

3.15. TRAFFIC

3.15.1. Affected Environment

Transportation resources include roads, public transit, railroads, waterways, and non-motorized travel. The transportation setting for ground transportation includes those streets and intersections that would be used by both automobile and truck traffic to gain access to and from a project site, as well as those streets that would be used by construction traffic (i.e., equipment and commuting workers). The marine vessel setting includes the waterways (e.g., Hood Canal and Puget Sound) that would provide access to the project site.

3.15.1.1. EXISTING CONDITIONS

The area to be evaluated includes the road network within NAVBASE Kitsap Bangor and main access road routes to and from the base and marine waterways, such as Hood Canal and Puget Sound. The project is not anticipated to use rail service. Therefore, rail traffic is not discussed further.

Primary transport is by automobile, although bus service to the base is available from some parts of Kitsap County, as well as taxi service. The major population centers within Kitsap County, which are Silverdale, Poulsbo, Bremerton, Port Orchard, and Bainbridge Island, are all between a 10- and 40-minute drive from NAVBASE Kitsap Bangor.

3.15.1.1.1. VEHICLE TRAFFIC

ROADWAY CHARACTERISTICS

The primary access to NAVBASE Kitsap Bangor is State Route (SR)-3, which is the major roadway serving Bremerton, Poulsbo, Silverdale, and the Hood Canal Bridge. SR-3 has a posted speed limit of 60 mph and is a controlled access, four-lane, north-south highway located 1/3 mile (0.5 kilometer) east of the base. SR-3 connects with SR-305 near Poulsbo providing access from NAVBASE Kitsap Bangor to Bainbridge Island and the Seattle ferry. Travel time is approximately one hour and 15 minutes from Seattle. Travel time by highway from Tacoma is less than one hour.

There are two entrance routes to NAVBASE Kitsap Bangor from SR-3, either NW Trigger Avenue or NW Luoto Road (referred to as Trident Boulevard inside of base boundaries) (Figure 15–1). Trident Avenue/Luoto Road has six 12-foot (4-meter) travel lanes with 6-foot (2-meter) paved shoulders extending from the main gate to SR-3. Trigger Avenue has five 12-foot travel lanes with 6-foot paved shoulders. Both roads are posted for speeds up to 40 mph.

The internal NAVBASE Kitsap Bangor road system is composed of two- and four-lane paved roads that provide access to Naval and commercial facilities, housing, and the waterfront area. Roads in the vicinity of the waterfront are two-lane roads. Generally, travel lanes are from 10 to 12 feet (3 to 4 meters) in width with wide paved shoulders ranging from 5 to 10 feet (1.5 to 3 meters) or gravel shoulders from 2 to 5 feet (0.6 to 1.5 meters) in width. Speed limits on the base range from 20 to 45 mph. Traffic lights and signals have been installed where needed near the commercial area and main gates. Other intersections are controlled by four-way or two-way stop signs.

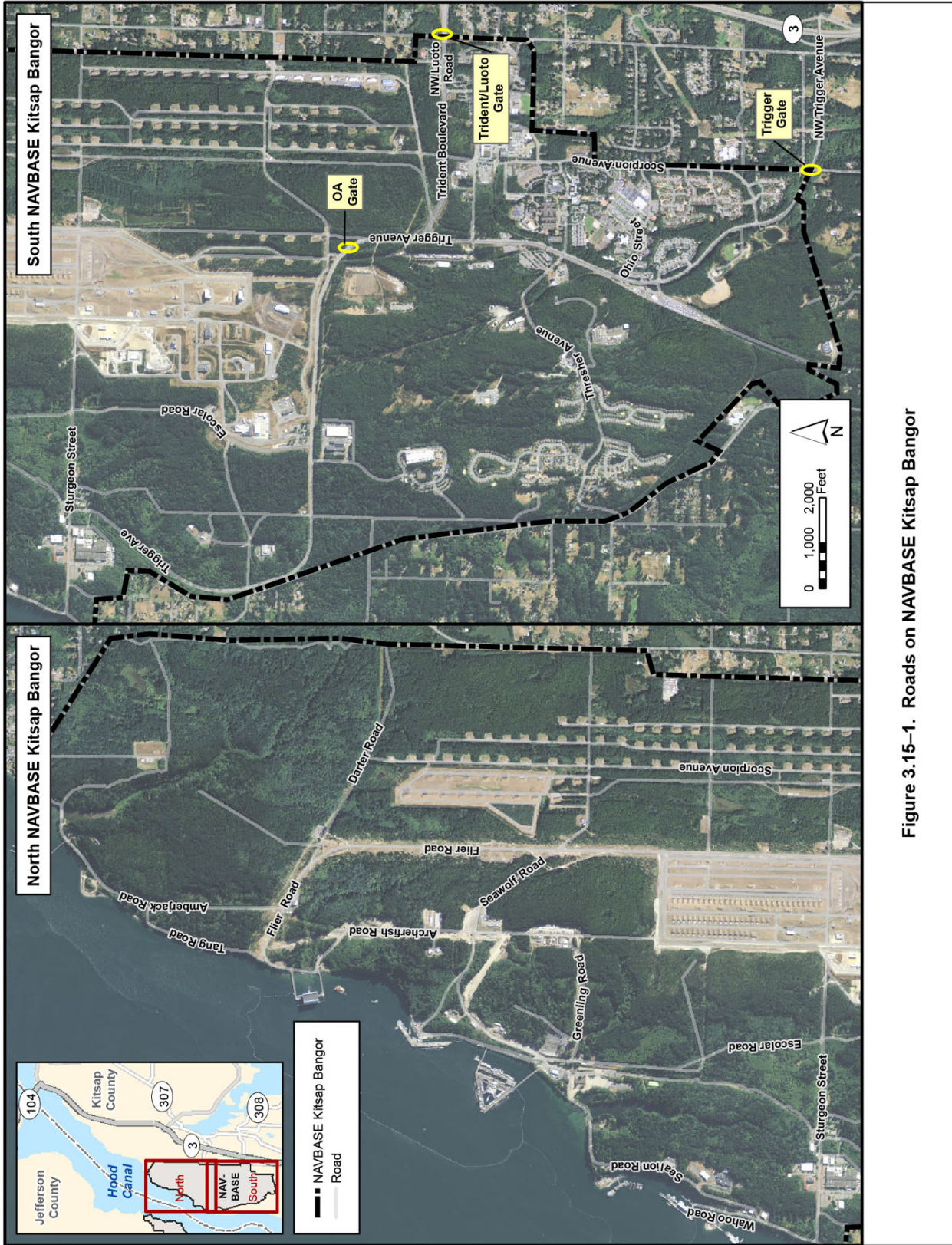


Figure 3.15-1. Roads on NAVBASE Kitsap Bangor

Internal roads are improved and maintained by the Navy. The key access streets serving the project site are Trigger Avenue, Trident Boulevard, Escolar Road, Greenling Road, Archerfish Road, and Flier Road. The Operational Area (OA) Gate on Trigger Avenue separates the upper base, which includes administrative, commercial and residential areas, from the lower base, which includes various industrial and “mission” areas including the waterfront area. Traffic delays occur at this gate during morning and afternoon peak hours.

TRAFFIC VOLUMES

Traffic counts were collected at two regional roadways that provide direct access to NAVBASE Kitsap Bangor: Trigger Avenue and Luoto Road. Table 3.15–1 provides the average daily traffic volumes on NW Trigger Avenue and NW Luoto Road immediately outside of base boundaries. NW Luoto Road has an average daily traffic volume of 12,295 vehicles, with automobiles comprising approximately 65 percent (7,984 vehicles) of the total. NW Trigger Avenue has a lower average daily traffic volume of 11,426 vehicles, with almost 72 percent of those trips (8,213 vehicles) being automobiles.

Table 3.15–1. Average Daily Traffic Volumes (2008) — Regional Roadways

Location	Cars	Trucks	Total
NW Trigger Avenue	8,213	3,213	11,426
NW Luoto Road	7,984	4,311	12,295

Source: All Traffic Data Services 2008

Vehicle trips for a.m. and p.m. peak hours are shown in Table 3.15–2. Peak-hour trips on NW Trigger Avenue typically occur from 7:00 to 8:00 a.m. and 3:00 to 5:00 p.m. The average a.m. and p.m. peak hour volumes on NW Trigger Avenue are 676 and 844, respectively. The peak volumes on NW Luoto Road occur at slightly different times than on NW Trigger Avenue and are more evenly distributed between the a.m. and p.m. peak periods. On NW Luoto Road, the peak volumes occur from 6:00 to 7:00 a.m. and 4:00 to 5:00 p.m. Average a.m. and p.m. peak hour volumes on NW Luoto Road are 978 and 918 vehicles, respectively.

Table 3.15–2. Average Peak Hour Volumes (2008) — Regional Roadways

Location	a.m. peak	p.m. peak
Trigger Avenue	676	844
Luoto Road	978	918

Source: All Traffic Data Services 2008

With the exception of peak hours, traffic from NAVBASE Kitsap Bangor generally does not cause congestion problems outside the base. This is because the base is close to major highways such as SR-3 and SR-308, which provide direct access to NW Trigger Avenue and NW Luoto Road. In addition, these two access roads are multi-lane roads capable of handling large volumes of traffic. During morning and afternoon peak hours, however, both the Trident/Luoto and Trigger gates experience backups and delays. These delays can affect traffic flow on SR-3 (morning only) and at the intersection of Trigger Boulevard and Frontier Road.

TRAFFIC VOLUMES TO AND FROM THE LWI PROJECT SITES

Existing average daily traffic volumes were obtained for internal base roadways that would be used during construction activities associated with the LWI project (Table 3.15–3). In addition to traffic counts, travel lane configuration, roadway grade, and types of traffic controls were verified and documented. The following roadways were selected because they are key access routes to and from the LWI project sites:

- Trigger Avenue south of Trident Boulevard,
- Trident Boulevard east of Trigger Avenue,
- Trigger Avenue east of Escolar Road,
- Escolar Road north of Trigger Avenue,
- Escolar Road north of Sturgeon Street,
- Greenling Road west of Archerfish Road,
- Archerfish Road north of Seawolf Road,
- Seawolf Road east of Flier Road,
- Flier Road north of Seawolf Road,
- Trigger Avenue south of Sturgeon Street,
- Sturgeon Street west of Trigger Avenue, and
- Sealion Road north of Sturgeon Street.

Table 3.15–3. Average Daily Traffic Volumes — NAVBASE Kitsap Bangor Roadways

Location	Cars	Trucks/Buses	Total
Trigger Avenue north of Thresher Avenue	6,854	266	7,120
Trident Boulevard east of Scorpion Avenue	10,830	751	11,581
Trigger Avenue east of Escolar Road	8,676	702	9,378
Escolar Road south of Goldfinch Lane	4,026	226	4,252
Escolar Road north of Sturgeon Street	3,446	96	3,542
Greenling Road west of Archerfish Road	829	25	854
Archerfish Road north of Seawolf Road	446	2	448
Seawolf Road east of Flier Road	n/a	n/a	510
Flier Road North of Seawolf Road	n/a	n/a	520
Trigger Avenue south of Sturgeon Street	n/a	n/a	2,710
Sturgeon Street west of Trigger Avenue	n/a	n/a	3,220
Sealion Road north of Sturgeon Street	n/a	n/a	2,100

Source: Parametrix 2011; All Traffic Data Services, Inc. 2012

Existing average morning and evening peak hour intersection turning movement volumes were obtained at intersections that would be used during construction activities associated with the LWI project within the study area (Table 3.15–4). Specifically, traffic counts were gathered

during peak periods of 6:00 a.m. to 8:00 a.m. and 2:30 p.m. to 4:30 p.m. on a typical weekday at the following intersections:

- Trigger Avenue and Ohio Street,
- Trigger Avenue and Trident Boulevard,
- Trigger Avenue and Escolar Road,
- Escolar Road and Sturgeon Street,
- Escolar Road and Greenling Road,
- Archerfish Road and Seawolf Road,
- Seawolf Road and Flier Road, and
- Trigger Avenue and Sturgeon Street.

Table 3.15–4. Average Peak Hour Volumes — NAVBASE Kitsap Bangor Intersections

Location	Peak (a.m.)	Peak (p.m.)
Trigger Avenue/Ohio Street	1,267	1,424
Trigger Avenue/Trident Boulevard	1,693	1,512
Trigger Avenue/Escolar Road	1,445	1,480
Escolar Road/Sturgeon Street	625	460
Escolar Road/Greenling Road	398	347
Archerfish Road/Seawolf Road	91	72
Seawolf Road/Flier Road	45	36
Trigger Avenue/Sturgeon Street	313	415

Source: Parametrix 2011; All Traffic Data Services, Inc. 2012

TRAFFIC VOLUMES TO AND FROM THE SPE PROJECT SITE

Existing average daily traffic volumes were obtained for internal base roadways that would be used during construction activities associated with the SPE project site (Table 3.15–3). In addition to traffic counts, travel lane configuration, roadway grade, and types of traffic controls were verified and documented. The following roadways were selected because they are key access routes to and from the SPE project site:

- Trigger Avenue south of Trident Boulevard,
- Trident Boulevard east of Trigger Avenue,
- Trigger Avenue east of Escolar Road,
- Trigger Avenue south of Sturgeon Street,
- Sturgeon Street west of Trigger Avenue, and
- Sealion Road north of Sturgeon Street.

Existing morning and evening peak hour intersection turning movement volumes were obtained at intersections that would be used during the construction activities associated with the SPE projects within the study area (Table 3.15–4). Specifically, traffic counts were gathered during peak periods of 7:00 a.m. to 9:00 a.m. and 2:00 p.m. to 4:00 p.m. on a typical weekday at the following intersections:

- Trigger Avenue and Ohio Street,
- Trigger Avenue and Trident Boulevard,
- Trigger Avenue and Escolar Road, and
- Trigger Avenue and Sturgeon Street.

LEVEL OF SERVICE

Level of service (LOS) is a measure of roadway operation, which uses a qualitative grading scale from A to F. LOS A represents the best traffic operations and LOS F represents the worst traffic operations. LOS can be used to characterize the overall traffic operations along a roadway. Tables 3.15–5 and 3.15–6 provide descriptions of LOS in terms of intersection delay.

The minimum standard for road operations in Kitsap County is LOS D. The LOS on NW Trigger Avenue is LOS A (Kitsap County Department of Community Development 2005) and NW Luoto Road is LOS C (Rogers 2008, personal communication).

Table 3.15–5. Level of Service for At-Grade Signalized Intersections

LOS	Average Control Delay	General Description
A	≤ 10 seconds	Free Flow
B	> 10–20 seconds	Stable Flow
C	> 20–35 seconds	Stable Flow (Acceptable Delay)
D	> 35–55 seconds	Approaching Unstable Flow (Tolerable Delay)
E	> 55–80 seconds	Unstable Flow (Intolerable Delay)
F	> 80 seconds	Forced Flow (Jammed)

Source: Transportation Research Board, Highway Capacity Manual 2010

Table 3.15–6. Level of Service for At-Grade Unsignalized Intersections

LOS	Average Control Delay	General Description
A	0–10 seconds	Free Flow
B	> 10–15 seconds	Stable Flow
C	> 15–25 seconds	Stable Flow (Acceptable Delay)
D	> 25–35 seconds	Approaching Unstable Flow (Tolerable Delay)
E	> 35–50 seconds	Unstable Flow (Intolerable Delay)
F	> 50 seconds	Forced Flow (Jammed)

Source: Transportation Research Board, Highway Capacity Manual 2010

SPECIAL TRAFFIC CONDITIONS

Several internal roads are periodically closed to traffic to enable the movement of assets on NAVBASE Kitsap Bangor. These road closures are part of routine operations, and personnel on the base are familiar with these procedures. These closures may last several days and alternate routes are used.

3.15.1.1.2. MARINE VESSEL TRAFFIC

The Sector Puget Sound Vessel Traffic Service, part of the U.S. Coast Guard and based in Seattle, monitors approximately 250,000 vessel movements in the sound annually. These movements are composed of tankers, cargo ships, ferries, and tug boats with tows (U.S. Coast Guard 2004).

Naval ships and support vessels access the base via the Strait of Juan de Fuca, Puget Sound, and Hood Canal. The majority of vessel traffic in Hood Canal consists of Navy-related marine traffic including submarines, escort vessels, tugs, and other vessels transiting to and from NAVBASE Kitsap Bangor. As Hood Canal is not a deep draft vessel operating area, this area is infrequently transited by commercial vessels, and vessel traffic data are not available for Hood Canal (Venture 2010, personal communication). Larger vessels (i.e., vertical clearance greater than 50 feet [15 meters]) transiting Hood Canal require opening of the Hood Canal Bridge. Typical bridge openings take approximately 30 minutes (WSDOT 2010b). As bridge openings are not scheduled in advance, vehicles traveling along SR-104 (Hood Canal Bridge) are subject to unexpected delays.

3.15.1.1.3. PUBLIC TRANSIT

Kitsap Transit operates a regularly scheduled shuttle bus that provides access to NAVBASE Kitsap Bangor from Silverdale, with connections from Silverdale to other parts of the county including ferry terminals. An internal bus system operates 18 hours per day within the base. Taxi service is also available at the base from several private companies located in Bremerton, Silverdale, Bainbridge Island, and Port Orchard. Kitsap Transit buses and taxis do not service the NAVBASE Kitsap Bangor waterfront area; however, the Navy's internal bus system provides service to the Bangor waterfront for Navy and contract personnel.

3.15.1.2. CURRENT REQUIREMENTS AND PRACTICES

The Military Surface Deployment and Distribution Command Transportation Engineering Agency provides the DoD with transportation engineering, policy guidance, research, and analytical expertise. Several DoD directives apply to transportation planning and implementation at military bases, including the following:

- DoD Directive 4500.9 Transportation and Traffic Management, and
- DoD Directive 4510.11 Transportation Engineering.

These directives apply policies to proposed transportation improvements, travel, traffic management, and traffic safety.

For vessel traffic, the Protection of Naval Vessels rule (33 CFR 165.2010) issued under the authority in 14 USC 91 provides protective measures for both vessels and bases. This regulation establishes naval vessel protection zones surrounding U.S. Naval vessels in navigable waters of the U.S. Within a Naval Vessel Protection Zone, no vessel or person is allowed within 100 yards (91 meters) of a U.S. Naval vessel unless authorized by the U.S. Coast Guard or senior Naval officer in command. Two restricted areas are associated with NAVBASE Kitsap Bangor: Naval Restricted Areas 1 and 2 (33 CFR 334.1220) (Figure 1–2). Naval Restricted Area 1 covers the area to the north and south along Hood Canal encompassing the Bangor waterfront. Naval Restricted Area 2 encompasses the waters of Hood Canal within a circle of 1,000 yards (3,000 feet [914 meters]) diameter centered at the north end of NAVBASE Kitsap Bangor and partially overlapping Naval Restricted Area 1. The WRA is located within Restricted Area 1.

To maintain adequate levels of safety for vessel navigation during in-water construction activities, the Navy would request that the U.S. Coast Guard issue a Notice to Mariners to establish uniform procedures to facilitate the safe transit of vessels operating in the project vicinity. The local Notice to Mariners would increase the awareness of all waterway users in the project vicinity and ensure adequate communication between the U.S. Coast Guard, Marine Exchange of Puget Sound, dredging contractors, dredge and vessel operators, and transiting vessels.

Impacts on motorists can be minimized by avoiding barge trips through the Hood Canal Bridge passage during peak commute hours of 6:00 a.m. to 8:30 a.m. and 3:30 p.m. to 6:00 p.m., Monday through Friday.

No consultations or permits are required.

3.15.2. Environmental Consequences

3.15.2.1. APPROACH TO ANALYSIS

The evaluation of impacts on transportation resources considers whether traffic volumes increase sufficiently to create a need to construct new transportation infrastructure, including new roads, stormwater design and culvert restoration along existing roads, traffic diversions needed during construction, new transit options for construction workers, or new parking areas.

Marine vessel traffic impacts are evaluated to determine whether marine-based construction equipment would interfere with normal navigational activities in Hood Canal or substantially increase vessel traffic volumes that would warrant construction of new facilities.

3.15.2.2. LWI PROJECT ALTERNATIVES

3.15.2.2.1. LWI ALTERNATIVE 1: NO ACTION

Under the LWI No Action Alternative, construction of the LWI would not occur and overall operations would not change from current levels. Existing ground and vessel traffic levels would remain unchanged. Therefore, no impacts on traffic would occur under the LWI No Action Alternative.

3.15.2.2.2. LWI ALTERNATIVE 2: PILE-SUPPORTED PIER

CONSTRUCTION

VEHICULAR TRAFFIC

Staging (i.e., parking lot, material/equipment storage, and soil stockpiling) for both LWI project sites would take place at a single site located near the intersection of Archerfish and Seawolf Roads (Figure 2-1). This site is approximately 5.4 acres (2.2 hectares) in size and has been used recently for staging for other projects. The staging area would accommodate construction worker parking, temporary material storage, and assembly. The staging area would generate traffic by supporting material deliveries, removal of debris, and distribution of construction personnel from a designated parking area to the staging area.

Traffic accessing the north LWI project site would head north on Escolar Road, traveling east on Greenling Road, and then north on Archerfish Road to reach the construction site via Seawolf and Flier Roads. Traffic accessing the south LWI project site would continue along Trigger Avenue west of Escolar Road to access the construction site via Sturgeon and Sealion Roads. Flier and Sealion Roads would be the primary haul routes for construction of the LWI north and south project sites, respectively. The soil hauling truck trips generated by the north LWI project site would follow Escolar → Greenling → Archerfish → Seawolf → Flier. The soil hauling truck trips generated by the south LWI project site would follow Trigger → Sturgeon → Sealion.

Truck traffic would be generated by the need to deliver construction materials and remove construction debris from the construction sites. Construction debris would be hauled off site to an approved disposal location. Over the duration of construction (24 months), a maximum of 100 workers are conservatively assumed to drive to and from the construction site daily. General large truck traffic is estimated to be approximately 8 trips per day on average, while other construction traffic such as inspectors, visitors and miscellaneous smaller vehicles is estimated to be 30 trips per day on average. This would result in a total of 135–140 vehicle trips per day on average for the duration of construction (Tables 3.15-7 and 3.15-8). Soil hauling is expected to require an additional 1,300 truck trips over a period of 6 months (95 work days) during 2016 and 2017, for a daily average of approximately 15–20 truck trips per day during that period. Based on relative cut and fill volumes, 80 percent of these soil hauling trucks are estimated to go the north site, while 20 percent would go to the south site. During peak construction activities, there would be a substantial increase in the peak number of truck trips. Peak period truck trips are estimated to increase up to 2–4 trips per hour for a period estimated at 10 days. The existing roads planned for construction traffic could accommodate the additional vehicles and trucks, and would not need to be upgraded to accommodate construction traffic. However, the additional traffic volumes may create longer wait times to enter the base, particularly during the a.m. peak hour, as vehicles queue up to pass through the security checkpoint. Project construction traffic would also result in additional delays at the OA Gate.

Table 3.15–7. Daily Average Traffic Volumes on NW Luoto Road for LWI Alternative 2

	2016	2017	2018
Non-Project Traffic	13,526	13,689	13,853
Construction Worker Automobile Trips ¹	100	100	100
Soil Hauling Truck Trips	20	20	0
Other Construction Truck Traffic	8	8	8
Other Construction Traffic	30	30	30
Total	13,684	13,847	13,991

1. The daily average number of construction workers is a conservative estimate based on the maximum workers onsite during the 808-day construction period.

Table 3.15–8. Daily Average Traffic Volumes on NW Trigger Avenue for LWI Alternative 2

	2016	2017	2018
Non-Project Traffic	12,570	12,721	12,873
Construction Worker Automobile Trips ¹	100	100	100
Soil Hauling Truck Trips	20	20	0
Other Construction Truck Traffic	8	8	8
Other Construction Traffic	30	30	30
Total	12,728	12,879	13,011

1. The daily average number of construction workers is a conservative estimate based on the maximum workers onsite during the 808-day construction period.

Regional Roadways

Construction activities would add traffic to NW Luoto Road/Trident Boulevard and NW Trigger Avenue. NW Luoto Road/Trident Boulevard has six lanes with 12-foot (4-meter) travel lanes and 6-foot (2-meter) paved shoulders extending from the main gate to SR-3. NW Trigger Avenue has five lanes with 12-foot travel lanes and 6-foot paved shoulders. As noted above, project construction traffic would exacerbate existing peak-hour delays at both the Trident/Luoto and Trigger gates and adjacent regional roadways, as well as at the OA Gate. There are no plans to expand these gates.

NAVBASE Kitsap Bangor Roadways

Intersection LOS Analysis

Construction-related traffic would have minor impacts (a few seconds or less) on several intersections during both the a.m. and p.m. peak hour (Table 3.15–9). However, these intersections would operate at an acceptable LOS D or better. Please refer to Appendix F for additional details regarding intersection LOS calculations. The LOS shown in Table 3.15–9 indicates the effect of the added traffic from the LWI projects.

Table 3.15-9. Peak Hour Intersection Level of Service Analysis — NAVBASE Kitsap Bangor Roadways

Intersection	AM Peak								PM Peak							
	BASELINE		FUTURE WITH CONSTRUCTION TRAFFIC						BASELINE		FUTURE WITH CONSTRUCTION TRAFFIC					
	2011 / 2012		2016		2017		2018		2011 / 2012		2016		2017		2018	
	LOS	Delay (seconds)	LOS	Delay (seconds)	LOS	Delay (seconds)	LOS	Delay (seconds)	LOS	Delay (seconds)	LOS	Delay (seconds)	LOS	Delay (seconds)	LOS	Delay (seconds)
Trigger & Ohio	B	11.2	B	11.5	B	11.6	B	11.7	B	12.6	B	12.8	B	12.9	B	13.1
Trigger & Trident	B	19.8	C	23.2	C	23.8	C	29.2	B	10.2	B	12.1	B	12.2	B	12.3
Trigger & Escolar	A	5.5	A	7.8	A	7.9	A	8.1	D	37.9	D	42.5	D	43.9	D	45.3
Escolar & Sturgeon	B	14.3	C	16.9	C	17.1	C	17.2	C	22.9	D	26.1	D	26.7	D	28.1
Escolar & Greenling	B	11.5	C	16.2	C	16.6	C	16.8	A	9.9	B	13.7	B	13.9	B	14.1
Archerfish & Seawolf	A	9.4	B	11.4	B	11.4	B	11.6	A	9.3	B	11.2	B	11.2	B	11.4
Seawolf & Flier	A	8.9	A	9.3	A	9.3	A	9.4	A	9.3	A	9.5	A	9.5	A	9.6
Trigger & Sturgeon	B	11.1	B	11.7	B	11.7	B	11.8	B	10.0	B	10.3	B	10.3	B	10.5

1. Default values used in determining the LOS were obtained from Parametrix 2011 Bangor Traffic Analysis-Construction of EHW Impacts (Technical Memorandum)
2. LOS values shown for the unsignalized intersections are for the stop-controlled movements experiencing the highest delay.
3. LOS = Level of Service

Roadway LOS Analysis

Construction traffic would impact the LOS for several roadway segments (Table 3.15–10). During peak times of heavy construction traffic, overall average speed of vehicles would be reduced due to reduced LOS. However, these roadways would operate at an acceptable LOS D or better. Please refer to Appendix F for additional details regarding roadway LOS calculations. The LOS shown in Table 3.15–10 indicates the effect of the added traffic from the LWI project sites.

MARINE VESSEL TRAFFIC

Proposed in-water construction activities would require use of marine-based construction equipment (i.e., pile-driving rigs, support barges, tugboat, and work skiffs) to support construction of the LWI and transport materials to and from the project sites. Construction materials would remain on barges until used for construction. Marine-based construction equipment would be present within the project area for two in-water work seasons (August 1, 2016, to January 15, 2017, and July 15, 2017, to January 15, 2018). A total of approximately 16 barge round trips per year (slightly less than three round trips per month during the 6-month in-water work season), would be required to support construction activities during this period. Barges are expected to transit from various locations in Central Puget Sound to the construction site via Admiralty Inlet to Hood Canal. This level of vessel traffic is not expected to adversely impact vessel transit routes or normal navigational activities in Hood Canal or Puget Sound. Therefore, no significant impacts on marine vessel traffic during construction are expected.

Any support boat or barge used during in-water construction activities would generally be located in NAVBASE Kitsap Bangor restricted areas away from normal navigational activities. Standard U.S. Coast Guard safety precautions would be used by all contractors. Within the NAVBASE Kitsap Bangor restricted areas, marine-based construction equipment would be highly visible, well-marked, and would be relatively stationary as equipment (e.g., barge/tugboat and pile drivers) would only be moved prior to and after completion of in-water construction activities. Movement of construction vessels within the restricted areas would be coordinated with NAVBASE Kitsap Bangor Port Operations to ensure no interference with other Navy vessel movements. To maintain adequate levels of safety for vessel navigation during in-water construction activities, the Navy would request that the U.S. Coast Guard issue a Notice to Mariners to establish uniform procedures to facilitate the safe transit of vessels operating in the project vicinity.

Construction vessels would require additional openings of the Hood Canal Bridge to access the project site. Each barge round trip and associated two bridge openings would result in delays (on average 30 minutes per opening for a total of 60 minutes per round trip) for motorists traveling on SR-104. The projected three round trips (six bridge openings) per month during the in-water work season would result in total delays on SR-104 of approximately 180 minutes (3 hours) per month. Based on a review of data on Hood Canal Bridge openings, the bridge typically opens 400 to 450 times per year for an average opening of just over once per day. June through October represents the period with the majority of openings due to an increase in pleasure boat traffic (Crawford 2010, personal communication). Impacts on motorists would be minimized by avoiding barge trips through the Hood Canal Bridge opening during peak commute hours of 6:00 a.m. to 8:30 a.m. and 3:30 p.m. to 6:00 p.m., Monday through Friday.

Table 3.15–10. Peak Hour Roadway Level of Service Analysis – NAVBASE Kitsap Bangor Roadways

Multi-Lane Roadway Sections																
Roadway Section	AM Peak								PM Peak							
	BASELINE		FUTURE WITH CONSTRUCTION TRAFFIC						BASELINE		FUTURE WITH CONSTRUCTION TRAFFIC					
	2011/2012		2016		2017		2018		2011/2012		2016		2017		2018	
	LOS	Density (veh/ mile/ lane)	LOS	Density (veh/ mile/ lane)	LOS	Density (veh/ mile/ lane)	LOS	Density (veh/ mile/ lane)	LOS	Density (veh/ mile/ lane)	LOS	Density (veh/ mile/ lane)	LOS	Density (veh/ mile/ lane)	LOS	Density (veh/ mile/ lane)
Trigger north of Thresher	A	7.8	A	8.9	A	9.1	A	9.2	A	6.7	A	7.7	A	7.9	A	8.1
Trident east of Trigger	A	7.2	A	8.4	A	8.4	A	8.5	A	6.9	A	8.0	A	8.1	A	8.1
Trigger north of Trident	B	14.8	B	17.3	B	17.5	B	17.6	B	13.0	B	15.4	B	15.6	B	15.7
Trigger east of Escolar	B	14.3	C	18.3	C	18.4	C	18.5	B	14.7	B	17.3	B	17.4	B	17.5
Trigger south of Sturgeon	A	2.3	A	2.7	A	2.7	A	2.8	A	3.5	A	3.9	A	3.9	A	4.0
Two-Lane Roadway Sections																
Roadway Section	AM Peak								PM Peak							
	BASELINE		FUTURE WITH CONSTRUCTION TRAFFIC						BASELINE		FUTURE WITH CONSTRUCTION TRAFFIC					
	2011/2012		2016		2017		2018		2011/2012		2016		2017		2018	
	LOS	Percent Time Spent Following (PTSF%)	LOS	Percent Time Spent Following (PTSF%)	LOS	Density (veh/ mile/ lane)	LOS	Percent Time Spent Following (PTSF%)	LOS	Percent Time Spent Following (PTSF%)	LOS	Percent Time Spent Following (PTSF%)	LOS	Density (veh/ mile/ lane)	LOS	Percent Time Spent Following (PTSF%)
Escolar north of Trigger	D	79.5%	D	83.2%	D	83.4%	D	83.7%	D	76.7%	D	80.9%	D	81.1%	D	81.2%
Escolar north of Sturgeon	D	72.3%	D	73.7%	D	73.9%	D	74.0%	C	68.8%	D	73.4%	D	73.5%	D	73.5%
Greenling west of Archerfish	C	58.9%	C	66.5%	C	66.8%	C	66.9%	B	51.3%	C	63.7%	C	63.9%	C	64.0%
Seawolf east of Archerfish	B	46.2%	C	60.2%	C	60.4%	C	60.5%	A	31.8%	C	57.6%	C	57.8%	C	58.0%
Flier north of Seawolf	A	37.1%	B	40.7%	B	40.8%	B	40.9%	A	38.7%	B	44.2%	B	44.4%	B	44.5%
Sturgeon west of Trigger	C	67.3%	C	68.5%	C	68.7%	C	68.9%	D	71.9%	D	73.5%	D	73.7%	D	73.8%
Sealion north of Sturgeon	C	62.1%	C	63.2%	C	63.4%	C	63.5%	C	66.1%	C	67.8%	C	68.0%	C	68.2%

1. Default values used in determining the LOS were obtained from Parametrix 2011 Bangor Traffic Analysis-Construction of EHW Impacts (Technical Memorandum)
2. LOS = Level of Service

PUBLIC TRANSIT

LWI Alternative 2 would not increase transit demand such that demands could not be accommodated by existing or planned transit capacity.

OPERATION/LONG-TERM IMPACTS

Operation and maintenance of LWI Alternative 2 would result in a minimal increase in vehicular and marine vessel traffic. Therefore, there would be no adverse impact on vehicular or marine traffic conditions.

3.15.2.2.3. LWI ALTERNATIVE 3: PSB MODIFICATIONS (PREFERRED)

CONSTRUCTION

VEHICULAR TRAFFIC

Construction of the upland portions of LWI Alternative 3 would be the same as construction of Alternative 2. Therefore, construction traffic for Alternative 3 would be the same as that for Alternative 2, and impacts on vehicular traffic would be the same as described for Alternative 2 (Section 3.15.2.2.2 above).

MARINE VESSEL TRAFFIC

Construction of Alternative 3 would require an estimated three round trips per year for construction barges, compared to 16 round trips per year for LWI Alternative 2. Therefore, impacts on marine vessel traffic would be less for Alternative 3 than for Alternative 2, with no significant impact on vessel traffic in Hood Canal. Further, construction of Alternative 3 would require only one in-water construction season versus two seasons for Alternative 2. To maintain adequate levels of safety for vessel navigation during in-water construction activities, the Navy would request that the U.S. Coast Guard issue a Notice to Mariners to establish uniform procedures to facilitate the safe transit of vessels operating in the project vicinity.

Assuming the three barge round trips occur during the 6-month in-water construction season, there would be 0.5 additional openings of the Hood Canal Bridge per month on average, resulting in delays of 30 minutes per month on average on SR-104 during the single in-water construction season (August 1, 2016, through January 15, 2017). Impacts on motorists would be minimized by avoiding barge trips through the Hood Canal Bridge opening during peak commute hours of 6:00 a.m. to 8:30 a.m. and 3:30 p.m. to 6:00 p.m., Monday through Friday.

OPERATION/LONG-TERM IMPACTS

Operation and maintenance of LWI Alternative 3 would result in a minimal increase in vehicular and marine vessel traffic. Therefore, there would be no adverse impact on vehicular or marine traffic conditions.

3.15.2.2.4. SUMMARY OF LWI IMPACTS

Impacts on traffic associated with the construction and operation phases of the LWI project alternatives, along with mitigation and consultation and permit status, are summarized in Table 3.15–11.

Table 3.15–11. Summary of LWI Impacts on Traffic

Alternative	Environmental Impacts on Traffic
LWI Alternative 1: No Action	No impact.
LWI Alternative 2: Pile-Supported Pier	<i>Construction:</i> Exacerbation of existing peak-hour delays at both base gates. Minor impacts on traffic on the Hood Canal Bridge. Increased marine vessel and vehicular traffic levels would not be sufficient to require improvement to infrastructure. <i>Operation/Long-term Impacts:</i> Minimal increase in traffic and marine vessel levels.
LWI Alternative 3: PSB Modifications (Preferred)	<i>Construction:</i> Exacerbation of existing peak-hour delays at both base gates. Less impact on traffic on the Hood Canal Bridge than Alternative 2 (3 barge round trips per year versus 16 round trips per year and only one in-water construction season versus two under Alternative 2). Increased marine vessel and vehicular traffic levels would not be sufficient to require improvement to infrastructure. <i>Operation/Long-term Impacts:</i> Minimal increase in traffic and marine vessel levels.
Mitigation: Openings of the Hood Canal Bridge would be scheduled to avoid peak traffic hours to the extent possible. The Navy would develop a local Notice to Mariners to establish uniform procedures to facilitate the safe transit of vessels operating in the project vicinity.	
Consultation and Permit Status: No consultations or permits are required.	

3.15.2.3. SPE PROJECT ALTERNATIVES

3.15.2.3.1. SPE ALTERNATIVE 1: NO ACTION

Under the No Action Alternative, construction of the SPE would not occur, the two SEAWOLF Class submarines would not be transferred to NAVBASE Kitsap Bangor, and overall operations would not change from current levels. Existing ground and vessel traffic levels would remain unchanged. Therefore, no impacts on traffic would occur under the No Action Alternative.

3.15.2.3.2. SPE ALTERNATIVE 2: SHORT PIER (PREFERRED)

CONSTRUCTION

VEHICULAR TRAFFIC

The SPE project is currently unprogrammed and a construction schedule has not been established. For the purposes of traffic impact analysis, a construction period of April 2018 through March 2020 has been assumed as a reasonably representative case.

The staging area (i.e., parking lot, material/equipment storage, and soil stockpiling) would be located at the SPE construction site, within the existing parking lot (and future Waterfront Ship Support Building), and so would result in no additional land clearing. This staging area would accommodate construction worker parking, temporary material storage, and assembly. The

staging area would generate traffic by supporting material deliveries, removal of debris, and distribution of construction personnel from a designated parking area to the staging area(s).

Truck traffic would be generated by the need to deliver construction materials and remove construction debris from the construction sites. Construction debris would be hauled off site to an approved disposal location. Over the duration of construction (24 months), a maximum of 70 workers are conservatively assumed to drive to and from the construction site daily. General large truck traffic is estimated to be 18 trips per day on average, while other construction traffic such as inspectors, visitors and miscellaneous smaller vehicles is estimated to be 70 trips per day on average. This would result in a total of 158 vehicle trips per day on average for the duration of construction (Tables 3.15–12 and 3.15–13). The existing roads planned for construction traffic could accommodate the additional vehicles and trucks and would not need to be upgraded to accommodate construction traffic. However, the additional traffic volumes may create longer wait times to enter the base, particularly during the a.m. peak hour, as vehicles queue up to pass through the Trident/Luoto and Trigger gates. Project construction traffic would also result in additional delays at the OA Gate.

Table 3.15–12. Daily Average Traffic Volumes on NW Luoto Road for SPE Alternative 2

	2018	2019	2020
Non-Project Traffic	13,853	14,187	14,358
Construction Worker Automobile Trips ¹	70	70	70
Soil Hauling Truck Trips	0	0	0
Other Construction Truck Traffic	18	18	18
Other Construction Traffic	70	70	70
Total	14,011	14,345	14,516

1. The daily average number of construction workers is a conservative estimate based on the maximum workers onsite during the 808-day construction period.

Table 3.15–13. Daily Average Traffic Volumes on NW Trigger Avenue for SPE Alternative 2

	2018	2019	2020
Non-Project Traffic	12,873	13,184	13,342
Construction Worker Automobile Trips ¹	70	70	70
Soil Hauling Truck Trips	0	0	0
Other Construction Truck Traffic	18	18	18
Other Construction Traffic	70	70	70
Total	13,031	13,342	13,500

1. The daily average number of construction workers is a conservative estimate based on the maximum workers onsite during the 808-day construction period.

Regional Roadways

Construction activities would add traffic to NW Luoto Road/Trident Boulevard and NW Trigger Avenue. NW Luoto Road/Trident Boulevard has six lanes with 12-foot (4-meter) travel lanes and 6-foot (2-meter) paved shoulders extending from the main gate to SR-3. NW Trigger Avenue has five lanes with 12-foot travel lanes and 6-foot paved shoulders. As noted above, project construction traffic would exacerbate existing peak-hour delays at both the Trident/Luoto and Trigger gates and adjacent regional roadways. There are no plans to expand these gates.

*NAVBASE Kitsap Bangor Roadways*Intersection LOS Analysis

Construction-related traffic would have minor impacts (a few seconds or less) on several intersections during both the a.m. and p.m. peak hour (Table 3.15–14). However, these intersections would operate at an acceptable LOS D or better. Please refer to Appendix F for additional details regarding intersection LOS calculations. The LOS shown in Table 3.15–14 indicates the effect of the added traffic from the SPE project.

Roadway LOS Analysis

Construction traffic would impact the LOS for several roadway segments (Table 3.15–15). During peak times of heavy construction traffic, the overall average speed of vehicles would degrade the LOS. However, these roadways would operate at an acceptable LOS D or better. Please refer to Appendix F for additional details regarding roadway LOS calculations. The LOS shown in Table 3.15–15 indicates the effect of the added traffic from the SPE project.

MARINE VESSEL TRAFFIC

Proposed in-water construction activities would require use of marine-based construction equipment (i.e., pile-driving rigs, support barges, tugboat, and work skiffs) to support construction of the SPE and transport materials to and from the project sites. Construction materials would remain on barges until used for construction. Assuming a construction period of April 2018 through March 2020, marine-based construction equipment would be present within the project area for two in-water work seasons (July 15, 2018, to January 15, 2019, and July 15, 2019, to January 15, 2020). A total of approximately six barge round trips per month would be required to support construction activities during this period. Construction of SPE Alternative 2 is not expected to require two full in-water construction seasons, however. Barges are expected to transit from various locations in Central Puget Sound to the construction site via Admiralty Inlet to Hood Canal. Construction vessels would require additional openings of the Hood Canal Bridge to access the project site.

Table 3.15-14. Peak Hour Intersection Level of Service Analysis — NAVBASE Kitsap Bangor Roadways

Intersection	AM Peak								PM Peak							
	BASELINE		FUTURE WITH CONSTRUCTION TRAFFIC						BASELINE		FUTURE WITH CONSTRUCTION TRAFFIC					
	2011 / 2012		2018		2019		2020		2011 / 2012		2018		2019		2020	
	LOS	Delay (seconds)	LOS	Delay (seconds)	LOS	Delay (seconds)	LOS	Delay (seconds)	LOS	Delay (seconds)	LOS	Delay (seconds)	LOS	Delay (seconds)	LOS	Delay (seconds)
Trigger & Ohio	B	11.2	B	11.8	B	11.9	B	12.0	B	12.6	B	13.0	B	13.1	B	13.2
Trigger & Trident	B	19.8	C	24.0	C	24.2	C	24.4	B	10.2	B	12.0	B	12.0	B	12.1
Trigger & Escolar	A	5.5	A	7.0	A	7.1	A	7.1	D	37.9	D	44.1	D	43.9	D	45.7
Trigger & Sturgeon	B	11.1	B	14.3	B	14.4	B	14.5	B	10.0	B	11.3	B	11.7	B	12.2

1. Default values used in determining the LOS were obtained from Parametrix 2011 Bangor Traffic Analysis-Construction of EHW Impacts (Technical Memorandum)
2. LOS values shown for the unsignalized intersections are for the stop-controlled movements experiencing the highest delay.
3. LOS = Level of Service

Table 3.15-15. Peak Hour Roadway Level of Service Analysis — NAVBASE Kitsap Bangor Roadways

Multi-Lane Roadway Sections																
Roadway Section	AM Peak								PM Peak							
	BASELINE		FUTURE WITH CONSTRUCTION TRAFFIC						BASELINE		FUTURE WITH CONSTRUCTION TRAFFIC					
	2011/2012		2018		2019		2020		2011/2012		2018		2019		2020	
	LOS	Density (veh/ mile/ lane)	LOS	Density (veh/ mile/ lane)	LOS	Density (veh/ mile/ lane)	LOS	Density (veh/ mile/ lane)	LOS	Density (veh/ mile/ lane)	LOS	Density (veh/ mile/ lane)	LOS	Density (veh/ mile/ lane)	LOS	Density (veh/ mile/ lane)
Trigger north of Thresher	A	7.8	A	9.0	A	9.1	A	9.2	A	6.7	A	7.9	A	7.9	A	8.1
Trident east of Trigger	A	7.2	A	8.5	A	8.6	A	8.7	A	6.9	A	8.1	A	8.2	A	8.3
Trigger north of Trident	B	14.8	B	17.7	B	17.9	C	18.1	B	13.0	B	15.7	B	15.9	B	16.1
Trigger east of Escolar	B	14.3	C	18.7	C	18.9	C	19.1	B	14.7	B	17.7	B	17.9	C	18.1
Trigger south of Sturgeon	A	2.3	A	3.9	A	4.0	A	4.1	A	3.5	A	5.0	A	5.1	A	5.2
Two-Lane Roadway Sections																
Roadway Section	AM Peak								PM Peak							
	BASELINE		FUTURE WITH CONSTRUCTION TRAFFIC						BASELINE		FUTURE WITH CONSTRUCTION TRAFFIC					
	2011/2012		2018		2019		2020		2011/2012		2018		2019		2020	
	LOS	Percent Time Spent Following (PTSF%)	LOS	Percent Time Spent Following (PTSF%)	LOS	Density (veh /mile/ lane)	LOS	Percent Time Spent Following (PTSF%)	LOS	Percent Time Spent Following (PTSF%)	LOS	Percent Time Spent Following (PTSF%)	LOS	Density (veh/ mile/ lane)	LOS	Percent Time Spent Following (PTSF%)
Sturgeon west of Trigger	C	67.3%	D	72.9%	D	73.0%	D	73.1%	D	71.9%	D	74.0%	D	74.1%	D	74.2%
Sealion north of Sturgeon	C	62.1%	D	69.2%	D	69.3%	D	69.4%	C	66.1%	D	72.2%	D	72.3%	D	72.3%

1. Default values used in determining the LOS were obtained from Parametrix 2011 Bangor Traffic Analysis-Construction of EHW Impacts (Technical Memorandum)
2. LOS values shown indicate the cumulative impacts of the LWI and SPE projects.
3. LOS = Level of Service

Any support boat or barge used during in-water construction activities would generally be located in NAVBASE Kitsap Bangor restricted areas away from normal navigational activities. Standard U.S. Coast Guard safety precautions would be used by all contractors. Within the NAVBASE Kitsap Bangor restricted areas, marine-based construction equipment would be highly visible, well-marked, and would be relatively stationary as equipment (e.g., barge/tugboat and pile drivers) would only be moved prior to and after completion of in-water construction activities. Movement of construction vessels within the restricted areas would be coordinated with NAVBASE Kitsap Bangor Port Operations to ensure no interference with other Navy vessel movements. To maintain adequate levels of safety for vessel navigation during in-water construction activities, the Navy would request that the U.S. Coast Guard issue a Notice to Mariners to establish uniform procedures to facilitate the safe transit of vessels operating in the project vicinity.

During in-water construction, six barge round trips per month and the 12 associated bridge openings would result in delays (on average 30 minutes per opening for a total of 6 hours per month) for motorists traveling on SR-104, an adverse impact. Based on a review of data on Hood Canal Bridge openings, the bridge typically opens 400 to 450 times per year for an average opening of just over once per day. During the construction periods, SPE barge traffic would increase bridge openings by approximately one third. Again, construction of SPE Alternative 2 is not expected to take two full in-water work seasons, so impacts would likely occur over less than two full 6-month seasons. June through October represents the period with the majority of openings due to an increase in pleasure boat traffic (Crawford 2010, personal communication). Impacts on motorists would be minimized by avoiding barge trips through the Hood Canal Bridge opening during peak commute hours of 6:00 a.m. to 8:30 a.m. and 3:30 p.m. to 6:00 p.m., Monday through Friday.

The projected level of vessel traffic is not expected to adversely impact vessel transit routes in Hood Canal or Puget Sound, however. As marine-based construction equipment would not interfere with normal navigational activities in Hood Canal, no significant impacts on marine vessel traffic during construction would occur.

OPERATION/LONG-TERM IMPACTS

SPE Alternative 2 would require improvements to land-based associated support facilities, including construction of a Waterfront Ship Support Building and a new parking lot. The proposed Waterfront Ship Support Building would be located on an existing parking lot on the east side of Wahoo Road. Roadway improvements to accommodate changes in traffic patterns along Wahoo and Sealion roads as well as repairs to existing roads damaged from construction activity would also be included under this alternative.

SSN submarines visiting NAVBASE Kitsap Bangor to berth at the SPE for maintenance and to receive logistic support at the Navy's SSN research, development, test and evaluation hub would produce approximately two additional one-way transits per month, resulting in approximately two additional openings of the Hood Canal Bridge per month. Assuming 30 minutes per opening, this would increase traffic delays on SR-104 by approximately 60 minutes per month; this is considered a minimal impact. Small support vessel traffic at the Service Pier would occur

within the Naval Restricted Area and so would not interfere with general marine vessel traffic. Adherence to the naval vessel navigation regulations described in Section 3.15.1.2 above would further reduce the potential for conflicts between Navy and general vessel traffic. Movement of support vessels within the restricted areas would be coordinated with NAVBASE Kitsap Bangor Port Operations to ensure no interference with other Navy vessel movements.

3.15.2.3.3. SPE ALTERNATIVE 3: LONG PIER

CONSTRUCTION

The upland features to be constructed under SPE Alternative 3, which would affect traffic on NAVBASE Kitsap Bangor during the construction period, would be the same as SPE Alternative 2. Therefore, the vehicular traffic impacts of SPE Alternative 3 would be the same as those of SPE Alternative 2. Refer to Section 3.15.2.3.2 for discussion on traffic data and analysis for the construction phase of the SPE project. The number of barge trips per month would be the same as for SPE Alternative 2. Because construction of SPE Alternative 3 is expected to take two full 6-month in-water work seasons, however, the resulting openings of the Hood Canal Bridge and impacts to traffic on SR-104 would occur over a longer period than for SPE Alternative 2.

OPERATION/LONG-TERM IMPACTS

Operations under SPE Alternative 3 would be the same as for SPE Alternative 2. Therefore, impacts to vehicular and marine vessel traffic would be the same as for SPE Alternative 2.

3.15.2.3.4. SUMMARY OF SPE IMPACTS

Impacts on traffic associated with the construction and operation phases of the SPE project alternatives, along with mitigation and consultation and permit status, are summarized in Table 3.15–16.

Table 3.15–16. Summary of SPE Impacts on Traffic

Alternative	Environmental Impacts on Traffic
SPE Alternative 1: No Action	No impact.
SPE Alternative 2: Short Pier (Preferred)	<p><i>Construction:</i> Exacerbation of existing peak-hours delays at both base gates and adjacent regional roadways. Adverse impacts on traffic on the Hood Canal Bridge over two partial in-water construction seasons. Increased marine vessel and vehicular traffic levels would not be sufficient to require improvement to infrastructure.</p> <p><i>Operation/Long-term Impacts:</i> Two additional openings of the Hood Canal Bridge per month, increasing traffic delays on SR-104 by approximately 60 minutes per month.</p>
SPE Alternative 3: Long Pier	<p><i>Construction:</i> Exacerbation of existing peak-hours delays at both base gates and adjacent regional roadways. Adverse impacts on traffic on the Hood Canal Bridge over two 6-month in-water construction seasons. Increased marine vessel and vehicular traffic levels would not be sufficient to require improvement to infrastructure.</p> <p><i>Operation/Long-term Impacts:</i> Two additional openings of the Hood Canal Bridge per month, increasing traffic delays on SR-104 by approximately 60 minutes per month.</p>
Mitigation: Openings of the Hood Canal Bridge would be scheduled to avoid peak traffic hours to the extent feasible. The Navy would request that the U.S. Coast Guard issue a Notice to Mariners to establish uniform procedures to facilitate the safe transit of vessels operating in the project vicinity.	
Consultation and Permit Status: No consultations or permits are required.	

3.15.2.4. COMBINED IMPACTS OF LWI AND SPE PROJECTS

Current schedules indicate that construction of the LWI and SPE projects would not overlap. Therefore, the construction traffic impacts of the two projects would not occur at the same time and would not be additive. The impacts of the two projects would extend over a 4-year period, however, as opposed to the 2-year construction period for each project alone. The same is true for impacts to traffic on the Hood Canal Bridge; impacts would not be additive but would extend over 4 years. Because the LWI and SPE projects would generate very little operational traffic, the combined operational traffic impacts of the two projects would not be substantially different from present conditions.