3.13 Transportation

This section describes the transportation system in the study areas and potential impacts from implementation of the action alternatives, compared with each other and the No Action Alternative. The analysis considers the roadway network, arterial and local street operations, active transportation facilities, transit facilities, safety, and freight mobility and access that could be affected by the proposed project. This section incorporates and relies on information related to transportation, presented in Appendix H, NERTS Transportation Assessment (revised), including Appendix A in that assessment, Transportation Assessment Methods and Assumptions (revised). As discussed in Section 2.2.3.5, in early 2025, a pilot program began at CHRLF that shifted from a seven-day operating schedule to a five-day operating schedule. This means that no transfer trailer hauling would occur on the weekend under normal operations. However, transfer trailer hauling could still occur via overtime operations or if the pilot program is not ultimately implemented permanently. The weekday transfer trailer trip generation used in this analysis is based on a five-day operating schedule.

The environmental review determined there would be no significant unavoidable adverse impacts to transportation during construction or operation of any of the alternatives.

3.13.1 Regulatory Context

Development activity for the proposed project study areas, and how such activity could potentially affect transportation, is guided by federal, state, and local government plans and policies listed in Table 3.13-1. This transportation analysis is consistent with the following guidelines and policies:

Table 3.13-1. Federal, State, and Local Plans, Policies, and Coordination Applicable to Transportation.

Plan, Policy, or Coordination	Lead Agency	Description
Transportation Research Board Highway Capacity Manual (2010, 2016)	Transportation Research Board	The Highway Capacity Manual is a fundamental resource on concepts, performance measures, and analysis techniques for evaluating the multimodal operation of streets, highways, and freeways and quantifying highway capacity.
AASHTO Highway Safety Manual (2010)	American Association of State Highway and Transportation Officials	The Highway Safety Manual is the leading guidance document for incorporating quantitative, data-driven safety analysis into the transportation project planning and development process.
Washington State Department of Transportation (WSDOT) Synchro and SimTraffic Protocol (2018)	Washington State Department of Transportation (WSDOT)	The protocol provides guidance for conducting consistent Synchro/SimTraffic operational analyses.
Washington State Highways (Revised Code of Washington [RCW] 47.06.140(2))	WSDOT	Code requiring level of service standards for state highways.
Washington Transportation Plan, Phase 2—Implementation 2017–2040 (2019)	WSDOT	The implementation portion of the state's long-range transportation plan (Washington Transportation Plan) based on the State Legislature's policy goals.

Table 3.13-1. Federal, State, and Local Plans, Policies, and Coordination Applicable to Transportation.

Plan, Policy, or Coordination	Lead Agency	Description
WSDOT Design Manual (2014)	WSDOT	The manual provides policies, procedures, and methods for developing and documenting the design of improvements to the transportation network.
WSDOT Traffic Manual M 51-02 (2021)	WSDOT	The manual provides instruction and guidance for those conducting traffic operation analyses and design activities.
WSDOT Sidra Policy Settings (2021)	WSDOT	Provides guidance for setting default inputs for roundabout operational analyses in Sidra software.
King County 2020 Strategic Climate Action Plan	King County Executive Climate Office	Focus Area 2, County Operations, Alternative Vehicles, Fuels, and Technologies directs County operations to electrify King County's vehicle fleet and build out charging infrastructure, including for KCSWD to pilot a Class 8 (80,000 gross vehicle weight) truck and infrastructure by 2025.
Puget Sound Regional Council (PSRC), VISION 2050 (PSRC 2014)	Puget Sound Regional Council (PSRC)	The Puget Sound region's long-term plan for growth.
City of Kirkland Transportation Plan and Capital Improvement Program	City of Kirkland	The Transportation Plan outlines the 20-year transportation policy for the City of Kirkland. The Capital Improvement Program is the shorter-term funding plan for construction, repair, and maintenance of capital facilities within the City.
City of Woodinville Transportation Plan and Capital Improvement Program	City of Woodinville	The Transportation Plan outlines the 20-year transportation policy for the City of Woodinville. The Capital Improvement Program is the shorter-term funding plan for construction, repair, and maintenance of capital facilities within the City.
City of Bothell Imagine Bothell Comprehensive Plan	City of Bothell	Outlines the transportation goals, policies, programs, and capital projects to support Bothell over the next 20 years.
Level of Service Standards for the City of Kirkland – Policy R-38 Transportation Impact Analysis Review (2022)	City of Kirkland	Identifies the City level of service standards and the level of transportation impact analysis required.
Level of Service Standards for the City of Woodinville – Transportation Infrastructure Standards and Specifications (2013)	City of Woodinville	Identifies the City level of service standards and traffic impact analysis guidelines.

3.13.2 Affected Environment

This Section identifies the affected environment for the transportation analysis in the study areas with a potential to affect construction and/or operations at each of the action alternative sites. It describes the existing transportation facilities, service types, and conditions in the study areas, including:

- Roadway network (intersections, traffic volumes, and operations)
- Active transportation facilities

- Transit
- Safety
- Freight

3.13.2.1Study Areas

There are two study areas for this transportation analysis, with one pertaining to each action alternative. The cities of Kirkland and Woodinville assess traffic impacts based on intersection operation concurrency standards (i.e., level of service and delay). Therefore, the study areas are defined as the study intersections near each action alternative site that are most likely to experience volume impacts as a result of the proposed project using the traffic impact guidelines set by each jurisdiction.

The Kirkland study area for Alternative 1 is made up of five study intersections adjacent to the existing Houghton Recycling and Transfer Station (RTS) site, generally bound by I-405 (and associated ramps) to the west, 120th Avenue NE to the east, NE 60th Street to the south, and NE 70th Street to the north. While there are two options for Alternative 1, the transportation analysis and study area are the same for both options, with the exception of the construction analysis. Figure 3.13-1 shows the Alternative 1 study area for the key transportation study elements.

The Woodinville study area for Alternative 2 is made up of 14 study intersections adjacent to the Alternative 2 site on Woodinville-Redmond Road NE, generally bound by SR 522 (and associated ramps) to the north, NE 124th Street to the south, Brickyard Road NE to the west, and along Woodinville-Redmond Road NE and SR 202. Figure 3.13-2 shows the Alternative 2 study area for the key transportation study elements.

Alternative 1 will not affect the Woodinville study area and Alternative 2 will not affect the Kirkland study area, apart from a decrease in volume due to the removal of the existing Houghton facility.

The methodology and assumptions used for this evaluation of transportation impacts are discussed in detail in the NERTS Transportation Assessment Methods and Assumptions memo (revised), which is provided in the appendix of the NERTS Transportation Assessment (revised) in Appendix H. The data used in the transportation analysis is also located in Appendix H.

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Legend

Site Boundary

Proposed Project Site

Study Intersections

Figure 3.13-1. Action Alternative 1 Transportation Study Area

PLAN

SCALE 1" = 11,000'-0"

0 250 500

Feet

King County

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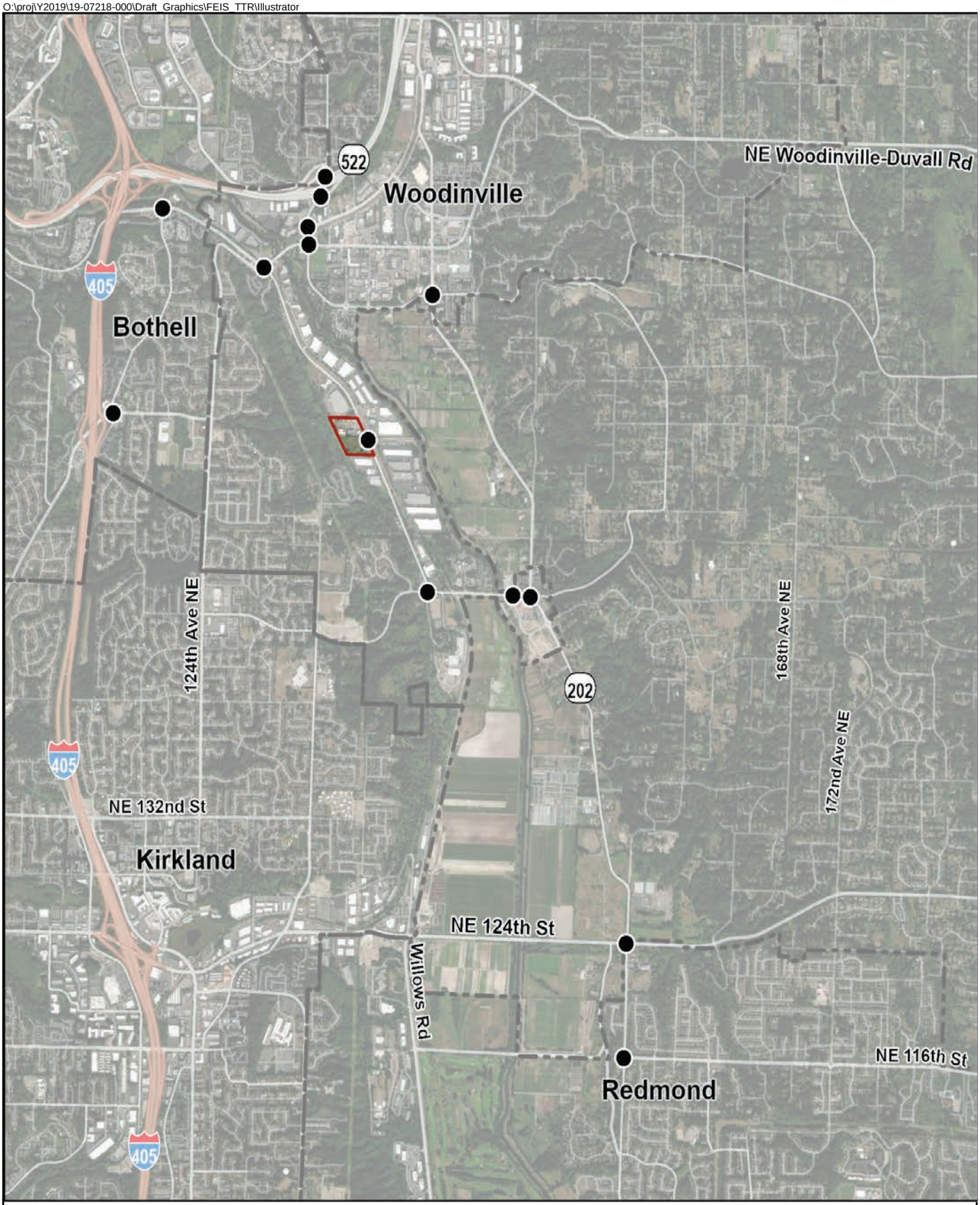

Legend

Site Boundary

Alternative 2

Study Intersections

Figure 3.13-2. Action Alternative 2 Transportation Study Area

N

PLAN

SCALE 1" = 45,000'-0"

0 0.25 0.5

Mile

King County

3.13.2.2No Action Alternative and Alternative 1

This section addresses the affected environment at the No Action Alternative and Alternative 1 site and study area, including options 1A and 1B. The site is located within the City of Kirkland at the existing Houghton RTS property at 11724 NE 60th Street.

3.13.2.2.1 Roadway Network

This section describes the existing conditions for arterials and local roadway facilities within the No Action Alternative and Alternative 1 study area. Turning movement volumes for the existing weekday and Saturday, AM, and PM peak hours are included in Appendix H. The local street network and classifications in this study area include minor arterials and collectors, which are summarized in Table 3.13-2 and shown in Figure 3.13-1. Annual average daily traffic (AADT) on the minor arterial and collectors in the No Action Alternative and Alternative 1 study area range from 2,500 to 17,500 vehicles per day (vpd). The existing Houghton RTS is accessed from NE 60th Street, which is classified as a collector, via an eastbound turn from the NE 60th Street travel lane or a westbound-only turning lane. Any off-site queueing for access to the Houghton RTS occurs in the westbound turning lane. Access to I-405 is provided via 116th Avenue NE and NE 72nd Place.

Table 3.13-2. Existing Local Roadway Facilities – No Action Alternative and Action Alternative 1.

Roadway	Classification	Number of Lanes	Speed Limit (mph)	AADT (vehicles per day)	Bike Lanes	Sidewalk
116th Avenue NE	Collector	2	35	13,700	Yes	Partial
NE 70th Street/NE 72nd Place	Minor Arterial	2	30	17,500	Partial	Yes
NE 60th Street	Collector	2	25	2,500	No	Partial

Source: City of Kirkland (2023b); WSDOT (2023b); WSDOT (2023c).
AADT = annual average daily traffic.

The No Action Alternative and Alternative 1 study area includes five study intersections, three signalized, one all-way stop control (AWSC) intersection, and one one-way stop control (OWSC) intersection. Table 3.13-3 summarizes the traffic control and regulating jurisdiction for each intersection in the Kirkland study area.

Table 3.13-3. No Action Alternative and Action Alternative 1 Study Area Intersections.

ID	Intersection	Traffic Control	Jurisdiction
101	116th Avenue NE and I-405 Northbound Ramps	Signal	WSDOT
102	116th Avenue NE and NE 70th Place	Signal	WSDOT
103	NE 68th Street and I-405 Southbound Ramps	Signal	WSDOT
104	NE 60th Street and 116th Avenue NE	AWSC	Kirkland
105	NE 60th Street and Site Driveway	OWSC	Kirkland

WSDOT = Washington State Department of transportation; AWSC = all-way stop control; OWSC = one-way stop control.

3.13.2.2.2 Arterial and Local Street Operations

This section describes the existing intersection operations for the study intersections within the No Action Alternative and Alternative 1 study area. Traffic operations are commonly measured using the level of service (LOS) method, which is defined in terms of average intersection delay on a scale ranging from A to F depending on the delay at the intersection. Appendix H provides a description of intersection operations and level of service standards, as well as the reports from the existing operational analysis.

3.13.2.2.2.1. Weekday Analysis

The existing weekday AM and PM peak hour LOS and delay for the No Action Alternative and Alternative 1 study area intersections are shown in Table 3.13-4. During the AM peak hours, the intersection at NE 68th Street and I-405 southbound ramps fails to meet the LOS standard. Conversely, in the PM peak hour, all study area intersections operate at or better than the LOS standard for the intersection.

Table 3.13-4. 2023 Existing Weekday Intersection Level of Service and Delay – No Action Alternative and Action Alternative 1 Study Area.

ID	Intersection	Traffic Control	LOS Standard	AM Peak		PM Peak	
				LOS	Delay (seconds)	LOS	Delay (seconds)
101	116th Avenue NE and I-405 Northbound Ramps	Signal	D	C	24.1	D	46.9
102	116th Avenue NE and NE 70th Place	Signal	D	D	37.7	C	24.8
103	NE 68th Street and I-405 Southbound Ramps	Signal	D	E	61.9	C	33.6
104	NE 60th Street and 116th Avenue NE	AWSC[1]	D	A	9.5	B	11.3
105	NE 60th Street and Site Driveway	OWSC[2]	D	A	9.1	A	9.2

Shading indicates intersections that are not operating at roadway LOS standard

Results are based on Highway Capacity Manual (HCM) 6 methodology where available. Otherwise, HCM 2000 methodology was reported (TRB 2000; 2016).

Intersection delay is measured by average seconds of delay per vehicle.

LOS = level of service; AWSC = all-way stop control; OWSC = one-way stop control.

[1] For AWSC intersections, LOS is reported as an average delay of all of the movements, much like a signalized intersection.

[2] For OWSC intersections, LOS is reported for the worst movement.

3.13.2.2.2.2. Saturday Analysis

The existing Saturday AM and PM peak hour LOS and delay for the No Action Alternative and Alternative 1 study area intersections are shown in Table 3.13-5. In the AM and PM peak hours, all study area intersections operate at or better than the standard for each intersection.

Table 3.13-5. 2023 Existing Saturday Intersection Level of Service and Delay – No Action Alternative and Action Alternative 1 Study Area.

ID	Intersection	Traffic Control	LOS Standard	AM Peak		PM Peak	
				LOS	Delay (seconds)	LOS	Delay (seconds)
101	116th Avenue NE and I-405 Northbound Ramps	Signal	D	B	17.0	B	19.7
102	116th Avenue NE and NE 70th Place	Signal	D	C	20.8	C	23.7
103	NE 68th Street and I-405 Southbound Ramps	Signal	D	C	31.6	C	30.1
104	NE 60th Street and 116th Avenue NE	AWSC[1]	D	A	8.2	A	8.8
105	NE 60th Street and Site Driveway	OWSC[2]	D	A	9.0	A	9.0

Results are based on Highway Capacity Manual (HCM) 6 methodology where available. Otherwise, HCM 2000 methodology was reported (TRB 2000; 2016).

Intersection delay is measured by average seconds of delay per vehicle.

LOS = level of service; AWSC = all-way stop control; OWSC = one-way stop control.

[1] For AWSC intersections, LOS is reported as an average delay of all of the movements, much like a signalized intersection.

[2] For OWSC intersections, LOS is reported for the worst movement.

3.13.2.2.2.3. Off-Ramp Queueing

Table 3.13-6 provides queueing data for two off-ramps, summarizing their storage capacities and 95th percentile queue lengths during the 2023 AM and PM peak hours for weekdays and Saturdays. The 95th percentile queue lengths for both off-ramps do not exceed the available storage length.

Table 3.13-6. 2023 Existing 95th Percentile Off-Ramp Queue Lengths – No Action Alternative and Action Alternative 1

ID	Intersection	Approach	Available Storage Length (feet)	Weekday Queue Length (ft)		Saturday Queue Length (ft)	
				AM Peak	PM Peak	AM Peak	PM Peak
101	116th Ave NE & I-405 Northbound Ramps	EB	1,250	255	535	175	225
103	NE 68th St/NE 72nd St & I-405 Southbound Ramps	WB	1,350	370	215	110	160

Active Transportation Facilities

This section describes the existing active transportation facilities within the No Action Alternative and Alternative 1 study area, including pedestrian, bicycle, trails, and equestrian facilities, as applicable. Active transportation facilities were inventoried on all primary roadways in the study area, including streets classified as arterials (principal, major, or minor) and collectors.

Existing active transportation facilities in the No Action Alternative and Alternative 1 study area are shown in Figure 3.13-3. On 116th Avenue NE, sidewalks are provided on both sides of the street between NE 70th Place and NE 67th Street, one side between NE 67th Street and NE 61st Court, and again on both sides

between NE 61st Court and NE 60th Street. Sidewalks are provided on both sides of NE 70th Place within the study area. A sidewalk is provided on the north side of NE 60th Street in the study area.

Bicycle lanes exist on 116th Avenue NE within the study area as well as along NE 70th Place east of 116th Avenue NE but not to the west. No bicycle facilities are provided along NE 60th Street within the study area. Other bicycle facilities adjacent to the study area are also shown on Figure 3.13-3, including buffered bike lanes and sharrows. A buffered bike lane is a bicycle lane that also includes a lateral separation between the bicycle lane and the travel or parking lane. A sharrow indicates facilities where bicyclists share the road with motorists.

In addition to the pedestrian and bicycle facilities in the area, Bridle Trails State Park is a 482-acre park situated in the southern portion of the study area, south of the existing Houghton RTS. While the park's primary purpose is to provide horseback riding facilities, there are over 28 miles of well-maintained trails in the park, some of which are also accessible by pedestrians. This provides additional active transportation facilities for those walking, running, and hiking. Bicycles are not allowed in Bridle Trails State Park.

Bridle Trails State Park may not serve as a primary transportation path for the majority of residents due to its emphasis on equestrian activities; however, it adds to the wider active transportation network by offering accessible green spaces for active transportation activities. Marked midblock crossings across NE 60th Street that provide access to Bridle Trails State Park are located at:

- Power Line Trail at 124th Avenue NE, adjacent to Benjamin Franklin Elementary School
- Between 124th Avenue NE and 125th Lane NE
- 128th Avenue NE
- Approximately 500 feet east of 128th Avenue NE

Bridle Trails State Park also connects to the Bridle Crest Trail further east, at NE 60th Street and 132nd Avenue NE.

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Legend

All Crashes (2017 - 2021)

- Suspected Serious Injury
- Possible Injury
- Suspected Minor Injury
- No Apparent Injury

Site Boundary

- Alternative 1

Figure 3.13-4. No Action Alternative and Action Alternative 1 Study Area Total Crashes by Severity (2017-2021)

N

PLAN

SCALE 1" = 11,000'-0"

0 250 500

Feet

King County

3.13.2.2.3 Transit Facilities

This section describes the existing regional and local transit facilities and services within the No Action Alternative and Alternative 1 study area. King County Metro Transit (Metro), Sound Transit, and Community Transit provide bus service in the study area, with local and regional fixed route service to transit centers, park-and-ride facilities, and bus stops. All information is current as of the March 2023 service change.

Table 3.13-7 summarizes the route number, service type, and routing for each route in the No Action Alternative and Alternative 1 study area. Appendix H shows the fixed route transit services provided in the study area. Bus stops are located on NE 60th Street, 68th Street, NE 70th Place, NE 72nd Place, NE 80th Street, 116th Avenue NE, 120th Avenue NE, and 132nd Street. There are no transit centers or park and rides in the No Action Alternative and Alternative 1 study area. The former Houghton park and ride that was located at NE 70th Street and 116th Avenue NE was closed in March 2023, due to low utilization.

Table 3.13-7. No Action Alternative and Action Alternative 1 Study Area Existing Transit Service.

Service Provider	Route	Service Type	Routing
King County Metro Transit	225	All Day	Kenmore, Kingsgate, Totem Lake, Redmond, Overlake
King County Metro Transit	239	All Day	Kirkland, Rose Hill, Totem Lake, Brickyard Park and Ride, Bothell
King County Metro Transit	245	Frequent All Day	Kirkland, Houghton, Overlake, Crossroads, Bellevue College, Eastgate, Factoria
King County Metro Transit	250	Frequent All Day	Avondale, Bear Creek Park and Ride, Redmond, Kirkland, Bellevue
King County Metro Transit	893	Peak Only	Lake Washington High School, Forbes Creek, Kirkland, Rose Hill
King County Metro Transit	895	Peak Only	Lake Washington High School, Overlake, NW Lake Sammamish
King County Metro Transit	986	Peak Only	University Preparatory Academy, Lakeside School, Kirkland, South Kirkland Park and Ride, Clyde Hill Yarrow Point Station, Evergreen Point Station, Montlake, Ravenna, Haller Lake

Sources: King County Metro Transit (2023); Sound Transit (2023), Community Transit (2023).

3.13.2.2.4 Safety

This section describes the existing safety conditions within the No Action Alternative and Alternative 1 study area in terms of observed crash history for all modes.

Crash data records for crashes within the No Action Alternative and Alternative 1 study area were collected from WSDOT for the most recent five-year period between 2018 and 2022. During this study period, 75 crashes occurred within the study area (see Figure 3.13-4). The majority of crashes (84 percent) occurred at the intersections within the study area, as opposed to road segments. No fatal crashes and only one serious injury crash occurred in the study area during this period. In addition, three pedestrian-involved crashes and no bicyclist-involved crashes occurred during the study period, as shown in Figure 3.13-5. No equestrian crashes were identified during this period. Table 3.13-8 summarizes the study area crashes by location type and severity.

Table 3.13-8. Existing No Action Alternative and Action Alternative 1 Study Area Crashes by Severity (2018-2022).

Location	2018-2022 Crash Frequency by Severity					
	Fatal	Serious Injury	Minor Injury	Possible Injury	No Injury	Total
Intersections	0	1	3	13	46	63
Segments	0	0	5	4	3	12
Total	0	1	8	17	49	75

Source: WSDOT (2023a).

Observed and critical crash rates were calculated for the study area intersections as the number of crashes per million entering vehicles (MEV). Table 3.13-9 shows the crash frequencies, entering volumes, and observed and critical crash rates for the study intersections. No crashes occurred at the site driveway during this period, so this location was not included in the summary.

Table 3.13-9. Existing No Action Alternative and Action Alternative 1 Study Area Crash Rates (2018-2022).

Intersection	AADT (entering volume, vpd)	2018-2022 Crash Frequency				Observed Crash Rate (crashes/MEV)	Critical Crash Rate (crashes/MEV)[1]
		Fatal	Injury	No Injury	Total		
I-405 Southbound Ramps and NE 68th Street/NE 72nd Place	18,400	0	4	10	14	0.42	0.80
116th Avenue NE and NE 70th Street	21,500	0	10	23	33	0.84	0.78
I-405 Northbound Ramps and 116th Avenue NE	14,700	0	1	11	13	0.48	0.82
116th Avenue NE and NE 60th Street	7,300	0	2	2	4	0.30	0.94

Source: WSDOT (2023a).

AADT = annual average daily traffic; vpd = vehicles per day; MEV = million entering vehicles.

[1] Critical crash rate calculated using Highway Safety Manual (HSM) equation 4-11 (AASHTO 2014).

None of the intersections had an observed crash rate of greater than one crash per MEV. One study intersection, 116th Avenue NE and NE 70th Street, had an observed crash rate greater than the critical crash rate. This intersection also had the highest number of crashes (33) of the five study intersections. The majority of these crashes (64 percent) were angle crashes, almost all of which occurred along NE 70th Street/NE 72nd Place where the left-turn phasing is protected-permissive[13].

[13] A left-turn signal phasing where drivers initially have a dedicated protected phase with a green arrow, allowing them to turn left without yielding to oncoming traffic, followed by a permissive phase where they can turn left during the regular green light, but must yield to opposing traffic as needed. This traffic control essentially combines the safety of a protected left turn with the efficiency of a permissive left turn when conditions allow.

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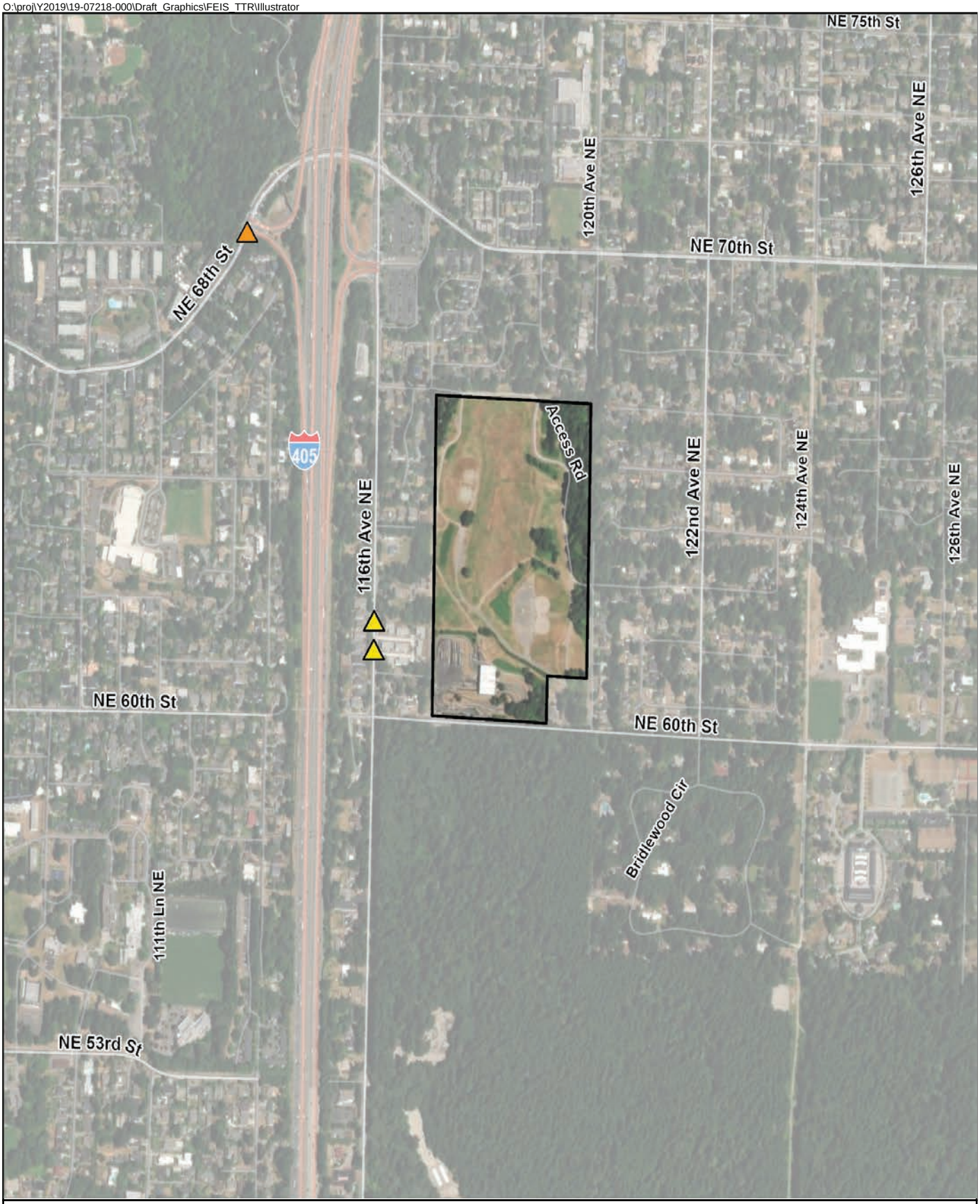

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Active Transportation Crashes (2017-2021)

- Suspected Serious Injury (Pedestrian)
- Suspected Minor Injury (Pedestrian)

Site Boundary

- Alternative 1

Figure 3.13-5. No Action Alternative and Action Alternative 1 Study Area Total Crashes by Severity (2017-2021)

N
PLAN

SCALE 1" = 11,000'-0"

0 250 500
Feet

King County

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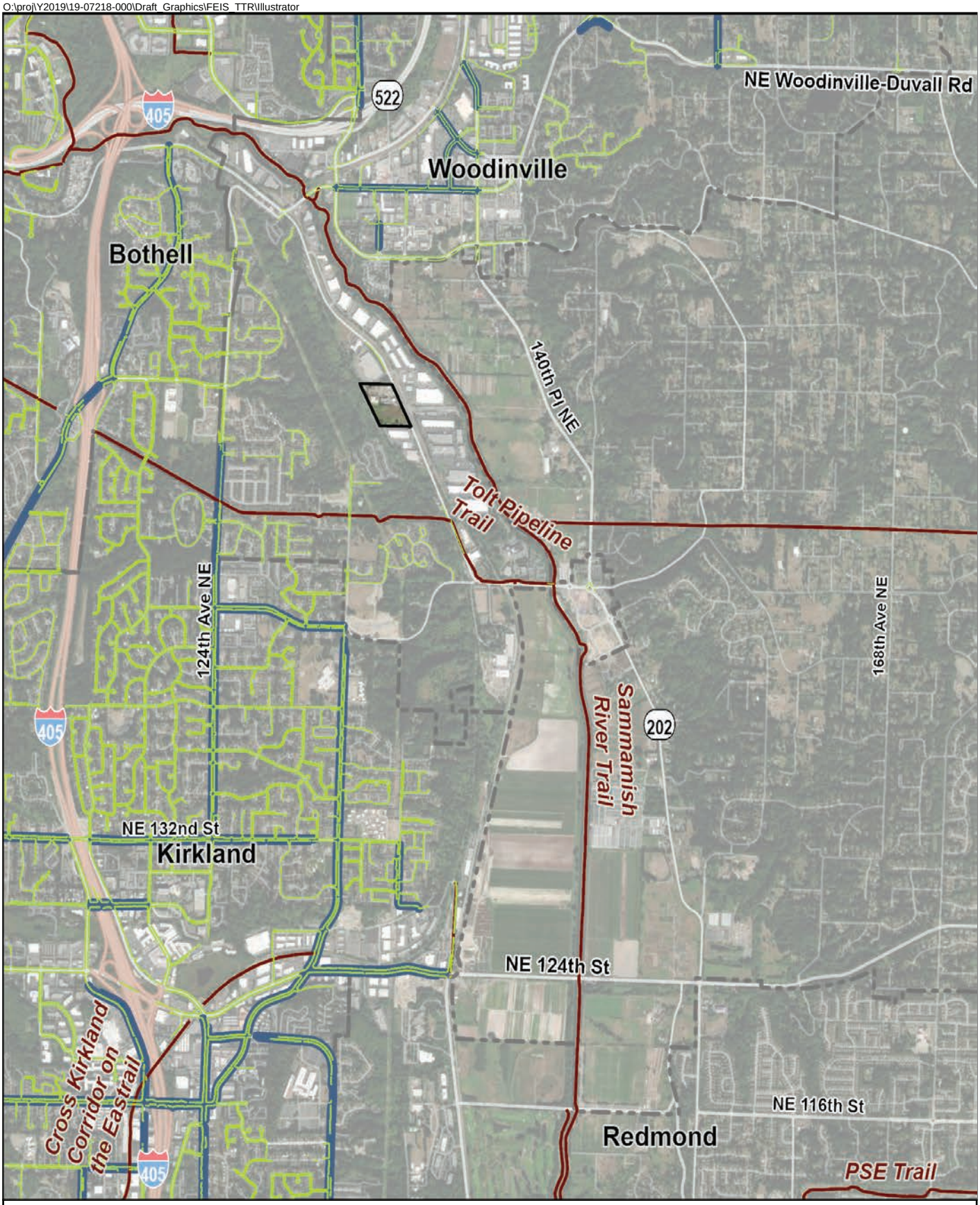

Legend

Bicycle Facilities
- Bike Lane

Pedestrian Facilities
- Sidewalks
- Existing Trail

Site Boundary
- Alternative 2

Figure 3.13-6. Existing Active Transportation Facilities - Action Alternative 2 Study Area

N
PLAN

SCALE 1" = 45,000'-0"

0 0.25 0.5 Mile

King County

3.13.2.2.5 Freight Mobility and Access

In the No Action Alternative and Alternative 1 study area, I-405 is the only designated freight route. Currently, up to 25 County transfer trucks arrive and depart from the existing Houghton RTS every day.

3.13.2.3Alternative 2

This section addresses the affected environment at the Alternative 2 site and study area. The site is located within the City of Woodinville on six tax parcels in the 15000 block of Woodinville-Redmond Road NE.

3.13.2.3.1 Roadway Network

This section describes the existing conditions for arterials and local roadway facilities within the Alternative 2 study area. Turning movement volumes for the existing weekday and Saturday, AM and PM peak hours are included in Appendix H.

The street network and classifications in this study area include principal and minor arterials, which are summarized in Table 3.13-10 and shown in Figure 3.13-2. The site for Alternative 2 is accessed from Woodinville-Redmond Road NE, a principal arterial roadway and state route. ADT on the arterials in the Woodinville study area range from 8,800 to 27,600 vpd. All of these roadways are part of SR 202. Access to SR 522 is provided via 131st Avenue NE.

Table 3.13-10. Existing Local Roadway Facilities – Action Alternative 2 Study Area.

Roadway	Classification	Number of Lanes	Speed Limit (mph)	ADT (vehicles per day)	Bike Lanes	Sidewalk
131st Avenue NE (SR 202)	Minor Arterial	4	35	27,600	No	Yes
NE 175th Street (SR 202)	Minor Arterial	4	35	18,000	Yes	Yes
Woodinville-Redmond Road NE (SR 202) – NE 175th Street to NE 145th Street	Minor Arterial	2	40	7,700-10,400	No	Partial
NE 145th Street (SR 202)	Minor Arterial	2	35	8,800	Shared-Use Path	Shared-Use Path
Woodinville-Redmond Road NE (SR 202) – NE 145th Street to NE 116th Street	Minor Arterial	2	40	17,400	No	No
Brickyard Road NE – NE Woodinville Drive to NE 160th Street	Collector	2	25	6,000	Yes	Yes

Source: City of Bothell (2024b); WSDOT (2023b); WSDOT (2023c).
ADT = average daily traffic.

The Alternative 2 study area included 14 intersections, including eight signalized intersections, four OWSC/two-way stop control (TWSC) intersections, and two roundabouts. The two roundabouts are located on State Route 202 and are subject to WSDOT standards. Table 3.13-11 summarizes the traffic control and regulating jurisdiction for each intersection in the Woodinville study area.

Table 3.13-11. Action Alternative 2 Study Area Intersections.

ID	Intersection	Traffic Control	Jurisdiction
201	SR 522 Westbound Ramps and 131st Avenue NE	Signal	WSDOT
202	SR 522 Eastbound Ramps and 131st Avenue NE	Signal	WSDOT
203	Little Bear Creek Parkway and 131st Avenue NE	Signal	WSDOT
204	NE 175th Street and 131st Avenue NE	Signal	WSDOT
205	Woodinville-Redmond Road NE and NE 175th Street	Signal	WSDOT
206	140th Avenue NE and NE 171st Street	Signal	Woodinville
207	Woodinville-Redmond Road NE and NE 145th Street	OWSC	WSDOT
208	Village Road and NE 145th Street	Roundabout	WSDOT
209	148th Avenue NE/Woodinville-Redmond Road NE and NE 145th Street	Roundabout	WSDOT
210	Woodinville-Redmond Road NE and NE 124th Street	Signal	WSDOT
211	NE 116th Street and Woodinville-Redmond Road NE	Signal	WSDOT
212	Woodinville-Redmond Road NE and Site Driveway	OWSC	Woodinville
213	Brickyard Road NE and NE Woodinville Drive	OWSC	Bothell
214	Brickyard Road NE/116th Avenue NE and Juanita Woodinville Way NE/NE 160th Street	TWSC	Bothell

WSDOT = Washington State Department of Transportation; OWSC = one-way stop control; TWSC = two-way stop control.

3.13.2.3.2 Arterial and Local Street Operations

This section describes the existing intersection operations for the study intersections within the Alternative 2 study area. Operational conditions associated with special events are also described in this section. Appendix H provides a description of intersection operations and level of service standards, as well as the reports from the existing operational analysis.

3.13.2.3.2.1. Weekday Analysis

The existing weekday AM and PM peak hour LOS and delay for the Alternative 2 study area intersections are shown in Table 3.13-12. In the AM peak hour, two intersections fail to meet the standards for the roadway at NE 175th Street and 131st Avenue NE and at Brickyard Road NE/116th Avenue NE and Juanita Woodinville Way NE/NE 160th Street. In the PM peak hour, two intersections fail to meet the standards for the roadway at 140th Avenue NE and NE 171st Street and at Brickyard Road NE/116th Avenue NE and Juanita Woodinville Way NE/NE 160th Street.

Table 3.13-12. 2023 Existing Weekday Intersection Level of Service and Delay – Action Alternative 2 Study Area.

ID	Intersection	Traffic Control	LOS Standard	AM Peak			PM Peak		
				LOS	Delay (seconds)	v/c	LOS	Delay (seconds)	v/c
201	SR 522 Westbound Ramps and 131st Avenue NE	Signal	D	D	39.0	-	C	33.2	-
202	SR 522 Eastbound Ramps and 131st Avenue NE	Signal	D	B	11.9	-	C	23.3	-
203	Little Bear Creek Parkway and 131st Avenue NE	Signal	E	B	12.5	-	D	37.8	-
204	NE 175th Street and 131st Avenue NE	Signal	E	F	110.4	-	E	70.5	-
205	Woodinville-Redmond Road NE and NE 175th Street	Signal	E	D	49.3	-	D	41.7	-
206	140th Avenue NE and NE 171st Street	Signal	E	C	32.8	-	F	80.3	-
207	Woodinville-Redmond Road NE and NE 145th Street	OWSC[1]	E	B	10.6	-	B	11.4	-
208	Village Road and NE 145th Street	RAB	D[2]	A	4.6	0.27	A	5.1	0.33
209	148th Avenue NE/Woodinville-Redmond Road NE and NE 145th Street	RAB	D[2]	A	5.7	0.47	A	6.8	0.47
210	Woodinville-Redmond Road NE and NE 124th Street	Signal	E	D	37.5	-	E	63.8	-
211	NE 116th Street and Woodinville-Redmond Road NE	Signal	E	B	16.5	-	C	28.6	-
212	Woodinville-Redmond Road NE and Site Driveway	OWSC[1]	E	-	-	-	-	-	-
213	Brickyard Road NE and NE Woodinville Drive	OWSC[1]	E	D	25.6	-	C	24.6	-
214	Brickyard Road NE/116th Avenue NE and Juanita Woodinville Way NE/NE 160th Street	TWSC[1]	E	F	219.6	-	F	114.1	-

Shading indicates intersections that are not operating at roadway LOS standard.

Results are based on Highway Capacity Manual (HCM) 6 methodology where available. Otherwise, HCM 2000 methodology was reported (TRB 2000; 2016).

Intersection delay is measured by average seconds of delay per vehicle.

LOS = level of service; v/c = volume to capacity ratio; OWSC = one-way stop control; TWSC = two-way stop control; RAB = roundabout.

[1] For OWSC and TWSC intersections, LOS is reported for the worst movement.

[2] For roundabouts, the v/c for each lane group is the primary controlling measure of effectiveness. Roundabouts will be considered failing if the v/c > 0.9, even if the LOS is better than D.

3.13.2.3.2.2. Saturday Analysis

The existing Saturday AM and PM peak hour LOS and delay for the Alternative 2 study area intersections are shown in Table 3.13-13. In the AM and PM peak hour, all study area intersections operate at or better than the standards for the roadway.

Table 3.13-13. 2023 Existing Saturday Intersection Level of Service and Delay – Action Alternative 2 Study Area.

ID	Intersection	Traffic Control	LOS Standard	AM Peak			PM Peak		
				LOS	Delay (seconds)	v/c	LOS	Delay (seconds)	v/c
201	SR 522 Westbound Ramps and 131st Avenue NE	Signal	D	C	27.6	-	C	30.3	-
202	SR 522 Eastbound Ramps and 131st Avenue NE	Signal	D	B	16.1	-	C	21.2	-
203	Little Bear Creek Parkway and 131st Avenue NE	Signal	E	C	24.3	-	D	35.2	-
204	NE 175th Street and 131st Avenue NE	Signal	E	C	34.7	-	D	42.3	-
205	Woodinville-Redmond Road NE and NE 175th Street	Signal	E	C	26.2	-	C	28.6	-
206	140th Avenue NE and NE 171st Street	Signal	E	C	26.7	-	C	34.0	-
207	Woodinville-Redmond Road NE and NE 145th Street	OWSC[1]	E	A	9.6	-	B	10.2	-
208	Village Road and NE 145th Street	RAB	D[2]	A	4.0	0.20	A	5.3	0.34
209	148th Avenue NE/Woodinville-Redmond Road NE and NE 145th Street	RAB	D[2]	A	4.0	0.20	A	6.0	0.36
210	Woodinville-Redmond Road NE/NE 124th Street	Signal	E	C	21.3	-	C	27.4	-
211	NE 116th Street and Woodinville-Redmond Road NE	Signal	E	B	11.4	-	B	19.4	-
212	Woodinville-Redmond Road NE and Site Driveway	OWSC[1]	E	-	-	-	-	-	-
213	Brickyard Road NE and NE Woodinville Drive	OWSC[1]	E	B	13.5	-	C	16.2	-
214	Brickyard Road NE/116th Avenue NE and Juanita Woodinville Way NE/NE 160th Street	TWSC[1]	E	D	28.5	-	E	48.4	-

Results are based on Highway Capacity Manual (HCM) 6 methodology where available. Otherwise, HCM 2000 methodology was reported (TRB 2000; 2016).

Intersection delay is measured by average seconds of delay per vehicle.

LOS = level of service; v/c = volume to capacity ratio; OWSC = one-way stop control; TWSC = two-way stop control; RAB = roundabout.

[1] For OWSC and TWSC intersections, LOS is reported for the worst movement.

[2] For roundabouts, the v/c for each lane group is the primary controlling measure of effectiveness. Roundabouts will be considered failing if the v/c > 0.9, even if the LOS is better than D.

3.13.2.3.2.3. Off-Ramp Queueing

Table 3.13-14 provides queueing data for two off-ramps, summarizing their storage capacities and 95th percentile queue lengths during the 2023 AM and PM peak hours for weekdays and Saturdays. The SR-522 eastbound off-ramp exceeds the storage capacity of 770 feet, during the weekday AM and PM peaks and the Saturday PM peak. The storage capacity is measured to the gore point of the ramp, however,

because this off-ramp is an auxiliary/drop lane, additional spillback beyond the gore (merge) point is not spilling back directly onto the SR 522 mainline. However, this may impact the operations of the weave between I-405 and SR 522.

Table 3.13-14.2023 Existing 95th Percentile Off-Ramp Queue Lengths – Alternative 2

ID	Intersection	Approach	Available Storage Length (feet)	Weekday Queue Length (ft)		Saturday Queue Length (ft)	
				AM Peak	PM Peak	AM Peak	PM Peak
201	131st Ave NE & SR-522 Westbound Ramps	WB	800	370	235	185	225
202	131st Ave NE & SR-522 Eastbound Ramps	EB	770	795	790	560	1,250

Note: Bold values indicate a 95th percentile queue that exceeds the available storage length

3.13.2.3.2.4. Special Events

A special event analysis was considered in the Alternative 2 study area due to the common occurrence of concerts and other large events that create an influx of people within the city and specifically the study area. After counts were collected, however, the volumes before and during events were similar to the peak nonevent volumes. Therefore, since the nonevent volumes represent a worst-case scenario, the special event conditions would be within the envelope of impacts already being analyzed and a separate special event analysis is not needed for the existing or future conditions. Appendix H has more details regarding this assessment.

3.13.2.3.3 Active Transportation Facilities

This section describes the existing active transportation facilities within the Alternative 2 study area, including pedestrian, bicycle, trails, and equestrian facilities, as applicable. Active transportation facilities were inventoried on all primary roadways in the study area, including streets classified as arterials (principal, major, or minor) and collectors.

Existing active transportation facilities in the Alternative 2 study area are shown in Figure 3.13-6. Sidewalks are provided on both sides of 131st Avenue NE and NE 175th Street in the study area. Woodinville-Redmond Road NE between NE 175th Street and NE 145th Street generally does not have sidewalks on either side of the road; however, there are short sections of sidewalks provided along some parcels along the corridor. Most of these are along the south portion of the corridor, but these do not connect all properties and generally only run for up to about 750 feet.

Sidewalks are provided on both sides of NE 145th Street through the Woodinville-Redmond Road NE/ 148th Avenue NE roundabout and continuing south along Woodinville-Redmond Road NE until NE 143rd Street. No sidewalks are provided on Woodinville-Redmond Road NE south of NE 143rd Street through NE 116th Street at the southern end of the study area, except for at the intersection of Woodinville-Redmond Road NE and NE 124th Street.

Bicycle lanes are only provided in the study area along NE 175th Street, the shared-use path along NE 145th Street, and through the roundabouts at NE 145th Street and Village Road and at NE 145th Street and Woodinville-Redmond Road NE/148th Avenue NE.

A shared-use path runs along NE 145th Street up to Village Road, with a signalized crossing connecting the Eastrail trail to the south to the future continuation of the Eastrail trail to the north, as well as to the Sammamish River Trail to the east. The Sammamish River Trail is a 10-mile, multi-use trail that parallels the Sammamish River between Bothell and Marymoor Park in Redmond.

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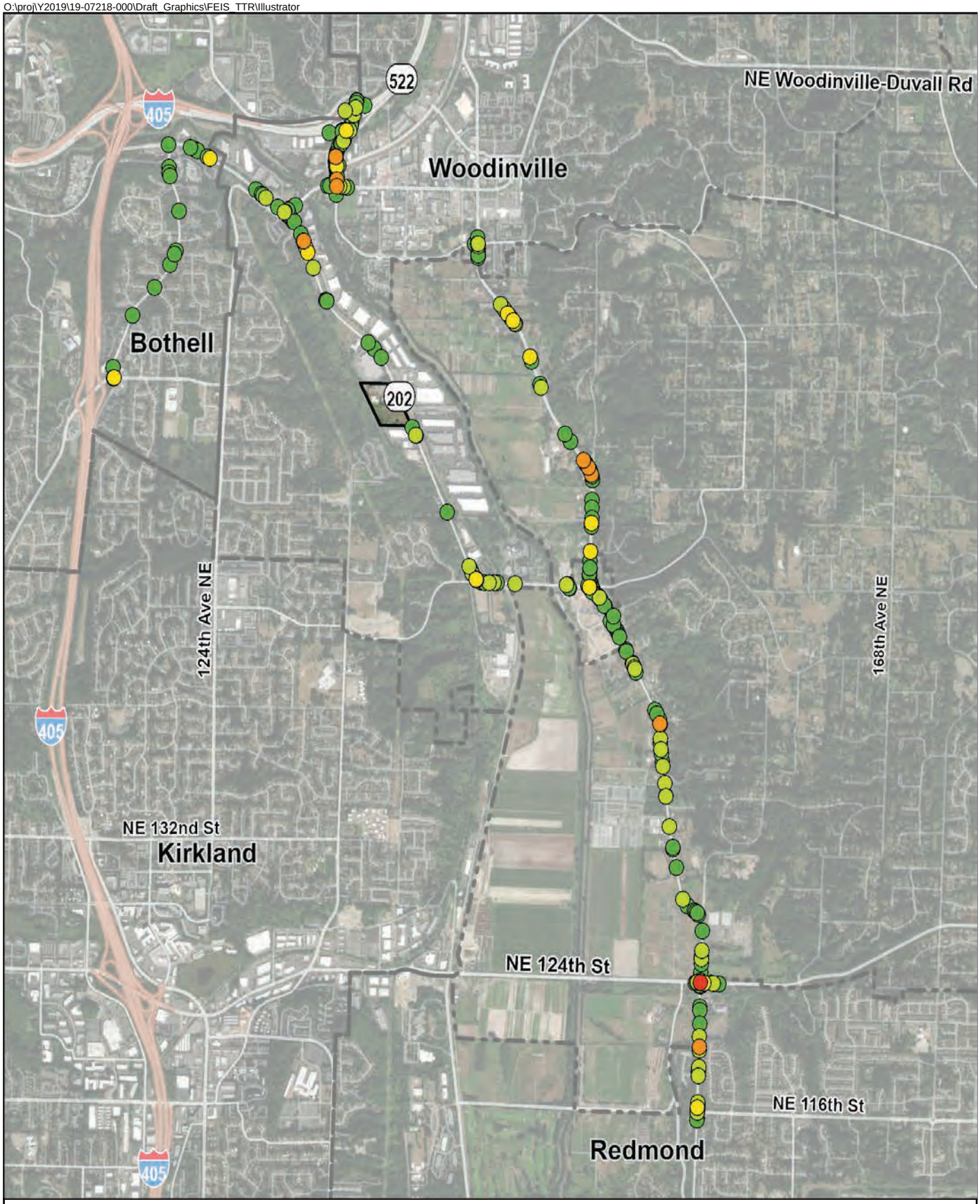

Legend

All Crashes (2017 - 2021)

- Fatal
- Suspected Serious Injury
- Suspected Minor Injury
- Possible Injury
- No Apparent Injury
- Unknown

Site Boundary

- Alternative 2

Figure 3.13-7. Action Alternative 2 Study Area Total Crashes by Severity (2017-2021)

N
PLAN

SCALE 1" = 39,442'-0"

0 0.25 0.5 Mile

King County

3.13.2.3.4 Transit Facilities

This section describes the existing regional and local transit facilities and services within the Alternative 2 study area. King County Metro Transit (Metro), Sound Transit, and Community Transit provide bus service in the study area, with local and regional fixed route service to transit centers, park-and-ride facilities, and bus stops. All information is current as of the March 2023 service change.

Table 3.13-15 summarizes the route number, service type, and routing for each route in the Alternative 2 study area. Appendix H shows the fixed route transit services and bus stops provided in the study area, as well as the Woodinville Park and Ride.

Table 3.13-15. Action Alternative 2 Study Area Existing Transit Service.

Service Provider	Route	Service Type	Routing
King County Metro Transit	225	All Day	Kenmore, Kingsgate, Totem Lake, Redmond, Overlake
King County Metro Transit	231	All Day	Bothell, Woodinville, Brickyard, Juanita, Kirkland
King County Metro Transit	237	Peak-Only	Woodinville, Brickyard Park and Ride, Totem Lake, Houghton, Bellevue
King County Metro Transit	239	All Day	Kirkland, Rose Hill, Totem Lake, Brickyard Park and Ride, Bothell
King County Metro Transit	311	Peak Only	Woodinville, Totem Lake Station, Yarrow Point Station, Evergreen Point Station, Downtown Seattle
King County Metro Transit	930	DART	Kingsgate Park and Ride, Totem Lake Transit Center, Willows Road Redmond Transit Center, Redmond Town Center
Community Transit	424	Peak Only	Snohomish, Monroe, Woodinville, Totem Lake, Evergreen Point Station, Downtown Seattle
Sound Transit	522	All Day Express Bus	Woodinville, Bothell, Kenmore, Lake City, Roosevelt Station

Sources: King County Metro (2023); Sound Transit (2023), Community Transit (2023).
DART = Dial-a-Ride Transit.

Bus stops are located on SR 522, Brickyard Road NE, NE Woodinville Drive, 119th Avenue NE, 124th Avenue NE, 131st Avenue NE, 138th Place NE, 140th Place NE, NE 132nd Street, NE 144th Street, NE 160th Street, NE 175th Street, NE 178th Place, and NE 179th Place. The Woodinville Park and Ride, located at NE 178th Street and 140th Avenue NE, has 438 parking spaces and is served by Metro Routes 231, 237, 311 and Sound Transit Route 522.

3.13.2.3.5 Safety

This section describes the existing safety conditions within the Alternative 2 study area in terms of observed crash history for all modes.

Crash data records for crashes within the Alternative 2 study area were collected from WSDOT for the most recent five-year period between 2018 and 2022. During this study period, 460 crashes occurred within the study area (see Figure 3.13-7). The majority of crashes (54 percent) occurred at the intersections within the study area as opposed to road segments. One fatal crash and nine serious injury crashes occurred in the study area during this period, none of which involved a pedestrian or bicyclist. There were two pedestrian-

involved crashes, and three bicyclist-involved crashes occurred during the study period as shown in Figure 3.13-8. Table 3.13-16 summarizes the study area crashes by location type and severity.

Table 3.13-16. Existing Action Alternative 2 Study Area Crashes by Severity (2018-2022).

Location	2018-2022 Crash Frequency by Severity					
	Fatal	Serious Injury	Minor Injury	Possible Injury	No Injury	Total
Intersections	1	2	9	47	188	247
Segments	0	7	8	35	163	213
Total	1	9	17	82	351	460

Source: WSDOT (2023a).

Observed and critical crash rates were calculated for the study area intersections as the number of crashes per million entering vehicles (MEV). Table 3.13-17 shows the crash frequencies, entering volumes, and observed and critical crash rates for the study intersections. The future site driveway was not included in the intersection crash summary.

Table 3.13-17. Existing Action Alternative 2 Study Area Crash Rates (2018-2022).

Intersection	ADT (entering volume, vpd)	2018-2022 Crash Frequency				Observed Crash Rate (crashes/MEV)	Critical Crash Rate (crashes/MEV)[1]
		Fatal	Injury	No Injury	Total		
131st Avenue NE and SR 522 Westbound Ramps	32,900	0	3	16	19	0.32	0.53
131st Avenue NE and SR 522 Eastbound Ramps	47,050	0	5	23	28	0.33	0.53
131st Avenue NE and Little Bear Creek Parkway	31,800	0	7	20	27	0.47	0.55
131st Avenue NE and NE 175th Street	33,150	0	6	18	24	0.40	0.55
Woodinville-Redmond Road NE/SR 202 and NE 175th Street	19,900	0	2	7	9	0.25	0.60
Woodinville-Redmond Road NE/SR 202 and NE 145th Street	15,300	0	4	2	6	0.21	0.63
NE 145th Street and Village Road	8,800	0	1	4	5	0.31	0.70
NE 145th Street and Woodinville-Redmond Road NE/SR 202/148th Avenue NE	22,300	0	5	37	42	1.03	0.59
Woodinville-Redmond Road NE/SR 202 and NE 124th Street	35,450	1	10	23	34	0.53	0.55
Woodinville-Redmond Road NE/SR 202 and NE 116th Street	19,450	0	1	6	7	0.20	0.60
NE 171st Street and 140th Place/Avenue NE	26,150	0	5	17	22	0.46	0.57
Brickyard Road NE and NE Woodinville Drive	9,100	0	0	1	1	0.06	0.70
Brickyard Road NE/116th Avenue NE and Juanita Woodinville Way NE/NE 160th Street	23,400	0	7	11	18	0.42	0.58

Source: WSDOT (2023a).
AADT = annual average daily traffic; vpd = vehicles per day; MEV = million entering vehicles.

[1] Critical crash rate calculated using Highway Safety Manual (HSM) equation 4-11 (AASHTO 2014).

One study intersection, NE 145th Street and Woodinville-Redmond Road NE/SR 202/148th Avenue NE, had an observed crash rate greater than one crash per MEV and greater than the critical crash rate. This intersection also had the highest number of crashes (42) of the 12 study intersections with data (analysis did not include the future site driveway - 12th intersection in the study area). Over 69 percent of these crashes were entering-at-an-angle crashes associated with entering the roundabout.

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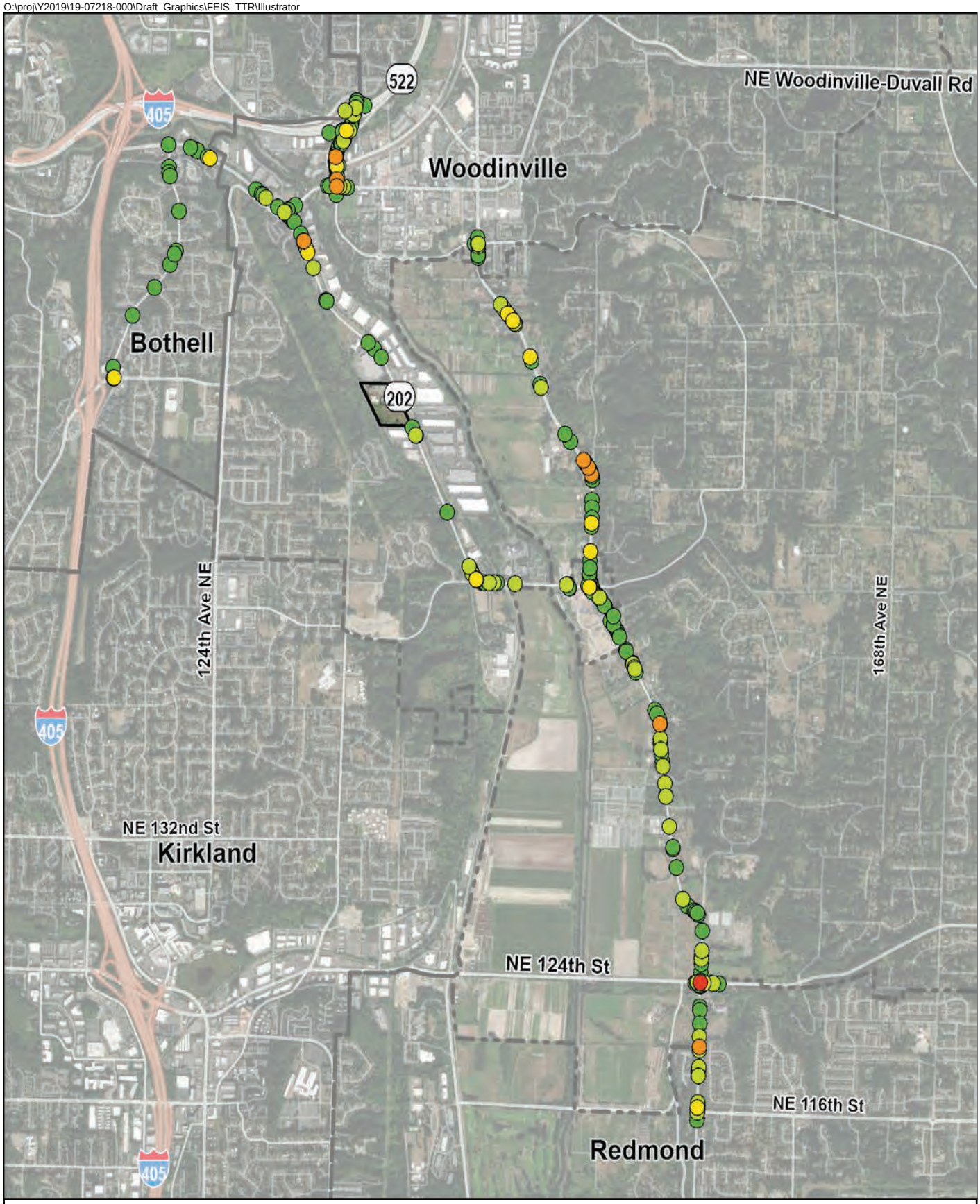

Legend

All Crashes (2017 - 2021)

- Fatal
- Suspected Serious Injury
- Suspected Minor Injury
- Possible Injury
- No Apparent Injury
- Unknown

Site Boundary

- Alternative 2

Figure 3.13-7. Action Alternative 2 Study Area Total Crashes by Severity (2017-2021)

N
PLAN

SCALE 1" = 39,442'-0"

0 0.25 0.5 Mile

King County

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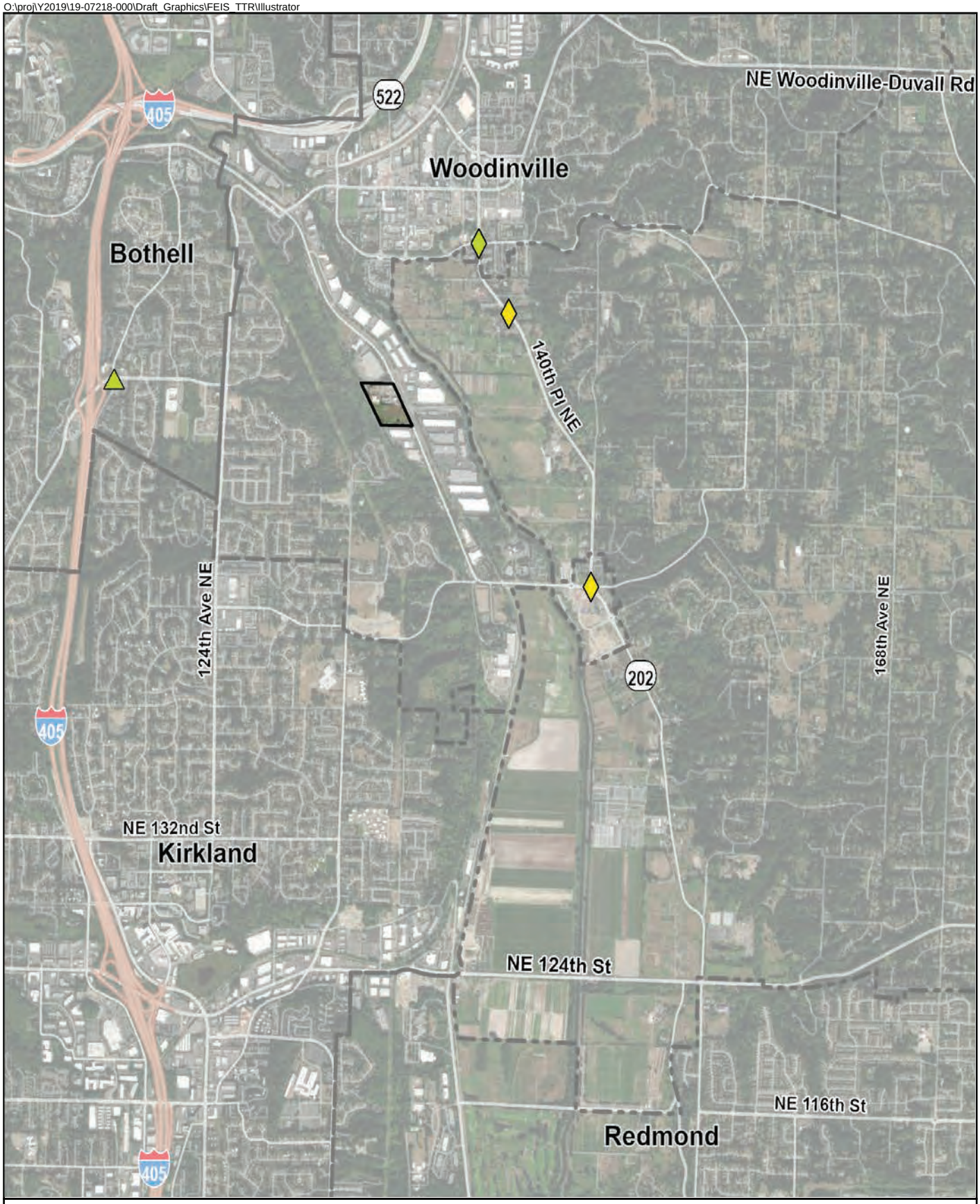

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Active Transportation Crashes (2017-2021)

- Suspected Minor Injury (Bicyclist)
- Possible Injury (Bicyclist)
- Possible Injury (Pedestrian)

Site Boundary

- Alternative 2

Figure 3.13-8. Action Alternative 2 Study Area Pedestrian and Bicyclist-Involved Crashes (2017-2021)

N
PLAN

SCALE 1" = 39,442'-0"

0 0.25 0.5 Mile

King County

3.13.2.3.6 Freight Mobility and Access

Designated freight routes in the Alternative 2 study area are shown in Appendix H, including Woodinville-Redmond Road NE, which is classified as a T-3 route (300,000 to four million tons per year).

3.13.3 Environmental Impacts

This section describes the potential transportation impacts from the No Action and action alternatives and identifies mitigation measures that could avoid, minimize, or reduce the impacts below the level of significance or reduce impacts in general. It includes assessment of impacts to the roadway network and traffic operations for both the year of opening (2029) and the horizon year (2040). The horizon year (also referred to as the "design year") is the year assigned to represent an estimation of the future traffic demand and volume expected at a facility. KCSWD chose 2040 to coincide with the design criteria used for the facility. Impacts to all other aspects of the transportation network were assessed for the horizon year only.

3.13.3.1No Action Alternative

This section describes the potential transportation impacts from the No Action Alternative located at the existing Houghton RTS property at 11724 NE 60th Street. Under the No Action Alternative, the existing Houghton RTS would continue to operate and no new NERTS facility would be developed.

3.13.3.1.1 Impacts from Construction

Under the No Action Alternative, a new transfer station would not be built. Direct construction-related transportation impacts would not occur.

3.13.3.1.2 Impacts from Operation

Under the No Action Alternative, KCSWD would continue to operate the existing Houghton RTS. Traffic volumes associated with its operation are expected to increase as the service area population grows.

3.13.3.1.2.1. No Action and Alternative 1 Study Area

Roadway Network

No Action volumes for 2029 and 2040 at the study intersections in the No Action Alternative study area were forecast using an annual growth rate of two percent. Traffic volumes are forecast to increase throughout the study area between existing conditions and the 2029 and 2040 AM and PM peak hours. Turning movement volumes for the 2029 and 2040 No Action weekday and Saturday conditions for the AM and PM peak hours are included in Appendix H. The City of Kirkland approved annual growth rate of two percent is considered to be a conservative growth factor for an already developed area. It is intended to account for planned developments within the city (such as development of the Houghton Park and Ride property and Bridle Trails Shopping Center) but does not explicitly correspond to individual developments and individual streets. It is noted that WSDOT is working to improve the I-405/Northeast 85th Street interchange in Kirkland, which may improve operations at that location under any scenario. No other

improvements are planned by the City of Kirkland that would alter the roadway network and intersections in the study area for the No Action Alternative (City of Kirkland 2020a).

Arterial and Local Street Operations

The existing, 2029, and 2040 No Action Alternative weekday AM and PM peak hour LOS and delay for the Alternative 1 study area intersections are shown in Table 3.13-18. In the 2029 AM peak hour, the intersection at NE 68th Street and I-405 Southbound Ramps does not meet the LOS standard. In the 2029 PM peak hour, the intersection at 116th Avenue NE and I-405 Northbound Ramps does not meet the LOS standard. During the 2040 AM peak hour, the intersections at 116th Avenue NE and NE 70th Place as well as NE 68th Street and I-405 Southbound Ramps do not meet the roadway LOS standards. In the 2040 PM peak hour, the intersections at 116th Avenue NE and I-405 Northbound Ramps and NE 68th Street and I-405 Southbound Ramps also fail to meet the roadway LOS standards.

Table 3.13-18. No Action Weekday Intersection Level of Service and Delay – No Action Alternative and Action Alternative 1 Study Area.

ID	Intersection	Traffic Control	LOS Standard	Existing		2029 No Action		2040 No Action	
				LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)
AM Peak									
101	116th Avenue NE and I-405 Northbound Ramps	Signal	D	C	24.1	C	27.4	C	35.0
102	116th Avenue NE and NE 70th Place	Signal	D	D	37.7	D	36.4	E	57.2
103	NE 68th Street and I-405 Southbound Ramps	Signal	D	E	61.9	E	64.3	F	115.7
104	NE 60th Street and 116th Avenue NE	AWSC[1]	D	A	9.5	A	9.8	B	10.3
105	NE 60th Street and Site Driveway	OWSC[2]	D	A	9.1	A	9.2	A	9.2
PM Peak									
101	116th Avenue NE and I-405 Northbound Ramps	Signal	D	D	46.9	E	62.7	F	115.3
102	116th Avenue NE and NE 70th Place	Signal	D	C	24.8	C	23.8	C	31.6
103	NE 68th Street and I-405 Southbound Ramps	Signal	D	C	33.6	D	39.1	E	73.0
104	NE 60th Street and 116th Avenue NE	AWSC[1]	D	B	11.3	B	12.1	C	15.7
105	NE 60th Street and Site Driveway	OWSC[2]	D	A	9.2	A	9.4	A	9.6

Shading indicates intersections that are not operating or are projected not to operate at roadway LOS standard.

Results are based on Highway Capacity Manual (HCM) 6 methodology where available. Otherwise, HCM 2000 methodology was reported (TRB 2000; 2016).

Intersection delay is measured by average seconds of delay per vehicle.

LOS = level of service; AWSC = all-way stop control; OWSC = one-way stop control.

[1] For AWSC intersections, LOS is reported as an average delay of all of the movements, much like a signalized intersection.

[2] For OWSC intersections, LOS is reported for the worst movement.

The existing, 2029, and 2040 No Action Alternative Saturday AM and PM peak hour LOS and delay for the No Action Alternative and Alternative 1 study area intersections are shown in Table 3.13-19. In the 2029 AM and PM peak hours, all study area intersections operate at or better than the standards for the roadway. In the 2040 AM peak hour, all study area intersections operate at or better than the standards for the roadway. In the 2040 PM peak hour, the intersection at NE 68th Street and I-405 Southbound Ramps does not meet the roadway LOS standards.

Table 3.13-19. No Action Saturday Intersection Level of Service and Delay – No Action Alternative and Action Alternative 1 Study Area.

ID	Intersection	Traffic Control	LOS Standard	Existing		2029 No Action		2040 No Action	
				LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)
AM Peak									
101	116th Avenue NE and I-405 Northbound Ramps	Signal	D	B	17.0	B	15.3	B	18.0
102	116th Avenue NE and NE 70th Place	Signal	D	C	20.8	B	19.1	C	21.2
103	NE 68th Street and I-405 Southbound Ramps	Signal	D	C	31.6	C	20.8	D	36.7
104	NE 60th Street and 116th Avenue NE	AWSC[1]	D	A	8.2	A	7.9	A	8.1
105	NE 60th Street and Site Driveway	OWSC[2]	D	A	9.0	A	9.0	A	9.0
PM Peak									
101	116th Avenue NE and I-405 Northbound Ramps	Signal	D	B	19.7	C	22.2	C	31.7
102	116th Avenue NE and NE 70th Place	Signal	D	C	23.7	C	25.2	C	30.9
103	NE 68th Street and I-405 Southbound Ramps	Signal	D	C	30.1	D	39.5	E	71.7
104	NE 60th Street and 116th Avenue NE	AWSC[1]	D	A	8.8	A	9.1	A	9.6
105	NE 60th Street and Site Driveway	OWSC[2]	D	A	9.0	A	9.2	A	9.3

Shading indicates intersections that are not operating or are projected not to operate at roadway LOS standard.

Results are based on Highway Capacity Manual (HCM) 6 methodology where available. Otherwise, HCM 2000 methodology was reported (TRB 2000; 2016).

Intersection delay is measured by average seconds of delay per vehicle.

LOS = level of service; AWSC = all-way stop control; OWSC = one-way stop control.

[1] For AWSC intersections, LOS is reported as an average delay of all of the movements, much like a signalized intersection.

[2] For OWSC intersections, LOS is reported for the worst movement.

Table 3.13-20 provides queueing data for two off-ramps, summarizing their storage capacities and 95th percentile queue lengths during the No Action 2040 AM and PM peak hours for weekdays and Saturdays in the No Action Alternative and Action Alternative 1 study area. Neither of the 95th percentile queue lengths for these off-ramps exceed the available storage length.

Table 3.13-20.2040 No Action 95th Percentile Off-Ramp Queue Lengths – Alternative 1							
			Available Storage Length (feet)	Weekday Queue Length (ft)		Saturday Queue Length (ft)	
ID	Intersection	Approach		AM Peak	PM Peak	AM Peak	PM Peak
101	116th Ave NE & I-405 Northbound Ramps	EB	1,250	360	750	225	310
103	NE 68th St/NE 72nd St & I-405 Southbound Ramps	WB	1,350	485	270	140	275

Active Transportation Facilities

In the No Action Alternative, no existing active transportation facilities would be modified, nor new active transportation facilities developed in the Kirkland study area (City of Kirkland 2020a).

Transit Facilities

In the No Action Alternative, Metro's fixed route bus service in the No Action Alternative and Alternative 1 study area would remain the same. Metro's long-range plan, Metro Connects, does not identify any new frequent or express bus service in the study area (KCM 2021). Metro Connects identifies the potential to implement modified local fixed-route and/or new flexible services to improve mobility and provide connections to the regional transit network and its intent to work with communities to determine the best options for them; thus, new transit service could be provided in the study area subject to future coordination between the City of Kirkland and Metro.

By 2029, Sound Transit will provide bus rapid transit (BRT) service along I-405 between Lynnwood and Bellevue. Known as the Stride S2 Line, it will connect communities along I-405 and SR 518 from Lynnwood to Bellevue. Buses will run every 10 minutes and will connect to Link light rail at Lynnwood and Bellevue as well as other transit services provided by Sound Transit, Community Transit, and King County Metro Transit. It will pass through the Kirkland study area but will not include a station or service in the study area.

Safety

As traffic volumes increase, there may be an increase in the potential for crashes in the study area. Background traffic volumes in the study area are expected to increase by 2029 and 2040 over the existing conditions. Therefore, there is potential for more crashes within the study area under the No Action conditions compared to existing conditions.

Freight Mobility and Access

Under the No Action Alternative, KCSWD would continue to operate the existing Houghton RTS. Some additional tonnage can be accommodated at the Houghton Transfer Station, and transfer trailer, self-haul, and commercial truck trips associated with its operation would be expected to increase (see Table 3.13-21). Freight traffic is expected to be affected similarly to general-purpose traffic in the study area. Freight would experience the same levels of delay as general-purpose traffic on roadways and at intersections with increased congestion.

Under the No Action Alternative, waste would continue not be compacted. Transfer trailers removing waste from the existing Houghton RTS transport waste that is top-loaded into the trailer with no mechanical compaction other than nominal compaction provided with the knuckle-boom equipment y. The average load weight of a loaded trailer is approximately 20 tons. The lack of compaction would keep the number of transfer truck and trailer trips needed to transport the waste to CHRLF or other disposal facility as currently projected, compared with the action alternatives. Table 3.13-21 shows existing and estimated No Action weekday and Saturday total vehicle volumes at the No Action and Alternative 1 site. Current estimates are that the average daily hauling volumes needed to serve the existing Houghton RTS without the use of a compactor would increase from 25 transfer trailers on weekdays and up to seven transfer trailers on weekends (50 weekday trips and 13 weekend trips) under existing conditions to 33 transfer trailers on weekdays and up to 9 transfer trailers on weekends (66 weekday trips and 18 weekend trips) under the No Action Alternative in 2040 (KCSWD 2023).

Table 3.13-21. Existing and Estimated No Action Weekday and Saturday Total Daily Vehicle Volumes – No Action and Alternative 1 Site

	2023 Existing		2029/2040 No Action	
Vehicle Type	Weekday	Saturday	Weekday	Saturday
Self-haul	186	324	404	531
Commercial	71	0	111	0
Employee	10	10	10	10
Transfer Trailers	25	7	33	9

The transfer trailer volumes reflected in the above table and in all modeled traffic forecasts incorporate appropriate trailer densities to calculate truck trips for the King County waste projection used in this analysis.

3.13.3.1.2.2. Alternative 2 Study Area

Under the No Action Alternative, no new NERTS facility would be operated on the Alternative 2 site and existing and potential land uses would continue on the site. As a result, there would be no operational impacts from the No Action Alternative at the Alternative 2 site and study area. However, even with no new NERTS facility, ongoing changes to and improvements in the transportation system in the study area would continue and are described in the following subsections.

Additional detail about anticipated changes or improvements to the Alternative 2 study area roadway network active transportation, transit facilities, safety, and freight mobility and access can be found in Appendix H.

Roadway Network

Future (2029 and 2040) No Action volumes at the study intersections in the Alternative 2 study area also were forecast using an annual growth rate of two percent. Like the No Action and Alternative 1 study area, traffic volumes throughout the Alternative 2 study area are forecast to increase between existing conditions

and the 2029 and 2040 AM and PM peak hours. Turning movement volumes for the 2029 and 2040 No Action weekday and Saturday conditions for the AM and PM peak hours are included in Appendix H.

The City of Woodinville 2023-2028 Capital Improvement Plan (CIP) identifies several planned roadway improvements in the vicinity of the Woodinville study area, some of which would be funded by the City of Woodinville, and some partially or fully funded by private development (City of Woodinville 2022). These projects may improve operations at those locations under any scenario. Projects include:

- Widening SR 202/131st Avenue NE from SR 522 under the Eastside Rail Corridor trestle to NE 175th Street and replacing the existing railroad trestle
- Converting the existing stop-controlled intersection at SR 202 and NE 145th Street to a two-lane roundabout. The project will include sidewalks along all approaches and within the roundabout.
- New roundabout at the intersection of 138th Avenue NE and NE 171st Street
- New signal at 132nd Avenue NE and NE 143rd Street to replace existing stop-controlled intersection
- Intersection realignment and signal installation at 132nd Avenue NE and NE 143rd Street. The project includes realigning the east leg of 143rd to remove an existing offset.
- Extending 133rd Avenue NE from NE 175th Street to Woodinville Snohomish Road
- Extending 133rd Avenue NE from Woodinville Snohomish Road to Little Bear Creek Parkway
- Assumed developments included in Appendix I and H.

Arterial and Local Street Operations

The existing, 2029, and 2040 No Action Alternative weekday AM and PM peak hour LOS and delay for the Alternative 2 study area intersections are shown in Table 3.13-22. In the 2029 AM peak hour, two intersections at NE 175th Street and 131st Avenue NE and at Brickyard Road NE/116th Avenue NE and Juanita Woodinville Way NE/NE 160th Street fail to meet the standards for the roadway. In the 2029 PM peak hour, three intersections at NE 175th Street and 131st Avenue NE, at 140th Avenue NE and NE 171st Street, and at Brickyard Road NE/116th Avenue NE and Juanita Woodinville Way NE/NE 160th Street fail to meet the standards for the roadway. In the 2040 AM peak hour, four intersections fail to meet the standards for the roadway at NE 175th Street and 131st Avenue NE, at Woodinville-Redmond Road NE and NE 175th Street, at Brickyard Road NE and NE Woodinville Drive, and at Brickyard Road NE/116th Avenue NE and Juanita Woodinville Way NE/NE 160th Street. In the 2040 PM peak hour, four intersections fail to meet the standards for the roadway at NE 175th Street and 131st Avenue NE, 140th Avenue NE and NE 171st Street, Woodinville-Redmond Road NE and NE 124th Street, and Brickyard Road NE/116th Avenue NE and Juanita Woodinville Way NE/NE 160th Street.

Table 3.13-22. No Action Weekday Intersection Level of Service and Delay – Action Alternative 2 Study Area.

ID	Intersection	Traffic Control	LOS Standard	Existing			2029 No Action			2040 No Action		
				LOS	Delay (sec)	v/c	LOS	Delay (sec)	v/c	LOS	Delay (sec)	v/c
AM Peak												
201	SR 522 Westbound Ramps and 131st Avenue NE[3,6]	Signal	D	D	39.0	-	-	-	-	-	-	-
202	SR 522 Eastbound Ramps and 131st Avenue NE	Signal	D	B	11.9	-	B	14.9	-	B	17.5	-
203	Little Bear Creek Parkway and 131st Avenue NE	Signal	E	B	12.5	-	B	11.1	-	B	12.1	-
204	NE 175th Street and 131st Avenue NE	Signal	E	F	110.4	-	F	177.3	-	F	211.9	-
205	Woodinville-Redmond Road NE and NE 175th Street	Signal	E	D	49.3	-	E	56.3	-	F	100.0	-
206	140th Avenue NE and NE 171st Street	Signal	E	C	32.8	-	C	35.0	-	D	52.6	-
207	Woodinville-Redmond Road NE and NE 145th Street	OWSC[1] RAB[4]	E	B	10.6	-	A	7.4	0.30	A	7.7	0.37
208	Village Road and NE 145th Street	RAB	D[2]	A	4.6	0.27	A	4.5	0.27	A	5.0	0.32
209	148th Avenue NE/Woodinville-Redmond Road NE and NE 145th Street	RAB	D[2]	A	5.7	0.47	A	6.0	0.50	A	7.7	0.61
210	Woodinville-Redmond Road NE/ NE 124th Street	Signal	E	D	37.5	-	D	44.7	-	E	76.2	-
211	NE 116th Street and Woodinville-Redmond Road NE	Signal	E	B	16.5	-	B	16.9	-	C	21.8	-
212	Woodinville-Redmond Road NE and Site Driveway[5]	OWSC[1]	E	-	-	-	-	-	-	-	-	-
213	Brickyard Road NE and NE Woodinville Drive	OWSC[1]	E	D	25.6	-	D	28.4	-	F	55.1	-
214	Brickyard Road NE/116th Avenue NE and Juanita Woodinville Way NE/NE 160th Street	OWSC[1]	E	F	219.6	-	F	289.6	-	F	> 300	-

Table 3.13-22. No Action Weekday Intersection Level of Service and Delay – Action Alternative 2 Study Area.

ID	Intersection	Traffic Control	LOS Standard	Existing			2029 No Action			2040 No Action		
				LOS	Delay (sec)	v/c	LOS	Delay (sec)	v/c	LOS	Delay (sec)	v/c
PM Peak												
201	SR 522 Westbound Ramps and 131st Avenue NE[3,6]	Signal	D	C	33.2	-	-	-	-	-	-	-
202	SR 522 Eastbound Ramps and 131st Avenue NE	Signal	D	C	23.3	-	C	25.0	-	C	31.8	-
203	Little Bear Creek Parkway and 131st Avenue NE	Signal	E	D	37.8	-	D	39.6	-	D	47.4	-
204	NE 175th Street and 131st Avenue NE	Signal	E	E	70.5	-	F	87.4	-	F	122.7	-
205	Woodinville-Redmond Road NE and NE 175th Street	Signal	E	D	41.7	-	D	48.3	-	E	66.5	-
206	140th Avenue NE and NE 171st Street	Signal	E	F	80.3	-	F	93.7	-	F	140.9	-
207	Woodinville-Redmond Road NE and NE 145th Street	OWSC[1] RAB[4]	E	B	11.4	-	A	8.0	0.58	A	10.0	0.72
208	Village Road and NE 145th Street	RAB	D[2]	A	5.1	0.33	A	5.4	0.35	A	6.1	0.42
209	148th Avenue NE/Woodinville-Redmond Road NE and NE 145th Street	RAB	D[2]	A	6.8	0.47	A	7.3	0.50	B	10.2	0.65
210	Woodinville-Redmond Road NE and NE 124th Street	Signal	E	E	63.8	-	E	73.7	-	F	123.8	-
211	NE 116th Street and Woodinville-Redmond Road NE	Signal	E	C	28.6	-	C	29.1	-	E	58.6	-
212	Woodinville-Redmond Road NE and Site Driveway[5]	OWSC[1]	E	-	-	-	-	-	-	-	-	-
213	Brickyard Road NE and NE Woodinville Drive	OWSC[1]	E	C	24.6	-	D	28.7	-	E	45.9	-
214	Brickyard Road NE/116th Avenue NE and Juanita Woodinville Way NE/NE 160th Street	TWSC[1]	E	F	114.1	-	F	166.5	-	F	> 300	-

Table 3.13-22. No Action Weekday Intersection Level of Service and Delay – Action Alternative 2 Study Area.

ID	Intersection	Traffic Control	LOS Standard	Existing			2029 No Action			2040 No Action		
				LOS	Delay (sec)	v/c	LOS	Delay (sec)	v/c	LOS	Delay (sec)	v/c

Shading indicates intersections that are not operating or are projected not to operate at roadway LOS standard.

Results are based on Highway Capacity Manual (HCM) 6 methodology where available. Otherwise, HCM 2000 methodology was reported (TRB 2000; 2016).

Intersection delay is measured by average seconds of delay per vehicle.

LOS = level of service; v/c = volume to capacity ratio; OWSC = one-way stop control; TWSC = two-way stop control; RAB = roundabout.

[1] For OWSC and TWSC intersections, LOS is reported for the worst movement.

[2] For roundabouts, the v/c for each lane group is the primary controlling measure of effectiveness. Roundabouts will be considered failing if the v/c > 0.9, even if the LOS is better than D.

[3] In the No Action Alternative, all movements at this intersection are free.

[4] In the No Action Alternative, this intersection is converted to a roundabout.

[5] In the No Action Alternative, this intersection does not exist.

[6] Intersection 201 - SR 522 Westbound Ramps and 131st Avenue NE – was removed from the analysis due to the anticipated reconfiguration of the interchange/ramps as part of the trestle replacement and road widening project identified in the first bullet in Section 3.13.3.1.2.2.1

The existing, 2029, and 2040 No Action Alternative Saturday AM and PM peak hour LOS and delay for the Woodinville study area intersections are shown in Table 3.13-23. In the 2029 AM peak hour, all study area intersections operate at or better than the standards for the roadway. In the PM peak hour, one intersection, at Brickyard Road NE/116th Avenue NE and Juanita Woodinville Way NE/NE 160th Street, fails to meet the standard for the roadway. In the 2040 AM peak hour, all study area intersections operate at or better than the standards for the roadway. In the 2040 PM peak hour, two intersections fail to meet the standards for the roadway at the intersection of NE 175th Street and 131st Avenue NE and at the intersection of Brickyard Road NE/116th Avenue NE and Juanita Woodinville Way NE/NE 160th Street.

Table 3.13-23. No Action Saturday Intersection Level of Service and Delay – Action Alternative 2 Study Area.

ID	Intersection	Traffic Control	LOS Standard	Existing			2029 No Action			2040 No Action		
				LOS	Delay (sec)	v/c	LOS	Delay (sec)	v/c	LOS	Delay (sec)	v/c
AM Peak												
201	SR 522 Westbound Ramps and 131st Avenue NE[3,6]	Signal	D	C	27.6	-	-	-	-	-	-	-
202	SR 522 Eastbound Ramps and 131st Avenue NE	Signal	D	B	16.1	-	B	15.3	-	B	16.8	-
203	Little Bear Creek Parkway and 131st Avenue NE	Signal	E	C	24.3	-	C	21.7	-	C	22.7	-

Table 3.13-23. No Action Saturday Intersection Level of Service and Delay – Action Alternative 2 Study Area.

ID	Intersection	Traffic Control	LOS Standard	Existing			2029 No Action			2040 No Action		
				LOS	Delay (sec)	v/c	LOS	Delay (sec)	v/c	LOS	Delay (sec)	v/c
204	NE 175th Street and 131st Avenue NE	Signal	E	C	34.7	-	C	30.8	-	C	32.3	-
205	Woodinville-Redmond Road NE and NE 175th Street	Signal	E	C	26.2	-	C	24.9	-	C	28.0	-
206	140th Avenue NE and NE 171st Street	Signal	E	C	26.7	-	C	26.7	-	C	27.0	-
207	Woodinville-Redmond Road NE and NE 145th Street	OWSC[1] RAB[4]	E	A	9.6	-	A	6.6	0.16	A	6.7	0.19
208	Village Road and NE 145th Street	RAB	D[2]	A	4.0	0.20	A	3.8	0.18	A	4.1	0.21
209	148th Avenue NE/Woodinville-Redmond Road NE and NE 145th Street	RAB	D[2]	A	4.0	0.20	A	3.8	0.17	A	4.1	0.21
210	Woodinville-Redmond Road NE and NE 124th Street	Signal	E	C	21.3	-	C	21.2	-	C	25.1	-
211	NE 116th Street and Woodinville-Redmond Road NE	Signal	E	B	11.4	-	B	11.2	-	B	12.5	-
212	Woodinville-Redmond Road NE and Site Driveway[5]	OWSC[1]	E	-	-	-	-	-	-	-	-	-
213	Brickyard Road NE and NE Woodinville Drive	OWSC[1]	E	B	13.5	-	B	13.0	-	B	14.6	-
214	Brickyard Road NE/116th Avenue NE and Juanita Woodinville Way NE/NE 160th Street	TWSC[1]	E	D	28.5	-	D	25.3	-	D	34.5	-
PM Peak												
201	SR 522 Westbound Ramps and 131st Avenue NE[3,6]	Signal	D	C	30.3	-	-	-	-	-	-	-
202	SR 522 Eastbound Ramps and 131st Avenue NE	Signal	D	C	21.2	-	C	22.8	-	C	27.6	-
203	Little Bear Creek Parkway and 131st Avenue NE	Signal	E	D	35.2	-	C	32.8	-	D	37.3	-

Table 3.13-23. No Action Saturday Intersection Level of Service and Delay – Action Alternative 2 Study Area.

ID	Intersection	Traffic Control	LOS Standard	Existing			2029 No Action			2040 No Action		
				LOS	Delay (sec)	v/c	LOS	Delay (sec)	v/c	LOS	Delay (sec)	v/c
204	NE 175th Street and 131st Avenue NE	Signal	E	D	42.3	-	D	45.4	-	F	86.5	-
205	Woodinville-Redmond Road NE and NE 175th Street	Signal	E	C	28.6	-	C	30.8	-	D	48.3	-
206	140th Avenue NE/NE 171st Street	Signal	E	C	34.6	-	D	35.6	-	D	50.0	-
207	Woodinville-Redmond Road NE and NE 145th Street	OWSC[1] RAB[4]	E	B	10.2	-	A	6.4	0.34	A	6.7	0.41
208	Village Road and NE 145th Street	RAB	D[2]	A	5.3	0.34	A	5.5	0.35	A	6.3	0.43
209	148th Avenue NE/Woodinville-Redmond Road NE and NE 145th Street	RAB	D[2]	A	6.0	0.36	A	6.2	0.38	A	7.7	0.47
210	Woodinville-Redmond Road NE/NE 124th Street	Signal	E	C	27.4	-	C	31.6	-	D	49.3	-
211	NE 116th Street and Woodinville-Redmond Road NE	Signal	E	B	19.4	-	C	20.4	-	C	27.0	-
212	Woodinville-Redmond Road NE and Site Driveway[5]	OWSC[1]	E	-	-	-	-	-	-	-	-	-
213	Brickyard Road NE and NE Woodinville Drive	OWSC[1]	E	C	16.2	-	C	17.6	-	C	22.4	-
214	Brickyard Road NE/116th Avenue NE and Juanita Woodinville Way NE/NE 160th Street	OWSC[1]	E	E	48.4	-	F	62.1	-	F	120.5	-

Shading indicates intersections that are not operating or are projected not to operate at roadway LOS standard.

Results are based on Highway Capacity Manual (HCM) 6 methodology where available. Otherwise, HCM 2000 methodology was reported (TRB 2000; 2016).

Intersection delay is measured by average seconds of delay per vehicle.

LOS = level of service; v/c = volume to capacity ratio; OWSC = one-way stop control; TWSC = two-way stop control; RAB = roundabout.

[1] For OWSC and TWSC intersections, LOS is reported for the worst movement.

[2] For roundabouts, the v/c for each lane group is the primary controlling measure of effectiveness. Roundabouts will be considered failing if the v/c > 0.9, even if the LOS is better than D.

[3] In the No Action Alternative, all movements at this intersection are free.

[4] In the No Action Alternative, this intersection is converted to a roundabout.

[5] In the No Action Alternative, this intersection does not exist.

[6] Intersection 201 - SR 522 Westbound Ramps and 131st Avenue NE – was removed from the analysis due to the anticipated reconfiguration of the interchange/ramps as part of the trestle replacement and road widening project identified in the first bullet in Section 3.13.3.1.2.2.1

Table 3.13-24 presents the 2040 No Action Alternative 95th percentile queue lengths for two intersections in the Alternative 2 study area during weekday and Saturday AM and PM peak hours. The SR-522 eastbound off-ramp exceeds the storage capacity of 770 feet during all conditions. Similar to the existing conditions, this may impact the operations of the weave between I-405 and SR 522. The planned interchange improvements will reconfigure the westbound off-ramp to NE 180th Street, which is outside of the study area so queueing results cannot be obtained for this location.

Table 3.13-24. 2040 No Action 95th Percentile Off-Ramp Queue Lengths – Alternative 2

ID	Intersection	Approach	Available Storage Length (feet)	Weekday Queue Length (ft)		Saturday Queue Length (ft)	
				AM Peak	PM Peak	AM Peak	PM Peak
201	131st Ave NE & SR-522 Westbound Ramps	WB	-	-	-	-	-
202	131st Ave NE & SR-522 Westbound Ramps	EB	770	1,115	1,340	1,040	1,960

Note: Bold values indicate a 95th percentile queue that exceeds the available storage length

Active Transportation Facilities

In the No Action Alternative, the Woodinville connection of the Eastrail Regional Trail Project will convert the existing historic railroad line that runs along the east side of Woodinville-Redmond Road NE between NE 145th Street and NE 175th Street to a multi-use trail, with construction to begin in 2027. Additional active transportation facilities identified in the 2023-2028 CIP that would be developed in the Alternative 2 study area are listed in Appendix H (City of Woodinville 2022).

Transit Facilities

Under the No Action Alternative, the Alternative 2 site would continue to be served by Metro's express bus service and RapidRide K Line, with improvements in BRT connections, new transit only or business access and transit (BAT) lanes on existing or new right-of-way, major intersection investments, and access to other regional transit services. Sound Transit will provide BRT service to connect riders to Link light rail and transit hubs in the study area. Community Transit will continue coordinating its services along the I-5 and I-405 corridors with Sound Transit, supplementing Sound Transit's regional bus network with commute services to downtown Seattle and the University of Washington. Community Transit will also adjust its service to feed Link services at the proposed Lynnwood and Mountlake Terrace stations. Sound Transit's online description of the Stride S3 Line states that the S2 and S3 Lines will connect with Community Transit service at the SR 522/I-405 transit hub. Additional detail is provided in Appendix H.

Safety

As traffic volumes increase, there may be an increase in the potential for crashes in those areas. Background traffic and active transportation volumes in the study area are expected to increase by 2029

and 2040 over the existing conditions. Therefore, there is potential for increased crashes within the Woodinville study area under the No Action conditions compared to existing conditions.

Freight Mobility and Access

Under the No Action Alternative, freight traffic is expected to be affected similarly to general-purpose traffic in the Alternative 2 study area. Freight would experience the same levels of delay as general-purpose traffic on roadways and at intersections with increased congestion resulting from local and regional growth. Waste self-haulers and commercial collection trucks would continue to travel existing roadways within and outside the Alternative 2 study area and use established routes to the existing Houghton RTS.

3.13.3.2Impacts Common to All Action Alternatives

3.13.3.2.1 Impacts from Construction

3.13.3.2.1.1. Direct Impacts

All of the action alternatives would require some preparatory deconstruction or demolition activities and earthwork that would generate truck trips. Material delivery and general construction vehicle activity would also contribute to construction-related traffic. Trucks could traverse designated haul routes during the entirety of the 12-hour daily construction period, including to and from the selected site during AM and PM peak periods.

As most of this activity would occur during import and export of material to and from the site during site preparation (Phases 4 and first half of 5, see Section 2.3), the estimated volumes of truck traffic would likely peak during the early period of construction on roads designated for truck traffic. Section 2.3 describes the likely construction methods to be used during construction of the action alternatives. Those activities, including soil excavation, soil filling, site grading, pile driving, utility trenching, waste excavation, modification or installation of environmental controls, installation of underground utilities, and installation of drainage systems, would all involve vehicle trips or delivery of equipment and materials. There could be potential roadway wear and tear during construction from heavy equipment and truck hauling. Construction of all of the action alternatives also would result in an increase in traffic volumes due to workers traveling to and from the sites. Road frontage improvements would occur after the majority of heavy construction and earthwork is complete to minimize impacts on traffic.

The construction would be locally managed with traffic control plans. Both traffic and truck impact fees could be required to mitigate for additional demand and need for transportation facilities in the host city (ongoing road maintenance is typically the responsibility of the city or WSDOT, depending on the roadway). Construction would be coordinated with the appropriate city agency for the NERTS facility location to minimize effects to travelers along local roadways. Short-term, temporary lane closures, if required, would be coordinated with local agencies, WSDOT, and the Washington State Patrol as applicable. Coordination with the appropriate City agency and other agencies would also occur during deconstruction or demolition of any existing structures.

The implementation of traffic control plans and coordination with the appropriate city and state agencies would minimize impacts to transportation during construction. Impacts to pavement condition should be monitored as a result of the increased truck traffic. Impacts would be temporary and localized; therefore, impacts to transportation would be minor.

Description of impacts unique to alternatives 1A, 1B, and 2 are discussed in sections 3.13.3.3 through 3.13.3.5.

3.13.3.2.1.2. Indirect Impacts

Indirect construction impacts are reasonably foreseeable impacts that could occur as a result of an action alternative at some future time and in areas beyond the action alternative's direct impacts. For example, indirect impacts could relate to changes in land use that occur beyond those changes immediately caused by a project's construction, which could result in a change to overall traffic patterns. The NERTS action alternatives are unlikely to lead to additional projects or actions that would result in indirect transportation impacts. Therefore, the construction of the action alternatives would not result in indirect impacts.

3.13.3.2.2 Impacts from Operation

3.13.3.2.2.1. Direct Impacts

As discussed under the No Action Alternative, background traffic volumes are forecast to increase throughout both study areas during the 2029 and 2040 AM and PM peak hours as a result of planned population and employment growth by the local jurisdictions.

Like the No Action Alternative, all action alternatives would require the use of the region's transportation system to collect, transfer, and dispose of waste. Collection of waste from households and businesses and delivery to a new NERTS facility, and use of transfer trucks for delivery of waste from the new NERTS facility to CHRLF or another permitted disposal facility, would be similar under all action alternatives, although the roadway network used for access to the new facility would differ under each action alternative. While King County's Re+ program and additional recycling capacity at a new NERTS facility are expected to reduce per capita waste disposal, vehicle trips associated with solid waste disposal are anticipated to increase along with the population. Impacts to roadway pavement conditions may increase as overall background traffic increases, while increases in traffic volumes due to the project would contribute incrementally to those roadway pavement impacts. While transfer trailer load weights would increase due to waste compaction, and heavy truck weights contribute to roadway pavement impacts to a greater degree than lighter vehicle weights, impacts from King County transfer trailers would be mitigated by adherence to state requirements for gross vehicle weight limits, and wheelbase and axle weight requirements (see RCW 46.44.041).

In addition, the action alternatives are unlikely to require modifications to the existing roadway network, active transportation facilities, or transit routes, nor would they be likely to or preclude development of any planned improvements.

Unique impacts for alternatives 1 and 2 are discussed in sections 3.13.3.3 through 3.13.3.5.

3.13.3.2.2.2. Indirect Impacts

The limited impacts on the transportation system from the operation of the NERTS facility at the action alternative sites are unlikely to lead to additional projects or actions that would result in indirect transportation-related impacts.

The addition of recycling capacity at the new NERTS facility under all action alternatives could indirectly increase the number of truck trips on the roadway network near regional recycling re-processing facilities, and conversely, decrease the number of truck trips to and from CHRLF or other permitted disposal facilities. The volume of material removed from the new NERTS facility, and therefore the truck trips, would remain roughly the same, but differentiated by a recycling or disposal destination. These impacts would not result in significant indirect impacts.

3.13.3.2.3 Cumulative Impacts

Cumulative impacts are the impact on the environment which results from the incremental impact of the action when added to the impacts of other past, present, and reasonably foreseeable future actions. The transportation operations analysis reflects conditions with assumed growth between existing conditions, opening year (2029), and horizon year (2040). The traffic growth assumptions also reflect changes in background traffic volumes that are projected in the traffic forecasts for each study area.

None of the identified background projects or other known or reasonably foreseeable developments in the vicinity of the action alternatives are expected to have construction periods that coincide with the construction of the NERTS facility, except possibly the Woodinville connection of the Eastrail Trail Project. This is expected to be a minor impact, however, due to the low anticipated construction vehicle traffic volumes. As a result, the traffic analyses reflect the cumulative impacts of the NERTS project, other planned and programmed developments, and associated increases in traffic within the study areas for each action alternative. The proposed action, when considered with past and reasonably foreseeable future transportation projects, would contribute to minor cumulative impacts on transportation facilities in the project areas.

3.13.3.3Alternative 1A

This section describes impacts unique to Alternative 1A, along with applicable mitigation measures. Alternative 1A would construct the new NERTS facility at the existing Houghton RTS property at 11724 NE 60th St in Kirkland after the existing transfer station building is closed and deconstructed or demolished.

3.13.3.3.1 Impacts from Construction

3.13.3.3.1.1. Direct Impacts

All project impacts, regulatory requirements, and cumulative impacts related to transportation under Alternative 1A would include those described previously in Section 3.13.3.2.1, Impacts Common to All Action Alternatives.

Construction under Alternative 1A would require deconstruction or demolition of existing structures, export of building debris and excavated material, and import of fill material, but these may occur at different points of construction. Construction access for Alternative 1A would be provided from NE 60th Street at the location of the existing Houghton RTS. Trucks would access northbound and southbound I-405 at the NE 70th Street interchange via NE 60th Street and 116th Avenue NE.

Under Alternative 1A, possible deconstruction or demolition and removal of the existing Houghton scale complex and transfer building (including the roof, the concrete flooring, and pilings) would bring construction equipment and work crew vehicles to the site and study area. Construction vehicles would follow a route and schedule that would avoid the AM and PM peak hours as much as possible. Section 3.7 estimates approximately 4,700 cubic yards of rubble from deconstruction or demolition of existing structures and pavements would be removed from the existing Houghton RTS. Assuming 50 cubic yards capacity per large construction and demolition material (C&D) disposal trailer, this would likely require approximately 93 truck round trips of haul away during the site preparation period. The deconstruction or demolition would be coordinated with the City of Kirkland and traffic control plans would be implemented. Based on the short duration of the activity, the provisions of the construction management plan, and anticipated traffic volumes, impacts of this activity would be minor. Repurposing rather than deconstruction or demolition of the existing transfer building would eliminate a large proportion of demolition truck trips and new construction truck trips.

Site preparation work is expected to last approximately twelve months, assuming 12-hour workdays, six days per week. Under Alternative 1A, the construction of the new NERTS facility is anticipated to require approximately 162,460 cubic yards of cut/export and approximately 103,675 cubic yards of fill/import if utilizing the direct excavation to native soil method; construction utilizing the drilled piles to native soil is not anticipated under Alternative 1A. All export and import material would be transported to and from the site in dump trucks with trailers with an assumed capacity of 20 cubic yards. Export activity would result in approximately 26 trucks per day (8,124 trucks total) and import activity would result in approximately 17 trucks per day (5,184 trucks total). Table 3.13-25 summarizes the quantity of export and import material estimated for development of Alternative 1A, the associated trucks, and the estimated durations of work. To provide a conservative estimate of construction activity, the construction transportation analysis assumed no reuse of on-site material, although KCSWD will attempt to maximize the reuse of on-site material. On-site material reuse would decrease the estimated number of trucks associated with construction activities.

Table 3.13-25. Truck Activity Associated with Site Preparation for Action Alternative 1A.

Export Material (cubic yards)	Export Total Trucks per Day	Export Total Project Trucks	Import In-Place (cubic yards)	Import Total Trucks per Day	Import Total Project Trucks	Site Preparation Duration
162,460	26	8,124	103,675	17	5,184	12 months

As described in Section 3.13.3.2.1, trucks would traverse the haul routes during the entirety of the 12-hour daily construction period, including to and from the site during AM and PM peak periods. With approximately 43 trucks distributed evenly during the daily construction period, the average number of trucks per hour would be three to five trucks.

To estimate traffic operation impacts, the trucks are assumed to be distributed evenly throughout the daily construction period and are based on the ability of the yard and receiving facility to process the trucks.[14] The 2.5 PCE factor is applied to the truck volume to estimate the number of new trips that would need to be accommodated along the truck routes. Alternative 1A would result in three to five trucks per hour for material import and export, and with a PCE of 2.5, equates to eight to thirteen PCE per hour, 108 PCEs per day.

The haul routes and therefore construction impacts would be concentrated on state facilities, including I-405, as well as several collector and arterial streets, including NE 60th Street and 116th Avenue NE. Because the construction staging, origin of import material, and destination for export material are unknown at this time, the volumes forecast at each intersection represent the highest possible volumes for all daily construction activity. A single potential route identified as a haul route could be used for all daily trucks, or the total daily volumes could be distributed among multiple routes.

The estimated daily truck PCEs associated with site preparation would represent up to 7.6 percent of daily existing entering volumes at study intersections for Alternative 1A. Table 3.13-26 summarizes the study intersection entering ADTs as well as the estimated daily truck PCEs as a percentage of entering ADT for each alternative Under Alternative 1A.

Table 3.13-26. Estimated Daily Truck Activity for Action Alternative 1A Compared with Existing ADT.

ID	Study Intersection	Estimated Existing Entering ADT (vehicles/day)[1]	Daily Roundtrip Truck PCEs as a Percentage of Existing Entering ADT
101	116th Avenue NE and I-405 Northbound Ramps	14,600	1.5%
102	116th Avenue NE and NE 70th Place	21,450	1.0%
103	NE 68th Street and I-405 Southbound Ramps	18,350	1.2%
104	NE 60th Street and 116th Avenue NE	7,300	3.0%
105	NE 60th Street and Site Driveway	2,850	7.6%

ADT = average daily traffic

[1] Entering ADTs were estimated from the existing turning movement volumes at each study intersection.

[14] Irregularity or bunching at the beginning and end of the day is possible.

The biggest volume increase and impact is likely to occur at the site driveway. Because the existing transfer station would be closed during construction under Alternative 1A, this may decrease delay at the site driveway more under that alternative. However, this location is currently operating at LOS A and the added volume is not likely to worsen LOS to or below the LOS standard. All other intersections under Alternative 1A would be estimated to experience less than a five percent increase in volume during construction, which is not expected to impact traffic operations in the study area.

While additional truck trips may occur throughout the entire construction period, the greatest concentration is expected to be during the site preparation period (Phases 4 and 5). Because this site preparation truck traffic is not expected to impact traffic operations in the study area, it is expected that any other truck traffic associated with construction would be less and also not likely to impact traffic operations.

Impacts to property access for sites in the Alternative 1 site study area, including nearby residences and schools, would be minimal. Trucks entering or exiting the site are not expected to block driveways along the haul routes. If driveway closures are required, access to these properties would be maintained to the extent practical. If access to a business could not be maintained during construction, the specific construction activity would be reviewed to determine whether it could occur during non-business hours.

During construction of Alternative 1, transit service is unlikely to be impacted. No buses travel along NE 60th Street or 116th Avenue NE, the primary haul routes to access I-405. Buses do travel along NE 70th Street/NE 72nd Place as well as on I-405, but these are unlikely to be impacted by construction activities. Under Alternative 1A, it is likely that pedestrian and bicycle facilities on the north side of NE 60th Street would be impacted during construction and may undergo closures to allow truck access to the site.

Also, under Alternative 1A, because the existing Houghton RTS would be closed and deconstructed or demolished at the start of construction, customer use would shift to other RTS facilities in the King County system that are appropriately zoned, and permitted for solid waste handling activities, and able to handle diverted customer trips. These locations include the Factoria RTS in Bellevue and the Shoreline RTS in Shoreline, the two closest facilities.

Overall, the construction of the proposed Alternative 1A would result in a slight increase in traffic volumes due to workers traveling to and from the site, delivery of material, and truck hauling. Impacts to traffic are anticipated to be minor and temporary. Construction management and coordination would be similar to what is described in Section 3.13.3.2.1.1 and include mitigations described in Section 3.13.4.

3.13.3.3.1.2. Indirect Impacts

Under Alternative 1A, with the construction mitigation proposed for the minor impacts expected, no significant indirect impacts on existing transportation systems are expected during construction.

3.13.3.3.2 Impacts from Operation

3.13.3.3.2.1. Direct Impacts

All project impacts, regulatory requirements, and cumulative impacts related to transportation under Alternative 1A would include those described previously in Section 3.13.3.2.2, Impacts Common to All Action Alternatives.

As discussed under the No Action Alternative, background traffic volumes are forecast to increase throughout the Alternative 1A study area during the 2029 and 2040 AM and PM peak hours as a result of planned population and employment growth. To develop traffic volume estimates for the action alternatives, the forecast project trips (including self-haul, commercial, employees, and trucks) were layered on top of the No Action volumes. For Alternative 1 in Kirkland, since the future NERTS would replace the existing Houghton RTS, the increase in project trips for the future, larger facility was determined and added to the No Action volumes to avoid double counting. As discussed in Section 3.13.3.2.2, Alternative 1A is unlikely to result in modifications to the roadway network, active transportation facilities, or transit routes, and therefore no additional discussion is included in this section.

The new NERTS facility would include a hydraulic waste compactor that uses an enclosed trailer and a horizontal ram to increase the density of waste in transfer trailers to approximately 29 tons per trailer. This increase in waste density per trailer reduces the number of truck trips necessary to transport a given amount of waste, compared with trailers of un-compacted waste. Table 3.13-27 provides a summary of the estimated potential weekday and Saturday total vehicle volumes for No Action and Alternative 1A 2029/2040 conditions. To be conservative, trip generation for 2029 was assumed to be the same as trip generation for 2040.

Table 3.13-27. Estimated 2029/2040 Weekday and Saturday Total Vehicle Volumes – No Action Alternative and Action Alternative 1A

	2029/2040 No Action		2029/2040 Action Alternative 1A	
Vehicle Type	Weekday	Saturday	Weekday	Saturday
Self-haul	404	531	404	531
Commercial	111	0	111	0
Employee	10	10	10	10
Transfer Trailers	33	9	25	7

The transfer trailer volumes reflected in the table above and in all modeled traffic forecasts incorporate those trailer density increases to calculate truck trips for the King County waste projection used in this analysis.

As shown in Table 3.13-27, King County's tonnage projections produce the same traffic volumes between Alternative 1A and the No Action Alternative, however, Alternative 1A would include waste compaction. Therefore, the total project volumes for self-haul, commercial, and employee vehicles are the same, but Alternative 1A would have fewer transfer trailer vehicle volumes compared to the No Action Alternative.

Five intersections were analyzed for the Alternative 1A study area in the year of opening (2029) and the horizon year (2040), including three signalized intersections, one AWSC intersection, and one OWSC intersection. The reports from the operational analyses are included in Appendix H.

The 2029 and 2040 weekday AM and PM peak hour LOS and delay for the Alternative 1A study area intersections are shown in Table 3.13-28, compared with corresponding year No Action AM and PM peak hour LOS and delay. All intersections expected to meet the roadway standards under the No Action Alternative during the AM and PM peak hours would also meet the roadway standards under Alternative 1A.

As shown in Table 3.13-28, in the 2029 AM peak hour, the intersection at NE 68th Street and I-405 Southbound Ramps does not meet the LOS standard under the No Action Alternative and Alternative 1. Similarly, in the 2029 PM peak hour, the intersection at 116th Avenue NE and I-405 Northbound Ramps does not meet the LOS standard for the roadway under the No Action Alternative and Alternative 1. In the 2040 AM peak hour, the intersection at 116th Avenue NE and NE 70th Place as well as NE 68th Street and I-405 Southbound Ramps do not meet the LOS standards under the No Action Alternative and Alternative 1. Similarly, in the 2040 PM peak hour, the intersections at 116th Avenue NE and I-405 Northbound Ramps and NE 68th Street and I-405 Southbound Ramps also do not meet the LOS standards under the No Action Alternative and Alternative 1.

There is little to no change between the No Action Alternative and Alternative 1A 2029 and 2040 conditions. The greatest change is an increase of approximately three seconds of delay at the NE 68th Street and I-405 Southbound Ramp. All other study intersection delays would stay the same, decrease slightly, or increase by no more than one second in the AM and PM peak hours.

Table 3.13-28. Action Alternative 1A Weekday Intersection Level of Service and Delay – No Action Alternative and Action Alternative 1 Study Area.

				2029 No Action		2029 Alt 1		2040 No Action		2040 Alt 1	
ID	Intersection	Traffic Control	LOS Standard	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)
AM Peak											
101	116th Avenue NE and I-405 Northbound Ramps	Signal	D	C	27.4	C	27.4	C	35.0	D	35.1
102	116th Avenue NE and NE 70th Place	Signal	D	D	36.4	D	36.4	E	57.2	E	58.4
103	NE 68th Street and I-405 Southbound Ramps	Signal	D	E	64.3	E	64.0	F	115.7	F	118.2
104	NE 60th Street and 116th Avenue NE	AWSC[1]	D	A	9.8	A	9.8	B	10.3	B	10.6
105	NE 60th Street and Site Driveway	OWSC[2]	D	A	9.2	A	9.2	A	9.2	A	9.3
PM Peak											

Table 3.13-28. Action Alternative 1A Weekday Intersection Level of Service and Delay – No Action Alternative and Action Alternative 1 Study Area.

ID	Intersection	Traffic Control	LOS Standard	2029 No Action		2029 Alt 1		2040 No Action		2040 Alt 1	
				LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)
101	116th Avenue NE and I-405 Northbound Ramps	Signal	D	E	62.7	E	62.7	F	115.3	F	115.4
102	116th Avenue NE and NE 70th Place	Signal	D	C	23.8	C	23.7	C	31.6	C	31.5
103	NE 68th Street and I-405 Southbound Ramps	Signal	D	D	39.1	D	38.9	E	73.0	E	72.8
104	NE 60th Street and 116th Avenue NE	AWSC[1]	D	B	12.1	B	12.0	B	15.7	C	15.7
105	NE 60th Street and Site Driveway	OWSC[2]	D	A	9.4	A	9.4	A	9.6	A	9.6

Shading indicates intersections that are projected not to operate at roadway LOS standard.

Results are based on Highway Capacity Manual (HCM) 6 methodology where available. Otherwise, HCM 2000 methodology was reported (TRB 2000; 2016).

Intersection delay is measured by average seconds of delay per vehicle.

LOS = level of service; AWSC = all-way stop control; OWSC = one-way stop control.

1 For AWSC intersections, LOS is reported as an average delay of all of the movements, much like a signalized intersection.

2 For OWSC intersections, LOS is reported for the worst movement.

The 2029 and 2040 Saturday AM and PM peak hour LOS and delay for the Alternative 1A study area intersections are shown in Table 3.13-29, compared with corresponding year No Action AM and PM peak hour LOS and delay. All intersections expected to meet the roadway standards under the No Action Alternative during the AM and PM peak hours would also meet the roadway standards under Alternative 1A.

As shown in Table 3.13-29, there is little to no difference between the No Action Alternative and Alternative 1A 2029 and 2040 conditions, with all intersections generally at the same average delay in the AM and PM peak hours. All intersections operate at or better than the standards for the roadway in the 2029 AM and PM peak hours under Alternative 1A. In the 2040 PM peak hour, the intersection at NE 68th Street and I-405 Southbound Ramps fails to meet the standards for the roadway under the No Action Alternative and Alternative 1.

Table 3.13-29. Action Alternative 1A Saturday Intersection Level of Service and Delay – No Action Alternative and Action Alternative 1 Study Area.

ID	Intersection	Traffic Control	LOS Standard	2029 No Action		2029 Alt 1		2040 No Action		2040 Alt 1	
				LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)
AM Peak											

101	116th Avenue NE and I-405 Northbound Ramps	Signal	D	B	15.3	B	15.3	B	18.0	B	18.0
102	116th Avenue NE and NE 70th Place	Signal	D	B	19.1	B	19.1	C	21.2	C	21.2
103	NE 68th Street and I-405 Southbound Ramps	Signal	D	C	20.8	C	20.8	D	36.7	D	36.7
104	NE 60th Street and 116th Avenue NE	AWSC[1]	D	A	7.9	A	7.9	A	8.1	A	8.1
105	NE 60th Street and Site Driveway	OWSC[2]	D	A	9.0	A	9.0	A	9.0	A	9.0
PM Peak											
101	116th Avenue NE and I-405 Northbound Ramps	Signal	D	C	22.2	C	22.2	C	31.7	C	31.7
102	116th Avenue NE and NE 70th Place	Signal	D	C	25.2	C	25.2	C	30.9	C	30.9
103	NE 68th Street and I-405 Southbound Ramps	Signal	D	D	39.5	D	39.5	E	71.7	E	71.7
104	NE 60th Street and 116th Avenue NE	AWSC[1]	D	A	9.1	A	9.1	A	9.6	A	9.6
105	NE 60th Street and Site Driveway	OWSC[2]	D	A	9.2	A	9.2	A	9.3	A	9.3

Shading indicates intersections that are projected not to operate at roadway LOS standard.

Results are based on Highway Capacity Manual (HCM) 6 methodology where available. Otherwise, HCM 2000 methodology was reported (TRB 2000; 2016).

Intersection delay is measured by average seconds of delay per vehicle.

LOS = level of service; AWSC = all-way stop control; OWSC = one-way stop control.

1 For AWSC intersections, LOS is reported as an average delay of all of the movements, much like a signalized intersection.

2 For OWSC intersections, LOS is reported for the worst movement.

Table 3.13-30 provides queueing data for two off-ramps, summarizing their storage capacities and 95th percentile queue lengths during the Action Alternative 1A 2040 AM and PM peak hours for weekdays and Saturdays. The 95th percentile queues lengths for both off-ramps do not exceed the available storage length.

Table 3.13-30. 2040 Action Alternative 95th Percentile Off-Ramp Queue Lengths – Alternative 1

ID	Intersection	Approach	Available Storage Length (feet)	Weekday Queue Length (ft)		Saturday Queue Length (ft)	
				AM Peak	PM Peak	AM Peak	PM Peak
101	116th Ave NE & I-40Northbound Ramps	EB	1,250	360	750	225	310

103	NE 68th St/NE 72nd St & I-405 Southbound Ramps	WB	1,350	485	270	140	275

Under Action Alternative 1A, planned bus service in the Kirkland study area would be the same as the No Action Alternative. Additional bus service levels or rerouting to the transfer station would not be required. Transit service would experience higher levels of average delay --approximately six seconds on weekdays and up to eight seconds on Saturdays-- at the following intersections, similar to general purpose traffic:

- NE 68th Street and I-405 Southbound Ramps
- NE 60th Street and 116th Avenue NE
- NE 60th Street and Site Driveway

As discussed under the No Action Alternative, background traffic volumes are expected to increase for 2029 and 2040 over the existing volumes under the Action Alternatives. As traffic volumes increase, the potential for traffic safety issues is also likely to increase. The overall vehicular and non-motorized traffic in the Alternative 1A study area under 2029 and 2040 conditions is anticipated to be higher than occurs under existing conditions, with or without the project.

As discussed above, the new NERTS facility would generate approximately 550 vehicles per day on weekdays and weekends in 2040, compared with the existing 290 to 350 vehicles per day on weekdays and weekends, adding 200 to 260 additional vehicles per day. Because the background and project volumes are expected to be the same between the No Action and Action Alternative 1A (for the comparable year, 2029 or 2040, except for the reduction in transfer truck volumes due to compaction) no difference in impacts on active transportation infrastructure and safety, including for pedestrians, bicycles, and equestrians is anticipated for Alternative 1A compared to the No Action Alternative. Impacts from Alternative 1A on vehicular safety within the study area would also be anticipated to remain similar to the No Action Alternative conditions. Although not required, potential mitigations that could add to the study area vehicular and active transportation safety include:

- Installation of a signal at the NE 60th Street and 116th Avenue NE intersection. Moving the southbound left-turn stop bar back would also assist in improving the turning path for trucks.
- Installation of speed feedback signs at locations along NE 60th Street and 116th Avenue NE. These are shown to have the potential to lower speeds and improve safety.

Action Alternative 1A would decrease transfer truck traffic in the study area compared with the No Action Alternative. Due to compacted loads in the future, on weekdays, truck volumes could be less than the No Action Alternative 25 transfer trailers per day, with approximately four transfer trailer trips each during the AM and PM peak hours. Weekends could have up to seven transfer trailers per day, with approximately two each during the AM and PM peak hours. Freight would have the same levels of delay as general-purpose traffic on roadways and at intersections throughout the study area.

3.13.3.3.2.2. Indirect Impacts

Under Alternative 1A, indirect impacts associated with operation would be similar to those discussed in Section 3.13.3.2.2. No significant indirect impacts on existing transportation systems are expected during operation.

3.13.3.3.3 Cumulative Impacts

Under Alternative 1A, cumulative impacts associated with operation would be similar to those discussed in Section 3.13.3.2.3. The traffic analyses reflect the cumulative impacts of the NERTS project, other planned and programmed developments, and associated increases in traffic within the study area. Therefore, Alternative 1A, when considered with past and reasonably foreseeable future transportation projects, would contribute to minor cumulative impacts on transportation facilities in the study area.

3.13.3.4Alternative 1B

This section describes impacts unique to Alternative 1B, along with applicable mitigation measures. Alternative 1B would construct the new NERTS facility at the existing Houghton RTS property at 11724 NE 60th ST in Kirkland while the existing transfer station building is open and operating. The old transfer station building would then be closed and repurposed or replaced after the new station is open.

3.13.3.4.1 Impacts from Construction

3.13.3.4.1.1. Direct Impacts

All project impacts, regulatory requirements, and cumulative impacts related to transportation under Alternative 1B would include those described previously in Section 3.13.3.2.1, Impacts Common to All Action Alternatives.

Construction impacts associated with Alternative 1B are expected to be somewhat similar to those for Alternative 1A. Impacts on construction access and truck haul routes, property access, transit, and nonmotorized facilities would be the same as Alternative 1A and with similar comparisons to the No Action Alternative.

Site preparation work is expected to last approximately twelve months, assuming 12-hour workdays, six days per week. Under Alternative 1B, the construction of the new NERTS facility is anticipated to require approximately 219,277 cubic yards (CY) of cut/export and approximately 196,945 cubic yards of fill/import if utilizing the direct excavation to native soil method; construction is anticipated to require approximately 110,218 cubic yards (CY) of cut/export and approximately 76,674 cubic yards of fill/import if utilizing the drilled piles to native soil method. All export and import material would be transported to and from the site in dump trucks with trailers with an assumed capacity of 20 cubic yards. Export activity would result in approximately 18 to 36 trucks per day (5,511 to 10,945 trucks total) and import activity would result in approximately 12 to 32 trucks per day (3,692 to 9,847 trucks total).

Table 3.13-31 summarizes the quantity of export and import material estimated for development of Alternative 1B, the associated trucks, and the estimated durations of work. To provide a conservative estimate of construction activity, the construction transportation analysis assumed no reuse of on-site material, although KCSWD will attempt to maximize the reuse of on-site material. On-site material reuse would decrease the estimated number of trucks associated with construction activities.

Table 3.13-31. Truck Activity Associated with Site Preparation for Action Alternative 1B.

Export Material (cubic yards)	Export Total Trucks per Day	Export Total Project Trucks	Import In-Place (cubic yards)	Import Total Trucks per Day	Import Total Project Trucks	Site Preparation Duration
110,218 - 219,277	18 - 36	5,511 - 10,964	76,675 - 196,945	12 - 32	3,692 - 9,847	12 months

As described in Section 3.13.3.2.1, trucks would traverse the haul routes during the entirety of the 12-hour daily construction period, including to and from the site during AM and PM peak periods. With approximately 30 to 68 trucks distributed evenly during the daily construction period, the average number of trucks per hour would be three to six trucks for material import and export, and with a PCE of 2.5, equates to five to fifteen PCE per hour, and between 75 and 170 PCEs per day.

The haul routes and location of construction impacts for Alternative 1B would be the same as for Alternative 1A. Because the construction staging, origin of import material, and destination for export material are unknown at this time, the volumes forecast at each intersection represent the highest possible volumes for all daily construction activity. A single potential route identified as a haul route could be used for all daily trucks, or the total daily volumes could be distributed among multiple routes.

The estimated daily truck PCEs associated with site preparation would represent up to 11.9 percent of daily existing entering volumes at study intersections for Alternative 1B. Table 3.13-32 summarizes the study intersection entering ADTs as well as the estimated daily truck PCEs as a percentage of entering ADT for each alternative Under Alternative 1B.

Table 3.13-32. Estimated Daily Truck Activity for Action Alternative 1B Compared with Existing ADT.

ID	Study Intersection	Estimated Existing Entering ADT (vehicles/day)[1]	Daily Truck Trips as a Percentage of Single-Direction AADT
101	116th Avenue NE and I-405 Northbound Ramps	14,600	1.0-2.3%
102	116th Avenue NE and NE 70th Place	21,450	<1-1.6%
103	NE 68th Street and I-405 Southbound Ramps	18,350	<1-1.9%
104	NE 60th Street and 116th Avenue NE	7,300	2.1-4.7%
105	NE 60th Street and Site Driveway	2,850	5.3-11.9%

ADT = average daily traffic

[1] Entering ADTs were estimated from the existing turning movement volumes at each study intersection.

[2] The range shown represents the two excavation options for Alternative 1B.

Alternative 1B excavation to native soil would have the highest potential traffic impact during construction (most trucks), while the Alternative 1B with piles would have the lowest potential traffic impact during construction (fewest trucks). Alternative 1A impacts would fall between the Alternative 1B options.

The biggest volume increase and impact is likely to occur at the site driveway. Because the existing transfer station would remain open during construction under Alternative 1B, this may increase delay at the site driveway more under that alternative. However, this location is currently operating at LOS A and the added volume is not likely to worsen LOS to or below the LOS standard. All other intersections under Alternative 1B would be estimated to experience less than a five percent increase in volume during construction, which is not expected to impact traffic operations in the study area.

Under Alternative 1B, the existing Houghton RTS would remain open during construction and customer use would not shift to other RTS facilities in the King County system. As a result, for the duration of construction, construction-related traffic (30 to 68 trucks per day) would be added to traffic related to operation of the existing facility. While additional truck trips may occur throughout the entire construction period, the greatest concentration is expected to be during the site preparation period (Phases 4 and 5). Because this site preparation truck traffic is not expected to impact traffic operations in the study area, it is expected that any other truck traffic associated with construction would be less and also not likely to impact traffic operations. Compared with Alternative 1A , Alternative 1B could result in minor differences in the timing of construction truck traffic due to the altered timing of replacement or repurposing of the existing transfer building.

Construction management and coordination would be similar to what is described in Section 3.13.3.2.1.1 and include mitigations described in Section 3.13.4.

3.13.3.4.1.2. Indirect Impacts

Under Alternative 1B, indirect impacts from construction would be similar to those expected for Alternative 1A.

3.13.3.4.2 Impacts from Operation

3.13.3.4.2.1. Direct Impacts

All project impacts, regulatory requirements, and cumulative impacts related to transportation under Alternative 1B would include those described previously in Section 3.13.3.2.1, Impacts Common to All Action Alternatives.

Operational impacts associated with Alternative 1B are expected to be largely similar to those for Alternative 1A. Impacts on roadway network (intersections, traffic volumes, and operations), active transportation facilities, transit, safety, and freight would be the same as Alternative 1A and with similar comparisons with the No Action Alternative.

3.13.3.4.2.2. Indirect Impacts

Under Alternative 1B, indirect impacts from operation would be similar to those expected for Alternative 1A.

3.13.3.4.3 Cumulative Impacts

Under Alternative 1B, cumulative impacts associated with operation would be similar to those discussed in Section 3.13.3.2.3. The traffic analyses reflect the cumulative impacts of the NERTS project, other planned and programmed developments, and associated increases in traffic within the study area. Therefore, Alternative 1B, when considered with past and reasonably foreseeable future transportation projects, would contribute to minor cumulative impacts on transportation facilities in the study area.

3.13.3.5Alternative 2

This section describes impacts unique to Alternative 2, along with applicable mitigation measures. Alternative 2 would construct the new NERTS facility on six tax parcels in the 15000 block of Woodinville-Redmond Road NE in Woodinville.

3.13.3.5.1 Impacts from Construction

3.13.3.5.1.1. Direct Impacts

All project impacts, regulatory requirements, and cumulative impacts related to transportation under Alternative 1A would include those described previously in Section 3.13.3.2.1, Impacts Common to All Action Alternatives.

Construction under Alternative 2 also would require deconstruction or demolition of existing structures, export of building debris and excavated material, and import of fill material. To provide a conservative estimate of construction activity, the development scenarios assume no reuse of on-site material, although reuse is possible, and KCSWD will attempt to maximize the reuse of on-site material. Construction access for Alternative 2 would be provided from Woodinville-Redmond Road NE at the site driveway, located at approximately SR 202 milepost 1.45. Trucks would access eastbound and westbound SR 522 at the 132nd Avenue NE interchange via Woodinville-Redmond Road NE, NE 175th Street, and 131st Avenue NE/132nd Avenue NE.

Under Alternative 2, deconstruction or demolition and removal of the existing structures on the northern parcels would bring construction equipment and work crew vehicles to the site and study area. Construction vehicles would follow a route and schedule that would avoid the AM and PM peak hours as much as possible. Section 3.7 estimates approximately 12,000 cubic yards of rubble from deconstruction or demolition of existing structures and pavements would be removed from the existing site. Assuming 50 cubic yards capacity per large C&D disposal trailer, this would likely require approximately 240 truck round trips of haul away during the site preparation period, which is greater than under Alternative 1. The deconstruction or demolition would be coordinated with the City of Woodinville and traffic control plans would be implemented. Based on the short duration of the activity, the provisions of the construction management plan, and anticipated traffic volumes, impacts of this activity would be relatively minor.

Site preparation work would last approximately twelvemonths, assuming 12-hour workdays, six days per week. Under Alternative 2, the construction of the new NERTS facility is anticipated to require approximately 89,196 CY of cut/export and approximately 10,667 CY of fill/import utilizing the direct excavation to native soil method; construction utilizing the drilled piles to native soil is not anticipated under Alternative 2. All export and import material would be transported to and from the site in dump trucks with trailers with an assumed capacity of 20 cubic yards. Export activity would result in approximately 14 trucks per day (4,460 trucks total) and import activity would result in approximately two trucks per day (533 trucks total). Table 3.13-33 summarizes the estimated quantity of export and import material for development of Alternative 2, the associated truck trips, and the estimated durations of work. As with Alternative 1, the construction transportation analysis assumed no reuse of on-site material, although reuse is possible.

Table 3.13-33. Truck Activity Associated with Site Preparation for Action Alternative 2.

Export Material (cubic yards)	Export Total Trucks per Day	Export Total Project Trucks	Import In Place (cubic yards)	Import Total Trucks per Day	Import Total Project Trucks	Site Preparation Duration
89,196	14	4,460	10,667	2	533	12 months

As described in Section 3.13.3.2.1, trucks would traverse the haul routes over the entire 12-hour daily construction period, including to and from the site during AM and PM peak periods. With approximately 16 truck trips distributed evenly during the daily construction period under Alternative 2, the average number of truck trips per hour would be two, less than both options under Alternative 1. Each truck round trip includes an outbound and inbound segment, resulting in 40 PCE daily PCEs in the study area associated with export and import activity.

To estimate the traffic operational impacts for Alternative 2, similar truck distribution assumptions were made as described under Alternative 1 and detailed in Appendix H, including use of a 2.5 PCE to estimate the number of new trips that would need to be accommodated along the truck routes. Alternative 2 would result in two trucks per hour for material import and export, and with a PCE of 2.5, equates to three to eight PCE per hour.

The haul routes, and therefore construction impacts, would be concentrated on state facilities, including SR 522 and SR 202, as well as several collector and arterial streets, including 131st Avenue NE/132nd Avenue NE and NE 175th Street. Because the construction staging, origin of import material, and destination for export material are unknown at this time, the volumes forecast on each roadway segment represent the highest possible volumes for all daily construction activity. As with Alternative 1, a single potential roadway identified as a haul route could be used for all daily truck trips, or the total daily volumes could be distributed among multiple roadways under Alternative 2.

The estimated daily truck PCE trips associated with site preparation would represent up to 0.9 percent of daily existing entering volumes at study intersections for Alternative 2. Table 3.13-34 shows the study intersection entering ADTs as well as the estimated daily truck PCEs as a percentage of entering ADT under Alternative 2.

Table 3.13-34. Estimated Daily Truck Activity for Action Alternative 2 Compared with Existing ADT.

ID	Study Intersection	Estimated Existing Entering ADT (vehicles/day)[1]	Daily Truck Trips as a Percentage of Single-Direction AADT
201	SR 522 Westbound Ramps and 131st Avenue NE	24,350	<1%
202	SR 522 Eastbound Ramps and 131st Avenue NE	33,350	<1%
203	Little Bear Creek Parkway and 131st Avenue NE	32,600	<1%
204	NE 175th Street and 131st Avenue NE	33,300	<1%
205	Woodinville-Redmond Road NE and NE 175th Street	20,300	<1%
206	140th Avenue NE and NE 171st Street	25,850	<1%
207	Woodinville-Redmond Road NE and NE 145th Street	15,300	<1%
208	Village Road and NE 145th Street	9,000	<1%
209	148th Avenue NE/Woodinville-Redmond Road NE and NE 145th Street	22,900	<1%
210	Woodinville-Redmond Road and NE 124th Street	34,700	<1%
211	NE 116th Street and Woodinville-Redmond Road	18,650	<1%

ADT = average daily traffic

[1] The site driveway was not included as this driveway does not currently exist. Additionally, the two study intersections located along Brickyard Road NE were not included as haul trucks would not be routed through those intersections due to geometric constraints.

[2] Entering ADTs were estimated from the existing turning movement volumes at each study intersection.

All study intersections under Alternative 2 would be estimated to experience less than a one percent increase in volume during construction, which is not expected to impact traffic operations in the study area. As with Alternative 1, while additional truck trips may occur throughout the entire construction period, the greatest concentration under Alternative 2 is expected to occur during the site preparation period (Phase 4). Because this site preparation truck traffic is not expected to impact traffic operations in the study area, it is expected that any other truck traffic associated with construction would be lower in volume and also not likely to impact traffic operations.

Impacts to property access for sites in the Alternative 2 site study area, including nearby businesses, schools, and farms, would be minimal. Trucks entering or exiting the site are not expected to block driveways along the haul routes. If driveway closures are required, access to these properties would be maintained to the extent practical. If access to a business could not be maintained during construction, the specific construction activity would be reviewed to determine whether it could occur during non-business hours.

During construction of Alternative 2, transit service is unlikely to be impacted. No buses travel along Woodinville-Redmond Road NE north of the Alternative 2 site, the primary portion of the haul route to access SR 522. Buses do travel along NE 175th Street and 131st Avenue NE/132nd Avenue NE, as well as on SR 522, but these are unlikely to be impacted by construction activities. Also under Alternative 2, no pedestrian facilities exist or are currently planned along Woodinville-Redmond Road NE adjacent to the

Alternative 2 site, so no impact to pedestrians is expected. One exception is the Eastrail Trail Project, which will convert the existing rail line on the east side of Woodinville-Redmond Road NE to a multi-use path. However, this is on the opposite side of the roadway from the NERTS site, so no impacts are expected. Bicyclists using the shoulder on Woodinville-Redmond Road NE could be impacted during construction and experience closures to allow truck access to the site.

Overall, the construction of the proposed Alternative 2 would result in a slight increase in traffic volumes, due to workers traveling to and from the site, delivery of material, and truck hauling similar to Alternative 1. Impacts to traffic are anticipated to be minor and temporary. Construction management and coordination would be similar to what is described in Section 3.13.3.2.1.1 and include mitigations described in Section 3.13.4.

3.13.3.5.1.2. Indirect Impacts

Under Alternative 2, with the construction mitigation proposed for the minor impacts expected, no significant indirect impacts on existing transportation systems are expected during construction.

3.13.3.5.2 Impacts from Operation

3.13.3.5.2.1. Direct Impacts

All project impacts, regulatory requirements, and cumulative impacts related to transportation under Alternative 1A would include those described previously in Section 3.13.3.2.2, Impacts Common to All Action Alternatives.

As discussed under the No Action Alternative, background traffic volumes are forecast to increase throughout the Alternative 2 study area during the 2029 and 2040 AM and PM peak hours as a result of planned population and employment growth. To develop traffic volumes for the action alternatives, the forecast project trips, including self-haul, commercial, employees, and trucks, were added to the No Action volumes. For Alternative 2 in Woodinville, project trips were added directly to the No Action volumes. As discussed in Section 3.13.3.2.2, Alternative 2 is unlikely to result in modifications to the roadway network, active transportation facilities, or transit routes, and therefore no additional discussion of these topics is included in this section.

The new NERTS facility would include a hydraulic waste compactor that uses an enclosed trailer and a horizontal ram to increase the density of waste in transfer trailers to approximately 29 tons. This increase in waste density per trailer reduces the number of truck trips necessary to transport a given amount of waste, compared with trailers of un-compacted waste. Table 3.13-35 provides a summary of the estimated potential weekday and Saturday total vehicle volumes for the No Action Alternative and Alternative 2 2029/2040 conditions. As with Alternative 1, to be conservative, trip generation for 2029 was assumed to be the same as trip generation for 2040.

Table 3.13-35. Estimated 2029/2040 Weekday and Saturday Total Vehicle Volumes – No Action Alternative and Action Alternative 2

	2029/2040 No Action		2029/2040 Action Alternative 2	
Vehicle Type	Weekday	Saturday	Weekday	Saturday
Self-haul	-	-	456	583
Commercial	-	-	111	0
Employee	-	-	10	10
Transfer Trailers	-	-	25	7

The transfer trailer volumes shown in the table above, and in all modeled traffic forecasts, incorporate trailer density increases to calculate truck trips for the King County waste projection used in this analysis.

As shown in Table 3.13-35, the 2029/2040 traffic volumes for Alternative 2 are anticipated to increase when compared with the No Action Alternative based on the new facility and tonnage projections provided by King County. MRW service would also increase traffic to the site compared with Alternatives 1A and 1B. Alternative 2 would produce new vehicle trips of all types in the study area due to the presence of the new facility when compared with the absence of a facility under the No Action Alternative. All employee and transfer trailer trips would be new to the Alternative 2 study area. However, while Table 3.13-35 conservatively shows no self-haul and commercial vehicle volumes under the No Action condition and an increase under Alternative 2, some of these trips already exist on the roadway network in and around the Alternative 2 study area. Under Alternative 2, the destination for these trips would switch from the existing Houghton RTS to the Alternative 2 site. Modeling results shown below are based on the conservative assumption shown in the table.

Fourteen intersections, including the Alternative 2 driveway, were analyzed for the Alternative 2 study area in the year of opening (2029) and the horizon year (2040), including eight signalized intersections, four OWSC/TWSC intersections, and two roundabouts. The reports from the operational analyses are included in Appendix H.

The 2029 and 2040 weekday AM and PM peak hour LOS and delay for the Alternative 2 study area intersections are shown in Table 3.13-36, compared with corresponding year No Action AM and PM peak hour LOS and delay. In 2029 and 2040, all intersections expected to meet the roadway standards under the No Action Alternative during the AM and PM peak hours would also meet the roadway standards under Alternative 2.

As shown in Table 3.13-36, in the 2029 AM peak hour, two intersections, at NE 175th Street and 131st Avenue NE and at Brickyard Road NE/116th Avenue NE and Juanita Woodinville Way NE/NE 160th Street, fail to meet the standards for the roadway under the No Action Alternative and Alternative 2. In the 2029 PM peak hour, three intersections at 140th Avenue NE and NE 171st Street, at NE 175th Street and 131st Avenue NE, and at Brickyard Road NE/116th Avenue NE and Juanita Woodinville Way NE/NE 160th Street, fail to meet the standards for the roadway under the No Action Alternative and Alternative 2. In the 2040 AM peak hour, four intersections, NE 175th Street and 131st Avenue NE, Woodinville-Redmond

Road NE and NE 175th Street, Brickyard Road NE and NE Woodinville Drive, and Brickyard Road NE/116th Avenue NE and Juanita Woodinville Way NE/NE 160th Street, fail to meet the standards for the roadway under the No Action Alternative and Alternative 2. In the 2040 PM peak hour, four intersections, NE 175th Street and 131st Avenue NE, 140th Avenue NE and NE 171st Street, Woodinville-Redmond Road NE and NE 124th Street, and Brickyard Road NE/116th Avenue NE and Juanita Woodinville Way NE/NE 160th Street, fail to meet the standards for the roadway under the No Action Alternative and Alternative 2.

There are mostly minor differences between No Action Alternative and Alternative 2 2029 and 2040 weekday conditions, with most study intersections meeting roadway LOS standards at four seconds or less of added average delay in 2029 and 2040 AM and PM peak hours due to the project, and generally at or less than one second of average delay in the AM and PM peak hours due to the project.

The NE 175th Street and 131st Avenue NE intersection does not meet roadway LOS standards in the 2029 and 2040 AM and the 2029 and 2040 PM peak hours with or without the Alternative 2 project. With Alternative 2, this intersection would experience up to 14 seconds of added average delay in the AM peak hour and up to eight seconds of added average delay in the PM peak hour, compared with No Action.

The 140th Avenue NE and NE 171st Street intersection meets roadway LOS standards in the 2029 and 2040 AM peak hour, with less than one second of average delay due to the project. This same intersection does not meet roadway LOS standards in the 2029 and 2040 PM peak hour with or without the Alternative 2 project, but with less than one second of average delay due to the project.

The Woodinville-Redmond Road NE and NE 175th Street intersection meets roadway LOS standards in the 2029 AM peak hour, with up to 13 seconds of average delay due to the project. This same intersection does not meet roadway LOS standards in the 2040 AM peak hour with or without the Alternative 2 project, with up to 16 seconds of average delay due to the project. This intersection does meet the roadway LOS standards in the 2029 and 2040 PM peak hour with or without the Alternative 2 project, with up to five seconds of average delay in the PM peak hour due to the project. For this intersection in the 2029 and 2040 AM weekday peak hour, additional mitigation could be added as part of the project to reduce delays, including extending the northbound right-turn pocket of the Woodinville-Redmond Road NE and NE 175th Street intersection.

The Woodinville-Redmond Road NE and NE 124th Street intersection meets roadway LOS standards in the 2029 and 2040 AM peak hour, with less than four seconds of average delay due to the project. This same intersection does not meet roadway LOS standards in the 2040 PM peak hour with or without the Alternative 2 project, with less than five seconds of average delay due to the project.

The Brickyard Road NE/116th Avenue NE and Juanita Woodinville Way NE/NE 160th Street intersection does not meet roadway LOS standards in the 2029 and 2040 AM and PM peak hours with or without the project. With Alternative 2, this intersection would experience a negligible increase in added average delay in the 2029 AM peak hour and up to 15 seconds of average added delay in the 2029 PM peak hour, compared with No Action. An increase in average delay is expected in the 2040 AM and PM peak hours due to the project, though the total delay (existing plus project) is estimated at greater than 300 seconds.

Possible mitigation at this intersection could include consideration of potential turn-movement restrictions and/or access changes.

The Brickyard Road NE and NE Woodinville Drive intersection meets the roadway LOS standards in the 2029 AM and PM peak hours, and the 2040 PM peak hour with or without the project, with no more than two seconds of added average delay due to the project. The intersection does not meet the roadway LOS standards in the 2040 AM peak hour with or without the project, experiencing up to four seconds of added average delay due to the project, compared with No Action. Possible mitigation at this intersection could include installation of a signal.

The 2029 and 2040 Saturday AM and PM peak hour LOS and delay for the Alternative 2 study area intersections are shown in Table 3.13-37, compared with corresponding year No Action AM and PM peak hour LOS and delay. In 2029 and 2040, all intersections expected to meet the roadway standards under the No Action Alternative during the AM and PM peak hours would also meet the roadway standards under Alternative 2. In the 2029 AM peak hour, all study area intersections operate at or better than the standards for the roadway under the No Action Alternative and Alternative 2. In the 2029 PM peak hour, one intersection fails to meet the standards for the roadway at Brickyard Road NE/116th Avenue NE and Juanita Woodinville Way NE/NE 160th Street under the No Action Alternative and Alternative 2. In the 2040 AM peak hour, all study area intersections operate at or better than the standards for the roadway in Alternative 2. In the 2040 PM peak hour, two intersections at NE 175th Street and 131st Avenue NE and at Brickyard Road NE/116th Avenue NE and Juanita Woodinville Way NE/NE 160th Street, fail to meet the standards for the roadway, which would occur with or without the Alternative 2 project.

As shown in Table 3.13-37 and similar to the weekday analysis, there are minor differences between No Action Alternative and Alternative 2 2029 and 2040 Saturday conditions. Most study intersections that meet roadway LOS standards are at or less than one second of average delay in the AM and PM peak hours due to the project. One intersection that meets roadway LOS standards in the 2029 and 2040 AM and PM peak hours, Woodinville-Redmond Road NE and NE 175th Street, would experience up to three seconds of average delay in the 2029 PM peak hour and up to nine seconds of average delay in the 2040 PM peak hour due to the project. One intersection that meets roadway LOS standards in the 2029 PM peak hour, NE 175th Street and 131st Avenue NE, would experience up to two seconds of average delay due to the project. This same intersection does not meet roadway LOS standards in the 2040 PM peak hour, with up to two seconds of average delay due to the project. One intersection that does not meet roadway LOS standards in the 2029 and 2040 PM peak hours, Brickyard Road NE/116th Avenue NE and Juanita Woodinville Way NE/NE 160th Street, would experience up to two seconds of average added delay in the 2029 PM peak hour and up to eight seconds of average added delay in the 2040 PM peak hour, due to the project and compared with No Action. Possible mitigation at this intersection could include consideration of potential turn-movement restrictions and/or access changes.

None of the project-induced weekday or weekend operating conditions are expected to significantly affect access to businesses or other properties in the study area, including agricultural areas on the east side of the Sammamish River. Access to farms in the Sammamish APD from the west side of the Sammamish River for farm equipment and farm workers would likely be from NE 145th Street to the south or alternately

but less likely from NE 175th Street and downtown Woodinville to the north. Considering any project-related traffic from the south along SR 202, the Woodinville-Redmond Road NE and NE 145th Street intersection and the 148th Avenue NE/Woodinville-Redmond Road NE and NE 145th Street roundabout are forecast to operate at LOS A or B in 2029/2040 in the peak AM or PM hour with or without the project.

Without the project (No Action), some intersections are already operating below the LOS standard and are expected to continue to do so with the project. Some intersections may experience increased delay as a result of the project. However, because the change in delay does not worsen the LOS at any of the study intersections to below the LOS standard as a direct result of the project, the impacts are not considered significant, and no additional traffic mitigation is required to improve the LOS.

Table 3.13-36. Action Alternative 2 Weekday Intersection Level of Service and Delay – Action Alternative 2 Study Area.

ID	Intersection	Traffic Control	LOS Standard	2029 No Action			2029 Alt 2			2040 No Action			2040 Alt 2		
				LOS	Delay (sec)	v/c	LOS	Delay (sec)	v/c	LOS	Delay (sec)	v/c	LOS	Delay (sec)	v/c
AM Peak															
201	SR 522 Westbound Ramps and 131st Avenue NE[3,6]	Signal	D	-	-	-	-	-	-	-	-	-	-	-	-
202	SR 522 Eastbound Ramps and 131st Avenue NE	Signal	D	B	14.9	-	B	14.8	-	B	17.5	-	B	17.5	-
203	Little Bear Creek Parkway and 131st Avenue NE	Signal	E	B	11.1	-	B	11.0	-	B	12.1	-	B	12.0	-
204	NE 175th Street and 131st Avenue NE	Signal	E	F	177.3	-	F	191.7	-	F	211.9	-	F	225.3	-
205	Woodinville-Redmond Road NE and NE 175th Street[7]	Signal	E	E	56.3	-	E	68.6	-	F	100.0	-	F	115.9	-
206	140th Avenue NE and NE 171st Street	Signal	E	C	35.0	-	D	35.1	-	D	52.6	-	D	52.8	-
207	Woodinville-Redmond Road NE and NE 145th Street	OWSC[1] RAB[4]	E	A	7.4	0.30	A	7.5	0.31	A	7.7	0.37	A	7.8	0.39
208	Village Road and NE 145th Street	RAB	D[2]	A	4.5	0.27	A	4.7	0.28	A	5.0	0.32	A	5.2	0.34
209	148th Avenue NE/Woodinville-Redmond Road NE and NE 145th Street	RAB	D[2]	A	6.0	0.50	A	6.1	0.50	A	7.7	0.61	A	8.0	0.62
210	Woodinville-Redmond Road NE and NE 124th Street[7]	Signal	E	D	44.7	-	D	46.5	-	E	76.2	-	E	79.8	-
211	NE 116th Street and Woodinville-Redmond Road NE	Signal	E	B	16.9	-	B	17.1	-	C	21.8	-	C	22.6	-
212	Woodinville-Redmond Road NE and Site Driveway[5]	OWSC[1]	E	-	-	-	B	13.9	-	-	-	-	C	15.4	-
213	Brickyard Road NE and NE Woodinville Drive	OWSC[1]	E	D	28.4	-	D	29.7	-	F	55.1	-	F	58.9	-
214	Brickyard Road NE/116th Avenue NE and Juanita Woodinville Way NE/NE 160th Street	TWSC[1]	E	F	289.6	-	F	289.6	-	F	> 300	-	F	> 300	-
PM Peak															
201	SR 522 Westbound Ramps and 131st Avenue NE[3,6]	Signal	D	-	-	-	-	-	-	-	-	-	-	-	-

Table 3.13-36. Action Alternative 2 Weekday Intersection Level of Service and Delay – Action Alternative 2 Study Area.

ID	Intersection	Traffic Control	LOS Standard	2029 No Action			2029 Alt 2			2040 No Action			2040 Alt 2		
				LOS	Delay (sec)	v/c	LOS	Delay (sec)	v/c	LOS	Delay (sec)	v/c	LOS	Delay (sec)	v/c
202	SR 522 Eastbound Ramps and 131st Avenue NE	Signal	D	C	25.0	-	C	25.0	-	C	31.8	-	C	31.8	-
203	Little Bear Creek Parkway and 131st Avenue NE	Signal	E	D	39.6	-	D	39.6	-	D	47.4	-	D	47.4	-
204	NE 175th Street and 131st Avenue NE	Signal	E	F	87.4	-	F	93.0	-	F	122.7	-	F	130.6	-
205	Woodinville-Redmond Road NE and NE 175th Street[7]	Signal	E	D	48.3	-	D	51.6	-	E	66.5	-	E	70.7	-
206	140th Avenue NE and NE 171st Street	Signal	E	F	93.7	-	F	94.0	-	F	140.9	-	F	140.7	-
207	Woodinville-Redmond Road NE and NE 145th Street	OWSC[1] RAB[4]	E	A	8.0	0.58	A	8.4	0.61	A	10.0	0.72	B	10.9	0.76
208	Village Road and NE 145th Street	RAB	D[2]	A	5.4	0.35	A	5.6	0.37	A	6.1	0.42	A	6.4	0.44
209	148th Avenue NE/Woodinville-Redmond Road NE and NE 145th Street	RAB	D[2]	A	7.3	0.50	A	7.4	0.51	B	10.2	0.65	B	10.5	0.66
210	Woodinville-Redmond Road NE and NE 124th Street[7]	Signal	E	E	73.7	-	E	77.0	-	F	123.8	-	F	128.4	-
211	NE 116th Street and Woodinville-Redmond Road NE	Signal	E	C	29.1	-	C	31.3	-	E	58.6	-	E	63.3	-
212	Woodinville-Redmond Road NE and Site Driveway[5]	OWSC[1]	E	-	-	-	C	15.8	-	-	-	-	C	18.2	-
213	Brickyard Road NE and NE Woodinville Drive	OWSC[1]	E	D	28.7	-	D	29.7	-	E	45.9	-	E	47.7	-
214	Brickyard Road NE/116th Avenue NE and Juanita Woodinville Way NE/NE 160th Street	OWSC[1]	E	F	166.5	-	F	180.9	-	F	> 300	-	F	> 300	-

Shading indicates intersections that are projected not to operate at roadway LOS standard.

Results are based on Highway Capacity Manual (HCM) 6 methodology where available. Otherwise, HCM 2000 methodology was reported (TRB 2000; 2016).

Intersection delay is measured by average seconds of delay per vehicle.

LOS = level of service; v/c = volume to capacity ratio; OWSC = one-way stop control; TWSC = two-way stope control; RAB = roundabout.

[1] For OWSC and TWSC intersections, LOS is reported for the worst movement.

[2] For roundabouts, the v/c for each lane group is the primary controlling measure of effectiveness. Roundabouts will be considered failing if the v/c > 0.9, even if the LOS is better than D.

[3] In the No Action Alternative, all movements at this intersection are free.

[4] In the No Action Alternative, this intersection is converted to a roundabout.

[5] In the No Action Alternative, this intersection does not exist.

[6] Intersection 201 - SR 522 Westbound Ramps and 131st Avenue NE – was removed from the analysis due to the anticipated reconfiguration of the interchange/ramps as part of the trestle replacement and road widening project identified in the first bullet in Section 3.13.3.1.2.2.1

[7] Signal timings were optimized for the 2040 No Action Alternative and Alternative 2 at Intersection #205 in the PM peak hour and at Intersection #210 in the AM peak hour.

Table 3.13-37. Action Alternative 2 Saturday Intersection Level of Service and Delay – Action Alternative 2 Study Area.

ID	Intersection	Traffic Control	LOS Standard	2029 No Action			2029 Alt 2			2040 No Action			2040 Alt 2		
				LOS	Delay (sec)	v/c	LOS	Delay (sec)	v/c	LOS	Delay (sec)	v/c	LOS	Delay (sec)	v/c
AM Peak															
201	SR 522 Westbound Ramps and 131st Avenue NE[3,6]	Signal	D	-	-	-	-	-	-	-	-	-	-	-	-
202	SR 522 Eastbound Ramps and 131st Avenue NE	Signal	D	B	15.3	-	B	15.1	-	B	16.8	-	B	16.6	-
203	Little Bear Creek Parkway and 131st Avenue NE	Signal	E	C	21.7	-	C	21.5	-	C	22.7	-	C	22.6	-
204	NE 175th Street and 131st Avenue NE	Signal	E	C	30.8	-	C	30.9	-	C	32.3	-	C	32.5	-
205	Woodinville-Redmond Road NE and NE 175th Street[7]	Signal	E	C	24.9	-	C	25.9	-	C	28.0	-	C	28.5	-
206	140th Avenue NE and NE 171st Street	Signal	E	C	26.7	-	C	26.6	-	C	27.0	-	C	27.0	-
207	Woodinville-Redmond Road NE and NE 145th Street	OWSC[1] RAB[4]	E	A	6.6	0.16	A	6.7	0.19	A	6.7	0.19	A	6.8	0.23
208	Village Road and NE 145th Street	RAB	D[2]	A	3.8	0.18	A	4.1	0.21	A	4.1	0.21	A	4.3	0.24
209	148th Avenue NE/Woodinville-Redmond Road NE and NE 145th Street	RAB	D[2]	A	3.8	0.17	A	3.8	0.17	A	4.1	0.21	A	4.2	0.21
210	Woodinville-Redmond Road NE and NE 124th Street[7]	Signal	E	C	21.2	-	C	21.8	-	C	25.1	-	C	26.0	-
211	NE 116th Street and Woodinville-Redmond Road NE	Signal	E	B	11.2	-	B	11.5	-	B	12.5	-	B	12.8	-
212	Woodinville-Redmond Road NE and Site Driveway[5]	OWSC[1]	E	-	-	-	B	11.3	-	-	-	-	B	11.8	-
213	Brickyard Road NE and NE Woodinville Drive	OWSC[1]	E	B	13.0	-	B	13.2	-	B	14.6	-	C	15.0	-
214	Brickyard Road NE/116th Avenue NE and Juanita Woodinville Way NE/NE 160th Street	OWSC[1]	E	D	25.3	-	D	25.9	-	D	34.5	-	E	35.2	-
PM Peak															
201	SR 522 Westbound Ramps and 131st Avenue NE[3,6]	Signal	D	-	-	-	-	-	-	-	-	-	-	-	-

Table 3.13-37. Action Alternative 2 Saturday Intersection Level of Service and Delay – Action Alternative 2 Study Area.

ID	Intersection	Traffic Control	LOS Standard	2029 No Action			2029 Alt 2			2040 No Action			2040 Alt 2		
				LOS	Delay (sec)	v/c	LOS	Delay (sec)	v/c	LOS	Delay (sec)	v/c	LOS	Delay (sec)	v/c
202	SR 522 Eastbound Ramps and 131st Avenue NE	Signal	D	C	22.8	-	C	22.8	-	C	27.6	-	C	27.6	-
203	Little Bear Creek Parkway and 131st Avenue NE	Signal	E	C	32.8	-	C	32.9	-	D	37.3	-	D	37.4	-
204	NE 175th Street and 131st Avenue NE	Signal	E	D	45.4	-	D	47.2	-	F	86.5	-	F	87.8	-
205	Woodinville-Redmond Road NE and NE 175th Street[7]	Signal	E	C	30.8	-	C	33.2	-	D	48.3	-	E	56.9	-
206	140th Avenue NE and NE 171st Street	Signal	E	D	35.6	-	D	35.7	-	D	50.0	-	D	50.5	-
207	Woodinville-Redmond Road NE and NE 145th Street	OWSC[1] RAB[4]	E	A	6.4	0.34	A	6.6	0.37	A	6.7	0.41	A	6.9	0.44
208	Village Road and NE 145th Street	RAB	D[2]	A	5.5	0.35	A	5.8	0.38	A	6.3	0.43	A	6.6	0.46
209	148th Avenue NE/Woodinville-Redmond Road NE and NE 145th Street	RAB	D[2]	A	6.2	0.38	A	6.4	0.39	A	7.7	0.47	A	8.0	0.48
210	Woodinville-Redmond Road NE and NE 124th Street[7]	Signal	E	C	31.6	-	C	33.4	-	D	49.3	-	D	52.7	-
211	NE 116th Street and Woodinville-Redmond Road NE	Signal	E	C	20.4	-	C	20.9	-	C	27.0	-	C	29.6	-
212	Woodinville-Redmond Road NE and Site Driveway[5]	OWSC[1]	E	-	-	-	B	14.4	-	-	-	-	C	16.0	-
213	Brickyard Road NE and NE Woodinville Drive	OWSC[1]	E	C	17.6	-	C	18.0	-	C	22.4	-	C	23.0	-
214	Brickyard Road NE/116th Avenue NE and Juanita Woodinville Way NE/NE 160th Street	TWSC[1]	E	F	62.1	-	F	64.0	-	F	120.5	-	F	128.0	-

Shading indicates intersections that are projected not to operate at roadway LOS standard.

Results are based on Highway Capacity Manual (HCM) 6 methodology where available. Otherwise, HCM 2000 methodology was reported (TRB 2000; 2016).

Intersection delay is measured by average seconds of delay per vehicle.

LOS = level of service; v/c = volume to capacity ratio; OWSC = one-way stop control; TWSC = two-way stope control; RAB = roundabout.

[1] For OWSC and TWSC intersections, LOS is reported for the worst movement.

[2] For roundabouts, the v/c for each lane group is the primary controlling measure of effectiveness. Roundabouts will be considered failing if the v/c > 0.9 even if the LOS is better than D.

[3] In the No Action Alternative, all movements at this intersection are free.

[4] In the No Action Alternative, this intersection is converted to a roundabout.

[5] In the No Action Alternative, this intersection does not exist.

[6] Intersection 201 - SR 522 Westbound Ramps and 131st Avenue NE – was removed from the analysis due to the anticipated reconfiguration of the interchange/ramps as part of the trestle replacement and road widening project identified in the first bullet in Section 3.13.3.1.2.2.1

[7] Signal timings were optimized for the 2040 No Action Alternative and Alternative 2 at Intersection #205 in the PM peak hour and at Intersection #210 in the AM peak hour.

Table 3.13-38 provides queueing data for two off-ramps, summarizing their storage capacities and 95th percentile queue lengths during the 2040 AM and PM peak hours for weekdays and Saturdays. The SR 522 eastbound off-ramp exceeds the storage capacity of 770 feet during all conditions. Similar to the existing and No Action Alternative conditions, this may impact the operations of the weave between I-405 and SR 522. All of these queues are longer under Alternative 2 compared with the No Action Alternative, ranging between an additional 35 and 65 feet, equivalent to approximately 1 to 3 additional vehicles. The planned interchange improvements will reconfigure the westbound off-ramp to NE 180th Street, which is outside of the study area so queueing results cannot be obtained for this location.

Table 3.13-38. 2040 Action Alternative 95th Percentile Off-Ramp Queue Lengths – Alternative 2

ID	Intersection	Approach	Available Storage Length (feet)	Weekday Queue Length (feet)		Saturday Queue Length (feet)	
				AM Peak	PM Peak	AM Peak	PM Peak
201	131st Ave NE & SR-522 Westbound Ramps	WB	-	-	-	-	-
202	131st Ave NE & SR-522 Eastbound Ramps	EB	770	1,170	1,375	1,105	2,005

Note: Bold values indicate a 95th percentile queue that exceeds the available storage length

Transfer Trailer Routing Sensitivity Analysis

It is assumed with Alternative 2 that all of the transfer trailers accessing the NERTS site would travel to and from the north via I-405 and SR 522. However, if this assumption were to change and some or all of the transfer trailers would instead access I-405 via NE 124th Street (i.e., to and from the south relative to the NERTS site), it is important to understand the potential operational implications of that change. Therefore, a sensitivity analysis was conducted to assess the traffic operational results in the Alternative 2 study area if all of the transfer trailers accessed the site to and from the south instead of to and from the north.

Overall, the level of service results do not change whether or not the trucks are routed to and from the north or the south. Some of the intersections north of the site could see a reduction in delay of a few seconds or less if all transfer trailers were removed from those intersections, but the overall operations would remain the same. Similarly, some of the intersections south of the site could see an increase in delay of a few seconds or less if all transfer trailers went through those intersections instead, but the overall operations would also remain the same. This is due to the small percentage of project-related traffic represented by transfer trailers. The detailed results of this analysis are included in Appendices A and D of the revised NERTS Transportation Assessment in Appendix H.

Under Action Alternative 2, planned bus service in the Woodinville study area would be the same as the No Action Alternative. Neither additional bus service levels nor rerouting to the transfer station would be required. Transit service would experience higher levels of delay (approximately 15 seconds on weekdays and up to seven seconds on Saturdays) at the following intersections, similar to general purpose traffic:

- SR 522 Westbound Ramps and 131st Avenue NE
- SR 522 Eastbound Ramps and 131st Avenue NE

- Little Bear Creek Parkway and 131st Avenue NE
- NE 175th Street and 131st Avenue NE
- Woodinville-Redmond Road NE and NE 175th Street

As discussed previously, background traffic volumes are expected to increase for 2029 and 2040 over the existing and No Action Alternative volumes.

As discussed above, the new NERTS facility would generate approximately 600 vehicles per day on weekdays and weekends in 2040. As noted, there are generally only minor increases in delay expected at the study area intersections as a result of Alternative 2 traffic. The greatest increase in volume is expected in the immediate vicinity of the site, along Woodinville-Redmond Road NE between NE 175th Street and NE 145th Street. Based on the volume changes on each roadway and through each intersection in the study area, the average change in crashes is estimated to be up to a four percent increase. Using the current number of crashes as a point of reference, this would equate to an increase of up to three total crashes per year across the entire study area. Pedestrian and bicycle crashes account for less than one percent of total crashes, therefore the impact from the volume increases is likely to be minimal and similar to the No Action Alternative across the study area.

The trail and pedestrian crossing across NE 145th Street and the roundabouts near NE 145th Street and Woodinville-Redmond Road NE/148th Avenue NE are the most likely locations for additional conflicts for active transportation users due to increased active transportation activity. However, the trail crossing is already signalized with additional signing and a refuge area, and the roundabouts include marked and signed crosswalks along with lower speed limits, which significantly help with visibility and reaction time. In addition, while the Eastrail Trail Project would be constructed near the Alternative 2 site, it would be on the east side of Woodinville-Redmond Road NE, opposite the NERTS Alternative 2 site, and would not create any potential conflicts between users of the trail and those accessing the NERTS facility. Although not required, potential mitigations that could add to the study area vehicular and active transportation safety include:

- Extension of the northbound right-turn pocket of the Woodinville-Redmond Road NE and NE 175th Street intersection
- Additional signing, warning lights, or pavement markings to improve pedestrian visibility at the intersection of NE 145th Street and Woodinville-Redmond Road NE/148th Street NE
- Installation of a signal at Brickyard Road NE and NE Woodinville Drive.
- Consideration of potential turn-movement restrictions and/or access changes at Brickyard Road NE/116th Avenue NE and Juanita Woodinville Way NE/NE 160th Street.
- Traffic calming measures along Brickyard Road NE to promote lower speeds (e.g., speed feedback signs, speed humps, etc.).

With or without the additional mitigation discussed above, Alternative 2 is likely to have a less than significant impact on vehicular and active transportation safety within the study area.

Action Alternative 2 would increase truck traffic in the study area compared with the No Action Alternative. Compacted loads in the future would result in fewer truck volumes than without compaction, with up to 25 new transfer trailers per day on weekdays, or approximately four transfer trailer trips each during the AM and PM peak hours. Weekends would have up to seven transfer trailers per day, with up to two each during the AM and PM peak hours. Because Action Alternative 2 would also offer service for collection of MRW, hauling of MRW material from the site would occur twice a week via box truck. Freight would experience the same levels of delay as general-purpose traffic on roadways and at intersections throughout the study area.

3.13.3.5.2.2. Indirect Impacts

Under Alternative 2, indirect impacts associated with operation would be similar to those discussed in Section 3.13.3.2.2. Also, while no specific plans exist for disposition of the infrastructure located on the No Action and Action Alternative 1 site, it is assumed that selection of Alternative 2 would result in deconstruction or demolition and removal of the existing Houghton RTS facility at some time in the future. These activities would result in minor traffic and other impacts similar to those described in Section 3.13.3.3.1. No significant indirect impacts on existing transportation systems are expected during operation.

3.13.3.5.3 Cumulative Impacts

Under Alternative 2, cumulative impacts associated with operation would be similar to those discussed in Section 3.13.3.2.3. The traffic analyses reflect the cumulative impacts of the NERTS project, other planned and programmed developments, and associated increases in traffic within the study area. Therefore, Alternative 2, when considered with past and reasonably foreseeable future transportation projects, would contribute to minor cumulative impacts on transportation facilities in the study area.

3.13.4 Mitigation Measures

Construction and operation of the new NERTS facility under either of the action alternatives are not anticipated to result in long-term operational impacts to freight, transit, active transportation, parking, or safety. Therefore, no mitigation is required or proposed for those transportation elements.

Traffic impacts were determined for arterials and local streets by comparing the overall intersection operations (LOS or v/c ratios) for the No Action Alternative and the action alternatives against the agency operational standards (Table 3-6 in Appendix H). Mitigation could be required for study intersections that meet agency performance standards under the No Action Alternative but operate below agency performance standards under the action alternatives. For the Kirkland study area, mitigation is required if:

- A study intersection is forecasted to operate at LOS E or LOS F under the No Action Alternative and

- The action alternative at that location increases intersection delay by 15 percent or more at LOS E, or by five percent or more at LOS F.

The mitigation measures must maintain the intersection at its No Action Alternative LOS and, in the case of LOS F, prevent an increase in delay. For the Woodinville study area, mitigation thresholds for study intersections are not explicitly defined.

Under the action alternatives, all intersections would operate similarly to the No Action Alternative; therefore, no mitigation improvements are anticipated under Alternative 1A or Alternative 1B for the Kirkland study area, or in Alternative 2 for the Woodinville study area, for the arterial and local street operations for 2029 and 2040. In addition, only minor construction impacts are expected for both action alternatives and do not require mitigation. However, additional mitigation could be added as part of the project to reduce delays or increase safety. These are described below for each Alternative.

- Alternative 1 Potential Mitigation Measures:
    - Installation of a signal at the NE 60th Street and 116th Avenue NE intersection. Moving the southbound left-turn stop bar back would also assist in improving the turning path for trucks. Signalization of this intersection would also improve pedestrian visibility and safety.
    - Designation of access routes for commercial vehicles and King County transfer trailers concentrated on state facilities, including I-405, as well as several collector and arterial streets, including 116th Avenue NE and NE 60th Street west of the site
    - Installation of speed feedback signs at locations along NE 60th Street and 116th Avenue NE. These are shown to have the potential to lower speeds and improve safety.
    - Additional signing, warning lights, or pavement markings to improve pedestrian visibility at the intersection of NE 60th Street and 124th Avenue NE
- Alternative 2 Potential Mitigation Measures:
    - Extension of the northbound right-turn pocket of the Woodinville-Redmond Road NE and NE 175th Street intersection
    - Additional signing, warning lights, or pavement markings to improve pedestrian visibility at the intersection of NE 145th Street and Woodinville-Redmond Road NE/148th Street NE
    - Installation of a signal at Brickyard Road NE and NE Woodinville Drive.
    - Consideration of potential turn-movement restrictions and/or access changes at Brickyard Road NE/116th Avenue NE and Juanita Woodinville Way NE/NE 160th Street.
    - Traffic calming measures along Brickyard Road NE to promote lower speeds (e.g., speed feedback signs, speed humps, etc.).

For all action alternatives, a construction transportation management plan addressing site access, construction vehicle, equipment, and material staging; traffic control; hauling routes; impacts to transit; construction employee parking; impacts to local businesses; and pedestrian and bicycle control in the area would be prepared per City of Kirkland or City of Woodinville requirements and in coordination with WSDOT as applicable. If driveway closures are required, access to these properties would be maintained

to the extent practical. If access to a business could not be maintained during construction, the specific construction activity would be reviewed to determine whether it could occur during non-business hours or whether the parking and users of this access could be accommodated at an alternative location. Any properties temporarily impacted during construction would be restored as closely as possible to their previous condition.

Other avoidance and minimization measures could include:

- Installing advance warning signs and highly visible construction barriers and using flaggers where needed
- Providing clear signage and reasonable detour routes for vehicles and active transportation users when cross streets are closed
- Using tools such as print, radio, posted signs, websites, and email to communicate information regarding street closures, hours of construction, business access, and parking impacts
- Coordinating with transit providers to post advance notice signs prior to construction when bus stops need to be temporarily relocated or closed
- Posting advance notice signs prior to construction in areas where construction activities would affect access to surrounding businesses
- Scheduling traffic lane closures and high volumes of construction truck traffic during off-peak hours to minimize delays where practical.
- Limiting staging of off-site vehicle, equipment, or material on area road shoulders, in center turn lanes, and in areas that could create view obstructions and mobility impacts to local traffic
- Scheduling contractor deliveries during off-peak (and non- event) hours to minimize delays where practical

3.13.5 Significant Unavoidable Adverse Impacts

3.13.5.1No Action Alternative

There are no significant unavoidable transportation impacts associated with the No Action Alternative.

3.13.5.2Alternative 1

Compliance with the applicable regulations along with implementation of avoidance and minimization measures and non-required mitigation described in Section 3.13.4 would reduce impacts on transportation. There are no significant unavoidable transportation impacts associated with Alternative 1.

3.13.5.3Alternative 2

Compliance with the applicable regulations along with implementation of avoidance and minimization measures and non-required mitigation described in Section 3.13.4 would reduce impacts on transportation. There are no significant unavoidable transportation impacts associated with Alternative 2.