

3.8 Air Quality and Greenhouse Gas Emissions

This section discusses the potential air quality and greenhouse gas (GHG)-related impacts associated with the construction and operation of the OMF South project alternatives.

Regional impacts on air quality would be caused by criteria air pollutants that would be emitted directly or indirectly as a result of the proposed project. “Criteria air pollutants” are six common air pollutants that can harm health and the environment, cause property damage, and are subject to certain federal air quality standards known as the National Ambient Air Quality Standards (NAAQS). Three agencies have jurisdiction over the ambient air quality in the OMF South study area: EPA, the Washington State Department of Ecology (Ecology), and the Puget Sound Clean Air Agency.

The impacts of the OMF South project’s air quality and GHG emissions are not limited to the build alternative sites. Therefore, the study area for this analysis is the Puget Sound Clean Air Agency’s jurisdiction, which includes King, Pierce, Snohomish, and Kitsap counties.

Please see Appendix H4, Air Quality and Greenhouse Gas Technical Appendix, for more information on the regulatory requirements for air quality, including the NAAQS and efforts by Washington State and Sound Transit to reduce GHG emissions.

3.8.1 Affected Environment

3.8.1.1 Climate Conditions and Local Air Quality

Washington is located on a windward coast in the mid-latitudes, producing a predominantly marine-type climate west of the Cascade Mountains. East of the Cascades, the climate possesses both continental and marine characteristics. The Puget Sound region’s climate is mild, with wet and cloudy winters and cool and comparatively dry summers. In the interior valleys, measurable rainfall is recorded on 150 days each year; in the mountains and along the coast, there is rain 190 days each year.

Prevailing winds are typically from the south or southwest during the winter and from the north or northeast during the summer. Wind speeds are generally sufficient to disperse air pollutants released into the atmosphere. Air pollution is most noticeable in the late fall and winter under conditions of clear skies and light winds.

Typical air pollution sources near the study area include vehicular traffic, commercial and retail businesses, light industry, and residential wood-burning devices. While many types of pollutant sources are present, the largest contributors of criteria pollutant emissions are on-road vehicles, which contribute the majority of the carbon monoxide and ozone precursors. Secondary sources of emissions are commercial and industrial land uses.

Based on monitoring information for criteria air pollutants collected over a period of years, Ecology and EPA designate regions as being attainment or nonattainment areas for the criteria pollutants. Once a nonattainment area achieves compliance with the NAAQS, the area is considered an air quality maintenance area. Although portions of the Puget Sound region are in maintenance areas for PM_{2.5} and PM₁₀, none of the build alternatives are located within nonattainment or maintenance areas.

According to Puget Sound Clean Air Agency’s annual Air Quality Data Summaries (PSCAA 2023), air quality in the study area is good, and there is no part of the study area that is currently under non-attainment or maintenance. The criteria air pollutants of carbon monoxide, sulfur dioxide, nitrous oxide, and lead are all below the NAAQS (EPA 2023a).

While also below the NAAQS, the two pollutants that pose the greatest issue in the study area are particulate matter (PM_{2.5}) and ozone (O₃). The standards set by EPA are 9 micrograms per cubic meter (µg/m³) for the PM_{2.5} annual concentration, 35 µg/m³ for the PM_{2.5} 24-hour concentration, and 0.070 parts per million (ppm) for the O₃ 8-hour concentration.³ The following tables list the readings from the closest monitoring stations to the site alternatives from 2019 to 2022 (2020 is not included because readings were not taken consistently through the year due to the COVID-19 pandemic). As demonstrated in Tables 3.8-1 and 3.8-2, the air quality values for PM_{2.5} and O₃ are below the NAAQS.

Table 3.8-1 PM_{2.5} Monitoring results at Beacon Hill, Kent, and Auburn Monitoring Stations (micrograms per cubic meter)

Station	Value	NAAQS Level (µg/m ³)	Results by Year (µg/m ³)		
			2019	2021	2022 ¹
Beacon Hill	24-hour ²	35	11.9	11.8	27.7
	Annual Mean	9	5.2	4.4	7.0
Kent	24-hour ²	35	17.8	17.6	33.7
	Annual Mean	9	5.8	7.1	9.3
Auburn	24-hour ²	35	16.9	NA ³	29.8
	Annual Mean	9	5.6	NA ³	8.9

Source: PSCAA Air Quality Data Summaries for 2019, 2021, and 2022. Available at: <https://pscleanair.gov/615/Data-Summary>.

Notes:

- (1) The relatively high readings for 2022 are attributable to the number of wildfires that year.
- (2) 98th percentile 24-hour value averaged over 3 years
- (3) Annual averages are reported only if 75 percent or more of the data for each of the four quarters is available.

Table 3.8-2 Ozone Monitoring Results at Beacon Hill Monitoring Station (parts per million)

Years	NAAQS Level (ppm)	Ozone concentration (ppm) ¹
2017 – 2019	0.070	.046
2019 – 2021	0.070	.050
2020 – 2022	0.070	.050

Source: PSCAA Air Quality Data Summaries for 2019, 2021, and 2022. Available at: <https://pscleanair.gov/615/Data-Summary>.

Notes:

- (1) 3-year average of the annual 4th Highest Daily Volume.

Diesel exhaust is a known source of particulate emissions. While there is currently no known direct monitoring method to track diesel emissions, they, along with wood smoke particulates, are known to present the greatest potential health risk in the Puget Sound area (PSCAA 2023). Diesel exhaust also contains volatile organic compounds and nitrogen oxides, which can undergo chemical reactions in the atmosphere and become ozone (smog). Typical construction equipment powered by diesel engines includes bulldozers, excavators, backhoes, and loaders.

³ EPA revised the standard for PM_{2.5} annual concentration, effective February 7, 2024; it was formerly 12 µg/m³.

There are several sensitive receptors in the project study areas, including single-family and multi-family residences and religious facilities. The study area around the Preferred Alternative includes a residential community with a mix of single- and multi-family residences and the Russian-Ukrainian Seventh-Day Adventist Church to the north. To the south is a mix of commercial uses with residences along 18th Place S and four churches south of S 341st Street: the Voice of Hope Church, Family Life Community Church, the Redwood Church of God, and Tabernacle Temple of Praise. To the west are commercial uses on both sides of SR 99, along with the KAC Baptist Church. I-5 is to the east.

The study area around the South 344th Street Alternative includes a mix of commercial, institutional, and residential land uses. To the north of the OMF site is a residential community with a mix of single- and multi-family residences, the Christian Faith Center and associated school, the Russian-Ukrainian Seventh-Day Adventist Church, and the KAC Baptist Church. To the south are commercial uses. To the west are commercial uses on both sides of SR 99. I-5 is to the east.

The land use around the Midway Landfill Alternative includes primarily commercial land uses to the west on both sides of SR 99, along with three churches: the Great Commission Presbyterian Church, the New Jerusalem Haitian Baptist Church, and the Seattle Full Gospel Church. Sensitive uses also include a mobile home park to the north and hotels and a single-family residential community to the south.

EJScreen (EPA 2024a) is an environmental justice screening and mapping tool developed by EPA to provide a nationally consistent dataset and approach for combining environmental and socioeconomic indicators. The EJScreen analysis conducted for OMF South indicates environmental justice indexes above the 90th percentile for diesel particulate matter, air toxics cancer risk, and air toxics respiratory hazard at each of the build alternative study areas. For the Preferred Alternative study area, the index is above the 80th percentile for particulate matter. The Washington State Health Disparities map (DOH 2022) indicates a similar ranking with the census tracts that contain the build alternatives, both ranking a 9 (on a scale of 1 to 10 with 10 being the highest) for Environmental Exposures.

3.8.2 Environmental Impacts

3.8.2.1 No-Build Alternative

Under the No-Build Alternative, impacts to air quality and GHGs from construction or operation of OMF South would not occur. Other planned projects in the area would have varying air quality and GHG impacts, depending on their nature. This includes TDLE, which overlaps with the OMF South Preferred and South 344th Street alternatives. If TDLE is constructed as proposed, the mainline track associated with these OMF alternatives would be built later in time. Impacts associated with construction of the mainline track are addressed within the build alternatives impacts discussion below. All other TDLE-related impacts are addressed in Chapter 4, Cumulative Effects Analysis.

The No-Build Alternative includes both private and public projects for which quantifiable GHG emissions data is not yet available. As a result, Sound Transit conducted a qualitative analysis of regional GHG emissions proportionate to the anticipated emissions from construction and operation of OMF South. King, Kitsap, Pierce, and Snohomish counties, the four counties within PSRC jurisdiction, have been experiencing an increase in GHG emissions over the past several years along with population and economic growth. In 2019 the four counties generated an estimated 48 million MTCO_{2e} (King County 2023). Consistent with the GHG emission reduction

goals of PSCAA, PSRC has a target to reduce GHG emissions to 50 percent below 1990 levels by 2030 and to 80 percent below 1990 levels by 2050 (PSRC 2020). Although GHG emissions within the PSRC region are anticipated to decline to 25.6 million MTCO_{2e} by 2042 due to a number of recently enacted federal, state, and local policies, the counties are not on track to meet their GHG emission reduction goals (King County 2023).

Sound Transit also considered the social cost of GHG emissions, which is an estimate of the monetary value of the net harm to society associated with emission of carbon dioxide, methane, nitrous oxide, or other GHGs in a given year that contribute to climate change (EPA 2023b). As described above, the No-Build Alternative would have no construction- or operations-related GHG emissions for OMF South. Other planned projects under the No-Build Alternative would affect GHG emissions differently and therefore result in varying social costs of those emissions.

3.8.2.2 Long-Term Impacts

Impacts Common to All Build Alternatives

Because all the build alternatives would have the same programming and function, there are no discernable differences between them in terms of potential long-term air quality impacts. As such, the description of impacts below applies to all OMF South build alternatives.

Air Quality

Operational air quality emissions include emissions from mobile sources associated with the facility, natural gas usage, electricity usage, architectural coatings, consumer products, and landscaping equipment. Because electrical utilities in the project area primarily rely on hydropower and thus have very low emissions, the primary sources of long-term air quality emissions would be associated with employee commutes, material deliveries, and on-site vehicle maintenance, which includes the use of an enclosed paint booth. Spray painting would occur infrequently and be limited in quantity. Welding would also occur in a dedicated space with the proper ventilation systems. These functions would be placed in the interior of the site. The potential impacts from painting and welding would be minor and addressed by implementing standard minimization measures.

Because the build alternatives are located within attainment areas for the PM_{2.5}, PM₁₀, and carbon monoxide standards, carbon monoxide and PM hot-spot analyses are not required. A conformity determination under federal regulations is not needed.

Climate Change

The maintenance and operational GHG emissions for OMF South were calculated using FTA's Transit Greenhouse Gas Emissions Estimator v3.0 (FTA 2022). Each phase of operation was considered separately and included both upstream and downstream sources of emissions. Upstream emissions are the emissions associated with the extraction, transportation, and production of the fuels and materials used in the operation of the facilities (e.g., natural gas for heating, paint and solvents, fuel for maintenance equipment, etc.). Downstream emissions are generated within the facility during daily operations (e.g., the burning of natural gas for heating, the use of paint and solvents, the burning of fuel for maintenance equipment, etc.).

In total, the OMF South facility would generate between 1,183 and 1,191 metric tons of carbon dioxide equivalent (MTCO_{2e}) per year. Sound Transit and Puget Sound Energy (PSE) have entered into an agreement that all electricity accounts related to the operations of Link light rail be sourced solely from renewable wind power via PSE's Green Direct program. Therefore, there

would be no upstream emissions associated with the project’s electricity use. Table 3.8-3 summarizes the project’s annual GHG emissions from operation and maintenance. Maintenance activities include routine transit way, pavement, and vehicle maintenance. The annual operational emissions are far below the 10,000 MTCO_{2e} per year mandatory reporting threshold for facilities in Washington State (Ecology 2020).

Table 3.8-3 Annual Operational Greenhouse Gas Emissions

Emission Source	Preferred Alternative	South 344th Street Alternative	Midway Landfill Alternative
Operations – Upstream	0 ¹	0	0
Operations – Downstream	1,149	1,149	1,149
Maintenance	41	42	34
Total Annual GHG Emissions	1,190	1,191	1,183

Note:

(1) Emissions are reported in MTCO_{2e}.

3.8.2.3 Construction Impacts

Impacts Common to All Build Alternatives

Because all the build alternatives would have a similar footprint and, as a result, similar on-site construction activities, the description of impacts below applies to all OMF South build alternatives. However, the large number of truck trips required for two of the Midway Landfill subsurface construction design options — Hybrid and Full Excavation — would result in additional off-site emissions. The emissions associated with those additional haul truck trips are reflected in Table 3.8-2 below.

Air Quality

During construction, short-term degradation of air quality may occur due to the release of particulate emissions generated by excavation, grading, hauling, and other activities. Emissions from construction equipment would include carbon monoxide, nitrogen oxides, sulfur dioxide, volatile organic compounds, and directly emitted particulate matter (PM_{2.5} and PM₁₀).

Site preparation and project construction would involve clearing, cut-and-fill activities, grading, and building activities. Table 2.3-1, Estimated OMF South Construction Durations, reports the estimated site preparation and facility construction durations for each build alternative. Construction-related effects on air quality from the proposed project would be greatest during the site preparation phase because most engine emissions are associated with the excavation, handling, and transport of soil to and from the site.

Sources of fugitive dust (primarily consisting of PM₁₀) could include disturbed soil at the construction sites and trucks carrying uncovered loads of soil. Unless properly controlled, vehicles leaving the site could deposit dirt and mud on local streets, which could be an additional source of airborne dust after it dries. PM₁₀ emissions would vary from day to day, depending on the nature and magnitude of construction activity and local weather conditions. PM₁₀ emissions would depend on soil moisture, silt content of soil, wind speed, and the amount of operating equipment. Larger dust particles would settle near the source, while fine particles would be dispersed over greater distances from the construction site.

Water or other soil stabilizers can be used to control dust, resulting in emission reductions of 50 percent or more. With the implementation of standard construction measures, such as frequent watering (e.g., two times per day at a minimum), fugitive dust emissions from construction activities would not result in adverse air quality impacts.

In addition to dust-related PM₁₀ emissions, heavy trucks and construction equipment powered by gasoline and diesel engines would generate carbon monoxide, sulfur dioxide, nitrogen oxides, volatile organic compounds, and some soot particulate (PM_{2.5} and PM₁₀) in exhaust emissions. If construction activities were to increase traffic congestion in the area, carbon monoxide and other emissions from traffic would increase slightly while those vehicles are delayed. These emissions would be temporary and limited to the immediate area surrounding the construction sites.

Climate Change

The construction GHG emissions for OMF South were calculated using the FTA's Transit Greenhouse Gas Emissions Estimator (FTA 2022). These emission estimates are based on the size of the proposed facilities and the number of truck trips required to complete the excavation of each alternative and design option. Each phase of construction was considered separately and included both upstream and downstream sources of emissions.

In the construction phase of a transit project, upstream emissions are the emissions associated with the extraction, transportation, and production of the materials used in the construction of the facilities (e.g., asphalt, concrete, base stone, and steel). Downstream construction emissions are tailpipe emissions resulting from the operation of construction vehicles and equipment. In total, construction of the project would generate up to 1,944 MTCO_{2e} per year. This total reflects an amortization of construction emissions over a 50-year period, which corresponds to the minimum useful life span of facilities (FTA 2017).

As shown in Table 3.8-3, operation and maintenance of OMF South would generate up to 1,191 MTCO_{2e} per year. Although construction emissions are not included in the Washington State Agency Greenhouse Gas Calculator, the amortized emissions from construction have been added to the operational emissions to determine the total annual impact of the OMF South build alternatives. Table 3.8-4 summarizes the annual GHG emissions from construction, operation, and maintenance for each of the build alternatives. The largest impact would be from the Midway Landfill Alternative using the Full Excavation subsurface construction design option, which would generate up to 3,127 MTCO_{2e} per year. This amount is less than the 10,000 MTCO_{2e} per year mandatory reporting threshold for facilities in Washington State (Ecology 2020). Therefore, no additional analysis is required.

Table 3.8-4 Total Annual Greenhouse Gas Emissions

Build Alternative	Mainline Track Construction ¹		OMF Site Construction		Haul Truck Emissions	Operation and Maintenance	Annual GHG Emissions
	Upstream	Downstream	Upstream	Downstream			
Preferred	108	4	1,165	23	60	1,190	2,550
South 344th Street	129	5	1,165	23	75	1,191	2,588
Midway Landfill – Platform	N/A	N/A	1,165	23	284	1,183	2,655
Midway Landfill – Hybrid	N/A	N/A	1,165	23	684	1,183	3,055
Midway Landfill – Full Excavation	N/A	N/A	1,165	23	756	1,183	3,127

Notes: Construction emissions, including truck haul trips, have been amortized over a 50-year period prior to being added to the annual operations and maintenance emissions. Emissions are reported in MTCO_{2e}.

(1) If neither the Preferred nor the South 344th Street alternative is selected, the mainline could be built later in time if TDLE is constructed as proposed. TDLE is currently under environmental review.

3.8.2.4 Social Cost of Greenhouse Gas Emissions

The analysis of the social cost of GHG emissions estimates the monetary value of the net harm to society associated with emission of carbon dioxide, methane, nitrous oxide, or other GHGs in a given year that contribute to climate change (EPA 2023b). Following guidance on analyzing GHGs under NEPA (CEQ 2023), the social cost is estimated based on the annual MTCO_{2e} emissions from the construction and operation of the build alternatives (see Table 3.8-4) multiplied by the average cost per MTCO_{2e} determined by EPA.

Table 3.8-5 lists the social costs and emission equivalencies for the Build Alternatives from EPA’s Greenhouse Gas Equivalencies Calculator (EPA 2024b).

Table 3.8-5 Social Cost of GHG Emissions and Emission Equivalencies

Build Alternative	Social Cost of GHG Emissions for the Year 2040 (2020 dollars) ¹	Number of Gasoline Powered Passenger Vehicles Driven for 1 Year for which GHG Emissions are Equivalent
Preferred	\$688,500	567
South 344th Street	\$698,760	576
Midway Landfill (Platform)	\$716,850	591
Midway Landfill (Hybrid)	\$824,850	680
Midway Landfill (Full Excavation)	\$844,290	696

Notes:

(1) The estimated 2040 average cost, in 2020 dollars, is \$270 (using the projected 2.0 percent near-term discount rate) per MTCO_{2e}. EPA projects rates at 10-year increments; 2040 was chosen for this analysis because it is the closest year to the OMF South design year of 2042.

3.8.2.5 Avoidance and Minimization of Impacts

Sound Transit would implement construction BMPs to minimize the impact on existing residential and recreational uses from construction-related emissions and fugitive dust, including the development of a fugitive dust control plan. Such plans typically include the following:

- Identification of all fugitive dust sources
- A source-specific description of the proposed dust control method(s)
- A prescribed method to identify how often, how much or when the control method is to be used
- Monitoring and recordkeeping plans and requirements
- A backup plan in case the first control plan is not successful
- The contact information for the person responsible for making sure the plan is implemented and who can be contacted for dust complaints (Ecology 2016)

BMPs to reduce construction impacts would be incorporated into construction plans and specifications and could include the following:

- Complying with the BMPs required in WAC 173-400-040 (general standards for maximum emissions)
- Complying with applicable dust control policies and plans
- Spraying dry soil with water to reduce dust
- Using temporary ground covers
- Minimizing idling of equipment when not in use
- Planning construction areas to minimize soil exposure for extended periods
- Covering dirt and gravel piles
- Establishing wheel wash stations at exits from spoils handling and truck-loading sites
- Sweeping paved roadways to reduce mud and dust
- Replanting exposed areas as soon as practical after construction

Sound Transit would implement the following measures to minimize, reduce, or control air emissions from the on-site paint booth:

- Install exhaust ventilation to remove particulates
- Dispose of paint materials appropriately
- Provide personal protective equipment to staff

3.8.2.6 Indirect Impacts

Indirect impacts are changes to air quality that may occur for reasons related to the project but are not part of it and that may occur separated by distance or time. The air quality analysis includes the indirect effects of the project and other traffic growth that would be associated with the project. Indirect construction GHG emissions are also known as embodied and life-cycle emissions. Both embodied and life-cycle emissions were included in the direct construction GHG methodology.

The expanded light rail system, which the OMF South would support, reduces regional vehicle miles of travel and associated auto-related criteria pollutants within the region (Sound Transit 2016). Therefore, the build alternatives would indirectly support improvements in air quality.

3.8.3 Mitigation Measures

Overall, existing air quality in the project area meets the national standards for criteria pollutants. With implementation of the controls required for the various aspects of construction activities and consistent use of BMPs to minimize on-site emissions, construction and operation of the proposed project would not be expected to substantially affect air quality. No mitigation is anticipated.

3.9 Noise and Vibration

This section contains the noise and vibration impact assessment for the OMF South project alternatives. Sound Transit uses FTA noise and vibration guidance in its environmental methodology to assess impacts from transit projects.

For the purposes of the noise analysis, sound is defined as small changes in air pressure above and below the standard atmospheric pressure, and noise is usually considered to be unwanted sound. The three parameters that define noise include:

- **Level:** The level of sound is the magnitude of air pressure change above and below atmospheric pressure and is expressed in decibels (dB). Typical sounds fall within a range between 0 dB (the approximate lower limit of human hearing) and 120 dB (the highest sound level generally experienced in the environment).
- **Frequency:** The frequency (pitch or tone) of sound is the rate of air pressure change and is expressed in cycles per second, or hertz (Hz). Human ears can detect a wide range of frequencies from around 20 to 20,000 Hz. The A-weighting system, which reduces the sound levels of higher- and lower-frequency sounds, is used to provide a measure (A-weighted decibels, or dBA) that correlates with human response to noise.
- **Time Pattern:** Because environmental noise is constantly changing, it is common to condense all this information into a single number, called the “equivalent” sound level (Leq). The Leq represents the changing sound level over a period of time, typically 1 hour or 24 hours in transit noise assessments. For assessing the noise impact of rail projects at residential land uses, the day-night sound level (Ldn) is used, which is a 24-hour cumulative noise exposure metric that accounts for increased noise sensitivity at night.

FTA criteria are based on both the existing level of noise and the change in noise exposure due to a project and depend on the land use category of the sensitive receptor. The descriptors and criteria for assessing noise impact vary according to land use categories adjacent to the project. For Category 2, land uses where people live and sleep (e.g., residential neighborhoods, hospitals, and hotels), the Ldn is the assessment parameter. For other land use types (Category 1 or 3) where there are noise-sensitive uses (e.g., outdoor concert areas, schools, and libraries), the Leq for an hour of noise sensitivity that coincides with train activity is the assessment parameter.

In addition, the noise assessment evaluates the noise impacts of the OMF at each build alternative under WAC 173-60, Maximum Environmental Noise Levels, which is used by Federal Way and Kent. WAC 173-60 defines the maximum allowable noise level (expressed as Leq) for each noise abatement designation, or land use zone, which can also be defined as residential, commercial, or industrial. As the WAC regulations only apply to stationary noise sources, the mainline track transit operations were not evaluated under these criteria.

For the purposes of the vibration analysis, ground-borne vibration from trains refers to the fluctuating or oscillatory motion experienced by persons on the ground and in buildings near railroad tracks. The response of humans, buildings, and equipment to vibration is most accurately described using velocity or acceleration. Because the human body tends to respond to an average of the vibration impulses, the root mean square (RMS) velocity is used to describe the “smoothed” vibration amplitude. RMS velocities are normally described in inches per second (in/sec) in the U.S., which can be expressed in decibel notation as vibration decibels (VdB).

Typical vibration levels can range from below 50 to 100 VdB, and the human threshold of perception is approximately 65 VdB. The operational vibration impact criteria used for the project are based on the information contained in Section 6 of the FTA Transit Noise and Vibration Impact Assessment Manual (FTA 2018). The criteria for a general vibration assessment are based on land use and train frequency.

See Appendix G2, Noise and Vibration Technical Report, for further information on FTA noise and vibration criteria, WAC limits and applicability to the project, and more detail about the noise and vibration assessment.

3.9.1 Affected Environment

3.9.1.1 Noise- and Vibration-Sensitive Land Uses

Sensitive receptors near the build alternatives sites include single-family and multi-family residences, hotels, and religious facilities. There are no commercial or industrial land uses nor any special buildings, such as recording studios or buildings with specialized equipment highly sensitive to vibration, known to be near any of the build alternatives.

Preferred Alternative

The noise-sensitive land uses adjacent to the mainline track options and the test track between the Federal Way Downtown Station and the Preferred Alternative are a mix of single- and multi-family residences.

The study area around the Preferred Alternative OMF site includes a mix of commercial and noise-sensitive residential land uses. To the north of the OMF site is a noise-sensitive residential community with a mix of single- and multi-family residences and the Russian-Ukrainian Seventh-Day Adventist Church. To the south is a mix of commercial uses with a few scattered noise-sensitive residences and the Restoration Life Church. To the west are commercial uses on both sides of SR 99, along with the KAC Baptist Church, and I-5 is to the east.

South 344th Street Alternative

The land uses around the mainline track options and the test track between the Federal Way Downtown Station and the South 344th Street Alternative are the same as described above for the Preferred Alternative. The land uses around the mainline tail track alignments to the south of the South 344th Street Alternative are commercial, with no noise-sensitive land uses.

The study area around the South 344th Street Alternative includes a mix of commercial, institutional, and noise-sensitive residential land uses. To the north of the OMF site is a noise-sensitive residential community with a mix of single- and multi-family residences, the Christian Faith Center and associated school, the Russian-Ukrainian Seventh-Day Adventist Church, and the KAC Baptist Church. To the south are commercial uses. To the west are commercial uses on both sides of SR 99, and I-5 is to the east.

Midway Landfill Alternative

The land use around the Midway Landfill Alternative includes primarily commercial land uses to the west on both sides of SR 99, along with three religious facilities that are noise sensitive: the Great Commission Presbyterian Church, the New Jerusalem Haitian Baptist Church, and the

Seattle Full Gospel Church. Noise-sensitive uses also include a mobile home park to the north and hotels and a single-family residential community to the south.

3.9.1.2 Existing Noise Conditions

Existing ambient noise levels were characterized through 24-hour direct measurements at selected sites in the areas near the OMF South alternatives during November 2019. Noise sources in the project area include traffic on I-5, local roadway traffic, aircraft overflights, and local community activities. The existing ambient sound levels vary by location, depending on the proximity to I-5, and are generally typical of a suburban environment near a busy interstate highway. The results of the existing noise measurements are shown in Table 3.9-1, and the locations of the measurements are shown in Figures 3.9-1 through 3.9-3.

Table 3.9-1 Summary of Existing Ambient Noise Measurement Results

Site	Measurement Location Description	Meas. Duration (hours)	Noise Exposure (dBA) Ldn	Noise Exposure (dBA) 1 Hour Leq
D	Mainline Track – 11 The Dunes Court, Belmor	24	65	59
E	Mainline Track – 326 Oakland Hills Boulevard, Belmor	24	70	65
F	Preferred Alt/S 344th – Christian Faith Center West	24	67	62
G	Preferred Alt/S 344th – Christian Faith Center East	24	72	66
H	Preferred Alt – 20th Avenue S and S 31st Place	24	73	67
A	Midway Landfill – Southwest Corner	24	65	62
B	Midway Landfill – Southeast Corner	24	71	66
C	Midway Landfill – North Side	24	67	62

3.9.1.3 Existing Vibration Conditions

Vibration-sensitive land uses for the build alternatives are the same as the noise-sensitive land uses described above. Existing vibration sources include auto, bus, and truck traffic on local streets. However, vibrations from street traffic are not generally perceptible at receivers in the study area unless streets have substantial bumps, potholes, or other uneven surfaces. Furthermore, the FTA vibration impact criteria are not ambient based; that is, future project vibrations are not compared with existing vibrations to assess impact. Therefore, the vibration measurements for the project focused on characterizing the vibration propagation properties of the soil along the mainline track design options rather than characterizing the existing vibration levels. One vibration propagation test site, Site VP-A in Belmor, was selected for the 2019 measurements. The location of the site is shown in Figures 3.9-1 and 3.9-2.

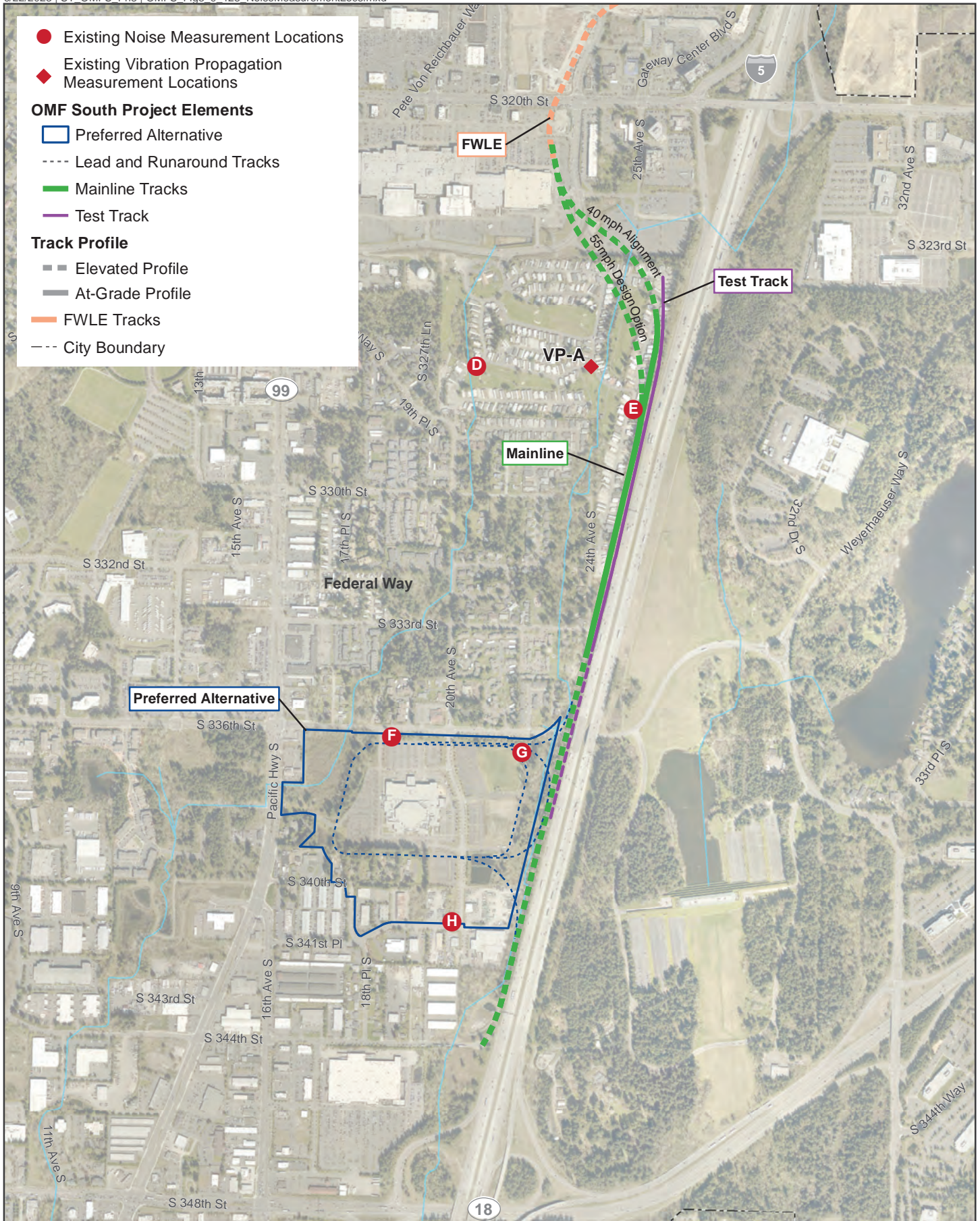
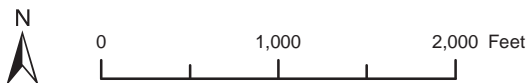


FIGURE 3.9-1
Measurement Locations for Existing Ambient Noise and Vibration: Preferred Alternative



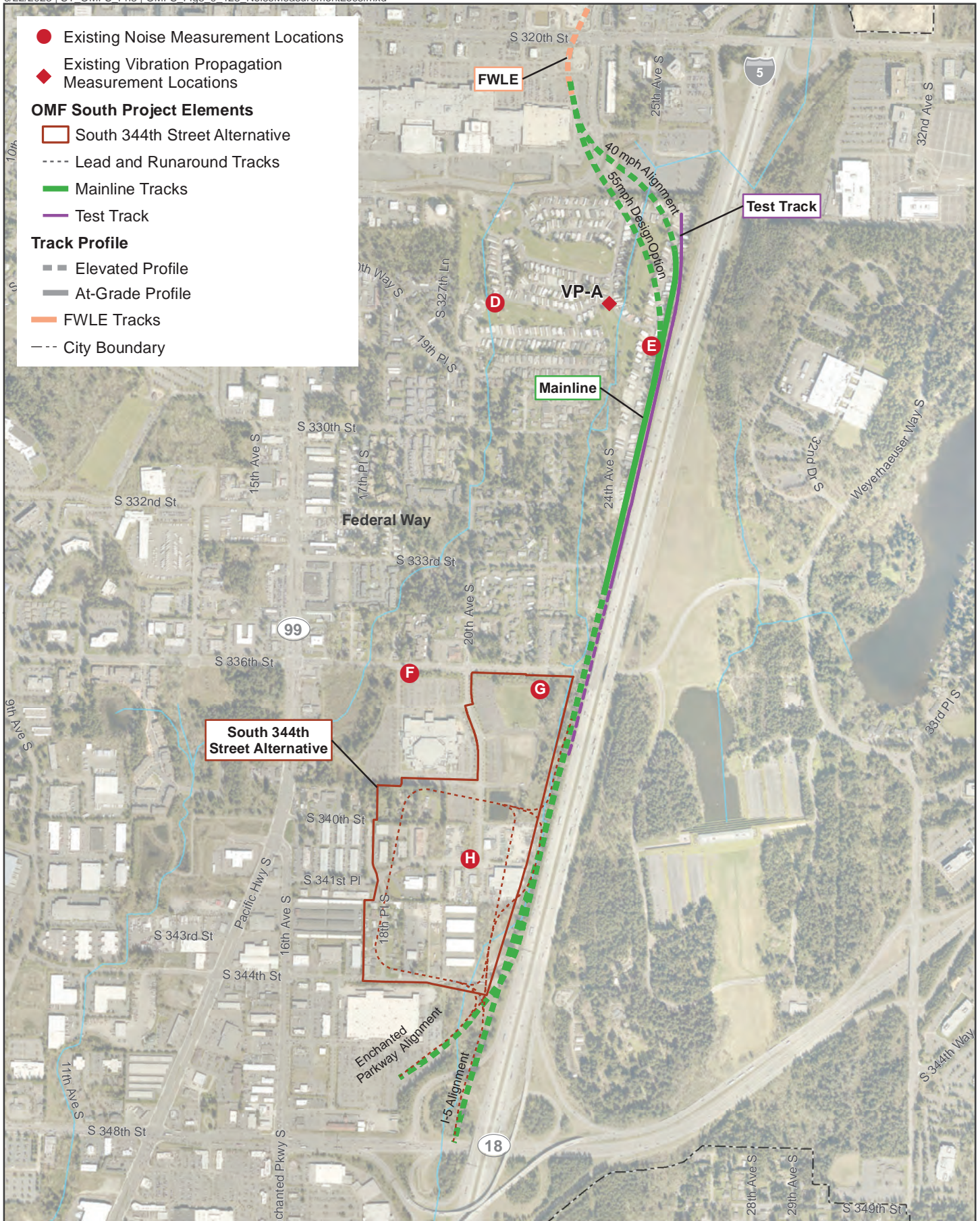


FIGURE 3.9-2
Measurement Locations for Existing Ambient Noise and Vibration: South 344th Street Alternative

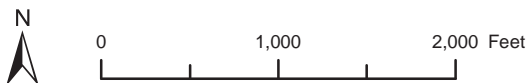
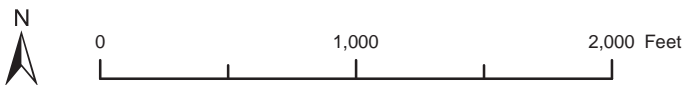




FIGURE 3.9-3
 Measurement Locations for Existing Ambient Noise:
 Midway Landfill Alternative



3.9.2 Environmental Impacts

3.9.2.1 No-Build Alternative

Under the No-Build Alternative, impacts to noise and vibration from construction or operation of OMF South would not occur. However, other planned projects would have impacts in the OMF South study areas. This includes TDLE, which overlaps with the OMF South Preferred and South 344th Street alternatives. The noise and vibration effects of FWLE on sensitive receptors near the Midway Landfill Alternative were addressed in the 2016 Federal Way Link Extension Final Environmental Impact Statement. FWLE constructed noise walls adjacent to the residential areas near the Midway Landfill to mitigate the anticipated noise impacts from that project. No vibration impacts from FWLE are anticipated in the area. If TDLE is constructed as proposed, the mainline track associated with these OMF alternatives would be built later in time. The noise and vibration effects of TDLE and Federal Way's City Center Access Project on sensitive receptors within the study area for the Preferred and South 344th Street alternatives are discussed in Chapter 4, Cumulative Effects Analysis. Noise and vibration impacts from TDLE will be further detailed in the TDLE Draft EIS, which is expected to be published in mid-2024.

3.9.2.2 Long-Term Impacts

Impacts Common to All Build Alternatives

Noise-generating activities at OMF South would include vehicles moving within the OMF site, vehicle washing and drying, limited testing of train bells and horns, a traction power substation, and vehicles moving on the mainline tracks (for the Preferred and the South 344th Street alternatives) into service in the morning and back to the OMF in the late evening, and test track operations.

Wheel squeal is possible on curves with a radius of less than 600 to 1,000 feet, depending on the speed and type of trackway. Wheel squeal is not included in the noise model because Sound Transit has committed to reducing any potential wheel squeal by installing wayside lubricators on all curves with a radius of less than 600 feet in noise-sensitive areas and by preparing all curves for wayside lubricators that have a radius of between 600 and 1,000 feet. There are numerous tight radius curves within the OMF sites for all three build alternatives that would also be prepared for wayside lubricators.

The slow speeds within the OMF South site would reduce any impact noise associated with crossover connections between tracks within the facility. Crossover tracks connecting to the mainline tracks would have higher speed operations and the potential for additional noise from vehicles traveling over them.

There are no FTA noise impacts or WAC exceedances associated with the OMF sites for any of the build alternatives. Noise impacts for the mainline tracks are discussed below. There are no vibration impacts associated with any of the build alternatives for all project elements including the mainline tracks.

Preferred Alternative

As several homes would be acquired along the mainline alignment, there would be no residential receptors immediately adjacent to the mainline or test tracks. As a result, there are no FTA noise impacts for the 40 mph Alignment, but there are FTA noise impacts at four single-family residences for the 55 mph Design Option, all due to their proximity to the proposed

mainline tracks. The noise impact locations are described in Table 3.9-2 for the 40 mph Alignment and are described in Table 3.9-3 and shown in Figure 3.9-4 for the 55 mph Design Option.

Tables 3.9-2 and 3.9-3 compare the estimated noise levels from the project against existing noise levels to determine the locations and severity of any noise impacts based on the FTA noise criteria. The existing noise level was measured at locations near the OMF and mainline tracks, as described in the Affected Environment section above. The project noise level was determined based on project parameters, such as the speed of the trains, headways and hours of operation, and the distance to sensitive receptors from the tracks. FTA moderate and severe noise criteria are based on the existing noise level (see Appendix G2, Noise and Vibration Technical Report, for information regarding the determination of the impact criteria). There are no noise or vibration sensitive receptors near the mainline tail tracks and no FTA noise impacts, WAC exceedances, or vibration impacts. There are no FTA noise impacts, WAC exceedances, or vibration impacts for the Preferred Alternative OMF site. The only activity that would generate vibration would be vehicles moving on the mainline or test tracks. Details regarding the model and assumptions used for the noise and vibration impact assessment are included in Appendix G2, Noise and Vibration Technical Report.

Table 3.9-2 Summary of Noise Impacts: 40 mph Alignment Mainline Track

Location	Side of Track	Distance to Nearest Proposed Track (feet)	Existing Noise Level (Ldn, dBA)	Project Noise Level (Ldn, dBA)	Moderate Noise Criteria	Severe Noise Criteria	# of Moderate Impacts	# of Severe Impacts
S 324th Street to Burning Tree Boulevard	SB ¹	80	70	62	64	69	0	0
Burning Tree Boulevard to S 330th Street	SB	111	70	56	64	69	0	0
S 330th Street to S 333rd Street	SB	81	72	58	65	71	0	0
S 333rd Street to S 336th Street	SB	197	72	64 (58) ²	65	71	0 (0) ²	0 (0) ²
Total:							0 (0)²	0 (0)²

Note: If neither the Preferred nor the South 344th Street alternative is selected, the mainline could be built later in time if TDLE is constructed as proposed. TDLE is currently under environmental review.

(1) SB = southbound

(2) The Preferred Alternative is shown first followed by the South 344th Street Alternative in parenthesis. The lead tracks and crossovers from the OMF would be further south for the South 344th Street Alternative in comparison to the Preferred Alternative.

Table 3.9-3 Summary of Noise Impacts: 55 mph Design Option Mainline Track

Location	Side of Track	Distance to Nearest Proposed Track (feet)	Existing Noise Level (Ldn, dBA)	Project Noise Level (Ldn, dBA)	Moderate Noise Criteria	Severe Noise Criteria	# of Moderate Impacts	# of Severe Impacts
S 324th Street to Burning Tree Boulevard	NB ¹	76	65	61	64	69	2	0
S 324th Street to Burning Tree Boulevard	SB ¹	57	65	63	61	66	2	0
Burning Tree Boulevard to S 330th Street	SB	85	70	57	64	69	0	0
S 330th Street to S 333rd Street	SB	81	72	58	65	71	0	0
S 333rd Street to S 336th Street	SB	197	72	64 (58) ²	65	71	0 (0) ²	0 (0) ²
Total:							4 (0)²	0 (0)²

Note: If neither the Preferred nor the South 344th Street alternative is selected, the mainline could be built later in time if TDLE is constructed as proposed. TDLE is currently under environmental review.

(1) NB = northbound, SB = southbound

(2) The Preferred Alternative is shown first followed by the South 344th Street Alternative in parenthesis. The lead tracks and crossovers from the OMF would be further south for the South 344th Street Alternative in comparison to the Preferred Alternative.

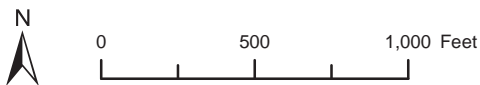
Construction of either mainline alignment would modify a portion of an existing berm and remove noise walls adjacent to I-5 that screen residences from traffic noise between S 320th Street and S 336th Street. The berm and noise walls were anticipated to be removed by the City of Federal Way’s City Center Access Project, which would construct a new interchange with roundabouts and a new bridge over I-5 at S 324th Street. However, the City Center Access Project is now anticipated to be constructed after OMF South. As a result, Sound Transit would modify the existing berm and remove approximately 1,390 linear feet of noise walls as part of the OMF South project.

While the retained fill structure to support the mainline would serve as a barrier to traffic noise from I-5, the modification of the existing berm and noise walls is anticipated to result in traffic noise impacts for about one to three residences (Sound Transit 2023a). In final design, Sound Transit would conduct additional noise analysis in coordination with Federal Way and WSDOT to verify the findings of the noise analysis, determine whether replacement of noise walls would be necessary, and ensure that the location of any new noise walls would be consistent with the plans for the City Center Access Project.



Data Sources: King County; Cities of Des Moines, Federal Way, Kent (2019).

FIGURE 3.9-4
 Noise Impact Locations
 55 mph Design Option
 OMF South



South 344th Street Alternative

Impacts due to the mainline tracks and test track would be the same as those discussed above for the Preferred Alternative, described in Tables 3.9-2 and 3.9-3 and shown in Figure 3.9-4.

There are no noise or vibration sensitive receptors near either of the mainline tail track options and no FTA noise impacts, WAC exceedances, or vibration impacts. There are no FTA noise impacts, WAC exceedances, or vibration impacts for the South 344th Street Alternative OMF site.

Midway Landfill Alternative

There are no FTA noise impacts, WAC exceedances, or vibration impacts for the Midway Landfill Alternative.

3.9.2.3 Construction Impacts

Impacts Common to All Build Alternatives

Noise

Elevated noise levels from construction activities are, to a degree, unavoidable for this type of project. For most construction equipment, diesel engines are typically the dominant noise source. For other activities, such as impact pile driving and jackhammering, noise generated by the actual process dominates. Noise during construction of the project can be intrusive to residents near the construction sites. Most of the construction would consist of site preparation and laying new tracks and should occur primarily during daytime hours, except when required and within city noise ordinance procedures for a variance. At some locations, more extensive work would occur, such as pile driving for elevated structures and retaining walls.

Construction noise predictions at noise-sensitive locations depend on the amount of noise during each construction phase, the duration of the noise, and the distance from the construction activities to the sensitive receptor. Conducting a construction noise impact assessment requires knowledge of the equipment likely to be used, the duration of its use, and the way it would be used by a contractor. Table 3.9-4 provides an example of a construction noise projection for typical at-grade track construction. Construction for other project features, such as buildings, would have similar results. Using these assumptions, an 8-hour Leq of 88 dBA would be projected at a distance of 50 feet from the construction site.

Table 3.9-4 Typical Construction Scenario, At-Grade Track

Equipment Type	Typical Noise Level at 50 Feet (dBA)	Equipment Utilization Factor	Leq (dBA)
Grader	85	50%	82
Backhoe	80	40%	76
Compactor	82	20%	75
Loader	85	20%	78
Roller	74	20%	67
Truck	88	40%	84
Crane, mobile	83	20%	76
Total 8-hour workday Leq at 50 feet:			88

Within residential land uses, the potential noise impacts from short-term, at-grade track construction could extend to approximately 120 feet from the corridor; however, if nighttime construction is conducted (when sensitivity to noise is higher and the criteria for impacts are lower), the potential for short-term noise impacts from at-grade track construction could extend to approximately 380 feet from the corridor. The distances of noise impacts would likely be similar for OMF site construction. For elevated structure construction, the distance for noise impacts during the daytime could be up to 250 feet for impact pile driving, assuming a usage factor of 20 percent during the day. If alternative methods of piling are used, the impact distance could be less.

Based on the distances above, there would be sensitive receptors within the screening distances for all three OMF South build alternatives and both mainline track design options. Noise impacts perceived by residents and other sensitive receptors would vary, depending on the proximity of the construction activity, the type of equipment being used, the time of day, and the overall duration of construction. While the noise levels would be similar for construction of any of the build alternatives, the Midway Landfill Alternative would have the greatest impact due to the extended period of time and number of daily truck trips needed for site preparation work.

Vibration

Unlike typical light rail transit operations, there is the potential for damage to nearby structures at close distances due to vibration from construction activities, such as pile driving, hoe rams, vibratory compaction, and loaded trucks. Most limits on construction vibration are based on reducing the potential for damage to nearby structures. Although construction vibrations are only temporary, it is still reasonable to assess the potential for human annoyance and damage.

As a conservative approach, the potential for construction vibration impacts was assessed based on the vibration damage criteria for the non-engineered timber and masonry building category (Category III) in the FTA guidance manual (FTA 2018). A vibration criterion of 94 VdB was used to assess potential damage impact, and the operational vibration criterion of 72 VdB was used to assess potential vibration annoyance from construction activities. With the exception of impact pile driving, the potential for vibration damage is limited to within 25 feet of construction activities. For impact pile driving, the screening distance for potential vibration damage is 55 feet. There are no sensitive receptors within 25 feet of the project alternatives, but there are several within 55 feet of both mainline alignments (40 mph Alignment and 55 mph Design Option) in Belmor. However, any potential for impacts would depend on the method of pile installation.

Because the exact location of construction equipment is important in projecting vibration levels, a more detailed assessment of potential vibration damage will be performed during final design when more accurate equipment locations are known.

3.9.2.4 Avoidance and Minimization of Impacts

For the Preferred and South 344th Street alternatives, the curves of the mainline 40 mph Alignment north of S 324th Street and from S 324th Street to Oakland Hills Boulevard would have a radius between 600 and 1,000 feet and would be prepared for wayside lubricators.

Construction activities would be carried out in compliance with Sound Transit specifications and applicable local noise regulations. Construction noise is exempt from the WAC noise limits, except at residential land uses during nighttime hours (10 p.m. to 7 a.m.). If construction is performed during nighttime hours, the contractor must meet the WAC noise level requirements or obtain a noise variance from the governing jurisdiction.

Noise-control for nighttime or daytime work may include the following measures, as necessary, to meet required noise limits and minimize temporary vibration impacts. These measures would be confirmed during final design and, if needed, the approval process for any noise variances:

- Avoiding nighttime construction in residential neighborhoods when possible
- Locating stationary construction equipment as far as possible from noise-sensitive sites
- Constructing noise barriers, such as temporary walls or piles of excavated material, between noisy activities and noise-sensitive receivers
- Routing construction-related truck traffic to roadways that would cause the least disturbance to residents
- Using alternative construction methods to minimize the use of impact and vibratory equipment (e.g., pile-drivers and compactors). If pile driving is necessary, it would be limited to daytime hours

In addition to the measures listed above, a detailed Noise and Vibration Control Plan would be required from the contractor as part of construction. Key elements of a plan would include:

- Contractor's specific equipment types
- Schedule (dates and times of day) and methods of construction
- Maximum noise limits for each piece of equipment with certification testing
- Prohibitions on certain types of equipment and processes during the night or daytime hours per local agency coordination and approved variances
- Identification of specific sensitive receptors near construction sites
- Methods for predicting construction noise levels
- Implementation of noise and vibration control measures where appropriate
- Methods for responding to community complaints in compliance with Sound Transit outreach requirements

3.9.2.5 Indirect Impacts

No indirect impacts related to noise and vibration would result from construction and operation of the proposed project. Most vehicle traffic and other sources of environmental vibration are below the levels of human perception and would not cause an indirect impact.

3.9.3 Mitigation Measures

3.9.3.1 Long-Term Measures

When noise would exceed FTA moderate or severe impact criteria, Sound Transit would provide noise mitigation measures consistent with its Link Light Rail Noise and Vibration Policy (Resolution No. R2023-15) (Sound Transit 2023b) and the Transit Noise and Vibration Impact Assessment Manual (FTA 2018). The Sound Transit Link Noise Mitigation Policy provides the hierarchy for implementation of mitigation measures. It prioritizes reduction at the noise source, followed by measures to disrupt the noise path, such as sound walls. Lastly it considers residential sound insulation. For the Preferred and South 344th Street alternatives, noise barriers are proposed for mitigation along the 55 mph Design Option elevated mainline track (Figure 3.9-5).

Noise barrier locations and lengths are described in Table 3.9-5. Typical noise barriers are 4 feet in height on elevated structures. Assuming 4-foot barriers on the elevated structure at the locations described below, the barriers would provide approximately 8 dBA of noise reduction, and there would be no residual impacts after mitigation. No mitigation would be necessary for the Midway Landfill Alternative.

Table 3.9-5 Summary of Potential Noise Barrier Locations

Mainline Track Options	Approximate Location	Noise Barrier Length (ft)
55 mph Design Option	Northbound side from south of Park & Ride to south of Burning Tree Boulevard	360
55 mph Design Option	Southbound side from south of Park & Ride to south of Burning Tree Boulevard	325

During final design, the noise analysis will be updated based on the more advanced design. All predicted noise levels and mitigation measures would be reviewed, and mitigation would be modified as needed to reduce noise levels to below the FTA impact criteria. If equivalent mitigation could be achieved by a less costly means or if the final design analysis shows no impact, then the mitigation measure may be modified or eliminated. After light rail operations begin, if the resulting noise were to exceed FTA criteria, Sound Transit would evaluate the need for additional mitigation.

For the Preferred and South 344th Street alternatives, Sound Transit would provide traffic noise mitigation measures where traffic noise levels are predicted to be above the 2042 No-Build levels from removal of the existing WSDOT berm and noise wall. Mitigation would be designed to maintain 2042 No-Build levels and could include replacement of noise walls and berms. Sound Transit would conduct additional noise analysis during final design in coordination with WSDOT to confirm whether noise mitigation is needed.

The noise mitigation for the cumulative effects of TDLE on sensitive receptors for the Preferred and South 344th Street alternatives, including the mainline tracks, and the City Center Access Project are discussed in Chapter 4, Cumulative Effects Analysis, and will be further detailed in the TDLE Draft EIS, which is expected to be published in mid-2024, and the City Center Access Project Noise Discipline Report.

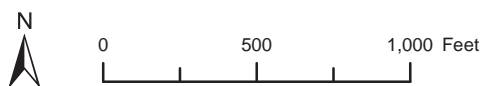
3.9.3.2 Construction Measures

Through compliance with applicable construction permits and implementation of avoidance and minimization measures described in Section 3.9.2.4, Avoidance and Minimization of Impacts, no mitigation for construction noise impacts would be needed.



Data Sources: King County; Cities of Des Moines, Federal Way, Kent (2019).

FIGURE 3.9-5
Noise Barrier Locations
55 mph Design Option
OMF South



3.10 Ecosystem Resources

This section evaluates the potential effects of the OMF South project alternatives on ecosystem resources, which include aquatic species and habitat; vegetation, wildlife, and wildlife habitat; and wetlands. Analyses in this section also evaluate potential effects on Essential Fish Habitat and threatened and endangered species that would typically be addressed during consultation under Section 7 of the Endangered Species Act (ESA). The Ecosystem Resources Technical Report (Appendix G3) provides detailed information on the regulations, analysis methods, affected environment, species, and impacts discussed in this section.

The study area for aquatic resources and wetlands includes all areas within 300 feet of the proposed construction limits of the project. This encompasses the area within which project construction and operation could deliver sediment to streams and where vegetation clearing could affect riparian habitat quality. This distance is also the largest potential width of regulatory buffers for wetlands that may be required in the project area. To address the potential impacts of stormwater runoff on fish, resource analysts also identified fish species that are known or expected to use aquatic habitats downstream of the study area.

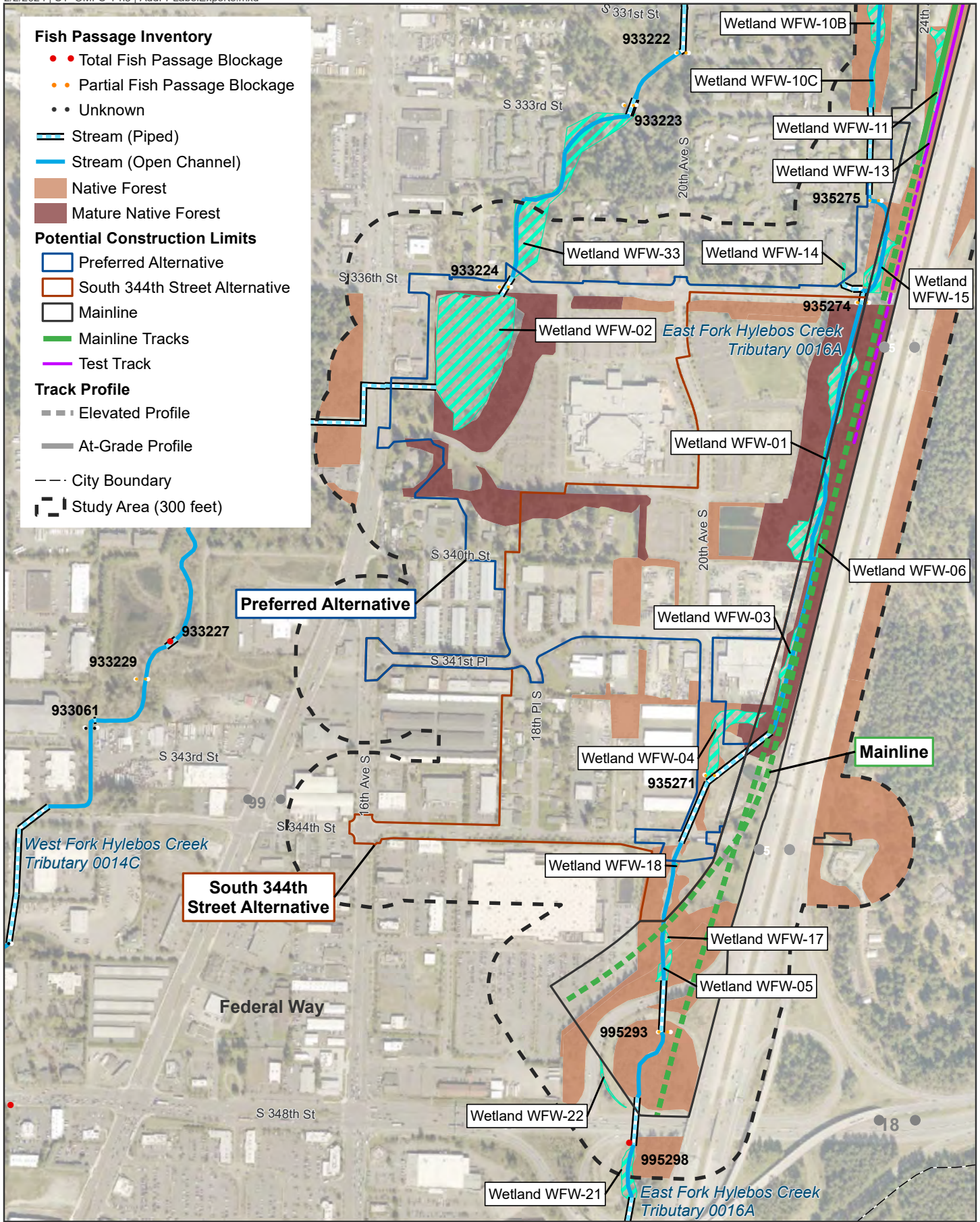
The study area for terrestrial resources includes areas within 200 feet of the proposed construction limits of the project. This represents a conservative estimate of the area in which project construction and operation could affect vegetation cover and habitat quality for terrestrial wildlife. To address wildlife potentially affected by project-related noise and human activity, resource analysts also reviewed documented occurrences of sensitive wildlife species within 0.25 mile of project construction areas.

3.10.1 Affected Environment

3.10.1.1 Aquatic Species and Habitat

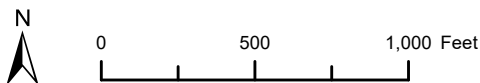
The assessment of aquatic species and habitat focused on features that may be affected by the project and that are directly related to ecological functions that support aquatic ecosystems. After collecting and reviewing existing information, biologists conducted detailed field reconnaissance and delineation surveys within the study area to identify and confirm ecosystem resources that could be affected. While formal surveyed delineations are typically completed during the permitting process, biologists conducted formal delineations of the ordinary high water line of tributaries to Hylebos Creek to inform discussions with Tribes, agencies, and the public and to guide the design to avoid or minimize impacts. More detailed information about streams and aquatic species in the study area is available in Appendix G3, Ecosystem Resources Technical Report.

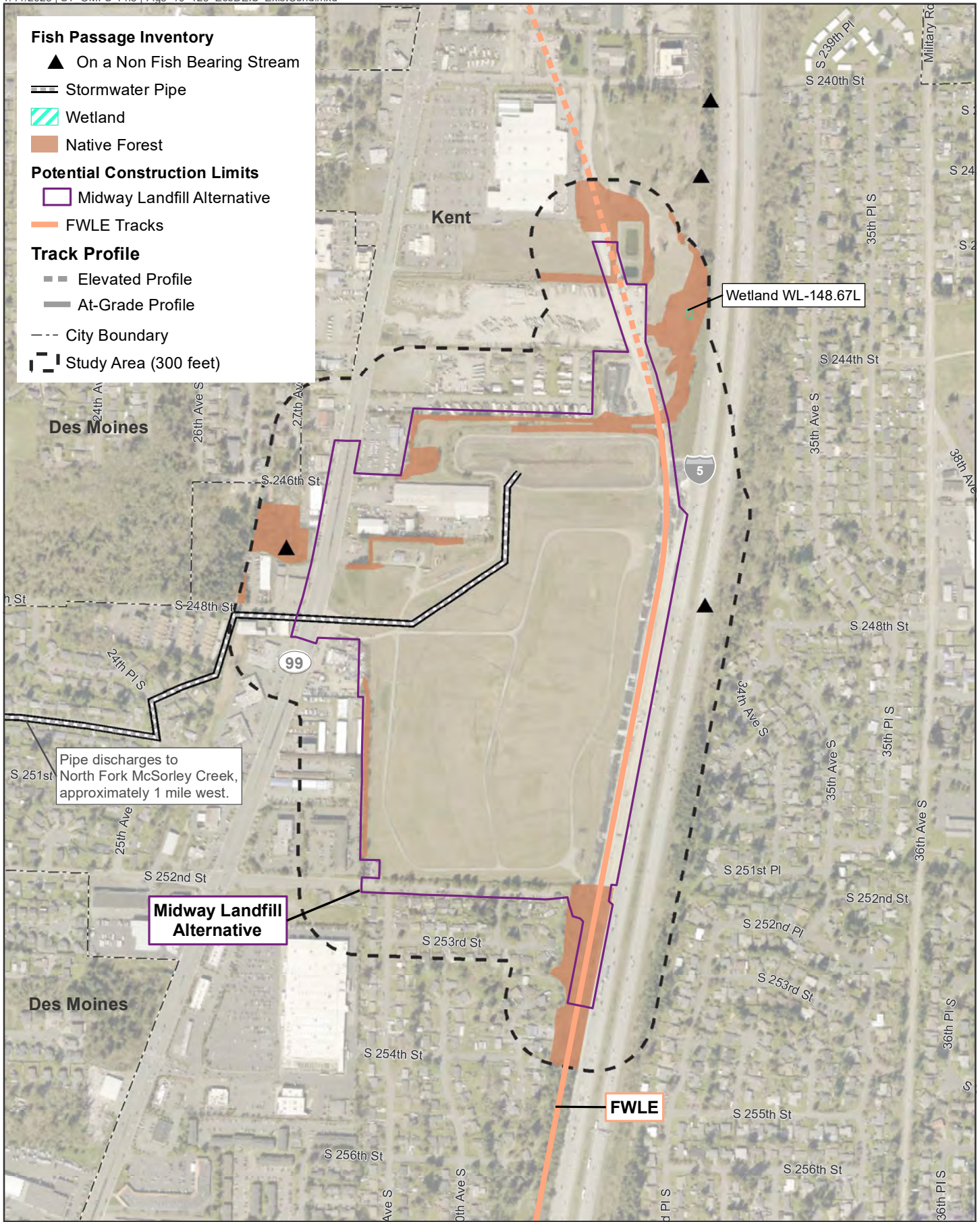
The study area includes two streams: East Fork Hylebos Creek Tributary 0016A and West Fork Hylebos Creek Tributary 0014C (Figures 3.10-1 and 3.10-2), referred to East Fork Hylebos Tributary and West Fork Hylebos Tributary, respectively, in this Final EIS. Both are tributaries to Hylebos Creek, an independent tributary that discharges to the Hylebos Waterway along the eastern shore of Puget Sound's Commencement Bay in Tacoma. A third stream, North Fork McSorley Creek, receives discharge from a regional stormwater detention facility at the north end of the study area (Figure 3.10-3). North Fork McSorley Creek would receive additional treated stormwater runoff from the Midway Landfill Alternative but would otherwise not be affected by project construction or operation.



Data Sources: Valtus (2017); WDFW (2020); King County; Cities of Des Moines, Federal Way, Kent (2019).

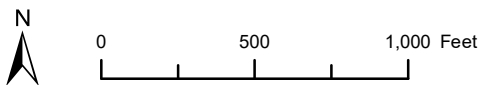
FIGURE 3.10-2
Ecosystem Resources
Preferred and South 344th Street Alternatives





Data Sources: Valtus (2017); WDFW (2020); King County; Cities of Des Moines, Federal Way, Kent (2019).

FIGURE 3.10-3
Ecosystem Resources
Midway Landfill Alternative



Using information gathered during field reconnaissance and from sources such as Tribes, local jurisdictions, WSDOT, and fish passage barrier maps maintained by the Washington State Department of Fish and Wildlife (WDFW), biologists evaluated streams in the study area to identify downstream impediments to fish passage. Salmonids are not currently known or expected to be present in reaches of East Fork Hylebos Tributary or West Fork Hylebos Tributary in the study area. These stream reaches are also not expected to currently support salmonids year-round, given the intermittent flow of the streams and the presence of constructed barriers between the study area and potential population sources downstream. None of these stream reaches is currently known or expected to be used by ESA-listed species, and no critical habitat for any such species has been designated or proposed for designation in these reaches. However, historically accessible reaches of these streams are designated as Essential Fish Habitat for Pacific salmon.

Numerous human-made barriers to fish passage currently exist downstream and throughout the study area, and those barriers deter anadromous salmonids from entering stream reaches in the study area (NWIFC 2023). Several of the downstream barriers on the East Fork Hylebos Tributary are located under I-5 or under on- and off-ramps to I-5 and are on the list of barrier culverts to be made fish passable under a 2013 federal court injunction in western Washington. Even with the removal of the state-owned barriers at some point in the future, several barriers (including two complete barriers on private property) would continue to impede access to stream reaches in the study area. The remaining complete barriers include a private road crossing approximately 1 mile downstream of the study area and a non-culvert barrier (abandoned pipeline) on private property approximately 2.8 miles downstream of the study area. If these privately owned barriers were removed along with WSDOT's barriers, anadromous salmonids would have access to reaches of East Fork Hylebos Tributary in the study area. No plans for the correction of barriers on West Fork Hylebos Tributary downstream of the study area have been announced.

The basin size, channel width, and gradient of the streams in the study area indicate the potential to support fish use in the future. Coho salmon, steelhead, and cutthroat trout have been documented in East Fork Hylebos Creek approximately 1.9 miles downstream of the Preferred and South 344th Street alternatives (HDR 2014; NWIFC 2023). These species have also been documented in West Fork Hylebos Creek approximately 2.7 miles (steelhead) and 1.7 miles (coho) downstream of the Preferred Alternative (HDR 2014; NWIFC 2023). In addition, fisheries biologists from the Puyallup Tribe of Indians have observed Chinook salmon in West Fork Hylebos Creek as far upstream as S 356th Street, approximately 1.5 miles downstream of the study area (Marks et al. 2018, 2019, 2020, 2021). Finally, a single sub-adult bull trout was captured in West Fork Hylebos Creek in August 2018, approximately 4 miles downstream from the study area from the Preferred Alternative. These observations indicate that resident and anadromous salmonids could have access to stream reaches in the study area in the future, if downstream fish passage barriers are corrected.

East Fork Hylebos Tributary

The headwaters of East Fork Hylebos Tributary are in a wetland complex northeast of I-5 and S 320th Street. The stream is piped under the freeway and beneath the Federal Way/S 320th Street Park & Ride, emerging in the study area in Belmor. The stream flows southward through the study area, confined by I-5 to the east and by residential, commercial, and light industrial developments to the west.

The segment of East Fork Hylebos Tributary in the study area flows intermittently and meets the Federal Way Environmental Critical Areas Code classification as a Type F stream, meaning it has the potential to support fish. The streambed in this area is typically dry during late summer and early fall. Much of the stream is confined within a straight and uniform (ditch-like) channel profile. The gradient of the stream is low, generally 1 percent or less. As a result, fine sediments have accumulated in many areas, resulting in the shallowing and widening of the streambed. Dense patches of reed canarygrass have become established in some low-energy areas, exacerbating the deposition of fine sediments.

Riparian vegetation along East Fork Hylebos Tributary in the study area includes cover types that provide a range of ecological functions. Areas dominated by native forest and wetlands are considered high-quality riparian habitat because they support functions such as fish and wildlife habitat provision; food chain support; water temperature moderation; infiltration; groundwater recharge and discharge; sediment delivery, transport, and storage; organic matter input; nutrient and pathogen removal; and stream channel formation and maintenance. In other areas, riparian habitat quality has been degraded through the conversion of native and structurally complex habitats into landscaping, mowed grasses, or invasive shrubs.

The stream is conveyed under S 336th Street in a pair of 65-foot-long culverts that are classified as partial barriers to fish passage. South of S 336th Street, the stream flows approximately 0.25 mile through a 200- to 300-foot-wide corridor of native forest habitat. At the southern end of this segment, the width of the functional riparian buffer is limited by a retaining wall along the eastern boundary of the Christian Faith Center property. The wall parallels the stream for approximately 500 feet. The width of the vegetated area between the retaining wall and I-5 is approximately 230 to 260 feet.

A few hundred feet north of S 341st Street, the forested riparian corridor narrows to approximately 80 to 100 feet, and it is confined by I-5 on the east and developed properties to the west. An existing retaining wall limits the width of the functional riparian buffer in the southern portion of this area. After flowing through that narrow area for approximately 700 feet, the stream enters a series of culverts associated with the WSDOT stormwater facility north of S 344th Street. One of those culverts is classified as a partial barrier to fish passage (Figure 3.10-1).

West Fork Hylebos Tributary

West Fork Hylebos Tributary flows through the northwestern corner of the project limits of the Preferred Alternative OMF site near the intersection of SR 99 and S 336th Street. Surface-flowing segments near the stream's headwaters are in the mainline track portion of the study area. The segment of West Fork Hylebos Tributary in the study area has intermittent flow and is considered a Type F stream based on its potential to support fish.

The high level of development and associated impervious surfaces in the West Fork Hylebos Creek basin have resulted in severe flooding issues over the years and have contributed to increased peak and base flows in West Fork Hylebos Tributary (King County 1990). As a result, Federal Way has completed numerous flood control projects, including large stormwater facilities throughout the basin.

Within the Preferred Alternative OMF site portion of the study area, West Fork Hylebos Tributary flows through a wetland (Wetland WFW-02) and an associated in-line stormwater detention facility. The stream lacks a defined bed and bank in this wetland area. When it is ponded, this facility could support fish use; however, once the facility drains, there is little or no holding water for fish. The pond's substrate is predominantly fine sediment and, as such, provides no suitable spawning habitat for anadromous or resident salmonid fish. Vegetation within the facility is dominated by native trees and shrubs that provide high-quality riparian habitat. Immediately upstream and downstream of the detention facility, the stream is contained in pipes or in other in-line stormwater facilities. Where it exits the wetland/stormwater facility, the stream flows through a raised outlet standpipe and then enters an approximately 500-foot-long culvert under SR 99. Based on field reviews performed in 2015, the culvert and standpipe have been identified as a complete barrier to fish passage (WDFW 2023).

North Fork McSorley Creek

No surface-flowing portions of North Fork McSorley Creek are within the OMF South study area for the Midway Landfill Alternative. However, a regional stormwater detention facility at the north end of the Midway Landfill site discharges to North Fork McSorley Creek, approximately 1.1 miles from the study area. For this reason, this analysis provides information about fish use in the stream reaches to which the stormwater detention facility discharges. North Fork McSorley Creek is a perennial stream and is considered a Type F stream based on its potential to support fish use.

Electrofishing surveys conducted by Washington Trout (2003) documented the presence of coastal cutthroat trout and western brook lamprey in reaches to which the stormwater detention facility discharges. According to NWIFC (2023), fall-run Chinook salmon, fall-run chum salmon, coho salmon, and winter-run steelhead could potentially use habitats in North Fork McSorley Creek 1.1 miles from the study area, but constructed barriers and/or degraded habitat quality currently preclude their presence.

3.10.1.2 Vegetation, Wildlife, and Wildlife Habitat

Biologists identified and delineated 10 vegetation cover types in the study area and evaluated their relative habitat value. The cover types are commercial, residential, grassland, invasive brush, native brush, non-native forest, mature native forest, other native forest, wetland/stream, and stormwater pond. The relative habitat value of each cover type is based on habitat structure, scarcity in the study area, disturbance types and frequency, and time required for ecosystem functions to recover following clearing and site restoration. Detailed descriptions of the cover types can be found in Appendix G3, Ecosystem Resources Technical Report.

Wildlife use of habitats in urban landscapes depends on the general location of the habitat, the size and type of undisturbed habitats, the degree of connectivity and extent of travel corridors between and among these habitats, and the types and levels of human activity. Much of the study area is dominated by areas of urban development with little vegetation cover and minimal habitat value. Trees and other landscaping in residential areas provide limited habitat value. Other common vegetation cover types, particularly in the rights-of-way of I-5 and other roads, are grassy areas and patches of invasive shrubs, such as Himalayan blackberry. The relative habitat value of developed areas is low to moderate.

Wildlife use of developed areas is generally limited to adaptable species, such as house sparrows, European starlings, rats, mice, raccoons, Virginia opossums, and eastern gray squirrels. Birds such as rock pigeons and cliff swallows commonly build nests on bridges and road overpasses, and many bat species use such structures as temporary roosting sites. Red-tailed hawks and other raptors prey on voles and other small mammals that are found in abundance in grassy vegetation, such as in the I-5 right-of-way. Open-water habitats, such as wetlands and stormwater detention ponds, provide resting and foraging areas for waterfowl. Animals that use habitats in the study area are exposed to high levels of disturbance generated by human activity in commercial, institutional, and industrial areas and by traffic on I-5 and major arterial roadways.

Structurally complex habitats, such as forested areas and wetlands, have more biological diversity and higher value as wildlife habitat. With habitat features such as large trees, snags, decaying logs, and a diverse understory, areas classified as mature native forest typically support diverse communities of forest-associated wildlife. Mature native forests have been identified as priority habitats by WDFW. Most patches of forest cover in the study area are fragmented and separated from surrounding habitat areas by commercial and residential developments and roads. Despite their isolation, these areas still provide habitat for forest-associated resident and migratory songbirds, as well as for hawks, owls, woodpeckers, and small mammals. The largest patches of forested habitat are near the Preferred and South 344th Street alternatives. These areas contain the only patches of mature native forest that have been identified in the study area. One patch, approximately 10 acres in size, parallels I-5 south of S 336th Street.

The Migratory Bird Treaty Act of 1918, administered by the U.S. Fish and Wildlife Service (USFWS), makes it unlawful to take any migratory bird, or the parts, nests, or eggs of any such bird, except under the terms of a valid permit. In the context of this Act, “take” is defined as “pursue, hunt, shoot, capture, collect, kill, or attempt to pursue, hunt, shoot, capture, collect, or kill” (Title 16 U.S. Code [U.S.C.] § 715n). Nearly all bird species that may occur in the study area are protected under the Migratory Bird Treaty Act. Protected birds or bird nests may be present in any of the cover types in the study area. Forested areas, wetlands, and other areas with comparatively complex cover types are likely to support greater densities and more diverse assemblages of nesting birds.

3.10.1.3 Wetlands

Sound Transit identified a total of 23 wetlands in the study area (Figures 3.10-1 through 3.10-3). During scoping, Tribes, agencies, and the public expressed concern about potential impacts on ecosystem resources. Sound Transit determined that detailed information collected early in the process would help the design team avoid and minimize impacts on wetlands. Therefore, biologists performed formal delineations of wetland boundaries in legally accessible areas associated with tributaries of Hylebos Creek. Wetlands that could not be accessed for formal delineations were mapped and characterized at the reconnaissance level. All wetlands analyzed as part of the OMF South EIS process were rated according to local jurisdiction critical area ordinances and the Washington State Wetland Rating System for Western Washington, 2014 Update (Hruby 2014). The Washington State system was updated in 2023, and the wetlands will be reassessed under the new system for the permitting process. Wetlands were delineated or identified based upon the criteria in the U.S. Army Corps of Engineers Wetland Delineation Manual (Environmental Laboratory 1987) and the Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Western Mountains, Valleys and Coast Region (Corps 2010). The delineation methods were not affected by the 2023 Supreme Court decision which changes the regulatory status of some “waters of the U.S., including wetlands.”

Descriptions of individual wetlands are provided in Appendix G3, Ecosystem Resources Technical Report.

The portion of the study area encompassing the Preferred and South 344th Street alternatives is dominated by commercial, institutional, and industrial development, which includes substantially altered natural wetlands, watercourses, and buffers that are degraded due to development, human disturbance, and abundant non-native and invasive vegetation. Ten wetlands were identified in this portion of the study area. All but one of these are associated with East Fork Hylebos Tributary within the approximately 100- to 300-foot-wide undeveloped forested corridor adjacent to I-5. The remaining wetland, identified as Wetland WFW-02, is contained within the in-line stormwater detention facility associated with West Fork Hylebos Tributary.

At the Midway Landfill Alternative, biologists identified five areas meeting the parameters for wetland hydrology, soils, and vegetation. During preparation of the 2021 SEPA Draft EIS, the U.S. Army Corps of Engineers (Corps) determined that the areas do not meet federal criteria for jurisdictional wetlands (Tong 2019), and Ecology verified that they are non-jurisdictional under state definitions (Gresham 2020). On May 25, 2023, the Supreme Court issued a judgment limiting Corps jurisdiction on "waters of the U.S." Effective September 8, 2023, EPA and the Corps published their amendments to the Revised Definition of Waters of the United States. Ecology, which has state authority under RCW 90.48 to regulate wetlands, will likely issue administrative orders to address impacts to waters of the U.S. the Corps no longer regulates. In the case of these five areas at the Midway Landfill, Sound Transit believes that it is not likely the earlier determination will change because the Supreme Court judgment limits jurisdiction. As such, these areas are not considered regulated wetlands and are not discussed further. However, if the definition of waters of the U.S. were to expand and the Midway Landfill is selected as the project to be built, Sound Transit will comply with the applicable regulations and update project documentation as required. One wetland, previously delineated for the WSDOT SR 509 Project, was identified in the Midway Landfill Alternative portion of the study area north of the proposed OMF South site (Anchor 2019).

3.10.1.4 Threatened and Endangered Species

As discussed in Section 3.10.1.1, no ESA-listed fish are known or expected to be present in the study area under current conditions. However, Chinook salmon and steelhead have been documented in Hylebos Creek and other streams downstream of the study area. In addition, one bull trout was observed in West Fork Hylebos Creek in 2018. In the future, if all downstream barriers to fish passage are removed, individuals of these species could access the study area. Under existing conditions, contaminants in stormwater runoff from roads within the study area could harm these species in stream reaches downstream of the study area.

Five ESA-listed wildlife species (marbled murrelet, yellow-billed cuckoo, streaked horned lark, Taylor's checkerspot, and North American wolverine) and one species proposed for listing (northwestern pond turtle) potentially occur in areas that might be affected by the project (USFWS 2023). In addition to those species, gray wolves in western Washington have a listing status of endangered. None of these species are expected to occur in the study area because no suitable habitat is present (see Appendix G3, Ecosystem Resources Technical Report). No designated critical habitat for any ESA-listed species is present in the study area. The Washington State Department of Natural Resources (WDNR) Natural Heritage Program database does not include any records of ESA-listed plant populations within 5 miles of the study area (WDNR 2019).

3.10.2 Environmental Impacts

For this analysis, the design team identified a permanent impact footprint for each alternative, based on project features that could result in long-term impacts on ecosystem resources. Each build alternative footprint includes the OMF South site, along with the short segments of lead tracks that connect the site to the mainline tracks and any new mainline tracks that would be constructed to connect the site to the southern terminus of FWLE. The Preferred Alternative and the South 344th Street Alternative include approximately 4,600 linear feet of test track paralleling the mainline tracks. The Preferred Alternative also includes the extension of 18th Place S from S 336th Street to S 340th Street, and the extension of 21st Ave S from S 341st Place to S 344th Street.

The design team also defined a larger temporary impact footprint for each build alternative, encompassing the permanent impact footprint and surrounding areas where vegetation clearing and ground-disturbing work would likely be required for project construction. Areas outside the permanent impact footprint but within the temporary impact footprint would be restored to pre-project conditions, or better, following construction. These footprints were overlaid on mapped locations of wetlands, streams, buffers, and vegetation cover types to determine the extent of the potential impacts of the alternatives on ecosystem resources.

Compared to the impacts of site facilities, road extensions, and at-grade tracks, the impacts of elevated portions of the mainline, lead, tail, and test tracks (under the Preferred Alternative or the South 344th Street Alternative) would be less severe. These structures would be relatively narrow (typically 20 to 30 feet wide) and generally more than 15 feet above the ground surface. Vegetation would be able to grow in such areas, although the density and variety of vegetation would be limited by the reduced availability of sunlight and precipitation. For operational safety, only appropriate short-stature vegetation would be planted under the elevated mainline tracks. Trees and other tall vegetation would not be allowed to grow underneath or within 15 feet of elevated track segments. A similar constraint would apply within 15 feet of at-grade track segments.

Based on site-specific conditions, retaining walls would be built in some areas to minimize disturbance to the aquatic features and their buffers. To allow maintenance access and to avoid damage, trees and other large vegetation would not be allowed to grow near the base or top of the walls.

The tables and figures in Appendix G3, Ecosystem Resources Technical Report, detail the results of the impact analysis. The permanent and temporary impact footprints developed for this analysis represent Sound Transit's best estimates of the areas that may be affected by the OMF South alternatives. These estimates are conservative. For example, clearing of all areas within the temporary impact footprint may not be necessary, but analyses of construction-related impacts are based on the assumption that the entire temporary impact footprint would be cleared. In addition, the permanent impact footprint may include some areas where project components could be scaled down or eliminated as the project design progresses from its current, preliminary status. Moreover, not all areas within the project footprint would be converted to structures or hard surfaces. Some vegetated areas are expected to be converted to other land cover types, such as landscaping or stormwater facilities; in other areas, existing hard surfaces may be converted to vegetation. Section 3.11, Water Resources, includes more analysis on land cover conversions.

By applying a consistent set of assumptions for all the alternatives, these footprints allow Sound Transit to evaluate the relative degree of the potential impacts of the alternatives on ecosystem resources. Anticipated impacts would be further refined and determined when an alternative is

selected to be built and the project design is sufficiently advanced to undergo permitting review. Additional field work would be conducted for the selected alternative to refine the understanding of project impacts.

Analyses of project-related impacts assume that appropriate BMPs would be implemented and would perform as expected to avoid and minimize certain impacts during construction. See Appendix G3, Ecosystem Resources Technical Report, for a discussion of BMPs. For each resource area, analyses of direct impacts are divided between long-term (operational) impacts and short-term (construction-related) impacts. Cumulative impacts are evaluated in Chapter 4.

3.10.2.1 No-Build Alternative

Under the No-Build Alternative, impacts to ecosystem resources from construction or operation of OMF South would not occur. However, other planned projects would have impacts in the OMF South study areas. This includes TDLE, which overlaps with the OMF South Preferred and South 344th Street alternatives. If TDLE is constructed as proposed, the mainline track associated with these OMF alternatives would be built later in time. Impacts associated with construction of the mainline track are addressed within the build alternatives impacts discussion below. All other TDLE-related impacts are addressed in Chapter 4, Cumulative Effects Analysis.

3.10.2.2 Long-Term Impacts

Under any of the build alternatives, direct long-term impacts on ecosystem resources would occur where permanent features, such as proposed project facilities, overlap ecosystem resources, such as wetlands, wetland buffers, streams, stream buffers, or native forest. Long-term impacts of OMF South development on ecosystem resources are described below.

Aquatic Species and Habitat

Direct impacts on aquatic resources would occur where permanent features alter in-stream habitat or riparian functions. As previously discussed, no ESA-listed fish are known or expected to be present in the study area, and the study area contains no critical habitat for any ESA-listed species. Therefore, none of the OMF South alternatives would have the potential for any direct adverse effects on ESA-listed species or critical habitat.

ESA-listed Chinook and steelhead have been documented in Hylebos Creek and both the East and West Fork Hylebos creeks and, therefore, may be present in other tributary stream reaches downstream of the study area. In addition, although bull trout are not expected to use habitats in the Hylebos Creek watershed, one observation of bull trout occurred in West Fork Hylebos Creek in 2018. In the future, if all downstream barriers to fish passage are removed, individuals of these species would have access to the study area.

None of the stream segments in the study area are known or expected to support resident or anadromous salmonids under current conditions. Other aquatic organisms, such as invertebrates and non-salmonid fish, are likely present in those streams, however. In addition, the loss or degradation of stream habitat could reduce the availability of prey (e.g., benthic invertebrates) for fish and other aquatic species in downstream reaches. Impacts on stream habitat could also decrease the availability and quality of habitat for salmonids and other fish in the future if access is restored through the removal of downstream fish passage barriers.

Impacts may also occur where elevated mainline, test, or lead tracks pass over surface-flowing streams. Shade from structures placed over streams may affect the behavior of salmonids in the affected stream segments. Juvenile salmonids may respond to shadows from overwater

structures by pausing at the upstream end of the darkened area or moving into deeper waters, potentially increasing their vulnerability to predation (Kemp and Williams 2008; Moore et al. 2013). Although none of the stream segments in the study area currently support salmonids, the presence of these structures could affect fish behavior if access is restored in the future. (These impact areas and length of streams affected are summarized in Table 3.10-1 and depicted in Figures G3.4-1 through G3.4-5 in Appendix G3, Ecosystem Resources Technical Report.)

Where the permanent impact footprint of an OMF South alternative overlaps a stream's riparian buffer, the ecological function of that buffer would be diminished or lost. Substantial decreases in current riparian function would occur where areas of tree or shrub cover in a stream's riparian zone are converted to facilities or to other vegetation types (e.g., lawns, ornamental landscaping, areas near tracks) with less structural or compositional diversity. Where riparian vegetation is removed altogether, potential future riparian functions would be eliminated. Potentially affected riparian functions and processes include fish and wildlife habitat provision; food chain support; water temperature maintenance; infiltration; groundwater recharge and discharge; sediment delivery, transport, and storage; organic matter input; nutrient and pathogen removal; pollutant removal; and stream channel formation and maintenance. Impact areas and length of streams affected are summarized in Table 3.10-1 and depicted in Figures G3.4-1 through G3.4-5 in Appendix G3, Ecosystem Resources Technical Report.

Table 3.10-1 Potential Long-Term Impacts on Aquatic Resources

Alternative	Design Option	Project Element	Stream ¹	Stream Impact (linear feet) ²	Total Stream Impact per Alternative (linear feet)	Stream Channel Daylighted (linear feet)	Stream Buffer Impact (acres) ³	Total Stream Buffer Impact Per Alternative (acres)
Preferred	40 mph Alignment	Site	East Fork Hylebos Tributary	900	3,050	420	2.8	7.2
			West Fork Hylebos Tributary ⁴	600		0	0.5	
		Mainline ⁵	East Fork Hylebos Tributary	1,550		0	3.9	
	55 mph Design Option	Site	East Fork Hylebos Tributary	900	3,100	420	2.8	8.6
			West Fork Hylebos Tributary ⁴	600		0	1.6	
		Mainline ⁵	East Fork Hylebos Tributary	1,600		0	4.2	
South 344th Street	40 mph Alignment and Enchanted Parkway Tail Track Alignment	Site	East Fork Hylebos Tributary	1,250	2,850	420	4.5	10.5
		Mainline ⁵	East Fork Hylebos Tributary	1,600		0	6.0	
	55 mph Design Option and I-5 Tail Track Alignment	Site	East Fork Hylebos Tributary	1,250	2,900	420	4.6	11.3
		Mainline ⁵	East Fork Hylebos Tributary	1,650		0	6.7	
	55 mph Design Option and Enchanted Parkway Tail Track Alignment	Site	East Fork Hylebos Tributary	1,250	2,900	420	4.6	10.9
		Mainline ⁵	East Fork Hylebos Tributary	1,650		0	6.3	
	40 mph Alignment and I-5 Tail Track Alignment	Site	East Fork Hylebos Tributary	1,250	2,850	420	4.6	11.0
		Mainline ⁵	East Fork Hylebos Tributary	1,600		0	6.4	
Midway Landfill	N/A	N/A	N/A	0	0	0	0	0

- Notes:
- (1) Both affected streams are Type F, per WAC 222-16-030 and FWC 19.145.260.
 - (2) Includes the total length of surface-flowing stream within the permanent impact footprint defined for this analysis.
 - (3) Impact numbers presented in this table represent all affected areas inside functional stream buffers, including areas that overlap with wetland buffers.
 - (4) The portion of this stream in the study area lacks a defined bed and bank where it flows through Wetland WFW-02. For this reason, stream impacts are based on the approximate centerline of the mapped stream, and buffer impacts are based on the affected area of Wetland WFW-02. See text for further discussion.
 - (5) If neither the Preferred nor the South 344th Street alternative is selected, the mainline could be built later in time if TDLE is constructed as proposed. TDLE is currently under environmental review.

The impacts described in Table 3.10-1 reflect potential long-term impacts to streams and aquatic resources based on the overlap between streams or stream buffers and the permanent impact footprint for each alternative. Impacts to aquatic resources within the permanent impact footprint could take several forms. For example, project features (including elevated structures, such as the mainline, test, and lead tracks) would be built near, parallel to, or over surface-flowing stream channels. In certain areas, no ground-disturbing work would take place in the stream channel, but the presence of those structures could have long-term effects on riparian and/or aquatic habitats. In other areas, an existing stream channel would need to be relocated and realigned to accommodate project features. These impacts are described further in the discussions of the impacts of the individual alternatives.

Under any of the build alternatives, runoff from impervious surfaces, including pollution-generating impervious surfaces, would be detained and treated in accordance with local, state, and federal requirements. However, water that passes through stormwater management facilities may still contain contaminants (albeit in reduced concentrations) that could harm fish in receiving waters. These impacts could extend a considerable distance downstream, potentially affecting fish (including ESA-listed species) in stream reaches outside of the study area. In addition, during major storm events, the capacity of those facilities may be exceeded, and some runoff may directly enter streams and other surface waters without receiving treatment. It is important to note that the first-flush runoff from such events (i.e., runoff with the highest concentrations of contaminants) would enter treatment facilities. Bypassing would occur later in the storm event, after most contaminants have washed off.

Recent research has found 6PPD-quinone, a contaminant found in runoff from highways and roadways, to be a major contributor to pre-spawning mortality in coho salmon (Tian et al. 2021). A 2022 study (Brinkman et al. 2022) found that rainbow trout and brook trout were sensitive to exposure, while arctic char and white sturgeon were tolerant. Another study (French et al. 2022) found that urban roadway runoff is lethal to juvenile coho, steelhead, and chinook salmonids but not sockeye. Other harmful contaminants in stormwater runoff from roadways include polycyclic aromatic hydrocarbons, which have been found to cause reduced growth, increased susceptibility to infection, and increased mortality in salmonids (Meador et al. 2006; Varanasi et al. 1993). Another common component of stormwater runoff is dissolved copper, which can impair the olfactory system of salmonids and hinder their predator avoidance behavior (Sandahl et al. 2007). Dissolved zinc is another common component of stormwater that, when at higher concentrations, can lead to internal tissue hypoxia, reduced immunity, osmoregulatory failure, acidosis, and low oxygen tensions in the arterial blood of freshwater fish (Eisler 1993).

Ecology (2022) has evaluated the effectiveness of stormwater facilities in providing treatment that prevents or reduces the toxicity of contaminants in receiving waters. Final design will use this evaluation in the selection and design of stormwater management facilities.

Because the volume of runoff from impervious surfaces would be managed in accordance with local, state, and federal requirements, none of the alternatives would be expected to have long-term adverse effects on flow regimes in streams. Peak stream flows would not increase because the stormwater systems built for the proposed project would be designed to replicate predevelopment hydrology. Additional measures to reduce stormwater runoff, such as low-impact development (LID) or other on-site measures, would be considered at a more advanced phase of project development.

Operation of the mainline or test tracks would not be expected to increase nighttime illumination of fish-bearing waters (which could increase the risk of predation on juvenile salmonids). The tracks would have no overhead lighting, and the train headlights would be directed parallel to

the tracks. Lighting within the site would be shielded and directed inward toward the site to minimize spillover effects.

Preferred Alternative

The Preferred Alternative would affect approximately 3,050 to 3,100 linear feet of surface-flowing stream. The affected stream segments include approximately 2,450 to 2,500 linear feet of East Fork Hylebos Tributary (depending on whether the 40 mph Alignment or 55 mph Design Option is selected; see below) and approximately 600 linear feet of West Fork Hylebos Tributary (Table 3.10-1). Compared to the South 344th Street Alternative, the Preferred Alternative would affect approximately 400 fewer linear feet of East Fork Hylebos Tributary. But this alternative would impact West Fork Hylebos Tributary, whereas the South 344th Street Alternative would avoid those impacts. Compared to the South 344th Street Alternative, the Preferred Alternative would relocate more of East Fork Hylebos Tributary and would not daylight a segment of that stream near S 344th Street. These impacts are analyzed below.

Approximately 2,450 linear feet of East Fork Hylebos Tributary (surface-flowing) fall within the permanent impact footprint of this alternative. The affected portion of the stream extends from north of S 336th Street to S 344th Street (see Figure G3.4-4 in Appendix G3, Ecosystems Resources Technical Report). Approximately 1,650 feet of the stream channel in this area would be relocated and realigned. The current conceptual design includes meanders and other features to enhance the availability and diversity of aquatic habitats. Based on the conceptual design, the addition of meanders would increase the length of the stream channel in this area by approximately 130 linear feet. The actual layout of the stream channel would be developed by the design-build contractor in consultation with Sound Transit, permitting agencies, and other stakeholders.

Approximately 350 feet of the stream relocation would occur in the OMF site footprint, and approximately 1,300 feet would be associated with the mainline tracks. The relocated stream channel would be approximately 40 to 70 feet west of the mainline tracks. An additional approximately 750 linear feet of the stream would be within the permanent impact footprint but would not be relocated.

Currently, much of East Fork Hylebos Tributary in this area is confined within a straight and narrow channel that lacks complexity. Relocating and realigning the channel could create opportunities to add channel sinuosity and habitat complexity, potentially improving in-stream habitat conditions in some reaches. Large woody debris would be placed in and near the stream channel to restore habitat complexity. The new channel would be designed to maintain flows and water quality conditions.

Sound Transit has committed to minimizing the need to place existing streams in new culverts and has designed the OMF South alternatives to avoid new stream piping whenever possible. Any culvert on potentially fish-bearing streams that must be replaced to accommodate the project would be designed and installed in accordance with WDFW's Water Crossing Design Guidelines (Barnard et al. 2013). Any work below the ordinary high water line of any streams in the study area would be conducted in accordance with the terms of WDFW's Hydraulic Project Approval (HPA), Clean Water Act Section 404 permit, and other applicable permits and reviews.

The current interim design indicates that some of the relocated channel would be routed through a parcel immediately south of the Christian Faith Center property. That parcel is currently unvegetated and is used for storage of heavy equipment and construction materials. Under current conditions, the vegetated riparian area along that stream segment is confined to an

approximately 80-foot-wide strip. Upon project completion, the width of the area between the OMF site and the mainline tracks would be approximately 200 feet. It is assumed for this analysis that trees and other woody vegetation would be planted in all allowable areas between the OMF site and the mainline tracks. As a result, a wider area would be available to support riparian functions, but those functions would be limited in some parts of that area because trees and other tall vegetation would not be allowed to grow near the mainline and lead tracks.

Although relocating and realigning the stream channel would have some beneficial effects, changing the physical characteristics of a stream could adversely affect its hydrology and downstream sediment regimes. In addition, the presence of the OMF site to the west and the mainline tracks to the east would further reduce the width of the already limited area available to support riparian functions. From S 336th Street to the southeastern corner of the Christian Faith Center property, the vegetated riparian zone between the OMF site and the mainline tracks would be approximately 180 feet wide. Compared to the existing width of the vegetated riparian zone in this area (200 to 300 feet), under the Preferred Alternative, this zone would amount to a 10 to 40 percent reduction in the width of the existing vegetated riparian zone along approximately 1,400 linear feet of stream channel. Riparian functions in this area would be further reduced by the presence of lead tracks crossing the stream; trees and other tall vegetation would not be allowed to grow near the lead tracks.

Approximately 350 feet south of the Christian Faith Center parcel, the stream would be confined to an approximately 80-foot-wide corridor between the Ellenos Yogurt parcel and I-5. This area would include about 400 linear feet of stream channel. Much of the stream in this area would be beneath or immediately adjacent to the mainline or lead tracks. The presence of support columns near the stream would constrain options for natural or human-created modifications to channel configuration in the future. In addition, existing forested riparian vegetation in this area would be cleared and replaced with low-growing vegetation or converted to hard surfaces, substantially reducing riparian functions along this stream segment.

Downstream of the Ellenos Yogurt parcel, the realigned channel would tie into the channel that would be daylighted as part of the Preferred Alternative. Under this alternative, approximately 420 linear feet of East Fork Hylebos Tributary immediately north of S 344th Street would be removed from a culvert (See Table 3.10-1) and restored to a daylighted channel. Downstream of the daylighted channel, the stream would be conveyed under the 21st Avenue S extension and S 344th Street in a new structure that would replace the existing, approximately 315-foot-long structure. Under current conditions, the stream is conveyed through this area in a 4-foot-diameter corrugated steel pipe that is not considered to be a barrier to fish passage.

The permanent stream buffer impact areas (Table 3.10-1) reflect the assumption that nearly all of the existing forested riparian habitat along the affected stretch of stream would be cleared for construction. It may be possible to retain existing vegetation (including riparian forest) in some areas; the actual extent of riparian clearing and planting would be determined by the design-build contractor in consultation with Sound Transit. Where safety constraints allow, riparian areas for construction would be restored with native vegetation, with an emphasis on trees and shrubs. Trees and other tall vegetation would not be allowed to grow back near the mainline tracks and associated facilities. In those areas, some riparian habitat functions would be restored through revegetation with native shrubs and other low-growing species. In areas where mixed deciduous and coniferous forest is replaced with project features and non-forested vegetation, the capacity of those areas to support riparian functions for East Fork Hylebos Tributary would be permanently reduced. Some riparian habitat functions would be restored through revegetation with native shrubs and other low growing species.

The Preferred Alternative would also affect aquatic and riparian habitats associated with West Fork Hylebos Tributary. The impacts on aquatic habitats are difficult to quantify because the stream lacks a defined channel where it flows through Wetland WFW-02 and an associated in-line stormwater detention facility south of S 336th Street. For this reason, the estimated extent of project-related impacts is based on the linework obtained from the King County iMap interactive mapping tool. That source identifies approximately 600 linear feet of the stream that would fall within the permanent impact footprint of the Preferred Alternative.

Frontage improvements along S 336th Street to meet city standards would necessitate the installation of a replacement structure where West Fork Hylebos Tributary is crossed by the road. The current interim design for that crossing includes a structure that is approximately 3 feet longer than the existing pair of city-owned culverts (see Figure 3.10-2; WDFW ID# 933224) and that has a substantially larger hydraulic opening than the existing culverts. The installation of a single structure with a wider opening at this site would help restore hydrological capacity, allowing sediment and organic debris to pass through and providing fish unhindered passage beneath the roadway. The existing culverts are identified partial barriers to fish passage. The replacement structure would be designed and installed in accordance with WDFW's Water Crossing Design Guidelines (Barnard et al. 2013). As such, the Preferred Alternative could have a beneficial effect on fish passage at this site, if downstream barriers are removed in the future.

As discussed in the analysis of impacts on wetlands (see below), the extension of 18th Place S in the eastern portion of Wetland WFW-02 would reduce the area of the stormwater pond/wetland complex through which the stream flows. In addition, frontage improvements along S 336th Street could necessitate fill in the northern portion of the wetland, further reducing the area of the wetland that supports riparian functions for the West Fork Hylebos Tributary. Mitigation measures for impacts to wetlands are described in Section 3.10.3. Potential impacts to the in-line stormwater detention are discussed in the Final EIS Section 3.11 Water Resources.

Vegetation in and around Wetland WFW-02 supports riparian functions for West Fork Hylebos Tributary. The wetland and its buffer are dominated by forest that provides high-quality riparian habitat. Clearing of these forested areas for extending 18th Place S would permanently reduce their capacity to support riparian functions. See the wetlands analysis below for additional discussion of impacts to this wetland.

The 55 mph Design Option at the northern end of the mainline tracks would affect approximately 50 linear feet more of East Fork Hylebos Tributary than would the 40 mph Alignment (Table 3.10-1). While the 55 mph Design Option would intersect the northern end of the stream in Belmor, the 40 mph Alignment would avoid it altogether.

South 344th Street Alternative

The South 344th Street Alternative would affect approximately 2,850 to 2,900 linear feet of surface-flowing stream (Table 3.10-1). Compared to the Preferred Alternative, this alternative would affect approximately 400 more linear feet of the surface-flowing channel of East Fork Hylebos Tributary but impacts on West Fork Hylebos Tributary would be avoided altogether.

Impacts on East Fork Hylebos Tributary between S 336th Street and the culvert upstream of the WSDOT stormwater facility would be as described above for the Preferred Alternative. South of S 344th Street, approximately 400 linear feet of stream channel would fall within the permanent impact footprint of this alternative. In total, approximately 1,250 feet of the stream impacts would occur in the site footprint, and approximately 1,600 feet would be associated with the mainline tracks (Table 3.10-1). In contrast to the Preferred Alternative, this alternative would not involve the relocation of a short segment of East Fork Hylebos Tributary north of S 336th Street. As a

result, this alternative would entail 1,650 linear feet of stream relocation impacts, which would be the same as the Preferred Alternative.

Similar to the Preferred Alternative, the loss of mature, mixed deciduous and coniferous forest would reduce the riparian functions along the affected stream reaches. By affecting reaches downstream of S 344th Street, this alternative would degrade riparian habitat along 400 more feet of the stream than would the Preferred Alternative.

Under this alternative, approximately 420 linear feet of East Fork Hylebos Tributary immediately north of S 344th Street would be removed from a culvert (See Table 3.10-1) and restored to a daylighted channel. Daylighting this segment would increase the amount of functioning aquatic and riparian habitat available in the stream system.

Emergency vehicle access to the mainline tracks would be needed in the daylighted stream location. One of the options under consideration may require approximately 60 feet of channel that is currently culverted (and that would otherwise be daylighted, as described above) to be placed in a new culvert. Because this alternative would not include the extension of 21st Avenue S, the replacement crossing structure south of the daylighted channel would be shorter, compared to the Preferred Alternative. It may be possible to eliminate the need for a culvert through detailed design of the access and of the stream meanders. The design of the emergency vehicle access would need to be coordinated and approved by Sound Transit, WSDOT, and Federal Way.

As with the Preferred Alternative, the 55 mph Design Option at the northern end of the mainline tracks would affect slightly more of East Fork Hylebos Tributary than would the 40 mph Alignment. Under the South 344th Street Alternative, the direct permanent impacts of the tail track design options on streams would be largely identical. The I-5 alignment would affect more stream/wetland buffer along East Fork Hylebos Tributary than would the Enchanted Parkway alignment.

Midway Landfill Alternative

The Midway Landfill Alternative would have no direct impact on streams or stream channels because no streams are present on the Midway Landfill Alternative site. The only project features affecting streams under this alternative relate to stormwater runoff and detention.

Compared with the other alternatives, the Midway Landfill Alternative would convert more pervious land cover to impervious land cover (see Section 3.11.2.2 for additional information about the permeability of the existing membrane cap at the landfill). However, all stormwater runoff from the site would be detained and treated in an underground vault system that would be designed in accordance with Kent Stormwater Manual. The treatment vaults in turn would likely discharge to the on-site regional stormwater treatment and detention facility, which ultimately discharges to the North Fork McSorley Creek approximately 1.1 miles west. As a result, an increase in the area of impervious surface under this alternative would not be expected to adversely affect fish resources, stream hydrology, or aquatic habitat.

Vegetation, Wildlife, and Wildlife Habitat

Long-term impacts on vegetation and wildlife habitat would vary, depending on the affected land cover type. Land cover types include both vegetated areas (e.g., forest, grassland) and developed areas (e.g., commercial, residential). In much of the study area, the replacement of existing impervious surfaces and structures would constitute a minimal change in ecological functions, such as the capacity to support wildlife. The surrounding grass and low-growing

vegetation along the alignment would provide some habitat for ground-dwelling small mammals, such as mice and voles.

The severity of impacts on plants and animals would be greater where cover types dominated by native forest — mature native forest in particular — are affected. Removing trees, snags, and understory vegetation would eliminate nesting and foraging sites for birds (including migratory birds), roosting sites for bats, and hiding cover for small mammals. Similarly, impacts on the wetland/stream cover type would have an elevated potential for adverse effects on plants and animals, based on the presence of water and diverse plant communities in many such areas. Alternatives that affect a greater area of these habitat types would have a higher likelihood of adverse effects on vegetation and wildlife. Table 3.10-2 presents a comparison of the build alternatives’ potential impacts on vegetation in the study area, based on the amount of each land cover type in the permanent impact footprint.

The severity of impacts would also depend on the type of structure. Construction of the OMF site and at-grade segments of mainline tracks would mean the permanent removal of nearly all vegetation within the permanent impact footprint (although some vegetation would be allowed to grow in landscaped portions of the OMF site). In contrast, as previously discussed, elevated structures that are high enough above the ground would allow for some vegetation to grow underneath.

Operation of OMF South would entail moderate to high levels of human activity and associated noise and light. Notably, all three build alternatives are adjacent to I-5 and are in developed areas with relatively high levels of human activity. In addition to the noise, light, and vehicle traffic on the highway, regular human activity associated with residential, commercial, institutional, and industrial development is a common feature of the landscape throughout the study area. Wildlife that uses habitats in or near the build alternatives is regularly exposed to human activity, noise, and light.

Table 3.10-2 Potential Long-Term Impacts on Vegetation

Alternative	Design Option	Land Cover Type ¹										Total ²
		Commercial	Residential	Grassland	Invasive Brush	Non native Forest	Mature Native Forest	Other Native Forest	Wetland/Stream	Stormwater Pond		
OMF Site Impacts (acres)												
Preferred	N/A	34	4	4	3	1	11	4	5	1	68	
South 344th Street	N/A	38	7	4	5	<0.5	6	6	2	2	70	
Midway Landfill	N/A	9	1	57	1	1	0	4	0	5	78	
Mainline Impacts³ (acres)												
Preferred	40 mph Alignment	2	7	<0.5	1	0	3	3	2	<0.5	18	
	55 mph Design Option	1	8	<0.5	1	0	3	3	2	<0.5	20	

Table 3.10-2 Potential Long-Term Impacts on Vegetation (continued)

Alternative	Design Option	Land Cover Type ¹									Total ²
		Commercial	Residential	Grassland	Invasive Brush	Non native Forest	Mature Native Forest	Other Native Forest	Wetland/Stream	Stormwater Pond	
South 344th Street	40 mph Alignment and Enchanted Parkway Tail Track Alignment	2	7	<0.5	2	0	4	6	2	1	24
	55 mph Design Option and I-5 Tail Track Alignment	2	8	1	2	0	4	7	2	1	26
	55 mph Design Option and Enchanted Parkway Tail Track Alignment	2	8	<0.5	2	0	4	6	2	1	25
	40 mph Alignment and I-5 Tail Track Alignment	2	7	<0.5	2	0	4	7	2	1	24
Midway Landfill ⁴	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Notes:

- (1) Land cover types are described in Appendix G3, Ecosystem Resources Technical Report.
- (2) The total values for some rows do not equal the sum of the values in the row due to rounding.
- (3) If neither the Preferred nor the South 344th Street alternative is selected, the mainline could be constructed later in time if TDLE is constructed as proposed. TDLE is currently under environmental review.
- (4) The Midway Landfill Alternative would not include any mainline or test track construction.

If activity or noise levels at the maintenance facility noticeably exceed current conditions, affected animals may be displaced from otherwise suitable habitat, potentially leading to competition with animals that occupy suitable habitat at other sites with less disturbance. Such competition may produce increased stress and decreased reproductive success for affected individuals. Adverse behavioral responses to increased night lighting may have similar consequences. Animals displaced from areas of suitable habitat may be exposed to an elevated risk of predation or vehicle collisions while they are seeking new areas of suitable habitat.

Based on the limited amount of suitable habitat that would be affected under any of the alternatives, the project would not be expected to measurably reduce the regional populations of any wildlife species. None of the build alternatives are within 0.25 mile of a known breeding area or other sensitive site for any wildlife species of concern.

As previously discussed, no ESA-listed plant or wildlife species are known or expected to be present in the study area, and the study area contains no critical habitat for ESA-listed species. As such, none of the OMF South alternatives would have the potential for any adverse effects on ESA-listed species or critical habitat.

Preferred Alternative

The extent of this alternative’s effects on the mature native forest, other native forest, and wetland/stream cover types would be greater than the Midway Landfill Alternative and approximately equal to the South 344th Street Alternative. Under this alternative (with either mainline track design option), construction and operation of the facility and mainline tracks would result in permanent impacts on approximately 14 acres of mature native forest, 7 acres of other native forest, and 7 acres of the wetland/stream cover type (Table 3.10-2). Most impacts (11 of 14 acres) on the mature native forest cover type would be associated with the OMF site rather

than the mainline tracks. Approximately 5 acres of mature native forest habitat surrounding Wetland WFW-02 would fall within the permanent impact area of the facility, as would approximately 6 acres of this habitat type along the eastern edge of the facility.

Compared with the South 344th Street Alternative, the Preferred Alternative would affect less of the forested wetland and riparian habitats associated with East Fork Hylebos Tributary. The 55 mph Design Option at the northern end of the mainline tracks would not have a noticeably different effect on native forests or wetlands and streams as compared to the 40 mph Alignment (Table 3.10-2).

Based on the prevalence of the commercial and residential cover types on the existing site and in the surrounding study area, OMF South operations at the Preferred Alternative site would probably result in a less noticeable increase in human activity and associated noise and light compared with the Midway Landfill Alternative. By affecting more areas with the native forest and wetland/stream cover types, however, this alternative would likely degrade or eliminate more areas that currently provide resting cover, hiding cover, or travel corridors for wildlife. As such, the potential for long-term behavioral disruption or displacement from suitable habitats may be greater under this alternative than under the Midway Landfill or South 344th Street alternatives.

South 344th Street Alternative

The extent of the South 344th Street Alternative's effects on the native forest and wetland/stream cover types would be similar to but lower than that of the Preferred Alternative (Table 3.10-2). Differences between these two alternatives arise primarily from the exclusion of Wetland WFW-02 and surrounding forested areas from the impact area of the South 344th Street Alternative. Compared to the Preferred Alternative, this alternative would affect fewer acres of the mature native forest (10 acres, compared to 14) and wetland/stream (3 acres, compared to 7) cover types. This alternative would affect 5 to 6 more acres of other native forest than the Preferred Alternative, depending on the tail track design option. Similar to the Preferred Alternative, most of the impacts on mature native forest would be associated with the OMF site, not the mainline tracks.

The impacts of the 55 mph Design Option at the northern end of the mainline tracks would be essentially identical to those of the 40 mph Alignment (Table 3.10-2). At the southern end of the facility, the design options for the tail tracks would have essentially identical impacts on the mature native forest and wetland/stream cover types, while the I-5 alignment would have slightly more impacts on other native forest, compared to the Enchanted Parkway alignment (Table 3.10-2).

Based on the smaller extent of impacts on the native forest and wetland/ stream cover types (and the similar degree of existing development in the study area), this alternative would likely have a lower potential to disturb wildlife over the long term compared with the Preferred Alternative, but greater than the Midway Landfill Alternative.

Midway Landfill Alternative

Compared with the other build alternatives, the Midway Landfill Alternative would have minimal effects on native or complex habitats (i.e., the mature native forest, native forest, and wetland/stream cover types). Most of the permanently affected area consists of the grassland cover type, which supports limited habitat functions that are widely available elsewhere in the study area. Only about 4 acres of other native forest cover would be affected, and no mature native forest or wetland/stream habitats would be affected (Table 3.10-2).

OMF South operations at the Midway Landfill site would result in a greater increase in human activity and associated noise and light compared with the other build alternatives. This is because most of the site is currently fenced to limit access to the landfill. In contrast, the Preferred and South 344th Street alternative sites are surrounded by commercial and residential areas with relatively high levels of human activity. Compared to the other two alternatives, however, the Midway Landfill Alternative would have a lower potential for adverse effects on wildlife because it would affect fewer acres of structurally complex habitat types such as native forests and wetlands.

Wetlands

Filling, excavating, or clearing within wetlands or wetland buffers would diminish wetland functions through the loss of area, changes to surface or subsurface water flows, or long-term changes to vegetation. Project actions that may entail such impacts include construction of buildings, roadways, mainline tracks, lead tracks, or test track (including support columns), train storage areas, retaining walls, parking areas, and stormwater facilities. The wetland impact areas are summarized in Table 3.10-3 below and depicted in Figures G3.4-1 through G3.4-5 in Appendix G3, Ecosystem Resources Technical Report. Wetland buffer impacts are summarized in Table 3.10-4 below.

Table 3.10-3 Potential Long-Term Impacts on Wetlands

Wetland Rating ¹	Alternative		
	Preferred ²	South 344th Street ^{2,3}	Midway Landfill
OMF Site Impacts (acres)			
Category II Wetlands	1.8	0	0
Category III Wetlands	0.9	1.4	0
<i>Total OMF Site Impacts</i>	<i>2.7</i>	<i>1.4</i>	<i>0</i>
Mainline Impacts^{4,5} (acres)			
Category III Wetlands	1.6	1.5	N/A
Category IV Wetlands	<0.1	<0.1	N/A
<i>Total Mainline Impacts</i>	<i>1.6</i>	<i>1.5</i>	<i>N/A</i>
Total Impacts	4.3	3.0	0

Notes:

- (1) Wetland ratings (Hruby 2014) are preliminary and subject to review by permitting authorities.
- (2) The impacts of the design options for the curve at the northern end of the mainline tracks would differ by 0.01 acre.
- (3) The impacts of the design options for the mainline tracks, including the tail tracks, for the South 344th Street Alternative would differ by 0.01 acre; see Table 3.10-6 for details.
- (4) If neither the Preferred nor the South 344th Street alternative is selected, the mainline could be built later in time if TDLE is constructed as proposed. TDLE is currently under environmental review.
- (5) The test track is included in the Preferred Alternative and the South 344th Street Alternative but not the Midway Landfill Alternative.

Table 3.10-4 Potential Long-Term Wetland Buffer Impacts

Alternative/Mainline Design Option		Wetland Buffer Impacts (acres) ¹	Affected Wetland Buffers
OMF Site Impacts²			
Preferred		7.8	WFW-01, WFW-02, WFW-03, WFW-04, WFW-15
South 344th Street		6.3	WFW-01, WFW-03, WFW-04, WFW-06, WFW-11, WFW-13, WFW-15, WFW-17, WFW-18
Midway Landfill		0	N/A
Mainline Impacts^{3,4}			
Preferred	With 40 mph Alignment	4.7	WFW-01, WFW-03, WFW-04, WFW-06, WFW-11, WFW-13, WFW-15, WFW-32
	With 55 mph Design Option	5.1	WFW-01, WFW-03, WFW-04, WFW-06, WFW-07, WFW-11, WFW-13, WFW-15
South 344th Street	With 40 mph Alignment and Enchanted Parkway Tail Track Alignment	7.0	WFW-01, WFW-03, WFW-04, WFW-05, WFW-06, WFW-11, WFW-13, WFW-15, WFW-17, WFW-32
	With 55 mph Design Option and I-5 Tail Track Alignment	7.2	WFW-01, WFW-03, WFW-04, WFW-05, WFW-06, WFW-07, WFW-11, WFW-13, WFW-15, WFW-17
	With 55 mph Design Option and Enchanted Parkway Tail Track Alignment	7.2	WFW-01, WFW-03, WFW-04, WFW-05, WFW-06, WFW-07, WFW-11, WFW-13, WFW-15, WFW-17
	With 40 mph Alignment and I-5 Tail Track Alignment	7.0	WFW-01, WFW-03, WFW-04, WFW-05, WFW-06, WFW-11, WFW-13, WFW-15, WFW-17, WFW-32
Midway Landfill	N/A	N/A	N/A

Notes:

- (1) Impact numbers presented in this table represent all affected areas inside functional wetland buffers, including areas that overlap with stream area and stream buffers; therefore, this table likely overestimates the extent of buffer impact areas. Stream areas, defined by the ordinary high water line, are excluded from wetland buffer areas.
- (2) For both the Preferred and S 344th Street Alternatives, there is only one site design; therefore, only one set of impact values is presented for the OMF site.
- (3) If neither the Preferred nor the South 344th Street alternative is selected, the mainline could be built later in time if TDLE is constructed as proposed. TDLE is under environmental review.
- (4) The test track is included in the Preferred Alternative and the South 344th Street Alternative but not the Midway Landfill Alternative.

Not all wetlands underneath elevated structures, such as the lead, test, and mainline tracks, would be permanently filled. However, trees and other tall vegetation would not be allowed to grow near track segments. This would result in the permanent conversion from trees and tall shrubs to short-statured shrubs and herbaceous vegetation. In addition, the long-term presence of structures above vegetation would reduce the amount of sunlight and precipitation the plants receive, potentially making these areas more sparsely vegetated. Also, the interception of precipitation by overhead structures could have the potential for long-term impacts on wetland hydrology. For any given wetland, the degree of those impacts would depend on the proportion of the wetland that is affected as well as the extent to which precipitation contributes to wetland hydrology at that site.

Preferred Alternative

The Preferred Alternative would have the greatest extent of long-term impacts on wetlands and wetland buffers among the build alternatives largely due to the construction of the OMF site and associated roadways, including the extensions of 21st Avenue S and 18th Place S (Tables 3.10-3 and 3.10-4). Approximately 60 percent of the area of long-term impacts on wetlands under this alternative would result from construction of the OMF site. A large proportion of the total wetland impact area (nearly 40 percent) would occur in Wetland WFW-02, a Category II forested wetland that is associated with West Fork Hylebos Tributary and contained within a stormwater facility in the northwestern portion of the OMF site footprint (see Table G3.4-7 and Figure G3.4-4 in Appendix G3, Ecosystem Resources Technical Report for more detail). The extension of 18th Place S and the construction of a bike/pedestrian pathway to meet local code requirements would require wetland fill and retaining walls in the eastern portion of this wetland. These impacts would reduce wetland habitat and functions, as well as reducing wetland buffer functions. Sound Transit is exploring options to further avoid and minimize impacts on wetlands during the design development process, if feasible.

Most of the other wetlands that fall within the permanent impact footprint for the Preferred Alternative (or have buffers that do) are riverine wetlands associated with East Fork Hylebos Tributary. Others are depressional or slope wetlands within or near the I-5 right-of-way.

Similar to direct impacts on wetlands, impacts on wetland buffers would occur primarily at the OMF site. The permanent impact footprint of the site would overlap 7.6 acres of wetland buffer, while that of the mainline tracks overlaps 4.7 to 5.0 acres of buffer (Table 3.10-4).

Impacts on Wetland WFW-07 would vary with the track design option at the northern end of the mainline tracks. The 55 mph Design Option would intersect a small portion (less than 0.05 acre) of that wetland and its buffer; the 40 mph Alignment would avoid it, and its buffer, altogether.

South 344th Street Alternative

The extent of long-term impacts on wetlands under the South 344th Street Alternative would be less than under the Preferred Alternative, primarily because the OMF site would not impact Wetland WFW-02. This alternative would have 3.0 acres of permanent impacts on wetlands, compared to 4.1 acres under the 336th Street Alternative (Table 3.10-3). The impacts of the mainline tracks would be similar in scale to those of the Preferred Alternative.

The direct long-term impacts of the mainline track design options on wetlands would be essentially identical. As under the Preferred Alternative, the 40 mph Alignment would avoid long-term impacts on Wetland WFW-07 and its buffer. Neither of the tail track options would have any direct impacts on wetlands, and their impacts on wetland buffers would be essentially identical.

Compared to the Preferred Alternative, the long-term buffer impact footprint of the site is slightly smaller (6.8 acres, compared to 7.6 acres), while the impacts of the mainline tracks would be greater due to the tail tracks (6.8 to 7.0 acres, compared to 4.7 to 5.0 acres; see Table 3.10-4).

Midway Landfill Alternative

The Midway Landfill Alternative would have no long-term impacts on wetlands because there are no regulated wetlands or wetland buffers within the temporary or permanent impact footprints of this alternative.

3.10.2.3 Construction Impacts

Temporary construction-related impacts would occur where wetlands, wetland buffers, streams, stream buffers, or native forest are affected by clearing, grading, and ground-disturbing work but are revegetated following construction. The temporary impacts of OMF South construction on ecosystem resources are described below. For each ecosystem component, the impacts common to all alternatives are described first, followed by comparisons of the effects of the alternatives.

Aquatic Species and Habitat

Temporary construction-related impacts on aquatic resources would occur where stream buffers are affected by clearing, grading, and ground-disturbing work but are revegetated following construction. In addition to impacts on riparian vegetation, temporary impacts on stream habitats would occur if streams were diverted or placed in temporary pipes. Also, ground-disturbing work and equipment use in or near surface-flowing waters would present the risk of delivering sediment or contaminants (e.g., fuel, hydraulic fluids) to streams, temporarily degrading water quality. The risk of adverse effects would be minimized through the implementation of BMPs during construction and post-construction restoration. Temporary, construction-related impacts on streams and stream buffers are summarized in Table 3.10-5.

The duration of such impacts would vary, depending on the existing condition of the affected area. Where clearing affects low-growing vegetation (e.g., grasses, herbaceous species) or invasive species, the riparian functions of the disturbed areas would likely be restored within one growing season of clearing and replanting. Where invasive species are cleared and replaced with native species, riparian functions may be improved. In contrast, temporary impacts on woody vegetation generally last longer because trees and/or shrubs may require several years or decades to achieve the size and stature necessary to provide preconstruction functions, such as shade and large woody debris recruitment.

Preferred Alternative

Most of the Preferred Alternative's impacts on aquatic resources (including impacts associated with the OMF site, mainline, lead, and test tracks) would be long-term and are discussed in Section 3.10.2.2. Approximately 500 linear feet of East Fork Hylebos Tributary would fall within the temporary impact footprint (250 linear feet for the OMF site and 250 feet along the mainline tracks; see Table 3.10-5). Impacts would include temporary loss of riparian habitat function and an elevated risk of water quality degradation, as described above. Site construction would temporarily affect approximately 1.4 acre of stream buffer habitat along East Fork Hylebos Tributary, and mainline track construction would affect approximately 2.2 acres.

Similar to permanent impacts, direct temporary impacts on West Fork Hylebos Tributary are difficult to quantify because the stream lacks a defined bed and bank in most of the study area. As with the analysis of permanent impacts, the estimated extent of project-related impacts is based on the linework obtained from the King County iMap interactive mapping tool. No part of the line representing West Fork Hylebos Tributary south of S 336th Street falls within the temporary impact footprint of the Preferred Alternative. North of S 336th Street, approximately 50 linear feet of the mapped stream channel fall within the temporary impact footprint. Project construction is anticipated to have temporary impacts on the stream, such as temporary loss of riparian habitat function and an elevated risk of water quality degradation, as described above. During construction of frontage improvements along S 336th Street and installation of a replacement structure where the stream is crossed by the road, a small segment of the stream would likely be placed in a temporary bypass while construction is underway.

Table 3.10-5 Potential Temporary (Construction-Related) Impacts on Aquatic Resources

Alternative	Design Option	Project Element	Stream ¹	Stream Impact (linear feet) ²	Total Stream Impact per Alternative	Stream Buffer Impact (acres) ³	Total Stream Buffer Impact per Alternative (acres)
Preferred	40 mph Alignment	Site	East Fork Hylebos Tributary	250	550	1.4	6.5
			West Fork Hylebos Tributary ⁴	50		2.9	
		Mainline ⁵	East Fork Hylebos Tributary	250		2.2	
	55 mph Design Option	Site	East Fork Hylebos Tributary	250	650	1.4	7.2
			West Fork Hylebos Tributary ⁴	50		2.9	
		Mainline ⁵	East Fork Hylebos Tributary	350		2.9	
South 344th Street	40 mph Alignment and Enchanted Parkway Tail Track Alignment	Site	East Fork Hylebos Tributary	50	900	0.1	4.4
		Mainline ⁵		850		4.3	
	55 mph Design Option and I-5 Tail Track Alignment	Site	East Fork Hylebos Tributary	50	1,050	0.1	4.7
		Mainline ⁵		1,000		4.6	
	55 mph Design Option and Enchanted Parkway Tail Track Alignment	Site	East Fork Hylebos Tributary	50	1,050	0.1	5.1
		Mainline ⁵		1,000		5.0	
	40 mph Alignment and I-5 Tail Track Alignment	Site	East Fork Hylebos Tributary	50	900	0.1	3.9
		Mainline ⁵		850		3.8	
Midway Landfill	N/A	N/A	N/A	0	0	0	0

Notes:

- (1) Both affected streams are Type F, per WAC 222-16-030.
- (2) Includes the total length of surface-flowing stream within the temporary (construction-related) impact footprint defined for this analysis.
- (3) Values presented in this table represent all affected areas inside functional stream buffers, including areas that overlap with wetland buffers.
- (4) The portion of this stream in the study area lacks a defined bed and bank where it flows through Wetland WFW-02. Direct impacts on the stream are considered permanent and are discussed above. Temporary impacts on the stream buffer are calculated as the affected area of Wetland WFW-02, plus the area of temporary impacts on the stream's buffer north of S 336th Street. See text for further discussion.
- (5) If neither the Preferred nor the South 344th Street alternative is selected, the mainline could be built later in time if TDLE is constructed as proposed. TDLE is currently under environmental review.

Vegetation in and around Wetland WFW-02 supports riparian functions for West Fork Hylebos Tributary. As with the analysis of permanent impacts, temporary impacts on the stream buffer in that area are identified for this analysis as the extent of temporary impacts on Wetland WFW-02 (approximately 2.7 acres). An additional 0.2 acre of this stream's buffer north of S 336th Street (i.e., outside of Wetland WFW-02) also fall within the temporary impact footprint.

The temporary impact footprint of the 55 mph Design Option at the northern end of the mainline tracks would overlap approximately 100 linear feet more of East Fork Hylebos Tributary than would the 40 mph Alignment (Table 3.10-5).

South 344th Street Alternative

Mainline track construction for the South 344th Street Alternative would temporarily affect between approximately 850 and 1,000 linear feet of East Fork Hylebos Tributary, depending on the design option (Table 3.10-5). Site construction would temporarily affect approximately 0.1 acre of stream buffer habitat along East Fork Hylebos Tributary, and mainline track construction would affect approximately 3.8 to 5.0 acres, depending on the design option. This alternative would have no temporary impacts to West Fork Hylebos Tributary.

As with the Preferred Alternative, the 40 mph Alignment at the northern end of the mainline tracks would have a smaller construction-related impact on the northern end of East Fork Hylebos Tributary, compared to the 55 mph Design Option (Table 3.10-5). The direct temporary impacts of the tail track design options on streams would be identical. The Enchanted Parkway alignment, however, would affect approximately 0.4 acre more stream/wetland buffer along East Fork Hylebos Tributary than would the I-5 alignment (Table 3.10-5).

Midway Landfill Alternative

The Midway Landfill Alternative would have no temporary construction-related impacts on aquatic resources.

Vegetation, Wildlife, and Wildlife Habitat

Construction-related impacts on terrestrial resources would include temporary loss or degradation of terrestrial habitats as well as disturbance due to construction-related noise, light, and human activity. The duration of temporary impacts would vary depending on the type of vegetation that is affected. Impacts on grasses and areas dominated by fast-growing invasive species would generally be short-lived, with functions typically returning to pre-impact performance within one growing season. In contrast, temporary impacts on woody vegetation generally last longer because trees and/or shrubs require several years or decades to achieve the size and stature necessary to provide pre-impact functions, such as canopy habitat. Table 3.10-6 presents a comparison of the build alternatives' potential construction impacts on vegetation in the study area, based on the amount of each land cover type in the temporary impact footprint. Land cover types include both vegetated areas (e.g., forest, grassland) and developed areas (e.g., commercial, residential).

Areas cleared for construction would be susceptible to colonization by noxious weeds and other invasive plants. The risk of colonization would be proportional to the amount of area temporarily disturbed by construction; an alternative with a greater extent of ground disturbance would pose a higher risk of contributing to the establishment or spread of noxious weeds and invasive plants.

In disturbed areas, any of the build alternatives would provide the opportunity to temporarily reduce invasive species, such as Himalayan blackberry, through vegetation removal. In some areas, noxious weeds may be eradicated because cover types dominated by invasive species would be converted to landscaping and other areas where invasive species would be controlled. In areas where invasive species are replaced with native species, construction-related impacts may result in improved habitat function.

Table 3.10-6 Potential Temporary (Construction-Related) Impacts on Vegetation

Alternative	Design Option	Land Cover Type ¹									Total ²
		Commercial	Residential	Grassland	Invasive Brush	Non native Forest	Mature Native Forest	Other Native Forest	Wetland /Stream	Stormwater Pond	
OMF Site Impacts (acres)											
Preferred	N/A	8	2	<0.5	1	<0.5	<0.5	1	<0.5	1	13
South 344th Street	N/A	1	0	<0.5	0	<0.5	<0.5	<0.5	<0.5	0	1
Midway Landfill	N/A	1	<0.5	2	2	0	0	1	0	<0.5	7
Mainline Impacts³ (acres)											
Preferred	40 mph Alignment	13	6	2	3	0	2	6	<0.5	1	33
	50 mph Design Option	13	6	3	3	0	2	6	<0.5	1	34
South 344th Street	40 mph Alignment and Enchanted Parkway Tail Track Alignment	16	6	3	3	0	2	11	<0.5	1	42
	55 mph Design Option and I-5 Tail Track Alignment	17	6	5	3	0	2	10	<0.5	1	42
	55 mph Design Option and Enchanted Parkway Tail Track Alignment	16	6	5	3	0	2	11	<0.5	1	43
	40 mph Alignment and I-5 Tail Track Alignment	16	6	3	3	0	2	10	<0.5	1	41
Midway Landfill ⁴	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Notes:

- (1) Land cover types are described in Appendix G3, Ecosystem Resources Technical Report.
- (2) The total values for some rows do not equal the sum of the values in the row due to rounding.
- (3) If neither the Preferred nor the South 344th Street alternative is selected, the mainline could be built later in time if TDLE is constructed as proposed. TDLE is under environmental review.
- (4) The Midway Landfill Alternative would not include any mainline or test track construction.

Preferred Alternative

The temporary impact footprint for this alternative includes a large amount of clearing at the northern end of the mainline tracks to accommodate staging, stockpiling, and other construction activities (see Figure G3.4-9 in Appendix G3, Ecosystem Resources Technical Report). Most of the affected area would consist of the commercial or residential cover types (Table 3.10-6).

The total extent of temporary construction-related impacts on the other native forest cover type would be less than that of the South 344th Street Alternative and greater than the

Midway Landfill Alternative (Table 3.10-6). Nearly all temporary impacts on vegetation would be associated with construction of the mainline and test tracks, not the OMF site. The associated potential for temporary loss or degradation of terrestrial habitats and disturbance of sensitive wildlife species during construction would thus be slightly lower than that of the South 344th Street Alternative. The temporary impacts of the Preferred and the South 344th Street alternatives on the mature native forest and wetland/stream cover types would be essentially identical. However, it may take several years for the forested vegetation communities and several decades for the mature forested community to return to their preconstruction habitat function.

Based on the total extent of temporary, construction-related impacts, the risk of contributing to the establishment and spread of noxious weeds and invasive plants would be slightly greater than that of the South 344th Street Alternative and substantially greater than that of the Midway Landfill Alternative.

The 40 mph Alignment for the mainline and test tracks would have a slightly larger area of temporary impacts compared to the 55 mph Design Option (Table 3.10-6). This difference reflects areas at the northern end of the mainline track segment that would be permanently impacted under the 55 mph Design Option but only temporarily impacted under the 40 mph Alignment.

South 344th Street Alternative

Similar to the Preferred Alternative, the temporary impact footprint for this alternative includes a large amount of clearing at the northern end of the mainline tracks to accommodate staging, stockpiling, and other construction activities. In addition, the temporary impact footprint for this alternative extends farther south than that of the Preferred Alternative, affecting areas around the I-5/SR 18 interchange (see Figure G3.4-11 and Figure G3.4-12 in Appendix G3, Ecosystem Resources Technical Report). As a result, the total extent of temporary, construction-related impacts under the South 344th Street Alternative would be greater than either of the other build alternatives. As with the Preferred Alternative, most of the affected area would consist of the commercial or residential cover types (Table 3.10-6).

The temporary impacts of the Preferred and the South 344th Street alternatives on the mature native forest and wetland/stream cover types would be essentially identical, as would the associated potential for temporary loss or degradation of terrestrial habitats and disturbance of sensitive wildlife species during construction. The total extent of temporary, construction-related impacts — and the associated risk of contributing to the establishment and spread of noxious weeds and invasive plants — would be slightly less than that of the Preferred Alternative (Table 3.10-6).

For the same reasons as described for the Preferred Alternative, the 55 mph Design Option for the curve at the northern end of the mainline tracks would have a slightly smaller area of temporary impacts compared to the 40 mph Alignment. At the southern end of the facility, the design options for the tail tracks would have essentially identical temporary impacts on the mature native forest and wetland/stream cover types. The Enchanted Parkway alignment would have slightly more impacts on other native forest compared to the I-5 alignment (Table 3.10-6).

Midway Landfill Alternative

The extent of temporary construction-related impacts would be substantially smaller under the Midway Landfill Alternative than under the other build alternatives (Table 3.10-6). Also, much less of the other native forest cover type (and no mature forest or and wetland/stream) is within

the temporary impact area of this alternative compared to the other two build alternatives. As such, this alternative would have the lowest potential for temporary loss or degradation of terrestrial habitats and disturbance of sensitive wildlife species during construction.

Based on the small size of the temporary disturbance area, this alternative would have the lowest risk of contributing to the establishment and spread of noxious weeds and invasive plants.

Wetlands

Temporary impacts on wetland resources may include reduction or alteration of wetland area, soils, hydrology, and/or vegetation. Construction-related dewatering may temporarily alter groundwater discharge to wetlands. Wetland and wetland buffer functions could also be impacted by soil compaction, accidental spills of hazardous substances, noise and other human-caused disturbance, sedimentation, and introduction of invasive species. Impact areas are summarized in Table 3.10-7. Temporary impacts on wetland buffers are summarized in Table 3.10-8.

Table 3.10-7 Potential Temporary (Construction-Related) Impacts on Wetlands

Wetland Rating ¹	Alternative		
	Preferred	South 344th Street	Midway Landfill
OMF Site Impacts			
Category II Wetlands	2.7	0	0
Category III Wetlands	0.3	0	0
Category IV Wetlands	<0.05	0	0
<i>Total Site Impacts</i>	<i>3.0</i>	<i>0</i>	<i>0</i>
Mainline Impacts^{2, 3}			
Category III Wetlands	<0.05	0.3	N/A
Category IV Wetlands	<0.05	<0.05	N/A
<i>Total Mainline Impacts</i>	<i>0.1</i>	<i>0.3</i>	<i>N/A⁴</i>
Total Impacts			
<i>Total Impacts</i>	<i>3.0 - 3.1²</i>	<i>0.3</i>	<i>0</i>

Notes:

- (1) Wetland ratings (Hruby 2014) are preliminary and subject to review by permitting authorities.
- (2) Under either the Preferred Alternative or the South 344th Street Alternative, the impacts of the design options for the curve at the northern end of the mainline tracks would differ by less than 0.05 acre. For the Preferred Alternative, this difference causes the total impact area to round to 3.1 acres or 3.2 acres, depending on the design option. See text for details. The tail track design options for the South 344th Street Alternative would have identical impacts on wetlands.
- (3) If neither the Preferred nor the South 344th Street alternative is selected, the mainline could be built if TDLE is constructed as proposed. TDLE is currently under environmental review.
- (4) The Midway Landfill Alternative would not include any mainline or test track construction.

The duration of temporary impacts on wetlands would vary, depending on the type of vegetation that is affected. For instance, temporary impacts on emergent wetlands would generally be short-lived, with functions typically returning to pre-impact levels within one growing season. Where invasive species are replaced with native species, construction-related impacts may result in improved habitat function. In contrast, temporary impacts on woody vegetation generally last longer because trees and/or shrubs may require several years or decades to achieve the size and stature necessary to provide pre-impact functions, such as canopy habitat.

Table 3.10-8 Potential Temporary (Construction-Related) Impacts on Wetland Buffers

Alternative/Mainline Design Option		Wetland Buffer Impacts (acres) ¹	Affected Wetland Buffers ²
OMF Site Impacts			
Preferred		1.7	WFW-02, WFW-04, WFW-14, WFW-15, WFW-18, WFW-33
South 344th Street		0	N/A
Midway Landfill		0	N/A
Mainline Impacts³			
Preferred	With 40 mph Alignment	3.5	WFW-01, WFW-03, WFW-04, WFW-06, WFW-10a, WFW-11, WFW-12, WFW-13, WFW-15, WFW-16, WFW-32
	With 55 mph Design Option	4.1	WFW-01, WFW-03, WFW-04, WFW-06, WFW-07, WFW-10a, WFW-11, WFW-12, WFW-13, WFW-15, WFW-16, WFW-32
South 344th Street	With 40 mph Alignment and Enchanted Parkway Tail track Alignment	3.9	WFW-01, WFW-03, WFW-05, WFW-06, WFW-10a, WFW-11, WFW-12, WFW-13, WFW-15, WFW-16, WFW-22, WFW-32
	With 55 mph Design Option and I-5 Tail Track Alignment	4.6	WFW-01, WFW-03, WFW-05, WFW-06, WFW-07, WFW-10a, WFW-11, WFW-12, WFW-13, WFW-15, WFW-16, WFW-22, WFW-32
	With 55 mph Design Option and Enchanted Parkway Tail track Alignment	4.6	WFW-01, WFW-03, WFW-05, WFW-06, WFW-07, WFW-10a, WFW-11, WFW-12, WFW-13, WFW-15, WFW-16, WFW-22, WFW-32
	With 40 mph Alignment and I-5 Tail Track Alignment	4.0	WFW-01, WFW-03, WFW-05, WFW-06, WFW-10a, WFW-11, WFW-12, WFW-13, WFW-15, WFW-16, WFW-22, WFW-32

Notes:

- (1) Values presented in this table represent all affected areas inside functional wetland buffers, including areas that overlap with stream area and stream buffers.
- (2) Wetland WFW-07 buffer is only impacted by the 55 mph Design Option.
- (3) If neither the Preferred nor the South 344th Street alternative is selected, the mainline could be built later in time if TDLE is constructed as proposed. TDLE is currently under environmental review.

Preferred Alternative

Overall, construction-related impacts on wetlands under the Preferred Alternative would be greater than under the South 344th Street Alternative (Table 3.10-7), primarily because this alternative would affect Wetland WFW-02 while the South 344th Street Alternative would not. Other temporary impacts on wetlands would result from construction roadway extension as part of the site and of the mainline. Construction of the OMF site and the mainline tracks would also temporarily affect the buffers of several wetlands (Table 3.10-8).

The direct temporary impacts of the design options for the curve at the northern end of the mainline tracks would be essentially indistinguishable. The design options would differ in their impacts on wetland buffers, with the 40 mph Alignment having fewer buffer impacts by avoiding the buffer of Wetland WFW-07 as compared to the 55 mph Design Option (Table 3.10-8).

South 344th Street Alternative

Construction of the South 344th Street Alternative site would not cause any temporary impacts on wetlands or wetland buffers; all temporary impacts would be associated with mainline track construction (Table 3.10-7). Only three wetlands under this alternative would be impacted by

construction-related activities. The total extent of temporary, construction-related impacts (OMF site and mainline tracks combined) would be substantially less than under the Preferred Alternative, primarily because this alternative would not impact Wetland WFW-02, and it would not have any temporary impacts on Wetland WFW-04. As with the Preferred Alternative, the 40 mph Alignment also avoids the buffer of Wetland WFW-07 and would have fewer construction-related impacts than 55 mph Design Option at its northern end. There are no temporary wetland impacts from the tail track design options for the South 344th Street Alternative, but the buffers of Wetlands WFW-17 and WFW-05 would receive some impacts (see Figures G3.4-5 and G3.4-6 in Appendix G3, Ecosystem Resources Technical Report).

Midway Landfill Alternative

The Midway Landfill Alternative would have no temporary construction-related impacts on wetlands because no regulated wetlands or wetland buffers fall within the temporary impact footprint of this alternative.

3.10.2.4 Avoidance and Minimization of Impacts

The avoidance and minimization of impacts to ecosystem resources was a guiding principle in the preliminary design of the build alternatives. The development of the design for OMF South was strongly influenced by the presence and location of wetlands, habitat features, vegetation conditions, and the potential presence of fish and wildlife. During the conceptual design phase, the project design was adjusted to avoid and minimize impacts on streams, riparian areas, wetlands (Wetland WFW-02 in particular), and areas of mature native forest, particularly along East Fork Hylebos Tributary. For example, the design of the Preferred Alternative includes retaining walls along the eastern and northwestern boundaries of the OMF site to minimize impacts on streams and associated wetlands in those areas. In addition, the OMF site in the Preferred Alternative was shifted west to widen the corridor available for stream restoration.

Additional avoidance and minimization measures will be implemented, as practicable, as project design continues to develop. Sound Transit is exploring options for reducing impacts on West Fork Hylebos Tributary without jeopardizing the operability of the Preferred Alternative. In addition, Sound Transit has committed to minimizing the need to place existing streams in new culverts and has designed the OMF South alternatives to avoid new stream piping whenever possible. However, two to three culverts may need to be replaced as part of the Preferred Alternative, and these replaced culverts, which may be longer, would be made fish passable. Relocated stream segments would be designed to include meanders (where space allows) and other features that would enhance the availability and diversity of aquatic habitats over the long term. Examples of additional measures include minimizing vegetation clearing, restoring temporarily affected areas, and preparing and implementing a revegetation plan.

Sound Transit would restrict clearing activities during the active bird nesting period, to the extent possible, to comply with the Migratory Bird Treaty Act administered by USFWS. If avoidance scheduling is infeasible, Sound Transit would conduct pre-construction surveys to determine the presence or absence of nesting migratory birds to assist in complying with the Migratory Bird Treaty Act.

Sound Transit would comply with standard specifications, BMPs, and applicable federal, state, and local mitigation requirements during design, construction, and post-construction activities. Sound Transit would meet all regulatory requirements and continue to implement proactive avoidance and minimization measures related to these BMPs in adherence with federal, state, and local regulations.

3.10.2.5 Indirect Impacts

For aquatic species and habitat, indirect impacts would be minimal because the surrounding areas are already heavily developed. The construction and operation of OMF South should not interfere with future projects that may provide habitat improvements, such as road projects that may improve fish passage or projects that may enhance vegetated and wetland areas in the project corridor. OMF South would be designed to ensure that it would not preclude future culvert replacement(s) by WSDOT to provide fish passage. Facilities that provide water quality treatment could minimize long-term indirect impacts on water quality in streams that provide habitat for fish sensitive to the toxic effects of contaminants in stormwater runoff. However, as discussed in the analysis of long-term impacts, treated water discharged from such facilities and untreated water that bypasses those facilities during major storm events may contain contaminants that can harm fish and other aquatic life.

Long-term indirect impacts on vegetation, wildlife, and wildlife habitat could include habitat loss or increased disturbance due to changes in land use patterns near the OMF South alternatives. Such impacts would be unlikely under any of the build alternatives, however, because OMF South is not anticipated to influence surrounding land uses, and all three site alternatives are in areas that are highly developed.

Indirect impacts from OMF South may result in long-term wetland degradation from stormwater discharges and alterations in wetland hydrology. Impacts to wetland hydrology would be minimized through the use of stormwater management facilities that meet the standards established by local, state, and federal agencies with regulatory authority. Facilities that provide water quality treatment could minimize long-term indirect impacts on water quality in wetlands. However, as discussed in the analysis of long-term impacts, treated water discharged from such facilities and untreated water that bypasses those facilities during major storm events may contain contaminants that can harm fish and other aquatic life.

3.10.3 Mitigation Measures

Construction of either the Preferred Alternative or the South 344th Street Alternative would have unavoidable impacts on ecosystem resources. On-site restoration would be undertaken to offset temporary construction impacts. Examples of such restoration activities include restoring in-stream habitat with large woody debris and planting temporarily disturbed wetlands and riparian buffers with native species. As the project design is advanced, Sound Transit would work with Tribes and permitting agencies to identify mitigation needs and opportunities. For unavoidable long-term impacts on streams and stream buffers, Sound Transit would develop a compensatory mitigation plan during the permitting phase in accordance with applicable federal, state, and local requirements and guidelines. Impacts on streams would be mitigated through restoration actions developed in collaboration with federal, state, local, and Tribal biologists.

Sound Transit has committed to achieving no net loss of wetland function and area on a project-wide basis. For unavoidable long-term impacts on wetlands and wetland buffers, Sound Transit would develop a compensatory mitigation plan during the permitting phase in accordance with applicable federal, state, and local requirements and guidelines. These guidelines and regulatory standards include the 2008 Federal Compensatory Mitigation Rule (Title 40 Code of Federal Regulations [CFR] § 230 and 33 CFR § 325 and 332.), interagency guidance contained in Wetland Mitigation in Washington State (Ecology et al. 2021, or as updated), and the applicable local critical areas ordinances. Sound Transit could use a combination of mitigation strategies to achieve no net loss of wetland function and area, such as

off-site compensatory mitigation within the Hylebos Creek watershed, mitigation bank, and/or in-lieu fee program.

Compensatory mitigation would be provided for construction impacts lasting more than one growing season and for permanent conversion of wetlands from one vegetation type to another (e.g., forested wetland to emergent or scrub-shrub wetland) as well as for indirect impacts on wetlands. In areas where stream buffers and wetland buffers overlap, mitigation for impacts would be based on the local jurisdiction's requirements for mitigating impacts either to wetland buffers or to stream buffers — whichever requirements are more stringent.

In cooperation with resource agencies and Tribes, Sound Transit would develop plans to mitigate the effects of the project on wetlands, streams, riparian corridors, and regulatory buffers on a watershed basis. To the extent possible, off-site compensatory mitigation sites would be identified and would compensate for lost values in kind. Potential off-site mitigation areas are identified in Appendix G.3, Ecosystems Technical Report. These or other areas may be used for off-site mitigation. It may be necessary to use several sites and Sound Transit does not anticipate the need to implement mitigation to compensate for diminished habitat functions due to impacts on vegetation outside of streams, wetlands, and their buffers.

The 2008 Federal Compensatory Mitigation Rule established a preference for the use of approved wetland mitigation banks and in-lieu fee programs over the development of permittee-responsible mitigation sites (40 CFR § 230 and 33 CFR § 325 and 332). The study area is located within the service areas of one mitigation bank (the Port of Tacoma's Upper Clear Creek mitigation bank, certified in June 2020) and one in-lieu fee program (the King County Mitigation Reserves Program).

3.11 Water Resources

This section discusses potential impacts of the OMF South project alternatives on water resources, which includes surface waters, stormwater utilities, shorelines, floodplains, and groundwater. The amount of stormwater runoff to surface waters and infiltration to groundwater that occurs in a basin is controlled in part by the types of soil and land cover that are present, which are also discussed.

Federal Way and Kent are Phase II permittees under Ecology's National Pollutant Discharge Elimination System (NPDES) Municipal Stormwater General Permit (Ecology 2017). The permit requires compliance with BMPs for design related to flow control and water quality as outlined in the Stormwater Management Manual for Western Washington (Ecology 2019) or equivalent manuals. Federal Way and Kent have each adopted the King County Surface Water Design Manual (King County 2016a) and the King County Stormwater Pollution Prevention Manual (King County 2016b), and each city has included amendments to meet their respective needs (City of Federal Way 2017; City of Kent 2017). A list of regulations applicable to water resources in the study area is provided in Appendix H5, Water Resources Technical Appendix.

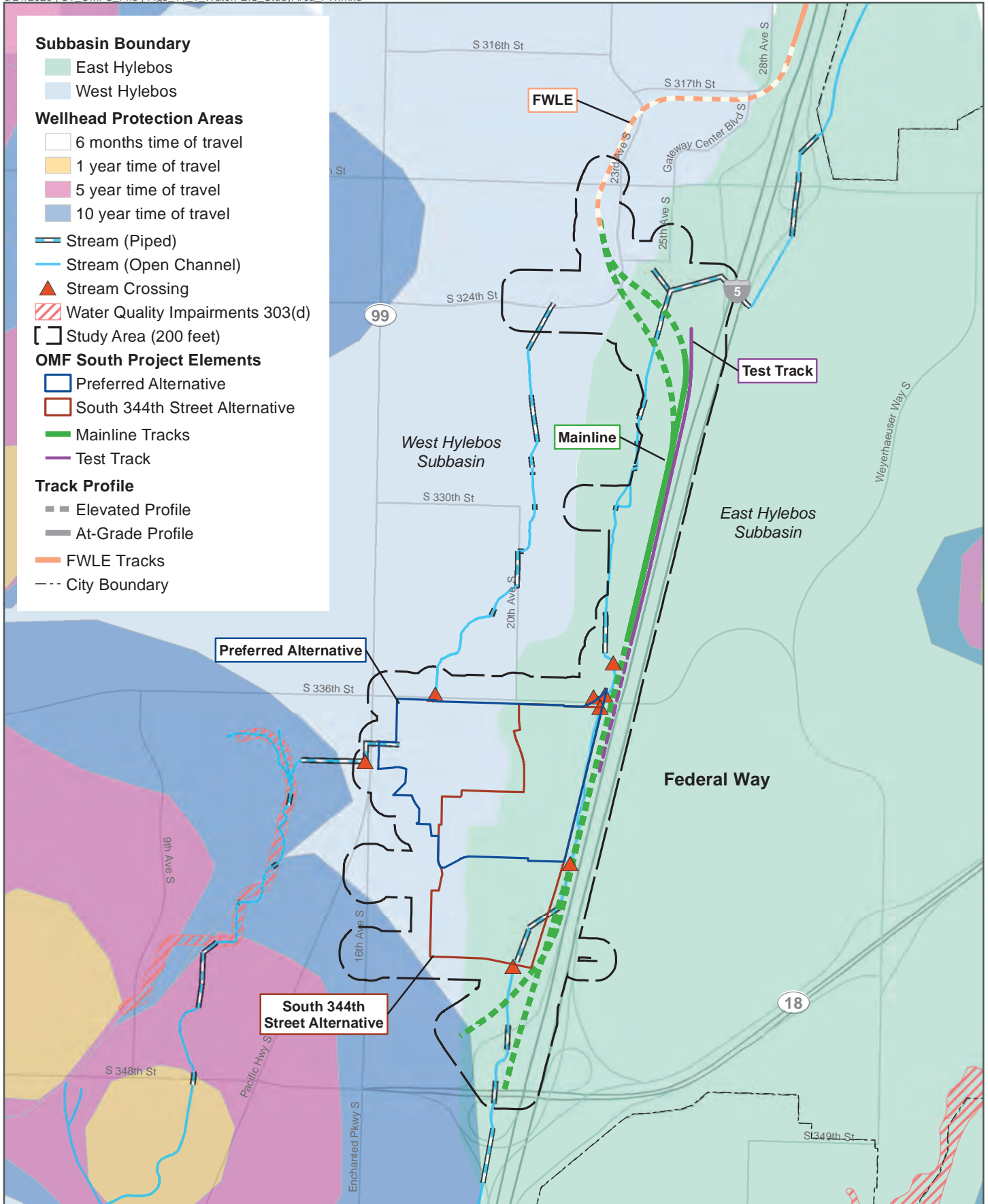
3.11.1 Affected Environment

The affected environment includes the surface water, shorelines, stormwater, floodplains, and groundwater resources in the study area, as shown in Figures 3.11-1 and 3.11-2. The Preferred and South 344th Street alternatives are in Water Resource Inventory Area 10, the Puyallup-White Watershed, as designated by WDNR. The Midway Landfill Alternative is in Water Resource Inventory Area 9, the Green/Duwamish and Central Puget Sound Watersheds.

Natural Water Bodies

The Preferred and South 344th Street alternatives discharge to two tributaries in the Hylebos Creek basin in the Puyallup-White Watershed, while the surface waters in the Midway Landfill Alternative study area discharge to the urban stream basin of McSorley Creek in the Lower Puget Sound-Des Moines/Federal Way Watershed (Figures 3.11-1 and 3.11-2). The surface streams in the study area are each part of a drainage system that ultimately discharges to Puget Sound. Only streams in the immediate vicinity of the alternatives or those receiving surface flows from the sites will be discussed here. Details regarding streams, typing, and classification are presented in Section 3.10, Ecosystem Resources.

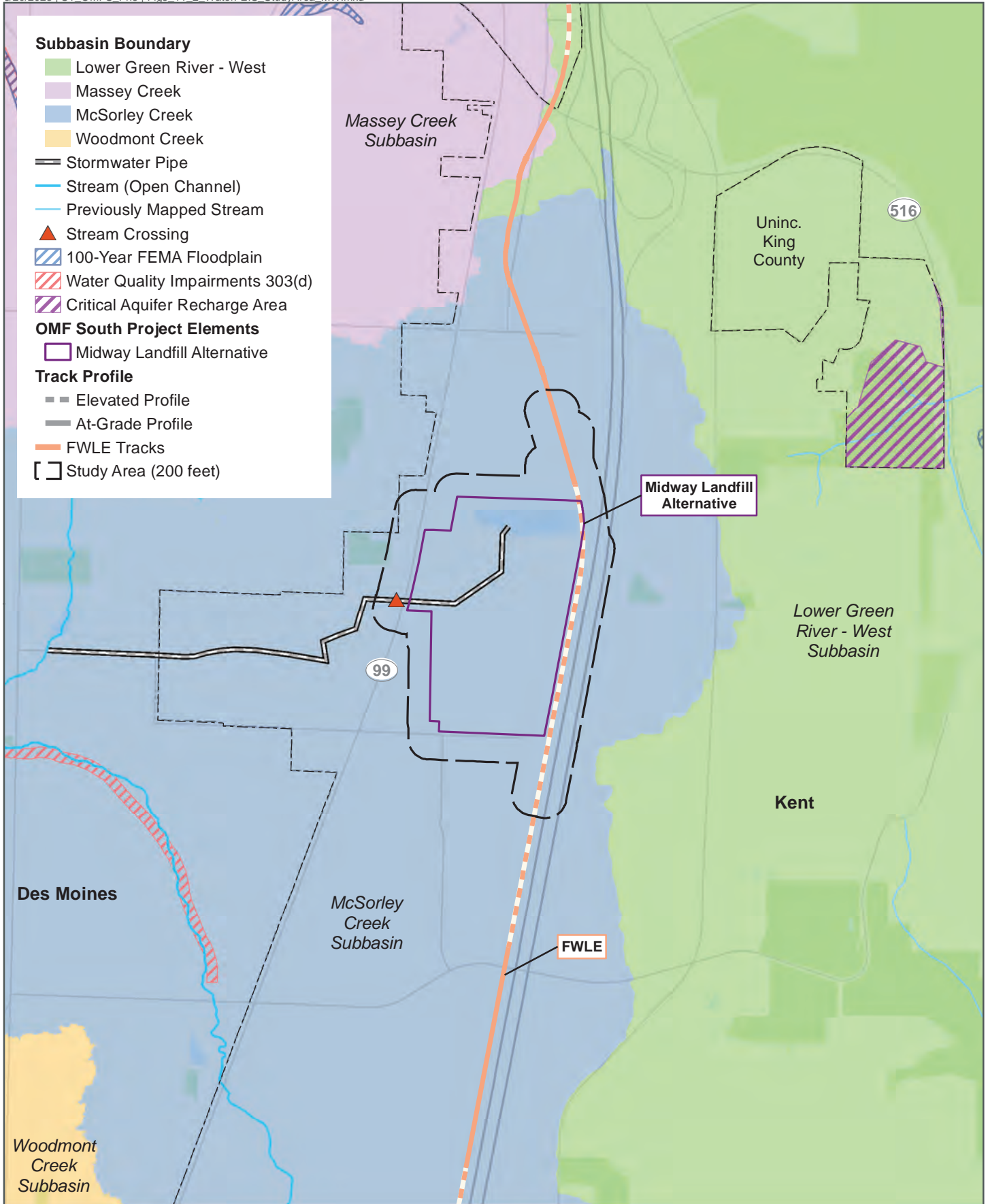
The surface waters in the study area have been historically impacted by urbanization, and all the streams have reaches that are either piped within stormwater facilities or are confined within straight and narrow channels that lack complexity. The industrial and urban development in the study area has prompted restoration efforts to protect water quality and wildlife habitat. The following sections describe each water body in the study area and identify those designated as impaired on the Water Quality Assessment Clean Water Act Section 303(d) list. Table 3.11-1 identifies water quality impairments and the documented floodplains associated with each stream. Discussion of fish species that may currently be present in stream reaches within and downstream of the study area is presented in Section 3.10.1.1, Aquatic Species and Habitat.



Data Sources: King and Pierce County, Cities of Federal Way, Fife, Milton, Tacoma (2019).

FIGURE 3.11-1
 Water Resources Affected Environment
 Preferred and South 344th Street Alternatives
 OMF South





Data Sources: King and Pierce County, Cities of Federal Way, Fife, Milton, Tacoma (2019).

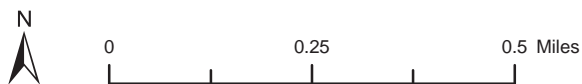


FIGURE 3.11-2
 Water Resources Affected Environment
 Midway Landfill Alternative
 OMF South

- **Hylebos Creek.** The Hylebos Creek basin is made up of the West and East Forks of Hylebos Creek and their respective tributaries (Tributaries 0014C and 0016A), all of which join in confluence before discharging to Puget Sound's Commencement Bay via the Hylebos Waterway, approximately 6.9 miles downstream. Historically, the Hylebos Creek basin has seen extensive and rapid suburban development that has led to a loss of stream and wetland function and value. Development has altered the natural hydrologic balance, which has negatively impacted both hydrologic functions of flow control and water quality and resulted in increased flooding, erosion, and water quality impairments as well as loss of aquatic habitat and life (King County 1990).
 - East Fork Hylebos Tributary flows through the eastern portion of both the Preferred and South 344th Street alternatives just west of I-5 (Figure 3.11-1). There is currently no documented fish use in East Fork Hylebos Tributary within the study area (see Section 3.10.1.1). East Fork Hylebos Tributary does not have any listed 303(d) water quality impairments (Ecology 2012). Riparian vegetation along East Fork Hylebos Tributary in the study area may provide a range of benefits to water resource functions. Areas dominated by native forest and wetlands support functions such as fish and wildlife habitat (see Section 3.10.1.1); water temperature moderation; improved infiltration; groundwater recharge; sediment delivery, transport, and storage; nutrient and pathogen removal; and erosion control and stream channel stabilization.
 - West Fork Hylebos Tributary flows through the northwestern corner of the project limits of the Preferred Alternative, through a wetland (WFW-02) and an associated in-line stormwater detention facility with no defined channel. The wetland drains to the west through a long, piped segment that joins several other tributaries to form the West Fork of Hylebos Creek (Figure 3.11-1). There is presently no documented fish presence in West Fork Hylebos Tributary within the study area (see Section 3.10.1.1). Heavy urbanization and development in the upper watershed have likely contributed to elevated levels of pollutants associated with vehicle use, including metals such as copper, lead, and zinc, which are listed on the 303(d) water quality assessment impairments along with polycyclic aromatic hydrocarbons (Ecology 2018).
- **McSorley Creek.** There are no surface-flowing segments of McSorley Creek or its tributaries in the study area. The on-site stormwater facility at the Midway Landfill discharges to the North Fork of McSorley Creek, approximately 1 mile west of the study area (Figure 3.11-2). North Fork McSorley Creek would receive additional treated stormwater runoff from the Midway Landfill Alternative but would otherwise not be affected by project construction or operation. The North Fork originates in Des Moines and joins the South Fork in confluence in Saltwater State Park to form McSorley Creek before it discharges to Puget Sound. Fish have been documented in North Fork McSorley Creek (see Section 3.10.1.1). The 303(d) list identifies no water-body impairments for North Fork McSorley Creek, but approximately 1.2 miles downstream of the Midway Landfill, McSorley Creek has been listed for bacterial and dissolved oxygen impairments (Ecology 2012).

Table 3.11-1 Potentially Affected Surface Water Bodies

Surface Water Body	Stream Index Number ¹	Alternative	Water Quality Impairments ²	Water Quality Impairments Category ²	FEMA Floodplains ³
Hylebos Creek Basin					
East Fork Hylebos Tributary	10.0016A	Preferred Alternative, South 344th Street	None	5	None
West Fork Hylebos Tributary	10.0014C	Preferred Alternative, South 344th Street	Copper, Lead, PAHs ⁴ , Zinc	5	None
Lower Puget Sound Basin					
North Fork McSorley Creek ⁵	09.0382	Midway Landfill	None	None	None
McSorley Creek ⁵	09.0381	Midway Landfill	Bacterial, Dissolved Oxygen	5	None

Notes:

- (1) Water Resource Inventory Area identification numbers according to King County (1990).
- (2) According to the 303(d) Water Quality Impairment List (Ecology 2018).
- (3) According to Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps (FIRMs) (53053C0968E, 53033C1250F) (FEMA 1995).
- (4) PAHs: polycyclic aromatic hydrocarbons; specifically listed are Dibenzo(a,h)anthracene and Benzo(a)pyrene.
- (5) No surface flowing portion of North Fork McSorley Creek is within the study area; however, because the Midway Landfill Alternative may potentially discharge stormwater to the stream, which discharges to McSorley Creek downstream, it has been included in this analysis.

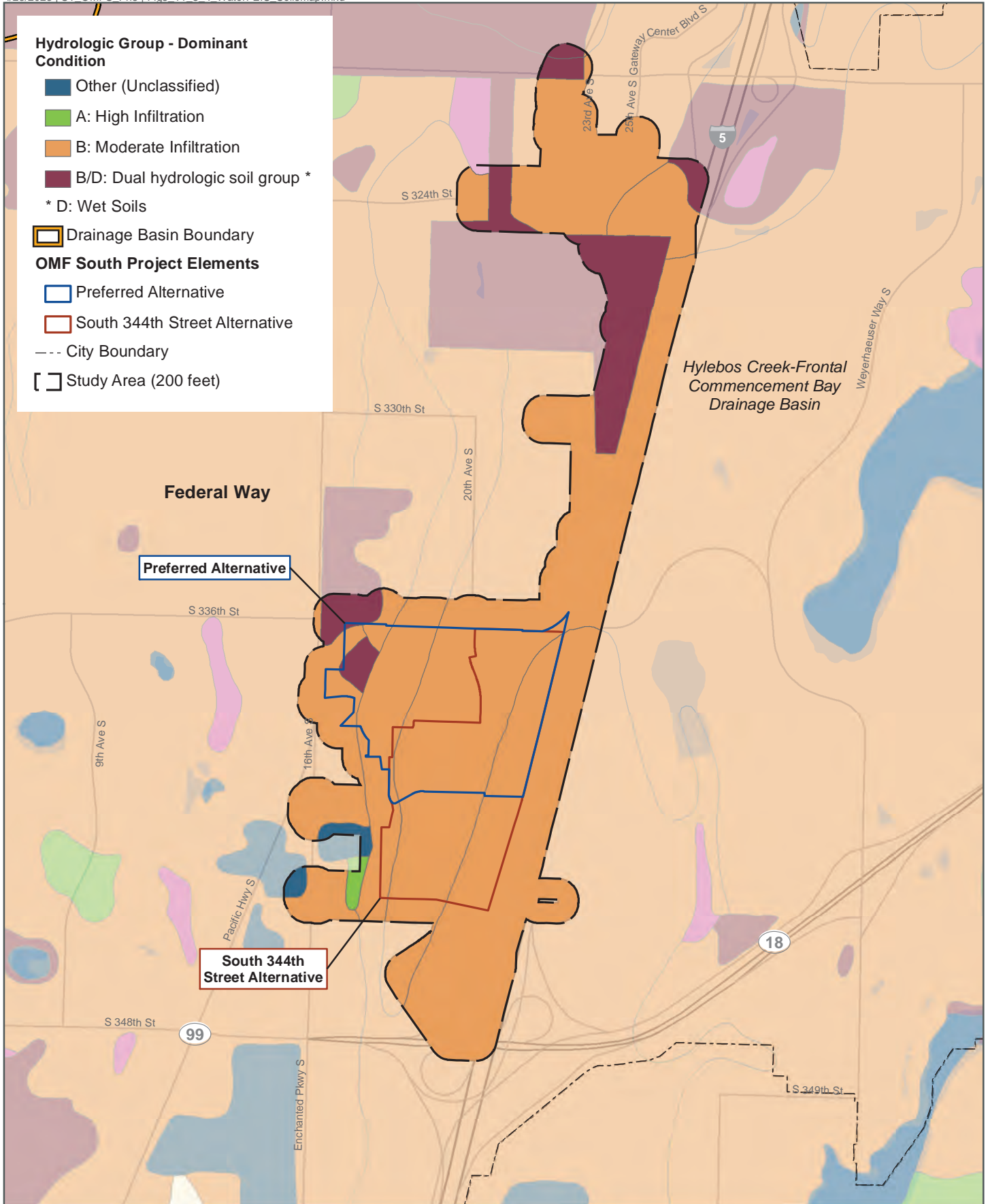
Stormwater Runoff Characteristics Related to Hydrologic Soil Group

The study area contains Hydrologic Soil Groups A, B, and D, and Pits (Figures 3.11-3 and 3.11-4). Group A has low runoff potential and moderate- to high-infiltration potential and is generally compatible with a variety of LID approaches to stormwater facilities (USDA NRCS 2007, 2019a, 2019b). Group B has moderately low runoff potential and moderate infiltration capacity. Group D has high runoff potential and tends to restrict water movement and infiltration. Some portions of the study area have dual hydrologic classifications (B/D), where the first classification applies to the dry condition and the second to the wet condition. The Midway Landfill is classified as Pits, which is a pit-fill soil with properties modified by years of solid waste disposal and fill processes (USDA NRCS 2007) and not included in any hydrologic soil group.

Stormwater Runoff Characteristics Related to Land Use

Most of the basin areas occupied by the build alternatives are urbanized, with impervious surface cover currently ranging from approximately 50 to 80 percent. The Preferred and South 344th Street alternatives located in Federal Way are a mix of suburban/residential, commercial, industrial, and recreational land use. Other developed portions of the study area include major roadways (I-5, SR 99, SR 18, SR 161, and SR 167), as well as surrounding suburban developments.

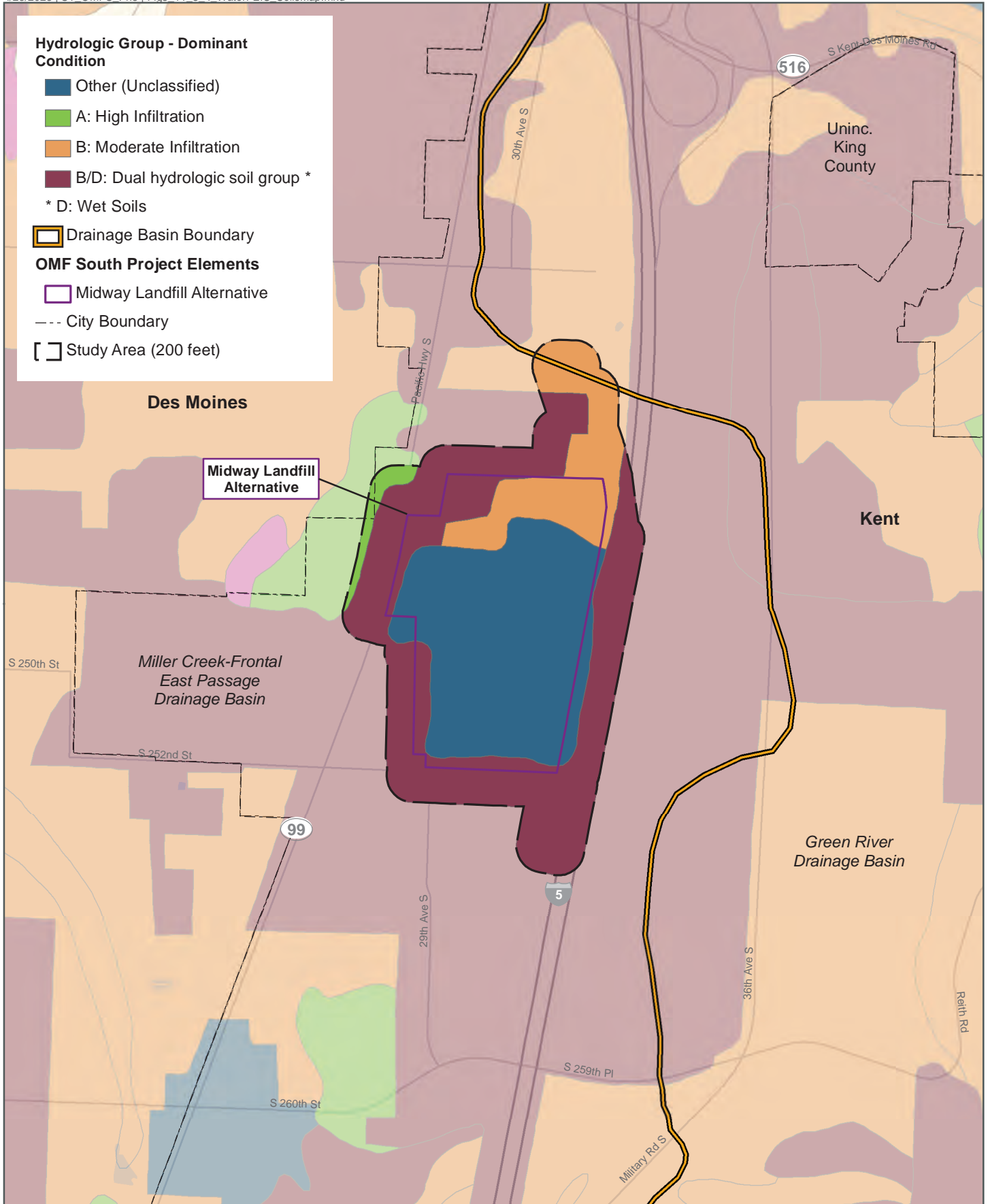
The Midway Landfill Alternative is on a 68-acre site in Kent that was a gravel pit from 1945 to 1966 and a landfill for Seattle from 1966 to 1983. The site was listed as a Superfund site in May 1986, and cleanup was completed September 2000. The cleanup included covering the landfill with an engineered multilayer cap with a top layer of till grass, installing a gas extraction system to remove and control methane gas, and making improvements to the surface water drainage system, such as grading, alterations, and creation of a surface water holding pond (Ecology 2005).



Data Sources: King and Pierce County, Cities of Federal Way, Fife, Milton, Tacoma (2019).

FIGURE 3.11-3
 Study Area Hydrologic Soil Groups
 Preferred and South 344th Street Alternatives
 OMF South





Data Sources: King and Pierce County, Cities of Federal Way, Fife, Milton, Tacoma (2019).

FIGURE 3.11-4
 Study Area Hydrologic Soil Groups
 Midway Landfill Alternative
 OMF South



Stormwater Management Systems

In the study area for all three alternatives, there are conveyance systems and management facilities that receive stormwater from the sites. The surface stormwater runoff is collected in piped municipal systems that consist of stormwater facilities, ditches, media filter drains, stormwater ponds, and vaults. The stormwater system also connects to piped stream reaches and historically modified wetlands that serve as in-line detention and flood control facilities (King County 1990). The modifications to the natural hydrologic system have historically disrupted natural flow patterns and processes, such as infiltration and groundwater recharge, and resulted in water quality degradation.

The Preferred and South 344th Street alternative sites currently discharge into regional stormwater facilities within Federal Way. Although the existing regional facilities will remain, the OMF South alternatives have been designed to have stormwater management facilities independent of the function of the existing regional facilities. The Preferred and South 344th Street alternative sites currently include some WSDOT managed stormwater facilities. The Midway Landfill has a regional stormwater facility that receives stormwater from off-site areas. The storm drain system downstream of that regional facility routes stormwater through Kent and ultimately discharges into McSorley Creek within Des Moines.

Shorelines, Floodplains, and Floodways

No regulated shorelines of the state have been identified within the study area (City of Kent 2009; City of Federal Way 2011, 2014). No regulated floodplains have been identified within the study area, either on adopted FEMA Flood Insurance Rate Maps or preliminary Flood Insurance Rate Maps (FEMA 1995).

Groundwater

The Preferred and South 344th Street alternatives are within Federal Way's 100-year Wellhead Capture Zone, and both alternatives have a permanent impact footprint that grazes the fringe of the 10-year travel zone for the Wellhead Protection Area (Figure 3.11-1). Lakehaven Water and Sewer District manages the three main aquifer systems that underlie the city — the Redondo-Milton Channel Aquifer, the Intermediate Aquifer System (Mirror Lake and Eastland Upland Aquifers), and the Deep Aquifer — in cooperation with Federal Way. To protect the drinking water supply, they have implemented both the state of Washington's Wellhead Protection Program and Section 1428 of the 1986 Amendments to the Federal Safe Drinking Water Act (City of Federal Way 2015). There are no sole-source aquifers designated by EPA in the study area of any of the alternatives (EPA 2019).

The Midway Landfill Alternative is not within any of the Wellhead Protection Areas (up to 10-year travel times) or Critical Aquifer Recharge Areas (categories 1 through 3) as identified by King County. As previously discussed, the Midway Landfill was listed as a Superfund site, with cleanup completed in 2000. The cleanup included covering the unlined landfill with an engineered multilayer cap and making improvements to the surface water drainage system (Ecology 2005). Rainwater is collected from the surface of the landfill and released into the North Fork of McSorley Creek. While some groundwater contamination at the site is above federal drinking water standards, there are no active sources of drinking water collection in the Midway Landfill Alternative study area. Kent's drinking water supply is mainly provided by a well drilled into an underground aquifer. To meet additional system demands, Kent sources water from partnerships with Lakehaven Water and Sewer District, Covington Water District, and Tacoma Water to obtain surface water from the Green River Watershed (City of Kent 2018).

3.11.2 Environmental Impacts

3.11.2.1 No-Build Alternative

Under the No-Build Alternative, impacts to water resources from construction or operation of OMF South would not occur. However, other planned projects would have impacts in the OMF South study areas, but they would be required to manage stormwater effectively and minimize impacts to water resources. This includes TDLE, which overlaps with the OMF South Preferred and South 344th Street alternatives. If TDLE is constructed as proposed, the mainline track associated with these OMF alternatives would be built later in time. Impacts associated with construction of the mainline track are addressed within the build alternatives impacts discussion below. All other TDLE-related impacts are addressed in Chapter 4, Cumulative Effects Analysis.

3.11.2.2 Long-Term Impacts

Impacts Common to All Build Alternatives

Surface Water Resources

An increase in impervious surfaces (from new maintenance yards, associated mainline tracks, stormwater ponds, parking areas, building roofs, project road improvements, etc.) is associated with any area where vegetation or other pervious surface is converted to paved surface. These surfaces are associated with an increase in runoff volumes and decrease in groundwater recharge, which may increase flooding and flow frequencies. Also, the increased surface flow volumes and water quality impairments can contribute to stream erosion and aquatic habitat degradation, if not properly managed. Stormwater management facilities will be evaluated as part of the project design and are discussed in more detail in Section 3.11.2.4.

OMF South would add both pollution-generating impervious surfaces and non-pollution-generating impervious surfaces in the study areas for the proposed alternatives. Pollution-generating impervious surfaces are subject to vehicular use and include parking areas, bus holding areas, project-associated roads or road realignments, and yard and apron areas; these areas have the potential to accumulate contaminants that can be transported by stormwater runoff into receiving water bodies. Non-pollution-generating impervious surfaces are not subject to vehicular use and include the light rail tracks,⁴ sidewalks, and rooftops, and stormwater ponds. Tables 3.11-2 and 3.11-3 summarize the range of impervious surface changes that would result from OMF South for the three build alternatives when compared with existing conditions. These alternatives would mainly redevelop existing parking lots and commercial business areas, in addition to some undeveloped areas along the I-5 corridor.

⁴ Sound Transit and Ecology entered into a Memorandum of Understanding dated December 9, 2019, in which Sound Transit agreed to conduct a study to characterize the quality of the stormwater discharged from light rail mainline tracks. The data and analysis from the study will be used to inform the design of light rail projects that are scheduled in the Sound Transit 3 Plan to be completed between 2030 and 2041, and, as necessary, Sound Transit will identify all known, available, and reasonable methods of prevention, control, and treatment (abbreviated as AKART) to define light-rail specific BMPs. OMF South is scheduled to be completed by 2032.

Table 3.11-2 Total Impervious Surface Land Cover Changes

Alternative with Mainline Track Options	Project Element	Existing (acres)	Proposed (acres)	Change (acres)
Preferred Alternative				
40 mph Alignment	OMF Site	30	47	+17
	Mainline ²	8	12	+4
	Total	38	59	+21
55 mph Design Option	OMF Site	30	47	+17
	Mainline ²	8	13	+5
	Total	38	60	+22
South 344th Street				
40 mph Alignment and Enchanted Parkway Tail Track Alignment	OMF Site	32	51	+19
	Mainline ²	8	14	+6
	Total	40	65	+25
55 mph Design Option and I-5 Tail Track Alignment	OMF Site	31	51	+20
	Mainline ²	8	15	+7
	Total	39	66	+27
55 mph Design Option and Enchanted Parkway Tail Track Alignment	OMF Site	32	51	+19
	Mainline ²	9	14	+5
	Total	41	65	+24
40 mph Alignment and I-5 Tail Track Alignment	OMF Site	31	51	+20
	Mainline ²	7	14	+7
	Total	38	65	+27
Midway Landfill				
Midway Landfill	OMF Site	17	62 ¹	+45

Sources: Existing land cover analysis developed from project survey data and aerial imagery using GIS. Proposed land cover analysis developed from project design files using GIS.

Notes:

- (1) For the water resource impact analysis, the landfill area was categorized as existing pervious grass in order to avoid underestimating potential impacts; however, this existing condition assumption should not necessarily be used for stormwater management design sizing.
- (2) If neither the Preferred nor the South 344th Street alternative is selected, the mainline could be built later in time if TDLE is constructed as proposed. TDLE is currently under environmental review.

Table 3.11-3 Pollution-Generating Impervious Surface Land Cover Changes

Alternatives with Mainline Track Options	Project Element	Existing (acres)	Proposed (acres)	Change (acres)
Preferred Alternative				
40 mph Alignment	OMF Site	22	23	+1
	Mainline ¹	4	4	+0
	Total	26	27	+1
55 mph Design Option	OMF Site	22	23	+1
	Mainline ¹	4	5	+1
	Total	26	28	+2
South 344th Street				
40 mph Alignment and Enchanted Parkway Tail Track Alignment	OMF Site	22	25	+3
	Mainline ¹	5	5	+0
	Total	27	30	+3
55 mph Design Option and I-5 Tail Track Alignment	OMF Site	21	25	+4
	Mainline ¹	4	5	+1
	Total	25	30	+5
55 mph Design Option and Enchanted Parkway Tail Track Alignment	OMF Site	22	25	+3
	Mainline ¹	5	6	+1
	Total	27	31	+4
40 mph Alignment and I-5 Tail Track Alignment	OMF Site	21	25	+4
	Mainline ¹	4	5	+1
	Total	25	30	+5
Midway Landfill				
Midway Landfill	OMF Site	11	26	+15

Sources: Existing land cover analysis developed from project survey data and aerial imagery using GIS. Proposed land cover analysis developed from project design files using GIS.

Note:

- (1) If neither the Preferred nor the South 344th Street alternative is selected, the mainline could be built later in time if TDLE is constructed as proposed. TDLE is currently under environmental review.

Shorelines, Floodplains, and Floodways

No regulated shorelines of the state exist within the study area; therefore, no impacts on shoreline resources would result from any of the proposed alternatives. All of the build alternatives are outside of mapped FEMA floodplains, and the preliminary design for the alternatives would span the mapped stream crossings without columns being placed within the boundaries. As a result, no impacts on mapped FEMA floodplains or floodways are expected.

Groundwater

The Preferred and Midway Landfill alternatives would not be located within groundwater protection boundaries and are not anticipated to adversely impact groundwater resources. The footprint of the South 344th Street Alternative may include the installation of columns to support the elevated guideway that could be placed on or near the edge of the 10-year wellhead protection area. Potential impacts would depend on design depth and column placement, but generally would be expected to be minimal.

Preferred Alternative

The Preferred Alternative, including both mainline track options, would convert approximately 20 fewer acres of land to impervious cover than the Midway Landfill Alternative and a similar amount to all mainline and tail track combinations of the South 344th Street Alternative. The Preferred Alternative, including both options, would result in the lowest net amount of pollution-generating impervious surfaces and would create the least new pollution-generating impervious surfaces compared to the South 344th Street and Midway Landfill alternatives.

For operational safety, trees and other tall vegetation would not be allowed to grow near the mainline, lead, tail, or test tracks. As a result, clearing of native forested vegetation close to proposed tracks in areas of the riparian zone associated with the East Fork Hylebos Tributary would be necessary. Under the Preferred Alternative, a loss of riparian vegetation may contribute to long-term impacts to water resources in the project area and downstream areas, including increased stream temperatures; decreased runoff interception and pollutant filtration functions; reduced groundwater recharge; increased erosion and sedimentation; and loss of stream channel stabilization. These impacts are discussed further in Section 3.10.2 and Appendix G3, Ecosystem Resources Technical Report. Shorter-stature trees and native vegetation may be replanted or replaced through natural establishment under elevated guideways to minimize riparian impacts.

The Preferred Alternative includes an extension of 18th Place S that would encroach upon a portion of a wetland (WFW-02) associated with West Fork Hylebos Tributary. The area of the wetland serves as an in-line stormwater detention facility through which the West Fork Hylebos Tributary currently flows. The construction of this road extension and bike/pedestrian pathway would place fill within the wetland boundary and construct retaining walls in the eastern portion of the wetland/detention facility. Potential impacts to the detention currently provided would be evaluated as the project design progresses and addressed in compliance with local and state requirements. Potential impacts to the wetland area and function are described in Section 3.10, Ecosystem Resources.

Frontage improvements along S 336th Street to meet city standards would necessitate the replacement of existing culverts that convey West Fork Hylebos Tributary under that roadway. If any culverts on potentially fish-bearing streams are replaced, the replacement structures would be designed and installed in accordance with WDFW's Water Crossing Design Guidelines (Barnard et al. 2013). The current conceptual design indicates that the replacement structure for West Fork Hylebos Tributary would have a larger hydraulic opening than the existing culverts at that site (see Section 3.10.2.2). Replacing the existing culverts with a larger opening could support more natural sediment transport patterns in the stream and potentially improve water quality. In addition, crossings may require a flood risk assessment to document proposed project impacts to adjacent lands and floodplains changes.

For the Preferred Alternative, the project team has coordinated with Federal Way regarding the use of regional facilities. Although the existing regional facilities will remain, the Preferred Alternative has been designed to have stormwater management facilities independent of the function of the existing regional facilities to minimize impacts to the existing stormwater system capacity and stream functions. Federal Way requires redevelopment structures to return flow control regimes to fully forested predevelopment conditions. In addition, the proposed on-site facilities have been designed to separate stormwater from the flows of the West Fork Hylebos Tributary until they have received water quality treatment, to avoid impacts to downstream water quality.

The Preferred Alternative proposes to relocate and realign approximately 1,650 linear feet of East Fork Hylebos Tributary, which could potentially benefit stream habitat by adding channel sinuosity and habitat complexity. When existing structures and paved areas are redeveloped to current stormwater design standards, downstream receiving waters benefit because of improved flow control and water quality treatment. In addition, relocation and redesign of heavily modified conveyance systems that return them to more naturally connected states can result in beneficial impacts on water resources. A full discussion of habitat and stream buffer details is presented in Section 3.10, Ecosystem Resources.

South 344th Street Alternative

All of the combinations of mainline and tail track options associated with the South 344th Street Alternative would convert approximately 20 fewer acres of land cover to an impervious condition than the Midway Landfill Alternative and would convert similar amounts of land as compared to the Preferred Alternative. Both mainline track options for the South 344th Street Alternative would create the least amount of new pollution-generating impervious surfaces when paired with the Enchanted Parkway tail track alignment. Potential impacts on East Fork Hylebos Tributary and its riparian zone resulting from the clearing of vegetation would be similar in nature to those described for the Preferred Alternative, but they would extend over a greater distance. The South 344th Street Alternative would have similar long-term impacts to stormwater runoff as the Preferred Alternative because of similar increases in impervious surfaces.

The South 344th Street Alternative is located in a commercial and industrial area that is bordered by the I-5 corridor to the east. The South 344th Street Alternative also discharges to West Fork Hylebos Tributary. The design proposes to realign and meander East Fork Hylebos Tributary and daylight an approximately 420-foot-long section of currently piped stream. There is ongoing coordination with WSDOT to design the project to avoid or minimize impacts to the existing WSDOT stormwater facility near the southeast corner of the site. The remaining area would be used for the stream.

Emergency vehicle access to the mainline tracks would be needed in the daylighted stream location. One of the options under consideration may require approximately 60 feet of channel that is currently in culverts (and that would otherwise be daylighted, as described above) to be placed in a new culvert. Because this alternative would not include the extension of 21st Avenue S, the replacement crossing structure south of the daylighted channel would be shorter compared to the Preferred Alternative. It may be possible to eliminate the need for a culvert through detailed design of the access and of the stream meanders. The design of the emergency vehicle access would need to be coordinated and approved by Sound Transit, WSDOT, and Federal Way.

Similar to the Preferred Alternative, the proposed realignment and restoration of approximately 1,650 linear feet of East Fork Hylebos Tributary could potentially benefit habitat by adding channel complexity. When existing structures and paved areas are redeveloped to current design standards, it can result in a positive impact to downstream receiving waters because of improved flow control and water quality treatment. In addition, relocation and redesign of heavily modified conveyance systems that return them to more naturally connected states can result in beneficial impacts on water resources. A full discussion of habitat and stream buffer details is presented in Section 3.10, Ecosystem Resources.

The Enchanted Parkway tail track option for the South 344th Street Alternative may include elevated guideway columns that could touch the edge of the 10-year wellhead protection area. Potential impacts would depend on design depth and column placement, but generally would be expected to be minimal.

Midway Landfill Alternative

The Midway Landfill Alternative includes the site of a former landfill, which presents both short-term risks associated with construction and long-term risks and benefits associated with permanent structures and operational activities. Over time, landfill waste settles at different rates, creating an uneven surface that contributes to engineering challenges and long-term operational and maintenance concerns. Additionally, Midway Landfill is a Superfund site and is under active monitoring and reporting to ensure that the cleanup measures continue to function as planned, which includes an active methane gas extraction system.

The surface of the Midway Landfill is grass on dense, compacted soils that overlay an impermeable membrane cap, which prevents infiltration and directs runoff to an on-site surface water collection system. This landfill cover does not strictly meet the definition of either a pervious or impervious surface. For the purposes of the water resources impact analysis, the landfill area was categorized as existing pervious grass in order to avoid underestimating potential impacts. However, this existing condition assumption should not necessarily be used for later stormwater management design sizing.

Sound Transit has analyzed three potential subsurface construction design options for siting an OMF on the landfill, all of which would be compatible with the current FWLE design of at-grade mainline tracks. Common to the three subsurface construction design options would be the replacement of the landfill cap to prevent surface water and stormwater from entering any remaining portion of landfill and ongoing monitoring, testing, and management of landfill materials, as needed. These options are discussed in detail in Chapter 2, Alternatives Considered.

The Platform subsurface construction design option would build the OMF structure above the landfill. However, the elevated platform option could create pathways for groundwater contamination through the installation of concrete-filled drilled shafts.

The placement of the slab and beam system in the Hybrid subsurface construction design option would have the potential to partially impede access to the hazardous materials in the landfill and could create pathways for the contamination to enter the groundwater table through the installation of concrete-filled drilled shafts. The Platform and Hybrid subsurface construction design options for the Midway Landfill Alternative, which require concrete-filled drilled shafts or other structures to be installed, would need to be designed to prevent the downward migration of more contaminated groundwater or leachate to the aquifer below. Each of the three subsurface design options would result in refuse left on site, which would require the preservation, or reinstallation, of a permanent landfill cap system, a landfill gas monitoring system, and a groundwater monitoring system to ensure the ability to continue monitoring the site as required by the Consent Decree and Record of Decision.

The Full Excavation subsurface construction design option would have the greatest long-term benefit to water resources in the study area by potentially removing sources of contamination of surface and groundwater resources.

3.11.2.3 Construction Impacts

Impacts Common to All Build Alternatives

OMF South construction would primarily affect surface and groundwater quality by increasing the potential for flooding, erosion, or degrading water quality when runoff is generated in construction areas. In general, OMF South build alternatives would have similar potential construction-related impacts on water resources because of similarities in construction equipment and techniques. The activities that could affect water resources include:

- **Earthwork, trench work, stockpiling, and material transport.** Soil exposed in sloped excavations, fills, or trench work is especially susceptible to erosion until vegetation is established or the surface is stabilized with pavement. If exposed soil becomes dry, it can be eroded by wind. Loose soil can be carried off site by water or wind to stormwater drains or streams, where it increases water turbidity. Construction vehicle tires can carry soil onto roadways, where it can then be washed into ditches or streams during storms. Increased turbidity from sediment reduces light transmission as well as decreases dissolved oxygen in the water.
- **Concrete work and paving.** The pH in surface water can be increased to levels harmful to fish and wildlife if runoff mixes with process water or slurry from concrete work or curing concrete.
- **Stream relocations, culvert replacements, and crossings.** Over-water work, stream relocations, culvert replacements, stream crossings, and construction in stream buffers can pose a direct risk to water quality through pollutant spills, sediment transport, or wind deposition of stockpiled materials.
- **In-water work.** The risk of scour is usually increased during the construction phase of in-water work. This work, including activities that may disturb the stream bed or banks, has the potential to mobilize sediments at the project site and contribute to turbidity and sedimentation.
- **Construction machinery.** Equipment leaks or spills can affect water quality in nearby water resources. Hydrocarbons and other hazardous materials associated with construction machinery can create imbalances to parameters such as pH levels or dissolved oxygen in the water.

Preferred Alternative

West Fork Hylebos Tributary runs through the northwest corner of the Preferred Alternative, which has a wetland (WFW-02) and an associated in-line stormwater detention facility. Clearing and grading activities, including the placement of fill in the combined wetland/stormwater facility, could lead to short-term degradation of water quality through sedimentation and turbidity impacts. Construction-related impacts on East Fork Hylebos Tributary from the mainline track options would be higher for the 55 mph Design Option than for the 40 mph Alignment. During construction of frontage improvements along S 336th Street and installation of a replacement structure where the stream is crossed by the road, a segment of the stream would likely be placed in a temporary bypass while construction is underway. Discussion of the impacts analysis associated with the stream buffer and linear length in proximity to construction is presented in Section 3.10, Ecosystem Resources.

South 344th Street Alternative

The daylighting of East Fork Hylebos Tributary has the potential for direct risk to water quality through pollutant spills, sediment transport, or wind deposition of stockpiled materials due to the proximity of construction work to the stream channel. The risk of scour is usually increased during the construction phase of in-water work, which has the potential to mobilize sediments at the project site and contribute to turbidity and sedimentation.

The South 344th Street Alternative OMF site would have fewer temporary impacts to East Fork Hylebos Tributary than the Preferred Alternative. However, the South 344th Street Alternative mainline tracks (including all design options) would have more temporary impacts to East Fork Hylebos Tributary than the Preferred Alternative mainline tracks. Between the mainline track options for the South 344th Street Alternative, the 55 mph Design Option would have more temporary impacts to East Fork Hylebos Tributary than the 40 mph Alignment. The tail track options would have identical temporary stream impacts. Full impacts analysis associated with the stream buffer and linear length in proximity to construction is presented in Section 3.10, Ecosystem Resources.

Midway Landfill Alternative

Construction-related impacts on water resources are expected for each of the three Midway Landfill Alternative subsurface construction design options. Each has the potential to release contaminated air, soil, and groundwater through excavation or installation of concrete-filled shafts. Substantial remediation would be necessary, including cleanup and proper disposal of any excavated materials during construction to minimize contamination as well as groundwater monitoring in the surrounding area. Any transport of the hazardous materials being removed through excavation increases the risk of mobilizing them in the environment by exposure to wind, rain, and runoff, which could impact water resources at the site, along the transportation route, and those present at the final disposal destination.

The Platform subsurface construction design option involves drilling support shafts, which could affect water resources by compromising the landfill cap membrane and creating pathways for downward mobilization of contaminants into the groundwater and ultimately the aquifer recharge system in surrounding areas. The entire cap membrane system would be removed and replaced after the shafts have been installed to avoid this possibility. However, cap removal has the potential to prolong or increase exposure and mobilization risks associated with hazardous materials known to be present at the site.

The Hybrid subsurface construction design option involves some excavation with placement of a slab and beam system at grade for the tracks and drilling support shafts to support the buildings at the site. The partial excavation and drilling would involve the removal and replacement of the entire cap membrane system and has the potential to prolong or increase exposure and mobilization risks associated with hazardous materials known to be present at the site.

The Full Excavation subsurface construction design option would pose the greatest risk during construction for exposure and mobilization of hazardous materials present in the sediments being removed. This option has the most substantial excavation and, therefore, the greatest potential for a spill or mobilization of contaminated groundwater and sediments.

3.11.2.4 Avoidance and Minimization of Impacts

Sound Transit seeks to prevent or minimize potential impacts on water resources by implementing project design and development measures that follow local code requirements and stormwater management regulations, using required BMPs, encouraging sustainable LID approaches where feasible, and preparing for climate-related uncertainties where practicable. For example, seasonal limitations for in-water work will likely be required by resource agencies during permitting. In addition to traditional stormwater management facilities, BMPs also include project planning measures, design elements, implementation practices, inspections, and monitoring. This section discusses BMPs that would be included in the project design regardless of the findings of this water resources impact analysis. Therefore, they are not considered mitigation measures and are instead part of the proposed alternatives.

Sound Transit's Link Design Criteria Manual (Sound Transit 2020) requires project-related stormwater management to conform to the requirements of the local jurisdictions. These measures include minimizing impervious footprints, avoiding placement of design-related structural elements in or near water resources and their associated buffers when possible, and installing or upgrading water quality treatment and flow control facilities when required.

In addition, based on Sound Transit design standards (Sound Transit 2020) and Ecology requirements (Ecology 2019), stormwater management facilities would be designed using LID approaches where feasible (Puget Sound Partnership 2012). However, due to the presence of till-type soils with low infiltration and high runoff potential in the study area, the use of infiltration-based LID approaches may not be feasible, and other stormwater management approaches may be necessary.

Measures Common to All Build Alternatives

Flow Control

Flow control would be implemented by controlling runoff based on a target standard simulating forested land use conditions. Proposed BMPs were developed using a conservative approach to drainage concepts, consulting the Western Washington Hydrology model developed by Ecology to estimate hydrology and facility sizing. Currently, the use of underground detention vaults is assumed for all alternatives. However, as design progresses, flow control may be provided by stormwater ponds or combinations that include other facility types, where feasible.

Water Quality Treatment

The project would provide water quality management based on enhanced treatment standards (intended to provide a higher rate of removal of dissolved metals than basic treatment) for all post-project pollution-generating impervious surfaces. This level of treatment uses Ecology-approved BMPs meeting standards for all known, available, and reasonable methods of prevention, control, and treatment (abbreviated as AKART). These BMPs are expected to treat water quality to the standards protective of designated uses of groundwater and surface waters under WAC 173-200 and WAC 173-201A, respectively. However, while impacts to designated uses of natural waters are not expected, it is possible that some sensitive aquatic species could be harmed due to the limitations of available treatment technology. Even with AKART, some pollutants may not be completely removed from runoff, and discharges from sites with approved BMPs may still release low concentrations of pollutants that could harm some sensitive aquatic species. See Section 3.10.2.2 for additional discussion of sensitive species.

Use of Existing Facilities

Stormwater could be routed to existing regional or on-site facilities or could be managed through new facilities. Using existing facilities would reduce the stormwater facility footprint, and this approach will be evaluated as part of the ongoing design process. However, the conceptual engineering design is based on providing project-specific stormwater BMPs rather than using existing regional or on-site BMPs.

Construction

The risk of construction-related impacts on water resources would be controlled by complying with the NPDES Construction Stormwater General Permit process and the WDFW Hydraulic Project Approval (as required) and by following guidance from the Sound Transit Design Criteria Manual, the WSDOT Highway Runoff Manual, the King County Stormwater Pollution Prevention Manual, the Pierce County Stormwater Management and Site Development Manual, and Ecology Manual standards and BMPs, as appropriate. Through compliance with these requirements, an approved Construction Stormwater Pollution Prevention Plan (CSWPPP) would be developed and implemented for the proposed Project. The CSWPPP would serve as the overall construction stormwater mitigation plan by describing overall procedural and structural pollution-prevention and flow control BMPs, including location, size, maintenance requirements, and monitoring. An Ecology-certified erosion and sediment control lead (CESCL) would be employed to conduct the inspections, and deficiencies would be promptly corrected. In addition, the CSWPPP would include, at a minimum, the following plans:

- Temporary Erosion and Sediment Control Plan – This plan would outline the design and construction specifications for BMPs to be used to identify, reduce, eliminate, or prevent sediment and erosion problems.
- Spill Prevention, Control, and Countermeasures Plan – This plan would outline requirements for and implementation of spill prevention, inspection protocols, equipment, material containment measures, and spill response procedures.
- Concrete Containment and Disposal Plan – This plan would outline the management, containment, and disposal of concrete debris, slurry, and dust and discuss BMPs that would be used to reduce high pH.
- Dewatering Plan – This plan would outline procedures for pumping groundwater away from the construction area, and storing (as necessary), testing, treating (as necessary), and discharging or disposing of the dewatering water.
- Fugitive Dust Plan – This plan would outline measures to prevent the generation of fugitive dust from exposed soil, construction traffic, and material stockpiles.

Specific BMPs would be incorporated into construction plans and specifications based on the manuals previously mentioned. BMPs could include, but are not limited to, the following:

- Developing construction plans for sensitive areas such as streams and their buffers
- Phasing the work to minimize the amount of disturbed area at any one time
- Stabilizing construction entrances, haul roads, and other surfaces that could produce erosion or sediment tracking
- Providing tire wash, silt fence, stockpile covers, and other protection measures to avoid sediment transport

- Cleaning construction site track-out from public roads, as necessary
- Constructing silt fences downslope from exposed soil
- Protecting catch basins from sediment
- Containing and controlling concrete, fuel, and hazardous materials on site
- Installing temporary ditches, asphalt berms to route runoff around or through construction sites, with periodic check dams to slow and settle runoff
- Providing erosion control covering and temporary piped conveyances to protect slopes from concentrated runoff
- Providing temporary plastic or mulch to cover soil stockpiles and exposed soil
- Using temporary erosion control blankets or mulch on exposed steep slopes to minimize erosion before vegetation is established
- Constructing temporary sedimentation ponds or cells to remove solids from concentrated runoff and dewatering before being discharged
- Conducting vehicle fueling and maintenance activities no closer than 100 feet from waters of the state
- Providing secondary containment for all potential sources of leaks and spills
- Implementing stream protection measures, including diverting stream flow around the construction area, and limiting the construction period to the required “work window,” a period of the year when fish would be minimally affected

Preferred Alternative

As previously stated, the extension of 18th Place S would encroach upon a portion of a wetland (WFW-02) associated with West Fork Hylebos Tributary that serves as an in-line stormwater detention facility. Potential impacts to the detention currently provided will be evaluated as the project design progresses and mitigation will be developed in compliance with local and state requirements.

Measures for mitigating impacts to water quality resulting from stream channel relocation for the Preferred Alternative could include those outlined by the WDFW in Chapter 13 of the Water Crossing Design Guidelines (Barnard et al. 2013). This could involve preventive BMPs, such as erosion and sediment control measures, the use of cofferdams, complete stream bypass, and restorative planting efforts. The construction of the Preferred Alternative would have the potential to impact water quality parameters such as turbidity; however, through compliance with applicable construction permits and the BMPs incorporated by the permits, the risks to water resources would be minimized.

South 344th Street Alternative

Similar to the Preferred Alternative, compliance with applicable construction permits and BMPs would minimize risks to water quality during construction. Measures for mitigating impacts to water quality resulting from stream channel relocation for the South 344th Street Alternative would be similar to those discussed above for the Preferred Alternative. In addition, the South 344th Street Alternative would include the daylighting of a piped segment of East Fork Hylebos Tributary.

Midway Landfill Alternative

For the Midway Landfill Alternative, Sound Transit would implement BMPs that include material handling and disposal plans for contaminated media and hazardous construction debris developed in conjunction with the appropriate regulatory agencies, including BMPs to prevent the potential downward migration of contaminants during construction of drilled shafts. All of the subsurface construction design options for the Midway Landfill Alternative would require placement of a low-infiltration cap to protect water resources in accordance with the current Superfund remedy, which could exclude the potential for infiltration-based LID approaches and make other stormwater management approaches necessary.

Special precautions at Midway Landfill would be required by the CSWPPP for temporary drainage systems and surface treatment after removal and during replacement or remediation of the existing membrane cover system.

A discussion of the impacts related to construction at a site with known hazardous substances is presented in Section 3.13, Hazardous Materials. Any of the subsurface construction design options for the Midway Landfill would require Ecology and/or EPA approval to amend the existing Cleanup Action Plan and Record of Decision to confirm that the project would maintain the commitments currently in place for the landfill, including protection of water resources.

3.11.2.5 Indirect Impacts

No indirect impacts related to water resources would result from construction and operation of the proposed project.

3.11.3 Mitigation Measures

The project would apply required stormwater BMPs, such as the flow control or treatment facilities described in Section 3.11.2.4, Avoidance and Minimization of Impacts. As previously discussed, these BMPs are expected to treat water quality to the standards protective of designated uses of groundwater and surface waters under WAC 173-200 and WAC 173-201A, respectively, and the need for additional mitigation to protect these designated uses is not anticipated. However, while impacts to designated uses of natural waters are not expected, it is possible that some sensitive aquatic species could be harmed due to the limitations of available treatment technology. Even with AKART, some pollutants may not be completely removed from runoff, and discharges from sites with approved BMPs may still release low concentrations of pollutants that could harm some sensitive aquatic species. Mitigation with regard to sensitive species and mitigation for ecosystem impacts related to wetlands, streams, and their buffers is addressed in Section 3.10, Ecosystem Resources.

3.12 Geology and Soils

This section addresses topography, geology, soil characteristics, geological hazards, and groundwater and potential impacts to these resources from the OMF South project alternatives. These considerations affect project design construction methods. The OMF South build alternatives are in Federal Way and Kent, both of which have adopted critical area ordinances for geologically sensitive areas, which are defined as areas that are not readily suited for development because of their susceptibility to erosion, sliding, earthquake-induced damage, or other geologic events. The study area includes resources within 100 feet of the potential construction limits of the alternatives.

3.12.1 Affected Environment

3.12.1.1 Topography

Elevations in the study areas are similar, ranging from 400 to 450 feet above sea level. Topographical features in the study area include various drainage systems, small water bodies, natural slopes, constructed slopes for bridges and other road-related elements, and associated topographic features indicative of Pleistocene continental glaciation.

3.12.1.2 Geology

The study areas are primarily underlain by Vashon till, a glacial till consisting of a generally unsorted mixture of clay, silt, sand, cobbles, and boulders deposited by continental Pleistocene glaciation. The regional geology includes glacially consolidated soils and sediments to a depth of almost 1,600 feet near the South 344th Street Alternative to over 1,200 feet near the Midway Landfill Alternative (Jones 1996). The areas beneath the highway on/off-ramps and overpasses directly adjacent to the Preferred and South 344th Street alternatives consist of Holocene artificial fill. Before it was used as a landfill, the Midway Landfill Alternative site was a gravel pit. Excavation exposed Pleistocene sand and gravels of glacial origin below the Vashon till.

3.12.1.3 Soils

Soils within the study area for all build alternatives primarily consist of gravelly sandy loams and sandy loams that have developed on the Pleistocene continental glacial drift of the Vashon till described above. Generally, these soils are moderately to excessively well drained. Many of the original soils within the project area have been removed or modified by land development.

3.12.1.4 Soil, Aggregate, and Rock Resources

There are no existing economic soil, aggregate, or rock resources within the study area. As noted, the Midway Landfill Alternative site was a gravel pit before 1966 when it was converted to a landfill.

3.12.1.5 Geotechnical Characteristics and Hydrogeology

Preferred and South 344th Street Alternatives

Understanding of the subsurface in the vicinity of the Preferred and South 344th Street alternatives is based on work completed for the S 336th Street/I-5 overcrossing and the I-5/SR 18 interchange (Shannon & Wilson 2020). The soil beneath the build alternative sites,

including the mainline and tail tracks, are thought to include a 5- to 15-foot-thick layer of surficial fill soil that is associated with past site development. The composition and compactness of the fill is unknown and likely to be highly variable. Beneath the fill, native soils consist of dense to very dense glacial sand and gravel outwash and glacial till. The groundwater table is anticipated to be shallow at the site, ranging from 15 to 25 feet below the existing ground surface.

Midway Landfill Alternative

The Midway Landfill Alternative site contains municipal solid waste underlain by native glacially derived sand, gravel, and glacial till. The municipal solid waste is estimated to be deepest in the southeast portion of the landfill, where waste fill thickness could be up to 130 feet or more. It is believed that the municipal solid waste fill thickness decreases to the north and west, where it is thought to typically be about 50 to 60 feet thick (City of Kent 2019).

The municipal solid waste fill is underlain by advance outwash soils and till deposits. The advance outwash soils generally consist of sand and gravel that were deposited by streams or rivers in front of the advancing continental glaciers. The till deposits are generally classified as compact silts and sands that have been glacially overridden. Shallow groundwater adjacent to the landfill occurs as discontinuous lenses at a depth of approximately 30 feet below ground surface. Leachate within the solid waste fill has been noted at depths of 30 to 40 feet below ground surface. See Appendix D4, Midway Landfill Human Health Risk Assessment, for further information regarding geotechnical characteristics at the Midway Landfill.

3.12.1.6 Geologic Hazards and Resources

Seismicity and Earthquakes

Earthquake hazards in the study area are primarily related to the convergent plate boundary of the North American continental plate and the Juan de Fuca oceanic crustal plate, known as the Cascadia Subduction Zone. This subduction zone boundary has a long history of large earthquakes (Frankel and Peterson 2008).

Additionally, intracrustal faults, such as the Tacoma and Seattle faults, can rupture, which can also cause substantial ground displacement and shaking. The Tacoma Fault Zone runs east-west through the Preferred and South 344th Street alternatives study area and has the potential to produce a major seismic event and ground rupture (Gomberg et al. 2010). The Tacoma Fault Zone lies approximately 3 miles south of the Midway Landfill Alternative. The Seattle Fault lies approximately 9 miles north of the Midway Landfill Alternative, and it is unlikely it would cause ground displacement in the study area.

Volcanic Hazards

Mount Rainier, an active stratovolcano located approximately 40 miles to the southeast, has produced substantial lahars (a mud or debris flow composed of water, debris, and pyroclastic material) in the Puyallup River Valley that have reached Puget Sound. The most recent lahar to reach Puget Sound occurred approximately 5,600 years ago. Based on the historical extent of lahar deposits (WDNR 2020), the three OMF South alternatives are unlikely to be affected by a lahar originating from Mount Rainier.

Landslides, Steep Slopes, and Erosion Hazards

Landslide hazard areas are generally defined as areas prone to earth movements through a combination of site factors, including slope, local geologic and soil conditions, precipitation and groundwater flow, freeze/thaw cycles, seismic events, and human impacts. Historical landslides and erosion hazards (a consideration of slope and soil types and characteristics) have not been identified in the study area. The Preferred Alternative has an area of steep slope (defined as over 40 percent) on the west side of the site.

Soil Properties

Particular soil properties can be challenging for development and infrastructure projects. Soils with particular textures, pH, and salt contents can be corrosive to both concrete and uncoated steel. Within the project area, multiple soil types in the study areas are considered corrosive to steel (USDA NRCS 2020).

Hydric soils are generally described as having been formed in saturated environments and having a water table close to ground surface. These soils create surface conditions susceptible to standing water and are generally limiting for construction purposes. The only hydric soil mapped within the study areas of any of the alternatives is a discrete area (approximately 2.6 acres) of Tukwila Muck in the northwest corner of the Preferred Alternative. This soil unit is also described as Wetland WFW-02 in Section 3.10, Ecosystem Resources.

Groundwater, Sole Source Aquifer Resources

The Preferred and South 344th Street alternatives are within Federal Way's 100-year Wellhead Capture Zone, and both alternatives have a permanent impact footprint that touches the outer edge of the 10-year travel zone for the Wellhead Protection Area. The Midway Landfill Alternative is not located within any of the Wellhead Protection Areas or Critical Aquifer Recharge Areas (categories 1 through 3). There are no sole source aquifers designated by EPA in the study area of any of the build alternatives. Groundwater resources are discussed in further detail in Section 3.11, Water Resources.

3.12.2 Environmental Impacts

A summary of long-term, construction, and indirect impacts to geologic and hydrogeologic conditions is presented below.

3.12.2.1 No-Build Alternative

Under the No-Build Alternative, impacts to geology and soils from construction or operation of OMF South would not occur. However, other planned projects would have impacts in the OMF South study areas. FWLE conducted some grading and filling in the Midway Landfill Alternative study area, adjacent to I-5, but these impacts to geology and soils were relatively minor. Other projects planned to be constructed within the alternative study areas may impact geology depending on the extent of grading and filling activities. This includes TDLE, which overlaps with the OMF South Preferred and South 344th Street alternatives. However, these impacts are also anticipated to be minor. If TDLE is constructed as proposed, the mainline track associated with these OMF alternatives would be built later in time. Impacts associated with construction of the mainline track are addressed within the build alternatives impacts discussion below. All other TDLE-related impacts are addressed in Chapter 4, Cumulative Effects Analysis.

3.12.2.2 Long-Term Impacts

Impacts Common to All Build Alternatives

The build alternative sites are located on highly urbanized land, and long-term effects on existing geologic and hydrogeologic conditions are likely to be limited. Long-term effects related to the completion and operation of OMF South that could occur are discussed below. All three build alternatives are in areas of relatively flat topography, with the exception of the steep slope on the Preferred Alternative site, and existing slope stability and landslide issues would be of minor concern during the period of operation at each of the sites.

Project structures, including elevated mainline, lead, test, and tail tracks, would be designed to withstand a major seismic event, as all build alternatives are within a seismically active area. Strong shaking has the potential to cause settlement, slope instability, and increased lateral pressure on retaining walls. Facilities would be designed in accordance with the International Building Code, which would result in an increased resistance to seismic shaking and reduce risk to the project. Each build alternative is in areas of low seismic liquefaction potential. Areas of introduced fill would be more highly susceptible to liquefaction, which would be assessed during final design.

Long-term changes in groundwater flow after construction are not expected.

Preferred Alternative

There are no additional impacts specific to the Preferred Alternative beyond those discussed above, under Impacts Common to All Build Alternatives. The steep slope on the Preferred Alternative site would likely be regraded with construction of the 18th Place S extension.

South 344th Street Alternative

The only additional impact from the South 344th Street Alternative, beyond those discussed above, is the potential for the installation of columns associated with the Enchanted Parkway tail track option, which has the potential to impact groundwater within the Federal Way 10-year wellhead protection area depending on the design depth.

Midway Landfill Alternative

Naturally corrosive soils as well as potentially corrosive leachate or groundwater within or in the vicinity of the Midway Landfill may compromise steel or concrete structures. Based on specific site conditions, structures can be designed with materials that resist the corrosivity of site-specific soil, groundwater, or leachate characteristics. The Platform and Hybrid subsurface construction design options for the Midway Landfill Alternative, which require support structures to be installed, would need to be designed to prevent the downward migration of more contaminated groundwater or leachate to the aquifer below.

While the Full Excavation subsurface construction design option removes all refuse from the landfill and replaces it with competent fill, the Platform and Hybrid subsurface construction design options would require alteration and replacement of the landfill gas mitigation system required by the EPA Record of Decision. Additionally, each subsurface construction design option would require the removal and replacement of at least a portion of the cap required by the Record of Decision. The Platform and Hybrid subsurface construction design options would leave refuse in place, which could lead to settlement issues within the project area.

3.12.2.3 Construction Impacts

Impacts Common to All Build Alternatives

The extent of earthwork needed for the build alternatives is dependent on site-specific topography, planned future site grades, and the usability of existing site soils for reuse. The nature and composition of excavated site soils would be evaluated for reuse as structural fill for construction purposes. Some soils that are not suitable for reuse as structural fill may be used for other on-site purposes if the need exists. While all build alternatives are in areas of relatively flat topography, all sites would need to be regraded, which would result in the need for retaining walls in certain locations.

Table 3.12-1 shows relative approximate cut and fill volumes for the alternatives and assumes that all unusable cut materials would need to be exported. The cut volume for the Midway Landfill Alternative includes soils and landfill materials. Imported fill would be soil. For the Platform and Hybrid subsurface construction design options at the Midway Landfill Alternative, there would also be imported concrete (approximately 531,000 and 165,000 cubic yards respectively).

Table 3.12-1 Cut and Fill Volumes for the OMF South Build Alternatives

Alternative	Cut Volume (cubic yards)	Cut Volume Reuse ¹ (cubic yards)	Imported Soil Fill (cubic yards)	Material Removed from Site (cubic yards)
Preferred ²	425,000	220,000	185,000	205,000
South 344th Street ²	580,000	270,000	200,000	310,000
Midway Landfill –Platform	1,010,000	340,000	0	670,000
Midway Landfill – Hybrid	4,270,000	1,710,000	1,240,000	2,560,000
Midway Landfill – Full Excavation	4,870,000	1,950,000	1,610,000	2,920,000

Notes:

- (1) Reusable quantities of cut volume are assumed to be 40 percent for Midway Landfill alternatives and 80 percent for the Preferred and South 344th Street alternatives.
- (2) Volume estimates do not include quantities for the mainline or tail track construction. The quantities would be relatively small and would be associated with building the foundations for the elevated portions of track and the short length of mainline tracks that would be built on retained fill.

With a shallow groundwater table expected in the vicinity of the Preferred and South 344th Street alternatives, there may be a need for dewatering or managing groundwater in deeper excavations, depending on design requirements. There may also be a need for BMPs limiting the downward migration of potential contaminants during the installation of columns for the South 344th Street Alternative tail tracks as the southern end intersects with the 10-year wellhead protection area for municipal water supply wells in Federal Way. If either the Full Excavation or Hybrid subsurface construction design option is chosen for the Midway Landfill Alternative, leachate and/or local groundwater would need to be managed during the excavation process.

If dewatering is required, the water would likely need to be treated on site or disposed of at an approved facility. For the Midway Landfill Alternative, removal of leachate or locally impacted groundwater from the vicinity of the project area would improve overall groundwater quality in the region. Any dewatering during excavation may impact groundwater flow direction in the vicinity of the study area for all build alternatives. In the case of the Midway Landfill Alternative, pumping water and/or leachate from the landfill itself would draw surrounding groundwater (and

associated contaminants) toward the landfill, which would not be likely to negatively affect groundwater quality in the vicinity of the landfill.

Aside from the potential need to address groundwater and leachate during excavation and to import fill for the Midway Landfill Alternative Full Excavation and Hybrid subsurface construction design options, there would be no appreciable differences in construction impacts to geology and soils between the build alternatives.

3.12.2.4 Avoidance and Minimization of Impacts

Construction specifications would include the following BMPs to address the potential short-term erosion of soils within the construction area:

- Minimizing areas cleared of vegetation
- Providing temporary cover or mulch for exposed soil stockpiles
- Using erosion control blankets on exposed slopes

The fugitive dust control plan described above in Section 3.8, Air Quality and Greenhouse Gas Emissions, would also address these concerns.

Short-term impacts to shallow groundwater quality from construction activities would be minimized by identifying the following BMPs in construction specifications:

- Containing and controlling waste and hazardous materials on site
- Confining maintenance and refueling activities to areas where excavations would not be impacted
- Preventing downward migration of contaminants in groundwater during shaft drilling using seals and reduced casing size at the Midway Landfill

In addition to the geotechnical borings that were installed during the preliminary engineering phase, Sound Transit would conduct additional geotechnical studies during final design. These studies would include borings and other exploration methods, laboratory testing of soil, and detailed foundation design for the project. This work would inform and refine the project design, construction techniques, and potential mitigation measures. The project design would meet state and federal design and construction codes for transportation projects.

Depending on final design, dewatering and groundwater management may be needed due to areas of shallow groundwater in the vicinity of the Preferred and South 344th Street alternatives. For all build alternatives, methods could include localized dewatering and groundwater injection, using sheet-pile walls, or freeze-shoring for horizontal groundwater containment.

If dewatering is required for construction of the Midway Landfill Alternative, contaminated groundwater concerns would be considered during design in compliance with future amendments to the Ecology Cleanup Action Plan or EPA Record of Decision. The current Cleanup Action Plan and Record of Decision requirements include continued operations and maintenance of site remedial actions, including the low permeability cap, the landfill gas extraction and monitoring system, and the surface water management system. Institutional controls implemented as part of the Record of Decision require the city of Seattle to continue operating and maintaining these remedial actions and provide an annual review of groundwater quality downgradient of the landfill.

Additionally, excavation of the Midway Landfill is expected to be restricted so as not to allow work during the wet season, which in western Washington is considered to be October 1 through April 30. This would reduce the amount of precipitation that could come in contact with the exposed refuse, which then could become contaminated water that could contribute to the contaminated groundwater at the site. Any of the subsurface construction design options for the Midway Landfill would require Ecology and/or EPA approval to amend the Cleanup Action Plan and Record of Decision to confirm that the project would maintain the commitments currently in place for the landfill, including protection of groundwater.

3.12.2.5 Indirect Impacts

No indirect impacts related to geology and soils would result from construction and operation of the proposed project.

3.12.3 Mitigation Measures

With appropriate use of engineering design standards and BMPs, geological and soils impacts are not expected, and additional mitigation is not anticipated.

3.13 Hazardous Materials

This section summarizes the hazardous materials analysis, which identifies properties near the OMF South project alternatives recognized to have hazardous materials issues associated with current or historical site activities or that have a documented release to the environment. A hazardous material is any substance that — because of its quantity, concentration, or physical or chemical properties — may pose a hazard to human health and the environment, either by itself or through interaction with other factors. Types and locations of sites were identified to evaluate potential impacts to construction, property ownership, and general public health and safety.

The study area for the hazardous materials analysis includes the area within a 1/8-mile radius of the construction limits for each build alternative. Properties farther than 1/8 mile were not considered for further analysis because they present a low probability of having hazardous materials releases that could affect the study area. Within the study area, the hazardous materials analysis included review of data from the Environmental Data Resources Inc. (EDR) database, review of historical land use, and a visual windshield survey to confirm the results of the database review. The EDR reports summarize federal, state, and local database information, and this information — along with the Ecology Cleanup Site Search database — was used to evaluate the three build alternatives, with an emphasis on known sites on, adjacent to, or near each alternative.

3.13.1 Affected Environment

The affected environment in the project study area was assessed by reviewing the state and federal regulatory database records as described above. The identified sites were ranked based on the proximity to the study area, the type and number of databases in which the site was found, known releases of hazardous materials or petroleum products, and the status of remediation or cleanup efforts at sites with known releases. One of three risk categories was assigned to sites within the study area: high, medium, and low.

- **High Risk.** Sites that involve substantial contamination of large areas, including soil, groundwater, and multiple contaminants, and might represent higher risk of further releases of hazardous materials to human health or the environment; that would be likely to involve high levels of regulatory approvals or extensive or lengthy remediation activities that may create other impacts to the environment; or that could pose major delays to the development of the project.
- **Medium Risk.** Sites where the nature of potential contamination is known based on existing investigation data, the potential contaminants are not extremely toxic or difficult to treat, and probable remediation approaches are straightforward.
- **Low Risk.** Sites where the nature of potential contamination is known based on existing investigation data and the sites are not expected to have notable impacts on the project due to their location, or sites where hazardous materials were used but had no or only very small, reported releases.

Table 3.13-1 lists the risk categories assigned to properties found during the regulatory records search within the 1/8-mile study area for each build alternative. These sites are also shown in Figures 3.13-1 and 3.13-2.

Table 3.13-1 Number of Hazardous Material Sites within Study Areas

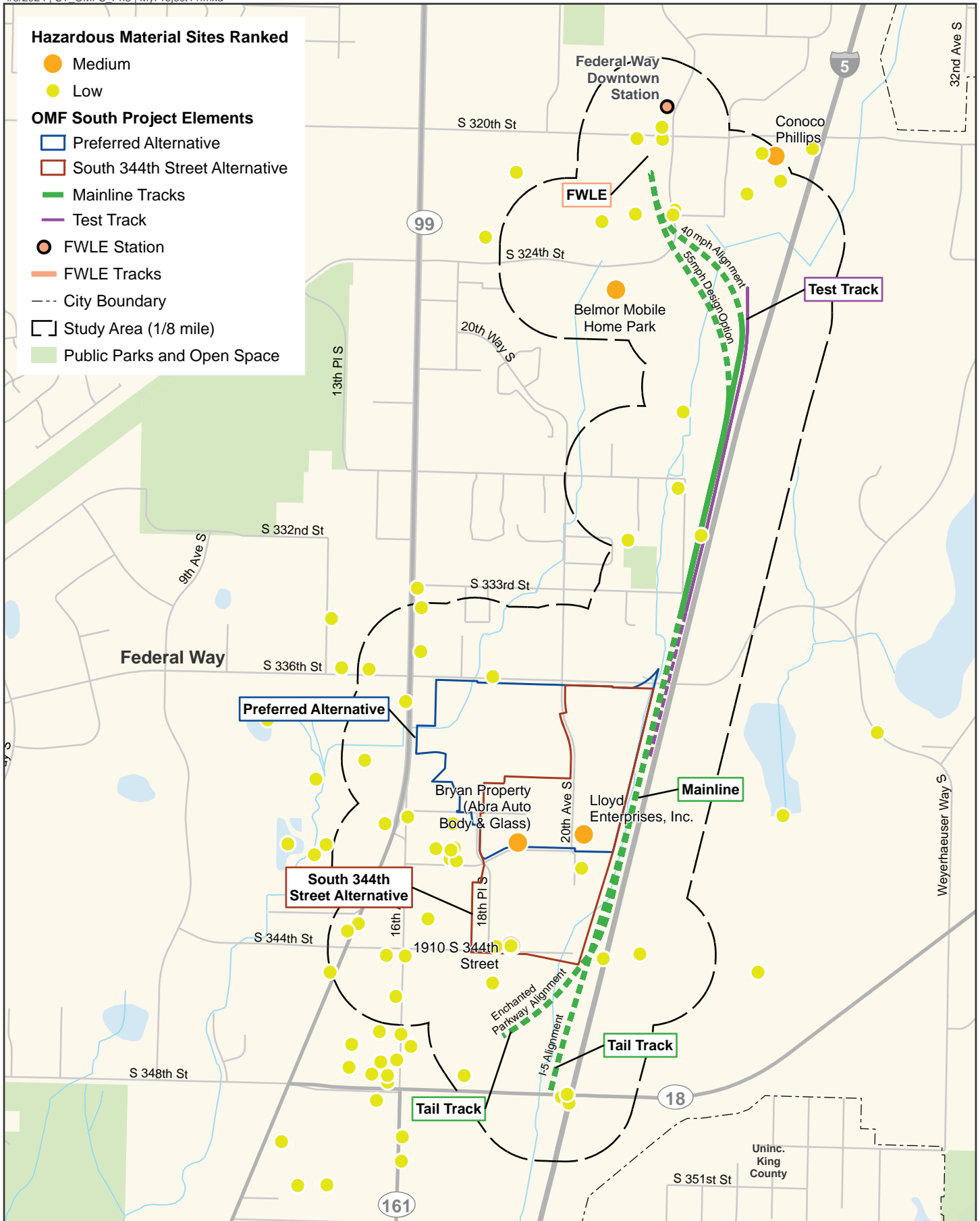
Alternative	High Risk	Medium Risk	Low Risk	Total
Preferred	0	5	53	58
South 344th Street	0	5	59	64
Midway Landfill	1	4	43	48

3.13.1.1 Preferred Alternative

Regulatory Database Review

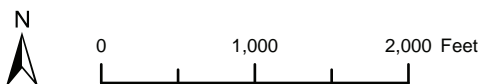
There were no high-risk hazardous materials sites identified for the Preferred Alternative. Five medium-risk hazardous materials sites were identified in the Preferred Alternative study area. Two of these sites are not properties that would be acquired, so are not discussed further:

- Belmor Mobile Home Park (2101 S 324th Street) is located at the northern portion of the mainline tracks. Gasoline-contaminated soil associated with a leaking underground storage tank was remediated, and the site was issued a No Further Action determination by Ecology.
- The Bryan Property (1908 S 341st Place), also listed as Abra Auto Body & Glass Federal Way, has been operating as an automotive repair shop since at least 2001. After numerous violations during environmental inspections, surface water, soil, and sediment samples were taken, and elevated levels of petroleum hydrocarbons and metals were found. The site entered the Ecology Voluntary Cleanup Program in 2013. Ecology has stated that there is no soil-to-groundwater pathway. Remedial activities on the property have been ongoing and a request for a No Further Action Determination was made by the property owner in 2019. Ecology issued a No Further Action letter in April 2021.
- The Lloyd Enterprises, Inc. site (2102 S 341st Place) was a former composting facility with several underground storage tanks on site and is a full acquisition for this alternative. All underground storage tanks have been removed, and the facility has been closed. No indication of release from the underground storage tanks was found. A small lube/motor oil spill (approximately 10 gallons) was reported in 2016; however, this incident has been closed and did not require listing in a large cleanup database.



Data Sources: King County; Cities of Des Moines, Federal Way, Kent (2019).

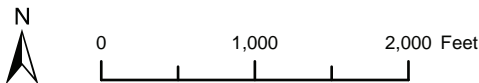
FIGURE 3.13-1
 Hazardous Material Sites
 Preferred and South 344th Street Alternatives





Data Sources: King County; Cities of Des Moines, Federal Way, Kent (2019).

FIGURE 3.13-2
 Hazardous Material Sites
 Midway Landfill Alternative



Historical Aerial Review

Historical aerial photographs of the Preferred Alternative area were obtained from EDR and compiled in the EDR Aerial Photo Decade Package. Aerial photographs were examined for the years 1941, 1943, 1957, 1968, 1972, 1980, 1990, 2006, 2009, 2013, and 2017. Observations are listed below.

- 1941–1943: The area appears to be mostly undeveloped, wooded land surrounded in all directions by undeveloped, partially wooded land. North Lake is visible to the far northeast of the site. Some rural residential properties are visible in the area. SR 99 is developed to the west, S 344th Street is developed to the south, and S 336th Street is developed to the north.
- 1957: A small residence or commercial building is located immediately to the southwest of the site. SR 18 is visible to the south of the site.
- 1968–1972: Some commercial and industrial development is visible to the north and west of the site. I-5 is visible to the east of the site. Development immediately to the southwest is visible. Residential and commercial development is visible in all directions from the site. Botanical gardens are visible to the far east of the site.
- 1980–1990: The site remains undeveloped, wooded land. Commercial development is visible immediately to the north, west, and south of the site.
- 2006–2017: The Christian Faith Center and associated parking lots are developed on the site. The surrounding area appears to be developed similarly to current conditions, with commercial, industrial, and residential development to the east, south, west, and north of the site.

3.13.1.2 South 344th Street Alternative

Regulatory Database Review

There were no high-risk hazardous materials sites identified for the South 344th Street Alternative.

The study area for the South 344th Street Alternative has the same five medium-risk hazardous materials sites as the Preferred Alternative, plus one additional site:

- 1910 S 344th Street has one operational underground storage tank and some violations of compliance. A surface petroleum spill is listed in 2003, though it is not related to the underground storage tank. Formal administrative compliance violations have been listed for the property.

Historical Aerial Review

Historical aerial photographs of the South 344th Street Alternative area were obtained from EDR and compiled in the EDR Aerial Photo Decade Package. Aerial photographs were examined for the years 1941, 1943, 1957, 1968, 1972, 1980, 1990, 2006, 2009, 2013, and 2017. Observations are listed below.

- 1941–1957: The site appears to be rural residential property on the southern portion and undeveloped, wooded land on the northern portion, surrounded in all directions by undeveloped, partially wooded land. North Lake is visible to the far northeast of the site. Some rural residential properties are visible in the area. SR 99 is developed to the west, S 344th Street is developed to the south, and S 336th Street is developed to the north.

- 1968–1972: Additional residential development is visible on the site. Some commercial and industrial development is visible to the north and west of the site. I-5 is visible to the east of the site. Development immediately to the northwest is visible. Residential and commercial development is visible in all directions from the site. Botanical gardens are visible to the far east of the site.
- 1980: The eastern portion of the site appears to be cleared and primed for development. Commercial development is visible immediately to the west and northwest of the site. The surrounding area to the far north, west, and south is developed with commercial, industrial, and residential properties.
- 1990: Commercial development is visible on the site, with several buildings and associated parking lots as well as land cleared for development.
- 2006–2017: The site appears to be developed similarly to current conditions, with multiple commercial buildings and parking lots, including a sports center, an RV storage center, and a church. The adjacent property to the north is developed with the Christian Faith Center and associated parking lot. The surrounding area appears to be developed similar to current conditions, as well, with commercial, industrial, and residential development to the east, south, west, and north of the site.

3.13.1.3 Midway Landfill Alternative

Background

The Midway Landfill is a Superfund site owned by the city of Seattle and managed by SPU. It is regulated by the Ecology and EPA under an existing Ecology Consent Decree and Cleanup Action Plan and EPA Record of Decision. The Midway Landfill was originally a gravel pit, which operated from 1945 to 1966. SPU began landfill operations at the site in 1966, accepting primarily demolition-type wastes. The landfill closed in 1983. Approximately 3,000,000 cubic yards of solid waste, reported to include demolition materials and wood waste as well as two million gallons of industrial liquids, were deposited at the unlined landfill facility (EPA 2015). Refuse depths in some areas are up to 130 feet.

When the landfill closed, concerns were raised regarding negative impacts to human health and the environment. Testing indicated landfill gas outside the landfill's boundary, and organic and inorganic contaminants were found in groundwater. An active landfill gas management system was installed in 1985, and in 1986 the Midway Landfill was placed on the National Priorities List due to groundwater contamination. With the listing, EPA assumed responsibility for facility oversight. Pursuant to Washington State's Model Toxics Control Act, SPU entered into a Consent Decree with Ecology in 1990 to initiate cleanup work.

The basis of action is groundwater contamination above federal drinking water standards. Original contaminants of concern include 1,2-dichloroethane, vinyl chloride, and manganese. During the 2010 to 2020 Five-Year Review periods, 1,4-dioxane was detected above Model Toxics Control Act Method B levels and is also considered a potential contaminate of concern. A final remedy for the site was identified in a Record of Decision by EPA, with Ecology's concurrence, on September 6, 2000. The identified remedy's aim was to ensure refuse containment is effective and maintained, groundwater quality is restored beyond the landfill boundary, and that no residential exposure to groundwater occurs until standards have been met.

The site is covered with a landfill cap. The cap layers from bottom to top, are a 12-inch-thick layer of low permeability (1×10^{-7} cm/sec) soil/clay material; a 50-millimeter-thick, high-density polyethylene geomembrane; drainage geonet; geotextile; a 12-inch-thick drainage layer; and a

minimum 12-inch-thick topsoil layer. The cap is designed to keep precipitation from reaching the buried refuse, where it could interact with the refuse and contaminate groundwater. SPU completed installation of the landfill cap, methane collection system, and surface water management system in 1992; however, construction completion was not officially recognized until the Record of Decision was signed in September 2000. SPU has continued to manage and maintain the site with regular environmental reporting, including required Five-Year Review Reports by the EPA completed in 2005, 2010, 2015, and 2020.

Regulatory Database Review

The Midway Landfill is classified as a high-risk hazardous materials site. As described above, the property was added to the National Priorities List in 1986 for known groundwater and air contamination that remains at the site. A 2005 Restrictive Covenant restricts any activity that may interfere with cleanup actions, removal, or use of groundwater from any well on the property and has deed transfer and lease restrictions (EPA 2019). In March of 2020, Ecology and Sound Transit signed a Prospective Purchaser Consent Decree (PPCD) for the Midway Landfill to facilitate redevelopment of a portion of the site for the extension of light rail as part of the FWLE project. The PPCD requires Sound Transit's work at the site to conform to Ecology's Cleanup Action Plan Amendment (King County Superior Court 2020).

Several medium-risk hazardous materials sites were identified in the study area for the Midway Landfill Alternative. None of these sites would be acquired for this alternative, so they are not discussed further.

Historical Aerial Review

Historical aerial photographs of the Midway Landfill Alternative study area were obtained from EDR and compiled in the EDR Aerial Photo Decade Package. Aerial photographs were examined for the years 1943, 1957, 1968, 1972, 1980, 1990, 2006, 2009, 2013, and 2017. Observations are listed below.

- 1943: The area appears to be mostly undeveloped, surrounded in all directions by undeveloped, partially wooded land. Some rural residential properties are visible in the area. SR 99 is apparent to the west, Military Road is partially developed to the east, S 259th Place is developed to the south, and S 240th Street is developed to the north.
- 1957: The site appears to be an active gravel quarry. Commercial development is visible to the north, south, and west. Some residential development is visible to the far northeast.
- 1968–1980: The Midway Landfill appears to be operational (landfill operations began in 1966). I-5 is visible to the east. Development immediately to the southwest is visible. Residential and commercial development is apparent in all directions from the site.
- 1990: Landfill operations ceased in 1983, and the site was listed as an EPA Superfund site. The 1990 aerial photograph shows remedial efforts underway, including a stormwater detention pond to the north of the landfill to collect surface runoff. The surrounding area appears relatively unchanged since the 1980 aerial photograph.
- 2006–2017: The Midway Landfill appears to be filled and capped according to reported remedial efforts. The surrounding area appears to be developed similar to current conditions, with commercial, industrial, and residential development to the east, south, west, and north of the landfill.

3.13.2 Environmental Impacts

Potential impacts discussed in the following sections are from known contaminated sites and are based on the hazardous materials site's location relative to the build alternatives, focusing on hazardous materials sites within the 1/8-mile study areas. Hazardous material sites within this distance to the build alternatives have a higher probability of affecting implementation of the proposed project. Sites that pose a high risk to the build alternatives could also have long-term impacts if remediation actions are necessary after project construction.

3.13.2.1 No-Build Alternative

Under the No-Build Alternative, there would be no project-related removal or cleanup of potentially hazardous materials in the study area. However, other planned projects in the area could have hazardous materials impacts, depending on their location and past use of their respective properties. This includes TDLE, which overlaps with the OMF South Preferred and South 344th Street alternatives. If TDLE is constructed as proposed, the mainline track associated with these OMF alternatives would be built later in time. Impacts associated with construction of the mainline track are addressed within the build alternatives impacts discussion below. All other TDLE-related impacts are addressed in Chapter 4, Cumulative Effects Analysis.

3.13.2.2 Long-Term Impacts

The operation of OMF South would follow all regulations concerning the proper use and disposal of hazardous materials. However, an OMF could cause long-term impacts to the environment if an accidental release of hazardous materials, such as a fuel spill, occurs. Light rail trains operate on electricity and not fuel; however, it is likely that hazardous materials, such as lubricants, solvents, cleaning agents, and paints, would be stored at the OMF, and minor accidental releases could result during maintenance activities. The proposed OMF South would have a painting area for the trains and would need to register as an applicator with the Puget Sound Clean Air Agency.

Preferred Alternative

There are no known long-term impacts associated with hazardous materials unique to the Preferred Alternative.

South 344th Street Alternative

There are no known long-term impacts associated with hazardous materials unique to the South 344th Street Alternative.

Midway Landfill Alternative

Vapor intrusion testing would continue to be required to ensure that any occupant of the OMF South facility would not be exposed to harmful gases associated with the former landfill. Long-term exposure to even low levels of certain gases can increase the risk of chronic health issues; in extreme cases, the buildup of gases from sources such as landfills can cause acute health effects and may pose immediate risks of fire or explosion (EPA 2008).

The Midway Landfill Human Health Risk Assessment (Appendix D4) details the risks to human health associated with the Midway Landfill Alternative. The report describes the contaminants of interest and the scenarios of potential exposure to these contaminants for OMF South

employees. Exposure to vapor from landfill gas would be a complete route of exposure to workers under the worst-case scenario; in other words, if engineering controls fail, vapor could intrude into indoor air. Vapor intrusion from contaminants in groundwater is not expected to adversely impact OMF South employees.

There is a high level of uncertainty regarding risks of landfill gases at the site based on the lack of sufficient data to fully characterize human health risks. The Human Health Risk Assessment recommends that additional testing of landfill gases, based on probable paths of occupational exposure, be completed to fill in these data gaps and identify other potential routes of exposure. In addition to toxicological considerations, uncontrolled release of methane gas from the landfill could pose an explosion hazard risk because the OMF South building (including below-grade pits) would have electrical equipment and live electrical overhead catenary wires that could spark or emit stray currents. Subsurface design options with greater amounts of excavation would produce lesser amounts of landfill gases. Also, a gas collection system would be required to help minimize the concern.

3.13.2.3 Construction Impacts

The hazardous materials analysis also considered direct impacts of activities associated with the construction of OMF South. The analysis considered the impacts to human health and the environment as a result of possible release of contaminants or alteration of contaminant migration pathways during construction activities and considered the effects of existing contaminated sites. Due diligence will be conducted prior to property acquisition, which will provide information about any necessary remedial actions required on the identified hazardous materials sites.

Preferred Alternative

No high-risk hazardous materials sites are within the Preferred Alternative. Based on regulatory status, acquisition level (full, partial, or no impact), or distance from the parcels being acquired, low- and medium-risk sites would not likely affect this alternative during construction. If acquired, one medium-risk site (the Bryan Property) could require additional remedial action, depending on the extent of project construction; however, based on the cleanup already conducted at the site, the amount of additional remedial action needed is expected to be little to none.

South 344th Street Alternative

No high-risk hazardous materials sites are within the South 344th Street Alternative. Based on regulatory status, acquisition level (full, partial, or no impact), or distance from the parcels being acquired, low- and medium-risk sites would not likely affect this alternative during construction. The same impact identified for the medium-risk site (the Bryan Property) would apply to this alternative.

Midway Landfill Alternative

The Midway Landfill is a high-risk hazardous materials site listed and managed as a Superfund site. Redevelopment of a property formerly used as a landfill and subject to ongoing Cleanup Action Plan and Record of Decision requirements is considered high risk for several reasons. There are potential structural challenges (foundation design and alignment of underground utilities) and environmental challenges (hazardous materials disposal; air, soil, and groundwater contamination; and rebuilding a vapor extraction system to manage risk of gas intrusion into human-occupied spaces).

Temporary impacts from construction on the Midway Landfill could include the potential release of contaminated air, soil, and groundwater. Substantial remediation, cleanup, and proper disposal of any excavated materials during construction, as well as air and groundwater monitoring in the surrounding area would be necessary. Any of the subsurface construction design options for the Midway Landfill would require Ecology and/or EPA approval to amend the existing Cleanup Action Plan and Record of Decision to confirm that the project would maintain the commitments currently in place for the landfill, including handling and disposal of excavated materials, worker health and safety, and related monitoring.

Subsurface Construction Design Options

The three subsurface construction design options for the Midway Landfill Alternative range from a structural platform with minimal excavation to a full excavation of the landfill with backfilling of competent soils. The Hybrid Subsurface Design Option would use a process called deep dynamic compaction to prepare the site for construction. In areas of the landfill containing liquid waste, compaction could cause mobilization of the contaminants.

All excavation (and installation of drilled shafts) would require the modification of the landfill gas management system and could include the exposure of workers to methane and other compounds generated by breakdown of landfill materials. The shaft drilling also presents the possibility for creating additional pathways for the downward migration of contaminants contained in leachate to the aquifer below. Section 3.11, Water Resources, considers the potential impacts to groundwater and the need for substantial remediation during construction. Remediation measures include cleanup and proper disposal of excavated materials to minimize contamination as well as groundwater monitoring in the surrounding area, with the possibility of replacing or rehabilitating the landfill membrane.

The excavation of landfill materials also has the potential to expose construction workers to contaminated materials and contaminated groundwater as well as the potential to encounter characteristic hazardous wastes. The subsurface construction design options with more substantial excavation would prolong and presumably increase these exposure risks. Additionally, the excavated material could potentially be flammable. Construction crews would need to be equipped with fire extinguishing tools and equipment. The transport of these contaminated landfill materials (and potentially hazardous wastes) via roadway and rail also presents a risk to the public in the case of a spill. These risks would increase with the volume of materials excavated and transported. Loads of landfill materials leaving the project area would be required to be covered per a project-specific contaminated media management plan.

From a beneficial impact standpoint, excavation of contaminated landfill materials from the Midway Landfill has the potential to improve local groundwater quality through reduced contact with contaminants and the potential for reduced infiltration. Any removal of the cap portion of the landfill presents the opportunity to potentially improve the cap and membrane and the landfill gas management system. The Midway Landfill is not lined and therefore there is no barrier to prevent mixing of leachate and groundwater. The benefit of fully excavating and hauling contaminated residuals from the Midway Landfill to a lined landfill located elsewhere would be the reduced potential for groundwater contamination.

3.13.2.4 Avoidance and Minimization of Impacts

A spill response program and hazardous material handling plan has been created by Sound Transit for existing maintenance locations and would be implemented during operations of the OMF South. OMF South activities that would generate hazardous materials would be managed according to all applicable regulatory requirements, which would minimize the exposure risk to all personnel and the surrounding environment.

Unexpected residual soil and groundwater contamination may be encountered during construction activities in portions of the Preferred or South 344th Street alternatives. To mitigate potential impacts from all potential hazardous material sites, Sound Transit would perform a level of environmental due diligence appropriate to the size and presumed past use at any properties in the study area before they are acquired. Sound Transit may seek certain legal protections as part of the real property acquisition process to reduce its legal and financial risk.

Construction of the Midway Landfill Alternative would encounter known areas of contamination and affect portions of the remedy currently in place for the site, including a low permeability cap, landfill gas collection system, surface water management system, and groundwater monitoring system. As a result, any of the subsurface construction design options for the Midway Landfill would require Ecology and/or EPA approval to amend the existing Cleanup Action Plan and Record of Decision to confirm that the project would maintain the commitments currently in place for the landfill, including protection against short-term impacts during construction and long-term impacts after construction. For example, this would include BMPs for the construction of drilled shafts to prevent the potential downward migration of contaminants and to prevent vapor intrusion.

If excavation of landfill materials is required, safety precautions, including personal protective equipment, air monitoring, and other best practices, would be employed to ensure the safety of workers on site. An Environmental Protection Plan would likely be required to establish procedures to manage and monitor the waste excavation and handling process, including management of stormwater and landfill gas. In addition to continuous landfill gas management, measures would need to be established to prevent air intrusion into the landfill that could result in a landfill fire. Sound Transit would prepare a Hazardous Materials Response and Sampling Plan, similar to the one prepared by SPU for FWLE construction on the western edge of the landfill (SPU 2020). The plan's objective would be to provide an approved approach on how to identify and handle any potentially dangerous waste that could be encountered. The plan would be prepared to meet the requirements of the Cleanup Action Plan.

A project-specific Health and Safety Plan would also be required and would include stipulations that construction workers who may be exposed to potentially hazardous substances would be required to obtain the appropriate level of Hazardous Waste Operations and Emergency Response Standard (HAZWOPER) training.

The medium-risk sites identified for the three alternatives have been well characterized and would likely require no additional investigation and little or no remediation expected in addition to what has been completed. To the extent practicable, Sound Transit would limit construction activities that might encounter contaminated groundwater or soil at these sites.

Based on the due diligence process, plans for the mitigation, handling, and disposal of contaminated media and hazardous construction debris would be developed on a site-by-site basis in conjunction with the appropriate regulatory agencies. Hauling out of excavated material and construction debris would comply with regulations concerning the transport of hazardous

and contaminated material, as applicable. A project-wide contaminated media management plan may also be developed and implemented.

Additionally, hazardous substances and petroleum products used during construction, such as fuels, paints, solvents, and other chemicals, would be managed and stored per the contractor's pollution control plan. BMPs would be followed in order to reduce the risk of spills, leaks, or other releases during construction activities. Construction plans and specifications developed during final design could include the following BMPs:

- Keep fueling, maintenance, and cleaning fluids in contained areas (berms, etc.)
- Minimize the production or generation of hazardous materials
- Appropriately label and store hazardous waste, per federal regulations
- Designate hazardous waste storage away from storm drains or surface water
- Recycle materials (used oil- and water-based paint) as appropriate
- Handle any potential spills of hazardous materials in conformance with applicable Material Safety Data Sheets

BMPs that address hazardous substances would be required as part of several plans that are prepared by the contractor, including the Contaminated Substances Health and Safety Plan, the Unknown Hazardous Screening and Handling Plan, the Contaminated Substances Handling Plan, and the Spill Prevention, Control, Contingency and Countermeasure Plan.

The current construction schedule assumes restrictions on excavation into the Midway Landfill during the wet season — October 1 through April 30. This would reduce the amount of precipitation that could come in contact with the exposed refuse, which then could become contaminated water that could contribute to the contaminated groundwater at the site.

3.13.2.5 Indirect Impacts

No indirect impacts related to hazardous materials are anticipated to result from construction and operation of the proposed project.

3.13.3 Mitigation Measures

Mitigation measures for the three subsurface construction design options for the Midway Landfill Alternative would vary depending on the option chosen. Common to the subsurface construction design options (except for the Full Excavation subsurface construction design option) would be the replacement of the landfill cap to prevent surface water and stormwater from entering any remaining portion of landfill. Replacement or upgrade of the landfill gas extraction system and the continuation of the landfill gas monitoring system would be required for the Platform and Hybrid options and may be required for the Full Excavation option. Additional mitigation measures would be determined in coordination with EPA and Ecology.

3.14 Public Services

This section discusses how public services could be affected by the OMF South project alternatives, such as through changes in response times for emergency services (fire, medical, and police), travel times for school bus and solid waste collection routes, and overall demand for public services. Public service providers that have facilities in the study area were also identified to determine if the facility would be displaced or emergency access would be interrupted. Analyses completed for other elements of the environment for the OMF South project were reviewed to assess potential impacts to public services, including those in Section 3.2, Transportation; Section 3.3, Acquisitions, Displacements, and Relocations; and Section 3.15, Utilities, Energy, and Electromagnetic Fields.

The study area is the area 0.5 mile from the construction limits of each build alternative. The study areas are within the jurisdictions of Des Moines, Kent, and Federal Way and include portions of unincorporated King County. There are no relevant regulatory requirements related to public services.

3.14.1 Affected Environment

3.14.1.1 Preferred and South 344th Street Alternatives

Public services within the Preferred and South 344th Street alternatives study area are shown in Figure 3.14-1. The public services are primarily the same for these two build alternatives, except for the Federal Way Public Academy, the United States Postal Service distribution center, and the Federal Way Veterans Affairs Clinic (Valor Healthcare), which are only in the South 344th Street Alternative study area.

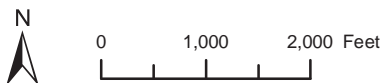
Fire and Emergency Medical

South King Fire and Rescue (South King Fire) provides emergency management services covering approximately 41 square miles, including Des Moines, Federal Way, and a portion of unincorporated King County. Facilities include seven fire stations and one training and maintenance station. The department employs 180 personnel, of whom 157 are uniformed officers, with a minimum of 27 firefighters and emergency medical technicians on duty 24 hours a day, 7 days a week (South King Fire 2022). In the southern portion of the study area, South King Fire completed the construction of a station fleet facility at 1351 S 351st Street. In 2021, they completed the construction of a logistics building at 35100 Pacific Highway S, just outside the study area, directly west of the new station fleet facility. Future facilities expansion includes the construction of a response station at the same location of the recently constructed logistics building (South King Fire 2022).

No existing fire stations are in the study area. Fire Stations 61, 62, and 64 are the closest facilities, all less than 2 miles from the site. South King Fire is also teamed with King County's Medic One Program, and Valley Communications Center provides 9-1-1 dispatch services. According to South King Fire's 2020 Performance Report, they met their response performance goal for the first emergency medical services to be on the scene in 6 minutes about 80 percent of the time. They met their response performance goal for the first fire unit to be on the scene in 5 minutes and 30 seconds approximately 88 percent of the time (South King Fire 2020a). South King Fire is also partnered with Federal Way Emergency Management for emergency response to larger-scale emergency alerts, such as earthquakes or floods.



FIGURE 3.14-1
Public Services
Preferred and South 344th Street Alternatives



Saint Francis Hospital is outside of the study areas to the southwest of both alternatives. It is a full-service hospital that provides diagnostic imaging and radiology; emergency services; a full range of women’s health services, including a birth center; and radiation oncology. Although it is outside the build alternative study areas, it is the closest emergency room.

Police

The Federal Way Police Department provides law enforcement within the city limits. The department has 150 uniformed personnel and 36 civilian staff. In 2021, the average response time for Priority E emergencies (confirmed emergency — extensive loss of life and/or property) was 5 minutes and 49 seconds, and the average response time for Priority 1 emergencies (potential emergency — could result in loss of life and/or property) was 5 minutes and 43 seconds (City of Federal Way 2022). The closest police station is located at 33325 8th Avenue S, just outside the study area.

Federal Way is served by the Washington State Patrol Field Operations Bureau District 2, which comprises all of King County. District 2 patrols interstate and state highways within the county, including I-5 and SR 99. The Field Operations Bureau is responsible for traffic law enforcement, collision investigation, criminal interdiction, terrorism prevention, and motorist assistance (WSP 2019).

Solid Waste and Recycling

Garbage collection in the study area is provided by a city-authorized contracted hauler for occupied commercial and residential properties. All nonhazardous solid waste collected in the study area is taken directly to King County’s Cedar Hills Landfill in Maple Valley or a nearby solid waste transfer station (the nearest is the Algona Transfer Station). The closest facility that accepts household hazardous waste is the South Transfer Station in Seattle, managed by SPU. A King County-operated “Wastemobile” travels to many communities in King County to provide residents a place to take their household hazardous waste periodically. The closest depository for household hazardous waste is approximately 3 miles from the study area in the parking lot of the Outlet Collection in Auburn at the intersection of SR 167 and SR 18.

School Districts/Schools

The study area includes five schools, shown on Figure 3.14-1 above and listed below. The elementary school enrollment is provided by the Washington Office of Superintendent of Public Instruction (OSPI 2022).

- Federal Way Open Doors (31455 28th Avenue S): Federal Way School District; 146 students enrolled in 2021/2022
- Federal Way Public Academy (34620 9th Avenue S): Federal Way School District; 308 students enrolled in 2021/2022 (South 344th Street Alternative only)
- Internet Academy (31455 28th Avenue S): Federal Way School District; 895 students enrolled in 2021/2022
- Pacific Christian Academy (33645 20th Avenue S): private school associated with the Christian Faith Center; 312 students enrolled in 2017/2018
- Career Academy at Truman High School (31455 28th Avenue S); Federal Way School District; 58 students enrolled in 2021/2022

Other Public Services

Other public services within the study area (Figure 3.14-1) include:

- Federal Way Department of Licensing (1617 S 324th Street)
- Federal Way Public Health Center (33431 13th Place S): The center provides health care for children with special needs, family planning, health insurance enrollment, HIV screening, pregnancy testing, teen services, and Women, Infants, and Children services
- Sea Mar Community Health Center (31405 18th Avenue S): The center provides family medicine and dentistry, behavioral health, maternity support, and a pharmacy; it is a community-based organization focused on health and social services to underserved communities
- Valor Healthcare (34617 11th Place S): The Federal Way VA Clinic provides primary care, mental health services, nursing, and social work to veterans of the armed services (South 344th Street Alternative only)
- United States Postal Service distribution center (34301 9th Avenue S) and Federal Way Post Office (32829 Pacific Highway S; South 344th Street Alternative only)

3.14.1.2 Midway Landfill Alternative

Public services in the Midway Landfill Alternative study area are shown in Figure 3.14-2.

Fire and Emergency Medical

The Puget Sound Regional Fire Authority (Puget Sound Fire) provides emergency management services covering approximately 109 square miles, including Kent, Covington, Maple Valley, and SeaTac, as well as portions of unincorporated King County. The coverage area within the Kent is 34 square miles, the entire jurisdictional boundary.

Puget Sound Fire provides emergency response service from 13 fire stations, none of which are within the project study area. The department employs a total of 350 personnel, of whom 271 are uniformed, with a minimum of 54 firefighters and emergency medical technicians on duty 24 hours a day, 7 days a week (Puget Sound Fire 2022). The study area is within the response area for Fire Station 73, used as both a fire station and police substation. Fire Station 73 is approximately 1 mile to the southeast on Military Road S in Kent. In 2021, the average response time for Priority E emergencies was 6 minutes and 18 seconds, and the average response time for Priority 1 emergencies was 6 minutes and 29 seconds (Valley Communications Center 2021).

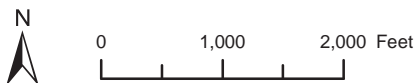
King County's Medic One program provides advanced life-support services, and Valley Communications Center provides 9-1-1 dispatch services. Puget Sound Fire is also partnered with King County Emergency Management for emergency response to larger-scale emergency alerts, such as earthquakes or floods. There are no hospitals or emergency medical facilities in the study area.

Although the public services study area includes a portion of Des Moines, the Midway Landfill Alternative itself is outside the city limits. Puget Sound Fire would respond to incidents at OMF South if it were constructed at the Midway Landfill.



FIGURE 3.14-2
Public Services
Midway Landfill Alternative

OMF South



Police

The Kent Police Department provides law enforcement within the city limits of Kent. The department has 172 uniformed police and corrections officers and 42 support staff (City of Kent 2022). In 2021, the average response time for Priority E emergencies was 8 minutes and 50 seconds, and the average response time for Priority 1 emergencies was 7 minutes and 6 seconds (Valley Communications Center 2021). No police stations are within the project study area.

The Kent Police Department would respond to incidents at OMF South if the Midway Landfill Alternative were selected to be built. However, a multi-jurisdictional interlocal agreement is in place for law enforcement to join forces to handle specific serious criminal confrontations. This agreement includes the Port of Seattle and the municipalities of Auburn, Kent, Renton, Tukwila, and Des Moines.

Kent and Des Moines are also served by the Washington State Patrol Field Operations Bureau District 2, described previously.

Solid Waste and Recycling

Garbage collection in the study area is largely provided by a city-authorized contracted hauler, as mandated for occupied commercial and residential properties. All nonhazardous solid waste is taken directly to King County's Cedar Hills Landfill in Maple Valley or to a solid waste transfer station (the nearest transfer station is the Bow Lake Transfer Station in Tukwila). The closest facility that accepts household hazardous waste is the South Transfer Station in Seattle, managed by SPU. A King County-operated "Wastemobile" travels to many communities to provide residents a place to take their household hazardous waste periodically. Kent Fire Station 75, approximately 10 miles from the study area, is the closest household hazardous waste depository.

School Districts/Schools

The Midway Landfill Alternative study area includes four schools, shown on Figure 3.14-2 and listed below. The elementary school enrollment is provided by the Washington Office of Superintendent of Public Instruction (OSPI 2022). Highline College enrollment information was found on the college website (Highline College 2022).

- Sunnycrest Elementary School (24629 42nd Avenue S): Federal Way School District; 505 students enrolled in 2021/2022
- Parkside Elementary (2104 S 247th Street): Highline School District; 415 students enrolled in 2021/2022
- George T. Daniel Elementary School (11310 SE 248th Street): Kent School District; 490 students enrolled in 2021/2022
- Highline College (2400 S 240th Street): approximately 13,196 students enrolled in 2020/2021

Other Public Services

The study area also includes a Washington Army National Guard location and the Sea Mar Community Health Center (Figure 3.14-1). The Washington Army National Guard is located east of I-5 at (24410 Military Road S in Kent) and serves as an armory. Sea Mar Community Health

Center (2781 S 242nd Street in Des Moines) provides family medicine and dentistry, behavioral health, maternity support, and a pharmacy. It is a community-based organization focused on health and social services to underserved communities.

3.14.2 Environmental Impacts

3.14.2.1 No-Build Alternative

Under the No-Build Alternative, impacts to public services from construction or operation of OMF South would not occur. However, other planned projects would have impacts in the OMF South study areas. This includes TDLE, which overlaps with the OMF South Preferred and South 344th Street alternatives. If TDLE is constructed as proposed, the mainline track associated with these OMF alternatives would be built later in time. Impacts associated with construction of the mainline track are addressed within the build alternatives impacts discussion below. All other TDLE-related impacts are addressed in Chapter 4, Cumulative Effects Analysis.

3.14.2.2 Long-Term Impacts

Impacts Common to All Build Alternatives

The build alternatives would not increase the population of workers or residents within the study areas in such a way that would create an increased demand for public services. Therefore, impacts related to access interruption and increased public services demand during operation would not occur.

Increased demand for police services would not occur. Security measures for each alternative would be similar to other Sound Transit OMFs. Measures would include on-site security personnel, perimeter fencing, electronically controlled gates, and security patrol in the evenings, from 5 p.m. to 5 a.m., 7 days a week. Emergency access to the mainline tracks (as applicable) and OMF site for fire, emergency medical, and police personnel would be provided.

No long-term impacts on school bus and solid waste/recycling collection routes would occur under any of the build alternatives. OMF South operations would produce solid waste and recycling. Maintenance operations would also produce hazardous waste due to the use of lubricants, solvents, and the like. Both waste streams would be managed according to all applicable regulations and requirements.

Preferred Alternative

Construction and operation of the Preferred Alternative would require the full acquisition of the Christian Faith Center campus, which houses the Pacific Christian Academy. If the facility is relocated, some students would likely have to travel farther to school. If the school discontinues operations, the approximately 312 students would either need to enroll in another private school or enter the public school system. No parcels containing public service facilities would be acquired for the mainline and lead tracks, and the tracks are designed to be elevated above all roadway intersections.

This alternative would close 20th Avenue S from S 336th Street to S 341st Place. A new roadway would be constructed on the west side of the OMF site that would extend 18th Place S to S 336th Street. It is expected that emergency vehicles would use the 18th Place S extension to access properties to the south of the site because they currently use 20th Avenue S. There would be no need for emergency services to change their operations. Therefore, there would be

no adverse effects on travel or response times for public service vehicles, including fire, emergency medical, and police.

South 344th Street Alternative

There would be no anticipated adverse impacts to public services associated with the South 344th Street Alternative. No parcels containing public service facilities would be acquired for the construction or operation of the mainline and lead tracks, and these components of the alternative are elevated above all roadway intersections. Therefore, there would be minimal effects on travel or response times for public service vehicles, including fire, emergency medical, and police.

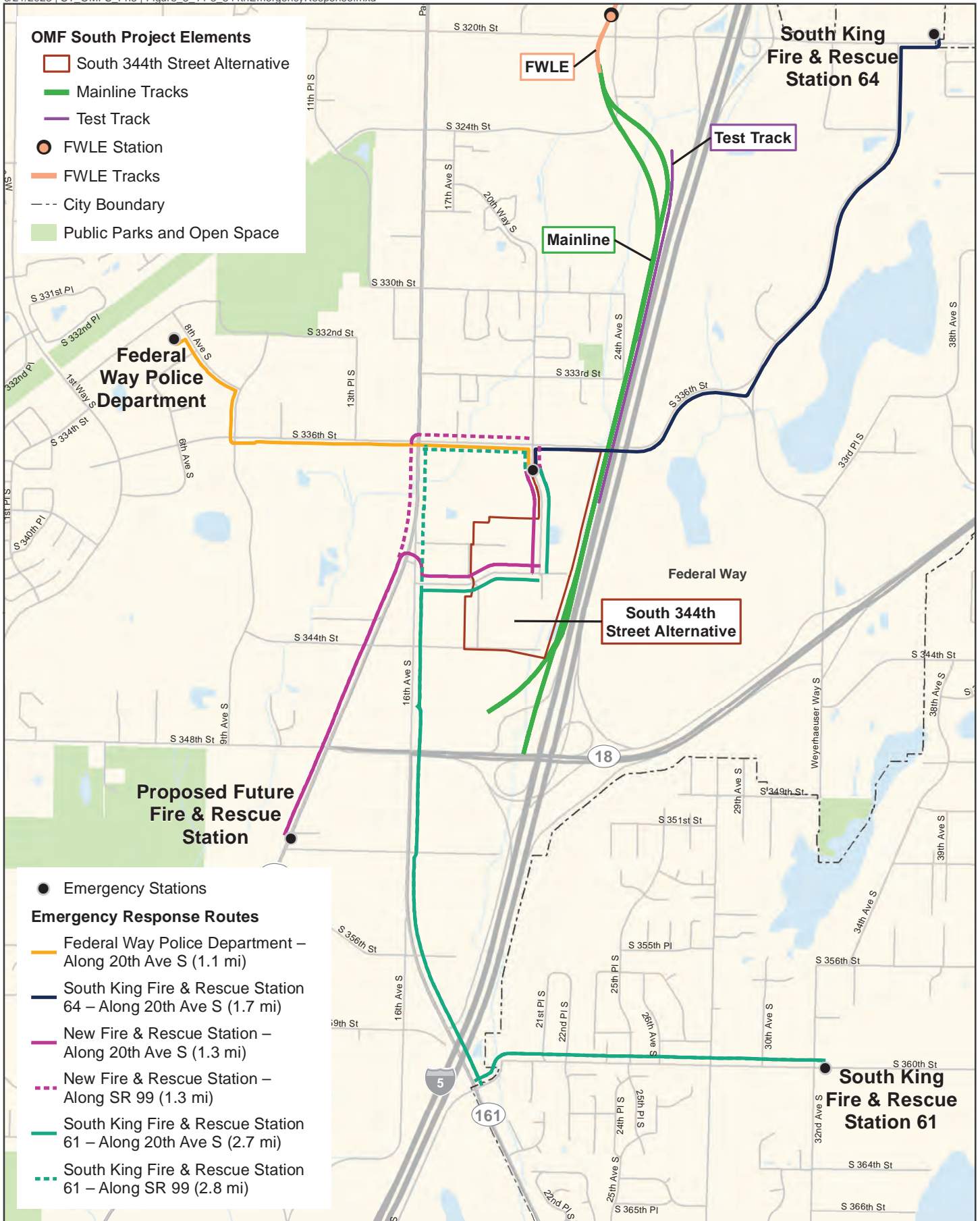
Approximately 19 acres of the Christian Faith Center's property east of 20th Avenue S would be acquired for the South 344th Street Alternative. Permanent acquisition would reduce parking and limit recreational opportunities on the campus. In addition, the presence of OMF South would be visible from portions of the school property, but at about 1,000 feet from the school building. This would not affect school uses or school operations.

This alternative would require the closure of 20th Avenue S starting 300 feet south of S 336th Street. Of all the properties that are currently served by 20th Avenue S, only the Christian Faith Center would remain after the construction of the South 344th Street Alternative. Because 20th Avenue S is used as an alternative route for by-passing traffic on SR 99, fire, police, and emergency response access would be changed.

Travel times were estimated for emergency service vehicles traveling from four emergency response origins to the Christian Faith Center property, as shown in Figure 3.14-3. The four emergency response origins include:

1. Federal Way Police Department, located near S 334th Street and 8th Avenue S
2. South King Fire and Rescue Station 64, located near S 320th Street and Military Road S
3. Proposed future Fire and Rescue Station, located near the new logistics building at 35100 Pacific Highway S
4. South King Fire and Rescue Station 61, located near S 360th Street and 32nd Avenue S

The Federal Way Police Department was used to represent travel from the northwest quadrant of the South 344th Street Alternative study area. The three fire and rescue stations represent travel from the northeast, southwest, and southeast quadrants of the South 344th Street Alternative study area.



Data Sources: Google Maps, King County; Cities of Des Moines, Federal Way, Kent (2019).

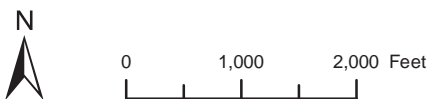


FIGURE 3.14-3
Emergency Response Routes
South 344th Street Alternative

Emergency response travel times were estimated between each of the four emergency response origin points and the Christian Faith Center property. For each emergency response origin point, travel times were estimated for a route along 20th Avenue S and a route along SR 99, as applicable. Emergency response travel times were calculated by estimating the time to travel along the roadway segments and the delay at signalized intersections. For both off-peak and peak periods, the time to travel along the roadway segments was estimated based on posted speed limit and length of the segment. For off-peak periods, it was assumed that emergency response vehicles would travel through without delay. For peak periods, it was assumed that emergency response vehicles would experience approximately 15 seconds of delay at each signalized intersection.

Table 3.14-1 summarizes the estimated emergency response travel times between the four emergency response origins and the Christian Faith Center property.

Table 3.14-1 Emergency Response Travel Times: South 344th Street Alternative

Emergency Response Route	Study Area Quadrant	Route Type	Route Length (miles)	Off Peak Period Travel Time (minutes)	Peak Period Travel Time (minutes)
Federal Way Police Department	NW	20th Ave S	1.1	1.9	2.9
		SR 99	N/A	N/A	N/A
South King Fire and Rescue Station 64	NE	20th Ave S	1.7	2.9	3.4
		SR 99	N/A	N/A	N/A
Proposed future South King Fire and Rescue Station	SW	20th Ave S	1.3	2.4	3.2
		SR 99	1.3	2.2	3.5
South King Fire and Rescue Station 61	SE	20th Ave S	2.7	4.9	6.4
		SR 99	2.8	4.8	7.0

Emergency vehicles traveling from the proposed future Fire and Rescue Station and South King Fire and Rescue Station 61 would be required to use the routes along SR 99 with the closure of 20th Avenue S. For the proposed future Fire and Rescue Station, using SR 99 instead of 20th Avenue S would decrease travel time by 0.2 minutes (12 seconds) during off-peak periods and increase travel time by 0.3 minutes (18 seconds) during peak periods. For the South King Fire and Rescue Station 61, using SR 99 instead of 20th Avenue S would decrease travel time by 0.1 minutes (6 seconds) during off-peak periods and increase travel time by 0.6 minutes (36 seconds) during peak periods.

Emergency vehicles traveling from the Federal Way Police Department and South King Fire and Rescue Station 64, both located north of the South 344th Street Alternative, would use the existing street network to access the Christian Faith Center property. Areas south of the South 344th Street Alternative are expected to be served by the proposed future Fire and Rescue Station and South King Fire and Rescue Station 61.

With suitable options for emergency access, the ability to shift first-response service boundaries, and a planned future fire station, South King Fire considers the closure of 20th Avenue S to have minimal impact on fire and emergency medical services (South King Fire 2020).

Federal Way reported that all parcels surrounding 20th Avenue S are served by their police department and expressed concern over the potential effects that the closure of 20th Avenue S could have on police response time. According to data provided by the city, Federal Way police

patrolled 20th Avenue S between S 336th Street and S 341st Place an average of two to three times per day from March through September 2022 (City of Federal Way 2023).

Because police officers are often traveling on patrol and not dispatching from a central location to respond to calls, it is not possible to accurately determine how the road closure would affect their response time. The majority of Federal Way is located west of the project site. With the South 344th Street Alternative located toward the eastern edge of the city limits, police patrol vehicles would likely be either north, south, or west of 20th Avenue S most of the day; thus, the closure would likely have very little impact on their response time to the area currently served by 20th Avenue S. Further, some of the businesses and residences served by 20th Avenue S would be acquired for the project, reducing the number of properties needing emergency services in the immediate area.

The closest hospital to the South 344th Street Alternative is St. Francis Hospital, at S 345th Street and 9th Avenue S. Because the hospital is southwest of the project site, emergency vehicle response times would not be affected by the closure of 20th Avenue S.

Midway Landfill Alternative

Impacts under the Midway Landfill Alternative would be the same as those discussed above under Impacts Common to All Build Alternatives. There would be no anticipated adverse impacts to public services.

3.14.2.3 Construction Impacts

Impacts Common to All Build Alternatives

Implementation of any of the build alternatives would temporarily affect the roadways in the study area and vicinity, resulting in short-term impacts on emergency services. Construction vehicles would temporarily increase traffic congestion. The Midway Landfill Alternative, with its relatively long construction schedule and large number of truck trips, would potentially have the largest effect on emergency service response times and public service delivery. Sound Transit would coordinate with potentially affected public service providers before and during construction to minimize delays in emergency response times and disturbance to school bus and solid waste collection routes.

3.14.2.4 Avoidance and Minimization of Impacts

The OMF South alternatives would be designed within a framework of standards that address emergency, safety, and security at each facility. Operations at OMF South would be performed in accordance with a facility operations plan that would ensure safety and security at the site. Sound Transit would also work with the local jurisdictions to develop an emergency response, safety, and security plan.

As discussed in Section 3.2, Transportation, construction-related traffic impacts would be addressed with implementation of a construction transportation management plan prepared through coordination with the affected jurisdiction prior to construction. Sound Transit would coordinate with potentially affected public service providers before and during construction to minimize delays in emergency response times and minimize disturbance to school bus and solid waste collection routes.

For the South 344th Street Alternative, due to the closure of 20th Avenue S, police and fire services would likely use SR 99 to access areas north and south of the OMF site. The use of

SR 99 as an alternate route would not substantially affect response times. Sound Transit would work with Federal Way during final design to develop measures to address this concern, which could include constructing a new roadway connection between S 336th Street and S 341st Place.

3.14.2.5 Indirect Impacts

The OMF South build alternatives could have indirect impacts to their respective study areas, including changes in development patterns which could affect the need for public services. Section 3.4, Land Use, contains a more detailed description of direct and indirect land use changes in addition to development potential consistent with local and regional policies and plans.

3.14.3 Mitigation Measures

No mitigation is anticipated for impacts to public services as a result of construction or operation of OMF South. Section 3.3, Acquisitions, Displacements, and Relocations, provides details regarding acquisition and relocation assistance for property owners and businesses, including those that provide public services.

3.15 Utilities, Energy, and Electromagnetic Fields

Utilities

The study area for the utility analysis is the area in the construction limits of the build alternatives. Information on relocated or protected utility lines was compiled from several sources, including GIS data from Sound Transit, Federal Way, and Kent; utility maps; and as-built drawings obtained from private and public utility companies. A field survey was also completed to confirm and map many of the utilities for the Preferred and South 344th Street alternatives.

Sound Transit inventoried major utility lines to identify potential conflicts that might require utility relocation. Major utilities were defined as:

- Water mains of 16-inch diameter or greater
- Stormwater drains and sanitary sewers of 36-inch diameter or greater
- Sanitary sewer force mains of 24-inch diameter or greater
- 115 kilovolt (kV) and greater electrical transmission lines
- High-pressure gas mains of any diameter
- Intermediate-pressure gas lines with an 8-inch diameter or greater
- Telephone and fiber-optic duct banks with three or more conduits
- Petroleum product pipelines

Utilities within the study area are regulated by Federal Way and Kent, as well as Lakehaven Water and Sewer, Highline Water, and Midway Sewer districts.

Energy

The study area for the energy analysis is the area in the construction limits of the build alternatives. The energy analysis evaluated operational energy used by the build alternatives and the demand on energy supply and energy consumption during construction.

Many federal, state, and local plans and policies identify goals for the efficient use of energy. Sound Transit's Sustainability Plan commits Sound Transit to integrating efficient operating practices at existing and new facilities, using energy-saving equipment to reduce energy demand, and maximizing intermodal transit connections to reduce automobile travel (Sound Transit 2019d). It includes goals focused on sustainable building and infrastructure and opportunities for transit-oriented development.

Electromagnetic Fields

The electromagnetic field (EMF) study area is the area immediately adjacent (300 feet) to the construction limits of the build alternatives. The EMF analysis discusses potential for electromagnetic fields from the build alternatives to interfere with the operation and function of sensitive equipment. Facilities with equipment potentially sensitive to electromagnetic interference were identified in the study area using a review of existing facilities, buildings, and land uses.

Electromagnetic fields are created by the generation, transmission, distribution, and use of electricity. Electromagnetic fields surround all electrical equipment, appliances, and facilities,

including light rail trains. Additionally, metal objects, such as trucks and buses, move through the earth’s static magnetic field creating electromagnetic fields. Electromagnetic fields can result in electromagnetic interference, which can cause disruption and possibly malfunction in sensitive equipment, such as magnetic resonance imaging (MRI) equipment, electron microscopes, mass spectrometers, and magnetic devices such as heart pacemakers.

In certain situations, with sufficiently high exposure, EMFs can affect human health by causing, for example, shocks or burns when objects that conduct electricity are touched. The World Health Organization, however, has concluded that “current evidence does not confirm the existence of any health consequences from exposure to low level electromagnetic fields” (World Health Organization 2019). The impact discussion, therefore, focuses on the potential interference with sensitive equipment as well as the potential impact of stray currents.

In electrical systems such as Sound Transit’s Link light rail system, current can flow from the system into nearby ground or concrete structures, resulting in “stray current.” Stray currents can occur when part of an electric current finds an alternative conducting path, such as metal, water, or a buried pipe or cable. Over time, a stray current can cause corrosion, which in turn can cause pipes to leak or wires to break.

3.15.1 Affected Environment

3.15.1.1 Utilities

Utility providers include municipal agencies, public utility districts, and private franchise utility companies. Table 3.15-1 summarizes the utility providers in the study area.

Table 3.15-1 Utility Providers in Study Area

Utility	Provider
Preferred and South 344th Street Alternatives	
Gas	Puget Sound Energy
Electricity	Puget Sound Energy
Water, Sewer	Lakehaven Water and Sewer District
Stormwater	Federal Way Public Works
Cable	Comcast
Communications	Lumen, Zayo, Verizon/MCI
Midway Landfill Alternative	
Gas	Puget Sound Energy
Electricity	Puget Sound Energy
Water	Highline Water District
Sewer	Midway Sewer District
Stormwater	Kent Public Works
Cable	Comcast
Communications	Lumen, Zayo

3.15.1.2 Energy

In 2019, Washington consumed 2,076 trillion British thermal units (Btu) of energy. Transportation accounts for 32 percent of energy consumption in Washington, followed by the industrial (26 percent), residential (24 percent), and commercial sectors (18 percent) (EIA 2022).

Per capita energy consumption, in general, is declining due to improvements in energy efficiency and design as well as the decline in industrial energy consumption (Washington State Department of Commerce 2018). Despite this reduction in per capita energy use, the state’s overall energy consumption is expected to increase over the next several decades due to growth in population, jobs, and demand for vehicle travel (Washington State Department of Commerce 2020). However, meeting the state’s GHG emission limits may result in lower overall energy demand by increasing energy efficiency and electrification to replace GHG-emitting fuels (Washington State Department of Commerce 2020a). Increased demand for energy is closely tied to energy prices; if prices remain high, the growth in energy demand may be moderated by consumers who purchase fuel-efficient vehicles or change personal consumption habits (Washington State Department of Commerce 2018).

Puget Sound Energy (PSE) provides both power and natural gas to the study area. Table 3.15-2 lists the number of customers and sales by energy type for PSE’s service area, which is approximately 6,000 square miles (PSE 2022).

Table 3.15-2 2019 Utility Data for Puget Sound Energy

Utility Data	Electricity	Natural Gas
Number of Customers	1,173,909	841,197
Energy Sales	20,014,275 MWh	95,104 billion Btu ¹

Sources: PSE 2019a, 2020

Note:

(1) Reported by PSE (2019) as 951,042,707 therms and converted using the relationship 10 therms = 1 million British thermal units (Btu).

In addition to its own generation sources, PSE purchases additional energy through short-, medium-, and long-term contracts with other energy producers and suppliers. In 2019, coal represented 32 percent of PSE’s electricity fuel mix, followed by natural gas (28 percent), hydropower (17 percent), unspecified (13 percent), wind (8 percent), nuclear (< 1 percent), and other (< 1 percent) (Washington State Department of Commerce 2020b). However, as stated in Section 3.8, Air Quality and Greenhouse Gas Emissions, Sound Transit and PSE have entered into an agreement that all electricity accounts related to the operations of Link light rail be sourced solely from renewable wind power via PSE’s Green Direct program.

Natural gas is purchased by PSE for both electricity generation and delivery to customers. Future increases in electricity and natural gas sales are expected in the Puget Sound region. PSE’s 2019 base forecast for the next 20 years includes a 1.4 percent average annual growth rate for electricity and a 0.7 percent rate for natural gas (PSE 2019b).

3.15.1.3 Electromagnetic Fields

Communities in the study area are served by a combination of overhead and buried electric distribution lines providing power to the existing commercial, industrial, and residential uses in the areas. There are also BPA 500 and 230 kV high-voltage transmission lines located just south of The Commons at Federal Way shopping mall.

All electrical equipment and electronic devices generate EMFs. The widespread use of electricity in homes and businesses means that EMFs are present almost everywhere. Electric fields in the home, on average, range from 0 to 10 volts per meter, and electric fields directly beneath power lines may vary from a few volts per meter for some overhead distribution lines to several thousand volts per meter for extra-high-voltage power lines (NIEHS and NIH 2002).

Sound Transit did not identify any EMF-sensitive facilities, buildings, or land uses within the study areas of the build alternatives.

3.15.2 Environmental Impacts

3.15.2.1 No-Build Alternative

Under the No-Build Alternative, impacts to utilities and energy and from construction or operation of OMF South would not occur. However, other planned projects would have impacts in the OMF South study areas. FWLE required utility relocations in the Midway study area, but additional electrical system capacity was not required. Additionally, there were no EMF impacts from the construction of FWLE. Other planned projects could require utility relocation, depending on their design. This includes TDLE, which overlaps with the OMF South Preferred and South 344th Street alternatives. If TDLE is constructed as proposed, the mainline track associated with these OMF alternatives would be built later in time. Impacts associated with construction of the mainline track are addressed within the build alternatives impacts discussion below. All other TDLE-related impacts are addressed in Chapter 4, Cumulative Effects Analysis.

3.15.2.2 Long-Term Impacts

Impacts Common to All Build Alternatives

Utilities

Operation of OMF South would result in a negligible increased demand for natural gas and for cable and communications systems.

Each build alternative would include an on-site traction power substation to power the LRVs for movement around the yard and transporting them back to the mainline tracks. The daily power demand for tools and machinery in the vehicle maintenance shops, along with the storage yard lighting and other on-site electricity needs, would be supplied from the site's power service feed off the main local grid. The on-site traction power substation would be powered by 12.5 kV electric lines connecting to the nearest power pole. Increased electricity demand at OMF South may require additional distribution lines to be constructed and maintained by PSE. The Energy discussion below contains more information.

For each of the build alternatives, water demand would increase slightly, most of it for LRV washing. A high percentage of this wash water would be recycled on site. The additional water demand would not greatly affect the water providers' existing and projected water supplies and would not likely compromise flow for fire protection. Water demand would be coordinated with fire departments and water suppliers to avoid impacts. The OMF South drainage system would be designed to filter and recycle a high percentage of the wash and rinse water. Solids, oils, soaps, and other contaminants would be filtered, settled into a sludge tank, and periodically removed for disposal in accordance with applicable regulations.

Some disposal to the local sanitary sewer system would be expected from the recycled, filtered wash water. The water discharged to the sanitary sewer system would be disposed in accordance with local and state regulations. For each of the build alternatives, existing sewer

lines on adjacent streets are available for sewer connections. Nonrecycled vehicle wash water disposal volumes would be compared with conveyance capacity of the existing system. On-site filtering and recycling capacity would be developed in more detail during the final design to ensure compatibility with the existing system.

Any required stormwater detention facilities and infrastructure to collect storm and wastewater would connect to both the existing sewer system and the stormwater conveyances. Operational impacts on stormwater are discussed in Section 3.11, Water Resources.

Energy

Table 3.15-3 shows the estimated aggregate annual operational and maintenance energy consumption for the build alternatives.

Table 3.15-3 Estimated Aggregate Annual Operational and Maintenance Energy Consumption for OMF South Build Alternatives

Alternative	Estimated Aggregate Annual Energy Consumption (million Btus)	Megawatt hours
Preferred	16,235	4,758
South 344th Street	16,249	4,762
Midway Landfill	16,139	4,730

OMF South operations would increase energy consumption equivalent to the requirement for up to 211 homes for the Preferred and South 344th Street alternatives and up to 209 homes for the Midway Landfill Alternative. Given that these increases represent a small fraction of PSE’s total energy resources (less than 0.03 percent of PSE’s annual sales of more than 20.0 million megawatt hours), the utility should have sufficient capacity and energy resources to accommodate the increases.

EMF

There are no properties with sensitive equipment in the study area, so no long-term EMF impacts on sensitive equipment are expected from any of the build alternatives.

The build alternatives would increase EMF levels from existing conditions due to the increase of EMF-generating sources, including the LRVs; overhead catenary wires used to provide power to the mainline, test tracks, and tracks within the OMF site; equipment to operate the facility and maintain the LRVs; and an on-site traction power substation facility.

Stray currents could result if electrical current traveling through the LRVs or overhead wires were to jump to nearby cables that are buried in the ground. Control measures preventing stray currents would be developed by Sound Transit, if necessary, in coordination with the operators of electric and other utility lines.

The build alternatives would not result in any health impacts on facility employees, visitors, or the surrounding public. Even when drawing full power, data from similar rail systems show that light rail operation is unlikely to generate health impacts for people along the tracks from EMF exposure (Sound Transit 2016). The ranges of EMF exposure to track maintenance workers and train operators are below the guidelines established by the International Commission on Non-Ionizing Radiation Protection. Because maintenance workers and operators would be in the immediate vicinity of electrical equipment generating EMFs, the EMF exposure to the public in surrounding land uses from the build alternative sites would be lower than train-worker exposure.

The magnetic field from light rail operations on the mainline and test tracks would not exceed 10 gauss, which is a unit of magnetic induction that measures the intensity of a magnetic field. This level is less than 1/100th of the exposure considered safe for human health by the Institute of Electrical and Electronics Engineers (2019).

Preferred Alternative

Utilities

In addition to the on-site traction power substation described above under Impacts Common to All Alternatives, the Preferred Alternative would require an additional traction power substation to power the mainline tracks. Like the on-site traction power substation, it would be powered by 12.5 kV electric lines connecting to the nearest power pole. Increased electricity demand at this traction power substation site may require additional distribution lines to be constructed and maintained by PSE.

To accommodate the mainline tracks, BPA's existing 500 and 230 kV high-voltage transmissions lines that are just south of The Commons in Federal Way would be modified to avoid potential effects on light rail operations. These modifications would include the installation of new towers to raise and shift the lines.

Energy

Operational impacts on energy resulting from the Preferred Alternative would be the same as those discussed above under Impacts Common to All Build Alternatives.

EMF

Operational impacts from EMF for the OMF site are the same as those described previously under Impacts Common to All Build Alternatives.

As noted above, the BPA 500 and 230 kV high-voltage transmission lines just south of The Commons in Federal Way would be modified. These modifications would include installation of new towers to raise and shift the location of each line. Both electric and magnetic field levels are expected to be well below threshold limits at the approximate edge of the BPA right-of-way for the modified portion.

LRVs approaching the OMF on the mainline tracks or running on the test track under the Preferred Alternative could be traveling up to the maximum operating speed of 55 mph. A report prepared by LTK Engineering Services (2006) describes extensive measurements and magnetic field modeling performed for the North Link line in Sound Transit's Link light rail system to evaluate magnetic fields that could be produced by operation of four-car trains. Even with the higher speeds, EMF levels expected within and adjacent to the LRVs along the mainline or test tracks would be considerably lower than exposure guidelines. It is important to note that, because these trains are moving, the resulting magnetic fields are transient in nature, typically lasting from a fraction of a second to a few seconds.

South 344th Street Alternative

Utilities

Operational impacts to utilities are the same as those described under Impacts Common to All Build Alternatives and the Preferred Alternative.

Energy

Operational impacts on energy resulting from the South 344th Street Alternative would be the same as those discussed above under Impacts Common to All Build Alternatives.

EMF

Operational impacts from EMF are the same as those described previously under Impacts Common to All Build Alternatives and the Preferred Alternative.

Midway Landfill Alternative

Long-term impacts to utilities, energy, and EMF from the Midway Landfill Alternative would be the same as those discussed above under Impacts Common to All Build Alternatives.

3.15.2.3 Construction Impacts

Impacts Common to All Build Alternatives

Utilities

Potential construction impacts common to all build alternatives would include:

- Relocating utility poles that support overhead lines; relocating aerial utility lines to taller or different types of poles (including the BPA 500 and 230 kV high-voltage transmission lines for the Preferred and South 344th Street alternatives); constructing new distribution lines to provide power to substations
- Relocating underground utilities out from under future OMF South site facilities
- Inspecting, repairing, and encasing underground utilities at yard track crossings

The effect on utilities is dependent on their depth and material as well as excavation and fill limits of the build alternative sites. Underground utilities would be relocated or protected to allow for excavation and/or fill and to minimize load impacts on existing utilities from the weight of the LRVs and building foundations.

Disruptions to service during utility relocations would be minimal, as temporary connections to customers would typically be established before starting relocation. Inadvertent damage to underground utilities could occur during construction if utility locations are uncertain or misidentified. Such accidents could temporarily affect service to the utilities' customers. Preconstruction surveys, and outreach measures to inform customers of potential disruptions would be used to minimize these impacts.

Construction of distribution systems within the site boundaries for electric, natural gas, water, communications, sanitary sewer, and stormwater would be achieved through relocation and reuse of existing systems as well as installation of new systems. Specific requirements for the on-site distribution systems would be determined during final design.

Table 3.15-4 summarizes the potential impacts to utilities from construction of OMF South for each build alternative. Utilities designated as "relocated" would need to be replaced to maintain the current level of service. "Removed" utilities are ones that could possibly be removed but may not need to be replaced due to the change in land use or required service. "Protected" utilities could be left in place and not affected by construction.

The full extent of utility relocations would be determined during final design. Relocations may require work outside the proposed project limits to complete connections back to existing systems and maintain levels of service as required for a successful utility relocation.

Table 3.15-4 Summary of Utility Impacts for OMF South Build Alternatives

Utility Type	Preferred Alternative	South 344th Street Alternative	Midway Landfill Alternative
Water Main Distribution	5,150 feet relocated 3,360 feet removed	5,450 feet relocated 3,930 feet removed	None
Sanitary Sewer Conveyance	2,376 feet relocated 200 feet removed	4,980 feet relocated 1,060 feet removed	None
Stormwater Collection	14,866 feet relocated 260 feet removed	14,570 feet relocated 1,800 feet removed	None
Electricity	3,450 feet of underground electrical relocated 2,000 feet of underground electrical removed 560 feet of overhead electrical removed	2,420 feet of underground electrical relocated 1,560 feet of underground electrical removed 2,140 feet of overhead electrical relocated 520 feet of overhead electrical removed	None
Natural Gas	2,100 feet relocated	3,290 feet relocated 390 feet removed	None
Cable/Telecommunications	1,950 feet of underground telecom protected ¹ 3,880 feet of underground telecom relocated 560 feet of overhead telecom relocated 4,710 feet of underground telecom removed	9,440 feet of underground telecom relocated 1,720 feet of underground telecom removed 4,240 feet of overhead telecom relocated 370 feet of overhead telecom removed	None
Petroleum/Fuel	None	None	None
Other Utilities	None	None	Up to 15,740 feet of the landfill gas extraction system removed and replaced ²

Notes: All lengths are approximate and will be determined during final design.

- (1) Existing telecom ducts can likely be protected in place but may need to be relocated, depending on construction means and methods.
- (2) Existing waste produced gaseous ventilation system; length of system modification depends on the subsurface construction design option.

Energy

Energy-related impacts during construction of the OMF South would be short term in nature and are not anticipated to be adverse. During project construction, energy would be consumed when construction materials are produced and transported to the project construction site. Operating and maintaining construction equipment would also consume energy. Table 3.15-5 summarizes estimated total energy consumption (i.e., construction equipment fuel consumption; material and fuel extraction, production, and transport; and soil import/export) associated with construction of the build alternatives. Total energy consumption estimates were calculated based on amortized construction GHG emission estimates. See Section 3.8, Air Quality and Greenhouse Gas Emissions, for details.

Table 3.15-5 Total Construction-Related Energy Consumption

Build Alternative	Gallons of Diesel Fuel ¹	Million Btu ²
Preferred Alternative		
OMF Site	6,196,714	851,311
Mainline	556,115	76,400
Total	6,752,829	927,710
South 344th Street Alternative		
OMF Site	6,271,193	861,543
Mainline	665,352	91,407
Total	6,936,545	952,950
Midway Landfill Alternative		
Platform	7,308,944	1,004,110
Hybrid	9,295,070	1,276,966
Full Excavation	9,652,573	1,326,080

Notes:

- (1) Upstream, downstream, and haul truck GHG emissions from the air quality analysis (Table 3.8-4) were used to estimate energy consumption.
- (2) 1 U.S. gallon of diesel fuel = 137,381 Btu (EIA 2019).

EMF

During construction, EMFs would be generated by equipment use and movement of construction vehicles. However, EMFs would not be substantially higher than those generated at a typical construction site. Additionally, because there are no facilities with EMF-sensitive equipment in the study area, no impacts from EMF are anticipated during construction.

Preferred Alternative

Utilities

This build alternative would require a portion of 24th Avenue S near its intersection with S 330th Street to be realigned and rebuilt to make room for the proposed mainline track alignment for either design option. The realignment of the road would have impacts on an existing 30-inch sewer main between the street and I-5 while also impacting the existing overhead electrical poles, wiring, and associated telecom lines along the east side of the street. For impacts of this magnitude, Federal Way requires existing overhead utilities to be converted to underground. The new mainline and test tracks would also have minor impacts on several other utilities along its proposed alignment until it reaches the OMF site. Table 3.15-6 summarizes those impacts

and provides additional information about the existing utilities that would potentially conflict with the mainline tracks.

Table 3.15-6 Preferred and South 344th Street Alternatives Mainline Utility Impacts Summary

Utility Type	Length	Utility Owner	Utility Size	Utility Material	Mainline Impact ¹	Relocate/Protect
Underground Electrical Distribution	Crossing	PSE	Unknown	PVC conduit	Column	R
Water Main	31	Lakehaven Water and Sewer District	16 inches	DI	Column	R
Sanitary Sewer Main	36	Lakehaven Water and Sewer District	12 inches	CI	Column	R
Sanitary Sewer Main	240	Lakehaven Water and Sewer District	30 inches	PVC	Column	R
Gas Main	31	PSE	2 inches	MDPE	Column	R
Underground Electrical Distribution	223	PSE	Unknown	PVC conduit	Column	R
Sanitary Sewer Main	Crossing	Lakehaven Water and Sewer District	8 inches	PVC	Column	R
Overhead Electrical Transmission	Crossing	BPA	500 kVA and 230 kVA	Wires	Mainline	R
Overhead Electrical Transmission	Crossing	BPA	230 kVA and 230 kVA	Wires	Mainline	R
Water Main	2,730	Lakehaven Water and Sewer District	2 inches	Poly	Test Track, Drainage Pond and Fill Walls	R
Sanitary Sewer Main	675	Lakehaven Water and Sewer District	Private	Unknown	Test Track and Fill Walls	R
Telecom Duct Bank	622	Lumen (formerly CenturyLink)	1 duct	PVC conduit	Test Track and Fill Walls	R
Underground Electrical Distribution	492	PSE	100 kVA	PVC conduit	Test Track and Fill Walls	R
Gas Main	482	PSE	2 inches	Steel	Test Track and Fill Walls	R
Underground Electrical Distribution	185	PSE	75 kVA	PVC conduit	Drainage Pond	R
Water Main	287	Lakehaven Water and Sewer District	2 inches	Poly	Drainage pond and Column	R
Telecom Duct Bank	2,123	Lumen	1 duct	PVC conduit	Test Track, Fill Walls & Drainage Pond	R
Water Main	Crossing	Lakehaven Water and Sewer District	2 inches	Poly	Test Track and Fill Walls	R
Telecom Duct Bank	1,027	Lumen	1 duct	PVC conduit	Drainage Pond	R
Gas Main	188	PSE	2 inches	Steel	Drainage Pond	R
Underground Electrical Distribution	265	PSE	50 kVA	PVC conduit	Drainage pond	R
Underground Electrical Distribution	290	PSE	50 kVA	PVC conduit	Drainage pond	R

Table 3.15-6 Preferred and South 344th Street Alternatives Mainline Utility Impacts Summary (continued)

Utility Type	Length	Utility Owner	Utility Size	Utility Material	Mainline Impact ¹	Relocate/Protect
Overhead Electrical Distribution	1,100	PSE	25 kVA	Wires	At grade	R
Overhead Telecom Lines	1,100	Lumen	1 aerial	Wires	At grade	R
Cell Tower	Crossing	Seattle SMSA LP	1 tower	N/A	Obstruction	R
Telecom Service ²	Crossing	Lumen	1 service	Buried	At grade	R
Sanitary Sewer Main	Crossing	Lakehaven Water and Sewer District	30 inches	Concrete	Retained fill	R
Water Main	Crossing	Lakehaven Water and Sewer District	6 inches	Cast iron	Retained fill	R
Overhead Telecom Lines	Crossing	Comcast	Aerial	Wires	Mainline	R
Overhead Electrical Distribution	Crossing	PSE	25 kVA	Wires	Mainline	R
Telecom Duct Bank	Crossing	Lumen	3 ducts	PVC conduit	Column	P
South 344th Street Alternative, Enchanted Parkway Tail Track Option						
Overhead Telecom Lines	Crossing	Comcast	Aerial	Wires	Mainline	R
Overhead Electrical Distribution	Crossing	PSE	25 kVA	Wires	Mainline	R
Telecom Duct Bank	Crossing	Lumen	3 ducts	PVC conduit	Column	P
Water Main	Crossing	Lakehaven Water and Sewer District	8 inches	DI	Column	R
Underground Electrical Distribution	Crossing	PSE	25 kVA	PVC conduit	Column	R
Gas Main	Crossing	PSE	2 inches	MDPE	Column	R
Telecom Duct Bank	Crossing	Comcast	unknown	PVC conduit	Column	R
South 344th Street Alternative, I-5 Tail Track Option						
Overhead Electrical Distribution	Crossing	PSE	25 kVA	Wires	Mainline	R
Overhead Telecom Distribution	Crossing	Comcast	Aerial	Wires	Mainline	R
Telecom Duct Bank	Crossing	Lumen	3 ducts	PVC conduit	Column	P

Notes: All lengths are approximate; CI = cast iron; DI = ductile iron; kVA = kilovolt-amp; MDPE = medium-density polyethylene; Poly = polyethylene; PVC = polyvinyl chloride; R = Relocate, P = Protect.

- (1) If neither the Preferred nor the South 344th Street alternative is selected, the mainline could be built later in time if TDLE is constructed as proposed. TDLE is currently under environmental review.
- (2) Existing service to a building that would be demolished for project; new service/replacement is not anticipated due to building removal.

The mainline tracks would also intersect with the location of the existing BPA electrical transmission corridor and would have to cross under the existing lines. This intersection creates a vertical conflict between the proposed mainline tracks and the existing power line elevations. The transmission lines would need to be raised by approximately 50 feet. BPA has determined that the existing towers are unable to accommodate this change and four new towers are needed. Sound Transit and BPA are working together to address this conflict. BPA estimates the work would take two construction seasons and would require planned power interruptions to allow crews to safely make improvements to the lines. BPA would work with the local utility to select a time with as minimal an impact on the community as possible (BPA 2023).

The mainline tracks would be located near an existing cell tower adjacent to I-5, 24th Avenue S, and Oakland Hills Boulevard. The completed mainline tracks could block or interfere with cell tower transmission waves, which would cause a service disruption. The tower would likely be relocated to available open property further to the west of the project rather than next to I-5.

Energy

As shown in Table 3.15-5, the Preferred Alternative is anticipated to have similar level of fuel consumption relative to all the build alternatives.

EMF

Construction impacts from EMF for this alternative are the same as those described previously under Construction Impacts Common to All Build Alternatives.

South 344th Street Alternative

Utilities

Potential impacts related to construction of the mainline tracks would be the same as those described above for the Preferred Alternative.

Both the Enchanted Parkway and the I-5 mainline tail track alignments would impact electrical utilities. At the end of S 344th Street on the east side of I-5, overhead distribution electrical power and telecom lines are in vertical conflict with the tracks. Taller poles would be necessary to raise the lines clear of the elevated mainline tracks.

Energy

As shown in Table 3.15-5, the South 344th Street Alternative is anticipated to result in a similar level of fuel consumption relative to all the build alternatives.

EMF

Construction impacts from EMF for this alternative are the same as those described previously under Construction Impacts Common to All Build Alternatives.

Midway Landfill Alternative

Utilities

No conflicts associated with natural gas were identified for the Midway Landfill Alternative site. New gas distribution piping would be constructed within the site boundary to service the OMF South buildings.

The Midway Landfill has approximately 15,740 feet of 6-inch-diameter PVC pipe in a landfill gas ventilation piping system. Located underneath the landfill cap, the system is designed to capture methane and other decay gases that are produced as the buried waste breaks down. After the gas is collected, it is mixed with natural gas to allow combustion and then flared off at an on-site facility. If the Midway Landfill Alternative is selected, this system would be modified or removed. Depending on the subsurface construction design option, the site preparation work would remove some or all of the landfill. Replacement or upgrade of the landfill gas extraction system and the continuation of the landfill gas monitoring system would be required for the Platform and Hybrid subsurface construction design options and may be required for the Full Excavation option.

No conflicts associated with underground or overhead electrical infrastructure, water main piping, sanitary sewer piping, storm drain piping, or telecommunication infrastructure were identified for the Midway Landfill Alternative. New piping and infrastructure for these utilities would be constructed within the site boundary to service the OMF South buildings.

Energy

As shown in Table 3.15-5, the subsurface construction design options associated with the Midway Landfill Alternative are anticipated to result in higher levels of fuel consumption relative to the other build alternatives.

EMF

Construction impacts from EMF for this alternative are the same as those described previously under Construction Impacts Common to All Build Alternatives.

3.15.2.4 Avoidance and Minimization of Impacts

Sound Transit used several design measures to avoid and minimize potential utility impacts. For example, where feasible, columns for elevated mainline tracks would be placed to avoid impacts to underground utilities. Sound Transit would also design the mainline tracks to maintain access to utilities for maintenance and repair per the utility owner's requirements. In some cases, that would require Sound Transit to relocate sewer manholes, pipes, vaults, or other access points as part of mainline track construction. Sound Transit would work closely with utility providers to maintain required access to these utilities and any relocated sewer manholes and vaults, utility mains, fire hydrants, and other features. To minimize potential impacts due to service disruptions during construction, Sound Transit would perform preconstruction surveys to identify utility locations as well as communicate with customers to inform them of planned or potential service disruptions.

To avoid or minimize potential corrosion impacts, Sound Transit would coordinate with utility providers during final design to identify appropriate control measures. Typical design measures include:

- Installing cathodic protection systems
- Installing insulating unions to break the electrical conductivity of the utility
- Isolating electrical rails from the ground
- Installing stray-current-control track fastening systems, where appropriate

To avoid or minimize consumption and demand on utilities, such as energy and water, Sound Transit would integrate efficient operating practices at existing and new facilities that require the use of energy- and water-saving equipment and related design strategies.

Sound Transit's commitment to sustainability practices includes minimizing GHG emissions, which could be achieved by conserving energy during construction. Such measures could include, but would not be limited to, conserving fuel through reductions in construction vehicle idling, setting minimum EPA-tier requirements for construction vehicles, and providing for pre-demolition extraction of salvageable, reusable, and recyclable materials. Sound Transit would confirm which sustainability measures are feasible during final design and work with the contractor to implement them during construction.

3.15.2.5 Indirect Impacts

No indirect impacts related to utilities, energy, and EMF would result from construction and operation of the proposed project.

3.15.3 Mitigation Measures

With planning and coordination with utility owners, none of the build alternatives would result in adverse impacts to utilities. There would be no impacts to energy resources or EMFs. As a result, no mitigation is anticipated.

3.16 Historic and Archaeological Resources

This section analyzes potential impacts associated with the OMF South project alternatives to built-environment resources and archaeological resources that are eligible for or listed in local, state, or national historic preservation registers. Historic-period, built-environment resources are buildings, structures, and objects that meet the minimum age criteria for consideration under a particular local, state, or national register. Archaeological resources are locations including objects that are in disuse and can be attributed to past human activities and that meet the minimum age criteria for consideration under particular local, state, or national guidelines and regulations. Collectively, historic-period, built-environment resources and archaeological resources that are listed in or eligible for the National Register of Historic Places (NRHP) are referred to as “historic properties.”⁵

Within the area of potential effect (APE) for the OMF South alternatives, project archaeologists conducted archaeological assessment and inventory, including surface and subsurface survey. The APE defined by FTA for OMF South is the same as the area of impacts identified by Sound Transit for the 2021 SEPA Draft EIS. The surface and subsurface survey for the 2021 SEPA Draft EIS identified two additional archaeological sites and one additional archaeological isolate within the APE in addition to the two previously documented archaeological resources.

Project architectural historians also conducted built-environment survey and inventory. Resources that were constructed in 1985 or earlier were considered historic-period built environment resources for the purposes of this analysis and included in the built-environment survey and inventory, as they would be 40 years old by the construction start date of 2025 and meet the age criteria for listing in the King County Register of Historic Places (KCRHP), though not for the WHR or NRHP. For the 2021 SEPA Draft EIS, Sound Transit evaluated 86 historic-period built environment resources for NRHP eligibility and coordinated with staff from the Washington State Department of Archaeology and Historic Preservation (DAHP) to assess NRHP eligibility of the built environment resources. Through this coordination it was determined that none of the resources evaluated by Sound Transit were eligible for listing in the NRHP.

The only built resources within the APE previously determined eligible or listed in the NRHP were the Tacoma-Covington No. 2, 3, and 4 and Tacoma-Raver No. 1 transmission lines. Under a separate evaluation, BPA determined that the OMF South project would have no adverse effect to the transmission lines, a finding with which the State Historic Preservation Office (SHPO) has concurred.

For the 2021 SEPA Draft EIS, Sound Transit coordinated with DAHP and Tribes in a fashion similar to a Section 106 consultation. No comments were received from Tribes that were coordinated with under SEPA. Sound Transit and DAHP staff worked closely to establish NRHP eligibility of archaeological and built environment resources for the 2021 SEPA Draft EIS. Sound Transit distributed the OMF South Cultural Resources Survey and Testing Methodology plan for review by Tribes and DAHP on January 13, 2020. The 2021 SEPA Draft EIS was distributed to Tribes and DAHP on March 5, 2021, via email. This transmittal included leadership at Tribes as well as technical staff.

On July 20, 2023, FTA initiated Section 106 consultation and requested comments on the APE in letters to the Muckleshoot Indian Tribe, Nisqually Indian Tribe, Puyallup Tribe of the Puyallup

⁵ Historic built-environment properties are differentiated from historic-period, built-environment resources, the former being eligible for the NRHP (and/or other historic registers) while the latter term is used to refer solely to those buildings, structures, and objects that meet minimum age criteria for historic register consideration.

Reservation, Snoqualmie Indian Tribe, Suquamish Indian Tribe of the Port Madison Reservation, Squaxin Island Tribe of the Squaxin Island Reservation, Confederated Tribes and Bands of the Yakama Nation, and SHPO. SHPO concurred with the APE on July 24, 2023. In October 2023, FTA determined, and SHPO concurred, that the project would have no adverse effect on resources listed on or eligible for the NRHP.

Appendix G4, Historic and Archaeological Resources Technical Report, contains additional information about state and local regulations affecting historic properties and describes in more detail the environmental and cultural context of the OMF South study area and the resources inventoried as part of the archaeological and historic-period, built-environment surveys.

3.16.1 Regulatory Context

The two main federal laws pertaining to archaeological and built-environment resources are the National Historic Preservation Act (NHPA; 54 U.S.C. § 300101 et seq.) and NEPA. Section 106 of the NHPA requires federal agencies to identify historic properties within the APE and to consider a project's potential effects on those historic properties. Implementing regulations for Section 106 compliance are found in 36 CFR § 800. The APE is defined as "the geographic area or areas within which an undertaking may directly or indirectly cause alterations in the character or use of historic properties" (36 CFR § 800.16(d)). Historic properties are defined as "any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion in, the National Register of Historic Places maintained by the Secretary of the Interior" and can also include traditional cultural properties (36 CFR § 800.16(l)(1)). Under Section 106 of the NHPA, historic properties (those listed or eligible for listing in the NRHP) are identified and evaluated by the lead federal agency in consultation with Tribes with jurisdiction or interest, SHPO at the Washington State Department of Archaeology and Historic Preservation (DAHP), local jurisdictions, and other consulting parties, as appropriate. Archaeological and built-environment resources must also be given consideration under NEPA. In NEPA, "cultural resources" encompass a wide range of resources including, but not limited to, sacred sites, archaeological and built-environment resources not eligible for the NRHP, archaeological and built-environment resources eligible for the NRHP, and archaeological collections (CEQ and ACHP 2013:4). In addition, for U.S. Department of Transportation (including FTA) projects, Section 4(f) of the U.S. Department of Transportation Act includes protections for historic sites that are NRHP-eligible properties.

Applicable state laws and authorities include SEPA and regulations relating to archaeological and built-environment resources guiding the Washington Heritage Register (WHR) program administered by DAHP. Under state law, RCW 27.53, Archaeological Sites and Resources, any alteration to an archaeological site requires a permit from DAHP. State law, RCW 27.44 Indian Graves and Records, also protects Native American burial sites.

In addition to federal and state laws, ordinances and regulations are in place at county and municipal levels. King County has a designated Historic Preservation Program under the guidance of a landmarks commission. Kent and Federal Way have joined these programs and adopted appropriate ordinances and regulations for their jurisdictions. Each of these programs has individual guidelines and criteria that are discussed in Appendix G4, Historical and Archaeological Resources Technical Report.

3.16.2 Affected Environment

The APE includes all project elements and areas extending from the project elements (e.g., the OMF site and mainline, lead, and tail tracks) to the nearest parcel, or a maximum distance of 200 feet where large tax parcels are adjacent to project elements. The Preferred and South 344th Street alternatives include up to approximately 1.8 miles of new mainline tracks that would connect either of the sites to the Federal Way Link Extension terminus at the Federal Way Downtown Station. Figure 3.16-1 shows the APE for the three build alternatives. The depth of anticipated impacts has not been finalized but is expected to range from near-surface impacts to up to 180 feet below ground surface, depending on the alternative.

The study area used for the background and literature review was a 1-mile radius centered on each of the alignments included in the APE. A file search of the DAHP Washington Information System for Architectural and Archaeological Records Data (WISAARD) along with Government Land Office records and maps, ethnographic reports, historical maps, and aerial photographs were used to evaluate the archaeological sensitivity within the APE.

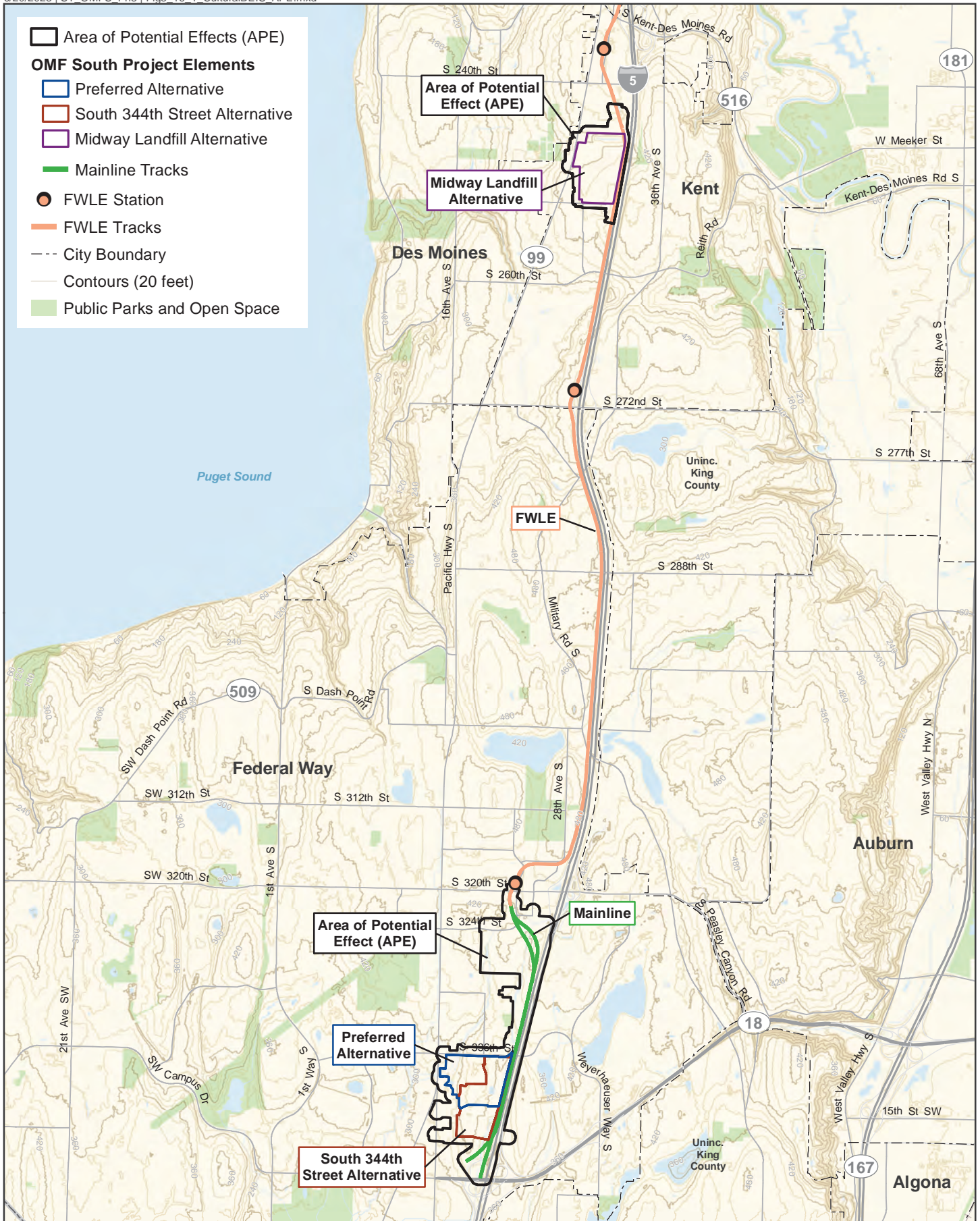
Fourteen previous cultural resource investigations have been undertaken within the 1-mile study area encompassing the Preferred Alternative, 15 previous investigations have been undertaken within the 1-mile study area encompassing the South 344th Street Alternative, and 14 previous investigations have been undertaken within the 1-mile study area of the Midway Landfill Alternative. No previously documented precontact archaeological sites or historic built-environment properties are known within the APE.

Two previously recorded historic-period archaeological sites are within the APE. Site 45KI719 was located within the potential construction limits of the South 344th Street Alternative but was determined not eligible for listing in the NRHP and subsequently removed by WSDOT during construction associated with I-5 improvements. Site 45KI1476 is the historic Midway Landfill, which has been determined not eligible for the NRHP by FTA, with SHPO concurrence (Chidley 2020).

Field Survey and Evaluation Methods

Prior to the commencement of the field surveys for the 2021 SEPA Draft EIS, a Cultural Resources Survey Plan was prepared for review by the Puyallup Tribe of Indians, Muckleshoot Indian Tribe, Nisqually Indian Tribe, the Confederated Tribes and Bands of the Yakama Nation, and SHPO. This plan was distributed to the aforementioned Tribes by Sound Transit under its authority as lead agency for SEPA. No formal comments were received from Tribes or SHPO.

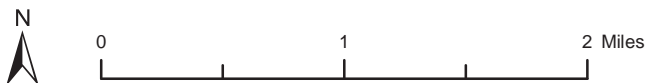
The field survey included a historic-period, built-environment resources survey and inventory for previously undocumented or unevaluated buildings, structures, and objects constructed in 1985 or earlier, as well as an archaeological survey that included pedestrian transects and subsurface archaeological investigations (shovel probes and hand auger cores).



Data Sources: King County; Cities of Des Moines, Federal Way, Kent.

FIGURE 3.16-1
Area of Potential Effects
OMF South Alternatives

OMF South



Historic-Period, Built-Environment Resources

The built-environment survey for the OMF South project inventoried resources built in or before 1985. The only built-environment resources built in 1985 or earlier that were excluded from survey were the BPA transmission system elements and resources with formal NRHP determinations of eligibility dating to within the last 10 years (per DAHP guidance). In 2020, BPA conducted its own Section 106 consultation with SHPO for the relocation of electrical transmission towers that would be impacted by the OMF South Project. These towers included those along the Tacoma-Covington Nos. 2, 3, and 4 and Tacoma-Raver No. 1 transmission lines. BPA determined, and SHPO concurred, that the transmission lines were eligible for listing in the NRHP (correspondence with SHPO is found in Appendix G4, Historic and Archaeological Resources Technical Report).

Built-Environment field survey took place between December 2019 and May 2020. Survey staff, who meet the Secretary of the Interior's qualifications for architectural history, collected photos and field notes sufficient to complete physical descriptions, integrity assessments, and evaluations of individual resources for listing in the NRHP, WHR, or KCRHP, as appropriate. All resources were surveyed from the public right-of-way unless otherwise noted.

Field research results combined with archival research provided the background for recommendations regarding whether or not each resource met criteria necessary for NRHP, WHR, or KCRHP eligibility.

Archaeological Resources

Archaeological survey occurred over several field sessions during 2020 and 2021. For the 2021 SEPA Draft EIS, pedestrian and subsurface investigations conducted in 2020 excluded areas of the Preferred and South 344th Street alternatives where they overlapped with the TDLE APE. Sound Transit, in cooperation with FTA, conducted a concurrent but separate analysis of the potential effects to historic and archaeological resources in the overlap areas as part of the TDLE environmental review process. Pedestrian and subsurface archaeological investigations were conducted for this analysis in 2021, and the results for the OMF South and TDLE overlap area are included in this Final EIS.

For both efforts, systematic surface and subsurface survey (shovel probe and auger cores) was conducted within the APE. Shovel probes were spaced at regular 20-meter intervals in areas of high archaeological probability, whereas 30 meters spacing was used in areas of low probability. All sediments in shovel and auger cores were screened through standard 0.25-inch mesh and pertinent information was collected for each shovel probe or auger core.

3.16.2.1 Survey Results

Historic-Period, Built-Environment Resources

Architectural historians surveyed and inventoried a total of 86 historic-period, built-environment resources in the APE, mapped in Figures 3.16-2 and 3.16-3. A total of 58 historic-period built-environment resources were old enough to meet minimum age criteria for NRHP eligibility consideration. Results for those resources old enough to qualify for the NRHP were documented in historic property inventory forms in DAHP's WISAARD database and can be found in Appendix G4, Historic and Archaeological Resources Technical Report. The remaining 28 surveyed resources were old enough to meet minimum age criteria for KCRHP eligibility consideration and were evaluated under King County criteria but were not recorded in WISAARD due to age restrictions, as per consultation with DAHP. Results of this analysis can

be found in Appendix G4, Historic and Archaeological Resources Technical Report. In October 2023, FTA determined, and SHPO concurred, that none of the historic-period, built-environment resources surveyed for this project meet criteria necessary for NRHP eligibility, with the exception of the Tacoma-Covington Nos. 2, 3, and 4 and Tacoma-Raver No. 1 transmission lines (see Appendix G4, Historic and Archaeological Resources Technical Report, for the correspondence from SHPO).

Archaeological Resources

Table 3.16-1 lists the archaeological resources found within the APE of the OMF South build alternatives. A total of five archaeological resources are within the APE; one of the sites is near multiple alternatives, while others are close to only one alternative (Table 3.16-1).

Table 3.16-1 Summary of Archaeological Resources within the APE

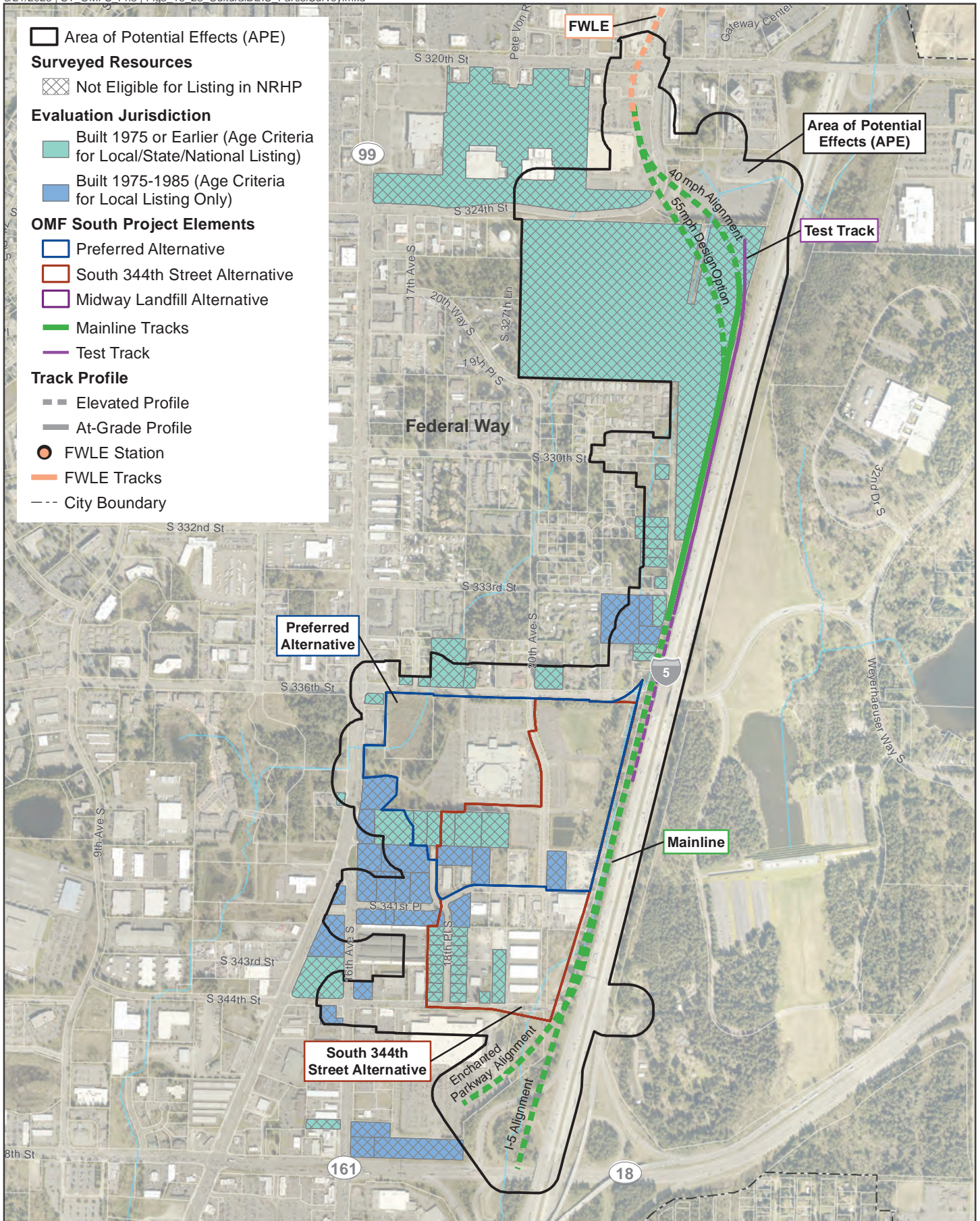
Smithsonian Trinomial	Alternative	Resource Type	Resource Description	Resource Age	NRHP Eligibility and Criteria	Reference
45KI1542	Preferred	Historic period site	Historic period	ca 1930	Not Eligible	Huber 2020a
45KI1543 ¹	Preferred, South 344th Street	Historic period site	Debris scatter	historic-period	Not Eligible	Huber 2020b
45KI1583	Preferred	Historic period isolate	Historic period bottle	1966	Not Eligible	Adams 2021
45KI719	South 344th Street	Historic period site	Historic period site	1936	Not Eligible	Lutrell 2005
45KI1476	Midway Landfill	Historic period site	Midway Landfill	1966–1983	Not Eligible	Chidley et al. 2020

Note:

(1) Site overlaps the Preferred and South 344th Street alternatives.

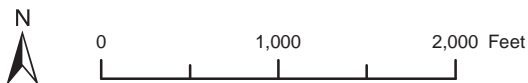
Site 45KI1542 is a concrete slab foundation dated to the 1930s using aerial imagery. The subsurface investigations around the foundation did not identify any additional archaeological deposits. Site 45KI1543 is a historic debris scatter, including brick and glass that appear to be in disturbed context. Isolate 45KI1583 is a historic period glass bottle identified on the surface. Site 45KI719 is a historic period foundation that is no longer present. During development of the 2021 SEPA Draft EIS Sound Transit has recommended, and SHPO has agreed, that none of the archaeological resources identified for this project meet criteria necessary for NRHP, WHR, or KCRHP eligibility (see Appendix G4, Historic and Archaeological Resources Technical Report for the correspondence from SHPO).

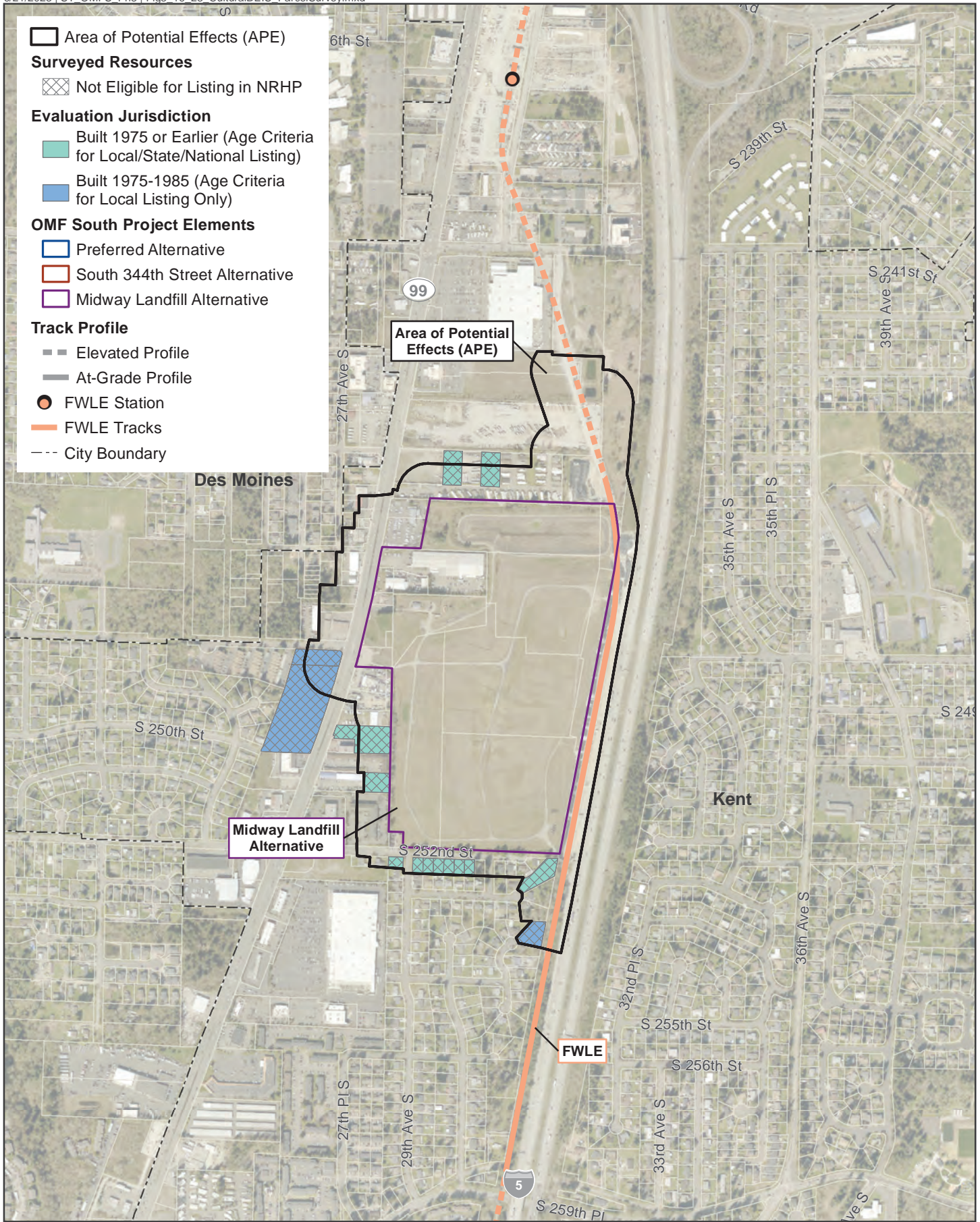
For more details on survey results, see Appendix G4, Historic and Archaeological Resources Technical Report.



Data Sources: King County; Cities of Des Moines, Federal Way, Kent.

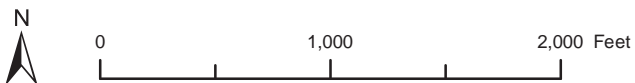
FIGURE 3.16-2
 Built Environment Parcel Survey
 Preferred and South 344th Street Alternatives





Data Sources: King County; Cities of Des Moines, Federal Way, Kent.

FIGURE 3.16-3
 Built Environment Parcel Survey
 Midway Landfill Alternative



3.16.3 Environmental Impacts

This section discusses long-term operational and short-term construction impacts of the alternatives. These impacts are specifically focused on NRHP-eligible resources.

Section 106 regulations allow three findings for effects on cultural resources:

- No Historic Properties Affected
- No Adverse Effect
- Adverse Effect

As the lead agency, FTA makes the final determination of effect for each NRHP-eligible or listed resource in the APE. FTA also makes an overall finding of effect for the undertaking and requests SHPO's concurrence. The Section 106 process is used to determine a historic site's NRHP eligibility and whether it is a Section 4(f) resource. The Section 4(f) Assessment for OMF South is included in Appendix F of this Final EIS, and summarized in Section 3.18, Section 4(f) and 6(f) Resources.

Impacts or Effects

The terms impact and effect are used purposefully in this Environmental Impact Statement Section 3.16 and Appendix G4, Historic and Archaeological Resources Technical Report. The word "effect" is used when referring to the effects (e.g., adverse effect) the project has on historic properties in a Section 106 framework, following implementing regulations 36 CFR 800.

The word "impact" is used when referring to specific long-term or construction impacts, both direct or indirect, pursuant to NEPA implementing regulations 40 CFR 1502.

3.16.3.1 Impacts Evaluation Methods

After a cultural resource is identified and found NRHP-eligible, the next step is assessing whether the undertaking will adversely affect the resource by applying the Criteria for Adverse Effect (36 CFR § 800.5). An adverse effect is found when an undertaking may alter, directly or indirectly, any of the characteristics of a historic property that qualify the property for inclusion in the National Register in a manner that would diminish the integrity of the property's location, design, setting, materials, workmanship, feeling, or association. Adverse effects may include, for instance, the demolition of an NRHP-eligible building or physical encroachment upon an NRHP-eligible archaeological site (36 CFR Part 800).

Of the five archaeological resources within the APE (Table 3.16-1), none were determined eligible for listing in the NRHP. Because these resources have been determined not eligible for listing in the NRHP, the project would result in no adverse effects to archaeological historic properties.

Of the 86 built-environment resources surveyed and inventoried within the APE, none were determined eligible for listing in the NRHP or recommended eligible for the WHR or KCRHP. Therefore, the only NRHP-eligible resources within the APE are the Tacoma-Covington Nos. 2, 3, and 4 and Tacoma-Raver No. 1 transmission lines. In separate consultations, both BPA and FTA determined that proposed tower relocation and reconstruction for the Preferred and South 344th Street alternatives would not constitute an adverse effect under Section 106. In letters dated August 19, 2021, and October 31, 2023, SHPO concurred with this finding (See Appendix G4, Historic and Archaeological Resources, for copies of this correspondence). Therefore, the project would result in no adverse effect to historic built-environmental properties.

3.16.3.2 Long-Term Impacts

Potential impacts to archaeological resources include, but are not limited to:

- Demolition or alteration of the resource
- Physical encroachment upon a site

Direct long-term impacts can happen during operation or as a result of a construction activity that causes a permanent change. For archaeological resources, long-term impacts are generally initiated when ground-disturbing activities occur; they are characterized as long-term impacts because they permanently affect the archaeological record.

Ground-disturbing activities, specifically those involving excavation or ground clearance, could encounter an unanticipated archaeological site. If the site is determined to be eligible for listing in the NRHP, an adverse effect could occur.

Through the NEPA and the Section 106 process, FTA and Sound Transit will continue to consult with Tribes, SHPO, and other interested parties (as appropriate) to avoid, minimize, or mitigate impacts to archaeological sites, if found.

Potential impacts to historic built-environment resources include, but are not limited to:

- Demolition or alteration of the resource or altering major sections of its historically platted and current tax lot
- Physical changes to the character of the resource's setting that contribute to its historic significance
- Introduction of visual or noise impacts that diminish the integrity of the property's significant historic features

The only historic built-environment resources within the APE are BPA's Tacoma-Covington Nos. 2, 3, and 4 and Tacoma-Raver No. 1 transmission lines, which have been determined eligible for listing in the NRHP. In consultation with SHPO, BPA, and FTA determined that OMF South would have no adverse effect on the NRHP-eligible resources.

No-Build Alternative

Under the No Build Alternative, impacts to historic built-environment and archaeological resources from construction or operation of OMF South would not occur. However, other planned projects in the area could have impacts to historic and archaeological resources, depending on their location. This includes TDLE, which overlaps with the OMF South Preferred and South 344th Street alternatives. If TDLE is constructed as proposed, the mainline track associated with these OMF alternatives would be built later in time. Impacts associated with construction of the mainline track are addressed within the build alternatives impacts discussion below. All other TDLE-related impacts are addressed in Chapter 4, Cumulative Effects Analysis.

Preferred Alternative

Construction of the mainline tracks would require the relocation of BPA powerlines at the north end of the APE. BPA's Tacoma-Covington Nos. 2, 3, and 4 and Tacoma-Raver No. 1 transmission lines have been determined eligible for listing in the NRHP. In consultation with SHPO, FTA determined that the Preferred Alternative would have no adverse effects on the NRHP-eligible resources under Section 106. There are no other archaeological sites or historic-

period, built-environment resources that meet criteria for listing in the NRHP, WHR, or KCRHP within the Preferred Alternative portion of the APE. As such, this alternative would have no adverse effects to historic or archaeological resources.

South 344th Street Alternative

Similar to the Preferred Alternative, construction of the mainline tracks would require relocation of BPA powerlines at the north end of the site. In consultation with SHPO, FTA determined that the 344th Street Alternative would have no adverse effects on the NRHP-eligible resources under Section 106. There are no other archaeological sites or historic-period, built-environment resources that meet criteria for listing in the NRHP, WHR, or KCRHP within the South 344th Street Alternative portion of the APE. As such, this alternative would have no adverse effects to historic or archaeological resources.

Midway Landfill Alternative

There are no archaeological sites or historic-period, built-environment resources that meet criteria for listing in the NRHP, WHR, or KCRHP within the Midway Landfill Alternative portion of the APE. As such, this alternative would have no effect to historic or archaeological resources.

3.16.3.3 Construction Impacts

Construction impacts are those that occur only during the construction period and are relatively short in duration. These may include effects such as noise, vibration, ground disturbance, and dust. It is unlikely that these kinds of effects will adversely affect archaeological resources. However, through the NEPA review and the Section 106 process, FTA and Sound Transit will continue to consult with Tribes, SHPO, and other interested parties (as appropriate) to minimize effects to archaeological sites, if found.

Construction-related impacts to built-environment resources can be caused by several factors, including, but not limited to, restricted access, increased truck traffic along haul routes, glare, noise, vibration, and temporary changes to setting. These factors can lead to reduced commercial activity and reduced investment in historic resources. Typically, these impacts would not be considered adverse effects under Section 106 of the National Historic Preservation Act unless they diminish the characteristics that contribute to a historic property's National Register eligibility.

The only historic built-environment resources within the APE are BPA's Tacoma-Covington Nos. 2, 3, and 4 and Tacoma-Raver No. 1 transmission lines, which have been determined eligible for listing in the NRHP. In consultation with SHPO, FTA determined that OMF South would have no adverse effect on the eligible resources.

Preferred Alternative

Because no previously documented or newly discovered eligible archaeological sites have been identified within the APE and because it is within an area of low probability for precontact archaeological sites, the project is not likely to impact archaeological resources.

The only historic built-environment resources within the APE are BPA's Tacoma-Covington Nos. 2, 3, and 4 and Tacoma-Raver No. 1 transmission lines, which have been determined eligible for listing in the NRHP. In consultation with SHPO, FTA determined that the Preferred Alternative would have no adverse effects on the eligible resources.

South 344th Street Alternative

Because no previously documented or newly discovered eligible archaeological sites have been identified within the APE and because it is within an area of low probability for precontact archaeological sites, the project is not likely to impact archaeological resources.

The only historic built-environment resources within the APE are BPA's Tacoma-Covington Nos. 2, 3, and 4 and Tacoma-Raver No. 1 transmission lines, which have been determined eligible for listing in the NRHP. In consultation with SHPO, FTA determined the South 344th Street Alternative would have no adverse effects on the eligible resources.

Midway Landfill Alternative

Because no previously documented or newly discovered eligible archaeological sites have been identified within the APE and because it is within an area of low probability for precontact archaeological sites, the project is not likely to impact archaeological resources. No historic built-environment resources are within the Midway Landfill Alternative portion of the APE.

3.16.3.4 Avoidance and Minimization of Impacts

An Inadvertent Discovery Plan has been developed for the project and would be implemented during construction. The purpose of the Inadvertent Discovery Plan is to minimize the risk of damage to currently unknown archaeological resources by providing appropriate procedures for addressing any inadvertent discoveries of human remains or archaeological resources during ground-disturbing work. Sound Transit would coordinate with SHPO and Tribes to review the plan prior to implementation. A contractor orientation would also be prepared to familiarize construction crews with Inadvertent Discovery Plan procedures and the kinds of resources that may be encountered during construction.

3.16.3.5 Indirect Impacts

No indirect impacts related to historic and archaeological resources would result from construction and operation of the proposed project.

3.16.4 Mitigation Measures

As the project would not result in adverse effects to historic built-environment properties, no mitigation is anticipated. No eligible archaeological sites have been identified. No mitigation measures are anticipated beyond the Inadvertent Discovery Plan to address potential discoveries during construction.

3.17 Parks and Recreational Resources

This section evaluates impacts to parks and recreational resources associated with the OMF South build alternatives, including impacts to the use or enjoyment of existing and planned recreational resources, including potential impacts to resource access, facilities, functions, or character. Parks and recreational resources include the following facilities and land uses:

- Federal, state, and local parks, playgrounds, recreation centers, and other public recreation facilities, such as golf courses and pools
- Designated public open spaces, greenbelts, and open space corridors
- Recreational trails
- Potential recreational properties funded by state and/or federal grants with special provisions

The study area for parks and recreational resources includes facilities and land within 0.25 mile of the potential construction limits for each of the OMF sites. The study areas for the Preferred and South 344th Street alternatives include the mainline tracks and are combined for the purposes of this analysis because of their geographic overlap.

3.17.1 Affected Environment

3.17.1.1 Preferred and South 344th Street Alternatives

Table 3.17-1 describes parks in the combined study area for the Preferred and South 344th Street alternatives, which are shown in Figure 3.17-1.

Table 3.17-1 Parks and Recreational Resources: Preferred and South 344th Street Alternatives

Park Name	Jurisdiction	Description
Cedar Grove Park	Federal Way	Park (2.6 acres) with open lawn picnic areas, a play area, and walking trails bordered by natural areas. Also known on King County maps as Thompson Park.
Town Square Park	Federal Way	Urban community park (3.9 acres) with amenities, including zip lines, a children’s play area, a basketball court, parking, a picnic area, restrooms, and a seasonal splash park.
Pacific Rim Bonsai Museum and Rhododendron Botanical Gardens	Federal Way	Both of these visitor attractions are nonprofit membership organizations on the grounds of the Woodbridge Corporate Park (former Weyerhaeuser corporate headquarters site). Both facilities feature public plant collection garden displays with walking tours and events. The Bonsai garden offers free admission, and the Rhododendron Garden charges entry fees or is free with membership.

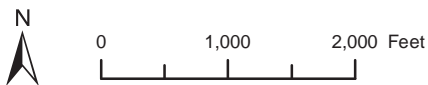
Sources: King County; City of Federal Way.

Although outside the study area, the 3.8-mile BPA Trail connects many key parts of Federal Way. There is potential for future expansion of the trail into the combined study area of these alternatives.

Belmor includes a private, par-3, nine-hole golf course for residents only.



FIGURE 3.17-1
Parks and Recreational Resources
Preferred and South 344th Street Alternatives



3.17.1.2 Midway Landfill Alternative

Table 3.17-2 describes parks within the Midway Landfill Alternative study area, which are shown in Figure 3.17-2.

Table 3.17-2 Parks and Recreational Resources: Midway Landfill Alternative

Park Name	Jurisdiction	Description
Parkside Park	Des Moines	Neighborhood park (4.4 acres) with an ADA-accessible paved trail system to all portions of the park, a multiuse paved sport court, fitness equipment, picnic tables, and benches. Mature trees frame the central open lawn and active recreation areas.
Parkside Wetlands	Des Moines	Park (14 acres) with natural areas and trails that are covered with a dense mix of deciduous and coniferous forest and wetlands.
Salt Air Vista Park	Kent	Neighborhood park (2 acres) bordered by the Parkside wetlands on the west. It features play equipment, picnic area, open space, and trails.
Linda Heights Park	Kent	Park (4.2 acres) with half-court basketball, picnic table, play equipment, and public art. The park is adjacent and east of I-5 and is buffered from the freeway by a wide stand of mature mixed forest.
West Hills Park	Kent	Undeveloped park (13 acres) with no facilities. It is adjacent to the Kent Armory and is composed of a grassy field and dense vegetation near the headwaters of Midway Creek.

Sources: King County; Cities of Des Moines and Kent.

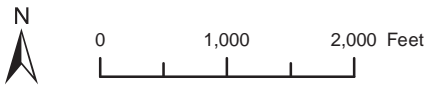
3.17.2 Environmental Impacts

3.17.2.1 No-Build Alternative

Under the No-Build Alternative, impacts to parks and recreational resources from construction or operation of OMF South would not occur. However, other planned projects could have impacts in the OMF South study areas, depending on their location. This includes TDLE, which overlaps with the OMF South Preferred and South 344th Street alternatives. If TDLE is constructed as proposed, the mainline track associated with these OMF alternatives would be built later in time. Impacts associated with construction of the mainline track are addressed within the build alternatives impacts discussion below. All other TDLE-related impacts are addressed in Chapter 4, Cumulative Effects Analysis.



FIGURE 3.17-2
Parks and Recreational Resources
Midway Landfill Alternative



3.17.2.2 Long-Term Impacts

Impacts Common to All Build Alternatives

Long-term impacts include permanent changes to a resource, such as when a project converts land from a park or recreational resource to another use. While long-term impacts generally refer to permanent changes, some construction impacts can be considered long term if they would have a major effect on the resource and extend for many years. Long-term impacts also potentially include noise, visual, or other impacts from project operations.

None of the build alternatives would cause long-term impacts to parks or recreation facilities within the study area, either by altering those properties or through noise or visual impacts to those facilities.

3.17.2.3 Construction Impacts

Impacts Common to All Build Alternatives

The project alternatives are not expected to have direct construction impacts on any park or other recreational resources. For parks and trails near construction activities, access could be affected by detours and street or lane closures and by increased congestion caused by construction traffic. Visual impacts, light, glare, dust, and noise could also affect users in some of the parks and trails, although most of these impacts would affect only small portions of the parks closest to the OMF site or mainline tracks being constructed. Visual and noise impacts during construction from on-site construction or from construction traffic along haul routes would be temporary and would not inhibit park use. It is possible some parks in the study area would experience emissions and airborne dust during construction; however, with implementation of controls required for construction activities and consistent use of BMPs to minimize on-site emissions, construction activities would not be expected to substantially affect air quality.

Preferred Alternative

Construction of the mainline tracks would require some utility relocations on S 333rd Street in Federal Way, which is the street used to access Cedar Grove Park. During that work, access to Cedar Grove Park from the east may be affected by a detour or lane closure, but access from the west on S 333rd Street and north from 22nd Place S would be maintained.

South 344th Street Alternative

Impacts for the South 344th Street Alternative would be the same as those described above for the Preferred Alternative.

Midway Landfill Alternative

Parks near the Midway Landfill Alternative are separated from the site either by SR 99 on the west or I-5 on the east. Park users are accustomed to noise, vibration, and visual effects from normal operation of these major roadways, which would likely lead to a reduced level of awareness of potential construction impacts at the parks.

3.17.2.4 Avoidance and Minimization of Impacts

Measures to minimize construction impacts would include public outreach to provide information on temporary closures or detours, on-site signage describing the duration and type of temporary impacts, detour signage, temporary ADA improvements (for example, temporary curb ramps for detour routes that do not currently include curb ramps for existing sidewalks), and similar strategies to ensure the continued use and enjoyment of affected park facilities.

BMPs, avoidance and minimization of impacts measures, or mitigation measures identified in this Final EIS for other resources (visual and aesthetics, air quality, water quality, neighborhoods, noise and vibration, and transportation) would also reduce the potential effects on affected parks and recreational resources and their users.

3.17.2.5 Indirect Impacts

No indirect impacts related to parks and recreational resources would result from construction and operation of the proposed project.

3.17.3 Mitigation Measures

No adverse impacts to parks or recreation facilities would occur; therefore, no mitigation is anticipated.

3.18 Section 4(f) and 6(f) Resources

This section summarizes the Section 4(f) analysis completed in compliance with Section 4(f) of the United States Department of Transportation Act of 1966 (49 U.S.C. § 303(c)). The full Section 4(f) analysis can be found in Appendix F, Section 4(f) and Section 6(f) Assessment.

The regulations at 23 CFR § 774 implement 23 U.S.C. § 138 and 49 U.S.C. § 303, which were originally enacted as Section 4(f) of the Department of Transportation Act of 1966 and are still commonly referred to as Section 4(f). Under these laws, FTA and FHWA are generally prohibited from approving projects that would result in a *use* of publicly-owned parks and recreation areas that are open to the public; publicly-owned wildlife and waterfowl refuges; and historic sites of national, state, or local significance.

In addition, Section 6(f) of the 1965 Land and Water Conservation Fund Act of 1965 (54 U.S.C. § 2003), prohibits the conversion of properties developed with funding from the Land and Water Conservation Fund to a nonrecreational purpose without approval of the U.S. Department of the Interior's National Park Service. Washington State law similarly requires documentation and consultation to approve any changes to or conversion of properties directly funded by the Washington State Recreation and Conservation Office (RCO; Title 79A RCW).

The study area for this analysis is the same used for Section 3.17, Parks and Recreational Resources, and includes the APE used in Section 3.16, Historic and Archaeological Resources. The Parks and Recreational Resources study area includes existing parks, trails, recreation sites, dedicated open space areas, and adjacent public rights-of-way used for access to these facilities within 0.25 mile of each OMF South site. The APE extends from the project elements to the nearest tax parcel, or a maximum of 200 feet where large tax parcels are adjacent to project elements.

Under Section 4(f), a use can be permanent, temporary, or constructive. **Permanent use** would acquire or incorporate all or part of a Section 4(f) property as part of the transportation facility. **Temporary use** occurs when the project temporarily occupies and substantially impairs the resource (typically during construction). **Constructive use** can occur when the project is near a Section 4(f) resource and has effects that substantially impair the protected activities, features, or attributes of the property.

Although the use of Section 4(f) property is generally prohibited, a transportation use of a Section 4(f) property can be approved if the use of the property meets the requirements for a regulatory exemption, the use will have a *de minimis* impact on the property (meaning that it does not adversely affect the activities, features, and attributes of a resource), or there is no feasible and prudent avoidance alternative to using the property.

3.18.1 Affected Environment

3.18.1.1 Public Parks and Recreation Areas

Sound Transit identified two parks within the study area for the Preferred and the South 344th Street alternatives that qualify as Section 4(f) properties: Cedar Grove Park and Town Square Park. Sound Transit identified four developed parks and one open space that qualify as Section 4(f) properties in the study area for the Midway Landfill Alternative: Parkside Park and Parkside Wetlands in Des Moines and Salt Air Vista Park, Linda Heights Park, and West Hill Park in Kent. These resources are described in detail in both Section 3.17, Parks and Recreational Resources and Appendix F, Section 4(f) and Section 6(f) Evaluation.

There are no designated 6(f) resources within the study area for any of the alternatives. However, Linda Heights Park in Kent is an RCO-funded park.

3.18.1.2 Wildlife and Waterfowl Refuges

No designated wildlife and waterfowl refuges of national, state, or local significance exist in the Parks and Recreation study areas for any of the alternatives.

3.18.1.3 Historic Sites

Section 3.16, Historic and Archaeological Resources and Appendix G4, Historic and Archaeological Resources Report provide information on historic properties in the OMF South build alternatives APE. The Tacoma-Covington Nos. 2,3,4 and Tacoma-Raver No. 1 electrical transmission lines were determined eligible for listing in the NRHP by both FTA and BPA, a finding with which SHPO has concurred. No other historic-period, built-environment resources were determined to be present within the APE.

3.18.2 Environmental Impacts

The Transportation; Acquisitions, Displacements and Relocations; Visual and Aesthetic Resources; Noise and Vibration; Historic and Archaeological Resources; and Parks and Recreational Resources sections of the Final EIS were considered to determine whether project alternatives would result in a Section 4(f) use. None of the alternatives would require any land from any of the park properties for either construction or operation of OMF South, and no construction activities or operational activities of the project would rise to the level of a permanent, temporary, or constructive use under Section 4(f).

Cedar Grove Park within the Preferred and South 344th Street alternative study area would be within the closest proximity to construction activities, at approximately 300 feet from mainline construction, just beyond the range of noise impacts from pile driving activities, which may be necessary for construction of the elevated mainline. While construction noise and activities would be perceptible from the park, the impacts would be temporary and transitory in nature, and would not prevent use of the amenities that make the park an eligible 4(f) resource. The other parks listed above would be outside the range of impacts or separated from the OMF sites by SR-99 and I-5, which would provide effective buffers from construction activities.

Construction of the mainline for the Preferred and South 344th Street alternatives would require the relocation of BPA powerlines. In separate consultations, BPA and FTA determined, and SHPO concurred, that raising the transmission lines to accommodate the OMF South project would have no adverse effect on historic properties under Section 106. Due to this, FTA has determined that the project would have a *de minimis* impact under Section 4(f).

Please see Appendix F, Section 4(f) and Section 6(f) Evaluation for more detail.

3.18.3 Mitigation Measures

As the Preferred and South 344th Street alternatives would have *de minimis* impacts to Section 4(f) properties and the Midway Landfill Alternative would have no impacts, no mitigation measures are anticipated.