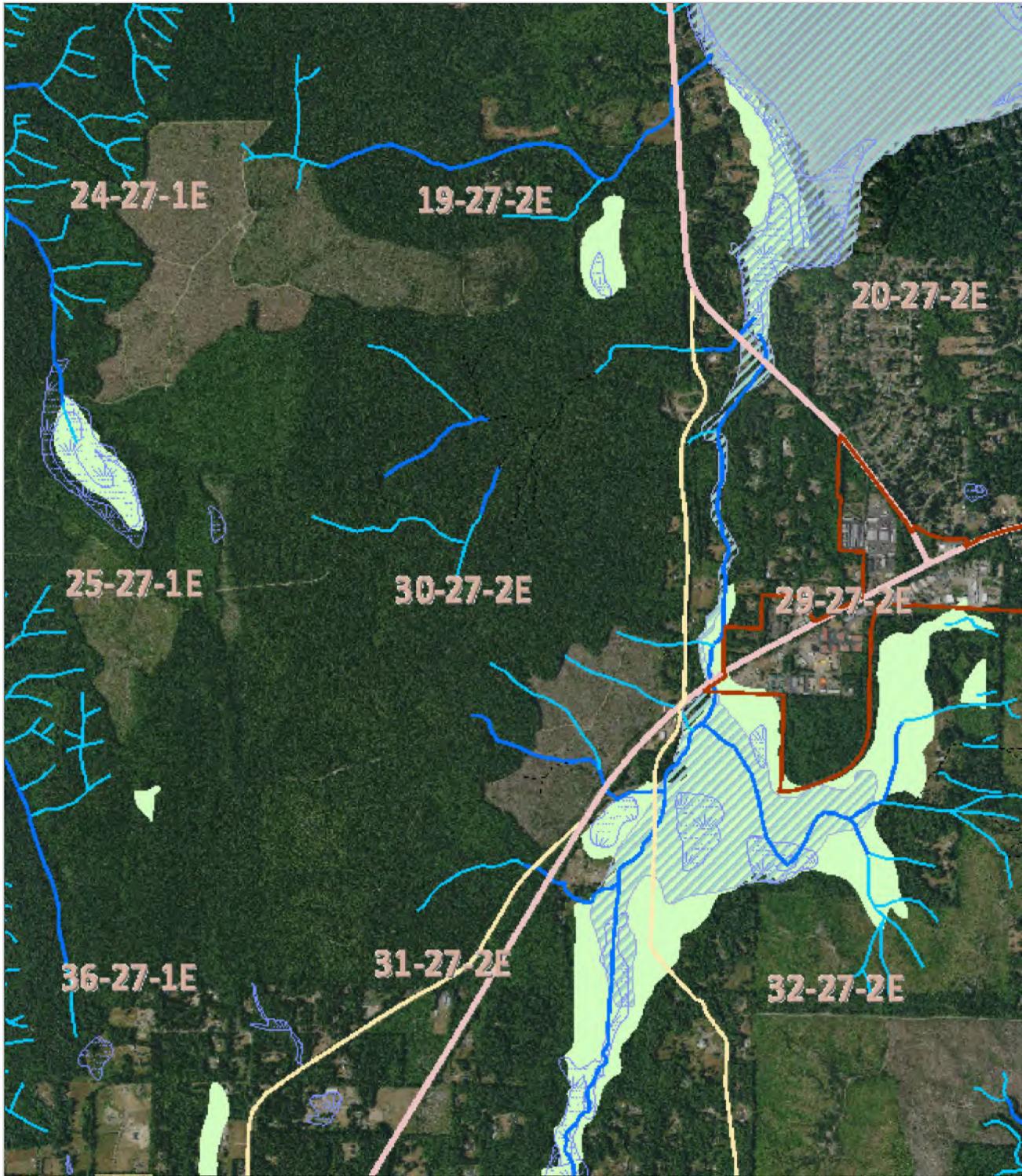


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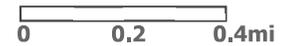


0.4mi

-122.591992 47.799443 Degrees



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



Comments



**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:**

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

**November 10, 2023**

## 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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## 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

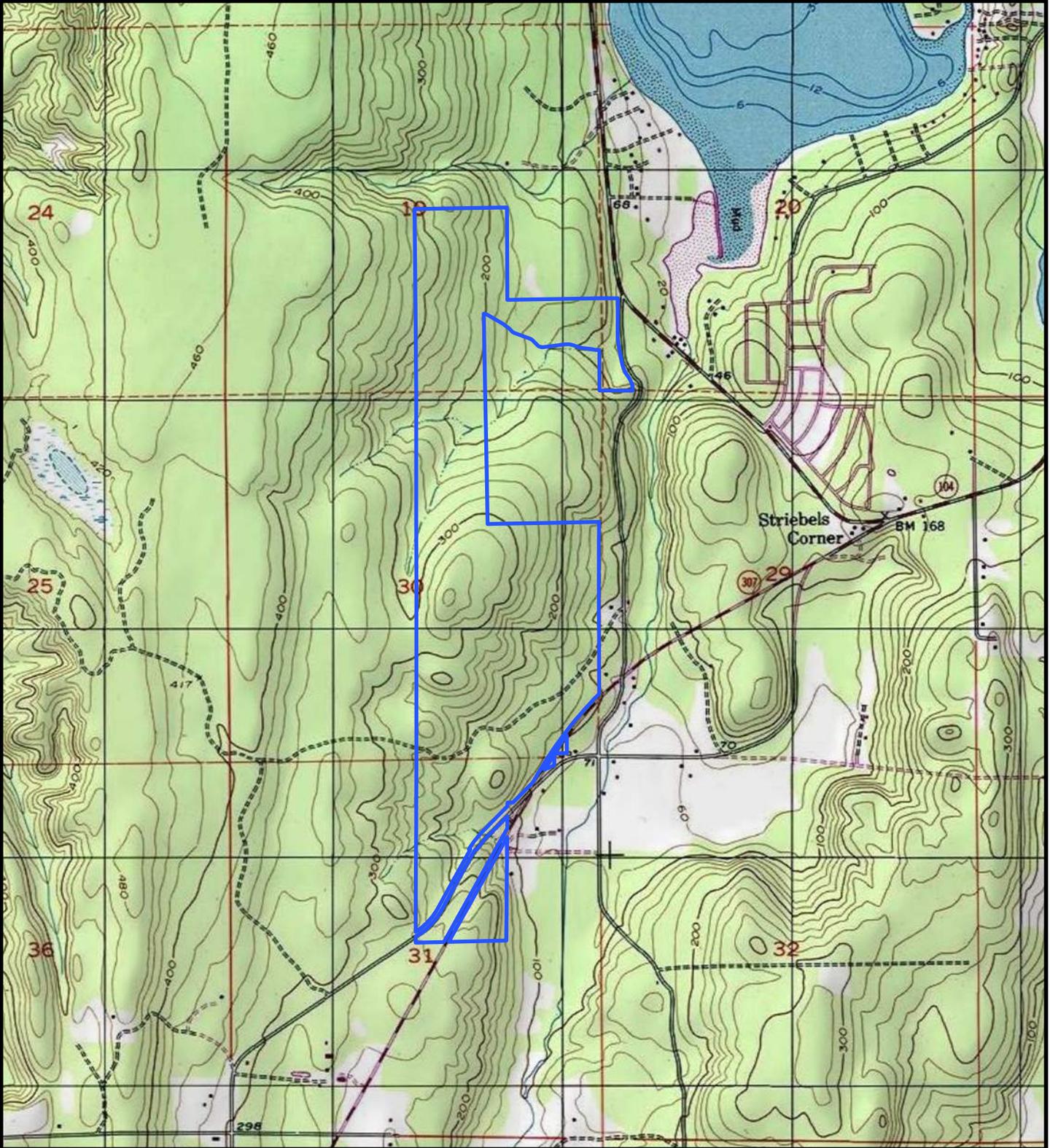
**Project Area/Area of Potential Impacts:** The Project Area/API consists of the entirety of the project parcels.

## 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**).

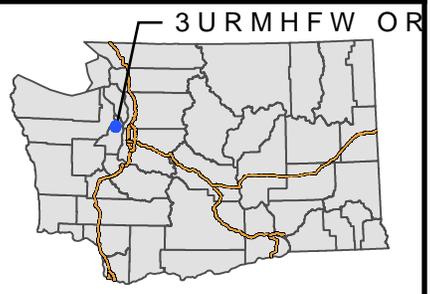
Raydient is conducting due diligence to facilitate anticipated permitting, administrative, and legal requirements in the future. Raydient therefore contracted WestLand Engineering & Environmental Services (WestLand) to conduct a cultural resources desktop assessment of the API and everything within a 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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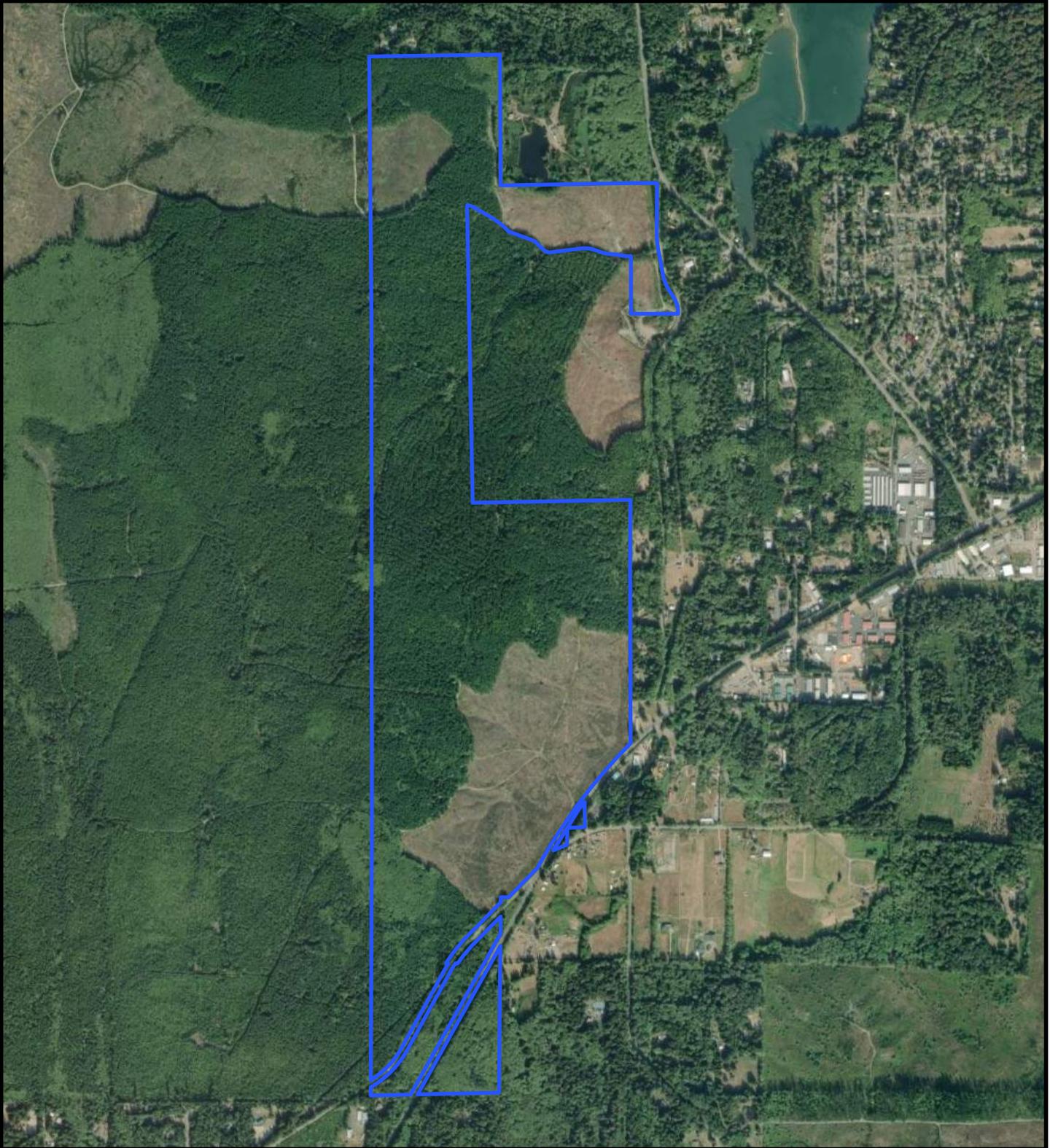
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## BACKGROUND RESEARCH

### 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).

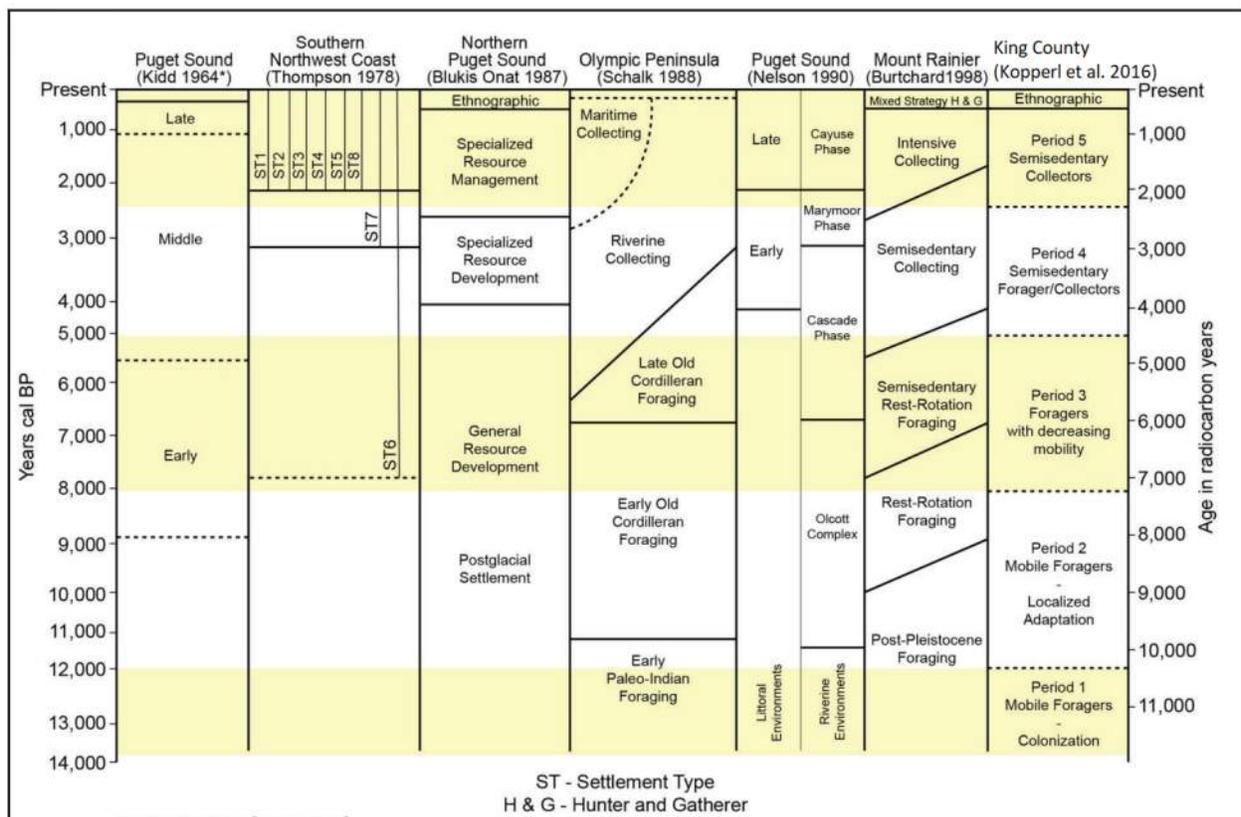
Early residential base camp sites dating to between 8000 and 5000 B.P. (or 6000 and 3000 BC, also referred to as the Middle Period) are commonly found on glacial outwash surfaces in the Puget Lowland, northwest Washington, and inland western Washington foothill valleys (Kidd 1964; Mattson 1985). The 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'Klallam, 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'ä5wat* ("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 *Q3qja'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

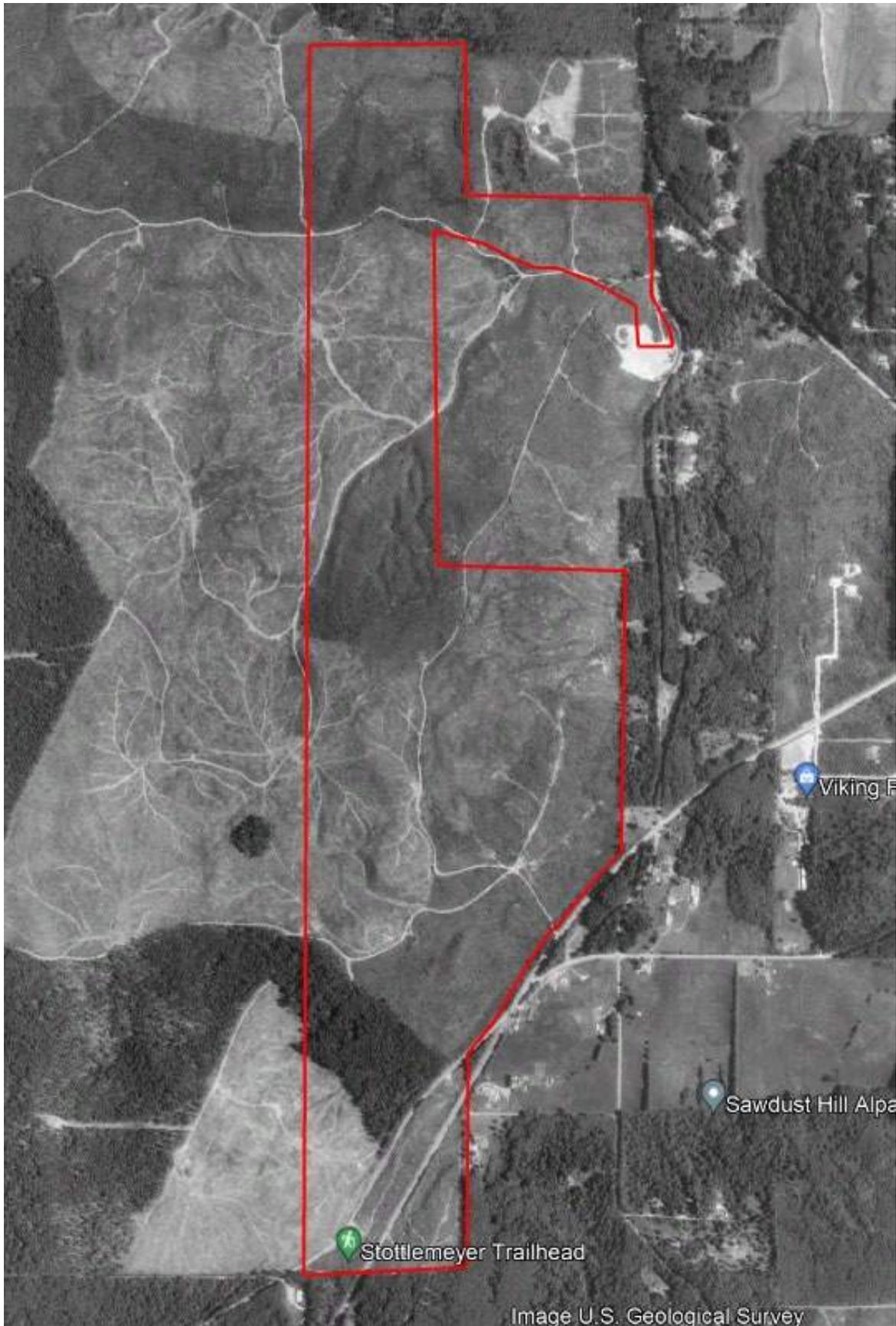


Figure 4. Google Earth 1990 aerial photo of the API

## 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)

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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)<sup>1</sup> 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.

---

<sup>1</sup> 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

NKU South Gamble

FIGURE

1



## 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.

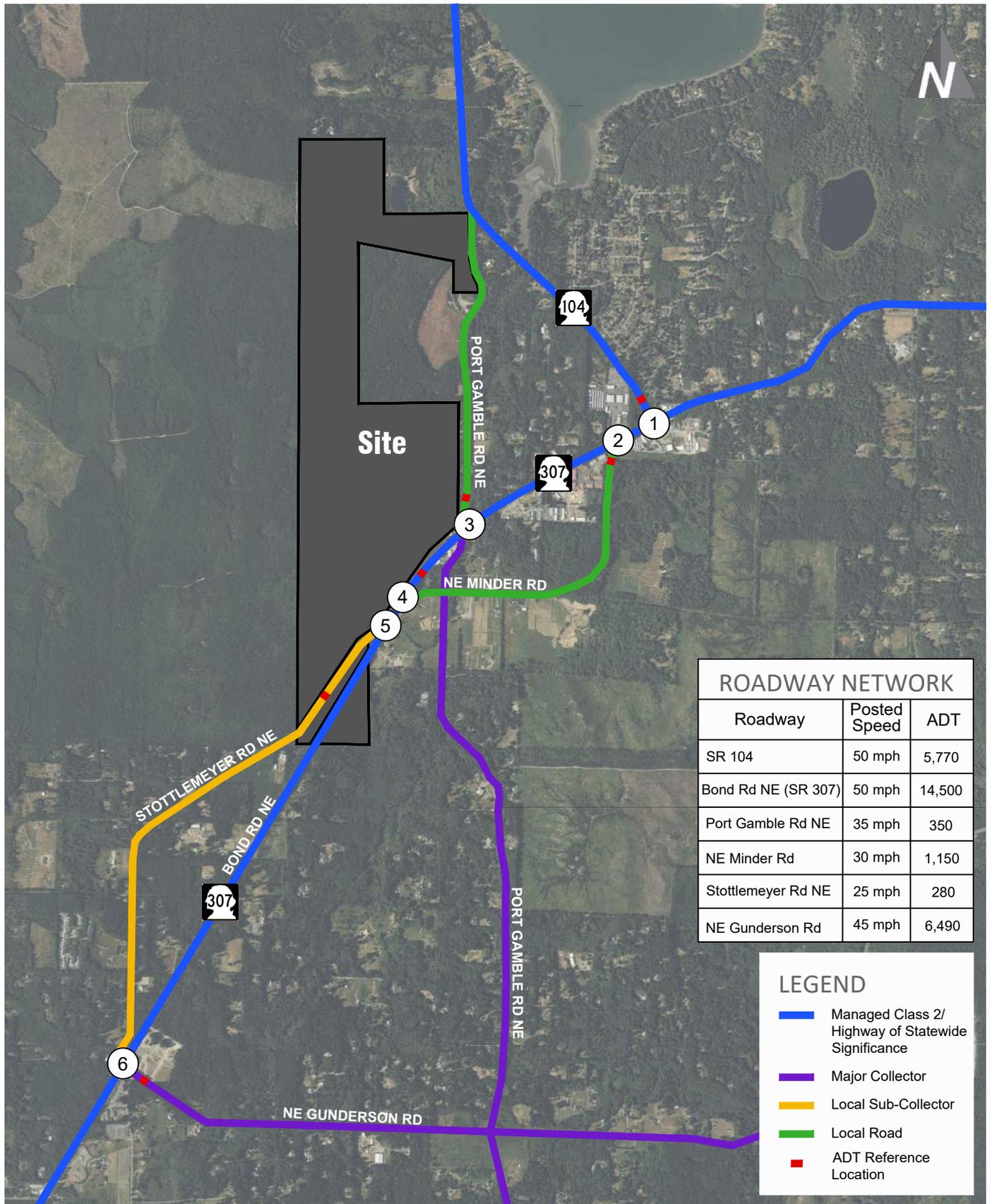
The majority of the roadways are side street stop controlled with the exception of the 2 existing traffic signals within the study area along Bond Road (SR 307) at SR 104 east of the site and at Gunderson Road/Stottlemeyer Road NE (south) southwest of the site.

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.



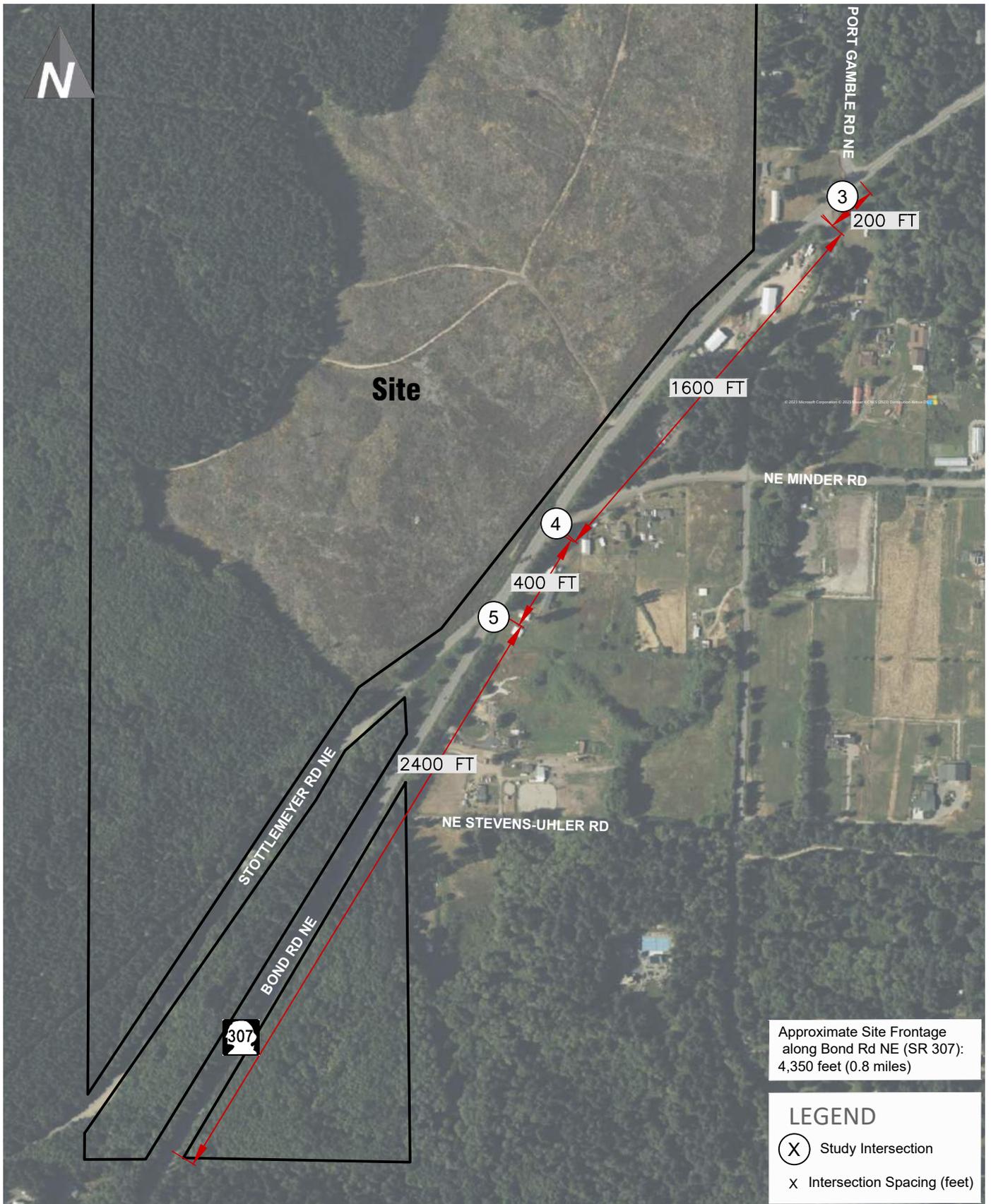
# Roadway Classification and Characteristics

NKU South Gamble

FIGURE

2





# Existing Intersection Spacing

NKU South Gamble

FIGURE

3



## 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.

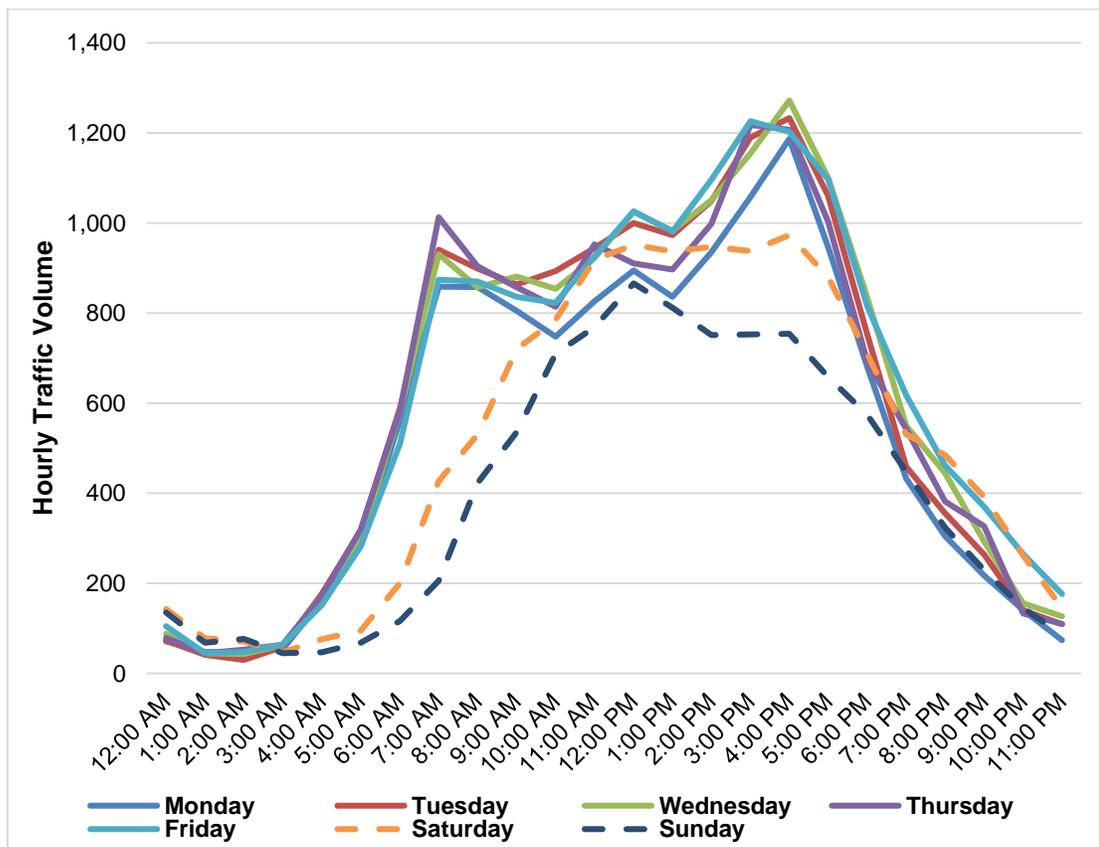
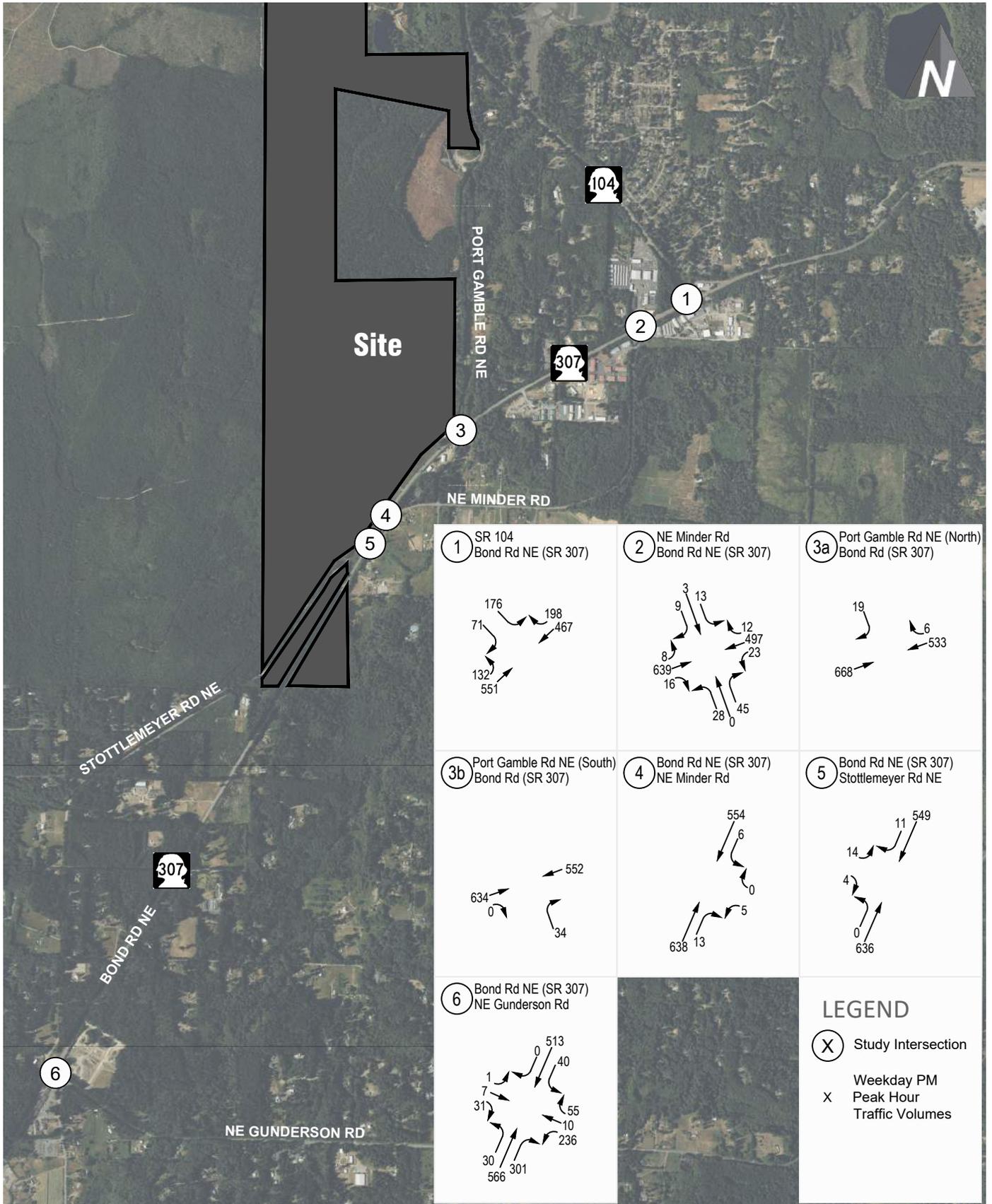


Figure 4. Bond Road (SR 307) 7-Day Hourly Volumes (based on October 2023 Traffic Counts)

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

NKU South Gamble



5

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.

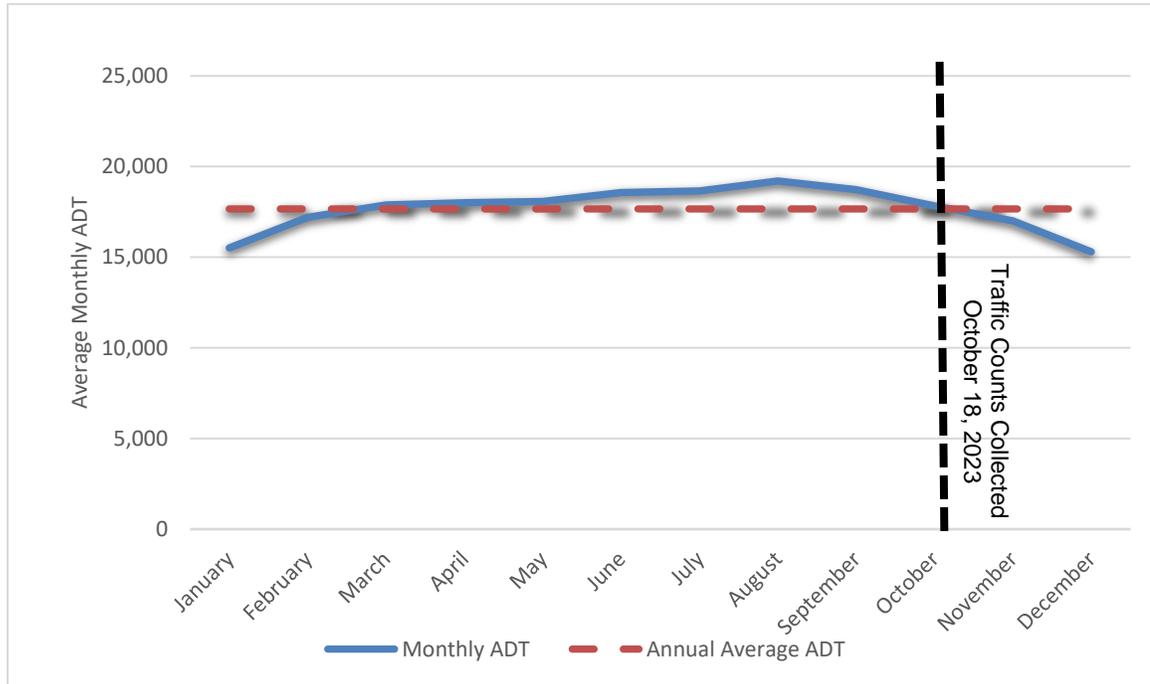
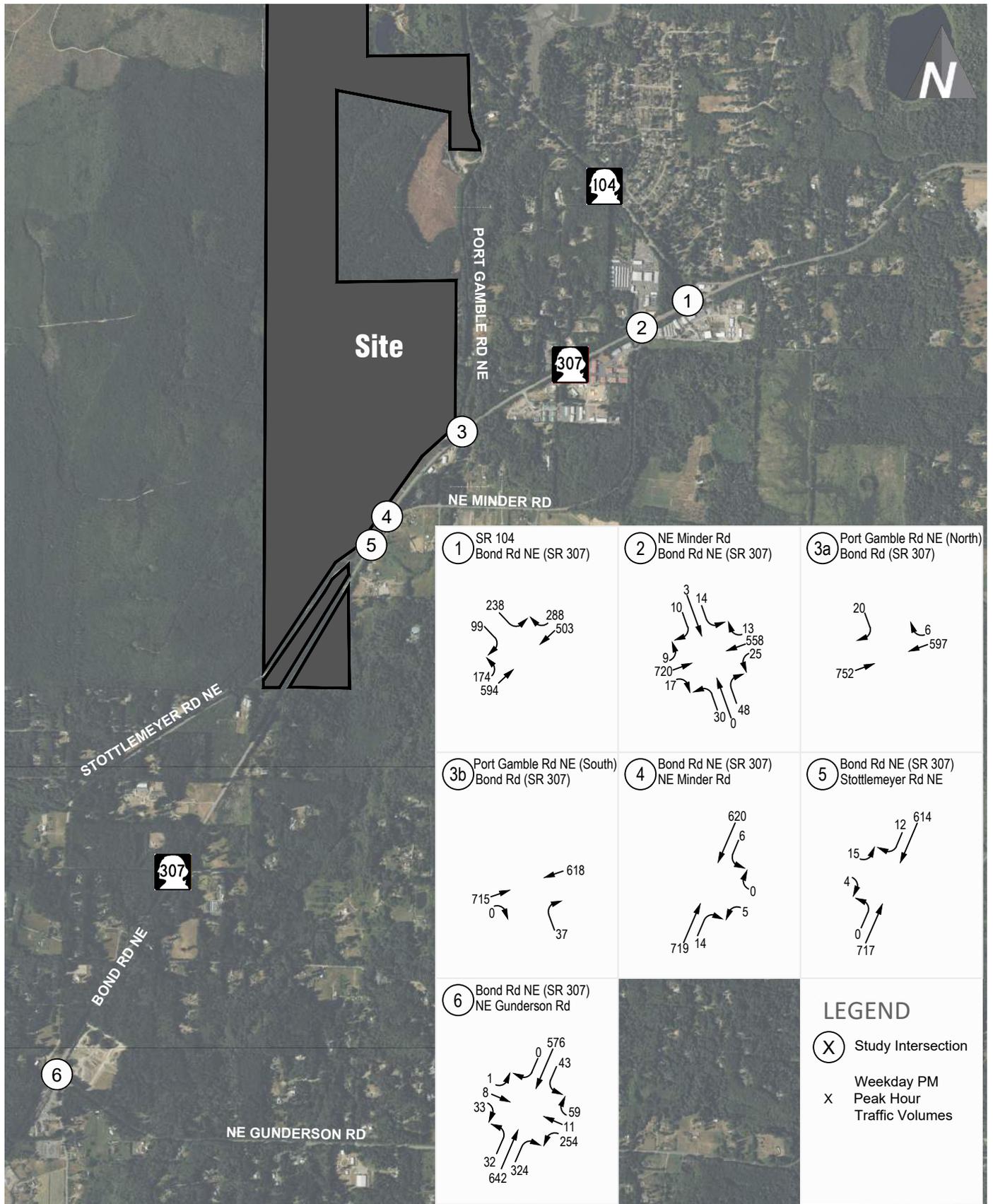


Figure 6. SR 307 Seasonal Variation (based on WSDOT Traffic Count Database, 2022)

### *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

## 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 <sup>1</sup>	Delay <sup>2</sup>	WM <sup>3</sup>	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) <sup>4</sup>	TWSC	<b>D</b>	<b>28</b>	<b>SB</b>	<b>E</b>	<b>36</b>	<b>SB</b>
		<b>D</b>	<b>26</b>	<b>NB</b>	<b>E</b>	<b>36</b>	<b>NB</b>
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	<b>D</b>	<b>25</b>	<b>WB</b>	<b>D</b>	<b>30</b>	<b>WB</b>
5. Bond Rd NE (SR 307)/Stottlemeyer Rd NE (North)	TWSC	C	23	EB	<b>D</b>	<b>28</b>	<b>EB</b>
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

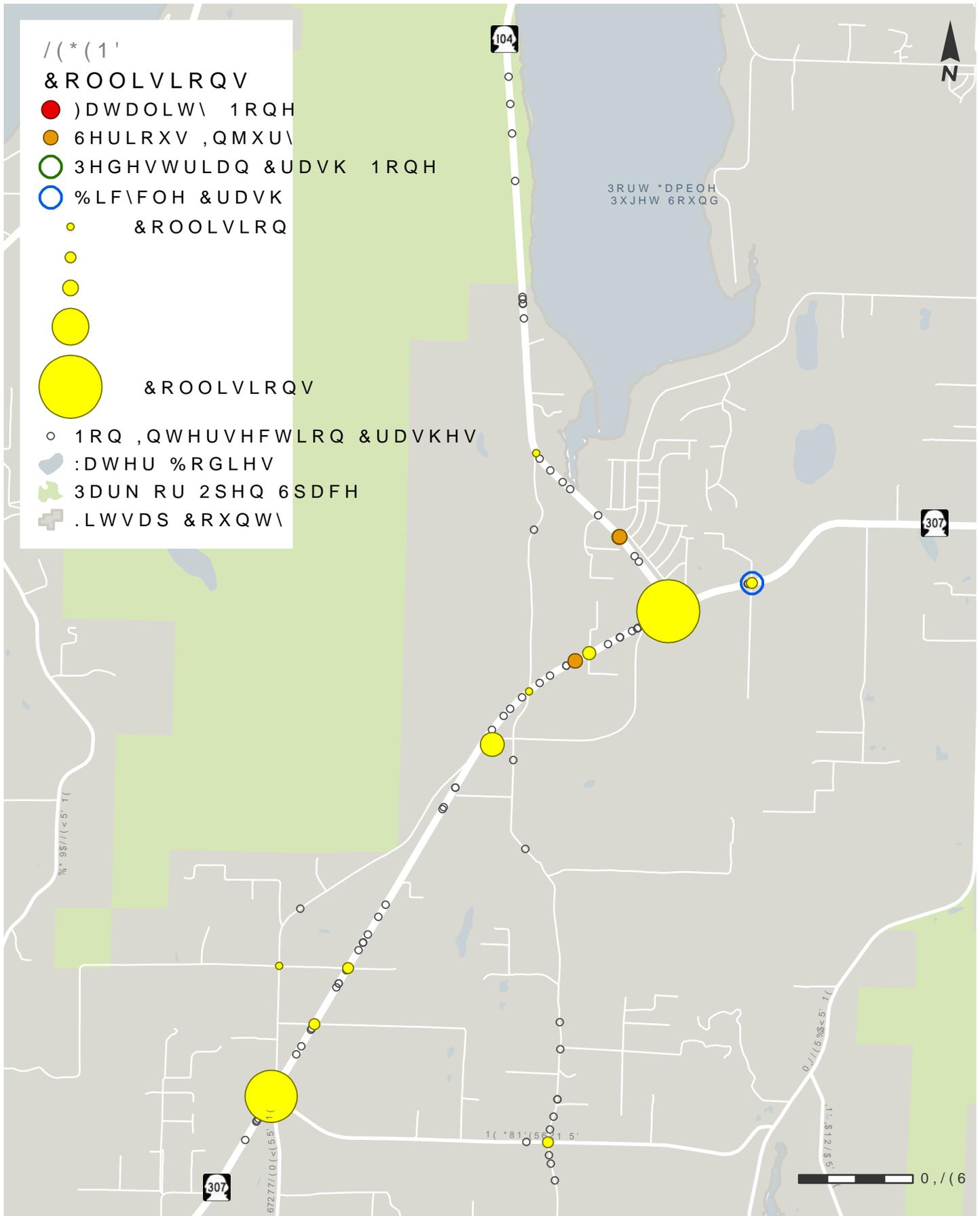
Source: WSDOT September 2023

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)

NKU South Gamble

FIGURE

8



## 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)<sup>2</sup>
- 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.

<sup>2</sup> 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**

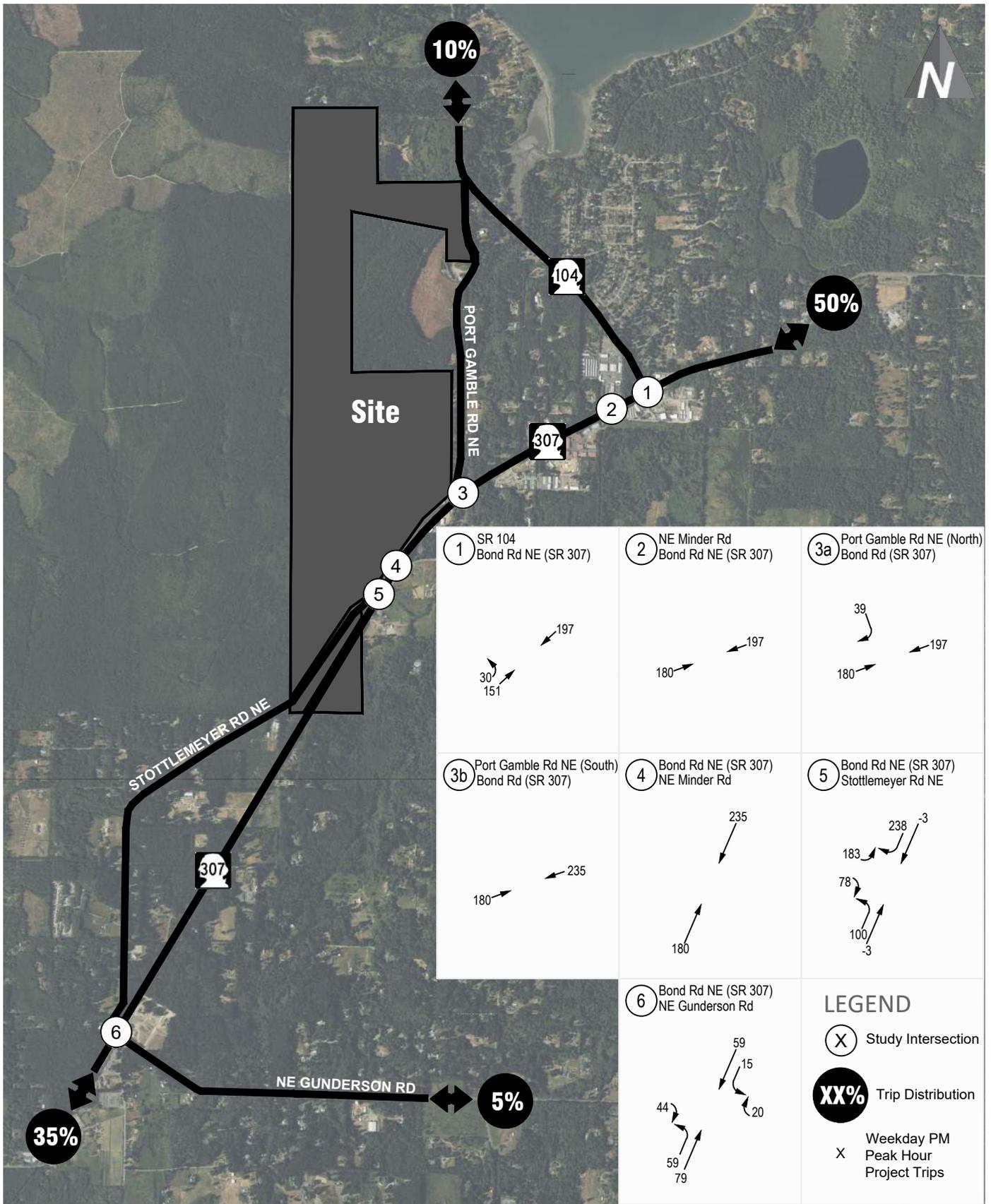
Trip Generation Scenario	Land Use	Daily Trips <sup>1</sup>	AM Peak Hour Trips			PM Peak Hour Trips		
			In	Out	Total	In	Out	Total
<b>High End Estimate</b>	Residential	1,390	26	79	105	85	51	136
	YMCA	2,282	101	52	153	93	103	196
	Sports Complex	2,568	83	44	127	200	142	342
	Commercial	402	20	18	38	19	9	28
	<i>Passby</i>	<i>-170</i>	<i>-8</i>	<i>-8</i>	<i>-16</i>	<i>-6</i>	<i>-6</i>	<i>-12</i>
	<b>Total New Trips</b>	<b>6,472</b>	<b>222</b>	<b>185</b>	<b>407</b>	<b>391</b>	<b>299</b>	<b>690</b>
<b>Low End Estimate</b>	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
	<i>Passby</i>	<i>-94</i>	<i>-5</i>	<i>-5</i>	<i>-10</i>	<i>-3</i>	<i>-3</i>	<i>-6</i>
	<b>Total New Trips</b>	<b>3,546</b>	<b>125</b>	<b>100</b>	<b>225</b>	<b>207</b>	<b>164</b>	<b>371</b>

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.

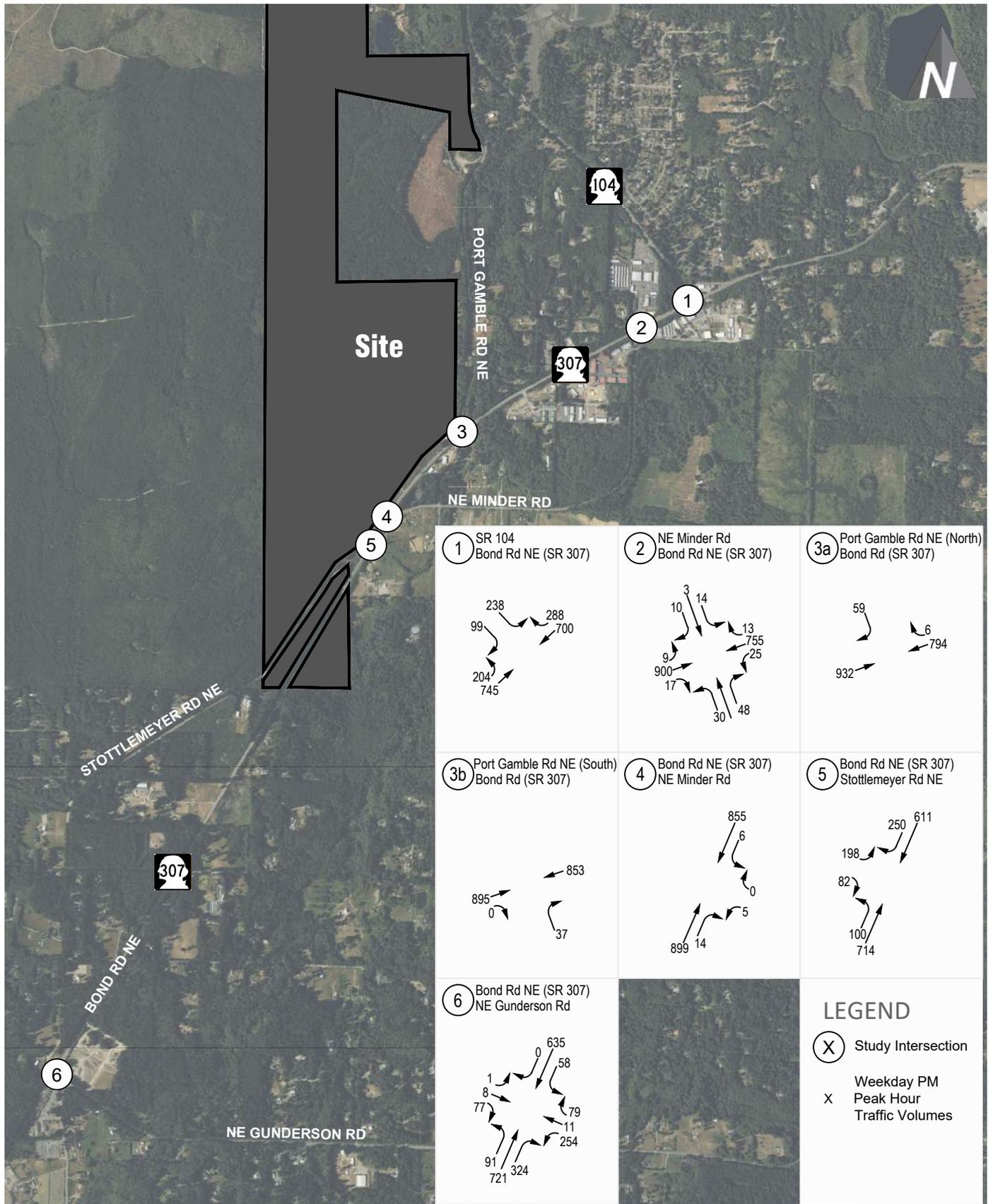
The net new peak hour project trips were assigned to the study intersections based on the anticipated distribution for the proposed project and the assumed site access point in the area of Stottlemeyer Road NE and Bond Road NE (SR 307). The resulting trip assignment is shown in Figure 9. The future (2028) 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



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

NKU South Gamble

## 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 <sup>1</sup>	Delay <sup>2</sup>	WM <sup>3</sup>	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) <sup>4</sup>	TWSC	<b>E</b>	<b>36</b>	<b>SB</b>	<b>F</b>	<b>78</b>	<b>SB</b>
		<b>E</b>	<b>36</b>	<b>NB</b>	<b>F</b>	<b>95</b>	<b>NB</b>
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	<b>D</b>	<b>30</b>	<b>WB</b>	<b>F</b>	<b>54</b>	<b>WB</b>
5. Bond Rd NE (SR 307)/Stottlemeyer Rd NE (North)	TWSC	<b>D</b>	<b>28</b>	<b>EB</b>	<b>F</b>	<b>1,003</b>	<b>EB</b>
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.<sup>4</sup> **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 <sup>1</sup>	Delay <sup>2</sup>	WM <sup>3</sup>	LOS	Delay	WM or v/c ratio <sup>4</sup>
<u>Maintain existing configuration (3-leg) with added TWLTL</u>							
2. NE Minder Rd/Bond Rd NE (SR 307)	TWSC	<b>F</b>	<b>78</b>	<b>SB</b>	<b>F</b>	<b>74</b>	<b>SB</b>
		<b>F</b>	<b>95</b>	<b>NB</b>	<b>F</b>	<b>89</b>	<b>NB</b>
4. Bond Rd NE (SR 307)/NE Minder Rd	TWSC	<b>F</b>	<b>54</b>	<b>WB</b>	C	22	WB
5. Bond Rd NE (SR 307)/Stottlemeyer Rd NE (North)	TWSC	<b>F</b>	<b>1003</b>	<b>EB</b>	<b>F</b>	<b>163</b>	<b>EB</b>
<u>Align Minder and Stottlemeyer (4-leg):</u>							
4/5. Bond Rd NE (SR 307)/Stottlemeyer Rd NE/Minder Rd	TWSC	-	-	-	<b>F</b>	<b>1,530</b>	<b>EB</b>
	TWSC (with added TWLTL)	-	-	-	<b>F</b>	<b>1,307</b>	<b>EB</b>
	Signal <sup>6</sup>	-	-	-	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.

<sup>4</sup> 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.

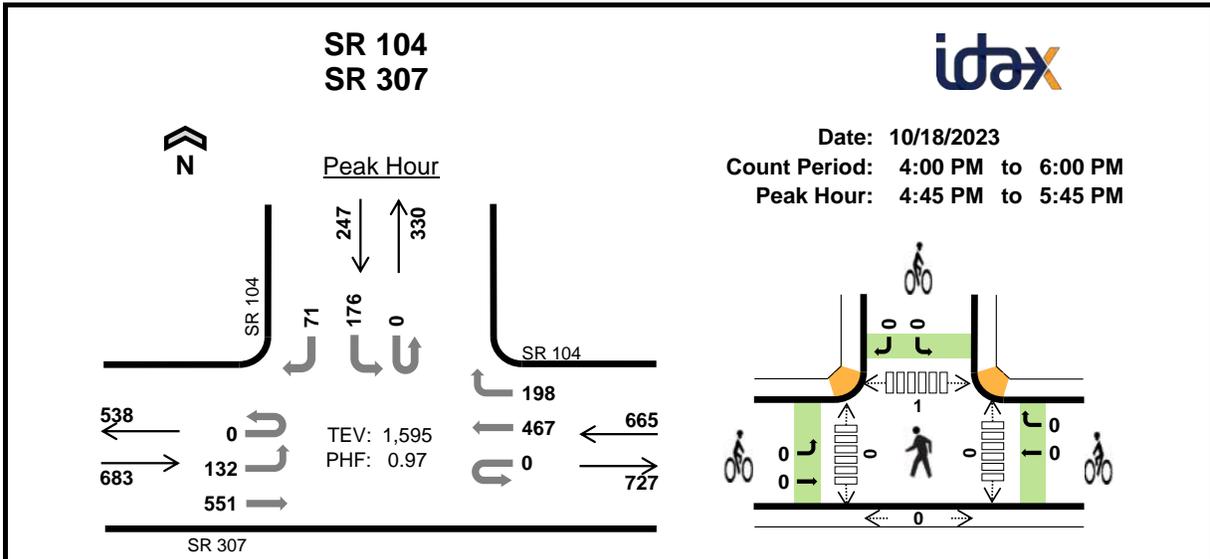
**Traffic Operations** – The existing full access side street stop-controlled intersections along Bond Road (SR 307) are shown to operate below the LOS C standard by future (2028) conditions without the project during the weekday PM peak hour due to the high volumes along Bond Road (SR 307). The traffic 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



	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				SR 104				0				SR 104				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	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	
<b>4:45 PM</b>	<b>0</b>	<b>36</b>	<b>141</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>123</b>	<b>48</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>47</b>	<b>0</b>	<b>16</b>	<b>411</b>	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					Bicycles					Pedestrians (Crossing Leg)				
	EB	WB	NB	SB	Total	EB	WB	NB	SB	Total	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
<b>4:45 PM</b>	<b>5</b>	<b>4</b>	<b>0</b>	<b>1</b>	<b>10</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
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														15-min Total	Rolling One Hour			
Interval Start	SR 307				SR 104				0				SR 104					
	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	5	6	0	0	0	0	0	0	0	1		
4:15 PM	0	0	3	0	0	0	4	2	0	0	0	0	0	3	0	1		
4:30 PM	0	1	3	0	0	0	7	0	0	0	0	0	0	2	0	0		
4:45 PM	0	2	3	0	0	0	4	0	0	0	0	0	0	1	0	0		
5:00 PM	0	0	5	0	0	0	3	0	0	0	0	0	0	1	0	0		
5:15 PM	0	0	4	0	0	0	2	1	0	0	0	0	0	1	0	0		
5:30 PM	0	0	1	0	0	0	4	2	0	0	0	0	0	1	0	0		
5:45 PM	0	0	2	0	0	0	5	1	0	0	0	0	0	1	0	0		
Count Total	0	3	21	0	0	0	34	12	0	0	0	0	0	10	0	2		
Peak Hour	0	2	13	0	0	0	13	3	0	0	0	0	0	4	0	0		

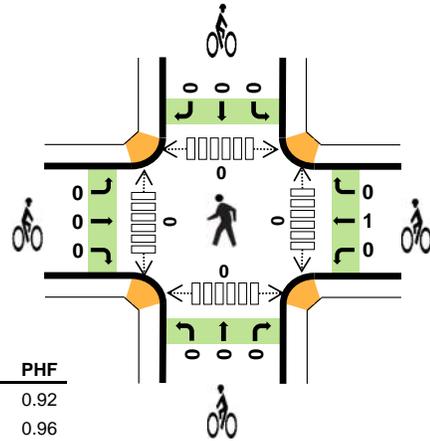
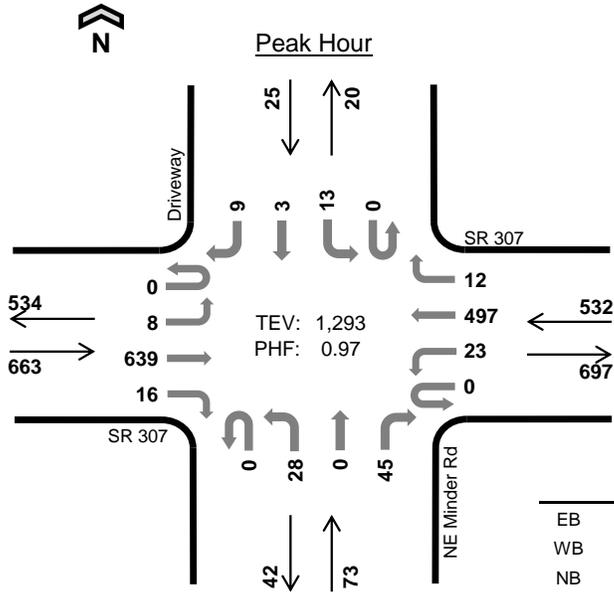
Two-Hour Count Summaries - Bikes														15-min Total	Rolling One Hour
Interval Start	SR 307			SR 104			0			SR 104					
	Eastbound			Westbound			Northbound			Southbound					
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT			
4:00 PM	0	0	0	0	1	0	0	0	0	0	0	0			
4:15 PM	0	0	0	0	0	0	0	0	0	0	0	0			
4:30 PM	0	0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

<b>Two-Hour Count Summaries - Heavy Vehicles</b>																		
Interval Start	SR 307				SR 307				NE Minder Rd				Driveway				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	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

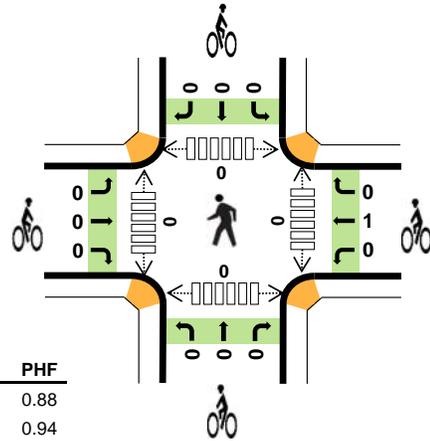
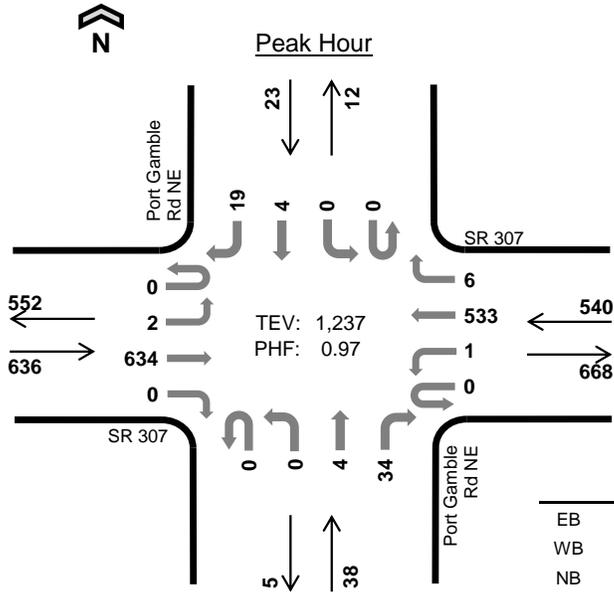
<b>Two-Hour Count Summaries - Bikes</b>																		
Interval Start	SR 307			SR 307			NE Minder Rd			Driveway			15-min Total	Rolling One Hour				
	Eastbound			Westbound			Northbound			Southbound								
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT						
4:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:15 PM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

<b>Two-Hour Count Summaries - Heavy Vehicles</b>																		
Interval Start	SR 307				SR 307				Port Gamble Rd NE				Port Gamble Rd NE				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	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

<b>Two-Hour Count Summaries - Bikes</b>																	
Interval Start	SR 307			SR 307			Port Gamble Rd NE			Port Gamble Rd NE			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	1	0	0	0	0	0	0	1	0	
4:15 PM	0	0	0	0	1	0	0	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	0	0	
4:45 PM	0	0	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	0	0	1	
5:15 PM	0	0	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	0	0	1	1	
5:45 PM	0	0	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	0	0	3	0	
Peak Hour	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	

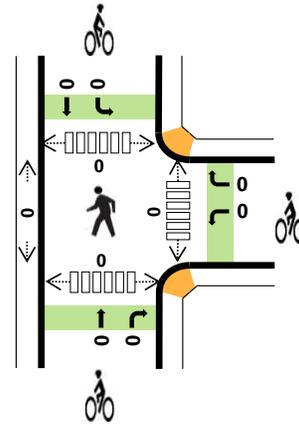
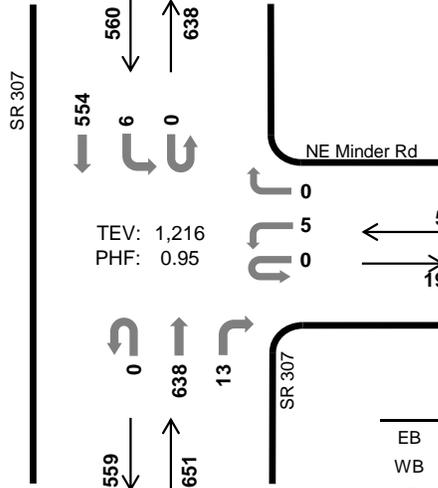
Note: U-Turn volumes for bikes are included in Left-Turn, if any.

# SR 307 NE Minder Rd



Peak Hour

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	-	-
WB	0.0%	0.42
NB	2.5%	0.86
SB	3.4%	0.91
TOTAL	2.9%	0.95

## Two-Hour Count Summaries

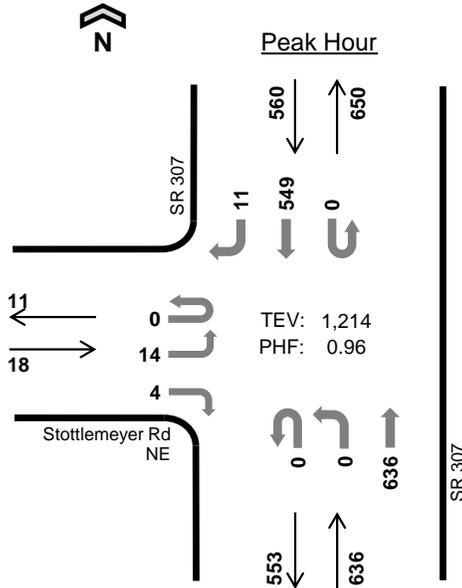
Interval Start	0				NE Minder Rd				SR 307				SR 307				15-min Total	Rolling One Hour	
	Eastbound				Westbound				Northbound				Southbound						
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT			
4:00 PM	0	0	0	0	0	2	0	0	0	0	161	4	0	4	142	0	313	0	
4:15 PM	0	0	0	0	0	0	0	0	0	0	143	4	0	1	130	0	278	0	
4:30 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

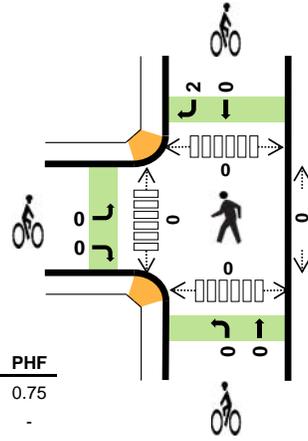
Two-Hour Count Summaries - Heavy Vehicles																		
Interval Start	0				NE Minder Rd				SR 307				SR 307				15-min Total	Rolling One Hour
	Eastbound				Westbound				Northbound				Southbound					
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
4:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	0		
4:15 PM	0	0	0	0	0	0	0	0	0	0	2	1	0	0	4	0		
4:30 PM	0	0	0	0	0	0	0	0	0	0	5	0	0	0	8	0		
4:45 PM	0	0	0	0	0	0	0	0	0	0	4	0	0	0	5	0		
5:00 PM	0	0	0	0	0	0	0	0	0	0	4	0	0	0	2	0		
5:15 PM	0	0	0	0	0	0	0	0	0	0	2	0	0	0	2	0		
5:30 PM	0	0	0	0	0	0	0	0	0	0	1	0	0	0	3	0		
5:45 PM	0	0	0	0	0	0	0	0	0	0	2	0	0	0	3	0		
Count Total	0	0	0	0	0	0	0	0	0	0	20	1	0	0	33	0		
Peak Hour	0	0	0	0	0	0	0	0	0	0	15	1	0	0	19	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	0	0	0	1	0	0			
4:15 PM	0	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	0			
4:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
5:00 PM	0	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	0			
5:30 PM	0	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	0			
Count Total	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0			
Peak Hour	0	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				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	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	636	0	0	0	549	11	1,214	0
	HV	0	1	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														15-min Total	Rolling One Hour			
Interval Start	Stottlemeyer Rd NE				0				SR 307				SR 307					
	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

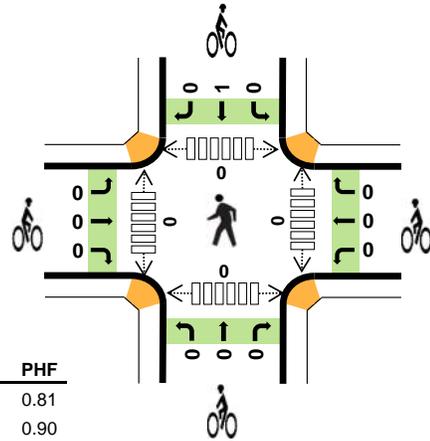
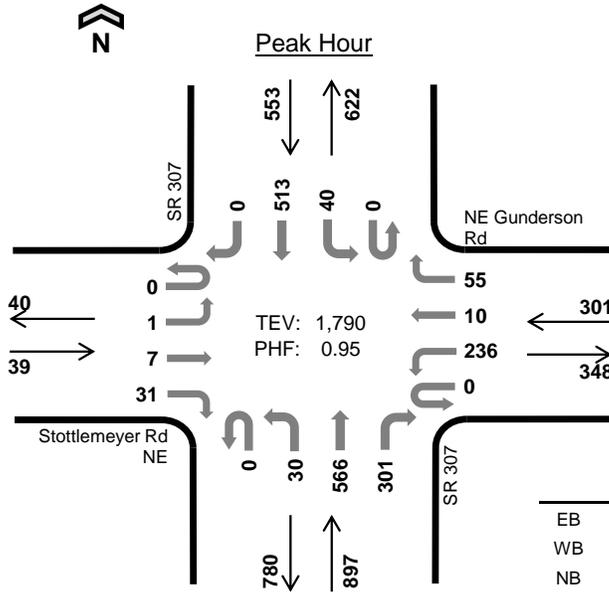
Two-Hour Count Summaries - Bikes														15-min Total	Rolling One Hour
Interval Start	Stottlemeyer Rd NE			0			SR 307			SR 307					
	Eastbound			Westbound			Northbound			Southbound					
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT			
4:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
4:15 PM	0	0	0	0	0	0	0	0	0	0	0	1	1	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		Northbound		Southbound		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

<b>Two-Hour Count Summaries - Heavy Vehicles</b>																		
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

<b>Two-Hour Count Summaries - Bikes</b>																		
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	0	0	0	0
4:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0
4:30 PM	0	0	0	0	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	0	0	0	0	1
5:00 PM	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	2	3	3
5:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2
5:30 PM	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	3	3
5:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	3
Count Total	0	1	1	0	0	1	0	0	0	0	0	0	0	1	0	4	0	0
Peak Hour	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	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 <sup>1</sup>	>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 <sup>1</sup>	>50

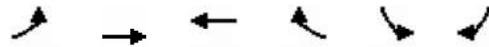
Source: *Highway Capacity Manual 2010 and 6th Edition*, Transportation Research Board, 2010 and 2016, respectively.

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

HCM 7th Signalized Intersection Summary  
 1: Bond Rd NE (SR 307) & SR 104

NKU South Gamble  
 Existing PM Peak Hour



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									
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

HCM 7th TWSC  
 3: Bond Rd NE (SR 307) & Port Gamble Rd NE

NKU South Gamble  
 Existing PM Peak Hour

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	-
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	-	-	-
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	-	-	-
Pot Cap-1 Maneuver	0	-	-
Stage 1	0	-	-
Stage 2	0	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	-	-	-
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

HCM 7th TWSC  
 33: Port Gamble Rd NE (south) & Bond Rd NE (SR 307)

NKU South Gamble  
 Existing PM Peak Hour

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	-	-	-

HCM 7th TWSC  
 4: Bond Rd NE (SR 307) & NE Minder Rd

NKU South Gamble  
 Existing PM Peak Hour

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/v25.11		0	0.1
HCM LOS	D		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	184	19
HCM Lane V/C Ratio	-	-	0.029	0.007
HCM Control Delay (s/veh)	-	-	25.1	9
HCM Lane LOS	-	-	D	A
HCM 95th %tile Q(veh)	-	-	0.1	0

HCM 7th TWSC  
 5: Bond Rd NE (SR 307) & Stottlemeyer Rd NE

NKU South Gamble  
 Existing PM Peak Hour

Intersection						
Int Delay, s/veh	0.3					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	T			T		T
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/v22.84		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	-	-

HCM 7th Signalized Intersection Summary  
 6: Bond Rd NE (SR 307) & Stottlemeyer Rd NE/NE Gunderson Rd

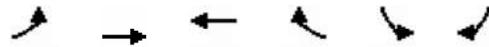
NKU South Gamble  
 Existing PM Peak Hour



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

HCM 7th Signalized Intersection Summary  
 1: Bond Rd NE (SR 307) & SR 104

NKU South Gamble  
 Future (2028) Without Project PM Peak Hour



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.

HCM 7th TWSC  
2: NE Minder Rd & Bond Rd NE (SR 307)

NKU South Gamble  
Future (2028) Without Project PM Peak Hour

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									
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

HCM 7th TWSC  
 3: Bond Rd NE (SR 307) & Port Gamble Rd NE

NKU South Gamble  
 Future (2028) Without Project PM Peak Hour

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	-
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	-	-	-
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	-	-	-
Pot Cap-1 Maneuver	0	-	-
Stage 1	0	-	-
Stage 2	0	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	-	-	-
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	-	-	-

HCM 7th TWSC  
 4: Bond Rd NE (SR 307) & NE Minder Rd

NKU South Gamble  
 Future (2028) Without Project PM Peak Hour

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/v30.19		0	0.09
HCM LOS	D		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	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
HCM Lane LOS	-	-	D	A
HCM 95th %tile Q(veh)	-	-	0.1	0

HCM 7th TWSC  
5: Bond Rd NE (SR 307) & Stottlemeyer Rd NE

NKU South Gamble  
Future (2028) Without Project PM Peak Hour

Intersection						
Int Delay, s/veh	0.4					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	T			T		T
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	-	-

HCM 7th Signalized Intersection Summary

NKU South Gamble

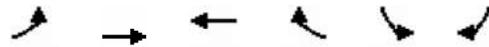
6: Bond Rd NE (SR 307) & Stottlemeyer Rd NE/NE Gunderson Rd (2028) Without Project PM Peak Hour



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

HCM 7th Signalized Intersection Summary  
 1: Bond Rd NE (SR 307) & SR 104

NKU South Gamble  
 Future (2028) With-Project PM Peak Hour



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.

HCM 7th TWSC  
2: NE Minder Rd & Bond Rd NE (SR 307)

NKU South Gamble  
Future (2028) With-Project PM Peak Hour

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									
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

HCM 7th TWSC  
 3: Bond Rd NE (SR 307) & Port Gamble Rd NE

NKU South Gamble  
 Future (2028) With-Project PM Peak Hour

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	-	319
Stage 1	-	-	0	-	-
Stage 2	-	-	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	-	-	-

HCM 7th TWSC  
 4: Bond Rd NE (SR 307) & NE Minder Rd

NKU South Gamble  
 Future (2028) With-Project PM Peak Hour

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	NBRWBLn1	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
HCM Lane LOS	-	-	F	B
HCM 95th %tile Q(veh)	-	-	0.2	0

HCM 7th TWSC  
 5: Bond Rd NE (SR 307) & Stottlemeyer Rd NE

NKU South Gamble  
 Future (2028) With-Project PM Peak Hour

Intersection						
Int Delay, s/veh	144.2					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	T			T		
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 \$/1000	0.02	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

HCM 7th Signalized Intersection Summary

NKU South Gamble

6: Bond Rd NE (SR 307) & Stottlemeyer Rd NE/NE Gunderson Rd Future (2028) With-Project PM Peak Hour



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				
<b>Intersection Summary</b>												
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									
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
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	NBRWBLn1	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	Y		Y	↑	↑	
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 \$/veh	529.84		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 \$/veh	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

HCM 7th Signalized Intersection Summary  
 7: SR 307 & Stottlemeyer Rd NE/NE Minder Rd

NKU South Gamble  
 Access #2 Aligned Future (2028) With-Project PM Peak Hour



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				
<b>Intersection Summary</b>												
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		DEMAND FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[ Total veh/h	HV ] %	[ Total veh/h	HV ] %				[ Veh. veh	Dist ] ft				
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.

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Project: M:\23\1.23310.00 - NKU South Gamble\Traffic Analysis\Traffic Operations\Dec 2023 Update\Int 4-5 Aligned\_RAB Report.sip9

## Appendix D: Trip Generation Calculations



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 <sup>1</sup>	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 <sup>2</sup>				0	0	0
<b>Total</b>				<b>239</b>	<b>132</b>	<b>107</b>

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 <sup>2</sup>						

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 <sup>3</sup>	235	130	105
External Transit-Trips <sup>4</sup>	0	0	0
External Non-Motorized Trips <sup>4</sup>	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

<sup>1</sup>Land Use Codes (LUCs) from *Trip Generation Informational Report*, published by the Institute of Transportation Engineers.

<sup>2</sup>Total estimate for all other land uses at mixed-use development site-not subject to internal trip capture computations in this estimator

<sup>3</sup>Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-A

<sup>4</sup>Person-Trips

\*Indicates computation that has been rounded to the nearest whole number.

*Estimation Tool Developed by the Texas Transportation Institute*

<b>Project Name:</b>	NKU South Gamble
<b>Analysis Period:</b>	AM Street Peak Hour

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

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	

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	

Destination Land Use	Person-Trip Estimates			External Trips by Mode*		
	Internal	External	Total	Vehicles <sup>1</sup>	Transit <sup>2</sup>	Non-Motorized <sup>2</sup>
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 <sup>3</sup>	0	0	0	0	0	0

Origin Land Use	Person-Trip Estimates			External Trips by Mode*		
	Internal	External	Total	Vehicles <sup>1</sup>	Transit <sup>2</sup>	Non-Motorized <sup>2</sup>
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 <sup>3</sup>	0	0	0	0	0	0

<sup>1</sup>Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-A  
<sup>2</sup>Person-Trips  
<sup>3</sup>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 <sup>1</sup>	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 <sup>2</sup>				0	0	0
<b>Total</b>				<b>405</b>	<b>224</b>	<b>181</b>

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 <sup>2</sup>						

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 <sup>3</sup>	377	210	167
External Transit-Trips <sup>4</sup>	0	0	0
External Non-Motorized Trips <sup>4</sup>	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

<sup>1</sup>Land Use Codes (LUCs) from *Trip Generation Informational Report*, published by the Institute of Transportation Engineers.

<sup>2</sup>Total estimate for all other land uses at mixed-use development site-not subject to internal trip capture computations in this estimator

<sup>3</sup>Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-P

<sup>4</sup>Person-Trips

\*Indicates computation that has been rounded to the nearest whole number.

*Estimation Tool Developed by the Texas Transportation Institute*

<b>Project Name:</b>	NKU South Gamble
<b>Analysis Period:</b>	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 <sup>1</sup>	Transit <sup>2</sup>	Non-Motorized <sup>2</sup>
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 <sup>3</sup>	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 <sup>1</sup>	Transit <sup>2</sup>	Non-Motorized <sup>2</sup>
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 <sup>3</sup>	0	0	0	0	0	0

<sup>1</sup>Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-P

<sup>2</sup>Person-Trips

<sup>3</sup>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)**

<b>Proposed Use</b>																								
Land Use	Setting	Size	Units	Model	Rate	Inbound %	Gross Trips			Land Use Type	Internal Trips				External Trips			Pass-By Trips			Primary Trips			
							Inbound	Outbound	Subtotal		In	Out	Total	%	In	Out	Total	%	In	Out	Total	Inbound	Outbound	Total
<b>Residential Lots + ADUs (LU 210)</b>		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	
<b>High Turnover (Sit Down) Restaurant (LU 932)</b>		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
<b>Strip Retail Plaza (&lt;40k) (822)</b>		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
<b>Soccer Complex (LU 488)</b>		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	
<b>Recreational Community Center (LU 495)</b>		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	
<b>Recreational Community Center (LU 495)</b>		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	
<b>Subtotal</b>																								
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 <sup>1</sup>	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 <sup>2</sup>				0	0	0
<b>Total</b>				<b>439</b>	<b>238</b>	<b>201</b>

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 <sup>2</sup>						

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 <sup>3</sup>	423	230	193
External Transit-Trips <sup>4</sup>	0	0	0
External Non-Motorized Trips <sup>4</sup>	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

<sup>1</sup>Land Use Codes (LUCs) from *Trip Generation Informational Report*, published by the Institute of Transportation Engineers.

<sup>2</sup>Total estimate for all other land uses at mixed-use development site-not subject to internal trip capture computations in this estimator

<sup>3</sup>Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-A

<sup>4</sup>Person-Trips

\*Indicates computation that has been rounded to the nearest whole number.

*Estimation Tool Developed by the Texas Transportation Institute*

<b>Project Name:</b>	NKU South Gamble
<b>Analysis Period:</b>	AM Street Peak Hour

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

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	

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	

Destination Land Use	Person-Trip Estimates			External Trips by Mode*		
	Internal	External	Total	Vehicles <sup>1</sup>	Transit <sup>2</sup>	Non-Motorized <sup>2</sup>
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 <sup>3</sup>	0	0	0	0	0	0

Origin Land Use	Person-Trip Estimates			External Trips by Mode*		
	Internal	External	Total	Vehicles <sup>1</sup>	Transit <sup>2</sup>	Non-Motorized <sup>2</sup>
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 <sup>3</sup>	0	0	0	0	0	0

<sup>1</sup>Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-A  
<sup>2</sup>Person-Trips  
<sup>3</sup>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 <sup>1</sup>	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 <sup>2</sup>				0	0	0
<b>Total</b>				<b>759</b>	<b>425</b>	<b>334</b>

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 <sup>2</sup>						

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 <sup>3</sup>	703	397	306
External Transit-Trips <sup>4</sup>	0	0	0
External Non-Motorized Trips <sup>4</sup>	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

<sup>1</sup>Land Use Codes (LUCs) from *Trip Generation Informational Report*, published by the Institute of Transportation Engineers.

<sup>2</sup>Total estimate for all other land uses at mixed-use development site-not subject to internal trip capture computations in this estimator

<sup>3</sup>Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-P

<sup>4</sup>Person-Trips

\*Indicates computation that has been rounded to the nearest whole number.

*Estimation Tool Developed by the Texas Transportation Institute*

<b>Project Name:</b>	NKU South Gamble
<b>Analysis Period:</b>	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 <sup>1</sup>	Transit <sup>2</sup>	Non-Motorized <sup>2</sup>
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 <sup>3</sup>	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 <sup>1</sup>	Transit <sup>2</sup>	Non-Motorized <sup>2</sup>
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 <sup>3</sup>	0	0	0	0	0	0

<sup>1</sup>Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-P

<sup>2</sup>Person-Trips

<sup>3</sup>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

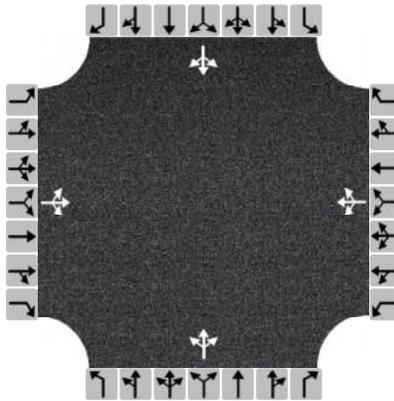
## Project Information

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		
	L	T	R	L	T	R	L	T	R	L	T	R
Movement												
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

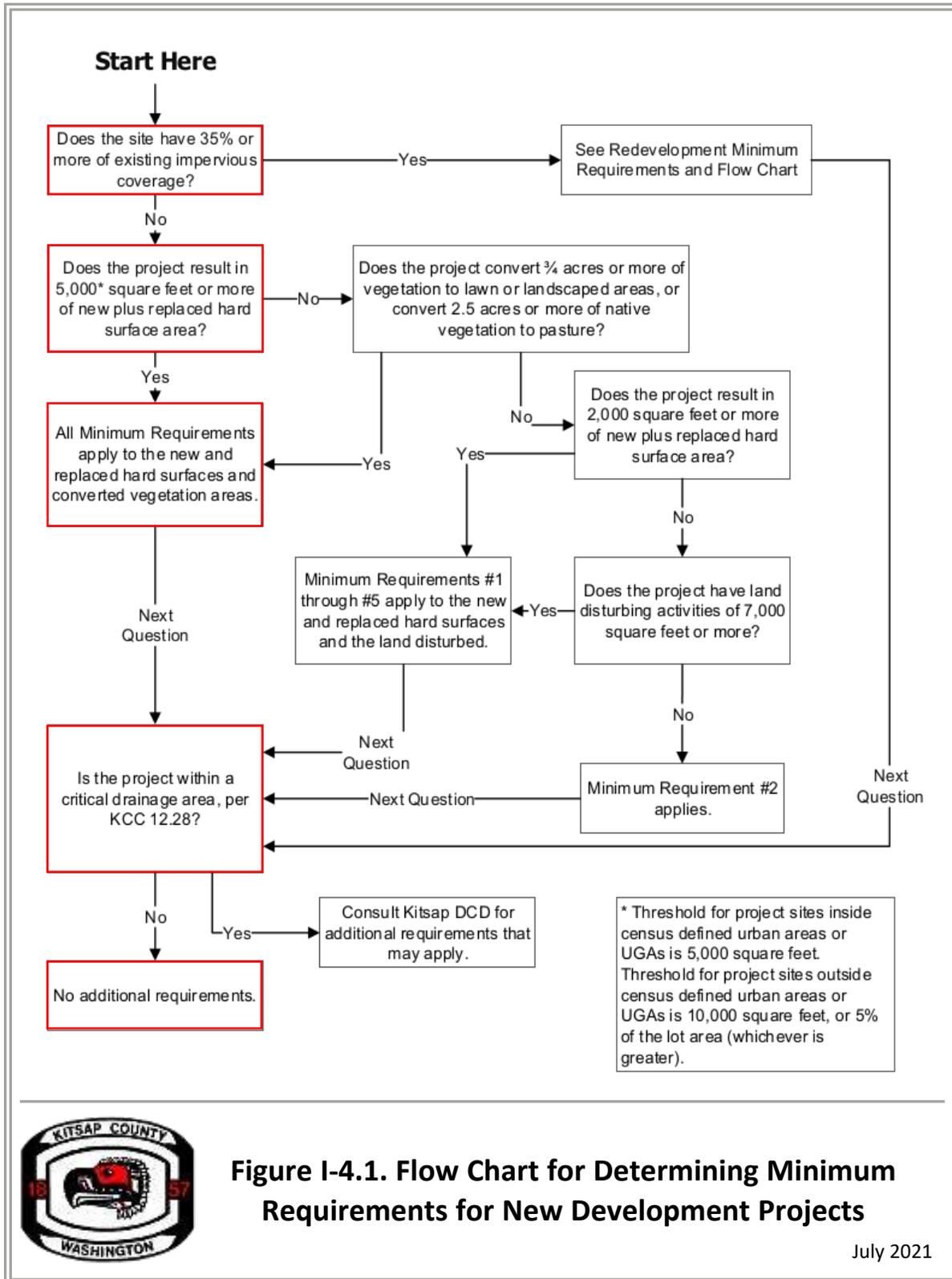
<b>Volume Summary</b>														
Hour	Major Volume	Minor Volume	Total Volume	Peds/h	Gaps/h	1A (70%)	1A (56%)	1B (70%)	1B (56%)	2 (70%)	3A (70%)	3B (56%)	4A (70%)	4B (56%)
07 - 08	1290	204	1498	0	0	Yes	Yes	Yes	Yes	Yes	No	Yes	No	No
08 - 09	960	152	1115	0	0	Yes	Yes	Yes	Yes	Yes	No	Yes	No	No
09 - 10	695	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

<b>Warrants</b>	
<b>Warrant 1: Eight-Hour Vehicular Volume</b>	✓
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)	✓
<b>Warrant 2: Four-Hour Vehicular Volume</b>	✓
Four-Hour Vehicular Volume (Both major approaches --and-- higher minor approach)	✓
<b>Warrant 3: Peak Hour</b>	✓
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)	✓
<b>Warrant 4: Pedestrian Volume</b>	
A. Four Hour Volumes --or--	
B. One-Hour Volumes	
<b>Warrant 5: School Crossing</b>	
Gaps Same Period --and--	
Student Volumes	
Nearest Traffic Control Signal (optional)	✓
<b>Warrant 6: Coordinated Signal System</b>	
Degree of Platooning (Predominant direction or both directions)	
<b>Warrant 7: Crash Experience</b>	
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	✓
<b>Warrant 8: Roadway Network</b>	
A. Weekday Volume (Peak hour total --and-- projected warrants 1, 2, or 3) --or--	
B. Weekend Volume (Five hours total)	
<b>Warrant 9: Grade Crossing</b>	
A. Grade Crossing within 140 ft --and--	
B. Peak-Hour Vehicular Volumes	

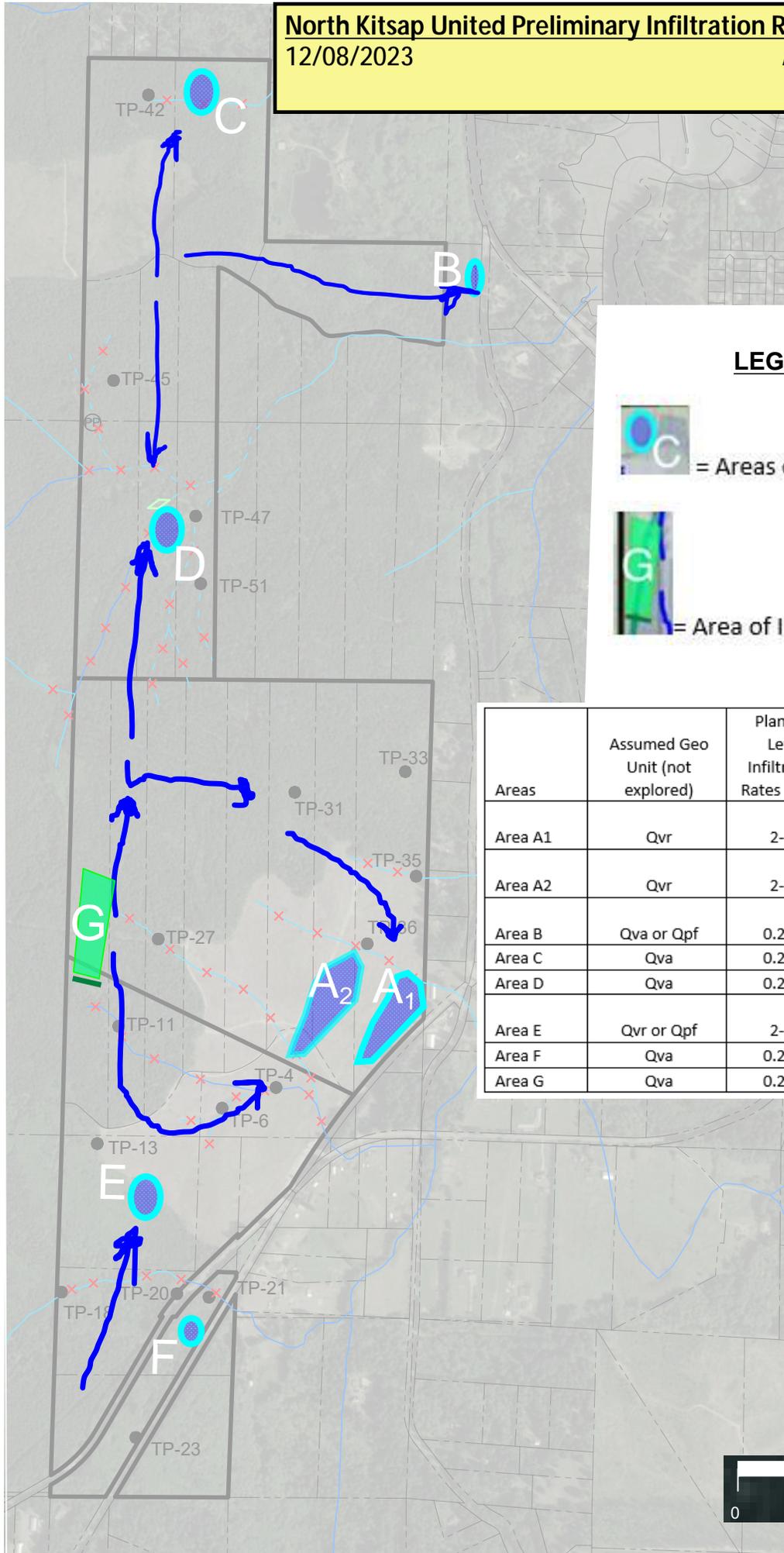
**Appendix F: Stormwater**

Flow Chart for Determining Minimum Requirements for New Development Projects, Kitsap County

Preliminary Infiltration Rates



**North Kitsap United Preliminary Infiltration Rates**  
 12/08/2023  
 AESI



**LEGEND**

-  = Areas of Interest for Infiltration
-  = 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

# KITSAP COUNTY WASHINGTON

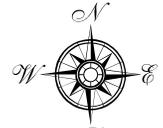
## Coordinated Water System Plan Water Service Areas

### 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

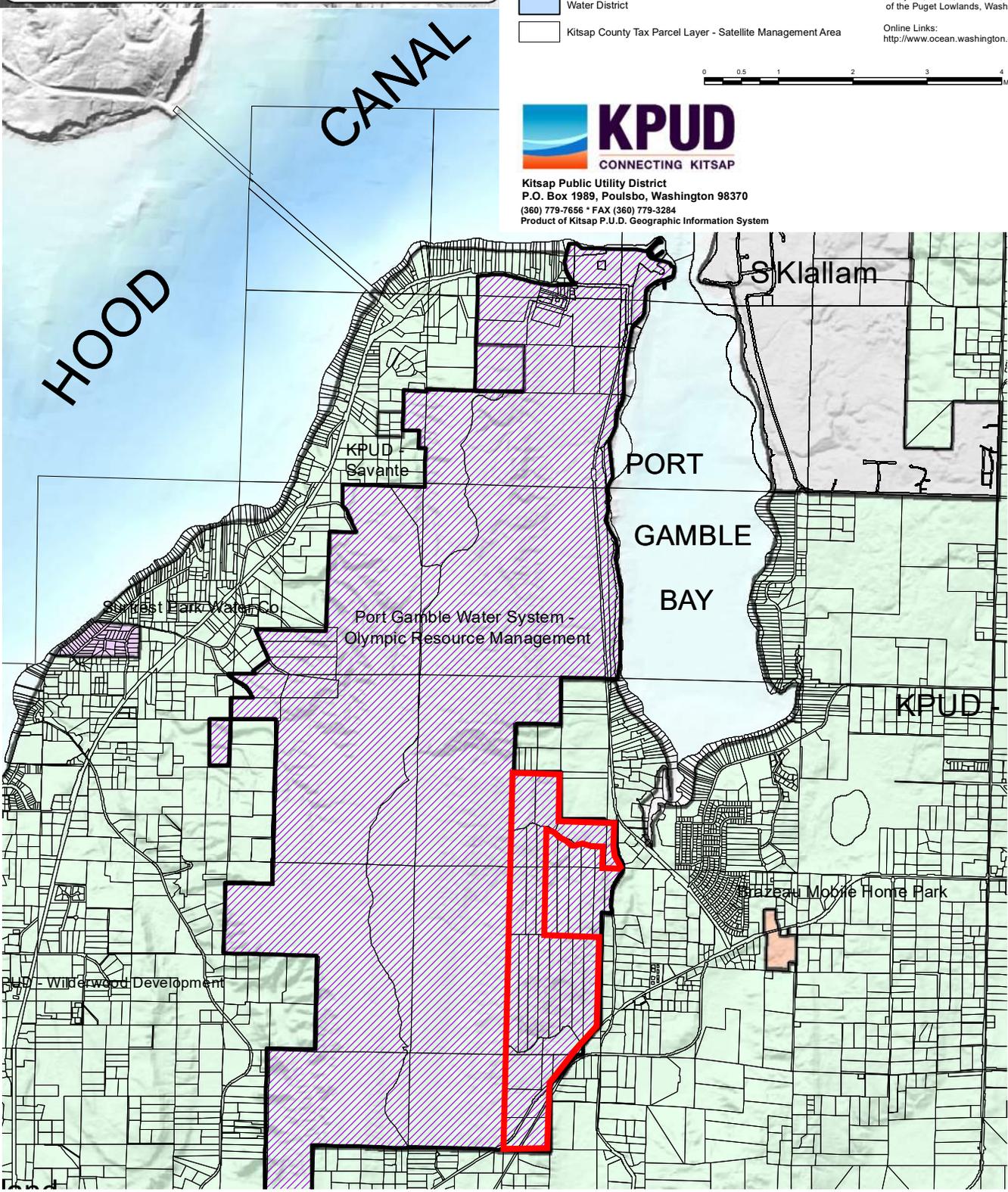
Elevation data source:

Finlayson, David, 20050124. Combined bathymetry and topography of the Puget Lowlands, Washington State (January 2005).

Online Links:  
<http://www.ocean.washington.edu/data/pugetsound/>



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Product of Kitsap P.U.D. Geographic Information System



# KPUD Water Service Exhibit

